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SAFETY VENTING ATTACHMENT FOR LARGE RECEPTACLES CONTAINING VOLATILE EXPLOSIVES

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Fig. 1.

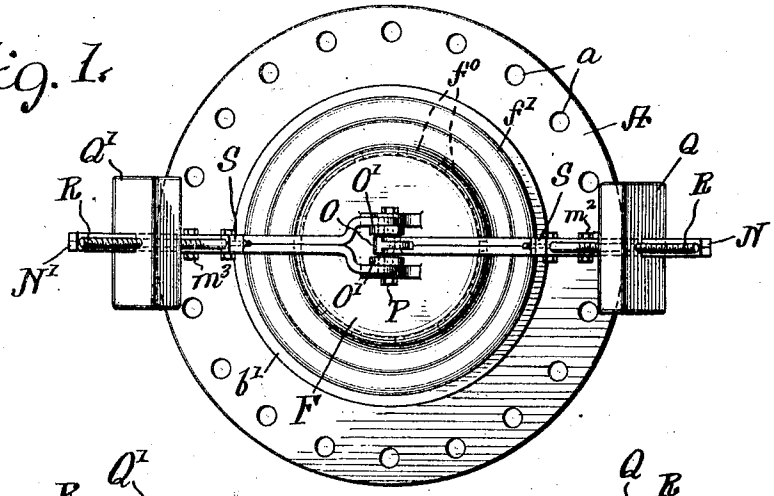
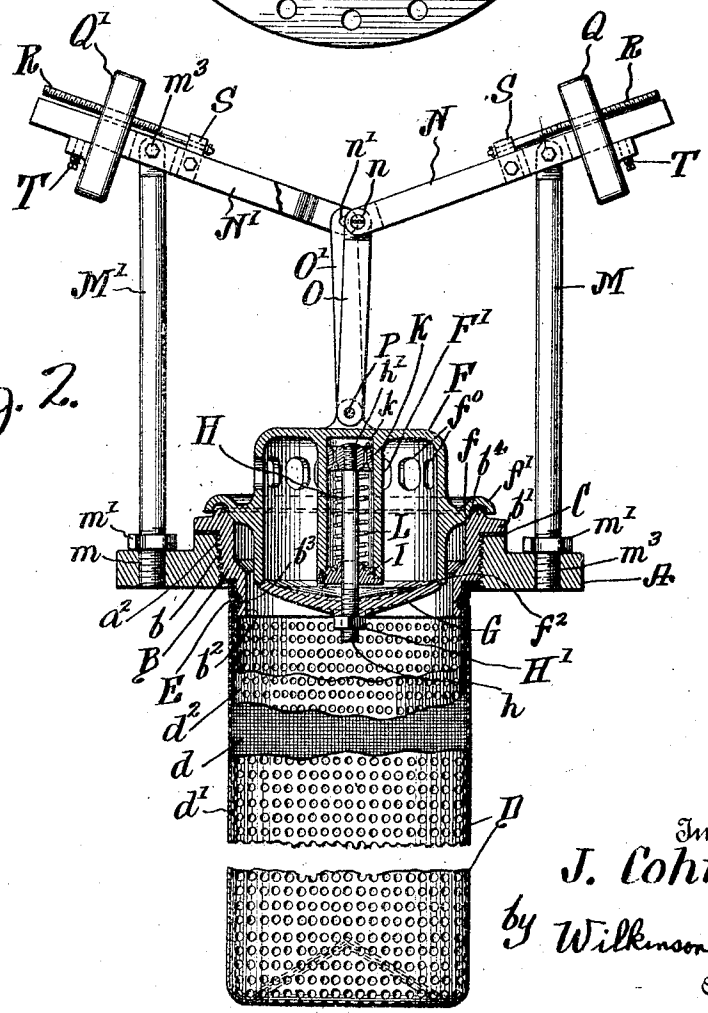


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SAFETY VENTING ATTACHMENT FOR LARGE RECEPTACLES CONTAINING VOLATILE EXPLOSIVES.

Application filed October 13, 1922. Serial No. 594,406.

To all whom it may concern:

Be it known that I, JACOB COHN, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Safety Venting Attachments for Large Receptacles Containing Volatile Explosives, of which the following is a specification.

My present invention relates to improvements in venting attachments for use with tanks or other large receptacles containing volatile inflammable liquids, such, for instance, as gasolene or the like.

The invention is intended to provide an arrangement which will permit the escape of the vapor rising from such receptacle when the pressure exceeds a predetermined limit, but if such escaping vapor becomes ignited, the attachment will prevent the flame from being conveyed to the interior of the tank containing the body of the inflammable liquid.

The invention comprises a specially balanced relief valve which may be adjusted to operate at various pressures to comply with the requirements of local conditions.

The invention also provides a suction valve to permit the influx of air when drawing liquid from the tank.

In my Patent No. 840,992, granted January 8, 1907, and entitled "Safety venting attachment for receptacles," I have shown a venting attachment especially adapted for use with small receptacles, such as casks, cans, or small tanks; but my present invention relates more especially to providing an apparatus adapted for use with storage tanks or larger receptacles containing large quantities of volatile inflammable liquid.

My invention will be more fully understood after reference to the accompanying drawings, in which like parts are indicated by similar reference symbols throughout the several views, and in which:—

Figure 1 is a plan view of the attachment as adapted to be applied to the roof of a tank; and

Figure 2 shows a central vertical section through the apparatus shown in Fig. 1, parts being shown in elevation and parts being broken away.

A represents a flanged housing ring provided with perforations a for the purpose of attaching same by means of bolts or rivets to the roof of the tank, not shown. This ring is provided with a shoulder a' and with internal screw threads a^2, which screw threads engage the screw threads b of the bushing B, which bushing is shouldered as at b' to engage the gasket C held between the bushing B and the ring A, as shown in Fig. 2. The bushing projects downwards, as at b^2, and is provided with an annular groove b^3.

D represents the safety cylinder which preferably consists of three concentric layers, the central layer d being made of fine wire mesh, and the outer and inner layers d' and d^2 being made of perforated metal sheets of cylindrical form which serve to protect the wire gauze from being so punctured as to admit flame. The head of this cylinder may be conveniently attached to the bushing B by pressing the walls of the same into the annular groove b^3, and securing the same in place by means of a wire binding E, see Fig. 2.

The bottom of the cylinder D is also preferably composed of three layers, wire gauze in the center and perforated metal sheets on either side thereof to protect the same. By this arrangement air or gas or vapor may pass freely in either direction through the walls and bottom of the hollow cylinder, but the wire gauze will prevent the passage of flame from the exterior to the interior, or, of course, in the opposite direction, but no protection from the interior is needed but only from the exterior.

In order to permit the escape of gas when the pressure rises above a predetermined limit, and also to permit the influx of air when drawing off the liquid from the tank, I provide a compound valve arrangement consisting of the pressure relief valve F and the air or suction valve G which are connected together but operate independently, as will be hereinafter described.

F represents the bell-shaped body of the relief valve which is provided with a cone bearing f adapted to engage the valve seat b^4 on the bushing B. The body of the valve is provided with an outwardly extending flange f', preferably bent over and downwards, as shown, which serves to protect the

valve seat against the elements, or more especially water or ice. The bell F is provided with a series of openings f^0, and at its bottom with a cone bearing f^2 for the air valve G.

This air valve G is mounted on the valve stem H, which is provided with screw threads h on its lower end to engage the nut H'. This valve stem passes up through the guide I in the cylinder F' which is integral with the bell F, and the upper end of the valve stem H is secured, as at h', to the piston K which is provided with air passages k therethrough. The purpose of this piston K and its air passages is to provide a dashpot arrangement which will prevent the valve G from chattering.

The air valve G is normally held on its seat by the compression of the spring L which tends to press the piston K upwards. The compression of this spring may be adjusted by setting up or easing off on the nut H'.

In order to adjust the pressure at which the relief valve operates, I provide an arrangement of weights and levers which will now be described.

M and M' represent two stanchions whose lower ends are attached to the ring A as by the screw threads m and the adjusting nuts m'. Near the upper end of the stanchion M the lever N is pivoted, as at m^2, and one end of this lever is pivoted, as at n, to the link O. The lever N' is pivoted, as at m^3, to the head of the stanchion M', and is pivoted, as at n', to the link O'. This lever N' is preferably provided with a yoke n^2 at its end to span the contiguous end of the lever N, as shown in Fig. 1, so that there may be no lateral binding effect in the system.

The free end of the lever N carries a counterweight Q, and the free end of the lever N' carries the counterweight Q'. These counterweights are slidably mounted on their respective levers and are movable in and out by the adjusting screws R, rotatably mounted in the sleeves S. These weights may be moved in or out so as to compensate to the degree desired for the weight of the relief valve F and its connected parts, and by moving these weights in or out the pressure from within needed to open the relief valve may be varied from zero or even a minus quantity to one or more pounds as desired. In other words, with this arrangement the relief valve may be so balanced that it will open at the slightest pressure from within, or at any pressure that may come within the limits required of the apparatus. The weights Q and Q' when properly adjusted may be clamped in position by means of set screws T.

The operation of the device is as follows:—

Suppose the apparatus to be in the closed position shown in Fig. 2, and the weights to be adjusted so that the relief valve will open at a predetermined pressure, say 8 ounces or one-half a pound to the square inch, should the pressure exceed this amount the relief valve will lift and will permit the passage of vapor and gas from the tank through the annular passage between the bushing and the relief valve, and this gas will continue to escape to the exterior until the pressure falls below the predetermined limit, when the relief valve will automatically close again. While the relief valve is lifted and the inflammable gas is escaping, should this gas become ignited the flame will follow the escaping gas as far as the cylinder D, but will be arrested there by the wire gauze and will not be communicated to the interior of the tank.

The air valve G will normally close the bottom of the relief valve F, and in fact will form an essential part thereof. Under ordinary working conditions the said valve is normally held up by the pressure from within, as also by the spring L which spring should be sufficient to hold the air valve up when the relief valve is lifted. The pressure of the spring, however, should not be strong enough to overcome the suction created by the partial vacuum when liquid is drawn from the tank, in which case the air valve G is sucked down against the action of the spring L, being drawn away from its seat f^2 and past the air valve G, passing into the tank and thus restoring the equilibrium of the system.

Thus it will be seen that the relief valve will move upwards and permit the escape of pressure from the tank when the pressure becomes excessive, and the air valve will move downwards and admit air to the tank when the pressure in the tank falls appreciably below the predetermined limit.

While I have shown the preferred embodiment of the invention, it will be obvious that various changes might be made in the construction, combination and arrangement of parts which could be used without departing from the spirit of my invention; and I do not mean to limit the invention to such details except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A safety attachment for receptacles containing volatile inflammable liquids comprising a hollow cylinder provided with a wire gauze screen adapted to project down into the upper portion of said receptacle, a hollow relief valve provided with an air passage therethrough, normally closing the top of said cylinder, weight means for adjustably counterbalancing said relief valve, said weight means being exterior of the recep-

tacle and valve, an air valve carried by said relief valve and adapted to normally close said air passage, but to open same when the pressure in said receptacle falls below a predetermined limit, with means for causing said air valve to open at a predetermined fall of presure in said receptacle.

2. A safety attachment for receptacles containing volatile inflammable liquids comprising a hollow cylinder provided with a wire gauze screen adapted to project down into the upper portion of said receptacle, a hollow relief valve provided with an air passage therethrough, normally closing the top of said cylinder, weight means extending above the relief valve for adjustably counterbalancing said relief valve, an air valve carried by said relief valve and adapted to normally close said air passage but to open same when the pressure in said receptacle falls below a predetermined limit, and a spring mounted in said hollow relief valve and adapted to normally close said air valve, with means for varying the tension of said spring.

3. A safety attachment for receptacles containing volatile inflammable liquids comprising a hollow cylinder provided with a wire gauze screen adapted to project down into the upper portion of said receptacle, a hollow relief valve provided with an air passage therethrough, normally closing the top of said cylinder, means for adjustably counterbalancing said relief valve, said means comprising a pair of links pivotally connected to said relief valve, oppositely disposed levers pivotally connected to said links, respectively, and counterweights adjustably mounted on said levers, and a suction air valve carried by said relief valve and adapted to normally close said air passage but to open same when the pressure in said receptacle falls below a predetermined limit.

4. A safety attachment for receptacles containing volatile inflammable liquids comprising a hollow cylinder provided with a wire gauze screen adapted to project down into the upper portion of said receptacle, a hollow relief valve provided with an air passage therethrough, normally closing the top of said cylinder, means for adjustably counterbalancing said relief valve, said means comprising a pair of links pivotally connected to said relief valve, oppositely disposed levers pivotally connected to said links, respectively, and counterweights adjustably mounted on said levers, and a suction air valve carried by said relief valve and adapted to normally close said air passage but to open same when the pressure in said receptacle falls below a predetermined limit, with a spring mounted in said hollow relief valve and adapted to normally close said air valve.

5. A safety attachment for receptacles containing volatile inflammable liquids comprising a hollow cylinder provided with a wire gauze screen adapted to project down into the upper portion of said receptacle, a hollow relief valve provided with an air passage therethrough, normally closing the top of said cylinder, means for adjustably counterbalancing said relief valve, said means comprising a pair of links pivotally connected to said relief valve, oppositely disposed levers pivotally connected to said links, respectively, and counterweights adjustably mounted on said levers, an air valve carried by said relief valve and adapted to normally close said air passage, but to open same when the pressure in said receptacle falls below a predetermined limit, with means for causing said air valve to open at a predetermined fall of pressure in said receptacle.

JACOB COHN.