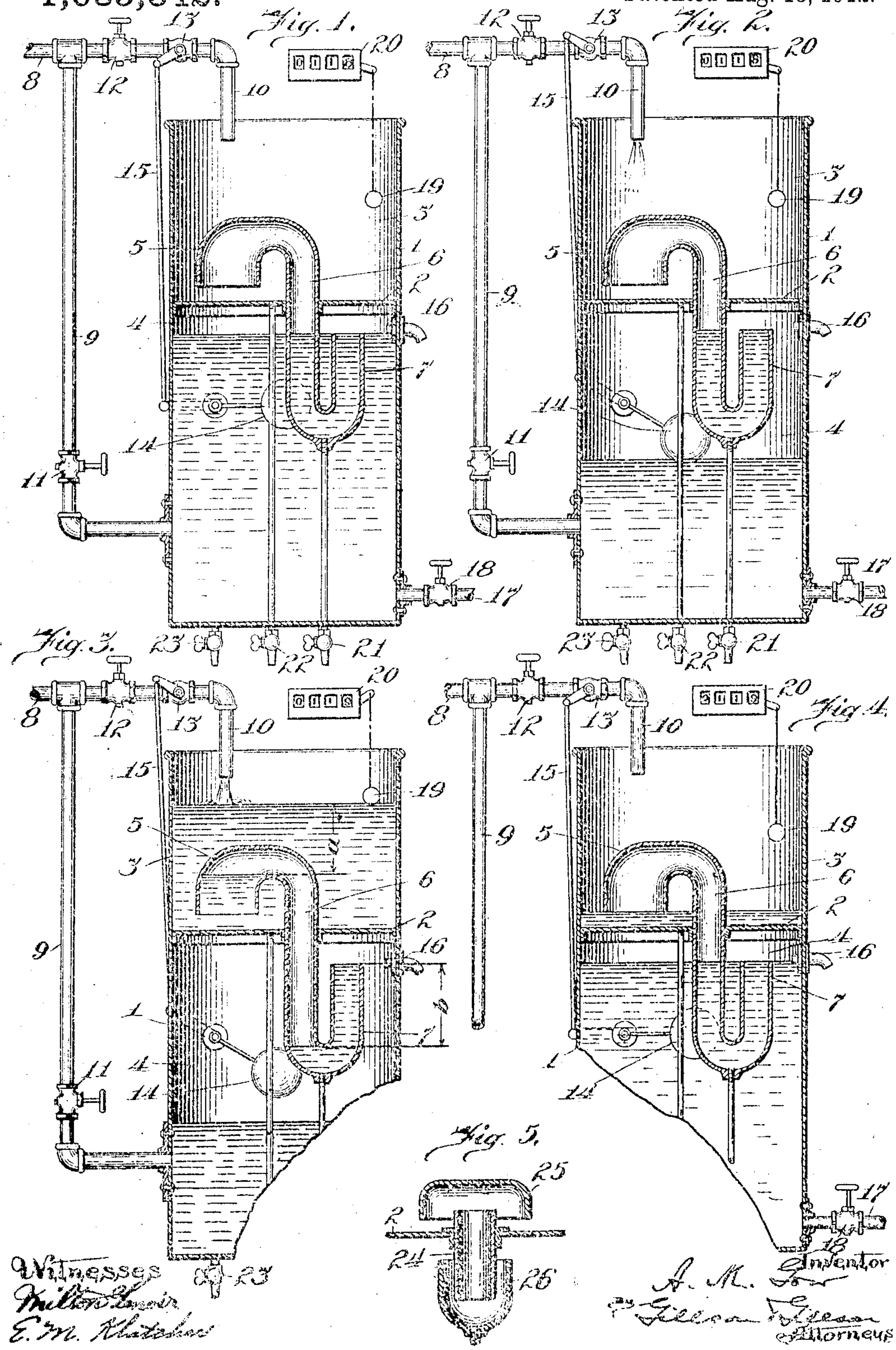
A. M. GOW.

LIQUID MEASURING APPARATUS.

APPLICATION FILED OCT. 17, 1910.

1,035,342. Patented Aug. 13, 1912.



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LIQUID-MEASURING APPARATUS.

1,035,342. Specification of Letters Patent. Patented Aug. 13, 1912.

Application filed October 17, 1910. Serial No. 587,549.

To all whom it may concern:

Be it known that I, ALEXANDER M. GOW, a citizen of the United States, and resident of Duluth, county of St. Louis, and State of Minnesota, have invented certain new and useful Improvements in Liquid-Measuring Apparatus, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to automatic devices for measuring liquids, its object being to simplify and cheapen devices of this kind while securing efficiency in operation.

The invention consists in a device such as is hereinafter described, and as diagrammatically illustrated in the accompanying drawings, in which—

Figures 1, 2, 3 and 4 show the apparatus in vertical section and at different stages in the cycle of its operation; and Fig. 5 is a sectional view of a modified form of the transferring connection between the two compartments of the apparatus.

In the simple form in which the device is shown, it comprises a tank 1, divided by a horizontal partition 2 into a measuring compartment 3, and a receiving and regulating compartment 4. These compartments are united by means of an S-shaped pipe passing through the partition 2, and comprising an upper or receiving leg 5, a connecting leg 6, and a lower or discharge leg 7.

The pipe for delivering liquid to the apparatus is shown at 8, and has branches 9 leading to the compartment 4, and 10 leading to the compartment 3. These branches are provided, respectively, with the manually-controlled valves 11 and 12, and in the branch 10 there is placed an additional valve 13, controlled by a float 14 in the compartment 4, the float lever being connected with the valve-stem by means of the rod 15.

At 16 there is an overflow vent leading from the compartment 4, on a level with the upper end of the leg 7 of the connecting pipe.

At 17 there is shown a discharge pipe leading from the compartment 4, and regulated by means of a valve 18, which is shown as being manually controlled.

A float 19 actuates a counter 20 for registering the number of operations of the apparatus.

At 21, 22 and 23 are shown drain pipes leading, respectively, from the lower ends of the legs 6 and 7 of the connecting pipe and from the compartments 3 and 4.

The form of the transferring passage may be varied. As shown in Fig. 5 this transferring device comprises a vertical pipe section 24, setting through the partition 2 and being open at both ends. Over the upper end of this pipe section is placed a bell 25, and its lower end is inclosed within a cup-shaped trap 26. The action is precisely the same as in the form shown in Figs. 1 to 4, the three elements constituting in effect the three members of an S-shaped pipe.

In use the apparatus is first primed by opening the valve 11, the valve 12 remaining closed until the liquid fills compartment 4 to the level of the vent 16, as shown in Fig. 1, filling the legs 6 and 7 of the connecting pipe to the same level, and closing the valve 13 by the action of the float 14. The valve 11 is now closed and the valves 12 and 18 are opened. As liquid is drawn off through the pipe 17, the level in compartment 4 is lowered gradually, the float 14 drops down far enough to open the valve 13, as shown in Fig. 2. Liquid now enters compartment 3, and as it rises a volume of air is trapped in the connecting legs 5 and 6. This air is compressed gradually, lowering the level of the liquid in the intermediate leg 6. The leg 5 is preferably made of greater cross-sectional area than the leg 6, whereby the depression of the liquid in the latter leg is greater than the rise of liquid in the former. When the liquid has risen to such a height in compartment 3 that the hydrostatic head from its level to the level in leg 5 is equal to the head from the juncture of legs 6 and 7 to the top of leg 7, as shown, respectively, at *a* and *b* (Fig. 3), the apparatus is just ready to discharge from compartment 3 to compartment 4. A further rise of liquid in compartment 3 will cause a portion of the compressed air to escape into leg 7, thus reducing the pressure in leg 6 as well as forcing water out of leg 7. This destroys the equilibrium, and the liquid in compartment 3 flows freely into compartment 4, the pipe acting as a siphon during the latter part of the discharge, bringing the level in compartment 3 to the open end of the leg 5, whereupon air enters

the pipe, breaking the siphon action. The volume of liquid transferred raises the level in compartment 4, and the rise of the float 14, incident to this transfer, closes the valve 13 and thus insures the interruption of the siphon action. This valve remains closed until the withdrawal of liquid through pipe 18 lowers the level in compartment 4 enough to allow the float 14 to drop, thus opening the valve 13 and recharging compartment 3, and repeating the cycle as before. The liquid may be withdrawn from the lower compartment as rapidly as desired, it being important only, when the discharge is continuous, that it be not too rapid to permit the actuation of the float 14. The float 19 actuates the registering device 20 at each filling of compartment 3; the capacity of one discharge being known, the aggregate quantity of liquid passing through the apparatus is determined.

Because of the simplicity of the apparatus and its freedom from moving parts, it becomes valuable for use not only in measuring water but acids and corrosive liquids, and its operation is free from danger of stoppage or clogging by dirt, chips, or other extraneous substances which the liquid may contain.

The apparatus is serviceable in various situations, as, for example, in connection with the open or vacuum type of feed water heaters.

While the connecting or transfer pipe is shown as being in S form, any other equivalent design may be used.

I claim as my invention—

1. In a liquid measuring apparatus, in combination, two compartments at different levels, the lower compartment having a discharge orifice, a pipe delivering liquid to the upper compartment, a stationary bell in the upper compartment, a stationary inverted bell in the lower compartment, and an unvented pipe connecting the chambers of the two bells.

2. In a liquid measuring apparatus, in combination, two compartments at different levels, the lower compartment having a discharge orifice, a pipe delivering liquid to the upper compartment, a stationary bell in the upper compartment, a stationary inverted bell in the lower compartment, an unvented pipe connecting the chambers of the two bells, a valve in the delivery pipe, and means controlled by the rise and fall of the liquid in the lower compartment for actuating the valve.

3. In a liquid measuring apparatus, in combination, two compartments at different levels, the lower compartment having a discharge orifice, a pipe delivering liquid to the upper compartment, a stationary bell in the upper compartment, an inverted bell in the lower compartment, an unvented pipe connecting the chambers of the two bells, a valve in the delivery pipe, a float in the lower compartment, and a connection between the float and the valve whereby the valve is closed by the rise and opened by the fall of the float.

4. In a liquid measuring apparatus, in combination, two compartments at different levels, the lower compartment having a discharge orifice, a pipe delivering liquid to the upper compartment, a stationary bell in the upper compartment, a stationary inverted bell in the lower compartment, an unvented pipe connecting the chambers of the two bells, a registering device, a float in one of the compartments, and operative connection between the float and the registering device.

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