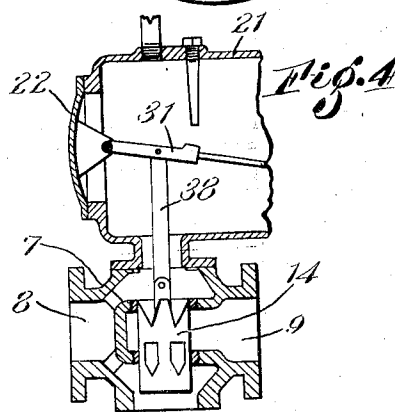
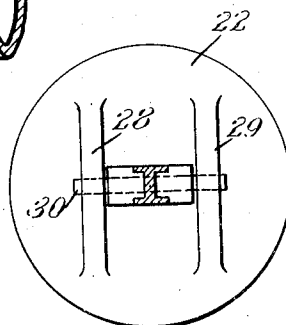


1,703,166

FLUID TRAP

Fig. 2



10
1/2
Truro
Abbott L. Pennington, Jr.
by Roberts Roberts & Cushman
attys.

UNITED STATES PATENT OFFICE.

ABBOTT L. PENNIMAN, JR., OF BALTIMORE, MARYLAND.

FLUID TRAP.

Application filed March 9, 1925. Serial No. 14,012.

This invention pertains to fluid traps and more particularly to traps for automatically maintaining a substantially constant liquid level in a vessel by controlling the drainage of liquid from the vessel or alternatively by controlling the admission of liquid thereto.

Among the many possible applications of the improved trap as a liquid supply controller may be mentioned its employment to control the admission of make-up water to condensers, evaporators, surge tanks, etc. or the admission of oil or other fluid to a still or supply tank, while as a drainage controller it may be employed to prevent water or other fluid from being drawn off into a priming pump or evaporating apparatus or to remove condensation water from bleeder heating apparatus. Many other applications of the device will doubtless occur to those skilled in engineering practice, but for purposes of illustration the invention is hereinafter more fully described as applied to the last named use, that is to say, to bleeder heating apparatus.

In modern steam turbine practice steam for feed water heating is now commonly bled from several of the turbine stages, including stages working both at super-atmospheric and sub-atmospheric pressures, the cold supply water first circulating through pipe coils surrounded by steam from the lowest pressure turbine stage and then successively circulating through other pipe coils surrounded by steam at higher pressures and temperatures coming from the higher turbine stages.

Each of such pipe coils is enclosed in a casing to which the bleeder steam from the turbine is admitted and as the steam condenses therein it is necessary to provide an outlet through which this water may drain from the heater casing, such outlet being provided with an automatically operating trap to prevent waste of uncondensed steam.

For proper and economical operation at the vacuum or sub-atmospheric stage or stages of the turbine, it is vitally important to prevent leakage of air into any part of the system including the water heater casing and auxiliary parts, such for example as the trap. Automatic water traps of usual type are not adapted to prevent air leakage and in many cases are so sluggish due to excessive friction between moving parts, for example that occasioned when a part reciprocates through a stuffing box, that they fail to maintain the water level with any accu-

racy, thus wasting steam by failure to close the drain quickly or reducing the economy of heat transfer in the heater by allowing the water level to rise unduly.

The principal object of the present invention is to provide a trap capable of operating substantially as well at sub-atmospheric pressure as at high pressure, which will not leak pressure either into or out from the system, and which will respond rapidly and with certainty to variations in water level.

In the accompanying drawings, Fig. 1 is a diagrammatic view illustrating one application of the improved trap;

Fig. 2 is a vertical section to large scale illustrating the improved trap in detail;

Fig. 3 is a section substantially on the line 3—3 of Fig. 2; and

Fig. 4 is a section similar to Fig. 1 but to small scale illustrating the trap as positioned to control admission of fluid rather than its delivery.

Referring to Fig. 1 of the drawings in which one specific application of the invention is illustrated by way of example, the numeral 1 indicates a water heater which comprises an outer casing surrounding a pipe coil 2 having an inlet at 3 and an outlet at 4.

A supply pipe 5 enters the upper part of the casing, coming from any suitable source of steam or other heated vapor, for example from the low pressure stage of a steam turbine. A drain pipe 6 leads from the lower part of the casing of the heater for conducting away the water of condensation as it accumulates in the casing. This drain pipe 6 leads to the automatic trap forming the immediate subject matter of the present invention, such trap being arranged to maintain a constant low level of water in the heater casing so as to avoid waste of steam or the undue rise of water of condensation about the pipe coils 2.

The improved trap shown in detail in Figs. 2 and 3 comprises a valve housing 7 having an inlet chamber 8 which communicates with the drain pipe 6 and an outlet chamber 9 which communicates with a discharge pipe 10 leading to any desired point.

The inlet and outlet chambers of the valve housing are separated by a partition or septum 11 of substantially U-shape comprising the spaced parallel walls 12 and 13. While as herein shown a U-shaped wall or partition is employed, it is contemplated

that a single wall or partition may be substituted therefor if desired, the purpose of employing the U-shaped wall being to permit of the use of a balanced valve.

5 The walls 12 and 13 are furnished with aligned valve orifices with which a balanced piston valve 14 cooperates. Normally this valve prevents the flow of fluid from the chamber 8 to the chamber 9 but when lifted
10 allows such flow to take place.

The valve orifice in the wall 12 opens into a valve chamber 15 directly above the valve, such chamber in turn communicating with the inlet chamber 8. The space 16 below
15 the valve also communicates with the inlet chamber 8 and with a passage in a pipe elbow 17 which leads to a valve casing 18. This valve casing 18 is furnished with a
20 valve controlled by a hand wheel 19, such valve normally being closed but when opened permitting the free flow of fluid from the chamber 8 out through the elbow 17 and through the valve casing 18 into a discharge
25 pipe 20. This arrangement permits blowing out dirt from the heater 1 and valve housing 7, but does not constitute an essential feature of the invention.

The trap also comprises a casing or vessel 21 preferably of cylindrical shape comprising a cylindrical shell closed at its opposite ends by means of covers 22 and 23
30 respectively, such covers preferably being removable. A pipe 24 connects the upper part of the vessel 21 with the upper part of the heater 1 to equalize the pressure in the heater and in the vessel 21.

The casing 21 is furnished with a laterally projecting tubular neck 25 terminating in a radial flange 26 by means of which it is
40 attached to the valve housing 7. The neck 25 furnishes a free and unobstructed passage 27 communicating with the valve chamber 15 and axially aligned with the valve orifices in the walls 12 and 13.

45 Brackets 28 and 29 project inwardly from the cover 22 of the vessel 21 and form supports for a pin 30 constituting a fulcrum for a lever 31. This lever is arranged to swing in a vertical plane and supports a hollow float 32 having a stem 35 forming a
50 continuation of the lever 31.

The casing 21 is preferably furnished with one or more baffle plates or partitions 33 to prevent fluid from surging longitudinally
55 of the casing. The upper part of the partition 33 is furnished with a vertical slot 34 forming a guide for the stem 35 of the float. The lower end of the slot 34 constitutes a stop for limiting downward movement of
60 the lever 31, while a stop 36 secured to the wall of the casing limits upward movement of the lever.

The lever is preferably furnished with a slot 37 for the reception of the upper end
65 of a link 38 pivotally connected to the lever

31 by means of a pin 39. This link extends down through the passage 27 in the neck 25 and its lower end is connected by means of a pivot pin 40 to the valve 14.

The operation of the device thus described
70 is substantially as follows:—Steam being admitted through the pipe 5 to the heater 1 circulates about the pipe coils 2 and as its heat is transferred to the water flowing through such coils the steam is condensed
75 and tends to accumulate in the lower part of the heater casing. Normally the valve 14 is closed and the float 32 is in the full line position indicated in Fig. 2. As the water accumulates in the lower part of the
80 heater casing it flows through the drain pipe 6 and gradually rising through the chambers 8 and 15 flows into the bottom of the casing 21 and eventually raises the float 32 sufficiently to open the valve 14. The water
85 is then free to flow out through the discharge pipe 10 until the level again drops in the casing 21 and the valve closes.

In the arrangement shown, the connections between the actuating float 32 and the
90 valve 14 are such that they do not oppose any substantial resistance to movement of the valve since the link 38 does not contact frictionally or otherwise with any fixed part of the structure. Further, the valve is of
95 balanced type, and these features thus combined make the valve extremely sensitive to variations in water level in the casing 21 so that fluctuation in water level in the heater casing is reduced to a minimum.

100 Since the mechanism for actuating the valve 14 is entirely enclosed in the substantially air-tight casing 21 it is impossible for air to leak into the latter and there is no interference with proper maintenance of
105 vacuum in the apparatus from which the supply pipe 5 may lead. The device is thus particularly useful in systems wherein a sub-atmospheric pressure is maintained.

Under some circumstances it may be desired temporarily to hold the valve 14 open
110 and for this purpose a spindle 41 having screw threaded engagement with a gland 42 carried by the member 17 is provided, such spindle being axially aligned with the
115 valve and projecting up toward the bottom of the latter. By advancing this spindle the valve may be opened regardless of the position of the float 32.

In Fig. 4 a slightly modified arrangement
120 of the valve 14 is illustrated, the valve proper in this case being inverted as respects its position in Fig. 2. With this arrangement the valve is open when the float
125 is down, but is closed when the float rises, thus adapting the device to the control of the admission of fluid to a tank or vessel.

While I have shown a preferred embodiment of the invention by way of example
I wish it to be understood that the inven- 130

tion is not necessarily confined to the specific arrangement of parts herein shown and described but that various modifications both in proportions and arrangements of parts may be made without departing from the spirit of the invention.

I claim:

1. A fluid trap comprising an air-tight vessel, a float within said vessel, a valve housing secured to the vessel, an opening from the vessel into the housing, said housing having inlet and outlet passages, the inlet passage communicating with said opening, and a valve controlling the flow of fluid from the inlet passage, link means operatively connecting the float and valve and passing freely through the opening therebetween to the outlet passage, said valve housing having a normally closed clean out passage leading from a point substantially in axial alignment with the valve.

2. A fluid trap comprising an air-tight vessel, a float within said vessel, a valve housing secured to the vessel, an opening from the vessel into the housing said housing having inlet and outlet passages, the inlet passage communicating with said opening, a valve controlling the flow of fluid from the inlet passage to the outlet passage, link means operatively connecting the float and valve and passing freely through

the opening therebetween; said valve housing having a blow-off passage leading from a point substantially in axial alignment with the valve and leading from the inlet side of the valve, and a normally closed valve controlling said passage.

3. A fluid trap comprising a closed vessel having an orifice in its under wall, a float within said vessel, means constraining the float to move in a substantially vertical plane, a valve housing secured to the wall of the vessel, said housing having an opening in its wall axially aligned with the orifice in the under wall of the vessel, a U-shaped septum separating the inlet end from the outlet end of the valve housing, said septum having aligned valve orifices in its parallel walls, said orifices being axially aligned with the orifice in the wall of said vessel, a valve of balanced type controlling the passage of fluid through said valve orifices, and a pivoted link passing freely through the opening between the float chamber and valve chamber vertically connecting said valve with the float, and a blow-off passage leading from the valve chamber in axial alignment with said opening and said valve orifices.

Signed by me at Baltimore, Maryland, this 27th day of February, 1925.

ABBOTT L. PENNIMAN, JR.