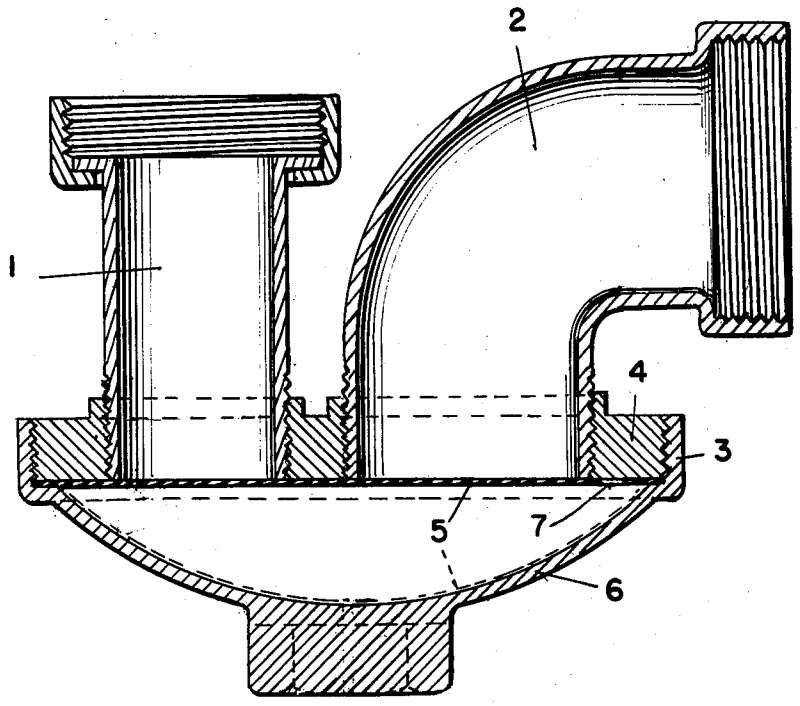
March 10, 1953 J. D. LANGDON 2,630,874

SIPHONLESS TRAP

Filed March 29, 1949



Inventor

J. D. Langdon

Patented Mar. 10, 1953

2,630,874

UNITED STATES PATENT OFFICE

2,630,874

SIPHONLESS TRAP

Jesse D. Langdon, Long Beach, Calif.

Application March 29, 1949, Serial No. 84,121

1 Claim. (Cl. 182—7)

1

This invention relates to liquid traps in particular, commonly installed between plumbing fixtures and the like and a drain pipe connected to a sewer line liable to contain non-potable liquids or to generate poisonous gases; and the invention aims to interrupt the movement of fluid through the trap under the conditions of pressure adverse to the proper functioning of the ordinary trap commonly used.

A primary purpose of the invention has the object in view to prevent the evacuation of the liquid seal from the trap when a sub-atmospheric condition of pressure exists in the outlet end of the trap or sewer pipe; by providing diaphragm check valve means interrupting the passageway through the trap.

Another purpose has the object in view to prevent the flow of fluid under pressure from the outlet end of the trap, or a sewer line contiguous thereto and into a reservoir or fixture to which attached.

The structure consists of a casing comprising an inlet 1 and an outlet 2 contiguous with a casing body formed by a domed base member or cap 3 having a plate 4 threadedly inserted thereinto. The inlet 1 is provided with coupling means at its upper end, and has its lower end threadedly inserted through the plate 4. The outlet 2 is also threadedly inserted through the plate 4, and has coupling or union means provided at its distal end. A diaphragm 5 has its outer rim impinged between the under face of the plate 4 at its outer rim, and an annular shoulder formed by the cap 3, which is domed inside of the shoulder to form a chamber 6. Bypass 7 is provided through the diaphragm 5, the latter being preferably made of material capable of being distorted and returning to normal shape. The bypass 7 is located near the rim of, and is normally closed by the plate 4. It is of course obvious that the inlet 1 and the outlet 2 can be cast integral with the plate 4. However, the form shown has the advantage of permitting the inlet 1 and the outlet 2 to be adjusted to and fro if it is desired to lower or raise the inner end of either to change the seating relationship with the diaphragm or to change the position of the horizontal portion of the outlet 2. The bypass 7 may be located anywhere desired within the area of, or near the outlet 2.

When the trap is attached in operative position between a reservoir and a drain pipe, and liquid is being evacuated from the reservoir, the pressure of the column of liquid in inlet 1 is effective over the entire upper surface of the diaphragm and causes the latter to be depressed,

2

permitting liquid to flow via the outlet 2 into a drain or sewer pipe to which the outlet 2 is attached. When the liquid ceases to flow, the liquid that remains in the trap below the plane of the lower limit of the outlet 2 will, via the bypass 7, displace such air or gaseous fluid as may remain in the chamber 6 until the pressure is balanced on both sides of the diaphragm and the bypass 7 is urged to closed position seating against a shoulder formed by the plate 4. When a reservoir or fixture is being drained thru the trap, liquid rises in the inlet above the level of outlet 2 depressing diaphragm 5 downwardly and separating that portion of the diaphragm surrounding the bypass 7 from the underside of plate 4: The dynamic pressure of the liquid flowing from the inlet to the outlet serves to evacuate the fluid content of chamber 6 thru bypass 7. The liquid stream flowing from outlet 2 has an aspiratory effect to entrain the fluid evacuated from chamber 6 thru bypass 7. When the liquid has ceased to flow thru the trap the dynamic pressure of the flowing liquid is changed to a static pressure; the column of liquid in the upright portions of both inlet 1 and outlet 2 subsides to common level approximately that of the lower margin of the horizontal portion of outlet 2, at which time a static condition of pressure is established according to the height of the column of liquid within the inlet and outlet passages; the dynamic condition of pressure prevailing during the flow of liquid thru the trap having ceased the tension exerted by dynamic pressure against the diaphragm is released and the liquid under static pressure enters chamber 6 thru bypass 7 until pressure on both sides of the diaphragm is equalized and the diaphragm assumes a normal state of rest as illustrated by the drawing.

When a pressure greater than atmospheric pressure exists within the outlet 2, such as would be the case if one reservoir were located on the first floor, and another reservoir on a floor above; both being connected to a common drain line, and the drain line were plugged below the lower reservoir; the higher reservoir being filled with liquid would ordinarily be drained into the reservoir on the first floor; column of liquid would exist higher than the trap and the top rim of the fixture, or reservoir, on the first floor; this condition would ordinarily cause the lower reservoir to be flooded, and in many cases the liquid would run over the rim of the lower fixture, flooding the lower floor with contaminated liquid, as very often happens. This invention prevents a backflow as described above.

When a back pressure exists within the outlet

2 greater than atmospheric pressure as described, liquid enters the chamber 6 through the bypass 7, and the pressure becomes effective against the entire under side of the diaphragm 5, while the effective down pressure is largely confined to the area of the outlet opening 2, thus sealing both the inlet 1 and the outlet 2 against the passage of liquid through the trap. Since the area of the upper side of the diaphragm 5 extending across the lower end of the inlet 1 is exposed to atmospheric pressure only when a condition of greater pressure exists in the outlet 2, which communicates with chamber 6, via bypass 7, fluid under pressure equal to that within the outlet 2 is bypassed through and underneath the entire surface of diaphragm, urging the same upwardly, first closing the inlet 1, and ultimately closing the outlet as the pressure tends to become effective over the whole of the underside of the diaphragm 5 over the area of the inlet, the outlet 2 and the bypass; meanwhile, the unbalanced lesser state of pressure existing on the upper side of the diaphragm over the area of the inlet, causes such area of the diaphragm to be urged upwardly to more tightly seal the inlet 1 against the egress of pressure fluid.

Having described the invention and the operation thereof, the following claim is made:

A trap for interrupting a fluid conduit with a liquid seal, comprising a casing having vertically disposed tubular inlet and outlet passages, said casing including means holding a diaphragm made of flexible material disposed transversely of the lower ends of the inlet and outlet tubes, a

chamber formed between said diaphragm and the wall of said casing below said diaphragm, a bypass through said diaphragm near the rim of the lower end of the outlet, and being normally closed by and seated against a portion of said casing adjacent to the rim of the outlet opening within the casing, said bypass being normally closed against the effect of a sub-atmospheric pressure existing in the outlet passage, said bypass being open when a condition of pressure exists in the outlet passageway greater than that prevailing within the inlet passageway, whereby the condition of pressure within said outlet is bypassed into the chamber below the diaphragm and that portion of said diaphragm covering the area of the opening in the lower end of the inlet tube is urged upwardly toward the inlet to close the same against the egress of liquid therethru.

JESSE D. LANGDON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
174,874	Thorp	Mar. 14, 1876
314,107	Chappell	Mar. 17, 1885

FOREIGN PATENTS

Number	Country	Date
61,720	Austria	Oct. 25, 1913
602,347	France	Dec. 22, 1925
823,482	France	Oct. 18, 1937