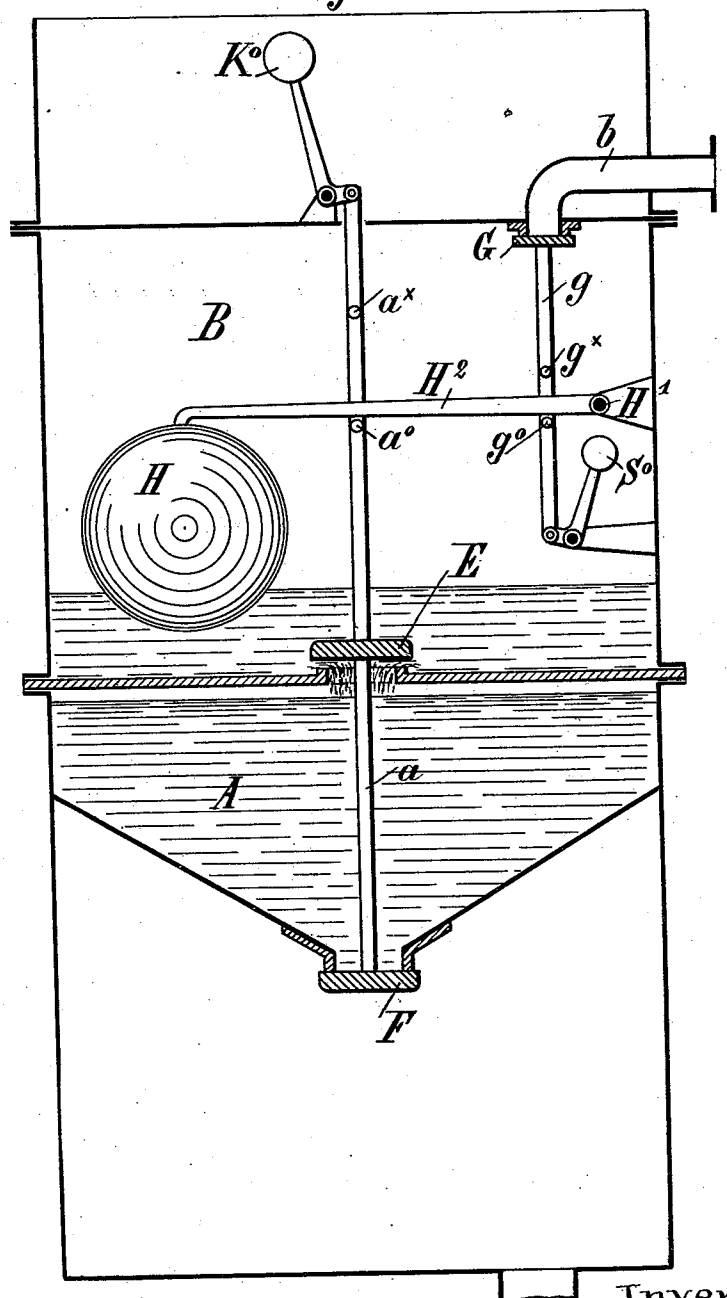
(No Model.) 4 Sheets—Sheet 1.

M. E. REISERT.

AUTOMATIC LIQUID METER.

No. 469,793. Patented Mar. 1, 1892.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

M. E. REISERT.

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Fig. 2.

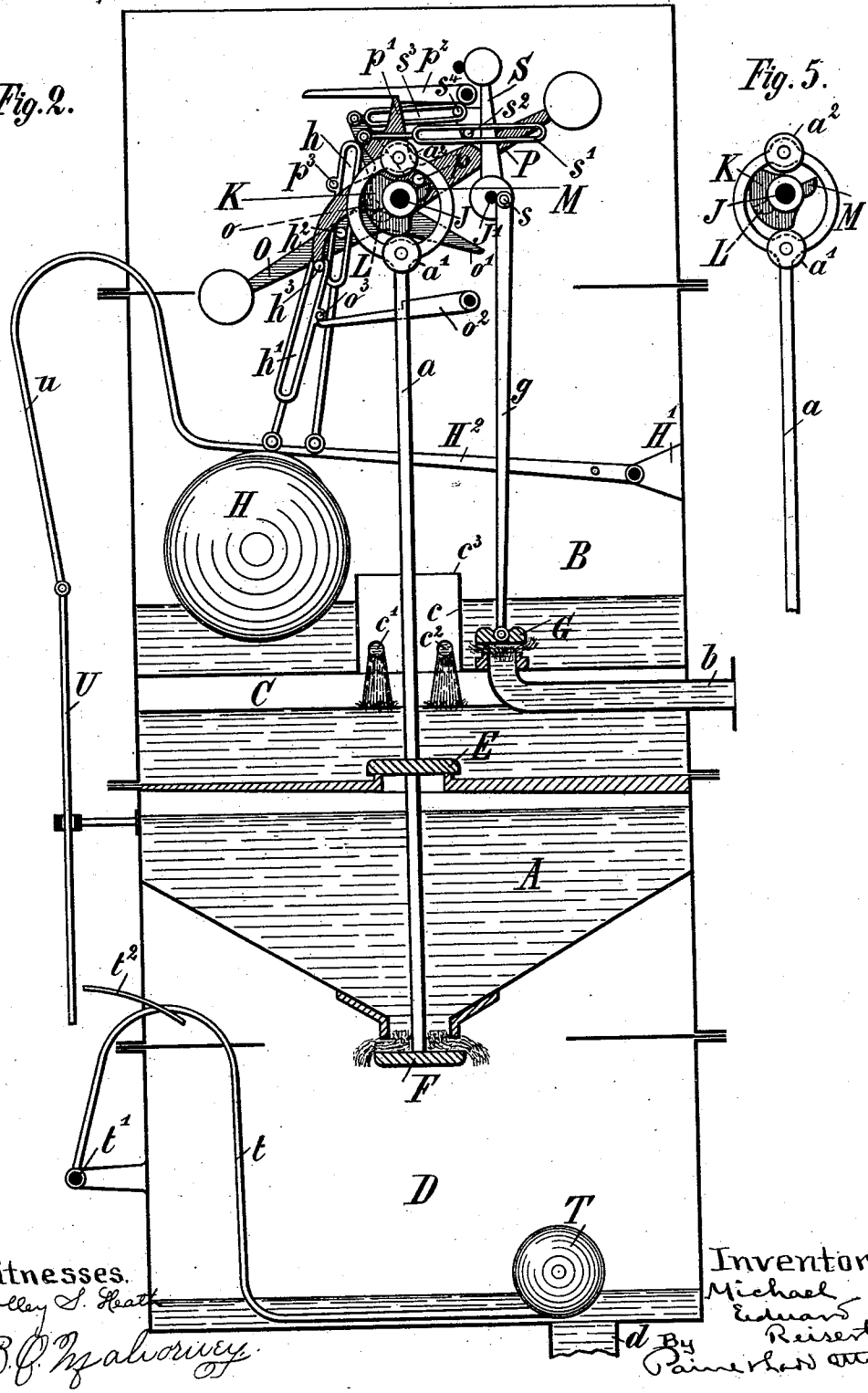

Fig. 5.

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(No Model.) 4 Sheets—Sheet 3.

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AUTOMATIC LIQUID METER.

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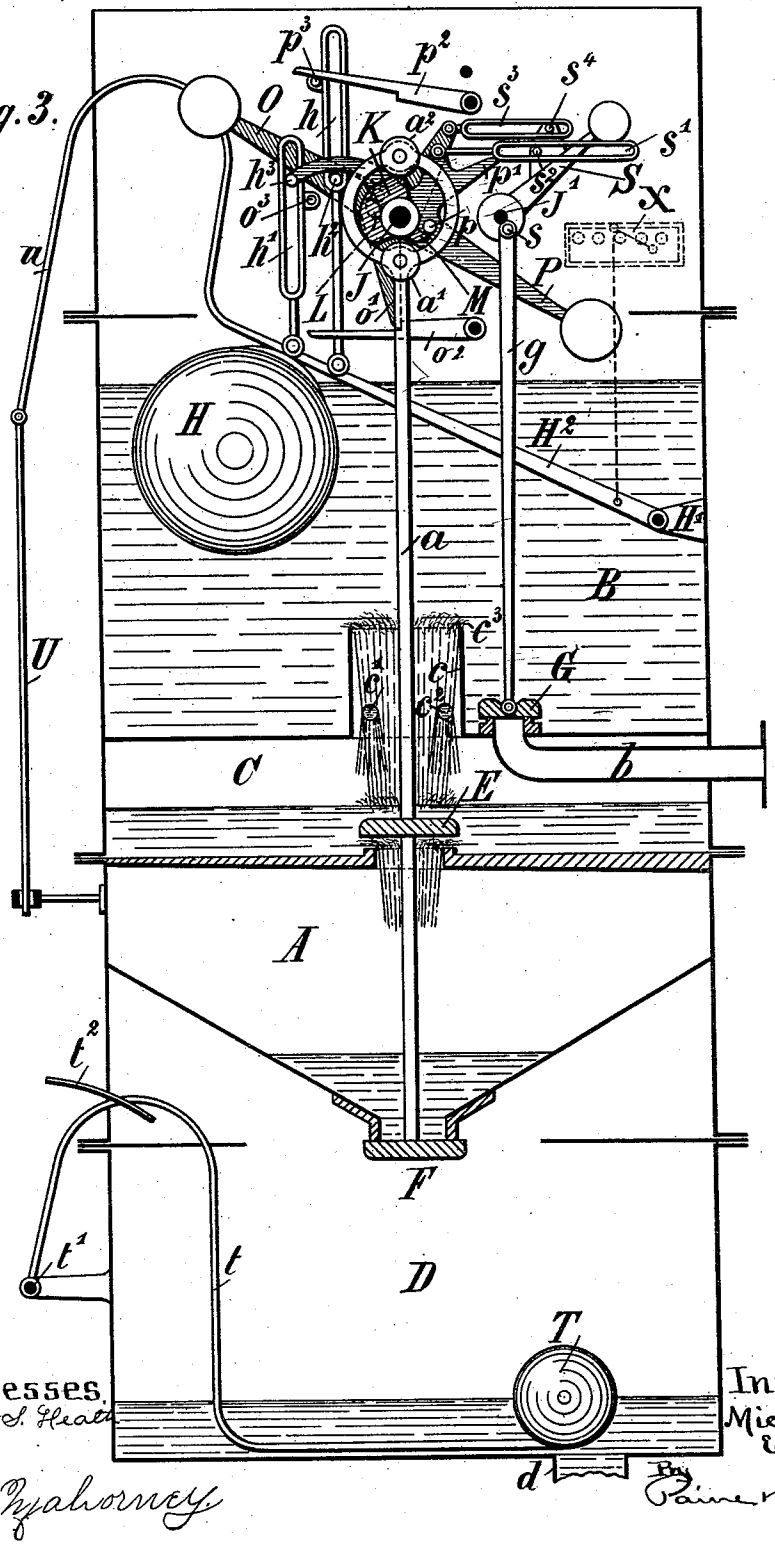
Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

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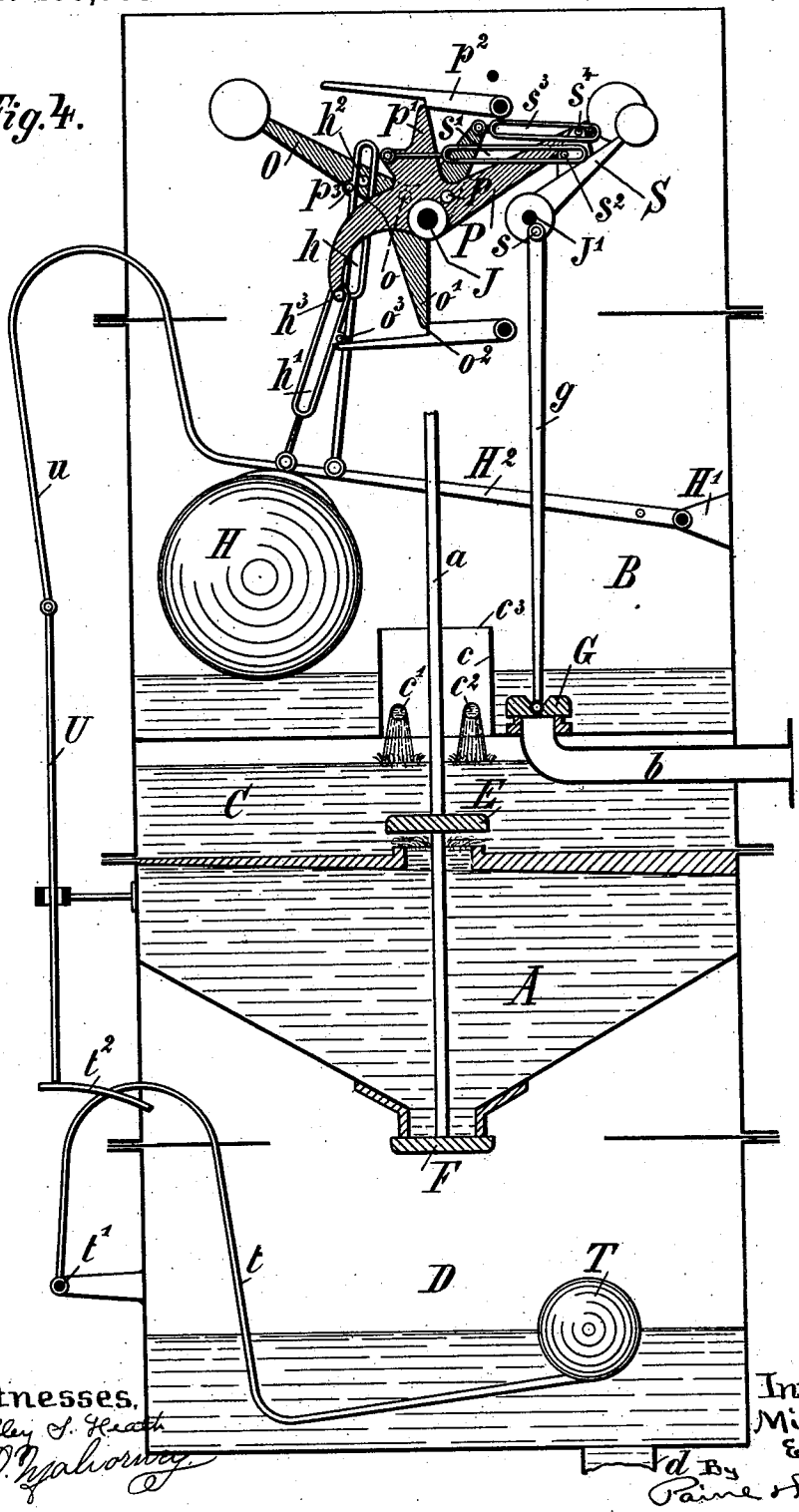
AUTOMATIC LIQUID METER.

No. 469,793. Patented Mar. 1, 1892.

Fig. 4.



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UNITED STATES PATENT OFFICE.

MICHAEL EDUARD REISERT, OF HENNEF-ON-THE-SIEG, GERMANY.

AUTOMATIC LIQUID-METER.

SPECIFICATION forming part of Letters Patent No. 469,793, dated March 1, 1892.

Application filed August 26, 1891. Serial No. 403,799. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL EDUARD REISERT, a subject of the German Emperor, residing at Hennef-on-the-Sieg, in the German Empire, have invented certain new and useful Improvements in Automatic Liquid-Meters, of which the following is a specification.

My invention relates to improvements in automatic liquid-meters, in which the number of fillings of a measuring-vessel of a given capacity is recorded by a counter of usual construction; and the object of the same is to provide means for securing a minute measuring and correct recording of the exact quantity of the liquid passed through the apparatus. I attain this object by providing within the casing of the apparatus and above the measuring-vessel proper a separate vessel in which the liquid is received before entering the measuring-vessel proper. In this separate vessel, which is hereinafter called the "receiver," a floating body designed to actuate the reversing-gear of the inlet and outlet valves is provided, and by this means the supply of the liquid in the apparatus may be stopped as soon as not only the measuring-vessel is entirely but also the said receiver partly filled, so that there is always an excess of liquid in the apparatus beyond the quantity required for a proper filling of the measuring-vessel. According to this invention the said receiver may be divided in its height into two compartments, in the lower one of which a certain time before the supply ceases less liquid is issued than discharged into the measuring-vessel proper, so that the said floating body is enabled to descend even when the measuring-vessel proper is already filled.

In the accompanying drawings, in which similar letters denote similar parts throughout the several views, Figure 1 is a vertical section of an apparatus with an undivided receiver. Figs. 2 to 4 are vertical sections of an apparatus having an intermediate compartment between the receiver and the measuring-vessel proper, showing the positions of the mechanism at different stages of operation, and, finally, Fig. 5 is a detailed part of the reversing-gear.

Referring to Fig. 1, A is the measuring-vessel proper, and B the receiver, which latter has a greater capacity than the former. The communication of both vessels is regulated by means of a valve E, actuated by a floating body H through the medium of a lever H^2, which is designed to operate, also, the inlet-valve G of the supply-pipe *b*. Through the rod *a* the valve E, adapted to regulate the passage of the liquid into the measuring-vessel is connected to a valve F, controlling the issue of the liquid from the measuring-vessel A. The rod *a* is provided with studs a° and $a^\times$, adapted to be engaged by the lever H^2, pivoted at H′ within the receiver B, and to open and close the valves E and F. The latter are arranged in such a manner that while the one is open the other one is always closed, and vice versa. The studs a° and $a^\times$ are also so adjusted that the valve E is caused to shut off the supply to the measuring-vessel instantaneously after the latter is entirely and the receiver B partly filled, so that a complete filling of the measuring-vessel A is secured under all circumstances. While the valve E is closed and the valve F opened the inlet-valve G of the apparatus, which is actuated by the studs g° and $g^\times$ of the valve-stem, and the lever H^2 has been opened. In order to control the exact function of the said valves E F G and secure an instantaneous opening and closing of the same, the valve-rods *a* and *g* may be connected to weighted tilting levers K° and S°, respectively, or any other known means, operating in conjunction with the said floating body H.

In the apparatus illustrated by Figs. 2 to 4 between the measuring-vessel proper A and the receiver B an intermediate compartment C, and underneath the measuring-vessel A a fourth compartment, the reservoir D, for the measured liquid, are arranged. The compartments B and C are communicating continuously one with the other, preferably by aid of a tubular stud or socket *c*, which is tightly connected to the bottom of the compartment B and open at both ends. The diameter of this socket *c* is large enough so that it will admit the passage of a quantity of liquid sufficient to maintain the intermediate compartment C always filled during the time that the level of the liquid in the receiver B stands higher than the upper mouth of the socket *c*—that is to say, the sectional area of the latter is

somewhat larger than that of the outlet-valve E. After the level of the liquid has sunk below the upper edge c^3 of the socket c the liquid is permitted to pass into the compartment C only through the apertures c' c^2 in the wall of the socket c. According to the proportion of the total area of the apertures or outlets c' c^2 to the area of the passage c, the flow or issue of the liquid is more or less retarded as the supply tends to cease. Consequently the quantity of liquid stored in the compartment C will be gradually reduced, since a larger quantity of liquid is capable of being expelled than may at the same time be supplied. It should, however, be observed that still a certain quantity of liquid must be retained in the compartment C, even when the valve regulating the supply of the measuring-vessel proper is closed. In this manner the supply of water or liquid to the measuring-vessel has just ceased when the latter has been properly filled; but the floating body H within the receiver B is still allowed to descend after the valve E has cut off the supply of the measuring-vessel A—a circumstance of great importance with regard to the regular working of the reversing-gear of the inlet and outlet valves. The inlet-valve E of the measuring-vessel proper A is fixed to the outlet-valve F by means of the rod a in such a manner that one of them has been opened when the other has been shut up, and vice versa. The supply of the receiver B is regulated by means of an inlet-valve G, connected to a rod g. Both rods a and g are actuated by a reversing-gear arranged in the receiver B, as will be described hereinafter, in such a manner that as soon as the valve G has been opened the valve E has been shut up, and at the same time the outlet-valve F opened. At this stage the liquid is permitted to enter the compartments B and C, Fig. 2, while the floating body H ascends to a certain level. At this moment the valve-rod a is pushed upward, whereby the valve F is closed and the valve E opened, while at the same time the inlet-valve G is closed. The liquid contained in the receiver B is for the most part conducted through the socket c into the intermediate compartment C, and from the latter through the passage of the valve E into the measuring-vessel A, which is thereby properly filled, Fig. 3. In consequence of the partial evacuation of the receiver B, the floating body H will descend and cause at its lowest position a sudden downward motion of the valve-rod a. The valve E is therefore closed while the valve F is opened, so that the contents of the measuring-vessel may be discharged into the compartment D. While the valve-rod a is moving downwardly the inlet-valve G is opened and the receiver B may again be filled, which will cause the floating body H to rise and the valves E and F to open and shut up, respectively, as herein described with reference to Fig. 1. Each evacuation of the measuring-vessel proper A is recorded by the counter X, and the manner in which the valves E, F, and G are actuated at the given moment will be understood from the following: A cam K is keyed on a shaft J, which is journaled within the upper part of the compartment B. The valve-rod a is provided with two rollers a' and a^2, upon which actuates the cam K. In the position Fig. 2 the cam K tends to move the rod a downward and to keep the valve E closed, but the valve F opened. In the position Fig. 3 the roller a^2 bears upon the cam K, which thereby maintains the valve E open and the valve F closed. On the shaft J are further fastened two short levers L and M, and beside the first one is arranged a weighted lever O, turning loosely on the shaft J, and beside the lever M a weighted lever P. The lever O acts upon the lever L by means of a pin o, and the lever P by means of a pin p upon the lever M. The levers O and P are, respectively, provided with studs o' and p', engaging pawls o^2 and p^2, respectively. To the lever H^2 of the float H, having its fulcrum at H', are connected two upwardly-extending rods h and h', having vertical slots engaging the pins h^2 and h^3 of the levers O and P, respectively. Another weighted lever S is keyed to a shaft J', which is also journaled in the upper part of the receiver B. This lever S is provided at a little distance from its axis of oscillations with the pivet s, supporting the rod g of the inlet-valve G. It is furthermore connected with the weighted lever P by means of a slotted rod s' and a stud s^2, and with the weighted lever O by means of a slotted rod s^3 and a stud s^4. If it is assumed that the inlet-valve G of the receiver B is opened and the valve E is closed the floating body H rises, and thereby causes the weighted lever O, by means of the rod h and the stud h^2, to swing upward, so that the branch o' of the same will engage with the pawl o^2, pivoted to the wall of the casing of the apparatus. At the same time the stud p^3 of the rod h meets with the pawl p^2, adapted to engage with the branch p' of the weighted lever P, which is thereby disengaged, so that it is caused under the influence of its weight to swing downward, Fig. 3. During this oscillating motion the stud p of the lever P bears upon the short arm M of the shaft J, which is thereby caused to turn, so that the cam K is brought into the position Fig. 3. The cam K, however, in the meantime acts upon the roller a^2 of the valve-rod a, which is thereby pulled upward, so that the valve F of the measuring-vessel A is shut up and the valve E is opened. At the same time the rod s', which is connected to the weighted lever P, acts upon the stud s^2 of the lever S, and thereby turns the latter to the right hand, so that the inlet-valve G of the receiver B is caused to return into its closed position and to stop the further supply of the liquid. By opening the valve E the measuring-vessel proper A is opened at its upper end, but shut up at its lower end by the closure of the valve F. The liquid having been

previously collected within the compartments B and C is now permitted to enter into the measuring-vessel A and to fill the same properly. By the sinking of the level of the liquid in the receiver B, also, the floating body H descends gradually, which causes the rod h' to turn the lever P by the aid of the stud h^3 into the upright position, in which the pawl p^2 engages behind the arm p' of the lever, and thus again arresting the same, Fig. 4. The stud o^3 of the rod h' further meets with the pawl o^2 and disengages in the lowest position of the floating body the lever O, so that the latter when dropping turns into the opposite position the cam K by the aid of the stud o, which bears on an arm L, keyed to the shaft J of the cam. The cam K will thereby press downward against the roller a' and also the valve-rod a, and consequently close the valve E and open the valve F, so that the measuring-vessel proper A is enabled to issue its contents into the lower compartment D. During the descent of the weighted lever O the rod s^3, connected to a branch of the latter, pulls again by means of the stud s^4 the weighted lever S into the upright position, thereby opening again the inlet-valve G.

The above-described operation may then be repeated.

As already mentioned, in the reservoir D is arranged a second floating body T, attached to a lever t, which is pivoted at t' to the casing of the apparatus. This lever t is provided with an arm t^2, serving temporarily as a support of a vertically-guided rod U, which is connected to the floating body H by means of an arm u, and being allowed to move to and fro with the floating body H. After the level of the liquid contained in the reservoir D has raised to a certain height, also the floating body H has ascended far enough to cause the arm t^2 to meet with the rod U, thus preventing the floating body H to further descend, so as to actuate the reversing-gear of the inlet and outlet valves, Fig. 4. The valve G will therefore be kept closed until so much of the liquid in the reservoir D is discharged through the pipe d that the arm t^2 is withdrawn from the path of the rod U and the floating body H is permitted to descend still farther, and thus actuate the reversing-gear to such an extent that the opening of the inlet-valve G is accomplished. Therefore the working of the apparatus is governed exactly by the quantity of the measured liquid drawn off from the reservoir D.

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

1. An automatic liquid-meter, in the casing of which a separate vessel for the previous reception of the liquid to be measured is arranged above the measuring-vessel proper, and in which by the rise and fall of the liquid a floating body governing the supply and discharge of the liquid through suitable mechanism is actuated in such a manner that the supply may be stopped after the measuring-vessel is entirely filled and yet a certain quantity of the liquid stored in the higher-placed said vessel, substantially as and for the purpose specified.

2. In an automatic liquid-meter, the combination of the herein-described receiver B and measuring-vessel A with an intermediate compartment C, into which toward the termination of the supply less liquid is discharged from the receiver B than issued to the measuring-vessel, so that the floating body H within the receiver B, governing the supply and discharge of the liquid, has not yet reached its lowest position when the supply to the measuring-vessel ceases, substantially as and for the purpose set forth.

3. In an automatic liquid-meter, the combination, with a receiver, of a floating body H, a measuring-vessel proper A, and a reservoir D, within which a floating body T, attached to a lever t, is acting by means of a branch t^2 and through the medium of a rod U upon the floating body H in the receiver, substantially as and for the purpose specified.

4. In an automatic liquid-meter, the combination, with a receiver B and an intermediate compartment C, of a floating body H, a measuring-vessel proper A, a reservoir D, and a floating body T, lever t, arm t^2, and rod U, substantially as and for the purpose specified.

5. In an automatic liquid-meter, the combination, with a receiver B, of a floating body H, attached to a lever H^2, a measuring-vessel proper A, and a reversing-gear consisting of the valve-rods a g, studs or rolls a' a^2, cam K, keyed to a shaft J, to which are attached the arms L and M, the weighted levers O and P being provided with pins o and p, respectively, which bear upon the arms L and M, and having branches o' and p', respectively, which engage with the pawls o^2 and p^2, respectively, the weighted lever S, operated through the slotted rods s^3 and s' by the levers O and P, respectively, and the slotted rods h and h', connected to the lever H^2, provided with projections or studs o^3 and p^3, respectively, and operating the weighted levers O and P, respectively, substantially as and for the purpose set forth.

6. In an automatic liquid-meter, the combination of the two compartments B and C, the upper compartment B having an overflow-passage adapted to discharge into the lower compartment C and having a greater and less discharging capacity, a floating body H, a measuring-vessel proper A, and a reversing-gear consisting of the herein-described mechanism, which operates the inlet-valve G of the supply-pipe b and the supply and discharge valves E and F of the measuring-vessel, the greater discharge of said overflow-passage occurring when the valve E is open and the less discharge continuing after the greater discharge has ceased, substantially as and for the purpose specified.

7. In an automatic liquid-meter, the combi-

nation, with a liquid collecting or storing vessel B, of a floating body H, a measuring-vessel proper A, a reversing-gear consisting of the herein-described mechanism, a reservoir D, floating body T, attached to a lever *t*, provided with an arm t^2 and acting through the medium of a rod U upon the floating body H, substantially as and for the purpose set forth.

8. In an automatic liquid-meter, the combination, with two compartments B and C, of a floating body H, a measuring-vessel proper A, a reversing-gear consisting of the herein-described mechanism, a reservoir D, a floating body T, lever *t*, with arm t^2, and rod U, substantially as and for the purpose specified.

9. In an automatic liquid-meter having a collecting or storing vessel arranged above the measuring-vessel proper, a tubular stud or socket forming a passage to an intermediate compartment situated between the said collecting and measuring vessels and having in its wall close to its lower mouth a number of apertures of less area than the cross-section of the socket, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this the 9th day of July, 1891.

MICHAEL EDUARD REISERT.

Witnesses:
G. W. MALLINCKRODT,
H. A. MAXWELL.