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L. E. VAN HISE ET AL

FLUID ELEVATING AND FEEDING MEANS

Filed June 6, 1922

Fig. 2.

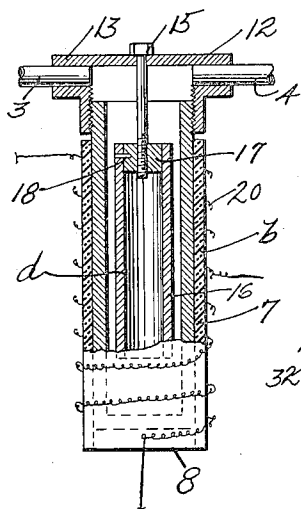


Fig. 1.

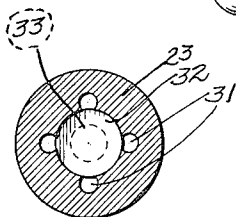
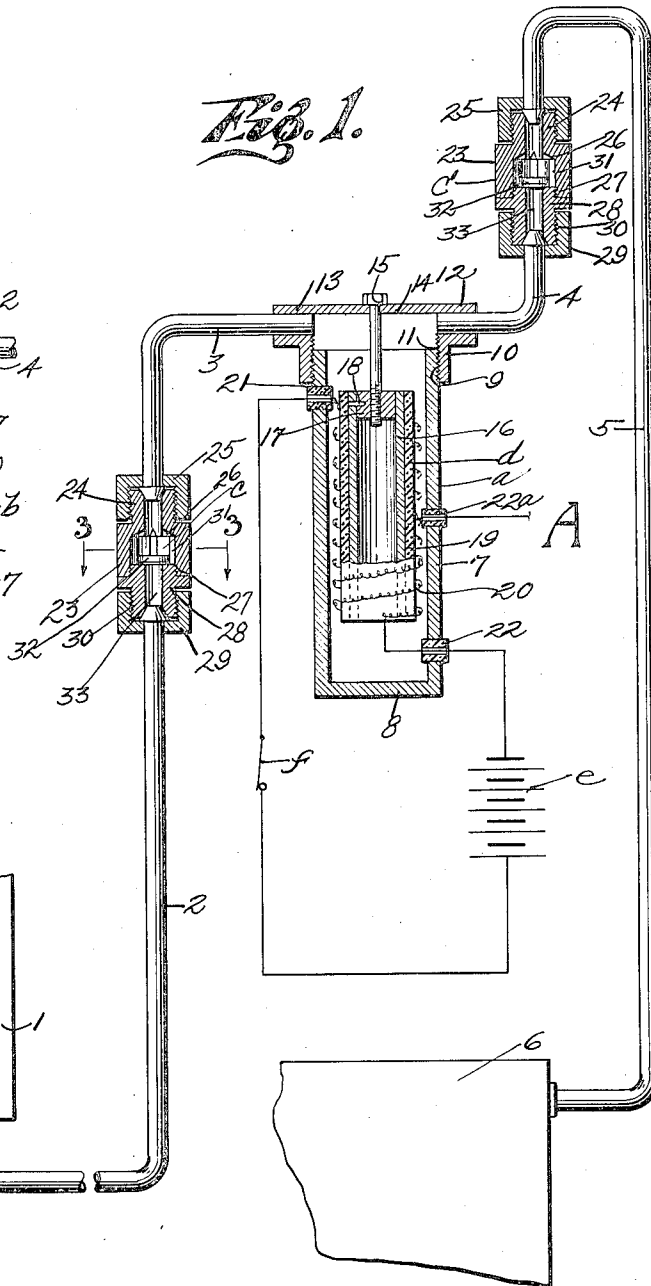


Fig. 3.

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LESTER E. VAN HISE AND JAMES V. BALDWIN, OF LOS ANGELES, CALIFORNIA.

FLUID ELEVATING AND FEEDING MEANS.

Application filed June 6, 1922. Serial No. 566,374.

To all whom it may concern:

Be it known that we, LESTER E. VAN HISE and JAMES V. BALDWIN, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have jointly invented new and useful Improvements in Fluid Elevating and Feeding Means, of which the following is a specification.

This invention relates to fluid elevating and feeding means, and has for its object the provision of a device of this character which is adaptable for pumping from a source of supply any form of fluid desired. Other objects of the invention will appear as the description proceeds. This invention is an improvement on our co-pending application for fluid elevating and feeding means filed April 10, 1922, Serial No. 551,244, and application for fluid elevating and feeding means filed Sept. 3, 1921, in the United States Patent Office, Serial No. 498,434.

In the drawing:

Figure 1 is a fragmentary view, certain parts being in section, of our improved fluid and elevating means considered in its entirety, in combination with a source of liquid supply and the member to which said fluid is pumped.

Figure 2 is a fragmentary view of a modification of the pump member; and

Figure 3 is a cross sectional view of a valve element used in practicing the invention, the said view being taken on the line 3—3 of Figure 1.

Corresponding parts in all the figures are designated by the same reference characters.

Referring to the drawing the adaptation of the means may be applied wherever it is desired to boost fluid or cause the flow of a fluid from a given point to a given point and where it is necessary to use a pumping element to cause said flow. In particular the fluid elevating and feeding means may be designated as an entirety by A in Figure 1, and of which *a* is one form of pump used in said system and *b* a second form of pump which might be substituted for the pump *a*, the chief difference between the said pumps residing in the method of heating the same, the said pump *a* is of relatively diminutive character and has the characteristics of a bottle, being open at one end and closed at the other, and therefore may be conveniently characterized as a bottle-like pump member. In Figure 1

the numeral 1 represents a tank which may contain some liquid such as gasoline, and a feeding pipe 2 leads from said tank to a valve element *c* and from said valve element through a suitable pipe 3 to the pump *a*. Leading from said pump is a pipe 4 which connects with a second valve element *c'* and from said valve element through a pipe 5 to a storage tank 6. The pump *a* may include a casing member 7 closed at one end as 8 and screw-threaded exteriorly as at 9 adjacent its open mouth. A member 10 is internally threaded as at 11 for reception on the threaded part 9 of the casing 7, and said member 10 is provided with two annular members 12 and 13 adapted to receive and confine ends of the pipes 3 and 4. The top 14 of the member 10 is provided with an opening through which projects a screw 15, and said screw normally supports an element *d* within the casing 7. The element *d* may comprise a tubular member 16 closed at one end by means of a plug 17, said plug being annular in formation and screw-threaded on its inner surface for reception of the screw-threaded portion of the screw 15. In the showing the plug 17 is retained in the tubular member 16 by a pin 18 passing through said tubular member and engaging the plug 17. One end of said tubular member 16, the lower end, is open. An insulating casing 19 surrounds the tubular member 16 and coiled about said insulating casing is an electrical conductor 20. Each end of the electrical conductor 20 passes through an insulating bushing 21 and 22 in the casing 7, and the said electrical conductors connect with a source of electrical current supply *e*, there being a switch element *f* in the electrical circuit. If desired, some form of rheostat might be provided in the electrical current so as to regulate the current flowing within the coil 20 surrounding the element *d*, or taps may be taken as shown at 22^a whereby different zones of the member *d* may be heated.

The valve elements *c* and *c'* are identical in form, and consequently only one of said elements will be described. The letters of reference applying to the one, likewise apply to the other, and said valve elements *c* and *c'* include an annular body member 23 having a reduced externally threaded member 24 with a cap member 25, carrying an end of the pipes 5 or 3. screw-threaded

upon the threads of the part 24. The annular portion of the body 23 is enlarged at the part 26 and said part is screw-threaded internally for a portion as at 27. A flanged nut 28 is received within the body 23 at the screw-threaded portion 27, and a second cap member 29 carrying an end of the pipes 3 or 4 is screw-threaded upon the threads 30 of the nut. The chamber of the body 23 is provided with a series of half bores 31 and a small disc 32 is normally confined within said chamber for closing at times the annular opening 33 in the nut 28.

The operation of the device is as follows: Assuming that the tank is filled with some fluid, such as gasoline, and that the apparatus including the pump *a* is fully primed, the switch *f* may be placed in position so as to close an electrical circuit through the coil 20 from the source of current supply *e*, and the coil 20 will become heated and in turn communicate its heat to the interior of the casing 7 and likewise heat the tubular element *d*.

When the apparatus is fully primed, the heating of the bottle-like pump element will rapidly vaporize the fluid therein with the result of vaporizing the same and placing pressure therein which will expel fluid upwardly past the check valve *c'*, and this vaporization and expulsion of liquid will continue until the pressure above the intake check valve *c* is less than atmospheric pressure above the fluid supply in the tank 1 with which the pipe 2 connects. When such differential pressure occurs, atmospheric pressure will force a quantity of liquid past the check valve *c* into the outer shell 7 of the pump thereby causing rapid condensation due to the cooling effect of the incoming fluid, thereby intensifying the vacuum. That condition necessarily provides the force for drawing into the pump chamber a fresh supply of fluid from the intake pipe 2, and that fresh supply of fluid is in turn vaporized and expelled in the manner already described. The operation repeats itself so as to give a distinct pulsation or pumping action that will pump the fluid in a substantially continuous stream into the container 6 which receives the same.

With reference to the member *d* it is pointed out that this member is primarily instrumental in effecting the pumping action previously described. That is to say when the device is properly primed with liquid fuel the lower open end of *d* is submerged in the liquid fuel and the space in the member *d* above the fuel and below the member 17 constitutes a vapor trap in which the vapor collects (upon the application of heat) and when the vaporization of the gasoline or other volatile liquid has accumulated sufficiently in the member *d* it will expand

and push out the fuel between the outer side of the member *d* and the inner side of the casing 7. The inertia and momentum in the moving column of fluid is sufficient to carry the liquid out to such a point that the pressure in chamber *a* is reduced below atmospheric pressure whereupon gasoline will be forced in through the pipe 3. The incoming gasoline being cold will condense the vapor within the member *d* whereupon the entire device will be filled with gasoline ready for the next pulsation. It may be pointed out that the operation of the device involves two cycles, first a discharge cycle and then an intake cycle. When the pump is primed so that liquid fills the so-called casing 7 to the proper point, the liquid fuel will enter the mouth of the member *d* up to a point where it is held back by the air trapped within the member *d*. When heat is applied to the pump the gasoline or other fuel becomes vaporized and the space above the gasoline which seals the open end of *d*, accumulates vapor under pressure until the pressure becomes strong enough to "let go" and push the gasoline out between the walls of the member *d* and the casing 7, as previously explained.

When the pressure in the vapor has expended itself and moved its increment of fluid forward, a partial vacuum is formed in the member *d* which tends to pull in fresh fuel through the supply line. Such fuel being cool intensifies the vacuum as explained, and greatly assists in the pumping action.

The modification of the device *b* shown in Figure 2 consists in coiling the conductor 20 about the outside of the casing 7 in place of coiling it about the element *d*. The results obtained, however, are the same. By fluting or relieving or half-boring, as it might be termed, portions of the wall surrounding the annular chamber 26, any fluid flowing through the opening 33 may escape past the disc 32 by raising said disc. As shown by the drawing the disc normally closes the opening 33 and prevents any liquid from passing back through the member *c* or *c'* into the pipes 4 or 3 respectively.

It is obvious that various changes and modifications may be made in departure from the particular description and showing of the accompanying drawing in adapting the invention to varying conditions and requirements of use and service, without departing from the true spirit of the invention and scope of the appended claims.

Having thus disclosed our invention, we claim and desire to secure by Letters Patent:

1. A device of the character disclosed, including two concentric tubular members and a wire coil surrounding one of said members for heating said member upon electrifying the wire coil, and means for conducting a

liquid to said tubular member; said inner tubular member being closed at one end and the other tubular member being formed with a base portion, said inner tubular member 5 having its open end directed toward the base portion.

2. A fluid pumping apparatus including a bottle-like pump element comprising a casing open at one end and closed at the other, 10 a second member within said casing for regulating the expansion of liquid therein, a valved feed line communicating with the open end of the pump casing, a valved dis-

charge line also communicating with the open end of the pump casing, and an electrical heating element associated with said pump element. 15

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES V. BALDWIN.
LESTER E. VAN HISE.

Witnesses:

J. SHUTT,
J. CALVIN BROWN.