March 21, 1933. E. A. RAINES 1,902,046

DISPENSING APPARATUS

Filed July 2, 1931

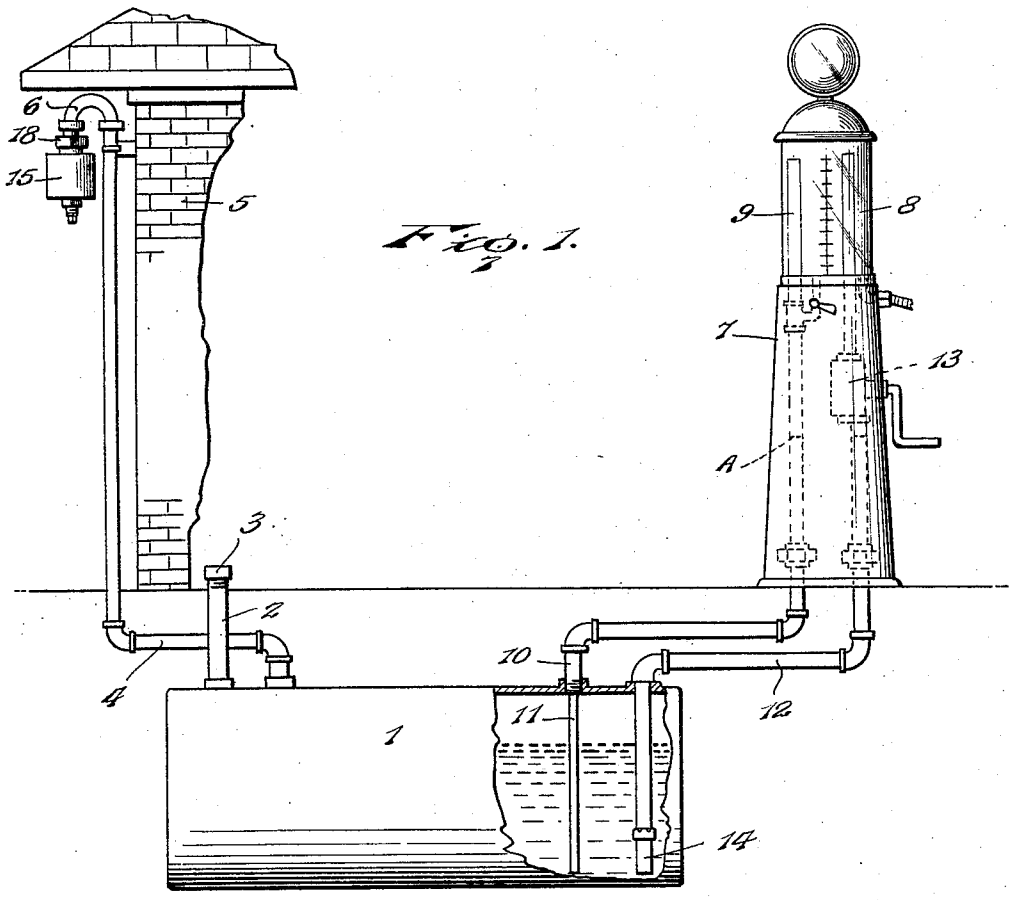


Fig. 1.

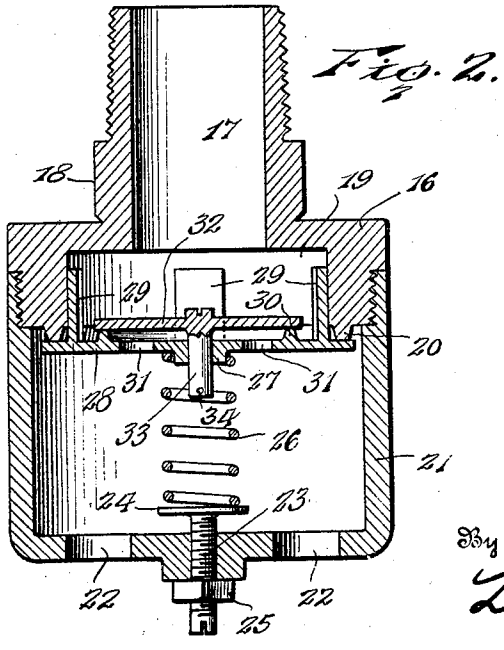


Fig. 2.

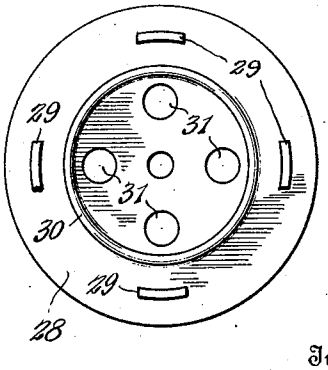


Fig. 3.

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UNITED STATES PATENT OFFICE

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DISPENSING APPARATUS

Application filed July 2, 1931. Serial No. 548,421.

This invention relates to gasoline dispensing stations and has for its object the provision of means whereby loss of gasoline by evaporation will be prevented. The invention provides apparatus whereby the pressure generated in the storage tank will be caused to automatically operate a vent valve to relieve excessive pressure or to admit air to maintain a proper balance within the tank and maintain a stated quantity of liquid in both the suction line and the overflow line at all times. The invention is illustrated in the accompanying drawing and will be hereinafter first fully described and then more particularly defined in the appended claims.

In the drawing,

Figure 1 is an elevation, partly broken away and in section, of a gasoline dispensing station having my improvements embodied therein,

Fig. 2 is an enlarged diametrical section through the relief valve, and

Fig. 3 is a detail top plan view of the main vent valve.

In the drawing, the reference numeral 1 indicates a storage tank which is buried below the surface of the ground and is equipped with a filling tube 2 rising therefrom to a point above the ground surface where it is equipped with a cap 3. A vent pipe 4 also rises from the top of the tank 1 and is carried to a point adjacent the roof of the station building 5 where it terminates in a return bend 6, as shown in Fig. 1. The station also includes the usual dispensing column 7 which is topped by a measuring vessel 8 and from which an overflow pipe 9 extends to the tank, as shown. The overflow pipe 9 has a nozzle 10 which is threaded into the top of the tank, the parts thus far described being of the usual type. In the present instance, an extension pipe 11 is secured in the nozzle 10 and extends to a point close to the bottom of the tank 1, as shown. The suction line 12 extends from near the bottom of the tank through the top of the same into the measuring vessel 8 in the usual manner and, within the pedestal of the dispensing column, passes through a suction pump 13 of any approved form. A foot valve 14 is also provided at the lower end of the suction line so that this line will always be filled with gasoline or other liquid to be dispensed.

According to the present invention, a valve 15 is secured to the outer end of the return bend 6, and this valve serves to maintain the proper balance between the gasoline and the vapor of the same within the storage tank 1. Said valve comprises an upper body member 16 of circular form having a stem 17 rising therefrom to be threaded into the end of the bend 6, and around the base of this stem are flat faces 18 whereby the stem may be engaged by a turning tool to be turned home in the bend in an obvious manner. The body member 16 is externally threaded at its lower edge and is also formed with an internal annular recess 19, as clearly shown in Fig. 2. Concentric with the recess or chamber 19, a circular rib or bead 20 is formed on the under side of the member 16, as clearly shown in Fig. 2. Threaded onto the body member 16 is a lower body member 21 which forms a cover for the valve and is of cupped formation having openings 22 through its bottom and having an internally threaded opening formed at its center. Mounted in the central threaded opening is a screw 23 having a head 24 on its upper end, and a lock nut 25 is mounted on the screw below the member 21 and is adapted to be turned home against the same whereby to lock the screw in a set position. Resting upon the head 24 is an expansion spring 26 which has its upper end engaged about a boss 27 on the under side of a valve disk 28 which is held against the circular rib 20 by the spring in an obvious manner. This valve disk 28 is provided on its upper side with a plurality of lugs 29 which extend into the recess or chamber 19 and engage the wall of said chamber so as to guide the valve in its movements. The valve disk is provided with a circular rib 30 on its upper side and, within the area defined by said rib, is provided with a plurality of ports 31, as shown. An inner valve disk 32 rests upon the rib 30 of the disk 28 and is imperforate so that it constitutes a cover for the ports 31. This inner valve is provided with a stem 33 depending centrally therefrom and playing in a central opening

provided therefor in the lower disk, as clearly shown in Fig. 2.

Liquids in contact with air tend to evaporate, the rate of evaporation rising as the temperature of the liquid increases and the pressure thereon decreases. In the practice of my invention, it is intended that the storage tank 1 be filled with gasoline through the filling tube 2, and the cap 3 then turned securely home to prevent leakage or evaporation through the filling tube. Inasmuch as the overflow pipe from the dispensing column is extended to near the bottom of the storage tank, the liquid will rise in said pipe to the point A, which point is determined by adjusting the tension of the spring 26 in the vent valve. The liquid will also rise in the suction line to the same level as in the overflow pipe and will be fed into the measuring container 8 whenever the pump 13 is operated. The vapor from the gasoline will collect in the upper portion of the storage tank, and the pressure exerted thereby upon the body of gasoline will tend to maintain the level of the same at the predetermined points in the suction and overflow lines, care being observed to maintain the upper portion of the overflow line empty at all times so that there will be no interference with the overflow from the measuring container. The pressure in the upper part of the storage tank will be distributed through the vent pipe 4 and will act upon the valves 32 and 28 which will remain seated as long as the pressure in the tank does not exceed the tension of the spring 26. Should the pressure rise so as to exceed the force of the spring 26, the valve 28 will be moved out of its contact with the seating rib 20 and the apparatus will be vented so that the danger of an explosion will be avoided. Should the pressure in the tank fall below the atmospheric pressure, the inner air valve 32 will be lifted from its seat on the rib 30 and sufficient air will be admitted to the apparatus to maintain the proper pressure upon the body of gasoline in the storage tank so that it will be kept at the desired level in the pipes 9 and 12. To prevent the valve 32 moving so far that its stem 33 will be lifted from the valve 28, a stop pin 34 is provided at the end of the stem, as will be understood.

From the foregoing description, taken in connection with the accompanying drawing, it will be seen that I have provided an exceedingly simple device whereby the proper balance between the gasoline and its vapor in the storage tank will be maintained so that the apparatus will be automatically vented and the liquid maintained at a desired level in the suction and the overflow lines. The valve 28 automatically vents the system, and the valve 32 automatically breaks any vacuum which might otherwise form in the tank or the dispensing system so that the operativeness of the system will be maintained.

It is known that for a given liquid there is a certain definite pressure of its vapor, varying with the temperature, at which the vapor and the liquid will remain in contact in the same container unchanged. In my present apparatus, the valve at one side opposes the vapor tension in the tank, being adjusted to the pressure of the vapor at atmospheric temperature. On the opposite side of the system, the vapor tension is opposed by the weight of the column of liquid in the pipe 10, the height of the column varying according to the pressure of the vapor which is determined by the vapor's temperature so that there is provided a very effectual heat control. The valve 28 constitutes a means for regulating the height of the column in the pipe 10 and, in actual practice, will probably never open except in the event of fire when excessive heat and pressure are rapidly produced.

Having thus described the invention, I claim:

1. In a dispensing apparatus, a dispensing column, a storage tank, suction and return lines extending from the storage tank into the dispensing column and having their lower ends disposed adjacent the bottom of the tank, and a vent tube rising from the storage tank and provided with a pressure-controlled relief valve.

2. For use on a vent tube of a storage tank, a valve casing fitted at one side to the vent tube and having ports through its opposite side open to the atmosphere, a vent valve within the casing seating therein and opening outwardly, yieldable means for holding said valve seated, and an inwardly opening air valve mounted on the inner side of the vent valve and operable independently thereof.

3. For use on the vent tube of a storage tank, a valve body secured at one side to the vent tube and having ports through its opposite side open to the atmosphere and provided interiorly with an annular valve seat, an outwardly opening vent valve bearing against said seat, yieldable means for holding the valve to its seat, said valve consisting of a disk having openings therethrough and provided with a circular rib on its inner side radially beyond said openings, and an inwardly opening air valve carried by the vent valve and normally seating on said rib.

4. A valve body for use in the vent tube of a storage tank comprising upper and lower members, the lower member having ports through its bottom and the upper member having an annular rib on its under side within the lower member and provided with a chamber in its under side, a valve disk seating against said rib and provided on its upper side with guide lugs entering the chamber in the upper member of the valve body, said valve disk being provided with openings

therethrough and having a circular rib on its upper side radially beyond said openings, an air valve consisting of a disk resting on the circular rib on the vent valve and provided with a central stem depending through the vent valve, means for preventing withdrawal of said stem through the vent valve, and an expansion spring holding the vent valve to its seat.

In testimony whereof I affixed my signature.

EWELL A. RAINES. [L. S]