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A. MOELLER
CAM LEVER OPERATED EXPANDABLE CLOSURE
WITH LEVER LOCKING MEANS
Filed Sept. 28, 1956

2,822,103

Fig. 1.

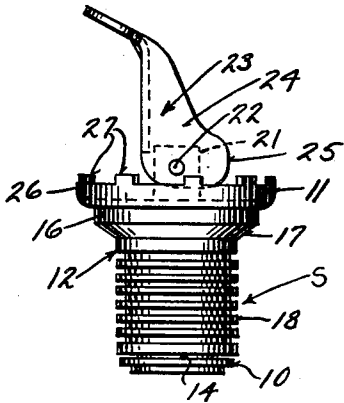


Fig. 2.

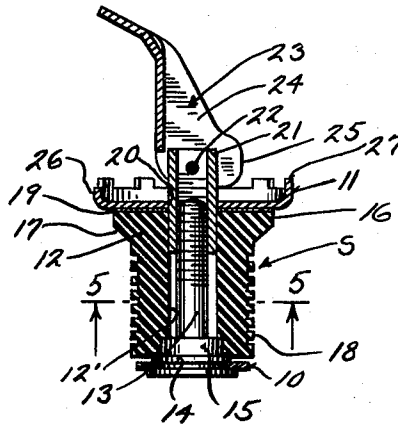


Fig. 3.

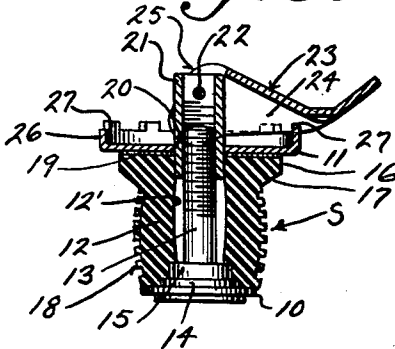


Fig. 4.

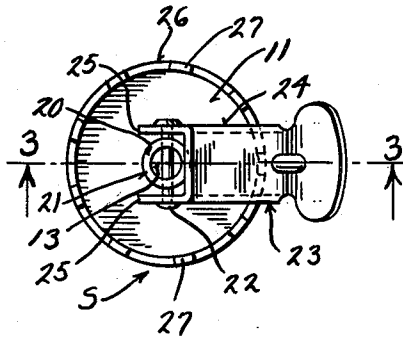
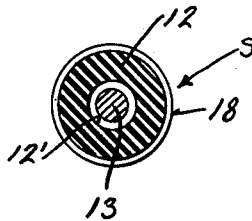


Fig. 5.



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1

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CAM LEVER OPERATED EXPANDABLE CLOSURE WITH LEVER LOCKING MEANS

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1 Claim. (Cl. 215—53)

This invention appertains to plugs and stoppers of the general type shown in my prior Patents, Numbers 2,292,149; 2,315,538; 2,347,835 and 2,729,353 issued respectively on August 4, 1942; April 6, 1943; May 2, 1944 and January 3, 1956.

One of the primary objects of my present invention is the provision of means for effectively holding the operating lever against accidental turning movement, when the lever is swung to its lowered operative position for expanding the stopper against the walls of an opening, whereby accidental change in the set of the stopper will be prevented incident to vibration etc.

Another salient object of my invention is the provision of an expanding stopper or plug embodying inner and outer compression plates having confined therebetween an expandable stopper body, the inner compression plate having an axially disposed threaded stem extending through the body, the outer compression plate having slidably and rotatably extending therethrough a sleeve nut carrying a pivoted cam lever for engaging the outer compression plate, the lever having cam throws for engaging the outer plate when the lever is swung down to its operative position for compressing the stopper body longitudinally and for expanding the body radially into intimate sealing contact with the wall of an opening, the stopper being initially adjusted by rotating the sleeve nut and the lever on the stem relative to the outer compression plate, means being formed on the outer compression plate for engaging and holding the lever (and consequently the sleeve nut) against accidental rotation whereby the desired initial set of the stopper body can be maintained.

A further important object of my invention is to improve the construction of the outer compression plate of an expandable stopper of the type generally disclosed in my prior patents above-mentioned, by providing outstanding latching lugs on the periphery of the plate engageable by the lever when said lever is moved to its operative stopper sealing position.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawing, in which drawing,

Figure 1 is a side elevational view of my improved stopper showing the operating lever in its raised inoperative non-locking position;

Figure 2 is a central longitudinal sectional view through the stopper;

Figure 3 is a view similar to Figure 2, but showing the lever in its lowered operative latched position, the section being taken on the line 3—3 of Figure 4, looking in the direction of the arrows;

Figure 4 is a top plan view of the improved stopper showing the lever in its lowered operative latched position, and

Figure 5 is a transverse sectional view through the

2

stopper taken on the line 5—5 of Figure 2, looking in the direction of the arrows.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter S generally indicates my improved stopper and the same includes inner and outer compression plates 10 and 11. Confined between the plates 10 and 11 is a compressible stopper body 12. This body is preferably formed from rubber or some other similar resilient compressible material.

The body 12 is of a general cylindrical shape and is provided with an axially disposed longitudinally extending way or bore 12', which opens out through the opposite ends of the body. The inner plate 10 is provided with stepped shoulders 14, so as to provide a series of reduced portions 15 and one of said reduced portions extends into the bore 13.

The outer or upper end of the bore 12 is provided with an outstanding annular flange 16, the lower face of which is tapered inwardly, as at 17. This flange is adapted to engage the outer edge or lip of an opening when the body 12 is inserted in an opening. The outer surface of the body 12, at least for a portion of its length is provided with a series of equidistantly spaced annular compressible ribs 18.

The outer compression plate 11 is preferably, but not necessarily, of a greater diameter than the flange 16 of the body, and the construction of this outer plate forms the important feature of this present invention. The plate is bonded to the outer end of the body 12 by the use of a suitable adhesive 19. Thus, the plate 11 and the body 12 are firmly secured together against turning or twisting movement relative to one another. This plate 11 has formed therein an axially disposed opening 20 which slidably and rotatably receives a sleeve nut 21. The sleeve nut 21 is threaded on the stem 13. Rockably mounted on the outer end of the sleeve nut 21 by means of a pivot pin 22 is the operating lever 23. The operating lever is preferably formed from a single stamping of sheet metal or the like and is of a substantially U-shape in cross-section and includes spaced side walls 24. The side walls 24 straddle the upper end of the sleeve nut 21 and the pivot pin 22 extends through the side walls. The inner lower corners of the side walls have formed thereon cam throws 25. When the lever is in its lowered operative position, as shown in Figures 3 and 4, the cam throws engage the outer face of the compression plate 11 and the plates 10 and 11 are moved toward one another so as to bring about the compressing of the body 12 longitudinally and the expansion thereof radially for intimate sealing contact with the wall of an opening. The lever 23 and the sleeve nut 21 can be initially rotated on the stem 13, so as to initially adjust the stopper body to a desired predetermined set or radial expansion. After this initial set then the lever 23 is operated by swinging the same on its pivot, to further expand the body 12 radially to hold the same in the opening.

Where the stopper S is associated with a body open to vibration, there is danger in the accidental turning movement of the sleeve nut and the lever on the stem 13. To positively insure the sleeve nut 21 and the lever 23 against accidental rotation when the lever is in its lowered operative position, the plate 11 has formed on its periphery an upturned annular flange 26 and this flange in turn is provided with upstanding equidistantly spaced peripheral lugs 27. Thus, the plate 11 takes a castellated form. The lugs 27 have a width less than the distance between the side walls 24 of the lever 23 for a purpose, which will now appear.

In operation of my improved stopper, the lever 23 is swung to its raised inoperative position, as shown in

3

Figures 1 and 2, and at this time the lever and the sleeve nut 21 can be rotated as a unit for adjusting the plates 10 and 11 toward or away from one another to give the body 12 a desired set. Upon the lowering of the lever 12 to its operative position the plates 10 and 11 will be brought closer together for further radial expanding of the body so that the body will be brought into intimate sealing contact with the wall of an opening. With the lowering of the lever, the lever is manipulated so as to straddle a selected lug 27. Thus, a lug will be confined between the walls 24 and hence the confined lug will prevent accidental turning movement of the lever.

From the foregoing description, it can be seen that I have provided an exceptionally simple, but efficient means for preventing the accidental rotation of the operating lever and its sleeve nut 21 after an initial adjustment thereof.

Changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

An expandable stopper comprising inner and outer compression plates, an expandable resilient compressible body confined between said plates and having an axially disposed bore, a threaded stem rigidly carried by the inner compression plate and extending into the bore, means rigidly securing the outer plate to the body against

4

accidental turning movement relative to the body and said outer plate having an axial opening in alignment with the bore, a sleeve nut rotatably and slidably extending through the opening and threaded on the stem, a pivoted operating lever carried by the outer end of the sleeve nut having throws adapted to engage the outer plate when the lever is in a lowered operative position, said lever including spaced side walls straddling the sleeve nut, and outwardly extending equidistantly spaced latch lugs on the periphery of the outer plate, said lugs having a width less than the distance between the side walls of the lever, the lever being adapted to straddle a selected lug when the lever is in its lowered position whereby accidental turning movement of the lever and the sleeve nut will be prevented.

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