(No Model.) 2 Sheets—Sheet 1.

J. COWAN.

AUTOMATIC LIQUID MEASURE.

No. 545,850. Patented Sept. 3, 1895.

Fig. 1.

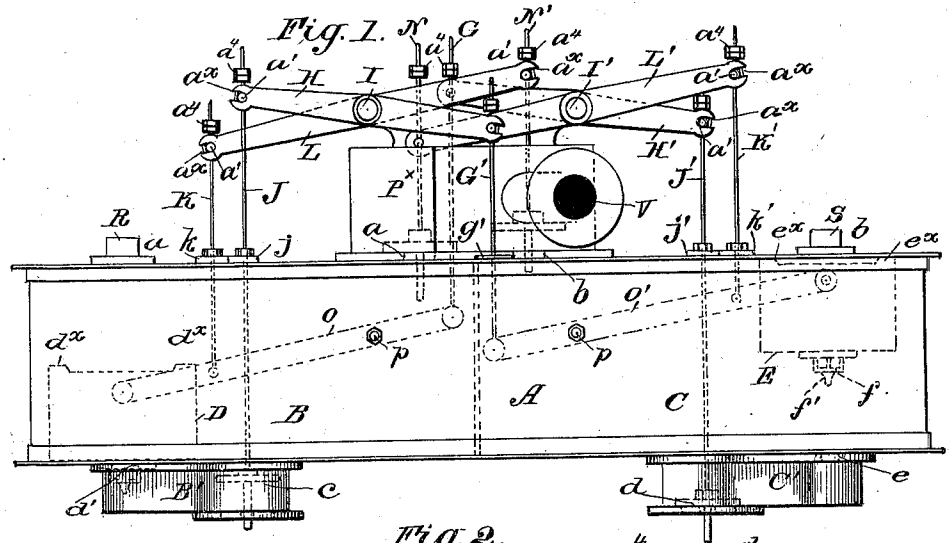


Fig. 2.

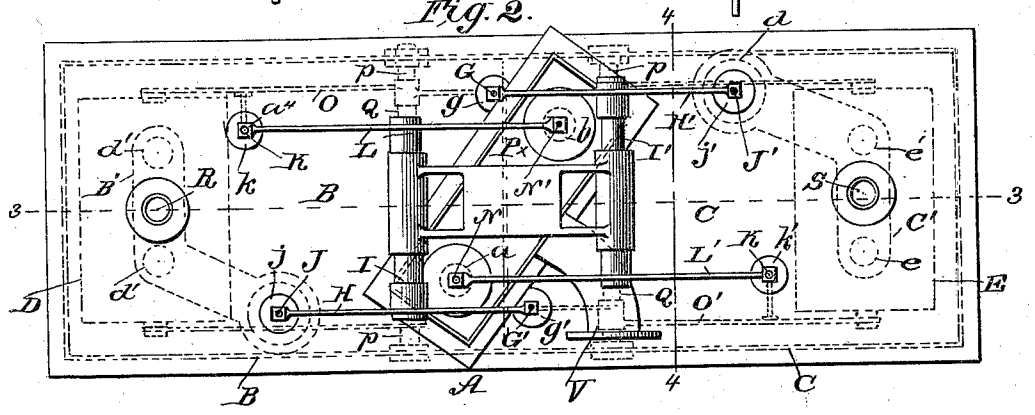


Fig. 5.

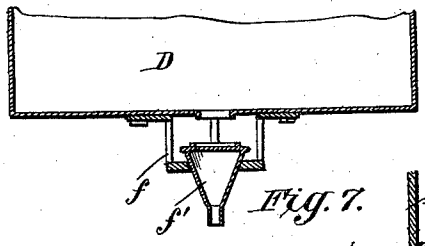


Fig. 6.

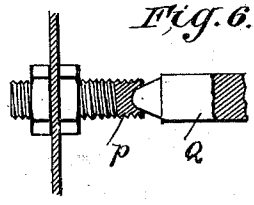


Fig. 7.

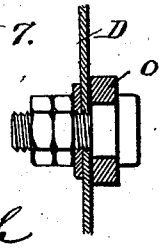
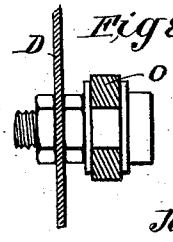


Fig. 8.



WITNESSES:

Fred G. Dieterich

Jos. A. Ryan

INVENTOR

James Cowan,

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. COWAN.

AUTOMATIC LIQUID MEASURE.

No. 545,850. Patented Sept. 3, 1895.

Fig. 3.

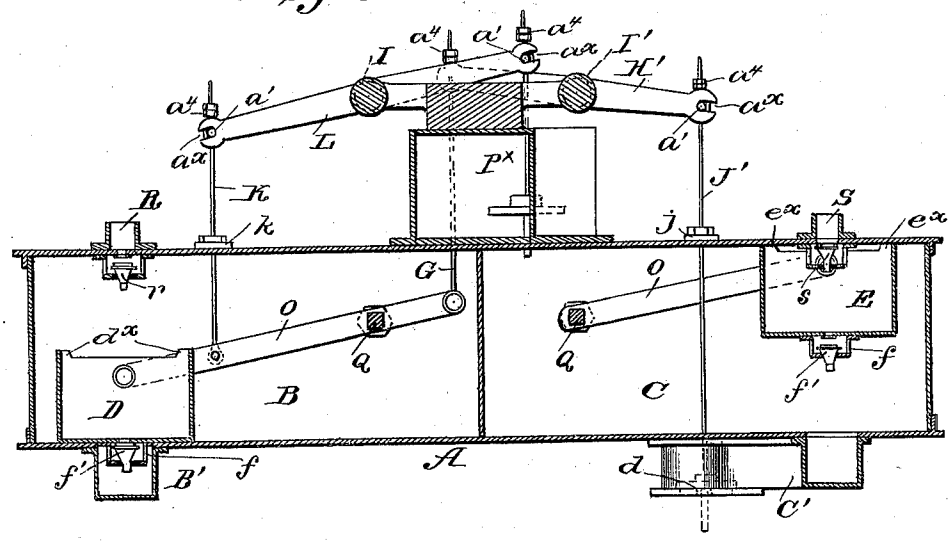
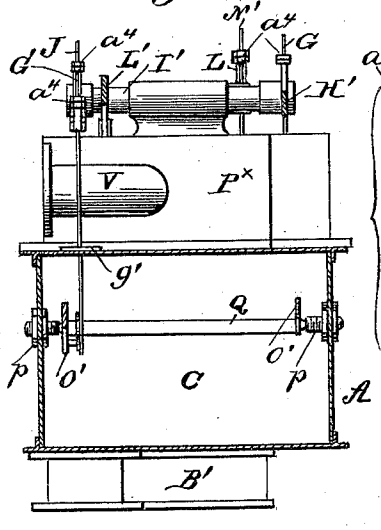
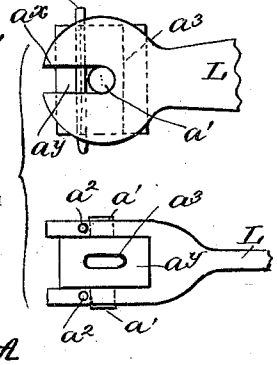


Fig. 4.



a^2 Fig. 9.



WITNESSES:

Fred J. Dieterich

Jos. A. Ryan

INVENTOR

James Cowan.

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES COWAN, OF HONOLULU, HAWAII.

AUTOMATIC LIQUID-MEASURE.

SPECIFICATION forming part of Letters Patent No. 545,850, dated September 3, 1895.

Application filed November 9, 1894. Serial No. 528,286. (No model.)

To all whom it may concern:

Be it known that I, JAMES COWAN, a subject of the Queen of Great Britain, residing at Honolulu, Hawaii, have made certain new and useful Improvements in Automatic Liquid-Measures, of which the following is a specification.

My invention relates to improvements in that class of liquid-measuring devices in which the liquid is measured as it flows therethrough, and such invention has primarily for its object to provide a measuring device of this character, of a simple and economic construction, which is easily set for an operative condition, in which the friction is reduced to a minimum, and which will effectually and positively serve to measure heavy as well as light liquids automatically.

With other objects in view, which hereinafter will be referred to, my invention consists in such novel features of construction and peculiar combinations of parts, as will be first described in detail and then be particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved automatic measure. Fig. 2 is a top plan view of the same. Fig. 3 is a longitudinal section of the same, taken on the line 3 3, Fig. 2. Fig. 4 is a transverse section taken on the line 4 4, Fig. 2. Fig. 5 is an enlarged sectional view of one of the float-valves. Figs. 6, 7, and 8 are detail views hereinafter referred to; and Fig. 9 is a detail view of one end of the lever-arms and the cross-head connected therewith.

Referring to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all the figures, A indicates a tank which is centrally divided to form two compartments B and C, of equal capacity. Each of the said compartments has an inlet valve *a b* at the top, and valved outlets *c d* at the bottom, which by means of a peculiar arrangement of floats and lever devices are operated to alternately open and close.

D and E indicate floats, one for each compartment, which are in the nature of rectangular tanks open at the top, provided with valved outlets *d d′ e e′*, respectively, in the bottom, and have their ends extended, as at d^x and e^x, for a purpose presently explained.

The outlet valves *c d* operate in pendent-like supplemental chamber or jacket portions B′ and C′, which portions also extend under the floors, as most clearly shown in Fig. 1, and form a space in which the valves *d d′ e e′* of the floats project when such floats are at their lowermost positions.

The floats D and E are connected to swinging levers O and O′, respectively, each pivoted near one end on cross-axles Q Q, as shown, their short ends being pivotally connected with rods G G′, which pass through stuffing-boxes *g g′* and connect with one end of pivoted levers H H′, journaled on suitably-supported shafts I I′, which levers connect at their opposite ends with plunger-rods J J′, which pass through stuffing-boxes *j j′* and connect, respectively, with the outlet-valves *c d*, as shown.

Near the float end the levers O O′ have pivotally connected thereto rods K K′, which pass through stuffing-boxes *k k′* and connect with one end of the levers L L′, to the opposite ends of which are pivotally connected the upper ends of rods N N′, which pass through stuffing-boxes and connect with the inlet-valves *a b*, as shown.

The several lift or plunger rods connected to the inlet and outlet valves are preferably connected with the valve-operating levers in the manner most clearly shown in Fig. 9, by reference to which it will be seen the ends of such levers are forked and have slots a^x, which form bearings for the journals *a′* of cross-heads a^y, which are held in place by the pins a^2, such cross-heads having elongated apertures a^3, through which the lift-rods pass.

By connecting the rods with operating-levers in the manner shown, the levers will be free to move on the rods and engage the heads a^4 of such rods at the proper time.

To cause the floats to rise level—that is, always in a true horizontal plane—I form the axles Q Q, to which the float-supporting lever-arms are connected, square in cross-section, (see Fig. 6,) and journal such axles in cone-bearings formed in the end of stub-screws *p p*, which pass through the side walls of the tank and are secured by the jam and lock nuts, as shown. The float ends of such lever-arms may be connected with the float in the manner clearly shown in Fig. 7, in which the jam and lock nuts for the bolt are disposed

on the inside of the float-wall, or as shown in Fig. 8, in which construction the jam-nut is disposed on the outside of the float.

P^x indicates an inlet-chamber, with which connects the inlet V, which chamber is disposed diagonally on the tank so as to project over the inlets of both compartments.

R and S indicate vent-openings having float-valves *r* and *s* and disposed centrally over the floats, as shown most clearly in Fig. 3. The several float-valves are preferably constructed as shown in detail in Fig. 5, and each of which comprises a cage *f*, in which is held the valve proper *f'*, which may be made of light copper or brass, like an inverted funnel, which may be open or closed at the apex. The inlet and outlet valves are of a large diameter, and in practice have guides in the valve-seat, as shown.

The operation of my improved measuring device is best explained as follows: When the valve-rods have been adjusted to the proper length (the heads of the upper ends being adjustable) and the machine is otherwise ready to start, both the inlet-valves will be moved to an open position and both outlets closed, the floats resting on the bottom of their respective compartments. The liquor is now let into the chamber P and into both compartments. When the supplemental compartments or jackets around the outlet-valves and in the valves in the bottom of the floats, now resting therein, are full, the float-valves will rise and close the openings in the bottom of such floats. As the liquor now rises in the main portion of the compartments, the floats will rise also, and owing to a slight difference in the length of the valve-rods one inlet-valve—say, *b*—will be moved to a closed position. Now, when the float in compartment B, having inlet *a* rises a little more, it will cause the lever H' to engage the head on the lift-rod J' of outlet-valve *d* and so empty the compartment C having inlet *b*. The liquor will now flow all through inlet *a*. When the float rises to the top of the tank or compartment B, the projected upper edges only will engage the top of such tank, which leaves a space over which the liquor can flow into the float D until it is nearly full, when it will sink to the bottom of its compartment, and as it does it will operate on the lever L and first close valve *d* and open inlet-valve *b* in the compartment C. The liquid will now flow into both compartments until the one B is full, at which time air-valve R will close (it being a float-valve) and prevent overflow. The compartment B being now full, all the liquid will flow into compartment C. When its jacket or supplemental chamber is full, the valves of its float will close and cause such float to rise with the liquid rising therein, which float as it rises will, through the operating-levers L' L', first shut off the inlet *a* and open the outlet *c* of the filled compartment B, in which, as it begins to empty, the air-valve R automatically opens, so that air will enter to let the said filled compartment empty freely. The machine will now work automatically as long as liquid flows into the chamber P and can be left to take care of itself.

The stuffing-boxes may be omitted and tubes used instead large enough to allow the connecting and valve rods to work easily. (See dotted lines, Fig. 2.) This would do away with the friction of stuffing-boxes. In using such stuffing-boxes, however, the packing has to be very loose, as the valves have to be heavy enough to pull the rods down through the packing by their own weight, as the levers operate only to lift the rods.

It is obvious balanced valves may be used when the machine works under pressure. The discharge-valves, however, have to be free from back-pressure. In practice registering devices are connected with the oscillating levers, which will indicate the number of times the compartments have been filled, and thereby keep a record of the number of gallons run through the machine.

When the liquid has ceased to flow and the machine has finished its work, it will be necessary to notice the register and by gage-glasses on the outside of the compartments note the amounts contained within the compartments. The said compartments can then be emptied by lifting the outlet-valve rods by hand.

It is manifest that in the practical construction the detailed arrangement of the several lever-arms may be varied without departing from my invention.

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

1. In a measuring apparatus as described, in combination a tank having two compartments each having a valved inlet and a valved outlet opening lever mechanism for alternately shifting such valves, and floats held in the compartments connected to such mechanism for operating it in reverse directions said floats being constructed to rise with the rising liquor in the tank and to fill as they reach the top and sink by gravity as set forth.

2. In a measuring apparatus as described, the combination with a tank having two equal compartments, each having an inlet and an outlet having valves held to close by gravity and a feed chamber common to both inlets of a pair of oscillating levers for each compartment floats in such compartments for operating the levers, and connections between each set of levers for one compartment and the valves of the opposite compartment, arranged substantially as shown whereby the inlet and outlet valves will be operated simultaneously and alternately and the outlet valves to close in advance of the openings of the inlet valves as and for the purposes described.

3. The combination with the tank having two compartments each having a jacket or pendent supplemental compartment valved outlets in each supplemental compartment

and valved inlets at the top of the tank, of floats open at the top and having openings in the bottom, having float valves adapted to project into the supplemental compartments when the floats are at their lowermost position, said floats having cut away portions at the top, and lever mechanism connecting the float of one compartment with the valves of the other compartment all arranged substantially as shown and described.

JAMES COWAN.

Witnesses:
WM. EARSIE,
W. H. MCINERRY.