

Dec. 29, 1931.

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HYDROMETRIC RECORDER
Filed Aug. 10, 1928

1,838,845

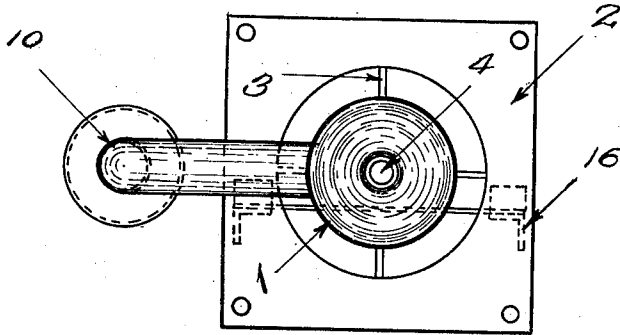
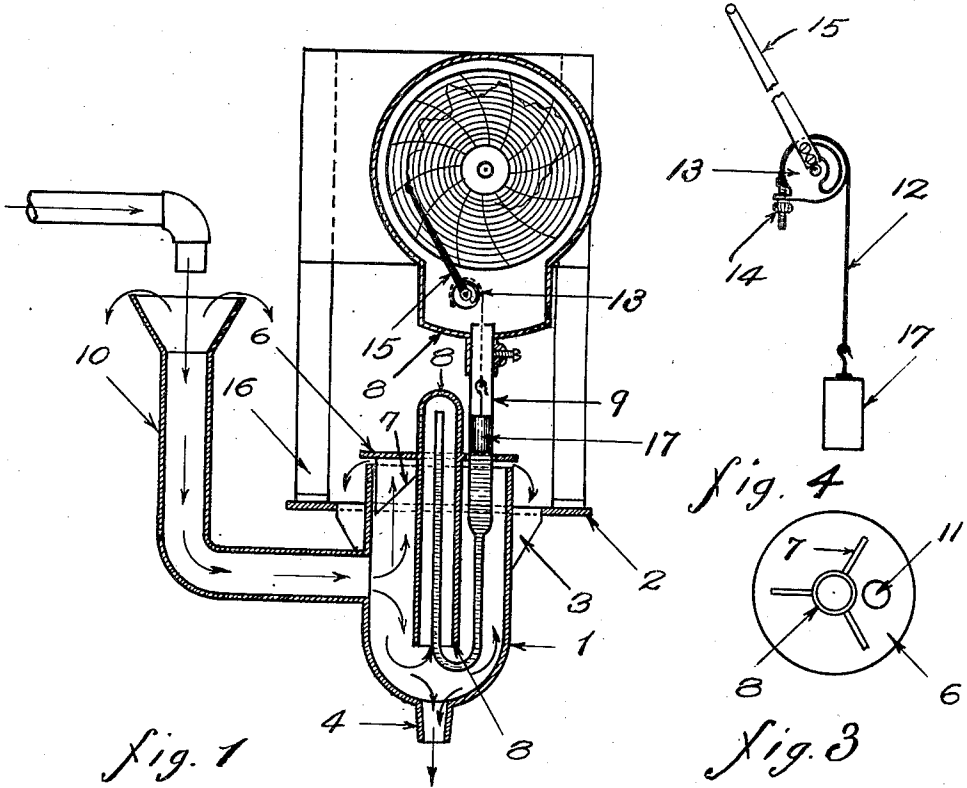


Fig. 2

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HYDROMETRIC RECORDER

Application filed August 10, 1928. Serial No. 298,696.

The invention relates to a means of recording the weight or density of liquids from their flow in a continuous manner.

One form of the invention is illustrated in the accompanying drawings, in which Fig. 1 is a vertical section of the entire machine; Fig. 2 is a view from below looking upwards; Fig. 3 is a plan view of the removable head 6; Fig. 4 is a vertical view of clock connection.

Description of apparatus

In Fig. 1 an assembly of the apparatus is shown. No. 1 is a receptacle or receiving chamber open at its upper extremity, and terminating at its lower end into a reduced nozzle 4. On the side of the vessel 1 is an opening connecting to a column 10. Vessel 1 has a supporting square flange 2 which joins it by means of spacers or webs 3 leaving an annular opening between the inner edge of the flange and the body of vessel 1. Forming part of the removable head 6, in Figs. 1 and 3, is a bell tube 8, the closed end of which projects above, and the lower end extends downwardly to a given depth into the vessel 1. The removable head 6 is also provided with vertical guides 7 which hold it centrally in vessel 1, and also permit of free vertical motion in vessel 1. Removable head 6 is also provided with a circular opening 11. In Fig. 1, 9 is a U tube, one end of which is enlarged. This tube hangs from the recording clock frame downwardly through the hole 11 of removable head 6 and into vessel 1. The smaller part of this tube projects downwards into this vessel, and upwards into the bell tube to a point near its closed end. 17, in Figs. 1 and 4, is a float of suitable material which freely fits into tube 9. 17 is suspended into U tube 9 from a chain or cord 12 connected to connection 13 in recording clock. Connection 13, Fig. 4, consists of an overbalanced pivoted circular disk on which is an adjusting screw 14 to attach the cord or chain 12. Extending radially from this disk

is an arm 15 which moves parallel to the face of the recording dial, recording thereon the fluctuations from the float 17. 16, in Figs. 1 and 2, is a frame or stand fastened to the flange 2; this frame supports the recording clock.

Operation

This apparatus is intended to record the density or weight of any liquid and is especially adapted for the suitable handling of viscous liquids, or liquids holding in suspension materials which would separate or precipitate, if not kept in constant agitation or motion, as for instance a mixture of earth or sand with water in the shape of mud, as exists in the process of "mudding" in well drilling. A description of the operation of the apparatus under such conditions follows:

Referring to Fig. 1 in the accompanying drawings, the liquid, the weight of which is to be recorded, enters the open end of column 10 connecting to chamber 1. The end of this column must extend to a sufficient height above the upper edge of chamber 1 to insure a static head sufficient to cause chamber 1 to fill and overflow over its upper edge, and at the same time discharge a full stream through the nozzle 4. It is also essential in operation that the liquid fills column 10 and overflows over its upper edge; this will insure an approximately constant head obtained from the otherwise variable flow through the pump discharge. Having proceeded thus far, the liquid in chamber 1, having risen to the upper edge of chamber 1 to a point of overflow, it will buoy up the removable head 6 and force same to rise in proportion to the approximate head in column 10; this will allow the liquid to overflow through the space thus formed between the upper edge of chamber 1 and lower edge of head 6. It will be noted from accompanying drawings that the submerged depth of the bell tube 8, forming part of the head 6, will remain

the same irrespective of the rise of the overflow surface above the edge of chamber 1; there will be maintained a constant static head against the lower open end of the bell tube 8, excepting when the density or weight of the liquid in chamber 1 is changed. It is evident that the U tube being fixed to the body of the clock will remain stationary while the bell tube is free to move vertically. The U tube is partially filled with mercury or other standardized liquid, the float, 17, floating upon the surface of this liquid will rise or lower in proportion to the pressure due to the density or weight of the liquid bearing against the open end of the bell tube. The fluctuations of the float in the U tube are transmitted through the connection 14 to the dial of the recording clock and are there registered; the record readings are given in direct pressure or weight of an assumed volume or head. This is an essential and much desired information for the driller in the "mudding" process as it will give ready information as to the actual weight of the mud at any given depth or time. In this apparatus it is evident that as long as sufficient head is maintained in the chamber 1 to overflow over its upper edge, the liquid therein will be kept in constant agitation or flow and eliminate any precipitation or accumulation of the matter held in suspension, for the reason that any sediment will be continuously discharged through the lower nozzle. The nozzle at the lower extremity also acts as an open drain to the receptacle, causing it to empty itself whenever the flow from the receiving pipe stops.

I claim as new and original:

1. A chamber or vertical cylinder fitted at the upper extremity with a movable head or float resting upon same and free to move vertically; the lower extremity of the chamber being fitted with a nozzle of given size admitting part of the liquid in the chamber to run out while the bulk overflows between the upper extremity of the chamber and lower side of the float or movable head.

2. In a device of the character described, a receptacle having a lateral inlet, an upper overflow outlet and a lower discharge outlet, a vertically movable cover for the overflow outlet of the receptacle, a bell tube carried by and movable with said cover, and a U-tube having an arm extending upwardly into the bell tube and an arm extending upwardly through the cover.

3. In a device of the character described, a receptacle having a lateral inlet, an upper overflow outlet and a lower discharge outlet, a pipe connected to said inlet and having a receiving and overflow end arranged above the level of the receptacle, a vertically movable cover for the overflow outlet of the receptacle, a bell tube carried by and movable with said cover, and a U-tube having an arm ex-

tending upwardly into the bell tube and an arm extending upwardly through the cover.

4. Measuring means including a receiving vessel having an inlet whose receiving end is above the vessel, said vessel having the upper overflow outlet, a vertically movable anchor arranged to ride on the liquid in the vessel, a bell tube movable with said anchor whose upper end is closed and whose lower end extends beneath the anchor so as to be submerged in the liquid in said vessel.

5. A device of the character described including a receptacle for liquid having an upper overflow outlet, an inlet whose receiving end is above the outlet, an anchor arranged to ride on the overflowing liquid, a bell tube movable with said anchor and whose lower open end extends beneath said anchor, a U-tube whose arms are arranged, one within and the other without said bell tube.

6. A device of the character described including a receptacle for liquid having an upper overflow outlet, an inlet whose receiving end is above the outlet, an anchor arranged to ride on the overflowing liquid, a bell tube movable with said anchor and whose lower open end extends beneath said anchor, a U-tube whose arms are arranged, one within and the other without said bell tube, said receptacle having, also, a lower discharge outlet.

7. A device of the character described including a receptacle for liquid having an upper overflow outlet, an inlet whose receiving end is above the outlet, an anchor arranged to ride on the overflowing liquid, a bell tube movable with said anchor and whose lower open end extends beneath said anchor, a U-tube whose arms are arranged, one within and the other without said bell tube, said receptacle having, also, a lower discharge outlet, of less capacity than said inlet.

8. A device of the character described including a conduit for fluid, a receptacle whose lower end is open and extended into the conduit and whose upper end is closed to form a pressure chamber in said receptacle, means for maintaining a uniform submergence of the lower end of the receptacle in the liquid flowing through said conduit.

In testimony whereof I have signed my name to this specification.

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