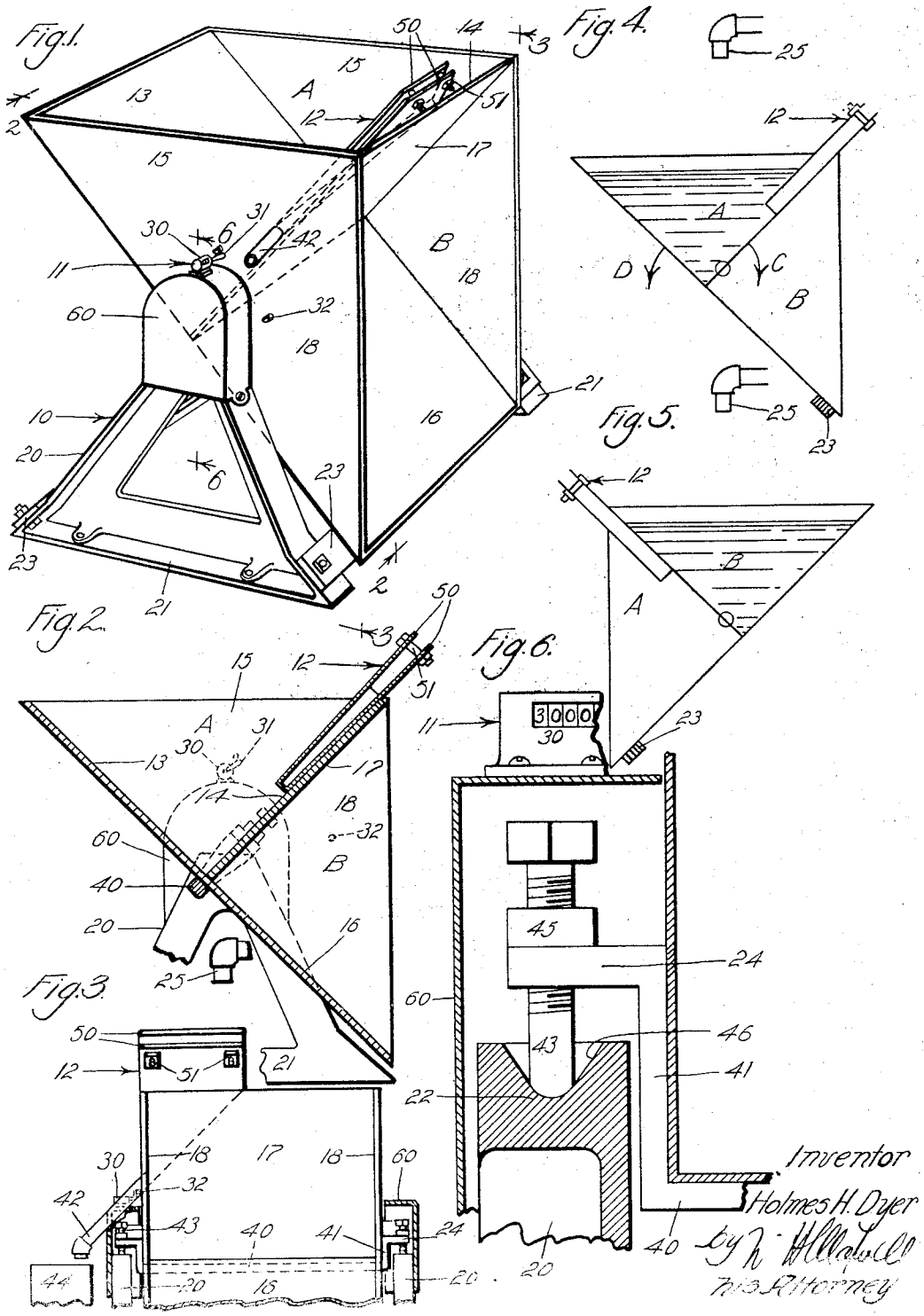
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DEVICE FOR MEASURING AND SAMPLING FLUID

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DEVICE FOR MEASURING AND SAMPLING FLUID

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This invention has to do with a device for measuring and sampling fluid, it being a general object of the invention to provide a simple, inexpensive, and efficient device of this character.

It is an object of the present invention to provide a simple, efficient, and dependable device for measuring fluid by weight as distinguished from volume or bulk.

Another object of the invention is to provide a device of the character mentioned which is simple and inexpensive of manufacture and which is capable of being made to handle either large or small quantities of material.

Another object of the present invention is to provide a device of the character mentioned operable to sample or take specimens of material being passed through it.

It is a further object of this invention to provide a combination measuring and sampling device which operates to take samples of the fluid being handled by the device during operation of the device, for instance upon each operation of the device, so that a true, typical sample is obtained.

The various objects and features of the invention will be best and more fully understood from the following detailed description of a typical form and application of the invention, throughout which description I refer to the accompanying drawings, in which:

Fig. 1 is a perspective view illustrating the device provided by this invention. Fig. 2 is a detailed transverse sectional view of the device being a view taken substantially as indicated by line 2—2 on Fig. 1. Fig. 3 is a reduced view of the device taken as indicated by line 3—3 on Fig. 1 showing certain parts broken away. Figs. 4 and 5 are diagrammatic views illustrating the two positions of the device and illustrating the principles of the invention. Fig. 6 is an enlarged detailed sectional view taken as indicated by line 6—6 on Fig. 1.

The device provided by this invention includes, generally, a movable element embodying two like compartments A and B adapted to alternately receive and discharge the material being handled by the device, a mounting 10 for the movable element whereby it is supported to oscillate so that the compartments are alternately brought under a stream of fluid, means 11 for recording the operations of the movable element, and means 12 in connection with the movable element for automatically sampling the fluid as the device operates.

The movable element is in the form of a unit constructed to form chambers or compartments A and B which are symmetrical in formation and alike. The compartments A and B are open and related so that the compartment A faces upwardly to receive fluid when the compartment B is positioned to discharge fluid, while the compartment B faces upwardly to receive fluid when the compartment A is positioned to discharge fluid. In the preferred arrangement the compartments A and B are in adjoining relation or are side by side, as clearly illustrated throughout the drawings. The compartment A is formed by an outer side wall 13, an inner side wall 14, and end walls 15. The compartment B is formed by an outer side wall 16, an inner side wall 17, and end walls 18. In the preferred construction a single plate or partition operates as a division between the two compartments so that its opposite sides form the walls 14 and 17 of the two compartments.

The side walls 13 and 14 of the compartment A join at a central bottom point and are related to extend upwardly and outwardly from such point at corresponding angles when the movable element is positioned with the compartment A facing upwardly. In the preferred formation the walls 13 and 14 extend upwardly and outwardly from the bottom point at angles of 45 degrees with reference to a vertical line through the said point so that the said vertical line extends through the center of gravity of any body of fluid filled into the compartment A when the compartment is in the up position, as shown in Figs. 1 and 4 of the drawings.

The compartment B is formed similar to the compartment A, that is, its sides 16 and 17 are joined at a lower or bottom point and extend upwardly and outwardly in opposite directions from said point at corresponding

angles when the compartment B is faced upwardly, as shown in Fig. 5 of the drawings. In the construction, where a single plate forms the division between the two compartments A and B, the bottom points of the two compartments are substantially coincident, that is, they both occur where the said single central partition plate joins the two side outside walls 13 and 16.

The mounting 10, provided for carrying the movable element so that it can tilt or oscillate between the two positions above referred to, may be of any suitable construction. In the drawings I have illustrated a mounting including end standards 20 each having a base 21 to be secured to a suitable horizontal support, and a bearing 22 at a point spaced a suitable distance above such support. The two standards 20 are preferably joined by straps 23 positioned to form stops for the movable element as will be apparent from inspection of the drawings. The bearings 22 of the end standards are adapted to support the movable element by supporting projections 24 extending from the ends of the movable element.

In accordance with the preferred form of the invention, the projections 24 may be the end portions of an axle or shaft 40 secured to the movable element. In the drawings I have shown the shaft 40 secured to the under side of the movable element and provided with arms 41 extending upwardly at each end of the movable element. The arms 41 of the shaft are located at the exterior of the movable element and are parallel to the ends of the movable element. The projections 24 extend horizontally from the upper ends of the arms 41. Each projection 24 carries a pivot pin 43. The pins 43 may be screw threaded through the projections 24 so that they project downwardly into the bearings 22. The pins 43 are provided at their upper ends with a polygonal head adapted to be engaged by a wrench, or the like. Each pin is rounded at its lower end as clearly shown in the drawings. Lock nuts 45 are provided on the pins to engage the upper faces of the projections 24 so that the pins can be set in position.

The bearings 22 are provided with sockets 46 to receive the rounded lower ends of the pins 43. The sockets 46 have upwardly divergent side walls so that the pins can rock in them. The sockets are formed so that the rounded end portions of the pins 43 are supported by the rounded bottoms of the sockets and are formed so that the end portions are the only portions of the bolts that engage the standards 20. The sockets are also formed so that they may contain oil or other suitable lubricating material.

In the construction just described the horizontal axis extending through the points of contact of the pins 43 and the bottoms of the sockets 46 lies in the plane of division between the compartments A and B and is located within the movable element, or above the point at which the central partition joins the outer sides 13 and 16. The pins 43 support the movable element so that the axis of pivotal movement may be adjusted vertically to change the center of gravity of the movable element with reference to the pivotal axis. The mechanisms of the mountings 10 are covered and protected by hoods 60 which completely encase the upper portions of the standards 20. The hoods may be formed of sheet metal and may be attached to standard 20, as shown in the drawings.

By locating the axis of pivotal movement of the movable element as above described, the vertical line extending through the center of gravity of the body of material in the compartment A, when the compartment A is up as shown in Figs. 1 and 4, is horizontally offset in one direction from said axis of pivotal movement of the movable element, while the vertical line extending through the center of gravity of the body of material in the compartment B, when the compartment B is up as shown in Fig. 5, is horizontally offset in the opposite direction from said axis of pivotal movement of the movable element. The center of gravity of the movable element as a whole, and considered without fluid in either compartment, is located in the plane of division between the two compartments and a suitable distance above the pivotal axis of the movable element so that a vertical line through the center of gravity of the movable element, when the element is in filling position, is removed a substantial distance horizontally from the axis of pivotal movement in a direction opposite to that in which the vertical line through the compartment being filled is offset from the pivotal axis of the element. This is true when the movable element is in either of the positions illustrated in the drawings.

Thus, when the movable element is positioned with the compartment A up, as shown in Figs. 1 and 4 of the drawings, the action of gravity on the movable element tends to turn the movable element in the direction indicated by the arrow C in Fig. 4 due to the center of gravity of the movable element being horizontally offset from the center of rotation of the element. As material is filled into the compartment A as from a fluid conduit 25, the weight of material in the compartment A tends to turn the movable element in the opposite direction, that is, in the direction indicated by the arrow D in Fig. 4, the weight of material in the compartment A having a tendency to turn the movable element in this manner due to the vertical line through the center of gravity of the material in compartment A being offset from the axis of pivotal movement of the movable element

in a direction opposite from that in which the center of gravity of the movable element is offset from the axis of rotation.

It is preferred that the conduit 25 be arranged so that the material discharged into the compartments strikes the compartments in substantial vertical alignment with the pivotal axis of the movable element. With the conduit 25 positioned in this manner, the impact of the material falling into the compartments has no tendency to turn the movable element on its pivotal axis or to prevent the movable element from turning on its axis. It is evident that the conduit 25 may be positioned over the compartments so that the material falls into the compartments at one side of the pivotal axis of the movable element, thereby adjusting the balance so that one compartment will discharge more material than the other compartment each complete operation of the device.

By the present invention the compartment A is uniform or regular in configuration and therefore the action of gravity on the mass in compartment A always acts through the same vertical line or center and therefore has a constant leverage with reference to the axis of pivotal movement of the element with the result that the element will not move in the direction indicated by the arrow D until the weight of material in compartment A reaches a definite value. When the weight of material in compartment A becomes sufficient to overcome the tendency of the mass of the movable element to turn the element in the direction indicated by the arrow C, the element turns from the positions shown in Figs. 1 and 4 to that shown in Fig. 5. The compartment B is then up and in position to receive fluid from the conduit 25, and, while the material drains from the compartment A, material fills into the compartment B.

The action of material filled into compartment B is the same as that above described with reference to compartment A, that is, when the weight of the material in the compartment B is sufficient the movable element turns from the position shown in Fig. 5 to that shown in Figs. 1 and 4. Thus it will be seen that the operation of the element about its pivotal axis is caused by the weight of material filled into the compartments A and B and that the action of the material tending to turn the element has a constant or fixed leverage with reference to the action of gravity on the element thus tending to turn the element. As a result of this arrangement, the device operates to accurately measure mass or weight as distinguished from volume.

The means 11 provided for registering the operations of the movable element may comprise an ordinary or conventional form of counter 30 arranged on one of the hoods 60 so that its operating lever 31 is engaged and operated by fingers 32 projecting from one end of the movable element. I have shown the counter located on one of the hoods 60 carried by a standard 20. The fingers 32 are located so that the lever 31 is tripped or operated each time the movable element turns about its pivotal axis. This provides a simple, dependable means of counting the operations of the movable element, and, knowing the weight of material handled by the device for each operation of the movable element, it is simple to calculate the exact amount of fluid handled by the device in a given time.

The means 12 provided for taking samples of the material handled by the device during operation of the device includes spaced blades 50 projecting upwardly from the plate which forms the division between compartments A and B to pass under the discharge end of the conduit 25 or through the stream of fluid entering the device. The blades 50, being spaced apart, operate to catch a certain amount of fluid entering the device. The exact amount caught during each passage of the blades under the conduit 25 depends upon the spacing of the blades. I provide means for adjusting or varying the spacing of the blades 50. This means may include bolts 51 extending between the blades as illustrated in the drawings.

The material caught between the blades flows by gravity into a conduit 42 which may be extended to any desired point, for instance, it may project outwardly through one end of the movable element and may project to a point where it intersects the axis of pivotal movement of the element where it may be open to discharge. A suitable receptacle 44 may be arranged under the discharge or open end of the conduit 42 to receive the samples caught by the blades 50. By suitable adjusting or positioning the blades 50, the desired cut or sample may be taken during each operation of the device so that the composite sample received by the receptacle 44 is of the same character as the entire mass of material passed by the device. This makes the device particularly useful for measuring oil as it is produced from a well as in such case the gravity or physical properties of the oil may vary from time to time so that a sample taken at any one time is not a fair indication as to the general character of the oil produced. With the present device the small sample taken each operation of the device results in a true or fair sample such as cannot be obtained with ordinary devices heretofore proposed.

From the foregoing description it is believed that the features and operations of the device will be fully understood. It is to be particularly noted that the device is simple and inexpensive of construction and that it has no delicate or intricate parts subject to failure or improper operation. The de-

vice is particularly suited for use in oil fields for measuring oil as above suggested in that it will effectively measure such material accurately by weight and will operate continuously and dependably with little or no care.

Having described only a typical preferred form and application of my invention, I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A measuring device including, a movable element having two compartments, and means pivotally supporting the movable element for oscillatory movement between two positions where the center of gravity of the elements is at opposite sides of the pivotal axis, the compartments being formed so that one compartment is up and the other down when the movable element is in one position and the positions of the compartments are reversed when the movable element is in the other position, and so that the center of gravity of the material in a compartment in an up position has a constant vertical axis and is opposite the center of gravity of the movable element relative to the pivotal axis, said means including supports at opposite ends of the movable element, and pivot pins on the movable element engaging the supports so that the pivotal axis of the element is located above the bottom of the element.

2. A measuring device including, a movable element having two compartments, and means pivotally supporting the movable element for oscillatory movement between two positions where the center of gravity of the elements is at opposite sides of the pivotal axis, the compartments being formed so that one compartment is up and the other down when the movable element is in one position and the positions of the compartments are reversed when the movable element is in the other position, and so that the center of gravity of the material in a compartment in an up position has a constant vertical axis and is opposite the center of gravity of the movable element relative to the pivotal axis, said means including supports at opposite ends of the movable element, and pivot pins on the movable element centrally located on the element and located to engage the supports at points above the bottom of the element.

3. A measuring device including, a movable element having two compartments, and means pivotally supporting the movable element for oscillatory movement between two positions where the center of gravity of the element is at opposite sides of the pivotal axis, the compartments being formed so that one compartment is up and the other down when the movable element is in one position and the positions of the compartments are reversed when the movable element is in the other position, and so that the center of gravity of the material in a compartment in the up position has a constant vertical axis and is opposite the center of gravity of the movable element relative to the pivotal axis, said means including, supporting standards at opposite ends of the movable element, the standards having sockets, projections at the ends of the movable element, and pivot pins carried by the projections to seat in the sockets.

4. A measuring device including, a movable element having a division member forming compartments adapted to contain material, means pivotally supporting the movable element for oscillatory movement between two positions where the center of gravity of the movable element is at opposite sides of the pivotal axis, the compartments being disposed in the movable element so that they are alternately up and down when the element is in the two positions and so that the center of gravity of the material in a compartment in the up position has a constant vertical axis and is opposite the center of gravity of the movable element relative to the pivotal axis, and sampling means including spaced blades carried by the division member, and a conduit connected with the space between the blades.

5. A measuring device including, a movable element having two compartments adapted to contain material, there being a division member between the two compartments, means pivotally supporting the movable element for oscillatory movement between the two positions where the center of gravity of the movable element is at opposite sides of the pivotal axis, the compartments being disposed in the movable element so that they are alternately up and down when the element is in the two positions and so that the center of gravity of the material in a compartment in the up position has a constant vertical axis and is opposite the center of gravity of the movable element relative to the pivotal axis, and sampling means including, spaced blades connected at their lower ends, bolts extending between the blades adapted to vary the space between the blades, and a conduit extending from the space between the blades to a point beyond the movable element.

In witness that I claim the foregoing I have hereunto subscribed my name this 3rd day of December, 1928.

HOLMES H. DYER.