Dec. 23, 1930. A. C. DURDIN, JR 1,786,056

FUMPING APPARATUS

Filed July 12, 1929

Fig. 1.

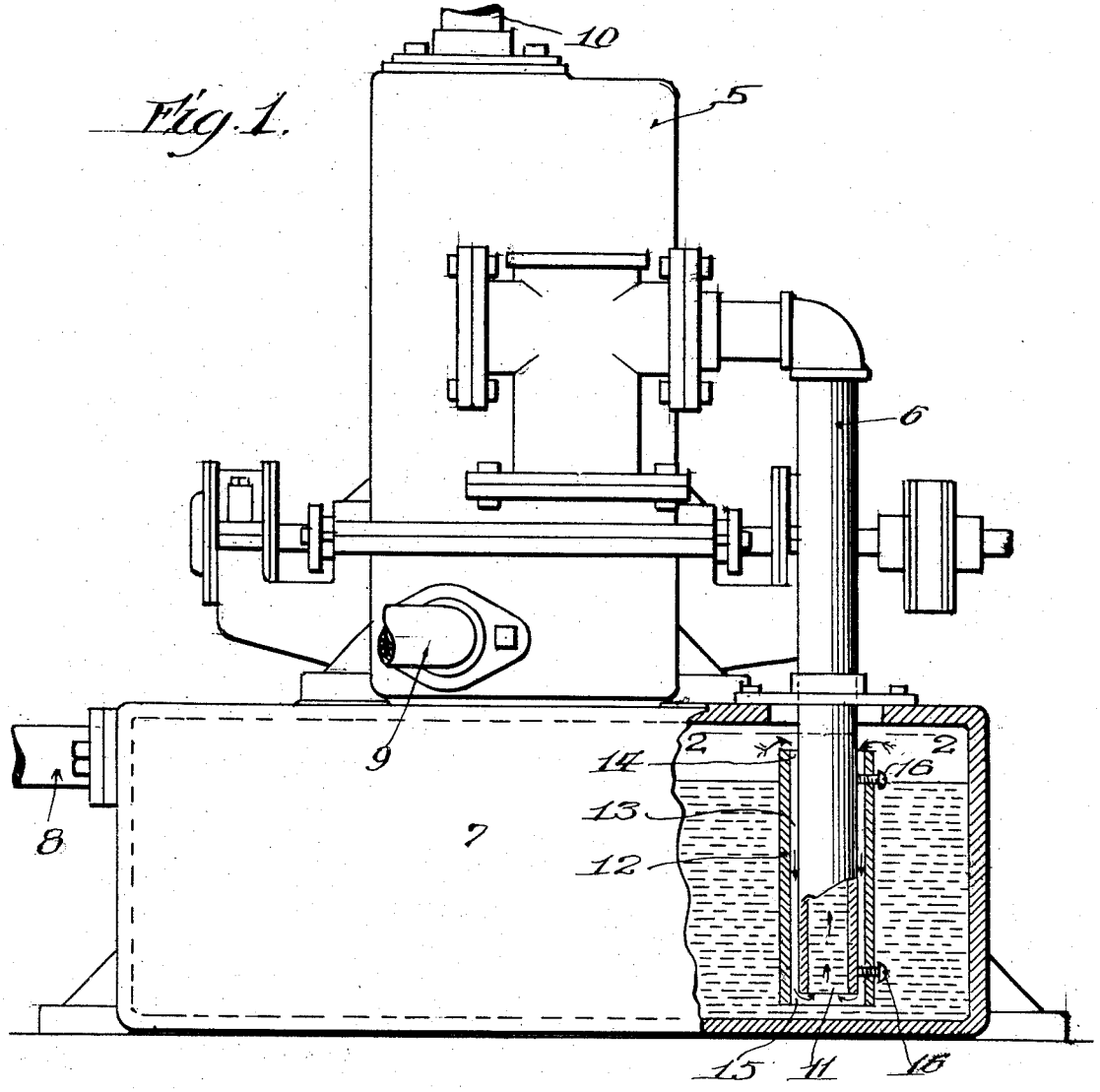


Fig. 2.

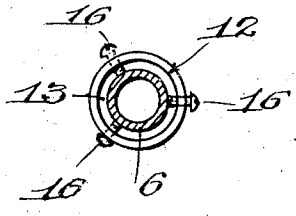
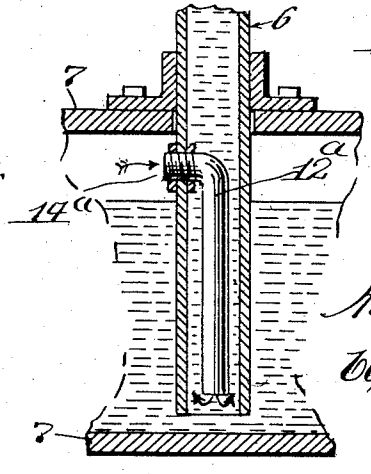


Fig. 3



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UNITED STATES PATENT OFFICE

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PUMPING APPARATUS

Application filed July 12, 1929. Serial No. 377,648.

This invention relates to pumping apparatus, and its principal object is to provide novel means for lightening the column of fluid which is being pumped. Another object is to provide novel means for lightening the work done by the pump, thereby reducing the power necessary to operate it and also reducing the wear and tear on the pump. Another object is to provide novel means for admitting air, gas, vapors, and other similar fluids to the column of liquid which is being pumped, whereby the same is lightened, and another object is to provide means for regulating the proportions of air, gas, vapor or other fluid and the liquid which is being pumped.

Other objects and advantages will appear in the course of this specification, and with said objects and advantages in view, this invention consists in a conduit for liquid, together with a conduit for other fluids, having an outlet end located in close proximity to the inlet end of the conduit for the liquid. The invention further consists in apparatus as above described in which the outlet end of the conduit for fluid is adjustable relative to the inlet end of the conduit for liquid, whereby the proportion of the respective fluids that enter the conduit for liquid may be regulated.

It further consists in the several novel features of construction, arrangement and combination of parts hereinafter fully set forth and claimed.

The invention is clearly illustrated in the drawing accompanying this specification in which—

Figure 1 is a side elevation of pumping apparatus embodying a simple form of the present invention, and showing a member broken out to illustrate parts which would otherwise be hidden from view;

Fig. 2 is a detail horizontal section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a detail vertical longitudinal section illustrating a slightly modified form of the invention.

Referring to said drawing, and first to Figs. 1 and 2, which show an application of the invention to a vacuum condensation pumping apparatus, the reference character 5 designates a pumping element containing a vacuum pump, the inlet conduit or pipe of which is seen at 6. In vacuum condensation apparatus, the pumping element is sometimes used in connection with a closed receiver, here shown at 7, having an inlet pipe 8 for liquid and other fluids, and when used in connection with heating systems, the pipe 8 is connected to the returns of the system and conveys water, gas, air, vapor and other non-condensable fluids to the receiver from which all of said fluids are exhausted by the pumping element 5 in which the liquid is separated from the other fluids and is discharged from a conduit or discharge pipe 9, the gas, air, and other non-condensable fluid escaping through a pipe 10, usually leading to the outer atmosphere. A more complete description of the vacuum condensation pumping apparatus is found in my prior application, Ser. No. 229,560, filed October 29, 1927, patented July 23, 1929, No. 1,721,590, to which reference may be made.

The pipe or conduit 6 leads to a place adjacent the bottom of the receiver 7 and terminates in an inlet end 11. It will be observed that when air, gas and other non-condensable fluids are taken into the inlet pipe 6 along with liquid, the weight of the column of water which is being moved by the pumping element 5 is lightened, thereby making it possible to operate the pumping element at its maximum efficiency with less power.

For the purpose of admitting said other fluids to the inlet pipe 6 when the liquid is being pumped, a pipe or conduit 12 is provided in connection with the inlet pipe 6, which, in the preferred form of the invention, surrounds the lower portion of the inlet pipe and forms therewith a passageway 13 at the upper end of which is a fluid inlet 14. At the lower end of the passageway is an outlet 15 from which air, gas, vapor or other non-condensable fluids entering the passageway through the inlet end 14 flows into the inlet end 11 of the inlet pipe 6. The lower end of the pipe or conduit 12 being open, it permits liquid contained in the tank to pass from the

interior of the tank to the inlet 11 of the inlet pipe 6.

The pipes 6 and 12 are secured against relative movement in order that the distance between the lower ends of said pipes may remain constant, and the pipe 12 is here shown as secured upon the pipe 6 by set screws 16 threaded in the pipe 12 and bearing against the outer face of the pipe 6. This arrangement also provides means whereby the lower ends of the pipes 6 and 12 may be adjusted relative to each other to increase or decrease the distance between their lower ends. It has been found that by moving the lower ends of the pipes 6 and 12 closer together, more liquid and less other fluids are drawn into the inlet pipe, and that by increasing the distance between said lower ends, more gas, or other similar fluids, is drawn into the inlet pipe. By properly locating the lower ends of the pipe with respect to each other, a proper proportion of the liquid and other fluids, which are drawn into the inlet pipe, can be obtained, and the most beneficial results are thus obtained.

In the modified form of the invention illustrated in Fig. 3, a pipe or conduit 12^a for the gas or other similar fluid is placed in the hollow of the inlet pipe 6, and its inlet end 14^a opens out through the side wall of the inlet pipe 6 and is secured thereto. The lower end of the pipe 12^a terminates at a place in close proximity to the lower end of the inlet pipe 6.

In the operation of the pumping apparatus embodying the present invention, whenever a partial vacuum or suction is created in the inlet pipe 6, liquid contained in the receiver 7 is drawn into the inlet pipe and because of the fluid passageway 13, which is in communication with the space in the receiver above the liquid and with the inlet end of the inlet pipe 6, causes gas, air, vapor, and other non-condensable fluids to be drawn through said passageway and enter the inlet end of the pipe 6 along with liquid, and, consequently, the weight of the column of liquid flowing up through the inlet pipe is considerably lessened, thereby making it possible to employ a vacuum pump of lesser capacity than is ordinarily used and also reducing the amount of power required to operate the pump.

While in the above specification, the column of lightened liquid is described as forced up the inlet pipe by vacuum, it is to be understood that the same result may be obtained by applying pressure to the interior of the receiver, as, for instance, through the pipe 8, since some of the air or gas above the liquid will flow through the passageway 13 and enter the inlet end 11 of the pipe 6.

More or less variation of the exact details of construction is possible without departing from the spirit of this invention. I desire, therefore, not to limit myself to the exact form of the construction shown and described, but intend, in the following claims to point out all of the invention disclosed herein.

I claim as new, and desire to secure by Letters Patent:

1. In pumping apparatus, the combination of a closed receiver for liquid and other fluids, a vacuum pumping element thereabove, an inlet pipe leading from the lower part of said receiver to the pumping element, a conduit for other fluids, said conduit being contained entirely within said receiver and surrounding the lower end of said inlet pipe and forming an annular air channel around said inlet pipe, said conduit being in open communication with the upper part of the receiver and opening directly to the inlet end of the inlet pipe.

2. In pumping apparatus, the combination of a receiver for liquid and other fluids, vacuum pumping apparatus thereabove, an inlet pipe leading from the lower part of the receiver to said pumping element, a conduit for said other fluids in open communication with the upper part of the receiver and with the inlet end of the inlet pipe, and means for adjusting the lower ends of said inlet pipe and conduit relative to each other.

3. In pumping apparatus, the combination of a conduit for liquid and having an inlet opening, pumping means for moving a column of liquid through said conduit, a conduit for other fluids having an inlet for said fluids at one end and an outlet for said fluids at the other end, said outlet being located in close proximity to the inlet of the conduit for liquid, and means for adjusting the lower ends of said conduits relative to each other.

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