A. STUBER.

LIQUID FEEDING DEVICE.

APPLICATION FILED FEB. 14, 1917.

1,357,361.

Patented Nov. 2, 1920.

2 SHEETS—SHEET 1.

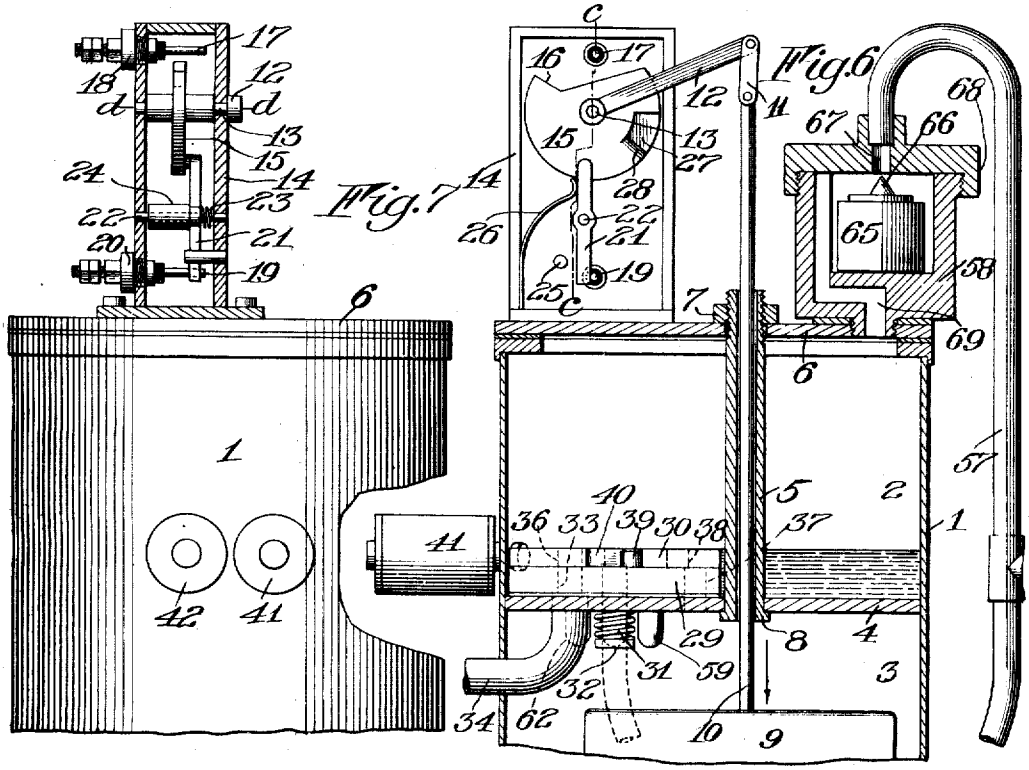


Fig. 7

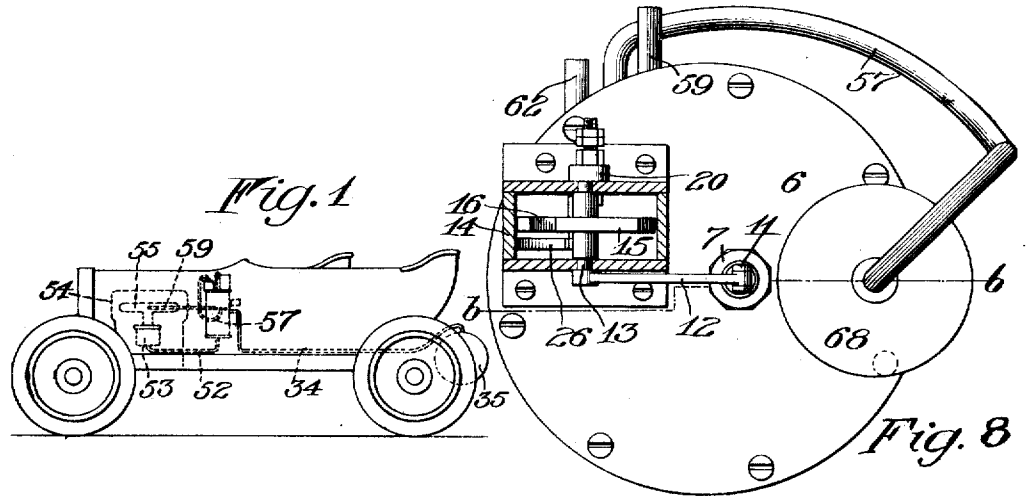


Fig. 1

Fig. 8

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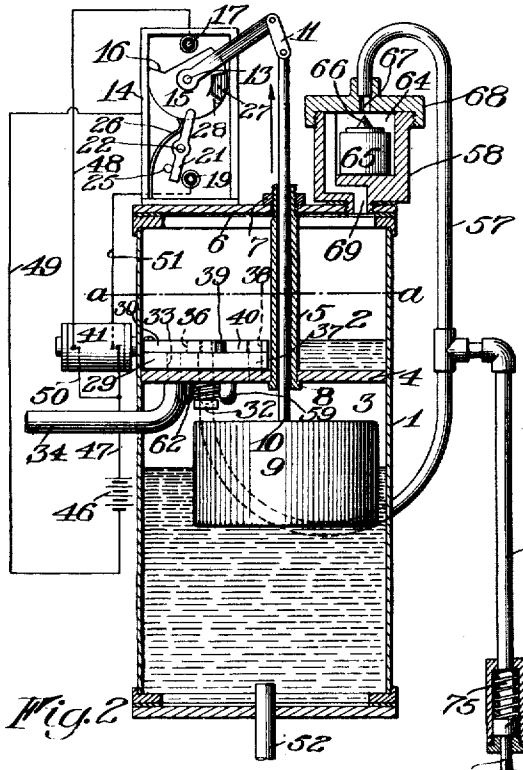


Fig. 2

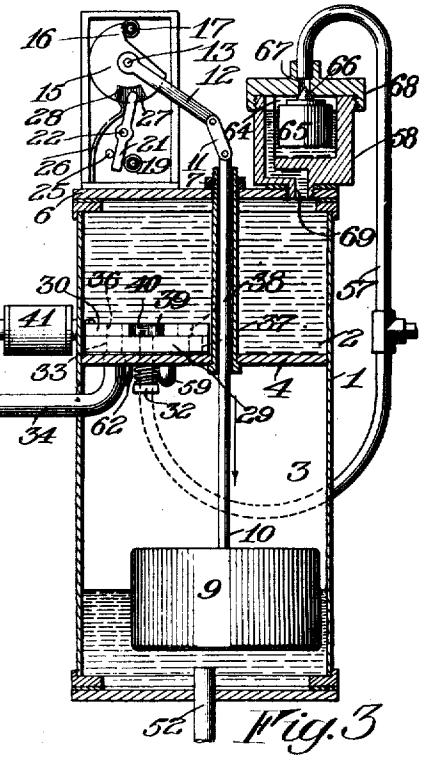


Fig. 3

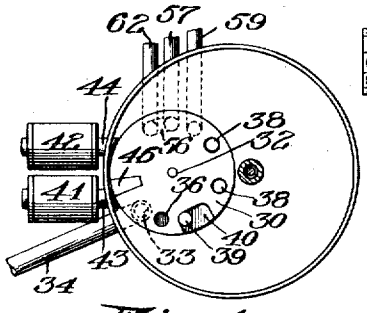


Fig. 4

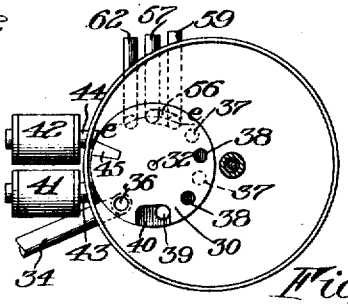


Fig. 5



Fig. 10

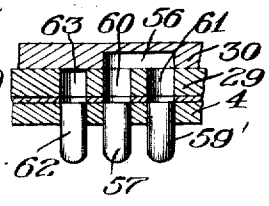


Fig. 9

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ADOLPH STUBER, OF ROCHESTER, NEW YORK.

LIQUID-FEEDING DEVICE.

1,357,361. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed February 14, 1917. Serial No. 148,497.

To all whom it may concern:

Be it known that I, ADOLPH STUBER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Liquid-Feeding Devices; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the reference characters marked thereon.

My invention relates to a liquid feeding and registering device similar in purpose to that disclosed in my copending application, Serial No. 136,879, filed December 14, 1916, and has for its object to provide improved means for transferring liquid from one point to another in predetermined quantities, the operation of the registering mechanism and transfer of the liquid being effected by any suitable suction producing means adapted to be connected with said device. A further object of the invention is to provide improved means for elevating liquid fuel to a point from which it may be fed by gravity to the intake of the cylinders of an explosive motor, during which time said fuel is transferred in predetermined quantities arranged to be registered by mechanism, the operation of which is effected by the suction created through the reciprocations of the pistons within the motor cylinders. A further object of the invention is to provide an improved pressure operated liquid feeding device in combination with means for recording the units of liquid passing therethrough, both of which are automatically operated upon a change of pressure in the device. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is an outline view illustrating one embodiment of my invention;

Fig. 2 is a sectional elevation of the liquid feeding device showing the manner of connecting the recording mechanism therewith;

Fig. 3 is a similar sectional view with the recording device omitted showing the float removed to substantially its lowermost position;

Fig. 4 is a horizontal sectional view taken on line *a*—*a* of Fig. 2, with the valve plate in position to discharge liquid from the measuring chamber;

Fig. 5 is a similar view showing the valve plate moved to position to admit the entrance of liquid to the measuring chamber;

Fig. 6 is an enlarged sectional elevation taken on line *b*—*b* of Fig. 8;

Fig. 7 is a sectional elevation taken on line *c*—*c* of Fig. 6 the tank being shown in elevation;

Fig. 8 is a horizontal sectional view taken on line *d*—*d* of Fig. 7;

Fig. 9 is an enlarged fragmentary sectional elevation through the liquid controlling valve, the section being taken on line *e*—*e* of Fig. 5, and

Fig. 10 is an enlarged detail edge view of the switch plate shown in Fig. 6.

Similar reference characters throughout the several views indicate the same parts.

The present invention embodies a fuel feeding and recording device which is intended especially for use on automobiles and other motor driven vehicles where it is desired to transfer the liquid fuel from a supply tank to the engine or motor of the vehicle and at the same time, record the units of fuel consumed by the engine. In carrying out this idea I have provided what may be termed a measuring or liquid receiving chamber to which the fuel is elevated by suction produced by the reciprocations of the pistons in the motor cylinders or by any other suitable aspirator and from which said fuel is discharged into a float chamber provided with a float for effecting the operation of movable means for controlling the aspirator and at the same time, alternately admitting and discharging the liquid fuel to and from the measuring chamber; a recording mechanism being connected with the latter, the operation of which is effected by a change of pressure produced in said measuring chamber when the movable means is actuated.

The apparatus for accomplishing this result comprises preferably an electrically operated valve or movable member located between the measuring and float chambers, which when moved to one position will open the inlet passageway for supplying fuel to the measuring chamber and at the same time, establish communication between said chamber and aspirator, comprising in the present instance the cylinders of the engine to

provide suction for elevating the fuel to the measuring chamber, and when moved to another position, will close said inlet passageway and open the discharge passageway leading to the float chamber, during which time the suction conduit leading from the engine manifold to the measuring chamber is closed and another conduit leading to the atmosphere opened, whereby air is supplied to the measuring chamber.

In the drawings, 1 represents a tank or container divided preferably into upper and lower compartments 2 and 3, the latter constituting the float chamber and the former the measuring or receiving chamber of the device. These chambers are divided by the partition 4 through which is extended a sleeve 5 which projects through the upper head 6 of the container to receive the nut 7. A flange 8 is formed upon the lower end of the sleeve in position to engage the bottom of the partition to form a liquid tight joint between the upper and lower chambers. A float 9 is mounted in the lower chamber and is provided with a rod 10 which is extended through the sleeve 5, a link 11 being pivotally connected with the upper end of the rod as shown in Figs. 2 and 3. The link 11 is also pivotally connected with a lever 12 which is rigidly connected with a shaft 13, the opposite ends of which are journaled in the side walls of the switch box 14 mounted upon the head 6 of the measuring tank, said lever arm being preferably positioned outside of the switch box as shown in Figs. 7 and 8. Mounted upon the shaft 13 is a segmental contact plate 15 provided with a shoulder 16 which is arranged when the float reaches its lowermost position to move into engagement with the upper contact pin 17 insulated from and carried by the screw plug 18 extending through one of the walls of the switch box as shown in Fig. 7. A second insulated contact pin or post 19 is projected into the switch box through the screw plug 20 as shown, and lies in the path of the lower arm of a contact lever 21 rotatably mounted upon a shaft 22, the opposite ends of which are supported by the walls of the switch box. The upper end of the contact lever 21 is held in frictional engagement with the front face of the contact plate 15 by means of a spring 23 on the shaft 22, the spring being interposed between the lever and the front wall of the switch box as shown in Fig. 7. A thimble 24 is loosely mounted upon the shaft 22 between the rear wall of the switch box and the lever 21 and serves to limit the movement of the lever in the direction of the contact plate 15.

A stop pin 25 is positioned at the rear of the lower arm of the contact lever 21 to limit its movement in one direction as shown in Figs. 2 and 3, while a spring 26 normally holds said lever out of engagement with the contact member 19. However, movement of the float downwardly from the position shown in Fig. 2 will, through the frictional contact of the lever with the contact plate 15, cause said lever to be thrown into engagement with the contact member 19 where it will remain until the float descends substantially to its lowermost position as shown in Fig. 2, at which time the upper end of the lever 21 will move into the recess 27 and hence out of contact with the plate 15, as said recess is of a sufficient depth to clear the lever when the same is in this position. It will be understood that said lever is limited in its sliding movement upon the shaft 22 under the action of the spring 23 toward the contact plate by the striking of the thimble 24 against the rear wall of the switch box 14. When the float reaches its extreme lowermost position the shoulder 16 on the plate 15 will move into engagement with the contact member 17 and as the float rises the segmental plate 15 will be moved back to the position shown in Fig. 2, during which time the upper end of the lever 21 will move out of the recess 27 over the incline 28 and the lower end will be held out of engagement with the contact pin 19 until the direction of movement of the segmental plate is reversed by downward movement of the arm 12 when actuated by the float 9. Thus it will be seen that the upper switch contacts are closed when the float reaches its lowermost position and that the lower switch contacts are closed when the float begins to descend from its uppermost position.

I will now describe the construction and operation of the electrically actuated valve or movable member, which opens and closes the pasageways for admitting the liquid to the measuring chamber 2 and for discharging it therefrom into the float chamber 3 and which also opens and closes the suction passageway leading to the engine cylinders. This valve comprises a lower stationary disk or plate 29 seated upon the partition 4 between the upper and lower chambers 2 and 3 respectively. Upon the lower plate 29 is rotatably mounted a valve plate 30 which is held in frictional contact with the lower plate by means of a spring 31, the upper end of which is seated upon the bottom of the partition 4, while the lower end is seated upon the head of the bolt 32 which passes through and is journaled in the lower valve plate, said bolt being connected with the upper valve plate whereby upon rotation of the same the bolt will rotate also. The lower plate is provided with an aperture or port 33 registering with an aperture in the partition wall 4 and communicating with said last mentioned aperture is a conduit 34 extending through the wall of the float chamber 3, said conduit being adapted to com-

municate with a liquid supply source such as the fuel supply tank 35 shown in Fig. 1.

The rotary valve plate 30 is provided with an inlet aperture 36 which when the plate is in the position shown in Fig. 5, will register with the aperture 33 in the lower valve plate 29 through which the liquid is drawn by suction into the measuring chamber from the conduit 34. The bottom plate 29 is also provided preferably with a plurality of outlet apertures or openings 37 which are closed by the upper valve plate when the aperture 36 registers with the aperture 33 and which communicate with corresponding openings in the partition wall 4. The upper valve plate is also provided with a plurality of apertures 38 which register with the apertures 37 when the aperture 33 is closed or when said upper plate is in the position shown in Fig. 4. Thus it will be seen that when the inlet aperture to the measuring chamber 2 is open, the outlet apertures leading to the float chamber will be closed and vice versa. Movement of the rotary valve plate 30 in opposite directions is limited by the stop pin 39 projecting upwardly from the valve plate 29 in the recess 40 formed in said movable plate, whereby the inlet and outlet openings in said valve plates are made to register with each other at the proper time.

Rotation of the valve plate 30 in opposite directions is effected by the magnets 41 and 42 which are provided with spaced cores 43 and 44 respectively, projected preferably into the measuring chamber 2 in proximity to the outer periphery of said rotary valve plate which is provided with an insert or bar of magnetic material indicated at 45, whereby the magnets upon being alternately energized will cause rotation of the valve plate in opposite directions.

The switch already described will alternately cause the energization of said magnets by opening and closing the divided circuit in which the magnets are placed, current for which is supplied by the battery 46. With the shoulder 16 in engagement with the contact member 17 current will flow from the battery through conductor 47, magnet 41, conductor 48, contact 17, segment 15, casing 14 and conductor 49 back to battery, at which time the movable plate 30 will be rotated from the position shown in Fig. 5 to that shown in Fig. 4, to allow the unit of fuel in the measuring chamber to be discharged into the float chamber, whereby the float is elevated to the position shown in Fig. 2. Downward movement of the float from this position will effect engagement of the lower arm of the contact lever 21 with the contact member 19 and when this is done current will flow from battery through conductors 47 and 50, magnet 42, conductor 51, contact member 19, lever 21, segment 15, switch box casing 14 and conductor 49 back to battery, thereby energizing said magnet 42 to move the plate 30 from the position shown in Fig. 4 to that shown in Fig. 5, which will close the float chamber and open the passageway leading from the supply pipe 34 to the measuring chamber.

Liquid in the float chamber is held under atmospheric pressure by air admitted through the sleeve 5 around the float rod 10 and is discharged therefrom through the conduit 52 leading to the carbureter 53 for supplying fuel to the engine 54.

In providing means for producing suction in the measuring chamber to transfer the fuel thereto from the supply tank 35 I preferably employ the liquid controlling valve for establishing communication between the manifold 55 of the engine and said measuring chamber at the time that the latter is in communication with said supply tank, the valve being so constructed as to automatically close both the air and liquid inlet passageways leading to the measuring chamber when communication is established between the latter and the float chamber. This is done by forming on the bottom of the movable valve plate 30 an elongated recess 56 at one side of the plate which when in the position shown in Fig. 5, establishes communication between the conduit 57 leading to the measuring chamber through the small container 58 and the conduit 59 leading to the manifold 55 of the engine by way of the ports 60 and 61 through the stationary valve plate 29, as shown in Fig. 9. When the valve plate 30 is moved to the position shown in Fig. 4 the suction or aspirator conduit 59 is closed by closing the port 61, at which time communication will be established between the vent pipe 62 and conduit 57 through the ports 60 and 63 and recess 56, whereby the liquid in the measuring chamber, which now begins to discharge into the float chamber through the outlet apertures 37 and 38, will be brought under atmospheric pressure. In order to prevent overflow of the measuring chamber into the suction or aspirator conduit 57 I provide in the chamber 64 of the container 58 a small float 65 carrying a valve 66 which will close the port 67 in the container head 68 when liquid enters said chamber through the passage 69 as shown in Fig. 3.

The registering mechanism which may be of any suitable type, comprises in the present instance, the counter 70 and ratchet wheel 71 actuated by the pawl 72 pivotally connected with the piston rod 73 carrying the piston 74 mounted in the cylinder 75, as shown in Fig. 2. The cylinder is connected with the conduit 57 by means of a short conduit 76, so that when communica-

tion is established between the former and the conduit 59 leading to the engine manifold the suction produced in the cylinder will move the piston 74 against the action of the spring 75 until the pawl 72 moves into engagement with the next succeeding tooth of the ratchet wheel 71. The pawl will be held in this position by the piston until the conduit 59 is closed by the movable plate 30, as shown in Fig. 4, at which time the spring 75 will force the piston back to the position shown in Fig. 2 and cause the pawl to actuate the ratchet wheel for the purpose of operating the counter. Thus it will be seen that the counter or registering member is operated each time the measuring chamber is filled and preferably at the time when the same begins to empty, or when the movable plate 30 is actuated from the position shown in Fig. 5 to that shown in Fig. 4.

I claim as my invention:

1. In a liquid feeding mechanism, the combination with a receptacle having an outlet leading therefrom, a liquid supply tank, a conduit connecting said tank with said receptacle, means comprising a float controlled by liquid discharged through said outlet for alternately opening and closing said conduit and outlet, and an aspirator connected with said receptacle.

2. In a liquid feeding mechanism, the combination with a receptacle having an outlet leading therefrom, a liquid supply tank, a conduit connecting said tank with said receptacle, electrical means for alternately opening and closing said conduit and outlet, a float actuated by liquid discharged through said outlet for controlling said electrical means, and an aspirator connected with said receptacle.

3. In a liquid feeding mechanism, the combination of a pair of receptacles having a passage therebetween, a liquid supply tank, a conduit connecting said tank and one of said receptacles, a float in the other of said receptacles, means actuated by said float for alternately opening and closing said passage and conduit, and an aspirator connected with the first mentioned receptacle.

4. In a liquid feeding mechanism, the combination of a pair of receptacles having a passage therebetween, a liquid supply tank, a conduit connecting said tank and one of said receptacles, a float in the other of said receptacles, solenoid means actuated by said float for alternately opening and closing said passage and conduit, and an aspirator connected with the first mentioned receptacle.

5. In a liquid feeding mechanism, the combination with a receptacle having an outlet leading therefrom, a liquid supply tank, a conduit connecting said tank with said receptacle, an aspirator, a conduit connecting said aspirator with said receptacle, a valve for alternately opening and closing said outlet and said tank and aspirator conduits, and means for periodically actuating said valve.

6. In a liquid feeding mechanism, the combination with a measuring receptacle having an outlet leading therefrom, a liquid supply tank, a conduit connecting said tank with said measuring receptacle, an aspirator, a conduit connecting said aspirator with said receptacle, a valve for alternately opening and closing said outlet and said aspirator conduit, and solenoid means controlling the operation of said valve arranged to be actuated by the liquid measured in said receptacle.

7. In a liquid feeding mechanism, the combination with a receptacle having an outlet leading therefrom, a liquid supply tank, a conduit connecting said tank with said receptacle, an aspirator, a conduit connecting said aspirator with said receptacle, a valve for alternately opening and closing said outlet and said aspirator conduit, and electro-mechanical means for actuating said valve.

8. In a liquid feeding device, the combination with a receptacle having an outlet leading therefrom, an auxiliary receptacle adapted to communicate with the first mentioned receptacle through said outlet, a liquid supply tank, a conduit connecting said tank with said first mentioned receptacle, an aspirator, a conduit leading from said first mentioned receptacle to said aspirator, a float in said auxiliary receptacle, a valve between said receptacles for alternately opening and closing said outlet and said aspirator conduit, and means controlled by the float for actuating said valve.

9. In a liquid feeding device, the combination with a receptacle having an outlet leading therefrom, an auxiliary receptacle adapted to communicate with the first mentioned receptacle through said outlet, a liquid supply tank, a conduit connecting said tank with said first mentioned receptacle, an aspirator, a conduit leading from said aspirator to said first mentioned receptacle, a float in said auxiliary receptacle, a valve for alternately opening and closing said outlet and said aspirator conduit, and electro-mechanical means controlled by the float for actuating said valve.

10. In a liquid feeding mechanism, the combination of a liquid measuring chamber, a float chamber, a source of liquid supply connected with said measuring chamber, pressure varying means connected with said measuring chamber, a connection between said measuring chamber and the atmosphere, a passage connecting said chambers, a float in the float chamber, valve means for opening and closing said pressure varying and atmospheric connections and said pas-

sage, and actuating means controlled by said float for alternately closing said atmospheric connection and passage and opening said pressure varying connection, and opening said atmospheric connection and passage and closing said pressure varying connection.

11. In a liquid feeding mechanism, the combination of a receptacle having a partition forming an upper measuring chamber and a lower float chamber, a source of liquid supply connected with said measuring chamber, pressure varying means connected with said measuring chamber, an atmospheric vent for said measuring chamber, a passage between said chambers, a float in said float chamber, valve means comprising a disk on said partition controlling said pressure varying connection, vent and passage, and actuating connections between said float and valve means.

12. In a liquid feeding mechanism, the combination of an upper measuring chamber, a lower float chamber provided with a float, a source of liquid supply connected with the measuring chamber, an atmospheric vent for said measuring chamber, pressure varying means connected with said measuring chamber, a passage between said chambers, valve means for closing said vent and passage and opening said pressure varying connections and vice versa, solenoid means actuating said valve means, and electrical connections including a source of power having a pair of contacts actuated by said float in its upper and lower positions respectively for actuating said valve means.

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