

March 24, 1925.

W. A. BRADLEY

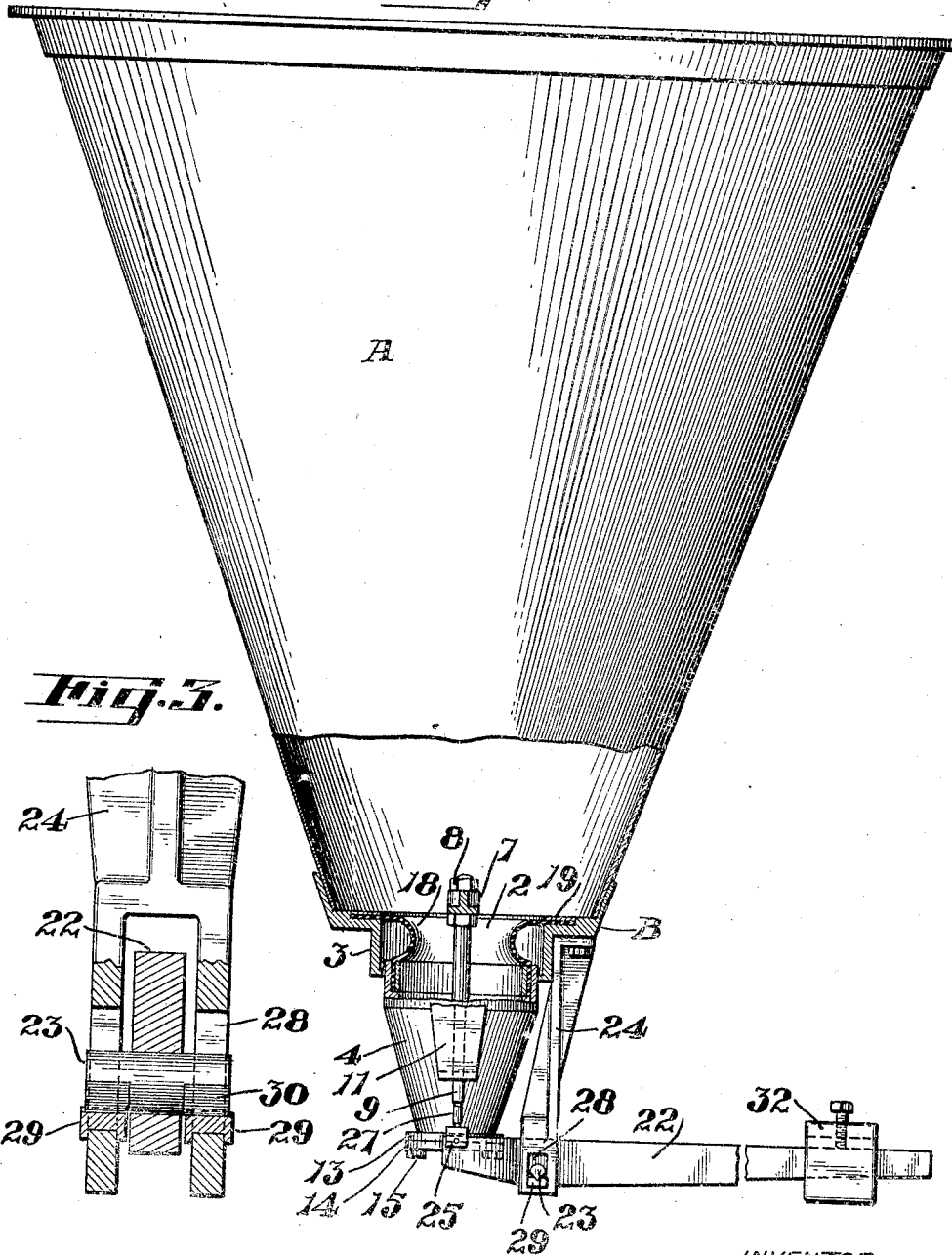
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AUTOMATIC DISCHARGE VALVE

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2 Sheets-Sheet 1

Fig. 1.



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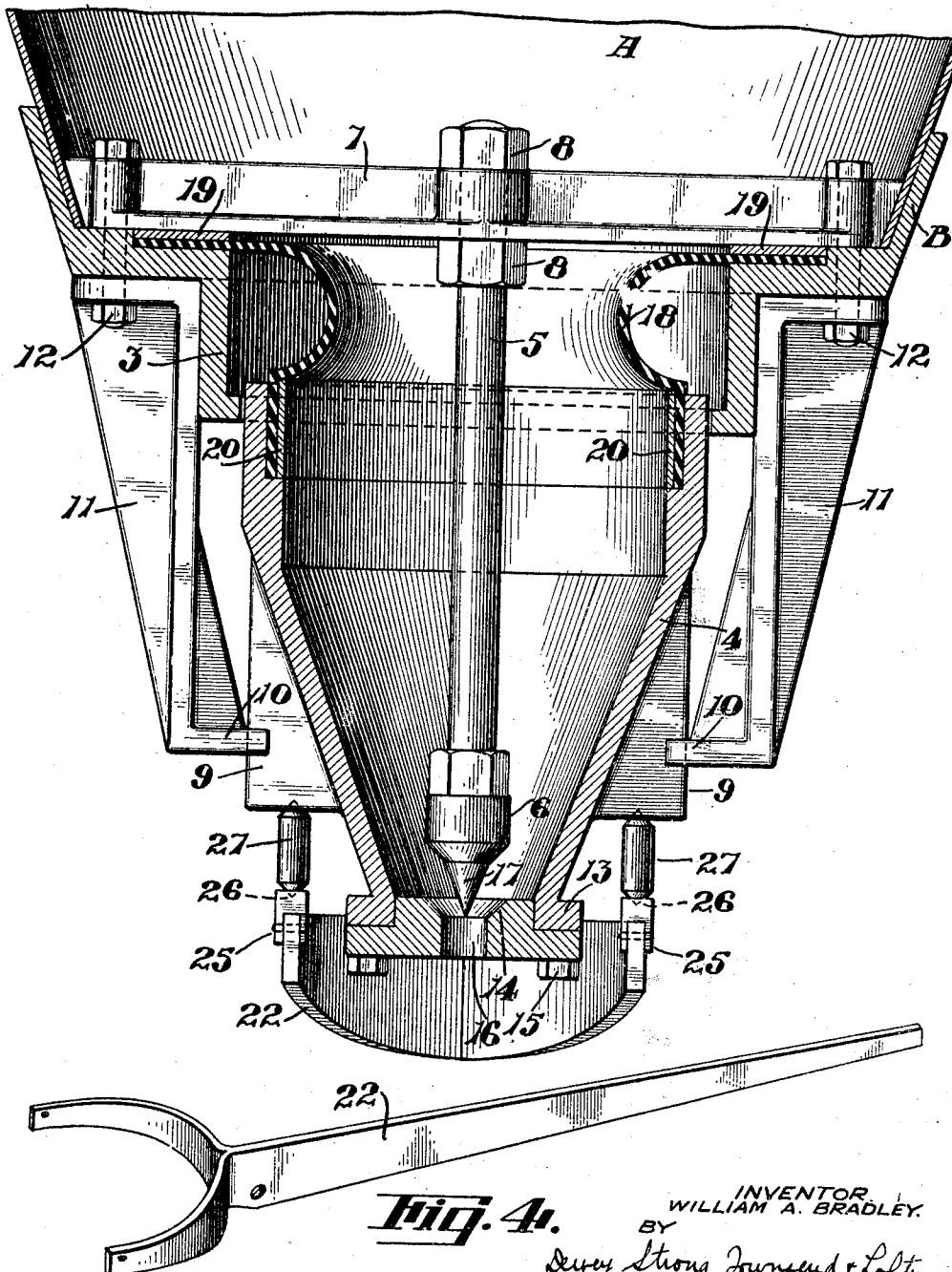
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Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM A. BRADLEY, OF SAN FRANCISCO, CALIFORNIA.

AUTOMATIC DISCHARGE VALVE.

Application filed March 20, 1924. Serial No. 700,578.

To all whom it may concern:

Be it known that I, WILLIAM A. BRADLEY, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Discharge Valves, of which the following is a specification.

This invention relates to valves, and particularly to an automatic discharge valve, to be used on dewatering and decanting machines, thickeners or any similar machine in which particles in suspension are to be settled and removed.

The object of the present invention is to generally improve and simplify the construction and operation of valves of the character described; to provide a valve which is automatic and sensitive in operation; a valve which is adapted to be attached to the bottom of a tank used in conjunction with a dewatering or like machine, and which will be operable independent of the tank or the contents thereof, a valve which consists of a stationary member and a movable bowl, and which depends upon the weight of the contents of the bowl for movement and operation and further, a valve which is adjustable so that the density of the discharge may be varied.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Fig. 1 is a side elevation of the settling tank of a dewatering machine or the like showing the application of the invention, said side elevation being partially in section.

Fig. 2 is an enlarged central vertical section of the valve taken at right angles to Fig. 1.

Fig. 3 is an enlarged detail sectional view showing the bearing in which the weighted lever is journaled.

Fig. 4 is a perspective view of the lever. Referring to the drawings in detail, and particularly to Figs. 1 and 2, A indicates a cone shaped tank which may be used in connection with thickeners, dewatering machines, and the like, or, in fact, with any similar apparatus in which particles in suspension are to be settled and discharged.

Forming a bottom for the tank A is a ring shaped member B which is provided with a central opening 2, and forming an extension of the bottom member B is an

annular sleeve or guide member 3. Disposed below the sleeve 3 is a cone shaped cup or bowl 4, and extending downwardly from the bottom member B is a stationary rod 5, on the lower end of which is secured a valve member 6.

The rod 5 is secured to a cross arm 7 and the upper end of the rod is threaded so that it may be vertically adjusted with relation to the cross-arm 7 by means of nuts 8.

The upper end of the cup or bowl 4 extends into the sleeve 3, as shown in Fig. 2, and as such is guided thereby. Two flanges or ribs 9—9 are formed on the sides of the bowl and these extend between slotted guide members 10—10 which are formed on the lower ends of brackets 11; these brackets being suitably secured to the bottom member B by bolts or other means as indicated at 12. The cup or bowl is thus guided at its upper and lower ends and a free vertical movement is insured.

The cup is preferably cone shape, as shown in Figs. 1 and 2, and its lower end is flanged, as indicated at 13, to receive a valve seat member 14 which is secured thereto by means of bolts 15. The valve seat member is provided with a central discharge opening 16 and a valve 17, which is adapted to be engaged by the valve member 6, as will hereinafter be described.

The flow or discharge of solids or settled suspended matter from the tank A takes place between the valve 6 and the seat 17 and the material discharged through the central opening 16; the amount of material discharging depending upon the position of the cup 4 with relation to the stationary valve member 6. The cup forms a portion of the valve inasmuch as it raises and lowers the seat 17 with relation to the stationary member 6 and free movement of the cup in a vertical direction is therefore necessary. Such free movement is permitted by providing the guides previously referred to, and furthermore, by providing a flexible annular diaphragm such as indicated at 18. The diaphragm is rounded as shown in Fig. 2; its upper edge being secured to the bottom section B by a clamping plate 19, and its lower edge being secured to the cup by means of an interior clamping ring 20. A water-tight joint is thus formed between the cup and the bottom section and a free vertical movement is at the same time permitted; no snug fit being necessary at any

point as leakage is prevented by the use of the diaphragm. The diaphragm is furthermore of such construction that a fairly large movement may take place without interfering with the free vertical movement of the cup.

In actual operation it will be understood that the tank A is filled with a solution which carries solids in suspension; for instance, the slime or fine ground material of a pebble mill or the like such as used in mining operations. This material is continuously delivered to the tank A. The solids gradually settle, while the more or less clear solution is permitted to overflow. The continuous settling of the solids would, in time, completely fill the tank and it is therefore necessary to discharge the solids as rapidly as they accumulate. This is automatically taken care of in the present instance by providing the valve here illustrated. The solids enter the cup 4 through the central opening 2 and as they accumulate in the cup the weight gradually increases to such an extent that the cup has a tendency to settle in a downward direction. Downward movement of the cup moves the valve seat 17 away from the stationary valve 6 and the solids, together with a portion of the solution, are thereby permitted to continuously or intermittently discharge.

For the purpose of regulating the opening of the valve or, in other words, the downward movement of the cup, a counterbalanced lever 22 is employed. This lever is pivotally mounted at the point indicated at 23 in a stationary bracket 24. The forward end of the lever is fork-shaped, as shown in Fig. 4, and each prong of the fork is provided with a bearing block 25 which is suitably secured thereto. The upper faces of the bearing blocks are countersunk with a drill or the like, as indicated at 26 in Fig. 2, and the countersunk depressions thus provided form seats for vertically disposed pins such as shown at 27. The lower faces of the guide ribs 9 are similarly countersunk and thereby form seats for the upper ends of the pins 27; the pins 27 being pointed at their opposite ends to present the smallest bearing surface possible and to reduce friction to a minimum.

The bracket 24 is slotted, as indicated at 28, (see Figs. 1 and 3) and bearing blocks 29 are also here inserted. V-shaped grooves are formed crosswise of the bearing blocks and the bearing pin extending through the lever 22 and the slotted portions 28 is also V-shaped on the ends as shown at 30, thus forming a knife-edged bearing which reduces friction and permits exceedingly sensitive action. The lever, as previously stated, is counterweighed by a weight such as indicated at 32. This weight is adjustable along the lever and may be secured whenever

desired. The position of the weight is normally such that the cup will remain in a raised position and in engagement with the valve 6 when no solids are entering the cup, but the moment the solids begin to enter and accumulate a slight additional weight will be obtained just sufficient to permit lowering of the cup. The solids collecting will thus continuously or intermittently discharge and the density of the discharge may be regulated by merely adjusting the position of the counterweight; actual experience having determined that it is possible to obtain a discharge containing seventy per cent or more of solids.

While certain features of the present invention are more or less specifically illustrated, I wish it understood that various changes in form and proportion may be resorted to within the scope of the appended claims. I similarly wish it understood that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate or various uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. The combination with a settling tank having a centrally disposed discharge opening formed in its lower end, of a cup shaped container disposed below the opening and in vertical alignment therewith, a flexible diaphragm forming a water-tight connection between the cup and the tank, said cup having a discharge opening formed in its lower end, and a stationary valve within the cup with relation to which the cup is vertically movable, said valve normally forming a closure for the discharge opening in the cup.

2. The combination with a settling tank having a centrally disposed discharge opening formed in its lower end, of a cup shaped container disposed below the opening and in vertical alignment therewith, a flexible diaphragm forming a water-tight connection between the cup and the tank, said cup having a discharge opening formed in its lower end, a stationary valve within the cup with relation to which the cup is vertically movable, and means for normally holding the cup in a raised position and in engagement with the valve so that the valve will normally form a closure for the discharge opening in the cup.

3. A device of the character described, comprising a settling tank having a discharge opening formed in its lower end, a cup shaped container disposed below the opening and in vertical alignment therewith, an annular flexible diaphragm forming a water-tight connection between the bottom of the tank and the cup, said cup having a discharge opening formed in its lower

end, a stationary valve within the cup, said cup being vertically movable with relation to the valve, and a pivotally mounted lever engageable with the cup and normally maintaining it in a raised position and in engagement with the valve.

4. A device of the character described, comprising a settling tank having a discharge opening formed in its lower end, a cup shaped container disposed below the opening and in vertical alignment therewith, an annular flexible diaphragm forming a water-tight connection between the bottom of the tank and the cup, said cup having a discharge opening formed in its lower end, a stationary valve within the cup, said cup being vertically movable with relation to the valve, a pivotally mounted lever engageable with the cup and normally maintaining it in a raised position and in engagement with the valve, and an adjustable weight on the opposite end of the lever.

5. The combination with a settling tank,

of a retaining ring forming a bottom member therefor, said retaining ring having a central opening formed therein, a cup shaped container having a discharge opening formed in its lower end, the upper end of said container extending into the opening in the retaining ring and being guided thereby, means for guiding the lower end of the cup, an annular flexible diaphragm secured at its upper end to the retaining ring and at its lower end to the cup, said diaphragm forming a water-tight joint between the tank and the cup and permitting vertical movement of the cup, a stationary rod extending downwardly into the cup, a valve on the lower end of said rod, a pivotally mounted lever engageable with the cup and adapted to normally hold it in a raised position where the valve will form a closure for the discharge opening in the cup, and an adjustable weight on the opposite end of the lever.

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