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SEALING CLOSURE

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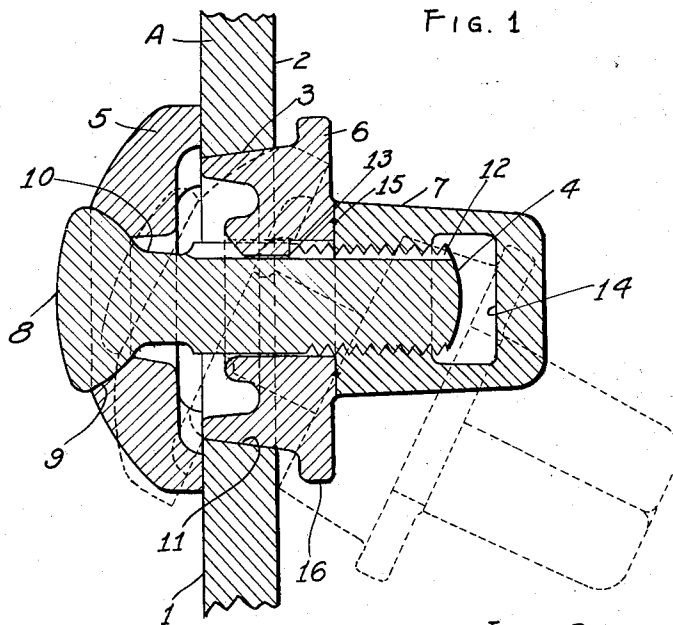


FIG. 2

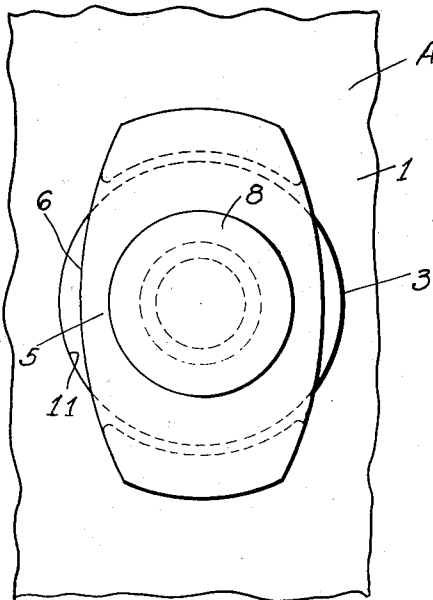
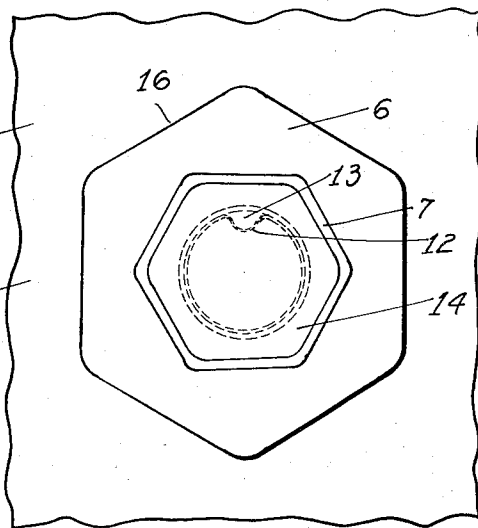


FIG. 3



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SEALING CLOSURE

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3 Claims. (Cl. 220—25)

My invention relates to improvements in sealing closures, and more particularly to means for sealing hand-holes or other openings in the wall of a boiler or other member which has fluid under pressure therein; the outer side being exposed to the atmosphere.

The invention has among its objects, the production of a device of the kind described, which will be simple and neat in construction, which will form a true and fluid-tight seal, which will be easy to apply and remove, which will be sturdy, and efficient and satisfactory for use wherever found applicable.

Another object of the invention is to provide a closure of the kind described, which will be interchangeable so that the same closure may be used on successive holes or members, and which will have an accurate seal with each.

A still further object of my invention is to so construct said closure that even though the inner surface of the member being sealed does not have a true plane surface thereabout, yet the closure will be self-leveling or self-adjusting so as to compensate for such differences as might occur.

A similar object is to so construct the device that there is no bending and similar stresses imparted through the innermost surface-contacting element of the device, due to differences in contour of successive wall surfaces of the fluid-containing member, and wherein the pull on the tightening element of the device will always be axially through the opening of the member, and wherein the parts need not be detached from one another when either inserting the device into position or removing the same therefrom.

Another object of my invention is to so construct the various parts of the device, that one of the parts will be held against rotation relative to the other when either tightening up or loosening the device, and wherein sufficient tightening can be accomplished to make a good joint which will hold the parts against the internal fluid pressure within the member being sealed.

A still further object of my invention is to provide means for tightening up the device and prevent leakage of fluid therepast, without the use of gaskets or other extraneous devices.

And still further, another object of the invention is a device of the kind described, which may be used for sealing holes through various thicknesses of material, with ease, safety, and efficiency.

Many other objects and advantages of the construction herein shown and described, and the uses mentioned, will be obvious to those skilled

in the art to which this invention appertains, from the disclosures herein given.

To this end, my invention consists in the novel construction, arrangement, and combination of parts herein shown and described, and the uses mentioned, and more particularly pointed out in the claims.

In the drawing, wherein like reference characters indicate like or corresponding parts throughout the views,

Figure 1 is a vertical cross-section through the device in position within an opening in the wall of a member having fluid under pressure therein;

Figure 2 is an elevation of the same, from within the member; and

Figure 3 is a similar elevation, from without the member.

Referring more particularly to the drawing, wherein I have illustrated a preferred embodiment of my invention, A indicates one wall of a boiler, still, or other member or mechanism within which fluid such as steam, water, gas, etc., is retained, under pressure, the interior surface of such wall being indicated at 1, and the outer surface, and which may be exposed to atmospheric pressure or even a lesser pressure, is indicated at 2.

An aperture or opening 3 is provided through the wall of the member A, for any suitable purpose, as for affording a hand-hole or the like, and under normal circumstances, it is desired that this opening be sealed so as to avoid the escape of steam or of any other fluid under pressure, from within the member A to the exterior of the same. This opening is preferably circular and has its bounding or peripheral wall surface flared outwardly, or in other words is tapered increasingly outwardly from the inner side of the member. Thus the smaller area of the tapered opening is on the inside of the wall, and the larger area is on the outside of the same. I have found, from practice, that an angle of taper of about $7\frac{1}{2}$ degrees from the one wall to the other, somewhat as shown, is a good taper to work with, and is neither too sharp nor too little an angle.

My device for sealing such an opening comprises the bolt or carrying element 4, the crab or cross-piece element 5 adapted to be seated against the inside surface of the wall on the pressure side at 1, the cover 6 adapted to seat against the peripheral bounding wall of the opening, and the tightening element or nut 7, all of the elements being movably mounted on the bolt or carrying element 4.

It will be noted that the bolt has a head 8 at one end, preferably rounded as shown, and that the crab element 5 has a central opening or socket 9 therethrough to receive and engage with the rounded head of the bolt, so as to form a universal connection therewith, and giving flexibility to the device at this point. Further, the shank of the bolt has been reduced in thickness immediately behind said rounded head, as shown at 10, in order to give still more movement to the two parts, relatively of one another.

The crab 5 has its free ends or feet of such radial distance from the socket that they will engage the surface of the wall just beyond the edges of the opening therethrough.

Axially movable on the bolt 4, but prevented from rotation thereon independently thereof, is the cover or cover plate 6, the same preferably having the tapered annular wall 11 for insertion within said tapered opening to engage against and seal the same against escape of fluid therepast, this sealing being with a metal-to-metal contact and without extraneous gaskets, packings or the like. In order to prevent the independent rotation of the cover on the bolt, one of the parts, as for example, the bolt may be provided with a keyway or slot 12 longitudinally thereof extending from the outermost free end to adjacent the enlarged head, and the cover may be provided with a key or feather 13 extending radially inwardly from its hub and into the keyway 12, this key being preferably of less length than the thickness of the hub itself.

The bolt may be threaded toward its outer free end of shank, and the nut 7 is threaded onto this portion, it being noted that the central opening through the nut does not go entirely through the nut, but only through one end, so as to leave the outer end 14 as an imperforate end wall.

A slight groove, such as the V-shaped groove shown at 15, may be provided between the opposed flat surfaces of the ends of the cover plate and the nut, that engage one another, so that a sealing compound may be placed therein and which will form a perfectly tight joint at this point when the parts are tightened up as shown in the full lines in Fig. 1.

When placing the device in operative position shown in full lines in Fig. 1, the nut is first backed off to adjacent the last thread or two, so as to permit of sufficient spread or separation between the cover plate and the crab elements carried on the bolt. Then the crab may be inserted within the opening without detaching the same from the bolt, from without the opening, thereby making it extremely simple to install in place.

After the crab and cover have been spread, one leg of the crab is then inserted into the opening and then the remainder of it is shifted into place therein, as shown in dotted lines in Fig. 1, and the cover plate then actuated toward the crab until it is in engagement with the tapered wall surface of the opening. The bolt will then be in position extended outwardly through the opening axially of the same, and the nut may be tightened sufficiently to bind the parts in place with sufficient force to withstand the pressure to which the device is to be subjected.

The crab will shift itself so that both its feet will seat perfectly against the inner wall surface of the opening, even though in so doing, the axis of the bolt is not or does not remain coincident with the axis through the socket of the crab. Thus, any irregularities in the plane surface of the inside all of the member A will be com-

pensated for, and yet the bolt will extend axially through the opening, and the pull on the bolt will be evenly and uniformly through both feet of the crab.

Thus there will be no continual bending and straining of the metal of the crab, and the device may be used interchangeably with different holes or in different members A. The reduction in the size of the diameter of the shank immediately behind the head will provide additional room for movement of the crab angularly, relatively of the bolt.

There is a metal-to-metal contact throughout, and the parts can be pulled up quite tight, and sufficient to withstand the highest pressures to which the parts might be subjected in usage. In case there is any slight leakage of pressure past the threads of the bolt, it can not escape to the atmosphere on account of the closed or imperforate end or head of the nut. No gaskets of any kind are required, and there is little or no likelihood of any shut-down of apparatus to which this device might be applied, on account of failure of gaskets, or of leakage.

The same cover plates may be inserted into sheets of different thicknesses, the only difference being that in heavier sheets, the innermost edge of the cover plate would not come quite to the inner side of the sheet. However, the contact area between the cover plate and the opening would be the same in both cases.

The cover plate is preferably provided with angular or polygonal head 16 for engagement by a wrench for holding the same against rotation, while another wrench may be applied to rotate the nut by engagement with the polygonal head of the latter.

When removing the device from the opening, the cover plate is held with a wrench while the nut is backed off the desired distance, after which the crab may be shifted out of the opening.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of the parts herein shown and described, or the uses mentioned, except as limited by the state of the art to which this invention appertains, and the claims hereto appended.

What I claim as new and desire to secure by Letters Patent is:

1. The combination, with a hollow member having an opening through its wall and adapted to have fluid under pressure therein, of a device for sealing said opening against such pressure and insertable as a unit without detachment through said opening from without the same, said device comprising a crab element adapted to be inserted through said opening from the exterior thereof and seat only against that portion of the inner wall of said member spaced beyond said opening, a cover plate movable into said opening adapted to engage the peripheral bounding wall of said opening from without, a bolt upon which said crab and cover plate are mounted, and a nut for drawing said cover plate and crab together to seal said opening.

2. A mechanism for sealing an opening in a member adapted to have fluid under pressure therein, and comprising a bolt; an element having universal connection thereto and adapted to seat against the inner surface of said member only spaced from said opening; a cover plate ele-

ment on said bolt and engageable with and with-
in the peripheral bounding wall of said opening;
and means for tightening said elements together
from opposite sides of said opening.

- 5 3. A device for sealing an outwardly flared
opening in a member having fluid under pressure
therein, and comprising a bolt having a peripher-
ally rounded enlarged head at one end and a re-
duced neck portion immediately adjacent there-
to and of lesser diameter than the shank portion;
10 a crab element having a rounded socket to re-
ceive said head, whereby said crab may be moved

longitudinally on said bolt from interengagement
with said rounded head, toward said reduced
neck portion and thence be shiftable laterally of
said reduced neck portion of the bolt; a cover in-
sertable into said opening means between said
bolt and cover to permit movement of the latter
longitudinally on said bolt but prevent rotation
relative thereto; and means for tightening said
crab and cover elements together to seal said
opening.

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