H. M. MILLER.

BALANCED RELIEF VALVE.

APPLICATION FILED JUNE 6, 1910.

996,873. Patented July 4, 1911.

Fig. 1.

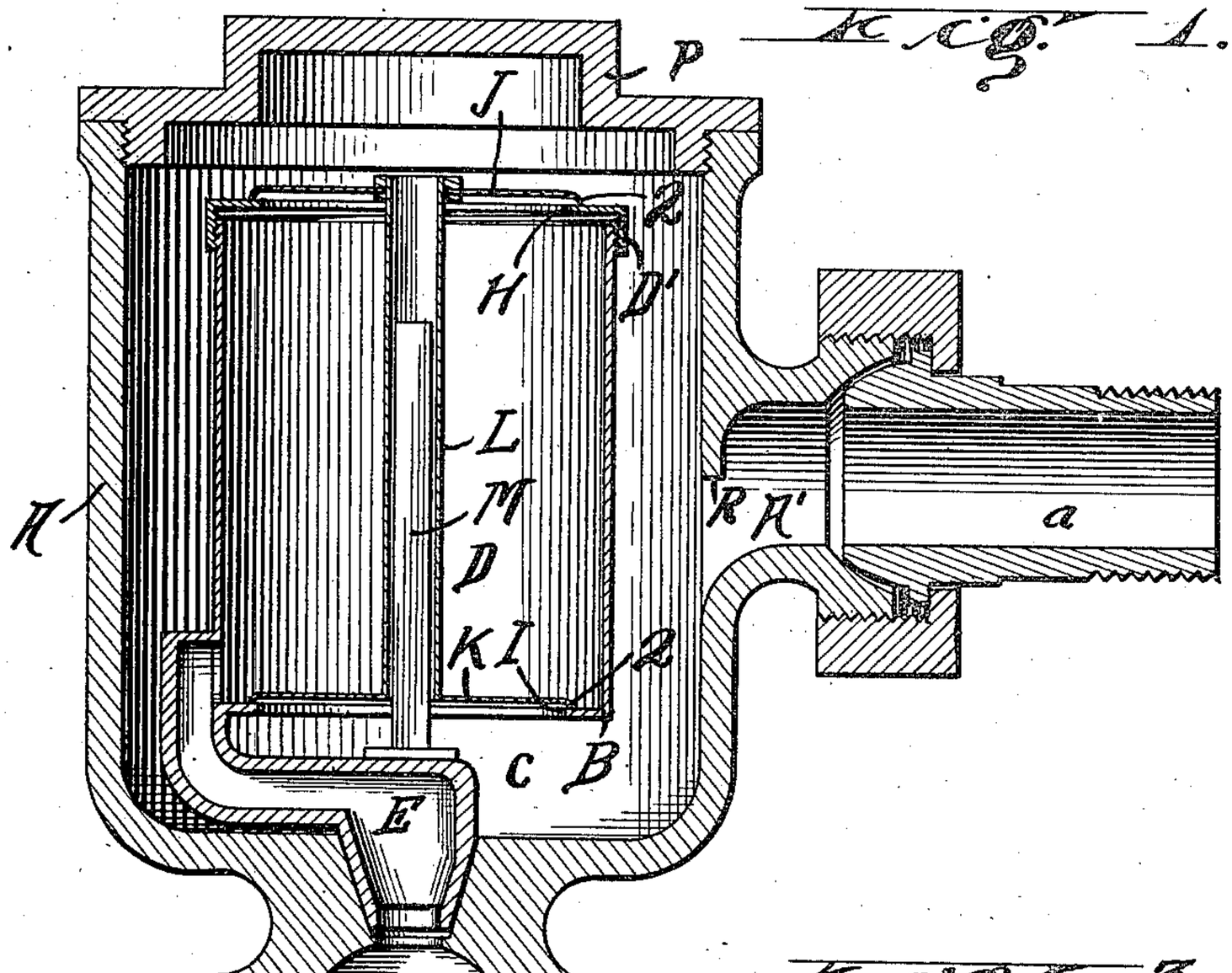


Fig. 3.

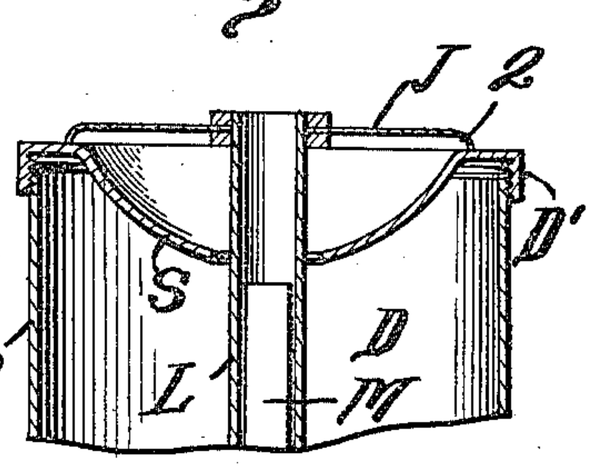
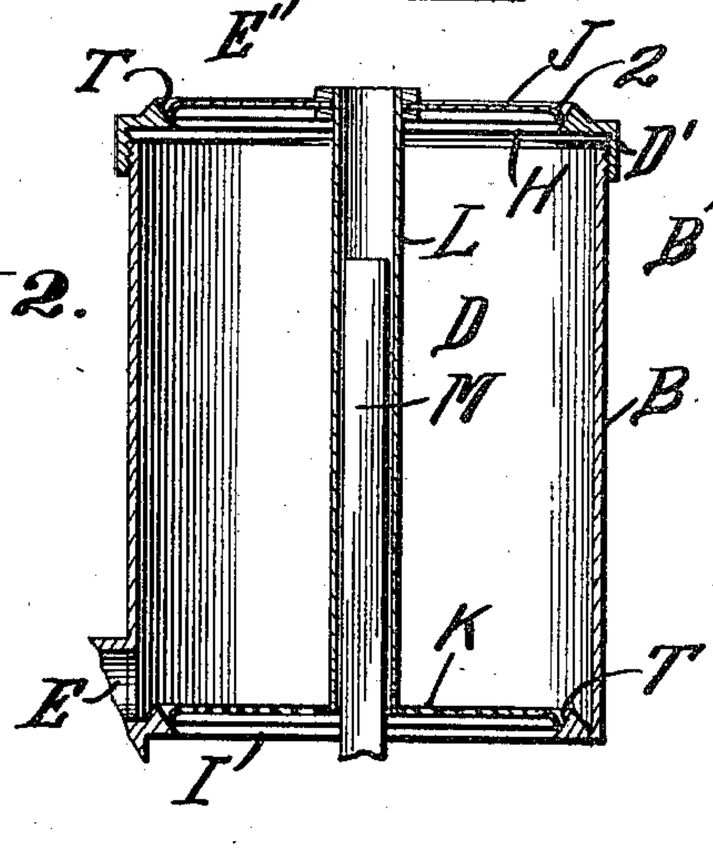


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

HARRY M. MILLER, OF MILWAUKEE, WISCONSIN.

BALANCED RELIEF-VALVE.

996,873. Specification of Letters Patent. Patented July 4, 1911.

Application filed June 6, 1910. Serial No. 565,189.

To all whom it may concern:

Be it known that I, HARRY M. MILLER, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Balanced Relief-Valves, of which the following is a specification.

My invention relates to improvements in balanced relief valves.

The object of my invention is to provide a balanced valve structure which can be used either as a trap or as a so called vacuum valve for heating systems, or in any other relation where accumulations of liquid are to be discharged at intervals without allowing a wasteful escape of steam or other vapor from the system, and in which the valve will be automatically operated by static pressure developed by the liquid itself without the aid of a float.

In the following description, reference is had to the acompanying drawings, in which—

Figure 1 is a vertical sectional view, drawn through the axes of the inlet and outlet ducts. Fig. 2 is a detail sectional view of the inner or outlet chamber and the balanced valves, showing a modified form of valve seat. Fig. 3 is a similar detail view showing a further modification.

Like parts are identified by the same reference characters throughout the several views.

An inclosing casing A is subdivided by an interior wall B into an inlet chamber C and an outlet chamber D, the outlet chamber having a duct E leading to the outlet E′ of the casing A, the walls of the duct E being tapered at the lower end of the duct and adapted to fit a correspondingly tapered opening in the casing A, which communicates with the outlet E′.

A′ is an inlet port or duct communicating with the chamber C, an inlet pipe *a* being coupled thereto by any ordinary means.

The chamber D is provided with apertures H and I in its upper and lower walls, which are normally closed by valves J and K respectively. The valves are connected by a stem L preferably tubular, and a guide rod M extends into this tube from any suitable support, such as the lower elbow of the duct E. The valves J and K are balanced or substantially so being of equal size, or at least having equal areas exposed to the interior of the inlet chamber C and equal areas exposed to the interior of the outlet chamber. They are also arranged to open upwardly and are sufficiently light in weight to be lifted by the pressure of a column of liquid on the lower valve of less height than the distance between the valves. With this arrangement, when sufficient liquid accumulates in the chamber C to lift the valves, the liquid will be permitted to discharge to the outlet through the chamber D. The momentum of the liquid will hold the valves open as long as this flow continues, after which the valves will drop by gravity to their seats and remain closed until a column of liquid again accumulates of sufficient height to lift them.

In structure, I prefer to have the chamber D cylindrical in form, with the outlet duct leading outwardly, downwardly and inwardly to a point below the chamber D, where the outlet E′ is located for convenience in connecting waste pipes. The outlet duct being tapered and socketed in slip joint connection with the casing A permits the chamber D with the valves and duct E to be lifted bodily from the casing A, when the cover P is removed. The upper wall of the chamber D also comprises a removable cap D′ by unscrewing which, the valves may be removed from the chamber. The valves are preferably provided with down turned margins 2, as they may thus be made both light and strong, and of sufficient area to secure the requisite lifting pressure to insure their lifting when the liquid column is formed. The casing A is preferably provided with a flange or lip R at the inlet to prevent flow of steam into the chamber C in cases where the inlet duct A′ is not full of liquid.

It will be observed that when the valves are lifted, any air in the upper portion of the chamber C will be permitted to discharge, where the outlet duct is connected with an exhausting device or chamber. The upper opening closed by the valve J may, if desired, be contracted below the valve by a wall S, as shown in Fig. 3, to lessen the suction pull of the vacuum upon the upper portion of the chamber C, and the valves may, if desired, be formed to close upon conically tapered seats T, as shown in Fig. 2. But I do not limit the scope of my invention to these structural details, it not being my intention to attempt to illustrate all the forms in which my invention may be

embodied or to exclude by any of the terms used or structures illustrated and specifically described, any mechanical equivalents therefor. The terms and phrases herein employed are used as terms and phrases of description and not of limitation. The valves may be adjusted to accurately fit the seats in any of the described forms of construction, either by adjusting one of the valves upon the connecting stem or by screwing the cap D′ down or up on the side walls of chamber D.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a device of the described class, the combination of a set of chambers having a plurality of intercommunicating apertures at different levels, and upwardly opening valves for said apertures connected with each other; said valves being loosely seated and arranged to open without friction and sufficiently light in weight to be lifted to open position by the pressure of a column of liquid on the lower valve of less height than the vertical distance between the valves, each valve having substantially the same area as the other exposed to the interior of the respective chambers and each valve having its upper surface exposed to the interior of one of the chambers and its lower surface exposed to the interior of the other chamber.

2. In a device of the described class, the combination of an outer chamber provided with an inlet, an inner chamber provided with an outlet leading through one wall of the outer chamber, said inner chamber being provided with openings in its top and bottom walls communicating between the outer and inner chambers, upwardly opening valves for normally closing said openings, a stem connecting said valves, said valves and the connecting stem being of sufficiently light weight to permit them to be lifted by the pressure of a column of liquid on the lower valve of less height than the vertical distance between the valves and said valves being of substantially equal area.

3. In a device of the described class, the combination of a set of chambers, one of which has top and bottom walls separating it from the other chamber and provided with valve controlled apertures, upwardly opening valves normally closing said apertures and a tubular stem connecting said valves, one of said chambers being provided with an inlet duct and the other with an outlet duct, and said valves and stem being sufficiently light in weight to be lifted by the pressure of a column of liquid on the under side of the lower valve of less height than the distance between the valves.

4. In a device of the described class, the combination of a set of chambers, one of which has top and bottom walls separating it from the other chamber and provided with valve controlled apertures, upwardly opening valves normally closing said apertures and a tubular stem connecting said valves, one of said chambers being provided with an inlet duct and the other with an outlet duct, and said valves and stem being sufficiently light in weight to be lifted by the pressure of a column of liquid on the under side of the lower valve of less height than the distance between the valves, each of said valves being provided with a down turned circular flange for contact with the valve seat.

5. In a device of the described class, the combination of a set of chambers provided with intercommunicating openings at different levels and balanced valves normally loosely resting upon supporting valve seats in a position closing said openings and connected with each other, one of said chambers being provided with an inlet and arranged to hold a column of liquid in position to press upon one of the valves and of sufficient height between the valves to open the valves by such pressure, and the other chamber being provided with an outlet; said valves, when open, being out of contact with the walls of said chambers.

6. In a device of the described class, the combination of an outer chamber having walls provided with an inlet and an outlet, an inner chamber provided with an outlet duct removably socketed in the outlet of the outer chamber, said inner chamber having openings leading to its interior from the outer chamber at different levels, valves normally closing said openings and connected with each other, said outer chamber being arranged to hold a column of liquid in a position to exert static pressure upon the under side of the lower valve, and said valves being sufficiently light to be lifted by such column of liquid.

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

HARRY M. MILLER.

Witnesses:
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