Dec. 9, 1930. J. MESSMER 1,784,153

STEAM TRAP

Filed Oct. 2, 1926

Fig. 1.

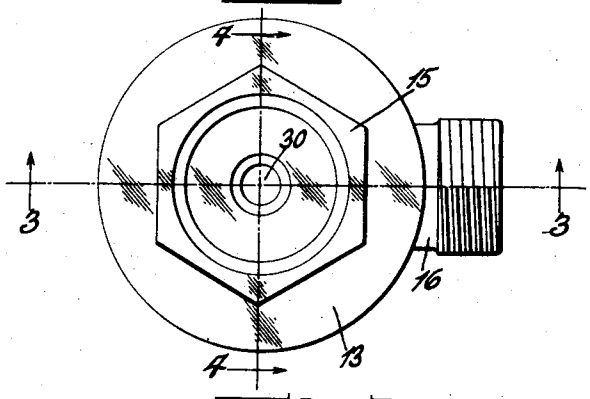


Fig. 2.

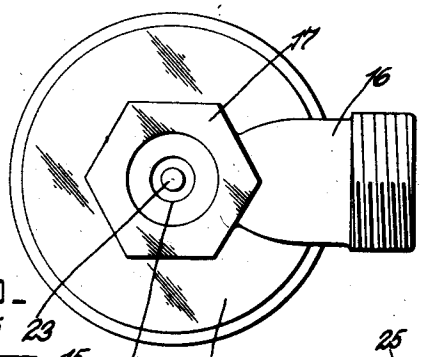


Fig. 3.

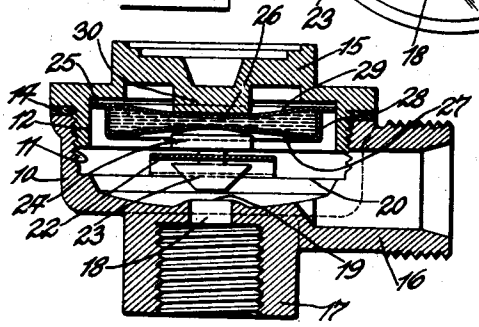


Fig. 4.

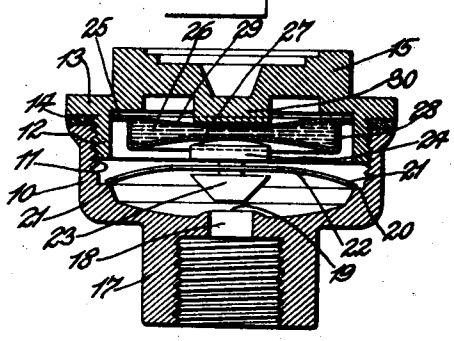


Fig. 5.

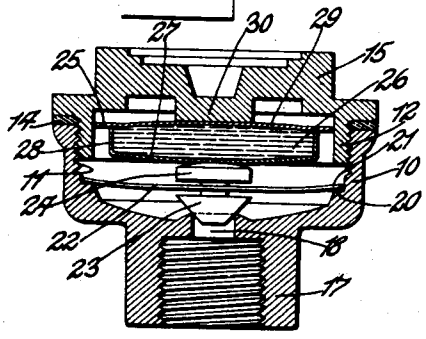
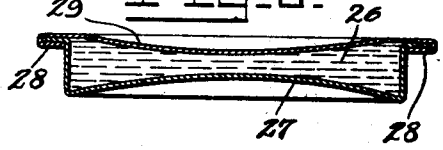


Fig. 6.



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by
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UNITED STATES PATENT OFFICE

JOSEPH MESSMER, OF KIRKWOOD, MISSOURI, ASSIGNOR TO MESSMER BRASS COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI

STEAM TRAP

Application filed October 2, 1926. Serial No. 139,083.

This invention relates to a steam trap or valve such as is provided in heating systems to permit the passage of air and water, but adapted to close when subjected to the action of steam. Traps of this character, to be satisfactory, should be simple in construction and quick and certain in operation.

The object of the present invention is the provision of a trap of the above described character, which is easily manufactured, rugged in construction and dependable in operation.

One of the features of the invention is the snap acting double diaphragm so constructed as to permit a high valve lift while employing a single expansible double diaphragm element of small compass.

Another feature of the invention is the loosely mounted valve carrying member so constructed as normally to retain the movable valve member well off the valve seat, but acting when the valve is forced into operative position by the expansion of the double diaphragm above mentioned, to center the valve in the valve opening as the valve is forced into working position.

A still further feature is the loosely mounted valve and valve carrier, together with the independent double diaphragm which permit the working parts of the valve to be removed from the housing, inserted, or changed with the expenditure of the minimum of time and labor.

Other features and advantages will appear from time to time as the description of the invention progresses.

It is believed the further disclosure of the invention will be understood most readily from a detailed description thereof taken in connection with the accompanying drawing, in which:

Fig. 1 is a top plan view of the trap of the present invention;

Fig. 2 is a view of the bottom of the trap;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a section, such as disclosed in Fig. 3, but shows the double diaphragm expanded and the valve in working position, and

Fig. 6 is an enlarged section through the double diaphragm member showing its construction more in detail.

Referring now to the drawings, in which like reference characters indicate the same parts in the several views, 10 indicates a recessed or cup shaped housing member, the free edge of which is internally threaded, as indicated at 11, to receive the externally threaded flange 12 of the housing cap member 13. The outer edge of cap 13 overlies the edge of housing member 10, and a gasket 14 may be provided therebetween. Cap member 11 is provided on the outer face thereof with a hexagonal projection 15, by means of which the cap may be screwed into position.

Communicating with the interior of the housing 10, 11 is an externally screw threaded nipple 16 adapted to be joined to a radiator, or the like, by any suitable means. Also, at the bottom of the housing is an internally screw threaded nipple 17 adapted to receive the end of the return pipe. The nipple 17 is preferably formed hexagonal on the exterior, as indicated in Fig. 2.

In the bottom of housing member 10 is an opening 18 which is positioned substantially centrally over the opening in the nipple 17. The metal about opening 18 forms the valve seat 19 of the trap.

The cylindrical portion of housing member 10 is formed on the inner side thereof with the offset or ledge 20 on which rest the ends 21 of the flexible valve carrier 22. Fixed centrally to carrier 22, on one side thereof, is the conical plug or valve member 23, and on the other side is a bearing member 24 preferably slightly convex on its outer surface. Carrier 22 is formed of resilient metal and normally assumes an upwardly bowed or curved position to raise the movable valve member 23 off the valve seat.

The carrier 22 is of substantial width, and of a length such that, when straight, the ends, formed as arcs of a circle similar to the inner lateral surface of housing member 10 above ledge 20, engage the sides of housing member 10 and thus serve to accurately center or position the valve 23 over the seat 19.

Freely positioned within the housing is the double diaphragm member 25, preferably of thin bronze. Within the diaphragm is a volatile liquid 26 of any suitable character. The member 25 consists of the diaphragm 27, having integral therewith the cylindrical rim 28, to the edge of which is secured the diaphragm 29 in any suitable manner. In practice, it has been found desirable, in constructing the diaphragm, to place the volatile fluid in the pan formed by diaphragm 27 and rim 28, then crimp the edge of the upper diaphragm 29 to the out-turned edge of the rim 28 by a power press and seal the parts together. This avoids the use of the solder plug commonly employed to seal the opening through which the volatile fluid was inserted in the applicant's diaphragm. When a solder plug is employed, it may become loosened by the stresses caused by high pressures or even melted thus permitting the volatile fluid to escape and rendering the valve useless. On account of this manner of assembling the diaphragm, it safely may be subjected to steam pressure much higher than advisable where the solder plug is employed. In the assembled arrangement, the double diaphragm is freely positioned between the lug 30 extending downwardly from the cap member 13 and the bearing member 24 on carrier 22. The double diaphragm is so constructed that when cool, the diaphragms 27 and 29 assume externally concave positions and permit the curved carrier 22 to lift the valve 23 off of valve seat 19. This structure permits a very high valve lift while employing a single expansible valve operating member of simple and rugged construction. When the double diaphragm is heated to the temperature of steam, the volatile fluid 26 expands sufficiently to cause the diaphragms 27 and 29 to assume convex positions and thus force the valve 23 into operative engagement with the seat 19.

In the present construction, the expansible diaphragm is entirely separate from the other parts. Also, the valve and valve carrier are a unit independent of all other parts. This structure permits ready replacement of the parts, and also permits the system to be operated without the movable valve elements in position, when desired, as when the system is installed and it is desired to flush out the casting sand or other sediment.

The diaphragms 27 and 29 being normally concave, permit the use of an exceedingly small double diaphragm. With the rise in temperature, these concave diaphragms move from each other and the tension in the metal being released, as they reach a flat position, they snap to a convex position, delivering the greatest valve travel before the maximum expansion of the volatile fluid 26 has taken place. Upon cooling, a similar but reverse snap action takes place, thus permitting the resilient arched carrier to more quickly effect a high lift of the valve.

While in the drawings, and in the above description, only the preferred embodiment of the invention is disclosed, it is to be understood that many modifications in the details of construction of the several parts are contemplated. It is, also, to be understood that the present trap readily may be adapted to uses other than in a heating system, as herein referred to. The invention, should, therefore, be limited only by the scope of the appended claims.

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

In a steam trap, a housing, a heat expansible valve-operating member within said housing, a valve seat, a normally arched resilient valve-carrier disposed beneath said member, and a plug secured to said carrier, said member consisting of a receptacle, diaphragms forming both sides of said receptacle, and a volatile fluid within said receptacle, the diaphragms being so constructed and said fluid so proportioned that said diaphragms assume inwardly concave positions when the operating member is subjected to normal temperatures and outwardly convex positions when subjected to a predetermined higher temperature, the central portion of said diaphragms being under a compression stress when in a flat or plane position whereby when said diaphragms pass slightly beyond said plane position, while moving in either direction responsive to temperature variations, they automatically snap into curved positions and thus rapidly complete the closing or opening of the valve in advance of full expansion of said fluid.

JOSEPH MESSMER.