

Dec. 24, 1929.

R. PORTE

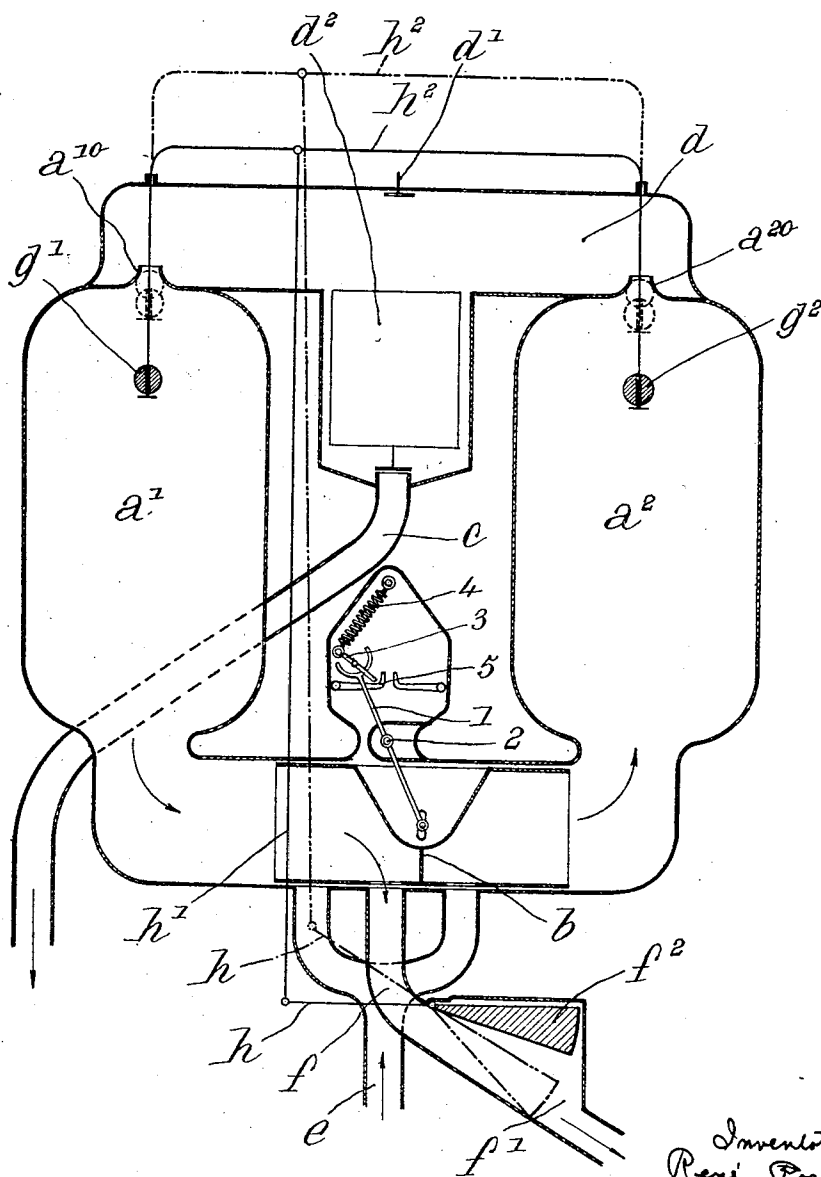
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LIQUID MEASURING AND DISTRIBUTING SYSTEM

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Fig. 1.



Inventor
René Porte,
By *Sturtevant & Mason*,
attorneys.

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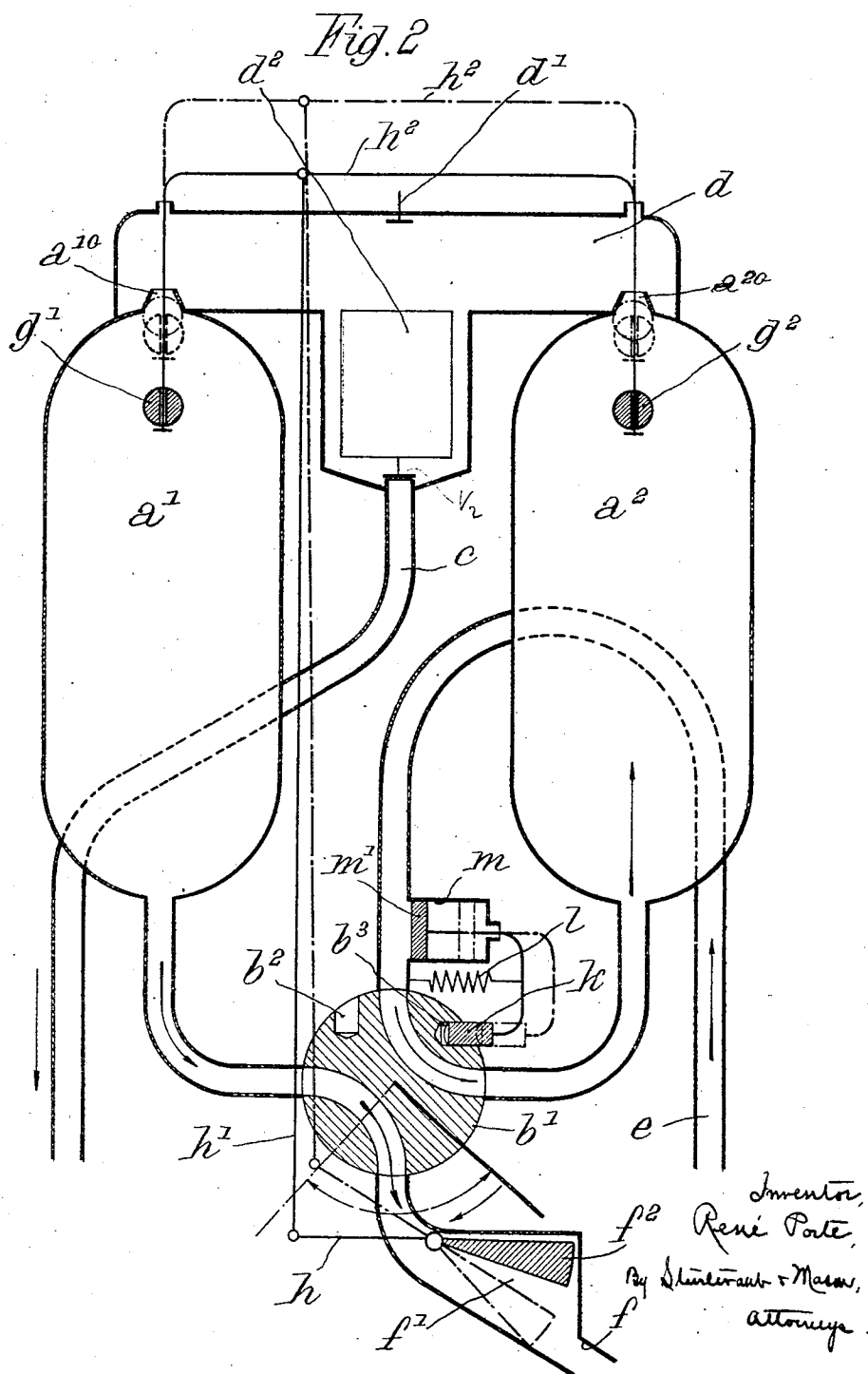
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UNITED STATES PATENT OFFICE

RENÉ PORTE, OF LEVALLOIS-PERRET, FRANCE, ASSIGNOR TO SOCIÉTÉ HARDOLL (ÉTABLISSEMENTS HARIVEAU & DOLIMIER ET RENÉ PORTE & CIE, REUNIS), OF LEVALLOIS-PERRET, FRANCE

LIQUID MEASURING AND DISTRIBUTING SYSTEM

Application filed June 6, 1927, Serial No. 196,953, and in Belgium June 11, 1926.

The present invention relates to liquid measuring and distributing systems of the type having a pair of measuring reservoirs arranged to be alternately filled and emptied upon the movement of a reversing valve.

One of the objects of the invention is to provide means for preventing movement of the reversing valve until one reservoir is full and the other completely empty.

Other objects will appear in the course of the description now to be given with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic section through one embodiment of the invention;

Fig. 2 represents, schematically, a section through a second inventive embodiment.

Referring to Fig. 1 of the drawings, there is shown a pair of reservoirs a^1 , a^2 ,—a slide valve b (to be more fully described later) connected by proper conduits to the bottoms of reservoirs a^1 , a^2 ,—an overflow conduit c connected to overflow and air equalizing chamber d , the latter being fitted with an inwardly opening valve d^1 ,—a vertically movable float d^2 connected to the valve v^2 controlling conduit c ,—a forked feed conduit e communicating with the cylinder in which the slide valve b moves, and supplied with fluid from a pump or other supply source (not shown),—a discharge conduit f ,—a pair of spherical valves g^1 , g^2 arranged to slide upon the vertical arms of a U-shaped rod h^2 and to seat in seats a^{10} and a^{20} respectively at the upper ends of the reservoir a^1 , a^2 ,—

and a valve control system consisting of a float chamber f^1 located as close to valve b as possible, a pivoted float f^2 actuating a lever h , and a rod h^1 pivotally connected to lever h and U-shaped rod h^2 . Valve b is provided with a vertical diaphragm and a pair of ports positioned so as to register at each reversal with discharge conduit f and one branch of feed conduit e and is designed to reverse automatically under the increased liquid pressure consequent on the closing movement of valves g^1 or g^2 with the aid of mechanisms of the type disclosed in co-pending application 139,712 filed Oct. 5, 1926. Said mechanisms comprise a lever 1 pivoted at a point 2 inter-

mediate its ends; the lower end of the lever is connected to the piston valve b while the upper end is bifurcated and is pivotally attached to an intermediate point of the short lever 3. The upper end of this short lever 3 is connected to a compression spring 4 which in turn is mounted by a fixed pivot at its own free end. The lower end of the short lever 3 may be brought against either one of the members 5 having upturned abutments at their free ends, and being mounted on fixed pivots at their outer ends. The assemblage of the portion of lever 1 above its pivot 2, the short lever 3 and the compression spring 4 forms a toggle arrangement.

The manner in which the device operates is as follows:—Assuming the apparatus to be in the position shown in full lines in Fig. 1, liquid flows into reservoir a^2 from conduit e and discharges from reservoir a^1 through conduit f ; during the period that reservoir a^1 is emptying, float f^2 is raised, lever h is lowered, and valves g^1 and g^2 (which are slightly heavier than the liquid) drop to a level where the rising liquid is unable to bring them into contact with seats a^{10} , a^{20} ; as soon as reservoir a^1 is empty, float f^2 drops, and valves g^1 and g^2 are brought to within a short distance of their respective seats (see Fig. 1); in this position of the valves the overflowing liquid in reservoir a^2 is able to move valve g^2 into seat a^{20} ; the liquid now contained in reservoir a^2 , under the pressure of the feed pump, will act on the diaphragm of valve b to move the latter from right to left. During this movement of the valve b , the lever is rocked about its pivot 2 so that its upper end is moved toward the right; the lever 1 carries with it the small lever 3 which is caused to rock by its engagement with the left hand abutment 5 with a storage of energy in the spring 4, until the parts have moved beyond the line of centers shortly thereafter, when valve b is at the dead point, lever system 1, 3 receives an impetus from spring 4 (which has been storing energy during the movement of valve b) which results in a quick movement of valve b to its reversed position. That is, if the lever 1 has been rocking clockwise about its pivot 2 by the action of the valve member b , its up-

per end has been carrying the pivot of the short lever 3 and hence this lever itself toward the right until its lower end has been presented against the left hand abutment point 5. During this movement, the spring 4 has been slightly compressed, the upper end of the short lever 3 being received against the left hand fork of the lever 1. As soon as the lower end of the lever 3 engages the relatively fixed abutment end 5, the lever 3 likewise is caused to make a clockwise rocking movement about its own pivot during the further movement of the lever 1, thus further compressing the spring 4. This continues until the connection between the spring 4 and lever 3 passes slightly beyond the line of centers of the pivot for lever 3 and the fixed upper pivot for the spring 4, upon attaining which position the spring 4 causes the short lever 3 to snap quickly over until its upper end engages the right hand fork of the lever 1. The construction and arrangement of the parts are such that the energy of the spring 4 is now brought to bear against the right hand fork of the lever 1 beyond the line of centers intersecting the pivot 2 and the upper fixed pivot of the spring 4, so that the toggle thus constituted causes the lever 1 to be moved quickly to the limit of its clockwise travel, carrying the valve member *b* along with it. It will be noted that the abutment members 5 are free to move slightly downward to permit the rocking of the short lever 3 with respect to the lever 1: but are normally biased into the position shown in full lines in Fig. 1.

In the modification shown in Fig. 2, a manually rotatable reversing valve *b*¹ replaces automatically actuated sliding valve *b* of Fig. 1, and is provided with passages permitting reservoirs *a*¹ or *a*² to be alternately connected to feed and discharge conduits *e* and *f*. The structure is otherwise the same as that shown in Fig. 1 with the sole exception of a locking assembly arranged to positively engage with valve *b* throughout the period that one reservoir is emptying or the other reservoir is filling. This locking assembly consists of a cylinder *m* and piston *m*¹ positioned on the inlet side of valve *b*, a bolt *k* rigidly connected to piston *m*¹, and a spring *l* tending to move bolt *k* into one of two recesses *b*² or *b*³ formed on the edge of valve *b*¹.

The locking assembly operates as follows: Assuming the apparatus to be in the position shown in full lines in Fig. 2, liquid will flow in the direction of the arrows into reservoir *a*² and out of reservoir *a*¹; as soon as the liquid level is sufficiently high to move valve *g*² into its seat *a*²⁰, the pressure on the liquid flowing through conduit *e* will increase; piston *m*¹ will be actuated outward to the right to the dotted line position by this increase in fluid pressure and will release bolt *k* from recess *b*³; valve *b*¹ can then be rotated into its reversed position i.e. with bolt *k* engaging in recess *b*²;

it will be noted, however, that, in the event that reservoir *a*¹ is not completely discharged at the time that the liquid reaches the tap of reservoir *a*², float *f*² will act on *h*, *h*¹, *h*² to maintain valves *g*¹, *g*² in lowered position and the pressure necessary for actuating piston *m* will not be available until one of the valves *g*¹, *g*² moves upward into one of the seats *a*¹⁰, *a*²⁰.

What I claim is:—

1. An apparatus of the class described comprising in combination a pair of tanks, valve means controlling the upper level of said tanks, a feed conduit, a discharge conduit, a valve interposed between said tanks and said conduits, and means associated with the discharge conduit and operable by the fluid flowing through said discharge conduit to prevent said valve means from being lifted for closing the tank being filled and the pressure taking effect in said tank so long as liquid flows through the discharge conduit.

2. An apparatus of the class described comprising in combination a pair of tanks, an overflow chamber connected to said tanks, first valve means controlling communication between said overflow chamber and said tanks, common feed and discharge conduits for said tanks, second valve means interposed between said feed and discharge conduits and the tanks so that either one of said tanks may be connected to the said conduit and the other tank to the discharge conduit and vice versa, and means operable by liquid flowing in the discharge conduit to prevent said first valve means from being lifted for closing the tank being filled and the pressure taking effect in said tank so long as liquid flows through the discharge conduit.

3. An apparatus of the class described comprising in combination a pair of tanks, valve means controlling the upper level of said tanks, a feed conduit, a discharge conduit, a pressure operated valve interposed between said tanks and said conduits, and means associated with the discharge conduit and operable by the fluid flowing through said discharge conduit to prevent said valve means from being lifted for closing the tank being filled and the pressure taking effect in said tank so long as liquid flows through the discharge conduit.

4. An apparatus of the class described comprising in combination a pair of tanks, valve means controlling the upper level of said tanks, a feed conduit, a discharge conduit, a distributing valve interposed between said tanks and said conduits, a locking device and pressure actuated means cooperating therewith for preventing movement of the distributing valve before complete filling and discharge of the tanks, and means associated with the discharge conduit and operable upon cessation of liquid flow through

said discharge conduit to move said valve means to a position whereby the liquid may be effective for lifting said valve means to closed position.

5 5. An apparatus of the class described comprising in combination a pair of tanks, closing valves controlling the upper level of the tanks, feed and discharge conduits for the tanks, a distributing valve interposed be-
10 tween said conduits and the tanks for alternate filling and discharge of the tanks, a locking device and pressure actuated means in association therewith normally to prevent movement of the distributing valve before
15 complete discharge and filling of the tanks, a pivoted float associated with the discharge conduit adapted to be actuated by the liquid flowing through said discharge conduit, lever means connecting said pivoted float and
20 said closing valves, said lever means upon exhaustion of liquid in the discharge conduit carrying said closing valves to positions whence they may be individually lifted by the liquid to closed position to allow of the
25 pressure taking effect in the filling tank to operate said pressure actuated means.

6. An apparatus of the class described comprising in combination a pair of tanks having openings therein at top and bottom, a
30 feed conduit, a discharge conduit, a valve interposed between the bottom openings of said tanks and said conduits so that either tank may be filled from the feed conduit while the other is being discharged through
35 the discharge and vice versa, independent valve members adapted to be brought into closing relation with respect to the upper opening of the respective tanks to shut off flow of liquid therethrough, said valve mem-
40 bers being of greater specific gravity than the liquid to be measured so that they will normally sink in such liquid, valve operating means associated with the discharge conduit and operable upon the cessation of fluid flow
45 through said discharge conduit to raise said valve members toward the closed position so that the liquid overflowing the tank being filled is made effective to lift the valve member of such tank to the closed position.

50 In testimony whereof I have hereunto set my hand.

RENÉ PORTE.

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