

J. B. GREEN.

PULP FEEDER.

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929,420.

Patented July 27, 1909.

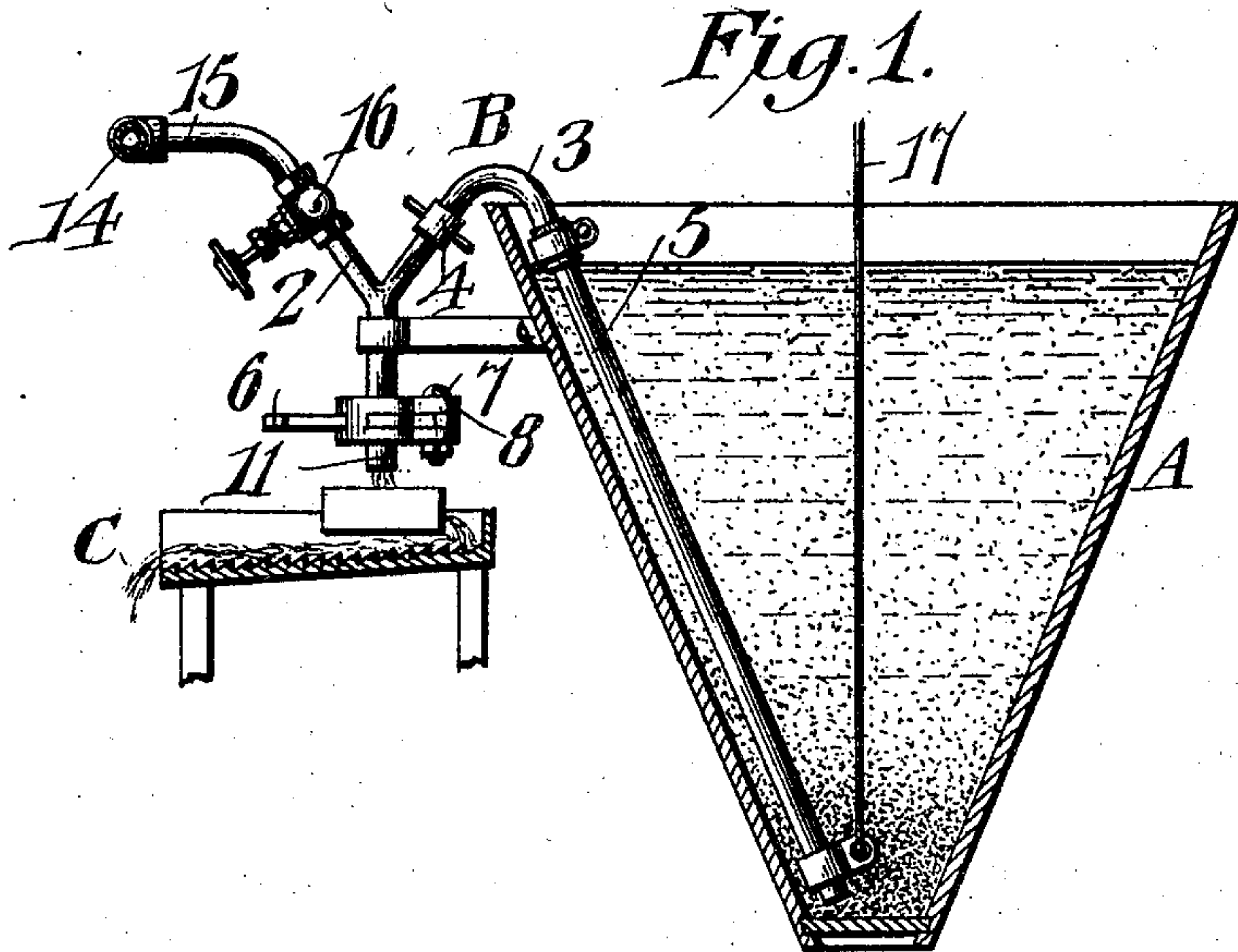


Fig. 2.

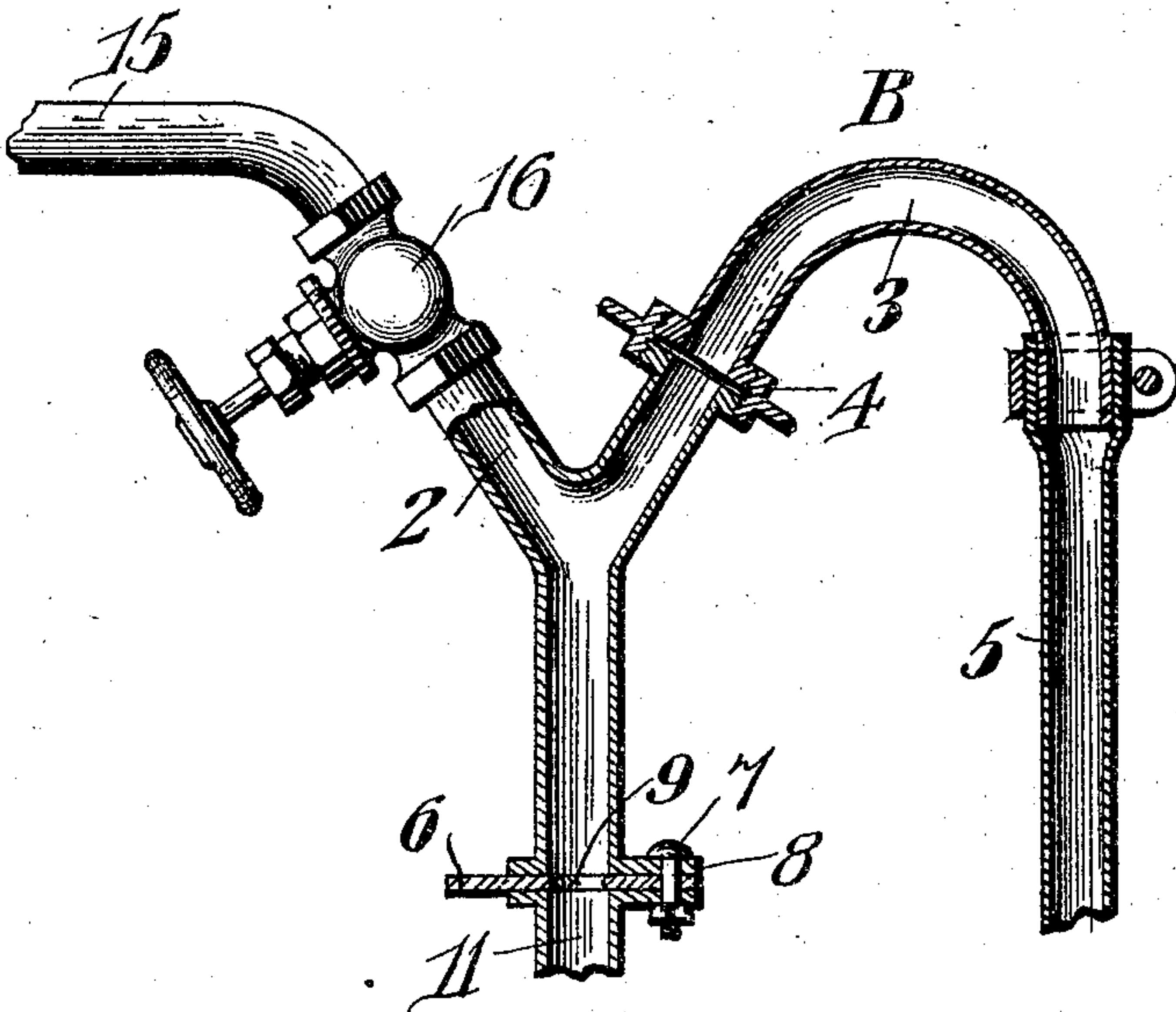
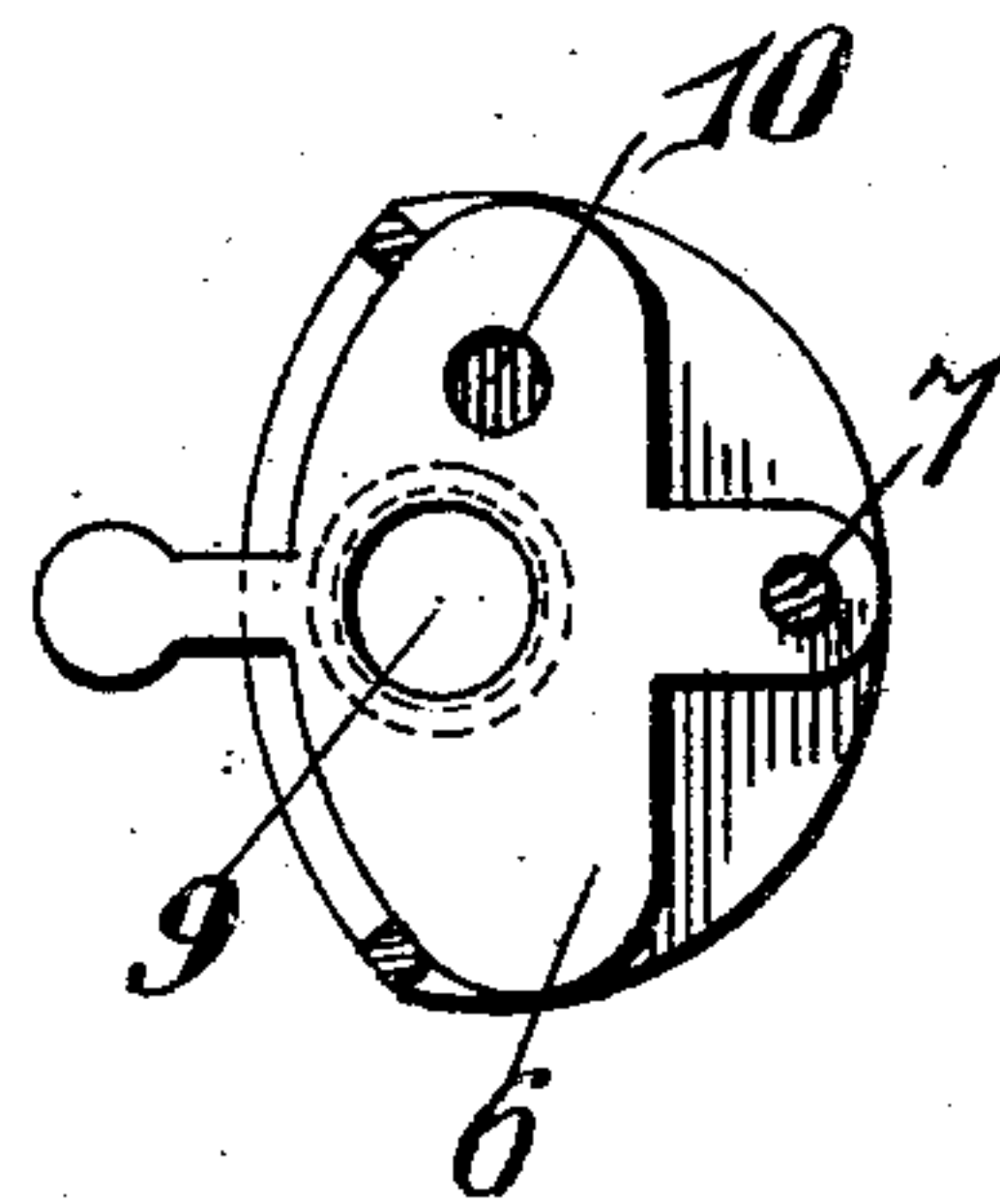


Fig. 3.



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JOSEPH B. GREEN, OF WALLACE, IDAHO.

PULP-FEEDER.

No. 929,420.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed December 26, 1908. Serial No. 469,288.

To all whom it may concern:

Be it known that I, JOSEPH B. GREEN, a citizen of the United States, and a resident of Wallace, in the county of Shoshone and State of Idaho, have invented a new and Improved Pulp-Feeder, of which the following is a full, clear, and exact description.

This invention relates to a pulp thickener designed especially for use in connection with concentrators.

Heretofore, it has been the usual practice to draw off the slime from a settling tank either by the employment of plugs spaced along the bottom of the tank or gooseneck pipes connected with the bottom. The first method is objectionable for the reason that it is extremely difficult to obtain a slime from the tank which has a sufficient percentage of solids to be effectively treated in the concentrators. As the plugs are located at the bottom of the tank, the full head of water in the latter, which is in some cases as much as nine feet, is operating at the orifices of the plugs so that large quantities of water pass out with the settlings, with the result that the latter are in a too diluted form to enable the concentrators to collect the settlings. In other words, the volume of water passing through the concentrator is so great as to carry a large proportion of the settlings with it. It has been attempted to overcome this disadvantage by reducing the orifices of the plugs, but this is impracticable for the reason that the orifices become clogged, and at the best it is necessary, in a milling plant, to employ a plug tender to maintain the plugs clear. With the gooseneck method of drawing off the settlings, it has been found extremely difficult to keep the goosenecks free from clogging, this being due to the inlet end of the gooseneck being directly downward and receiving the compacting pressure of the overlying stratum.

The object of the present invention is to overcome these difficulties by employing a slime-discharging conduit which is inverted so that there is no chance for the clogging of the same and also by reducing to a minimum the head under which the settlings are discharged and to draw off the settlings in such a manner that a comparatively quiescent state of the settlings will be maintained in the bottom of the tank, and yet remove the settlings where they are most dense, the advantage being that the percentage of water

in the material supplied to the concentrators will be materially decreased so that effective separation of the values can be obtained and very little conducted away from the concentrator with the waste.

In carrying out the present invention, a siphon is employed which has an inverted inlet end disposed in the bottom of the settling tank or pulp thickening settler where the settlings concentrate, and the outlet end of the siphon is disposed in any suitable manner to supply the relatively thick slime to the concentrator but located preferably at a point slightly below the level of the water in the tank so as to create sufficient head to draw off the sediment. By properly proportioning the outlet leg of the siphon with respect to the level of the water in the tank, the suction can be graduated in accordance with the density of the settlings. In practice, it has been found that the discharge end of the siphon can be located about one third the distance below the level of the water in the tank for producing a suction of such strength as to remove the settlings without conveying away too much water with them, although, of course, the point of discharge of the siphon can be varied. It will thus be seen that the discharge of the siphon takes place at a point above the bottom of the tank yet below the level of the water therein and thereby the full head of water in the tank is not used to discharge the settlings, as is the case with the plug method of discharge, and besides this, a better fall between the siphon and concentrator is obtained without the use of extensive spouting. According to the plug method, the tanks are usually built six to ten feet above the floor in order to obtain the proper fall between the tank and concentrator and other difficulties are experienced. With this present method, the concentrator could be located immediately at the side of the tank with the latter resting on the floor.

The apparatus for carrying out the invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a transverse section of a settling tank or pulp thickener equipped with the improved siphonic pulp-removing device. Fig. 2 is an enlarged detail sectional view of a siphon with portions broken away. Fig. 3 is a plan view of the gate or discharge valve of the siphon.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawing, A designates one of a plurality of settling tanks or pulp thickening settlers usually employed in concentrating mills, in connection with classifiers for the purpose of collecting the slime or pulp from the water, there being any desired number of such tanks according to richness of the slime. In these tanks are arranged a plurality of the pulp or slime-removing conduits having inverted inlet ends disposed within the said settlers or tanks and these discharge conduits, in practice, may take the form of siphonic slime-removing devices designated generally by B that operate to remove the thick slime from the bottom of the settling tanks to the concentrators in such proportion with water that practically all the slimes can be obtained in the latter. In the present instance, a single siphon is shown, but in practice, the siphons are arranged at short intervals along the settling tank.

Each device B comprises a Y-shaped body 1 which has one of its upper arms 2 connected with an elbow 3 by a coupling collar 4, and attached to this elbow is a suction tube 5 which may be in the form of a rubber hose or equivalent means to constitute the inlet leg of the siphon. This tube 5 depends into the settling tank with its lower end submerged in the comparatively thick settlings. At the lower end of the body 1 of the siphon is a gate 6 which is fulcrumed at 7 on a bracket 8 carried by the body 1, and the gate is provided with ports 9 and 10 of different sizes to change the effective outlet area of the siphon, and one end of the valve is solid so as to form a complete closure for the siphon when it is desired to flush the latter in case of clogging. The lower end 11 of the siphon which, as shown in Fig. 1, is located considerably above the level of the bottom of the tank A, discharges the pulp to a concentrator suitably arranged with respect thereto and shown in part in the present instance, under the discharge end of the siphon and designated by C.

In order to start the siphons, the latter are connected with a source of water under pressure by means of a pipe 14 which extends along the settling tank and is connected at intervals with the outer arms 2 of the siphons. In these branch connections between the siphons and supply pipe are cut-off valves 16 for controlling the supply of water. When the valve 16 of any siphon is open, water is discharged through the siphon and thereby a suction is created through the inlet leg so as to start the flow from the settling tank, and after this occurs, the valve is closed to cut off the water supply. After being thus started, the siphon will continue to operate as long as the slime and water

flow through the settling tank and the head is maintained therein. In case the siphon should become clogged with sediment, it is merely necessary to close the gate valve and open the water supply valve so that the full force of the water will be discharged through the inlet or suction leg of the siphon. It will thus be seen that the overcoming of the clogging is a very simple matter as compared with the plug and gooseneck methods of drawing off the slime. The lower ends of the hose sections 5 may be provided with a cable 17, as shown in Fig. 2, for the purpose of raising the hose to stop the flow through the siphon and also by means of this cable, the flexible inlet tube can be drawn out of the settled or thickened pulp in the bottom of the tank when it is desired to start the siphon after the latter or concentrator supplied thereby has been shut down for any reason. In this case, the hose is pulled upwardly out of the thickened pulp and allowed to rest on top of the latter for starting, so that when water is discharged through the pipe 15, the siphon will draw off the settlings at the top of the relatively thick stratum, and as the settlings are drawn off, the lower end of the hose will sink to the bottom of the tank.

A special feature of the inlet end of the siphon is that the suction takes place upwardly and the inlet opening of the siphon is located at the lowermost point so that there is no chance for slime to settle therein as is the case in the gooseneck method, in which the slime is drawn downwardly out of the tank, as distinguished from the upward suction in the siphon method.

In my co-pending application, Serial No. 499,631, filed June 2, 1909, I have disclosed matter broadly similar to that of this application; said application is, however, based on a different species of siphon and discloses how a plurality of siphons may deliver to a single concentrator.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent is:—

1. In combination, a concentrator, a pulp-thickening settler, and a conduit discharging from the settler to the concentrator and hav-

ing a portion extending downwardly in the settler and terminating within the region of settled pulp, there being an opening at the lower extremity of the said portion to permit the pulp to be drawn upwardly into and through the latter.

2. The combination of a concentrator, a pulp-thickening settler, and a conduit in the form of a siphon for discharging from the settler to the concentrator, said conduit having its inlet end extending into and inverted in the settler within the region of the settled pulp and its outlet end disposed at a point above the level of the bottom of the settler and below the normal level of the pulp-containing water therein, said conduit being adapted to withdraw the thickened pulp upwardly from the settler.

3. In combination, a concentrator, a pulp-thickening settler, a conduit for discharging from the settler to the concentrator, said conduit having an inverted inlet end disposed within the region of settled pulp and its outlet end discharging downwardly to the concentrator, and means for starting the flow through the conduit, said inlet end being adjustable throughout the vertical range of the thickened pulp region.

4. In combination, a concentrator, a pulp-thickening tank, and a conduit in the form of a siphon having its inlet branch passing down through the water to the bottom with its end terminating within the region of settled pulp and adjacent the bottom of the tank and its outlet branch terminating out-

side of the tank and below the normal level of the pulp-containing water therein, said inlet branch having an opening at its bottom through which the pulp is drawn upwardly.

5. In combination, a concentrator, a pulp thickening settler, a siphon conduit for discharging from the settler to the concentrator having its receiving portion extending downwardly and terminating within the region of settled pulp and provided with an opening at its extremity adapted to withdraw the thickened pulp upwardly from the settler, a valve for controlling the discharge of pulp from the conduit, and a water supply pipe for discharging water under pressure through the conduit for starting the flow of pulp therethrough or for flushing out the conduit.

6. In combination, a pulp-thickening settler, and a pulp-discharging siphon conduit having its inlet end disposed within the region of settled pulp in the settler to draw the pulp upwardly therefrom and arranged with its outlet end exterior to the settler at a point below the normal water level therein and above the bottom of the settler, and a device for extracting the values from the thickened pulp, receiving from said siphon conduit.

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

JOSEPH B. GREEN.

Witnesses:

A. M. STRODE,
J. A. WAYNE.