

E. M. CASKEY.
PUMPING AND PRESSURE REGULATING SYSTEM.
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1,151,661.

Patented Aug. 31, 1915.

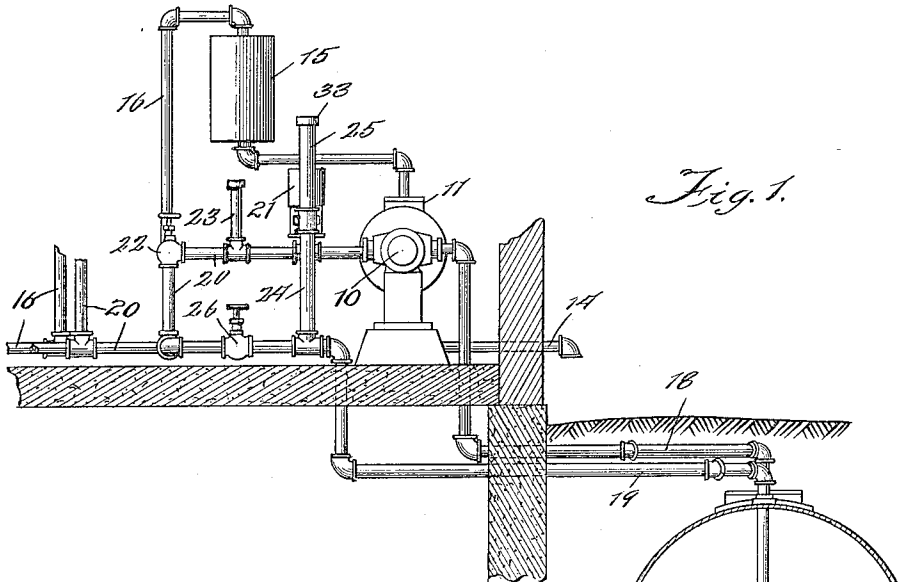


Fig. 1.

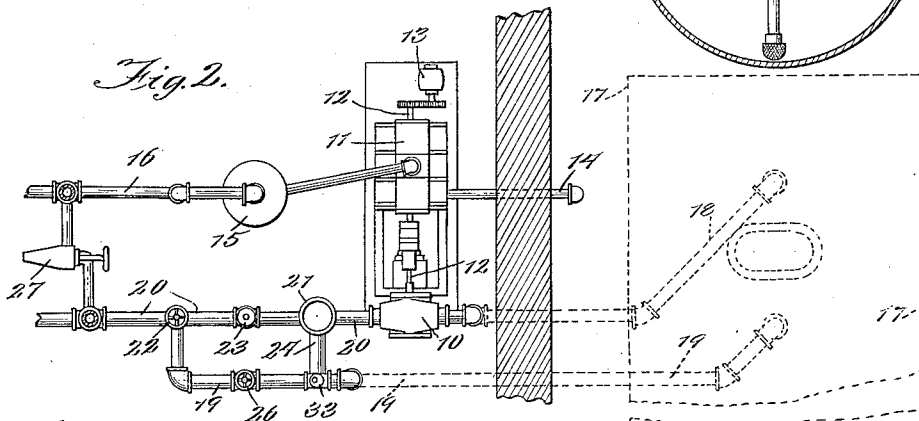


Fig. 2.

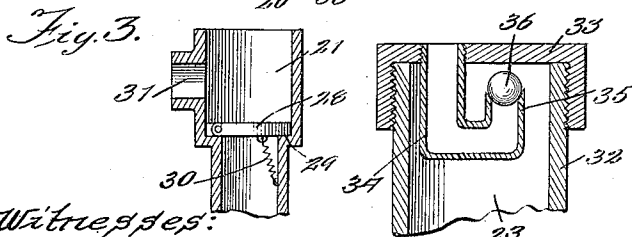


Fig. 3.

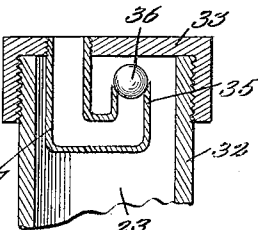


Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

EDGAR M. CASKEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO S. F. BOWSER & CO., INC., OF FORT WAYNE, INDIANA, A CORPORATION OF INDIANA.

PUMPING AND PRESSURE-REGULATING SYSTEM.

1,151,661.

Specification of Letters Patent.

Patented Aug. 31, 1915.

Application filed November 4, 1911. Serial No. 658,580.

To all whom it may concern:

Be it known that I, EDGAR M. CASKEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pumping and Pressure-Regulating Systems, of which the following is a specification.

This invention relates to a pumping and pressure regulating system for liquids, and more particularly to a system for pumping fuel oil.

One of the objects of the invention is to provide a system of the class described which employs an air pump and a liquid pump in combination, and positively connected driving means therefor to prevent the operation of the liquid pump without the operation of the air pump.

Another object of the invention is to provide means for permitting the admission of air to the discharge pipe of the liquid pump.

For the attainment of these ends and the accomplishment of other new and useful objects, as will appear, this invention consists in the features of novelty in the combination and arrangement of the several parts generally shown in the accompanying drawing, and described in the specification, but more particularly pointed out in the appended claims.

In the drawing, Figure 1 is a side elevation of a system embodying the principles of my invention; Fig. 2 is a plan view of the same; Fig. 3 is a detail sectional view of a relief valve; Fig. 4 is a detail sectional view of a single ball vent which is applied to the discharge pipe.

It has been found in practice that it is very dangerous to provide an air pump or blower in connection with a fuel oil supply system, unless the air pump is positively connected with the liquid pump, for the reason that if the blower or air pump fails at any time when the oil pump is in operation, there is great danger of the oil not being projected into the proper burning receptacle, resulting in a surplus of oil at the wrong place which may produce a dangerous explosion.

Another difficulty encountered in a system of the class described, is to provide means for relieving the fluctuations of pressure which are caused when the discharge

pipe is suddenly shut off at the discharging nozzles, or when a majority of the discharging orifices are closed at the same time during the actuation of the oil pump. It has been found that this operation results in a chattering of the pressure relief valve caused by the fluctuation of pressure in the discharge pipe. An air chamber alone in the discharge pipe will not overcome this difficulty for the reason that although an air chamber allows for a back pressure or condensation of liquid, it does not provide for a rarefaction of liquid in the discharge pipe which may be caused when the flowing liquid is suddenly diverted or pumped through the relief valve. Chattering of the relief valve is obviated in the present invention by permitting the ingress of air to the discharge pipe.

Referring now more particularly to the drawing, a liquid pump 10 and an air compressor or pump 11 are mounted upon or directly connected to a single shaft 12 which is driven in any suitable manner, as for example by a direct connected motor 13. The air pump is provided with an air inlet pipe 14, a receiver 15 and the discharge pipe 16. A liquid reservoir or tank 17 is provided and preferably disposed below the surface of the ground from which a supply pipe 18 extends to the liquid pump 10 and to which there extends a return pipe 19. The pump 10 is provided with a discharge pipe 20 which is provided with an automatic relief valve 21, a manually operable angle valve 22, and a single ball air valve 23.

Extending laterally from the relief valve 21, is a pipe 24 which communicates with the return pipe 19, and preferably positioned in connection with the pipe 24 is a relief valve 25 which regulates the pressure of liquid pumped through the relief valve. The return pipe 19 is also connected to the discharge pipe 20 preferably below the angle valve 22, and is provided with a gate valve 26 by means of which the discharge pipe may be drained and the liquid contained therein returned to the supply tank. The liquid discharge pipe and the air discharge pipe 16 are arranged in proximity so that a nozzle 27 having connections for both air and liquid, may be provided. It is evident that a nozzle may be employed wherever it is desired to use the liquid as a fuel, the nozzle being of any well known construction so

that the air and oil are both turned on by the operation of the nozzle valve. This insures that the oil will be properly projected and scattered.

Any type of relief valve 21 may be employed, such for example as that shown by Fig. 3, in which a weighted or spring pressed door 28, is held upon its seat 29 by means of a spring 30, with a lateral opening 31 to which the pipe is connected above the door to permit the discharge of fluid pumped through the valve.

To provide an air chamber and an air admission valve for the discharge pipe, a single ball vent may be provided similar to that shown by Fig. 4, in which a pipe 32 is secured to and is in connection with the discharge pipe. This pipe 32 is threaded at its upper end and provided with a cap 33 therefor. Secured to the cap 33 or formed integral therewith, is a tube 34 which extends through the cap and is bent or formed so that the inner end 35 extends upwardly in proximity to the underface of the cap. Positioned at the inner end 35 is a ball 36 which is of such a diameter that when raised from its seat in the end 35, it engages the underface of the cap before it can be dislodged, thereby retaining it in position. It is evident that this single ball vent is operative to permit the ingress of air and to close the vent when the discharge pipe or the air chamber is under pressure. It is also evident that the pipe 32 acts as an air chamber for the discharge pipe 20 and as such, is effective to prevent ramming in the pipe.

In operation the air pump and the liquid pump are operated simultaneously and the relief valve is effective automatically to maintain the proper pressure in the liquid discharge pipe. When, however, a large quantity of liquid is being pumped through the discharge pipe for the discharge outlets or nozzles, and a number of the outlets or nozzles are closed at substantially the same time, a surging action results in the discharge pipe which produces a chattering of the relief valve. This action is present to a greater or less extent each time a discharge nozzle is opened or closed, but is, of course, more noticeable when a great change is made in the quantity of fluid discharged. When a change in the quantity of fluid discharged is from a large amount to a small amount, the effect upon the relief valve is of course, the most noticeable, and it is at this time that the single ball vent 23 is called into operation. The surging action of the liquid in the discharge pipe, produces first a compression in the air chamber formed by the pipe 32, and then a rarefaction. To relieve the latter, it is necessary to provide means for instantaneously permitting a quantity of air to flow into the discharge

pipe. This is effectually accomplished by means of a single ball vent device which is operative automatically to permit the admission of air into the discharge pipe when a vacuum is produced therein, and to close the air vent when there is a pressure in the air chamber. This effectually prevents the surging action to be communicated to the relief valve 21 and prevents the chattering of the valve door.

In draining the discharge pipe into the reservoir or storage tank 17, the valve 26 is opened and air is permitted to pass into the discharge pipe through the single ball vent device 23, the suction of the liquid being sufficient to raise the ball from its seat.

In the accompanying drawings and in the foregoing description is set forth the preferred embodiment of my invention, but it is obvious that one skilled in the art may make modifications of the same without departing from the principle of the invention.

What I claim is:

1. In a pumping and pressure regulating system, the combination with a supply reservoir, of a pump having connection therewith, discharge means for the pump, and means to regulate the pressure of the fluid pumped, consisting of a relief valve for the passage of liquid from the discharge means and an atmospheric air inlet device for the passage of air into the discharge means.
2. In a pumping and pressure regulating system, the combination with a supply reservoir of a pump having connection therewith, a discharge pipe from the pump, a pressure relief valve for the passage of liquid from the discharge pipe, and means remote from the outlet end of the discharge pipe to admit atmospheric air into the discharge pipe.
3. In a pumping and pressure regulating system, the combination with fluid pumping and supply means, of a discharge pipe for the fluid pumped, means to relieve the pressure of the fluid pumped by returning the surplus to the supply, and an air inlet device in the discharge pipe to admit air when a vacuum is produced therein.
4. In a pumping and pressure regulating system, the combination with pumping and supply means, of a discharge pipe for the fluid pumped, means to return a surplus of fluid pumped to the supply source, and an air inlet device in the discharge pipe comprising a ball valve raised from the seat by a vacuum in the pipe.
5. In a pumping and pressure regulating system, the combination with pumping and supply means, of a discharge pipe for the fluid pumped, means to return a surplus of fluid pumped to the supply source, and an air inlet device in the discharge pipe comprising a closed pipe with a pipe with an inverted end projecting into the pipe, and

means to close the end when there is a pressure in the pipe.

6. In a pumping and pressure regulating system, the combination with pumping and supply means, of a discharge pipe for the fluid pumped, means to return a surplus of fluid pumped to the supply source, and an air inlet device in the discharge pipe comprising a closed pipe, a cap therefor having a tube opening through the cap with an inverted inner end, and a ball seated in the inner end of the tube operative to permit the ingress of air to the pipe.

7. In a pumping and pressure regulating system, the combination with pumping and supply means, of a discharge pipe for the fluid pump, and an air inlet device connected to the discharge pipe comprising an upwardly extending pipe, a removable cap therefor, a tube inserted in the cap and curved upwardly at the inner end, and a ball to cover the inner end of the tube, the inner end being positioned so that the ball, when raised, engages the cap to retain it on its seat.

8. In a pumping and pressure regulating system for fuel oil, the combination with a liquid pump, of discharge pipes therefor, and an air chamber secured to the discharge pipe comprising a closed pipe and means to provide an air inlet opening therein, the said inlet being opened when there is a vacuum in the pipe.

9. In a pumping and pressure regulating system for fuel oil, the combination with a liquid pump, of an air pump, means to drive the pumps, a discharge pipe for each of the pumps having a common delivery, a pipe connected to the liquid discharge pipe forming an air space, and means to permit the ingress of atmospheric air to the liquid discharge pipe.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this first day of November A. D. 1911.

EDGAR M. CASKEY.

Witnesses:

K. W. WOUNELLE,
C. H. SEEM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."