April 8, 1924. 1,489,326

W. H. McMASTERS

THERMAL OPERATED CUT-OFF OR VALVE

Filed Aug. 15, 1923

Fig. 1.

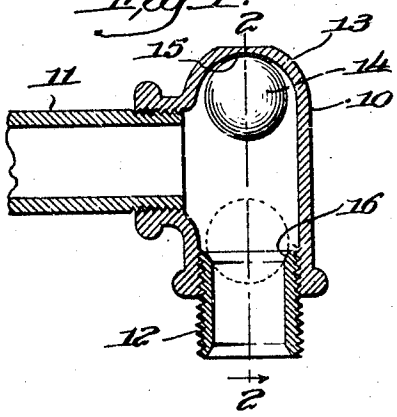


Fig. 2.

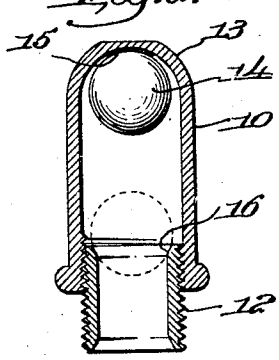


Fig. 3.

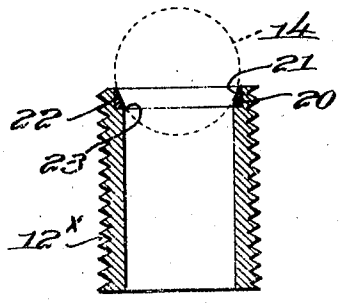


Fig. 4.

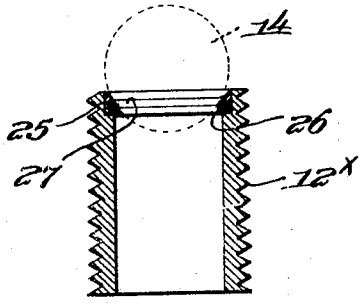
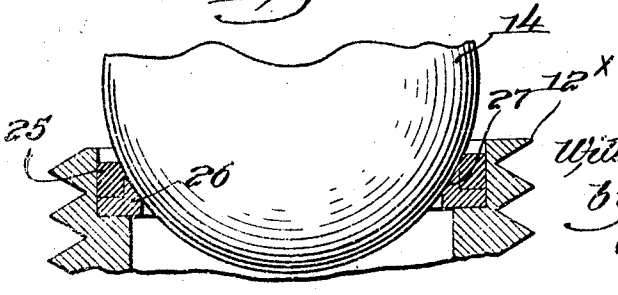


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM H. McMASTERS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO GRAVITITE CORPORATION, OF BOSTON, MASSACHUSETTS.

THERMAL-OPERATED CUT-OFF OR VALVE.

Application filed August 15, 1923. Serial No. 657,549.

To all whom it may concern:

Be it known that I, WILLIAM H. McMASTERS, a citizen of the United States of America, and a resident of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Thermal-Operated Cut-Offs or Valves, of which the following is a specification.

This invention relates to a thermal or heat actuated cut-off or valve such as might be used in connection with liquid or gas supply pipes and the like.

An object of the invention is to produce a simple, cheap and efficient cut-off, wherein a closure device, such as a ball, is normally held away from its closing position or seat, but adapted to rest thereon when the atmosphere surrounding the cut-off has reached a predetermined degree of temperature.

A further object of the invention is to produce a cut-off or valve of this class, wherein the closure device is normally attached to the inner wall of a fitting and adjacent the mouth of an outlet, with which it at times coacts to effect a closure thereof, by a fusible metal which is adapted to become molten at a predetermined atmospheric temperature, to thereby permit gravity to exert its influence upon the closure device and cause it to drop to its seat on the mouth of an outlet.

Another object of the invention is to so construct the fitting, as to form therein a receptacle for the closure device, so that the passage of liquid or gas therethrough is unobstructed under normal conditions, and which, when the device is seated to form a closure, causes the gas or liquid to exert its pressure upon the said device whereby it is aided in maintaining a tight closure.

A still further object of the invention is to so construct the walls of a fitting that the portion at the point of attachment of the closure device, is appreciably thinner than the other portions thereof, to thereby facilitate in the rapid transmission of heat to the fusible metal.

While the foregoing are the primary objects of the invention it will be understood that it is also an object to so construct and arrange the mouth of the outlet of the fitting, which forms a seat for the closure device, that when the closure device rests thereon, it will find a resting place upon metal softer than itself or the fitting, and which is so disposed as to flow toward and around the closure device, but at a temperature appreciably higher than that required to melt the metal normally holding the said device away from its seat.

The invention further consists in certain features which will be fully understood from a description of the drawings and the claims hereinafter given.

Of the drawings:

Figure 1, represents a section through a pipe fitting ready for use, showing the closure device as being held suspended and away from its seat.

Figure 2, a section on the line 2—2 Figure 1.

Figure 3 an enlarged detail of one form of pipe end or nipple having a soft metal seat for the closure device.

Figure 4 shows another form of seat for the closure device.

Figure 5 shows a view similar to Figure 4 on an enlarged scale as it would appear when the closure device has been seated.

Like characters represent like parts throughout the several figures of the drawing.

The fitting 10, shown herein as an elbow, is a convenient form with which to illustrate the invention, but it will be understood that it is not the intention to limit the invention to the precise construction and arrangement shown as it is obvious that changes might be made therein without departing from its spirit and scope.

In the present instance a pipe 11 adapted to convey liquid or gas, as required, is secured to the fitting 10 in usual manner, and may be a main supply pipe or a branch therefrom.

This pipe 11 may be of metal usual or suitable for the occasion of use, as also the outlet pipe 12, which is herein shown as a nipple.

The fitting 10 is composed, preferably of metal capable of withstanding high temperatures, and of high thermal conductivity, and is provided with a dome-like portion 13 which conveniently serves as a housing for a closure device 14 herein shown as a ball.

The ball 14 is normally held in the posi-

tion shown in Figures 1 and 2 by a small quantity of fusible metal 15 of well known character and nature, which is adapted to melt at a temperature considerably lower than required for the adjacent metal, particularly that of the fitting 10.

As will be observed, the ball is suspended directly above the pipe or nipple 12 which has the seat 16 adapted to receive the said ball at a predetermined degree of temperature of said fitting 10, or when the fusible metal 15 has become molten and released it.

It will also be observed that the portion of the wall of the fitting 10 where the ball is attached, is considerably thinner, to thereby facilitate in the rapid transmission of heat to the fusible metal 15.

When the ball drops to effect a closure of the pipe 12, it is preferred that it shall contact with a seat composed of metal softer than itself, and which in the present instance, is a fusible metal, but one that requires a higher degree of temperature to cause it to become molten, than the metal 15.

An object in providing the soft metal seat see Figure 3, is to ensure a tight joint when the ball is seated, its weight aided by the effect of heat on the metal, causes it to sink slightly into the metal and thereby form a seal around and above the line of junction.

Figure 3 shows a simple form of seat wherein the annular ring 20, bevelled at 21 to receive the ball 14, is set into a countersink 22.

When the ball 14 is seated, it is intended to rest on the ring 20, and in case the ring should become molten the ball will find a solid rest on the edge 23 around which the molten metal will form a seal.

Figures 4 and 5 show another form of seat wherein two annular rings are used one of which 25, is fusible metal, while the other 26 is harder metal which requires a very high temperature to melt.

In this instance the ring 26 has a bevel 27 which is ground to make a snug fit between it and the ball, while the ring 25 of fusible metal, may or may not contact with the ball, when first seated, but which has a surplus of metal extending above the ring 26 so that in case it should become molten it will assume the condition shown in the enlarged view Figure 5, and thereby form a seal around and above the junction of ball and seat.

The above explained cut-off is adapted to be used in main supply lines or branches thereof, and may be located where most convenient, or where it would be more quickly reached by flame or heat in the event of fire in the factory or building in which it may be located.

In case fire occurs in close proximity to one of these fittings, cut-off of supply will not be effected until such time as a predetermined temperature has been reached, either atmospheric or of the fitting.

When such temperature has been reached the metal 15 will immediately begin to soften and the ball, by its weight and the influence of gravity, will fall to its seat 16, whether that seat be formed in the metal of the pipe 12 as seen in Figures 1 and 2, or as shown in Figures 3 to 5 inclusive.

In both instances cut-off of supply will result, but in the latter instance a more perfect cut-off is obtained, first by the ball sinking into the metal of the seat and later upon continued heat of higher temperature, in extreme cases, a flow of molten metal will surround the ball at its juncture with the pipe 12, or ring 20 or 25, as the case may be, and form a seal, which when finally cooled will retain the ball in quite firmly seated position at least until repairs are made.

Having described the invention I claim:

1. A fitting of the desired size and shape having a passage therethrough; a closure member which under certain conditions is adapted to block said passage; said fitting having a chamber therein and formed integrally therewith adapted to house said closure member; and means within said chamber and comprising a metal readily fusible by heat and normally adhering to a wall of said chamber and also to said closure member whereby said closure member is normally held from passage blocking position.

2. In a device of the class described, a fitting having two openings therein comprising a passage, and having a chamber formed integrally therewith in free communication with said passage; a passage closure member adapted to be normally housed in said chamber; said closure member being normally held in said chamber and to a wall thereof, by fusible metal attached to both said wall and said closure member.

3. In a device of the class described, a fitting having two openings therein comprising a passage, and having a chamber formed integrally therewith in free communication with said passage; a passage closure member adapted to be normally housed in said chamber, said closure member being normally held in said chamber and to a wall thereof by fusible metal attached to both said wall and said closure member; said wall, at the point of said attachment, being appreciably of less thickness than the rest of said wall, whereby transmission of heat to said fusible metal may be more readily accomplished.

4. In a device of the class described, a fitting having a passage therethrough, the ends of which comprising openings in the fitting are angularly arranged each with the other; a chamber formed integrally with said fitting and having a portion of its wall thinner than

the wall of said fitting, and located opposite one of said openings; a closure member normally secured to said thinned portion of said chamber and in line with the last named opening; and means consisting of fusible metal attached to said thinned portion and said member, whereby said member and said fitting are retained in assembled condition under certain conditions of temperature.

5. In a device of the class described, a fitting having a passage therethrough, the ends of which comprising openings in the fitting are angularly arranged each with the other; a chamber formed integrally with said fitting, and located opposite one of said openings; a closure member normally secured to a wall of said chamber and in line with said last named opening; means consisting of fusible metal attached to said wall and said member, whereby said member and said fitting are retained in assembled condition during certain conditions of temperature; and a seat for said closure member located in said last named opening, said seat comprising fusible metal adapted to melt at a higher degree of temperature than said first mentioned fusible metal.

6. In a device of the class described, a fitting having two openings therein but being otherwise imperforate, and having a chamber formed integrally therewith, said openings being arranged angularly each with the other; and a ball normally housed in said chamber and attached to a wall thereof by means of fusible metal, said ball being located opposite one of said openings.

Signed by me at Boston, Mass., this 13th day of August, 1923.

WILLIAM H. McMASTERS.