May 12, 1953

R. J. SCOTT

2,638,242

CLOSURE PLUG

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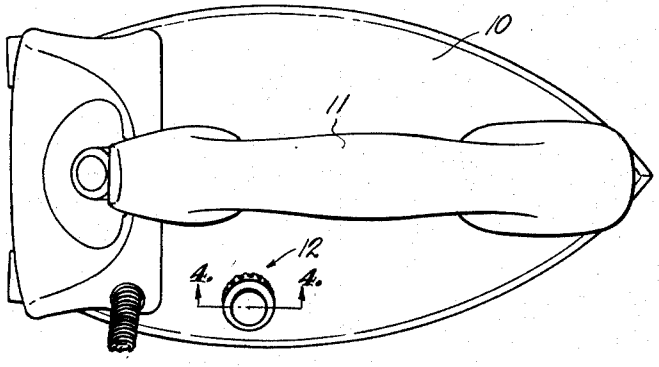


Fig. 1.

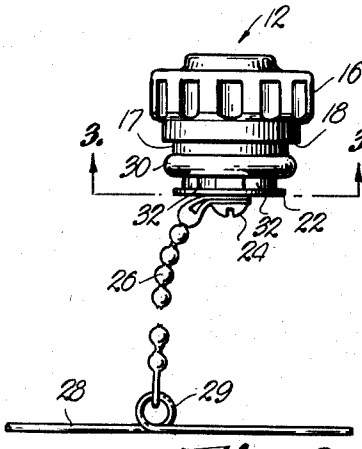


Fig. 2.

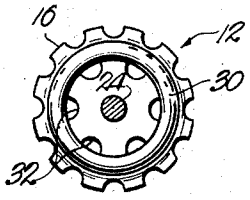


Fig. 3.

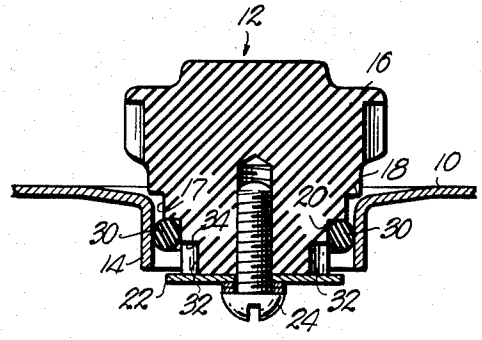


Fig. 4.

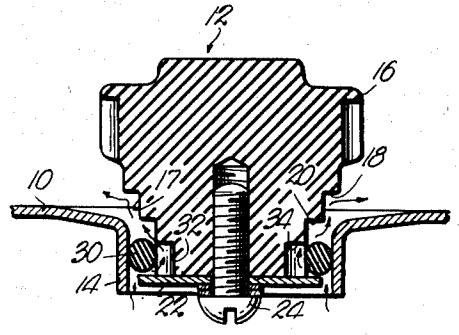


Fig. 5.

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CLOSURE PLUG

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5 Claims. (Cl. 220—44)

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This invention relates in general to closures for pressure vessels, and it deals more particularly with a closure plug for the filler opening of the boiler of a steam iron.

Broadly speaking, it is an important object of the invention to provide a closure for the filler opening of a steam generator or boiler, which closure will effectively seal the opening and prevent the escape of steam therethrough under normal operating conditions.

Another object is to provide a closure plug which, while sealing the filler opening under normal pressures, will allow the relief of steam therethrough at excessively high pressures.

A further object is to provide a plug of the character indicated, which is very simple in design and economical to manufacture, yet foolproof and highly effective in operation.

Other and further objects of the invention, together with the features of novelty whereby the objects are achieved, will appear in the course of the following description.

In the accompanying drawings, which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals are employed to identify like parts of the various views:

Fig. 1 is a plan view of a steam iron embodying my invention, showing the location of the closure plug for a filler opening located in the upper surface of the boiler,

Fig. 2 is an enlarged elevational view of a closure plug constructed in accordance with the invention,

Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 2 in the direction of the arrows,

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 1 in the direction of the arrows, showing the filler opening and my closure plug in the position it occupies under normal operating conditions, and

Fig. 5 is a view corresponding to Fig. 4 but showing the plug in the position it occupies when the pressure in the boiler exceeds a predetermined value.

Referring more particularly to the drawings, the numeral 10 designates the boiler of a conventional steam iron. In the upper wall of the boiler on one side of the handle 11 is a circular filler opening adapted to receive my closure plug 12, and, as may best be seen in Figs. 4 and 5, this opening has an annular neck 14 pressed from the metal of the boiler shell so that it projects into the boiler a short distance.

My plug, which can be molded of phenolic resinous material or the like, has at its upper end an enlarged head or knob 16, the rim thereof preferably being serrated, knurled or grooved at circumferentially spaced intervals, as shown, in order to facilitate gripping same with the fingers. Below the head, the plug has a short section 17 of reduced diameter, this being separated from the head by a shoulder 18; below the section 17 and separated from it by a second shoulder 20 is a longer stem section of still smaller diameter. The head of the plug, that is to say, the portion above shoulder 18, is larger than the inside diameter of neck 14 so that it cannot enter the filler opening, but the next lower section (17) will enter the opening readily with considerable clearance around same as may readily be appreciated from Figs. 4 and 5.

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A washer 22, which is of approximately the same diameter as section 17, is secured to the bottom of the plug by a screw 24, this screw also serving to secure to the plug one end of a ball chain 26. The other end of the chain is connected to an anchor link or bar 28 by means of a loop or eye 29 at the middle thereof, it being understood that the length of the bar is somewhat more than double the diameter of the filler opening.

Between shoulder 20 and washer 22, the stem of the plug is encircled by an O-ring 30 of resilient gasket material. Referring to Fig. 4, it will be seen that the axial distance between shoulder 20 and the upper face of washer 22 is substantially double the cross sectional diameter of the gasket, so that the gasket may slide or roll up and down on the stem of the plug a distance approximately equal to its own diameter. The stem of the plug is fluted as shown at 32, the individual flutes extending upwardly from the washer and terminating in shoulders 34 spaced approximately midway between shoulder 20 and washer 22.

In using my plug, bar 28 first is passed axially through neck 14 of the filler opening into the boiler and is allowed to drop free therein, whereupon, due to its central suspension on chain 26, it will assume a generally horizontal position; in other words, it will be crosswise of the opening and will span same so that plug 12 can be allowed to hang on chain 26 outside of the boiler while water is being poured into the boiler through the filler opening.

When the boiler has been filled to the desired level, plug 12 is advanced downwardly toward the filler opening allowing the balance of chain 26 to descend into the boiler. As the lower end

of the plug is pushed into the filler opening, (the plug preferably being turned slowly about its own axis at the same time) the outer margin of the gasket ring 30 engages the inner wall of neck 14, and, since the gasket is slightly oversize relative the inside diameter of the neck, it resists movement into the opening sufficiently to insure that the stem of the plug will advance through the gasket until shoulder 20 abuts the upper surface of the gasket; the gasket then must advance with the plug which is halted when shoulder 18 strikes the surface of the boiler about the margin of the opening. As will be seen from Fig. 4, the gasket now is compressed slightly between the neck 14 and the unfluted upper portion of the stem of the plug so that it forms a suitable seal for the filler opening.

The parts will remain in this position so long as the steam pressure within the boiler remains within the normal operating range. However, it sometimes happens in the normal use of a steam iron that the steam discharge passageway from the boiler becomes clogged, or for some other reason the steam pressure in the boiler becomes excessive. This pressure, of course, is exerted on the plug, and, unless somehow relieved, will blow the plug out of the filler opening with explosive force, or, alternatively, may burst the boiler, either of which represents a source of possibly serious injury to the operator. If the steam pressure rises above an undesirable level when my plug is used, the plug will move outwardly under its influence, but gasket 30 will remain substantially in its normal position due to its frictional engagement with the inner wall of neck 14. Thus when the plug reaches the position shown in Fig. 5, the gasket is disposed over the fluted portion of the stem, and the steam can escape harmlessly through the passageways provided by the fluting as indicated by the arrows, relieving the pressure and consequently halting the outward movement of the plug. The escaping steam is deflected laterally by shoulder 18 so that there is no concentrated discharge of the steam in any particular area.

Thus it will be seen that my plug embodies in a unitary structure a closure which effectively seals the filler opening of the steam iron boiler under normal operating conditions, but also serves as a relief valve for the boiler at undesirably high pressures. The plug may be easily inserted into the aperture or removed when desired to allow filling of the boiler. At the same time, the guard chain and anchor link prevents loss or misplacement of the plug when it is removed from the filler opening. It may readily be appreciated that my unit is of durable construction, simple in design, and very economical to manufacture.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinbefore set forth, together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility, and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the appended claims.

Inasmuch as various possible modifications may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A closure for an opening in a pressure vessel, comprising a plug having a stem smaller in size than said opening and insertable therein, an annular gasket encircling said stem and bridging the space between the outside of the stem and the confronting annular wall of the opening, said stem movable axially relative to said gasket in and out of said opening, inner and outer stop shoulders limiting the extent of such relative movement, said stem having in its peripheral surface an axial groove terminating at one end adjacent said inner shoulder and terminating at the other end at a point intermediate the two stop shoulders, said gasket engaging the ungrooved exterior of said stem outwardly from said point when it is positioned against said outer shoulder thereby to form a seal between said stem and the confronting annular wall of said opening, said gasket overlying said groove when it is positioned against said inner shoulder, and the length of said groove in an axial direction being greater than the thickness of the gasket in that direction, whereby the ends of said groove are exposed on either side of said gasket when the latter is positioned midway between the ends of the groove.

2. A closure for an opening in a pressure vessel, comprising a plug having a stem smaller in size than said opening and insertable therein, an annular gasket encircling said stem and bridging the space between the outside of the stem and the confronting annular wall of the opening, said stem movable axially relative to said gasket in and out of said opening, inner and outer stop shoulders limiting the extent of such relative movement, said stem being fluted, the fluting extending from said inner shoulder outwardly to a point intermediate the two stop shoulders and underlying said gasket when same is against said inner shoulder, said gasket engaging the ungrooved exterior of said stem outwardly from said point when it is positioned against said outer shoulder thereby to form a seal between the exterior of the stem and the confronting annular wall of said opening, and the ends of said fluting being exposed on either side of said gasket when it is positioned medially of the fluting thereby to form a flow passageway past the gasket.

3. A closure for an opening in a pressure vessel, comprising a plug having a stem smaller in size than said opening and insertable therein, an annular gasket encircling said stem and adapted to engage the marginal wall of the opening, said gasket movable axially of said stem, stop shoulders limiting the axial travel of said gasket on said stem in each direction, the peripheral surface of the stem containing an axial groove between said shoulders, said groove being of such length that when the gasket is disposed medially of the groove, the opposite ends of the groove are exposed on either side of the gasket, and at least one of said shoulders being spaced beyond the end of said groove by such a distance that when said gasket is against said one shoulder it is in sealing engagement with the ungrooved peripheral wall of said stem beyond the end of the groove.

4. A closure for an opening in a pressure vessel, comprising a plug having a stem smaller in size than said opening and insertable therein, an annular gasket encircling said stem and adapted to engage the marginal wall of the opening, said gasket movable axially of the stem, stop shoulders limiting the axial travel of said gasket on said stem in each direction, the peripheral surface of

the stem containing an axial groove between said shoulders, said groove being of such length that when the gasket is disposed medially of the groove the opposite ends of the groove are exposed on either side of the gasket, and the outer one of said shoulders being spaced beyond the end of said groove by such a distance that when said gasket is against said outer shoulder it is in sealing engagement with the ungrooved peripheral wall of said stem beyond the outer end of the groove.

5. A closure as in claim 4 wherein said plug has adjacent said stem a stop shoulder extending radially beyond the edge of said opening to limit the advance of the stem into said opening.

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