H. F. HANSEN.

PRESSURE RELIEVING DEVICE FOR PUMPS, &c.

APPLICATION FILED AUG. 31, 1911.

1,135,579.

Patented Apr. 13, 1915.

Fig. 1.

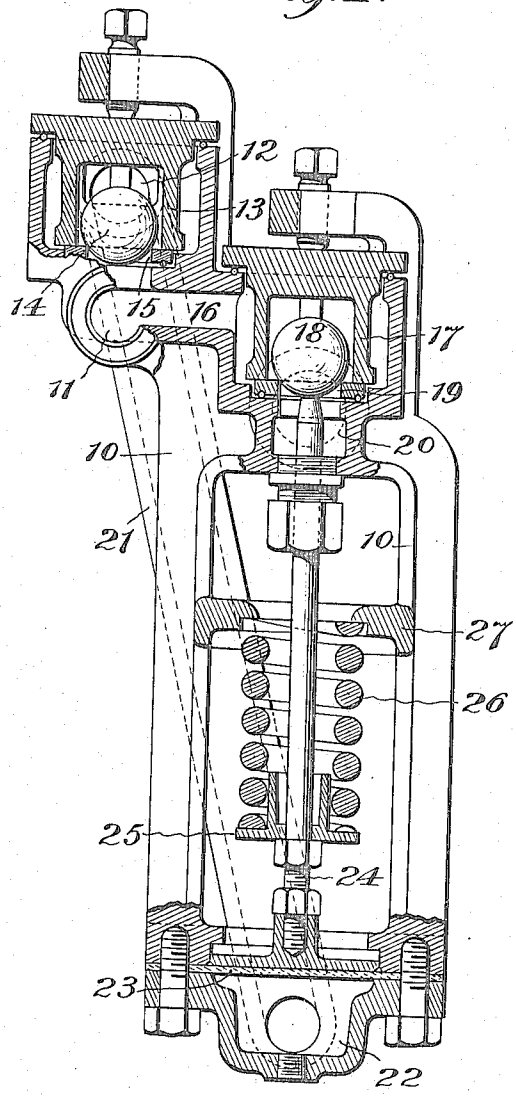
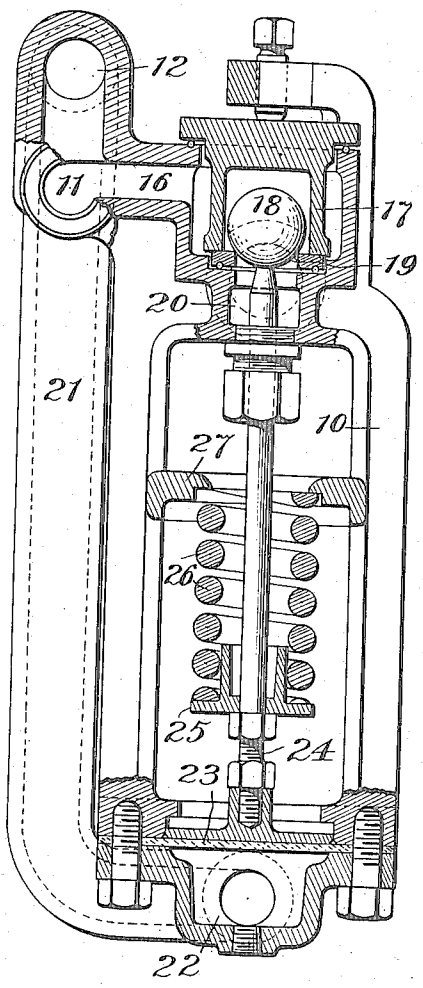


Fig. 2.



Witnesses:

Jas. E. Hutchinson.

A. T. Hayes

Inventor:

Harvey F. Hansen,

by Chas. V. Fowler

Attorney:

UNITED STATES PATENT OFFICE.

HARVEY FRANK HANSEN, OF SAN JOSE, CALIFORNIA, ASSIGNOR TO BEAN SPRAY PUMP COMPANY, OF SAN JOSE, CALIFORNIA.

PRESSURE-RELIEVING DEVICE FOR PUMPS, &c.

1,135,579. Specification of Letters Patent. Patented Apr. 13, 1915.

Application filed August 31, 1911. Serial No. 646,992.

To all whom it may concern:

Be it known that I, HARVEY F. HANSEN, a citizen of the United States, residing at San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Pressure-Relieving Devices for Pumps, &c., and do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

In the operation of spraying trees and other vegetation where the required pressure for the liquid is produced by a pump, inasmuch as the number of nozzles in use at the same time may vary and as there is a common source of supply of liquid for the nozzles to which the pump is connected, provision must be made to take care of the difference between the quantity of liquid supplied by the pump and the quantity actually used by the nozzle. Various expedients have been invented for this purpose. For example, a safety valve has been applied to the air or pressure chamber to which the pump forces the liquid and to which a number of spraying nozzles are connected by suitable hose, the excess liquid supplied to the chamber, when less than the full number of nozzles, is being cared for by the safety valve.

The object of this invention is to provide a more satisfactory means of dealing with the problem, which, amongst other advantages will have the important one of making the work to be performed by the pump no more than is required for the particular number of nozzles actually in use, or the rate of discharge of the liquid from the pressure tank or chamber. While designed more particularly for spraying apparatus, it is to be understood, of course, that the invention is of general application.

In the accompanying drawings—Figure 1 is a vertical section through a pressure relieving device embodying this invention; and Fig. 2 is a similar view of a different embodiment of my invention.

In describing the invention its adaptation to spraying apparatus will be used, but the selection of this particular apparatus, it is to be understood, is not to be taken as limiting the invention in an embodiment suitable only for that particular purpose. In the embodiment of the invention illustrated, the frame 10 consists of a casting having an inlet opening, or port 11, by which connection with the pump supplying the liquid is made, and there is an outlet or eduction port 12 leading to the air or pressure chamber to which the liquid is supplied by the pump and with which are connected the spraying nozzles by means of flexible hose, as usual. Between the induction port 11 and the eduction port 12, there is a valve chamber 13 containing a ball check valve 14 which is lifted from its seat 15 by the pressure of the liquid coming from the pump and is moved to its seat when there is a superior backward pressure from the air or pressure chamber through the eduction port 12. From the induction port 11 a passage or by-pass 16 leads on the inlet side of the valve chamber 13 to a valve chamber 17 containing a similar ball check valve 18 which is held to its seat 19 by means of the pump pressure. Below or beyond the valve seat 19 there is a port or passage 20 from which a pipe runs to the supply tank from which the pump is drawing the liquid, so that when the valve 18 is off its seat the liquid entering through the induction port 11 may pass either in whole or in part back to the supply tank. From the eduction port 12 a pipe 21 runs to and communicates with a chamber 22 containing a flexible diaphragm 23. Connected to the diaphragm is a rod 24 having an end that reaches to the valve 18 so that when the rod is moved by pressure upon the diaphragm 23 it will engage the valve 18 and lift it from its seat and thereby open a direct passage from the induction port 11 through the by-pass 16 to the discharge port 20. The rod 24 has a collar 25 against which bears one end of a coil spring 26 whose other end bears against a stationary abutment 27 on the casting 10 and thereby a desired pressure is placed upon the diaphragm which must be overcome before the diaphragm yields under the pressure within the pressure chamber 22.

In the bottom of the chamber below the diaphragm 23 is a drain, or outlet, which is usually closed, but which may be opened when desired to remove any sediment that may accumulate in the chamber, or draw-off liquid, which otherwise in cold climates might freeze and burst the structure

Assuming that there are, say, four nozzles to be supplied from the air or pressure chamber and that the pressure desired in the

latter is 200 pounds it will be seen that if but two of the nozzles are in use at a time there will be an excess pressure in the air chamber which being transmitted to the diaphragm 23 will result in the lifting of the valve 18 from its seat and hence the diversion of the liquid entering the induction port 11 in part to the discharge passage 20, the quantity diverted being, of course, one-half of that supplied by the pump, and, of course, the burden on the pump will be correspondingly reduced because the only work it is obliged to do is to supply the pressure required for the two nozzles in use, that portion of the liquid diverted to the discharge passage 20 not being subjected to the pressure necessary in the case of the liquid going past the valve 14 within the air or pressure chamber. It will be seen that if all the nozzles are closed as the back pressure on the valve 14 will seat it, the pump will not be called upon to do any other work than that required in the circulation of the liquid from the tank through the induction port 11 and back to the tank through the discharge passage 20.

It frequently happens in the use of a spraying apparatus where trees to be sprayed are widely separated, that in moving the apparatus from one tree to another all the nozzles will be shut off and, hence, the invention is of special importance in that connection.

In the embodiment of the invention illustrated in Fig. 2, only one valve is employed and there is a branch or by-pass connection from the pump connection to the pressure chamber 22. The advantage of the two valved arrangement illustrated in Fig. 1, is that the check valve 14 when closed keeps the pressure in the air chamber and prevents any back pressure upon the valve 19 so that when all the nozzles are closed there is practically no pressure in the by-pass, and, hence, all the work the pump has to do is that of merely circulating the liquid.

On account of the corrosive solutions for the spraying of which the apparatus to which this invention relates is employed, it is indispensable that valves having the characteristics of the ball type, which I illustrate in the drawings, be employed because the constant turning of the ball presents new surfaces thereof for contact with the seat and renders any corrosive action harmless because it cannot be localized as is the case with a valve of the flat or puppet type which does not permit any shifting of the valve surface with reference to the seat. The absence of springs subjected to the action of the fluid is also very important in this same conneetion. For the same reason the diaphragm 23 is important as compared with a piston slidable in a cylinder, for with a diaphragm there is no possibility of any gumming or clogging which is possible in the case of a piston in a cylinder.

Having thus described my invention what I claim is—

1. As an improvement in chemical spraying apparatus, the combination of a casing having a pump connection, two passages branching from said pump connection, each leading to a port for delivering the pumped liquid from the casing, a valve in the form of a loose freely movable body situated in one of said passages between the pump connection and its eduction port and normally closing the same so as to prevent the passage of liquid out of its eduction port and exposed to pressure from the pump connection which holds it to its seat, and means to lift said valve from its seat against such pump pressure, comprising a motor in a chamber that receives pump pressure from the pump side of said valve.

2. As an improvement in chemical spraying apparatus, the combination of a casing having a pump connection, two passages branching from said pump connection, each leading to a port for delivering the pumped liquid from the casing, a valve in the form of a loose freely movable body situated in one of said passages between the pump connection and its eduction port and normally closing the same so as to prevent the passage of liquid out of its eduction port and exposed to pressure from the pump connection which holds it to its seat, and means to lift said valve from its seat comprising a chamber having a diaphragm, a passage for fluid being provided to said chamber from a point between the pump connection and said valve, a rod extending from the diaphragm to said valve, a spring for moving the diaphragm against pressure within its chamber, and means for adjusting the tension of the spring, the spring and its adjusting means being wholly external to the casing, and said diaphragm chamber being provided with a drain opening.

In testimony whereof I affix my signature in presence of two witnesses.

HARVEY FRANK HANSEN.

Witnesses:
E. A. Bishop,
H. B. Gelatt.