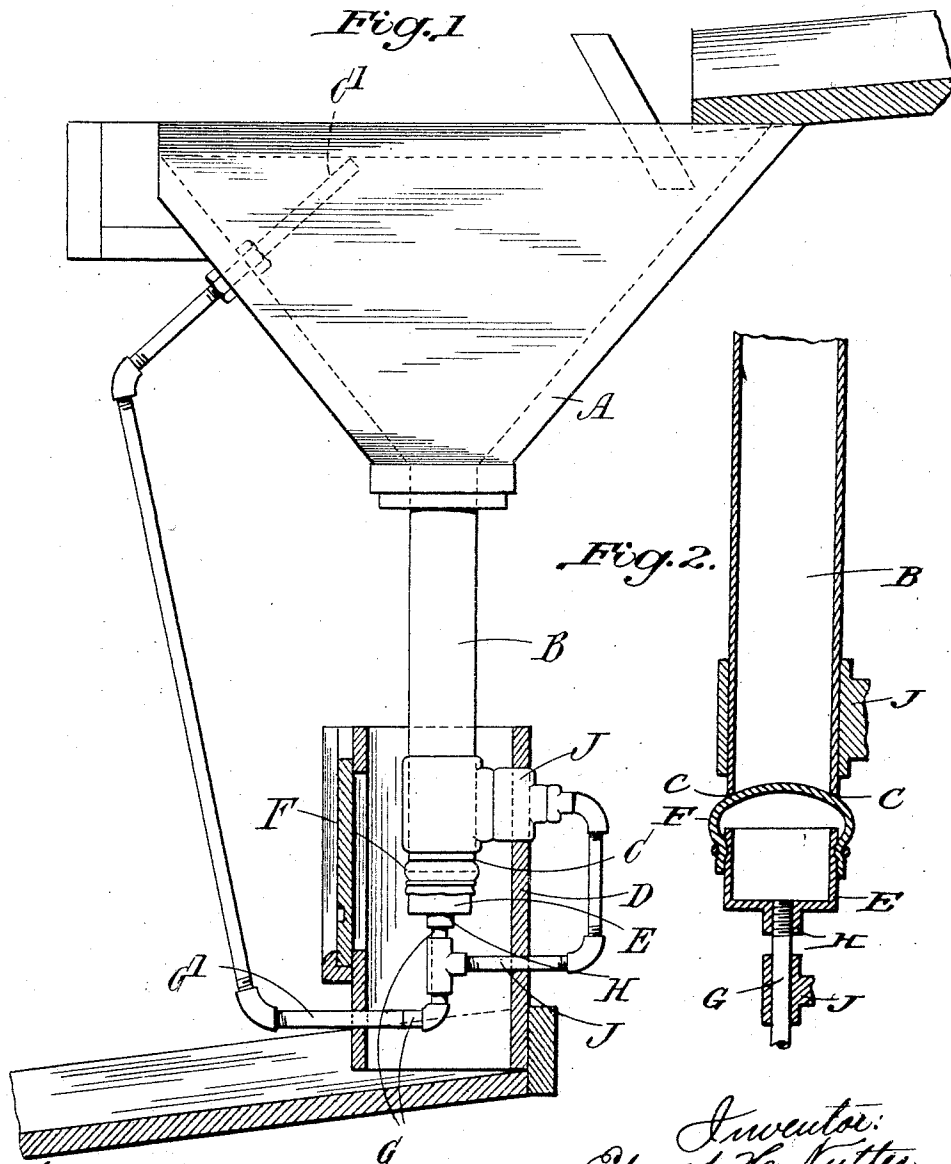


E. H. NUTTER.
 VALVE FOR CONTROLLING THE FLOW OF THICK PULPY MATERIAL AND THE LIKE.
 APPLICATION FILED DEC. 4, 1911.

1,071,784.

Patented Sept. 2, 1913.



Witnesses:
W. J. Harrison
W. J. Harrison

Inventor:
 Edward H. Nutter,
 by *W. J. Harrison*
 his attorney.

UNITED STATES PATENT OFFICE.

EDWARD HOIT NUTTER, OF NEW YORK, N. Y., ASSIGNOR TO MINERALS SEPARATION LIMITED, OF LONDON, ENGLAND.

VALVE FOR CONTROLLING THE FLOW OF THICK PULPY MATERIAL AND THE LIKE.

1,071,784.

Specification of Letters Patent.

Patented Sept. 2, 1913.

Application filed December 4, 1911. Serial No. 663,900.

To all whom it may concern:

Be it known that I, EDWARD HOIT NUTTER, a citizen of the United States of America, and residing in New York, United States of America, have invented certain new and useful Improvements in Valves for Controlling the Flow of Thick Pulpy Material and the Like, of which the following is a specification.

10 This invention is for improvements in or relating to valves for controlling the flow of thick pulpy material or the like.

It is often necessary in dealing with a liquid which has solid matter suspended in it, to allow the solid matter to settle more or less and thereafter to draw off the thick pulpy material thereby separating it from the bulk of liquid.

20 This invention relates to a valve for controlling the flow of such thick pulpy material, particularly thickened mineral pulps, thickened slimes and the like and is specially applicable for the removal or discharge of thickened mineral pulp or thickened slime pulp from receptacles in which the thicker portions or the solid portions settle to the bottom.

30 According to this invention a valve for controlling the flow of the thick pulpy portion of the liquid is arranged in such a way that the pressure of a head of liquid is applied to both sides of the valve, normally to hold it closed, and so that a predetermined increase of pressure on one side due to the collection of heavy or thick pulpy material carried in the liquid will open the valve and allow such material to pass. Thus a valve for controlling the flow of thick pulpy material may consist in a hollow chamber covered with an elastic diaphragm which on one side presses against the orifice through which the flow is to be controlled and on the other is so connected by a conduit to the liquid from which the pulpy material is being separated that the liquid head is the same on both sides of the diaphragm.

40 In one form of this invention the area of the orifice through which the flow is to be controlled is less than the effective area of pressure on the other side of the elastic diaphragm, whereby when both sides of the diaphragm are under the same liquid head the valve will be normally closed by the pressure of the liquid.

The diaphragm or valve is preferably of india-rubber or the like which readily yields to the varying pressures and means may be provided for altering the position of the valve in relation to the valve seat for example by adjusting the hollow chamber.

I shall now describe one form of apparatus embodying my invention illustrated in the accompanying drawings and shall thereafter point out my invention in claims.

60 Figure 1 is an elevation, partly in vertical section, of the apparatus. Fig. 2 is an enlarged central vertical section of the valve member and its adjuncts.

At the bottom of the vessel A into which passes the liquid containing solid or heavy matter in suspension is an extension B at the end of which is formed a valve seat C which may simply be the bottom of the open pipe B and this thick pulp outlet is arranged to discharge the thick pulp into a chamber, launder or the like, D.

80 Immediately below the valve seat C is a hollow open-ended box or chamber E. The valve consists of a piece of rubber or like elastic material F stretched over the open end of the box in close proximity to the valve seat. From the other side of the box a pipe G passes through suitable guides and is connected by a hose or other conduit G¹ to a pipe C¹ entering the vessel A containing the liquid from which the pulp is to be separated. This conduit may have its upper opening near the surface of the liquid to prevent the admission of solid matter thereto. The arrangement is such that the liquid head on the under side of the diaphragm is practically the same as the liquid head at the orifice or valve seat.

95 The area of pressure on the top of the valve is the area of the orifice and the effective area of pressure on the underside of the diaphragm is arranged to be slightly greater so that if the apparatus contains liquid only the valve will be normally closed.

100 The under side of the box is provided with a telescope joint H or a screw so that the box can be raised or lowered, thus adjusting its position in relation to the valve seat.

Suitable brackets J are provided for holding the various portions of the device in the proper relative positions.

The operation of the valve is as follows:— The conduit, composed of the pipes C¹, G¹ and G, leading to the under side of the dia- 110

phragm is first filled with water so that the valve will be closed then the liquid containing solid matter in suspension is run into the vessel A and the solid matter or thick pulp settles in the bottom or into the extension thereof B. The position of the valve is adjusted so that with equal pressure on both sides of the valve F it is closed by the rubber F bulging out until it comes into close contact with the valve-seat. As the solid or thick pulpy material settles out from the liquid on the top of the valve, there will be an increase of pressure on top of the valve and when this pressure reaches a predetermined amount, the valve F will be pushed down from its seat and the thick pulpy material will be allowed to escape into the receptacle D placed to catch it. If a sufficient quantity of the thick pulpy material should escape to remove the excess pressure from the top of the valve, the valve will regain its position on the valve seat. Thus even if the proportion of solid matter entering with the liquid should fluctuate, the valve will automatically accommodate itself to the supply so that the thick pulp will only be discharged when it accumulates to the desired extent.

In operation the material will be allowed to accumulate to the desired depth above the diaphragm, when the valve will be adjusted to discharge with the material at that depth.

It is obvious that various modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a pulp receptacle having a pulp discharge orifice, a chamber, an elastic diaphragm forming at one side a permanent closure for the chamber and adapted at its other side to close the pulp orifice at the outside thereof under the pressure of the chamber in opposition to that from the pulp orifice in the direction of the flow of pulp from the receptacle, and a conduit connecting the chamber to a head of liquid for pressing the diaphragm against the outside of the pulp orifice.

2. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a pulp receptacle having a pulp discharge orifice, a chamber, an elastic diaphragm forming at one side a permanent closure for the chamber and adapted at its other side to close the pulp orifice at the outside thereof under the pressure of the chamber in opposition to that from the pulp orifice in the direction of the flow of pulp from the receptacle, the effective area of the diaphragm being greater on the side toward

the chamber than on the side adjacent to the pulp orifice so that with both sides of the diaphragm under the same liquid head the diaphragm will be normally pressed against the outside of the pulp orifice to close it, and a conduit connecting the chamber to a head of liquid for pressing the diaphragm against the outside of the pulp orifice.

3. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising an elastic diaphragm arranged to press exteriorly against and to close the pulp orifice, a chamber for which the diaphragm at its other side forms a permanent closure, whereby the diaphragm is subjected on the side toward the chamber to the pressure of the chamber opposed to that from the pulp orifice, the chamber being arranged for adjustment to and from the pulp orifice to alter the relation of the diaphragm to the pulp orifice, the effective area of the diaphragm being greater on the side toward the chamber than on the side adjacent to the pulp orifice so that with both sides of the diaphragm under the same liquid head the diaphragm will be normally pressed against the pulp orifice to close it, and a conduit connecting the chamber to a head of liquid.

4. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a chamber, an elastic diaphragm forming at one side a closure for the chamber and adapted at its other side to close the pulp orifice under the pressure of the chamber in opposition to that from the pulp orifice, and a conduit connecting the chamber to the head of liquid from which the pulpy portion is supplied to the pulp orifice.

5. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a chamber, a rubber diaphragm forming at one side a closure for the chamber and adapted at its other side to close the pulp orifice under the pressure of the chamber in opposition to that from the pulp orifice, and a conduit connecting the chamber to the head of liquid from which the pulpy portion is supplied to the pulp orifice.

6. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a chamber, a rubber diaphragm forming at one side a closure for the chamber and adapted at its other side to close the pulp orifice under the pressure of the chamber in opposition to that from the pulp orifice, the effective area of the diaphragm being greater on the side toward the chamber than on the side adjacent to the pulp orifice so that with both sides of the diaphragm under the same liquid head the diaphragm will be normally pressed against the orifice to close it, and a

conduit connecting the chamber to the head of liquid from which the pulpy portion is supplied to the pulp orifice.

7. A valve for controlling the flow of the thick pulpy portion of a liquid through an orifice, comprising a chamber, a rubber diaphragm forming at one side a closure for the chamber and adapted at its other side to close the pulp orifice under the pressure of the chamber in opposition to that from the pulp orifice, the effective area of the diaphragm being greater on the side toward the chamber than on the side adjacent to the pulp orifice so that with both sides of the diaphragm under the same liquid

head the diaphragm will be normally pressed against the pulp orifice to close it, and a conduit connecting the chamber to the head of liquid from which the pulpy portion is supplied to the pulp orifice, the chamber being adjustably connected with the conduit so as to permit adjustment of the diaphragm relatively to the orifice.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD HOIT NUTTER.

Witnesses:

C. W. MELADY,
MARGARET V. PITTS