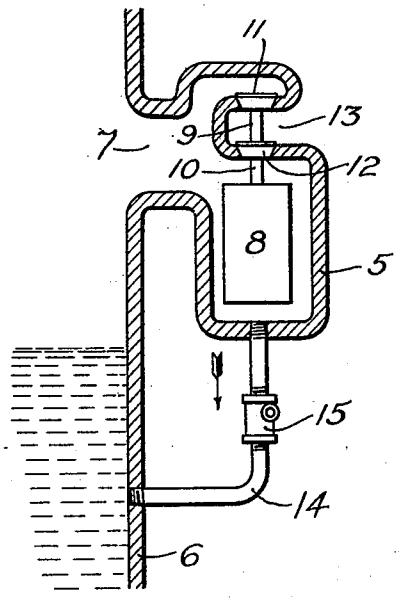
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VACUUM BREAKER.

APPLICATION FILED NOV. 6, 1917.

1,407,136. Patented Feb. 21, 1922.



WITNESSES:

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VACUUM BREAKER.

1,407,136. Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed November 6, 1917. Serial No. 200,626.

To all whom it may concern:

Be it known that I, RAYMOND N. EHRHART, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Vacuum Breakers, of which the following is a specification.

This invention relates to vacuum breakers and has for an object to produce a new and improved vacuum breaker for effectively preventing the flooding of a condenser or similar device.

A further object is to produce a new and improved vacuum breaker which automatically and effectively breaks the vacuum in a condenser when the level of the water in the condenser reaches a predetermined height.

A further and more specific object of my invention is to produce a vacuum breaker which is not affected by variations in level of the water within a condenser until the water has risen to a predetermined level, and which then opens quickly and is not affected by the diminishing vacuum within the condenser.

These and other objects are attained by means of a vacuum breaker embodying the features herein described and illustrated in the drawing accompanying and forming a part hereof.

The drawing is a diagrammatic sectional view of a vacuum breaker embodying the features of my invention.

A common trouble with vacuum breakers, as heretofore constructed, is that they do not completely break the vacuum and consequently injection water continues to be drawn into the condenser after the vacuum breaker has acted. This is especially true if the lift from the source of injection to the condenser is low. A further disadvantage of some types of vacuum breakers is that the normal water level in the condenser must be kept well below the actuating float of the vacuum-breaker so that ordinary fluctuations in the water level within the condenser will not partially submerge the float and allow the vacuum breaker valve to open slightly and admit air to the condenser. The disadvantages inherent in many vacuum breakers are due to the fact that the vacuum breaker float is located within the condenser shell itself, or in a float chamber in which the level of the water varies directly with the level of the water in the shell. The vacuum breaker valve is normally held shut against the pressure of the atmosphere by the weight of the unsubmerged float. When the float is sufficiently submerged, the weight is so reduced that the pressure of the atmosphere opens the valve and presumably breaks the vacuum. It has frequently been found that after the vacuum has been broken and the pressure falls to approximately 10″ of mercury, the effective opening force of the atmospheric pressure is reduced, or balanced by the pressure within the condenser, to such an extent that the valve begins to close with a partial vacuum still existing in the condenser. If the lift from the source of injection to the condenser is low, water continues to flow into the condenser, because of the partial vacuum still existing within the condenser and serious accidents often result from condensers being flooded in this manner after the vacuum breakers have acted.

In the drawing I have illustrated an embodiment of my invention in which the float chamber 5 is located outside of the condenser shell 6. As shown, this float chamber is in the form of a vertical cylinder and is connected near its upper end to the condenser shell 6 by means of a port or passage 7. Within the float chamber 5, I have shown a cylindrical float 8, which is nearly large enough to fill the lower portion of the chamber.

The float 8 is suspended, by means of a valve stem 10, from a vacuum breaker valve 9, located in the upper part of the valve chamber 5. As shown, the valve 9 is of the balanced type being provided with two valve discs 11 and 12, which cooperate with valve seats in opposite wall of a pocket or indent 13 in the valve chamber. The indent 13 and therefore the space between the discs 11 and 12 is open to the atmosphere so that the atmospheric pressure on one disc is substantially counterbalanced by the atmospheric pressure on the other disc.

I have illustrated a drain pipe 14 connecting the bottom of the float chamber 5 with the condenser shell so that the chamber is normally drained. A check valve 15 is shown in this piping and is arranged to prevent water from backing up the pipe

from the condenser shell into the chamber 5. The check valve may be eliminated by connecting the drain pipe to the air pump of the condenser installation.

The operation of the vacuum breaker illustrated is as follows: The normal operating level of the water in the condenser shell 6 is such that ordinary fluctuations of the level will not cause the water to reach the port 7 so as to overflow into the float chamber 5. However, when the water does reach this port it overflows into the float chamber 5, causes the float 8 to rise and open the valve 9 and to thereby break the vacuum in the condenser. As the float 8 nearly fills the lower part of the float chamber 5 only a comparatively small amount of water is required to fill the remaining space around the float, and, as a result, the float is quick and positive in action.

The valve 9 is independent of atmospheric pressure, consequently it opens easily and is unaffected by changes in pressure as the vacuum is broken. The drain pipe 14 is preferably so proportioned that the water is retained in the float chamber, and the valve 9 held open, long enough to completely break the vacuum. When the chamber 5 is drained, say in 30 seconds, the valve 9 is again closed and normal operation may be resumed.

The vacuum breaker illustrated is positive in action, remains tightly closed until opened by the float, then opens quickly, and remains open long enough to effectively break the vacuum. It is simple in construction and allows a maximum normal operating water level to be employed in the condenser, being unaffected by the normal variations in level until the maximum permissible level is reached. If desired, the weight of the float 8 may be partially counterbalanced so as to render the breaker more sensitive. Obviously the float chamber 5 may be located within the condenser shell 6 if desired.

While I have described and illustrated but one embodiment of my invention, it will be apparent to those skilled in the art that various changes, modifications, additions and omissions may be made in the apparatus illustrated without departing from the spirit and scope of the invention, as set forth in the appended claims.

What I claim is:

1. In combination with a condenser shell, a chamber into which liquid overflows from the condenser shell when a predetermined level is reached, a valve for establishing communication between the condenser and the atmosphere, a float in the chamber for actuating the valve, means for draining said chamber into the condenser shell below the level of the bottom of said chamber, whereby the valve is held open until the liquid has receded in the condenser shell to a level at which the vacuum in the condenser shell may be safely re-established, and means for preventing a return flow of liquid through the draining means.

2. In combination with a condenser shell, a float chamber communicating with the condenser shell, a float occupying the major portion of the float chamber and responsive to a relatively small amount of liquid, means controlled by the float for admitting air to the condenser shell, and means for draining the float chamber and for retarding said drainage.

3. In a vacuum breaker, a float chamber into which liquid overflows from a condenser when a predetermined level is reached, means for admitting air into the condenser shell, a float in the float chamber for controlling said means, means for draining said float chamber, and means for preventing a counterflow of liquid through said draining means.

4. In combination with the shell of a condenser, a float chamber communicating near its top with the condenser shell, a double seated balanced valve in the walls of the float chamber for controlling communication between the atmosphere and the chamber, a float depending from said valve for normally holding the valve closed and for opening the valve when the water in the condenser shell overflows into the float chamber, means for draining the float chamber and for retarding said drainage so that the valve is held open long enough to effectively break the vacuum in the condenser shell, and means for preventing a return flow of water through the draining means.

In testimony whereof, I have hereunto subscribed my name this 5th day of November, 1917.

RAYMOND N. EHRHART.

Witness:
C. W. McGHEE.