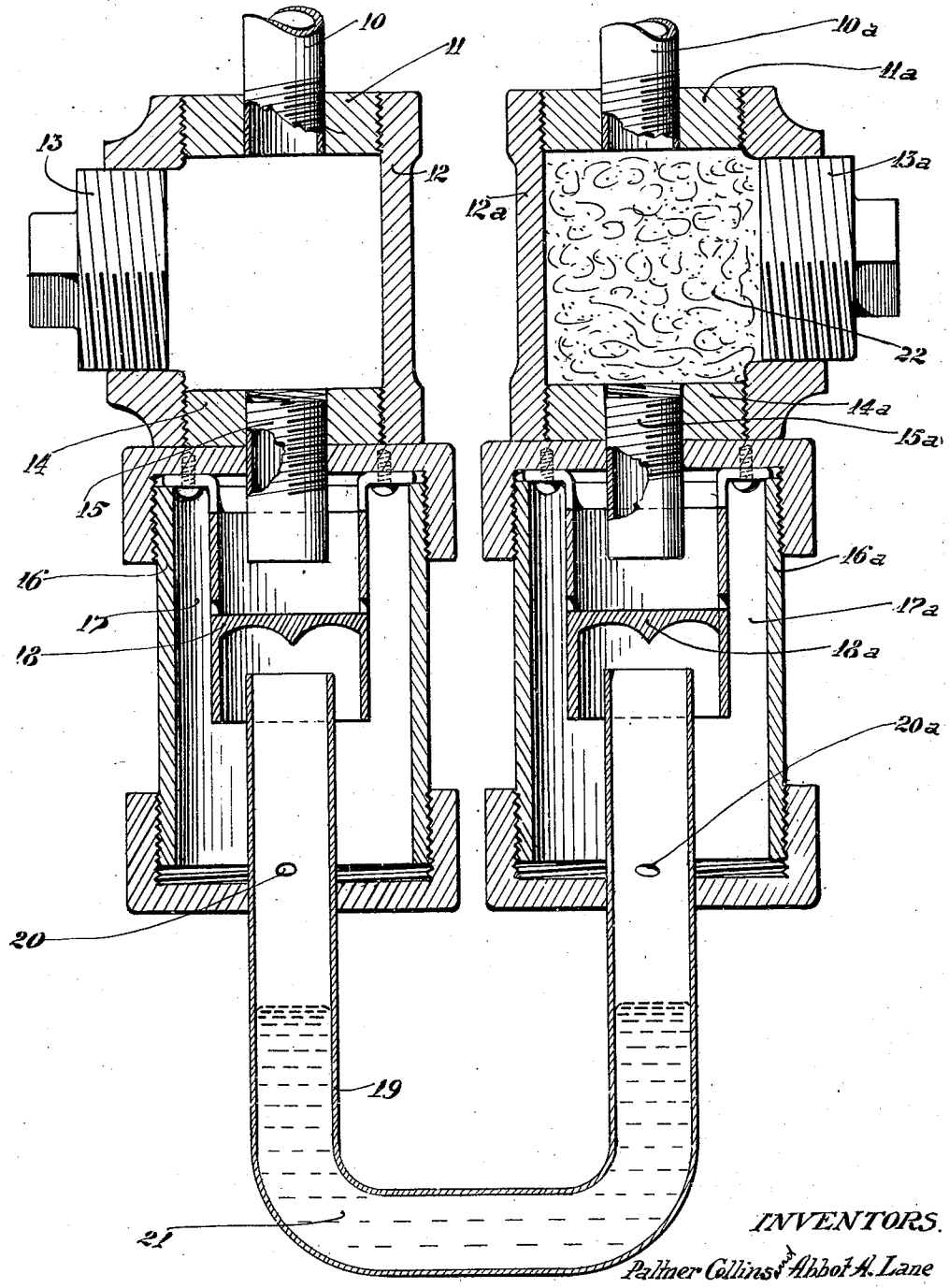
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BALANCE VALVE

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BALANCE VALVE

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The present invention relates to improvements in valves.

Among the principal objects which the invention has in view are: to provide a valve operating through a liquid in a U-shaped tube with open ends; to adapt the tube for connection to a region of gas pressure so that when the pressure is excessive, the gas will escape through the tube, displacing and ejecting the liquid therein; to provide means for collecting the ejected liquid and means for restoring and conveying it back again to the tube when the gas pressure has returned to normal; to provide a valve functioning to relieve against excessive pressure, and also to compensate for decreases in pressure of the gas; and to improve and simplify the construction.

Other objects, advantages, and desirable features of the invention will appear as the description proceeds.

The drawing illustrates by a cross-sectional, elevational view, a valve constructed in accordance with the present invention.

In detail, the invention is embodied in a valve construction which comprises a pipe 10 which is adapted to be connected to the region of gas pressure under control. The pipe 10 connects through a bushing 11 with a box 12 having a plug 13 in its wall which may be taken out to permit access to the interior of the box for purposes of cleaning, inspection, or repair. On the other end of the box opposite the pipe 10 is positioned another bushing 14 into which extends a nipple 15, the nipple projecting into a container 16 which is hollow and forms a chamber 17. The chamber communicates with the interior of the box 12 through the nipple 15.

Within the chamber of the container 16, there is positioned a baffle 18 which is secured to the interior of the container in any suitable or convenient manner and extends above the top or open end of a U-shaped tube 19. The end of the tube projects into the chamber 17 to an appreciable amount, as shown in the drawings, and as above stated, has an open end positioned just beneath the baffle 18. The end of the tube projecting within the container forms with the interior of the container a well, as will appear more fully hereinafter; and the bottom of this well has an opening 20 establishing communication between the well and the interior of the tube, the opening extending through the wall of the tube. Within the tube, a body of liquid 21 such as mercury, or other liquid of high specific gravity is placed and normally this liquid occupies the position shown in the drawings.

The other end of the tube is also open and communicates with the interior of a container 16^a, which is also hollow to form a chamber 17^a within which is positioned a baffle 18^a above the open end of the tube. The end of the tube projects into the container to an appreciable amount and forms with the interior of the container a well, the wall of the tube having an opening 20^a at the bottom of said well establishing communication between the interior of the tube and the well. The top of the container has a nipple 15^a extending into a bushing 14^a in a box 12^a and serving to connect the interiors of the container and the box. The box 12^a also has a plug 13^a for permitting access to its interior, and the upper part of the box a bushing 11^a into which is threaded a pipe 10^a. This latter pipe is open to the atmosphere.

Within the interior of the box 12^a, there is preferably placed a mass of collecting material 22 such as glass wool.

In operation, when the pressure through the pipe 10 becomes great enough to force the liquid or mercury column through the right hand arm of the tube 19 as seen in the drawings, the liquid is delivered into the chamber 17^a and collects in the well formed between the end of the tube and the interior of the container 16^a. The gas is thus free to pass through the chamber 17^a, nipple 15^a and through the collecting material 22 to the pipe 10^a into the atmosphere. The baffle 18^a deflects the liquid ejected into the well. If any of the liquid is carried over by the force of the expanding gas, it is caught by the collecting material 22 and when the pressure and flow of gas diminish, the liquid drips back into the well in the container 16^a. After the pressure and flow of gas has subsided, the liquid in the well of the container passes through the open-

ing 20^a back into the tube 19, and the initial condition is re-established.

Should the pressure through the pipe 10 expand slightly or gradually, the liquid in the tube 19 is forced gradually out of left hand arm into the right hand arm and when the pressure declines the liquid returns to its normal position. Should a decrease in pressure through the tube 10 exist, the liquid is lifted in the left hand arm of the tube 19 until the pressure readjusts itself, when the liquid again assumes its normal position. Thus, the liquid in the tube and the valve of the invention serves to compensate for small irregularities of pressure in the pipe 10, as well as to permit escape of gas when the pressure from the pipe 10 becomes excessive, and the valve works both ways, serving to control and compensate for both increases and decreases in pressure, and responding to both.

While the valve of the present invention is capable of application to a large variety of apparatus, it finds particular utility as a breather valve used in conjunction with the breather equipment in expansion tanks and particularly in oil tanks employed for electrical installation.

Claims:

1. A valve as characterized comprising a plurality of vertically disposed bottom connected passages, the upper ends whereof are open; a body of liquid in said passages for normally closing the same; chambers enveloping the open ends of said passages from a point below the extremity of said passages; and means establishing communication between said chambers and said passages adjacent the bottom of said chambers.

2. A valve comprising a U-shaped tube having open ends; a liquid in said tube; containers forming chambers above the open ends of said tube, the ends of the tube projecting into said chambers and forming wells with the interiors of the containers, said tubes having openings at the bottoms of said wells within the containers; and means establishing communication with said chambers.

3. A valve comprising a U-shaped tube having open ends; a liquid in said tube; means forming chambers above the open ends of said tube; baffles within said chambers above the open ends of the tube; and means establishing communication with said chambers.

4. A valve comprising a U-shaped tube having open ends; a liquid in said tube; containers forming chambers above the open ends of said tube; the ends of the tube projecting into said chambers and forming wells with the interiors of the containers, said tubes having openings at the bottom of said wells within the containers; baffles within the containers above the open ends of the tubes for deflecting the liquid emitted from the open ends into the wells, said containers having wall openings above the baffles.

5. A valve according to claim 4, with boxes above the containers and communicating with the interiors of the containers through the wall openings thereof; pipes leading from the interiors of the boxes; and collecting material in at least one of said boxes.

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