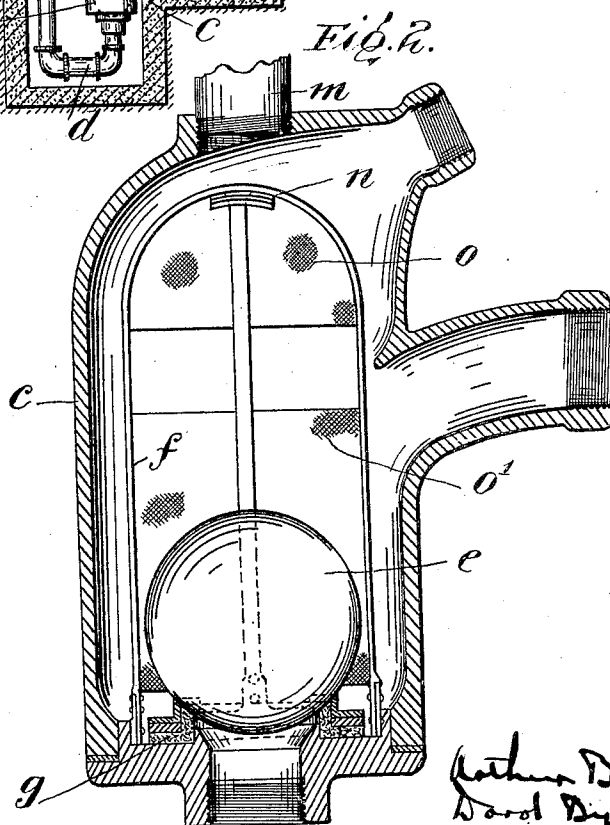
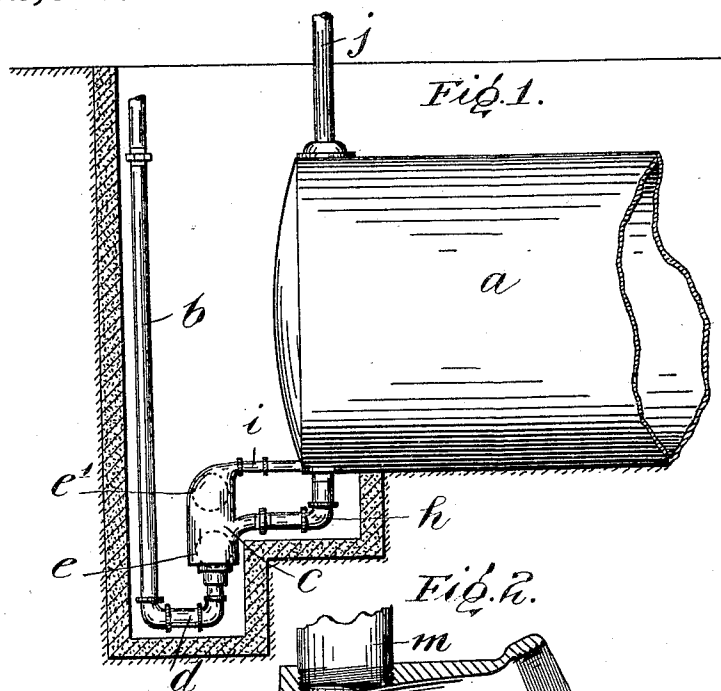


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 APPARATUS FOR RAISING AND FORCING OILS.
 APPLICATION FILED MAR. 8, 1919.

1,402,835.

Patented Jan. 10, 1922.



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APPARATUS FOR RAISING AND FORCING OILS.

1,402,835.

Specification of Letters Patent.

Patented Jan. 10, 1922.

Application filed March 8, 1919. Serial No. 281,569.

To all whom it may concern:

Be it known that we, ARTHUR BYWATER, DAROL BYWATER, and LENNOX BYWATER, subjects of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in and Relating to Apparatus for Raising and Forcing Oils, of which the following is a specification.

10 The present invention relates to improvements in and relating to apparatus for raising and forcing oils, as for example for garage or motor or like station use where motor fuel is designed to be in or at constant service, and is broadly of the class in which the oil is propelled by a heavier liquid and a closing valve is provided which is floated by the propelling liquid and let down by the propelled liquid.

20 The present invention more particularly relates to those systems in which overcharging of the storage tank is prevented by a water or balancing leg depending from the bottom of the tank so as to balance the charging head when the storage tank is filled with oil, and according to the present invention the effective water or balancing leg is reduced or shortened by a valve system having main and auxiliary connections with the tank, this valve system being located at or just below the bottom of the storage tank, and the valve having a density slightly less than the propelling liquid but greater than the propelled liquid so as to be floated off its seating by the propelling liquid and let down on its seating by the propelled liquid.

35 Means are conveniently and advantageously provided to protect or defend the valve against shock and the ball valve chamber may be provided with an air vent and air cushion at the upper part.

40 Advantages of the valve system with main or auxiliary connections according to the invention are that it may be constructed separately from the tank and inserted as an adjunct in the pipe leading to the tank; it being easy to arrange for detachment of the connection for examination, renewal or repair. When forcing out the oil the valve is raised and held clear of the inflow, and when forcing out water or the like the valve is prevented from hammering on its seating by the combined action of the main flow and the auxiliary flow of water, the

auxiliary flow countering the tendency of 55 the main flow to set up suction or vortex action on the valve. Thus there is no suction on the valve until the tank is actually full of oil and in forcing out the oil the valve is almost immediately raised clear of 60 the influence of the inflow.

The invention may be conveniently and advantageously carried out as follows, reference being had to the accompanying drawings, in which:—

Fig. 1 is a part section of the tank with the valved device applied thereto, and

Fig. 2 is a sectional view of the valved device, slightly modified.

a is the storage tank, *b* the propelling 70 water column pipe leading to the drain through which the water is displaced during the filling of the tank with oil, *c* the valved chamber to be hereinafter described, and *j* the inway and outway pipe for the oil. 75

By appropriate control valves the tank *a* may be connected in known manner through the pipe *b* with a water supply system operating at a certain head, or, otherwise with the drain. 80

The system depends on the difference between the specific gravity of the propelling liquid, for example water 1.00, and the propelled liquid, for example, petrol 0.72 (average). On this difference depends the relative heights of balancing columns of petrol and water for example. 85

Such a system described, or example, in relation to water as the propelling liquid, operates as follows:— 90

The tank *a* having been filled with water from the water supply, the water supply valve is closed, and the valve allowing water to discharge to the drain is opened. Petrol is supplied, either through the funnel 95 or a filler connected to the pipe *j* or by means of a flexible hose, in either case at a level higher than the level at which the water is discharged to the drain.

The hose and filler connections are valve 100 controlled so that when one is open the other may be closed, or both may be closed, and a back pressure valve is interposed between the connections and the tank *a*.

The difference in the respective heads of 105 the petrol supply and water discharge causes the petrol to displace the water in the storage tank *a* and discharge it to the drain.

Having filled the storage tank *a* with petrol, the water discharge valve is closed. To deliver petrol into a distributing connection leading from the pipe *j* the water supply valve is opened. The head of water is sufficient to propel the petrol in the storage tank *a* over a stand pipe, fitted with a siphon break, at the desired velocity.

In such systems it is important to prevent the discharge of petrol to the drain after the storage tank has been filled with petrol, and in one construction, such a system has embodied a water-leg extending downwardly from the storage tank *a* to form a hydrostatic column adapted to overbalance the charging head or charging pressure of the petrol, as for example, governed by the height of the petrol in the filler or in the tank of a tank wagon hose coupled thereto.

A long water-leg is open to the objection that it involves costly excavation work, a disadvantage which is overcome by the present invention according to which a valve system, embodying a flotation valve normally sustained by the water to open the water connection with the storage tank *a*, but adapted when the storage tank is filled with oil to fall and close the water connection with the storage tank, is so ordered that the valve chamber is connected with the storage chamber by middle and upper branches or passages whereby the valve, which can rise above and clear of the middle branch or passage, is brought under the influence of main or intermediate and auxiliary or upper flows of liquid, whose combined action prevents that hammering of the valve on its seating which otherwise, without the auxiliary or upper flow, would by its violence, damage not only the valve, but the storage apparatus in general, the effect of the auxiliary or upper flow of water being to modify or counter the tendency of the main or medial flow of water to set up suction in the valve to cause this to hammer violently, there being no such hammer causing suction produced on the valve of the present device at any time, the valve, when the storage tank is filled, being let down softly on its seating with little or no agitation.

In carrying the present invention into practical effect, at that end of the storage tank *a* adjacent to the propelling water column pipe *b*, the bottom of the tank is placed into communication with the water column pipe through the mediation of a valved chamber *c*. The bottom of the chamber communicates by a suitable bend *d* with the water column pipe and at the middle and top of the chamber, the chamber communicates by branch pipes with the bottom of the storage tank *a* (this being usually a horizontally placed cylinder of iron) through connections which are made respectively as

shown, on the longitudinal wall of the tank *a* and on an end wall of the tank *a*.

The valve ball is shown in its two positions by *e* and *e'* respectively. Fig. 2 shows the valve chamber *c* on an enlarged scale, and in the chamber *c* is the aforementioned ball valve of the character described, this being conveniently made of hollow brass and adjusted by internal loading to the required specific gravity. Over the valve is a confining or guiding cage *f* which allows the valve to rise in the presence of the propelling liquid (in the exemplar case, water) above and clear of the middle branch, also to sink on to a leather or other appropriate seating *g* if and when the propelled liquid (in the exemplar case, liquid motor fuel) is forced into the chamber *c*.

The middle branch *h* from the chamber *c* to the tank being the primary branch or branch for the main flow, is of greater sectional area than the upper branch *i* from the chamber *c* to the tank *a*; this upper branch being an organ for realizing or facilitating equilibrium.

With a water or balancing leg adjunct substantially as described, better facilities are given for accommodating oils of widely varying specific gravities.

j designates the outway pipe for petrol.

In relation to the chamber *c* (Figs. 1 and 2) it may be expedient to provide an air pipe *m*, Fig. 2, this serving to allow the out-pour or outlet of any air which may lodge in the apparatus, or alternatively an inway for any air which may be desirable as a buffer; an appropriate control or valve being provided at the upper extremity of the pipe *m*. The lower part of the pipe *m* may be expanded and made to contain a mass or volume of air to give a cushioning effect.

In the above description, instead of water an aqueous solution or technically equivalent fluid of higher specific gravity may be used as solution of calcium chloride, spent lye or waste or other saline solution. The double advantage of greater immunity against freezing and of high specific gravity being thus realized. In such a case obvious means should be taken for using the fluid repeatedly. Sea-water if on supply may be especially useful.

In the action of the ball valve *e* there is a tendency to an undesirable blow or shock when it passes from end to end of the guide-cage *f*, and the applicants relieve or modify this by constricting the flow increasingly as the ball progresses, as, for example, by enveloping or clothing the upper and lower portions of the cage with wire meshing or perforated metal or material as shown at *o* and *o'* (Fig. 2) so that the ball on entering either one of the clothed portions, *o* or *o'* may experience resistance, which resistance may be made greater or less diminishing or

increasing the size of the perforations; the perforated casings thus acting as defences against shock.

The top of the cage may be fitted with a mat, fender or buffer or the like *n*.

What we claim is:—

1. In an apparatus of the class described, in combination, a water column, a storage tank, a discharge pipe from said storage tank, connecting means between said water column and said storage tank comprising a valve chamber with main and auxiliary connections communicating with said storage tank, said chamber containing a valve of specific gravity intermediate the propelling liquid and the propelled liquid.

2. In an apparatus of the class described, in combination, a water column, a storage tank, a discharge pipe from said storage tank, connecting means between said water column and said storage tank comprising a valve chamber with main and auxiliary connections communicating with said storage chamber, said chamber containing a valve of specific gravity intermediate the propelling and the propelled liquid, and a metal guiding cage for said valve.

3. In an apparatus of the class described, in combination, a water column, a storage tank, a discharge pipe from said storage tank, connecting means between said water column and said storage tank comprising a

valve chamber with main and auxiliary connections communicating with said storage tank, said chamber containing a valve of specific gravity intermediate the propelling and the propelled liquid, a metal guiding cage for said valve, and shock absorbing means at each end of the chamber to prevent injury to said valve when it is at extreme positions in the cage.

4. In an apparatus of the class described, in combination, a water column, a storage tank, a discharge pipe from said storage tank, connecting means between said water column and said storage tank comprising a valve chamber with main and auxiliary connections communicating with said storage tank said chamber containing a valve of specific gravity intermediate the propelling and the propelled liquid, a metal guiding cage for said valve, shock absorbing means at each end of said chamber to prevent injury to said valve when it is at extreme positions in the cage, and retarding means, as wire meshing, for obstructing and retarding the rise or fall of the valve as it reaches its extreme positions.

In testimony whereof we affix our signatures.

ARTHUR BYWATER.
DAROL BYWATER.
LENNOX BYWATER.