H. E. WETHERBEE.

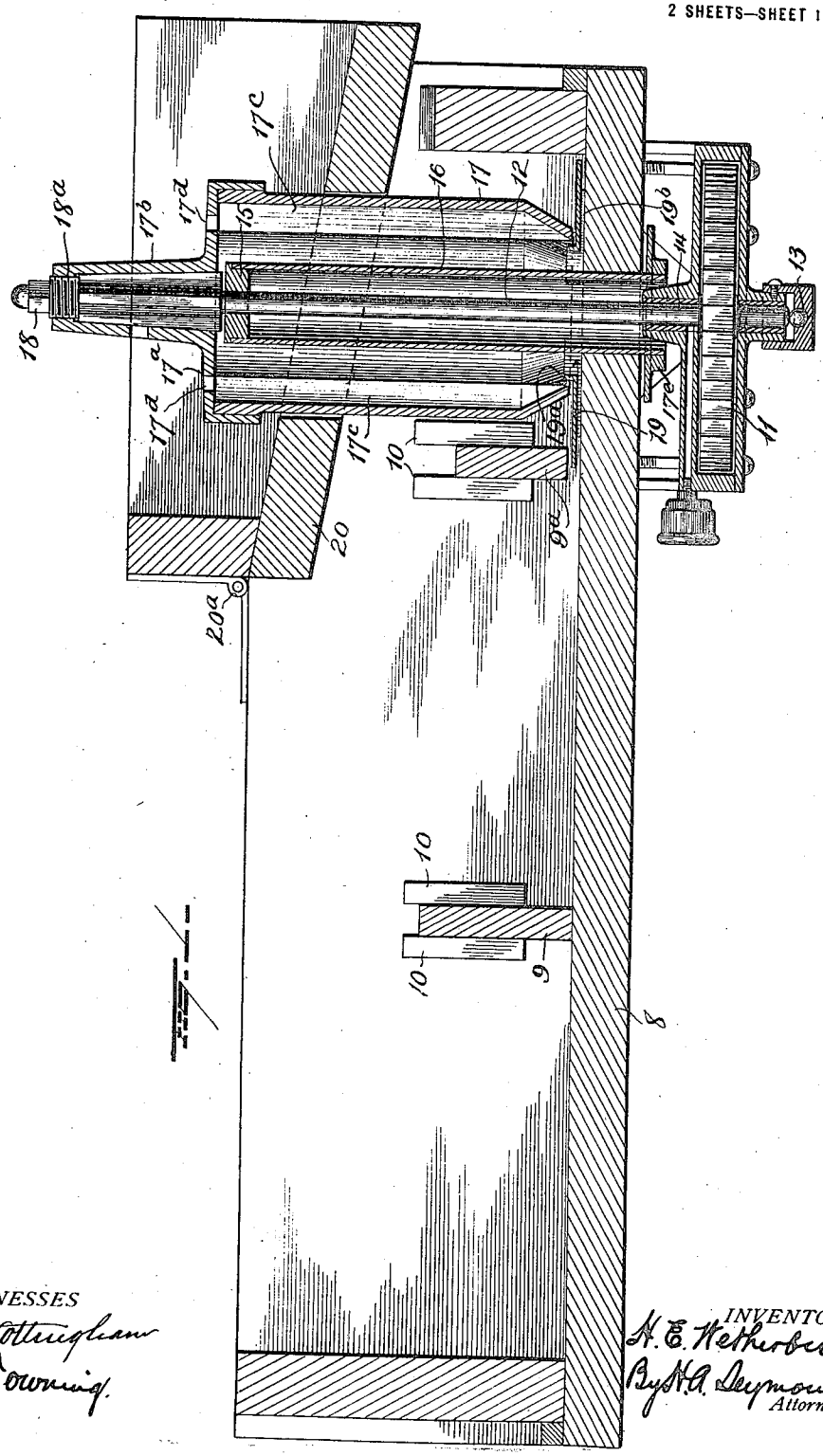
APPARATUS FOR SEPARATING SOLIDS FROM LIQUIDS.

APPLICATION FILED FEB. 27, 1915.

1,163,875.

Patented Dec. 14, 1915.

2 SHEETS—SHEET 1.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 2.

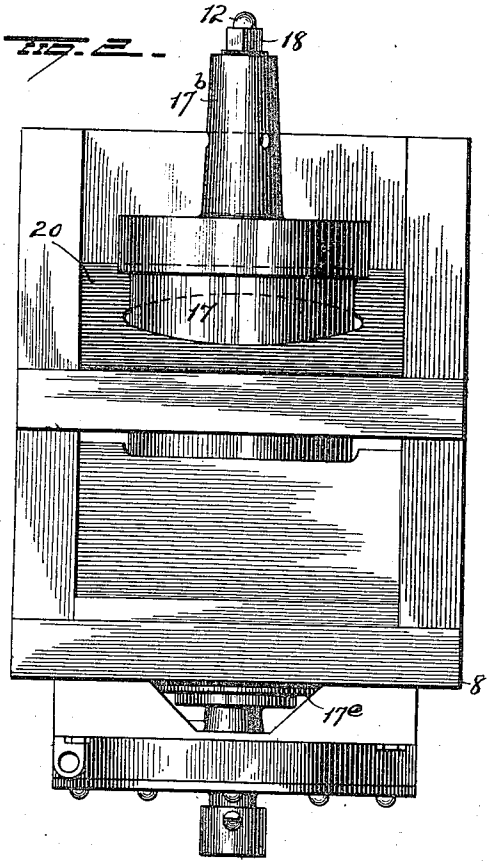


FIG. 5.

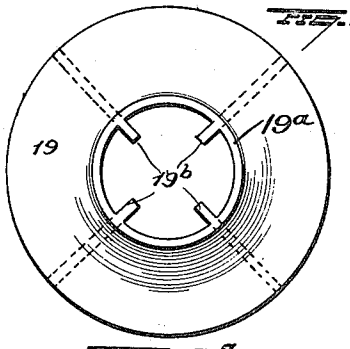


FIG. 5a.

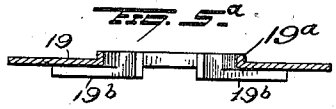


FIG. 6.

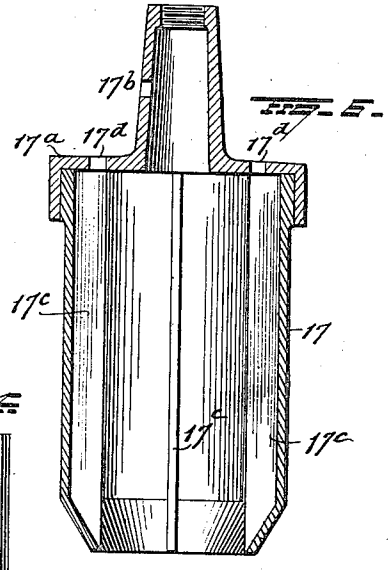


FIG. 3.

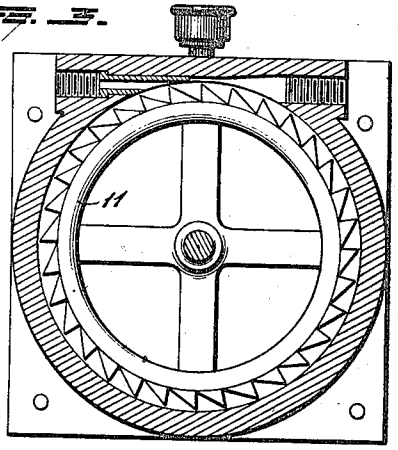


FIG. 4.

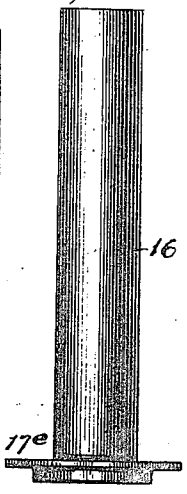


FIG. 7.

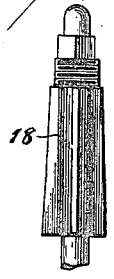


FIG. 7a.

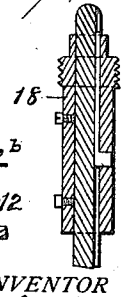


FIG. 7b.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SEPARATING SOLIDS FROM LIQUIDS.

1,163,875. Specification of Letters Patent. Patented Dec. 14, 1915.

Application filed February 27, 1915. Serial No. 11,001.

To all whom it may concern:

Be it known that I, HERBERT E. WETHERBEE, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Separating Solids from Liquids; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved apparatus for separating solids from liquids, and particularly for separating the solids for purpose of analysis, from the wash water from churn or other drills employed in exploring for ore or minerals.

Heretofore it has been the practice to catch the wash water or sludge from churn drills in barrels, usually four, the barrels being filled in sequence and allowed to settle as long as possible before being drained preparatory to another filling. The barrels are drained in the order in which they are filled, but it frequently happens that they are needed before the solids have had time to fully settle, or that owing to careless operation by the drill men they are allowed to overflow with consequent loss of part of the sludge, resulting in an inaccurate sample being obtained. It is customary to take samples representing each five or ten foot sections, and under the present practice each barrel contains sludge from different strata, and it is difficult to get a sample that fairly represents the average. When diamond drills are used, it is customary to catch the sludge in long shallow boxes which are usually provided with baffle plates, and overflow over a tail board. At the end of the operation the boxes are drained by pulling plugs located near the bottoms of the boxes. This leads to currents below the surface of the water and a loss of part of the sample which is usually the finer or lighter portion of the sludge. The material lost is often different in analysis from the balance of the sample, and this loss often results in inaccurate drill records, as the core is often lost in drilling soft ore and the sludge has to be depended upon for the analysis.

The object of my invention is to catch and confine all the solids, and this is accomplished by passing all the sludge through one receptacle and separating the solids from the liquids by mechanical means aided by gravity during its passage through the apparatus, and it consists in the parts and combinations of parts as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in longitudinal section of my apparatus; Fig. 2 is a view in end elevation of the same, and Figs. 3 to 7[b] inclusive are views of details.

8 is a box provided with baffle plates 9, which are loosely held in place by the cleats 10 secured to the sides of the box. Rigidly secured to the underside of the box, adjacent the discharge end of the latter is the steam turbine 11, which latter may be of any approved form, the construction shown in Figs. 1 and 3 being for illustrative purposes only. As a matter of fact any other motor or means for imparting rotary motion would answer all purposes.

Secured to the rotating member of the turbine is the shaft 12, mounted in bearings 13, 14 and 15, the bearing 13 being a hardened sphere on which a sphere in the lower end of shaft 12 rests, the two spheres being slightly eccentric so that the lower one will be free to turn in its seat and thus prevent undue wear at any one point. The bearing 14 is at the top of the turbine casing, and the bearing 15 is at the top of pipe 16. This pipe is open at its bottom and is secured at its lower end to the ring shaped plate 17[e], which latter is secured to the bottom face of the box 1, with the pipe 16, which is carried by said plate, passing upwardly through a hole in the bottom of the box, to a point adjacent the closed top of the cylinder 17, the upper end of the said pipe being closed by the bearing 15 for the shaft 12. Secured to the upper end of the shaft 12, is a ribbed head 18, which is shown in detail in Figs. 7, 7[a] and 7[b]. This head is slightly tapered, and is provided above the ribs thereof with the threaded portion 18[a], and above the latter with an angular end for the attachment of a wrench or other holding or turning tool.

The cylinder 17, above referred to, is closed at its upper end by the cap 17[a], which is provided centrally with an upwardly projecting neck 17[b], the bore of which is tapered so as to make a close fit with the ribs on the outer face of the head, so as to prevent any

movement of the cylinder on the head of the shaft during the operation of the apparatus. The head 18 is secured to the shaft by a key and set screws shown in Figs. 7[a] and 7[b], and the upper end of the neck 17[b] of the head of the cylinder, is threaded internally to engage the threaded section 18[a] of the head.

Attached to the cap 17[a] is the cylinder 17, open at its lower end and provided internally with the vertical ribs 17[c], the cap 17[a] of the said cylinder being provided with a series of water discharge holes 17[d], which latter are preferably in plane between the cylinder wall and the free edges of the ribs 17[c].

The direction of rotation of the shaft 12 is such as to tighten the cap of the cylinder onto the head of the shaft so as to avoid the possibility of any free movement of the cylinder on the shaft when the apparatus is in operation.

19 is a plate having an open center with a flange 19[a] around said opening, and provided with feet 19[b] which hold the plate off the bottom of the box and thus provide for the free flow of sludge beneath said plate and up into the cylinder, the flange 19[a] projecting up into the lower end of the latter and being sufficiently far removed from the lower end of the cylinder as not to engage it during the rotation of the latter. The feet 19[b] of the plate project into the plane of the opening in said plate, and bear against the pipe 16 for holding the plate centered with relation to the rotating end of the cylinder.

20 is a launder attached to the box by hinge 20[a]. It has a sloping bottom with an opening through the same for the cylinder, the said opening being of sufficient size to permit of the free rotation of the cylinder without permitting any material quantity of water to run back into the box. The bottom of this launder projects over the rear end of the box so as to discharge the clarified water outside of the box.

The operation of the apparatus is as follows:—The water carrying material from the drill hole enters the box 8 at the upper end and the heavier particles are stopped by the baffle 9, while the lighter material passes with the water over baffle 9, and under baffle 9[a] and plate 19 to the cylinder 17, which is rapidly rotating. The water rises in the cylinder and is drawn up into the latter by centrifugal action, and the solids therein are thrown to the wall of the cylinder by centrifugal force and are held there between the ribs 17[c], while the clarified water rises and passes out through the holes 17[d], into the launder and is discharged from the latter over the lower end or tail board of the box 8. The capacity of the cylinder should be equal to the feed of sludge from the drill, so that all the overflow will be through the rotating cylinder which will separate all the solids from the liquid during the passage of the latter through the cylinder. At the conclusion of the operation the cylinder is detached from the shaft 12, and the solids adhering to the inner surface of the same are removed and mixed with the solids in the box and the whole retained as the sample.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention. Hence I would have it understood that I do not wish to confine myself to the exact construction and arrangement of parts shown and described but

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In an apparatus for separating solids from liquids, the combination of a box having a baffle plate therein for controlling the flow of the material to the cylinder, a launder at the rear end of the box, a cylinder within the box at the rear of the baffle and projecting up into the launder, the said cylinder being open at its lower end and provided with water discharge openings adjacent its top whereby the discharge therefrom passes into the launder, and means for rapidly rotating said cylinder.

2. In apparatus for separating solids from liquids, the combination of a box into which sludge is discharged adjacent one end, a cylinder located adjacent the other end of said box, the said cylinder being open at its lower end and having water discharge openings adjacent its top, and provided with internal inwardly projecting ribs, the lower open end of said cylinder being close to the bottom of the box to take the sludge from the bottom, and means for rapidly rotating said cylinder.

3. In apparatus for separating solids from liquids, the combination of a box into which sludge is discharged adjacent one end, a cylinder located near the opposite end of the box and having an open inverted conical lower end, and provided with water discharge openings adjacent its top, a plate having an open center and resting on feet supported on the bottom of the box and provided with a flange projecting up into the open lower end of the cylinder, and means for rapidly rotating the cylinder.

4. In apparatus for separating solids from liquids, the combination of a receptacle into which sludge is discharged, an upright shaft within said receptacle and provided with an elongated bearing for the attachment and support of the cylinder, a cylinder detachably mounted on said shaft, the said cylinder being open at its lower end

and having discharge openings adjacent its top and provided at its top with a sleeve like bearing to engage the elongated bearing on the shaft, the said lower end of the cylinder being adjacent the floor of the receptacle, and means for rapidly rotating the shaft.

5. In apparatus for separating solids from liquids, the combination of a receptacle into which the sludge is discharged, a baffle in said receptacle for controlling the flow of material to the cylinder, a launder at the top of said receptacle at the rear end of the latter, a shaft within the receptacle at the rear of the baffle, and a cylinder detachably secured to said shaft and passing up through the bottom of the launder, the said cylinder being open at its lower end and having a discharge opening therein in a plane above the floor of the launder, and means for rapidly rotating said shaft and the cylinder secured to the shaft.

6. In apparatus for separating solids from liquids, the combination of a receptacle into which sludge is discharged, a launder at the top of said receptacle, a shaft passing through the bottom of the receptacle and provided at its upper end with a tapering head, a cylinder open at its lower end and provided at its upper end with a centrally located elongated neck tapered internally to conform to the head of the shaft and adapted to receive the latter, the said neck having a threaded portion to engage corresponding threads on the head, and the cylinder having discharge openings therein in a plane above the floor of the launder, and means for rapidly rotating the shaft and the cylinder carried by the same.

7. In apparatus for separating solids from liquids, the combination of a receptacle having an opening through its bottom, a pipe within said opening, a shaft passing through the pipe and supported in a bearing carried by the latter, a cylinder detachably secured to the shaft at a point above the top of the pipe, the said cylinder being open at its bottom and having discharge openings near the top, and means below the receptacle for rotating the shaft and the cylinder carried by the latter.

8. In an apparatus for separating solids from liquid the combination with a receptacle divided into compartments by baffle plates, a cylinder mounted in the compartment farthest removed from the feed end of the receptacle, the said cylinder being open at the bottom and provided with discharge openings near the top, the lower open end being adjacent the bottom of the receptacle, a launder having an opening in its bottom to receive the cylinder, and means for rotating the latter.

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

HERBERT E. WETHERBEE.

Witnesses:

SAM. W. FOLSOM,

T. F. SHEHAN.