Aug. 13, 1963 J. R. HAYNES ETAL 3,100,586

VALVED OPENER FOR SEALED CONTAINERS

Filed March 14, 1960 2 Sheets-Sheet 1

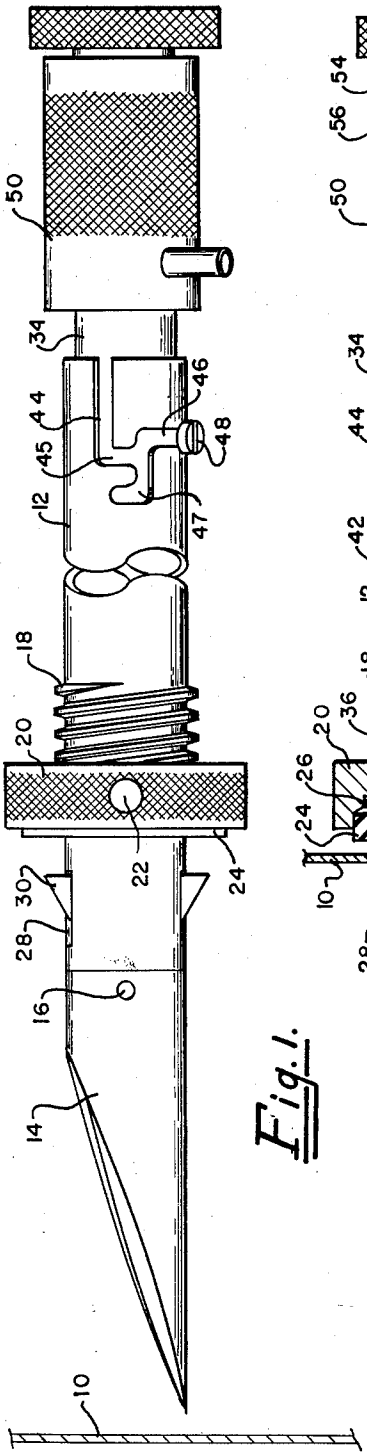

Fig. 1.

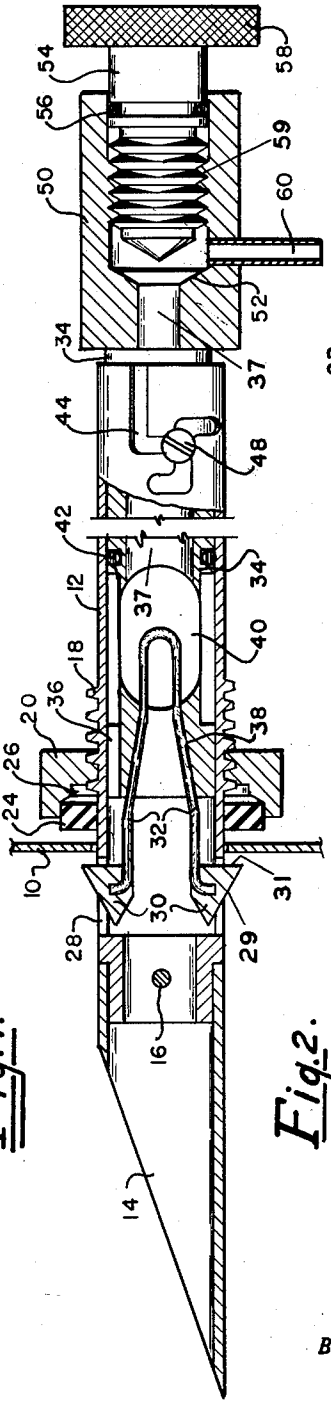

Fig. 2.

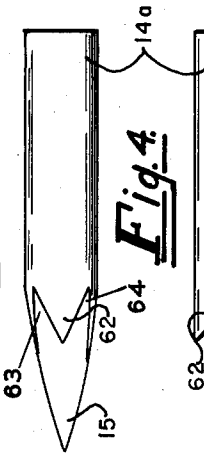

Fig. 4.

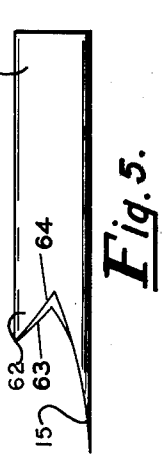

Fig. 5.

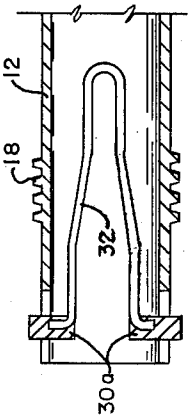

Fig. 3.

INVENTORS
JOHN R. HAYNES
JAMES W. HAYNES

BY James R. Head
ATTORNEY

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VALVED OPENER FOR SEALED CONTAINERS

Filed March 14, 1960 2 Sheets-Sheet 2

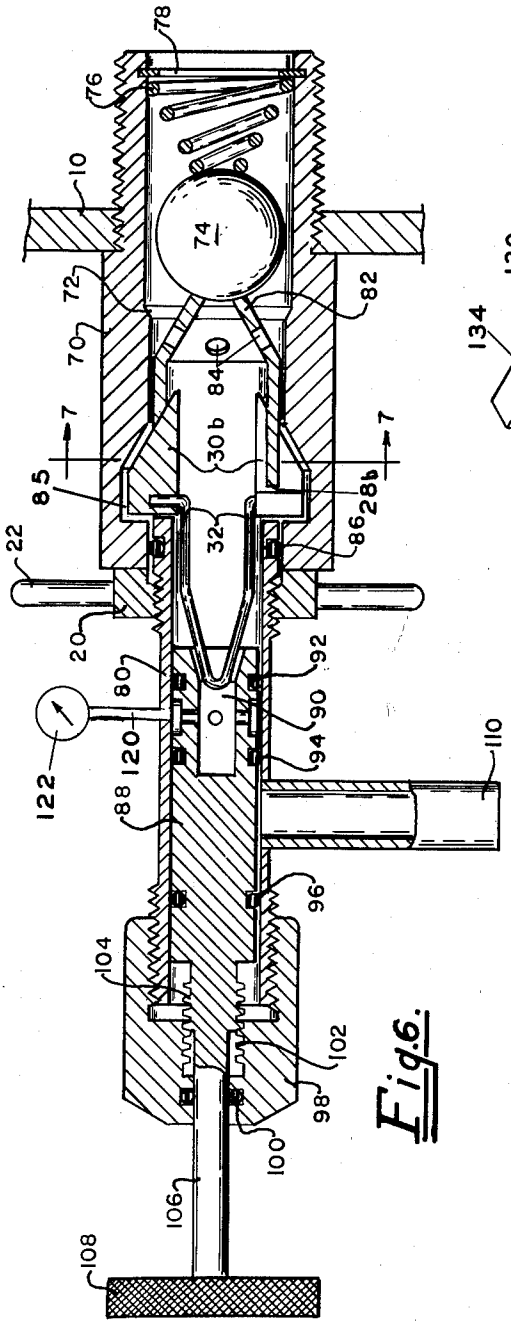

Fig. 6.

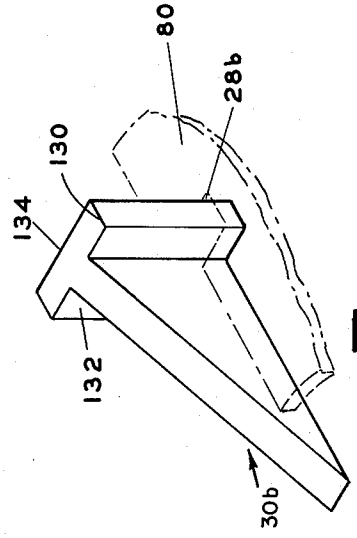

Fig. 8.

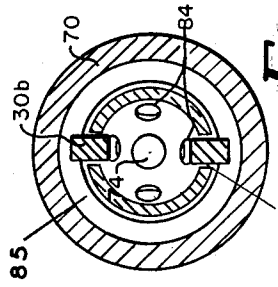

Fig. 7.

INVENTORS
JOHN R. HAYNES
JAMES W. HAYNES

BY James R. Head
ATTORNEY

United States Patent Office 3,100,586 Patented Aug. 13, 1963

3,100,586

VALVED OPENER FOR SEALED CONTAINERS

John R. Haynes and James W. Haynes, Tulsa, Okla.; said James W. Haynes assignor to said John R. Haynes

Filed Mar. 14, 1960, Ser. No. 14,834
1 Claim. (Cl. 222—90)

This invention relates to apparatus for dispensing fluids from normally closed containers. More particularly, it relates to apparatus which forms sealed opening in a fluid filled container and provided with adequate valved control over the flow of fluids therefrom.

Many fluids, especially liquids, are stored in sealed metallic containers to provide adequate safety from spillage and the like during transportation. The ability to dispense the liquids therefrom after they have reached their destinations with adequate valved control becomes very difficult. Some containers include a threaded plug at one end which requires either a special pump or placement of the container on its side after the plug has been removed. Adequate control of the fluids therefrom is difficult, resulting in a great deal of waste and trouble.

Accordingly, it is an object of this invention to provide apparatus which overcomes the problems connected with prior art methods of opening fluid filled containers.

It is another object of this invention to provide apparatus which can be quickly inserted through the walls of a normally sealed container of fluids and sealingly locked in place with adequate valved control over the fluid outlet.

Another object of this invention is to provide a valve which is quick acting and is absent the usual valve and valve seat and the wear and replacement associated therewith.

It is a further object of this invention to provide apparatus for insertion within sealed containers of fluids and sealingly locked therein and including further valved means for controlling fluid flow and readily disengaging said apparatus as required by the operator.

A still further object of this invention is to provide a quick opening apparatus for use with normally high pressure sealed containers which permits opening of the sealed container after the valved apparatus has been sealingly engaged therewith, and further permits full valved control over the fluids therein.

These and other objects and a better understanding of this invention will become more apparent upon further reading of the specifications and claim when taken in conjunction with the following drawings, of which:

FIGURE 1 is an overall elevational view of the apparatus of this invention as it appears ready for insertion into a sealed container.

FIGURE 2 is a cross-sectional view of the apparatus described by FIGURE 1 in the position after it has passed through the container wall.

FIGURE 3 is a partial sectional view of a locking dog apparatus for use in conjunction with this invention as an alternate embodiment.

FIGURES 4 and 5 represent top and side elevational views respectively of an alternate type cutting blade for use with the apparatus of FIGURE 1.

FIGURE 6 is a sectional view of an alternate embodiment of this invention describing apparatus for use with high pressure sealed containers.

FIGURE 7 is a cross-sectional view taken along the line 7—7 of FIGURE 6.

FIGURE 8 is an isometric view of the collet as used as an alternate embodiment to the apparatus of FIGURES 1, 2, and 6.

Briefly, this invention is concerned with an apparatus which includes a cutting point for opening a sealed container, releasable locking dog members which are adapted to expand inside container wall and sandwich the wall between the dog and an exterior and quick acting seal. A valved unit which co-acts to release the dog members when desired, and further control outlet flow. An additional embodiment is adapted for use with high pressure containers having a valved plug.

Description

Referring now specifically to the apparatus described in FIGURES 1 and 2, the numeral 10 represents a sectional view of a container wall. Outer mandrel 12 terminates at one end with a cutting blade 14 which is typically retained thereto by any well known means such as threads or by a pin 16. In some instances a unit construction of the outer mandrel and cutting blade is used. Threaded portions 18 are adapted to the outside of mandrel 12 for quick advance of the threaded sealing nut 20. Sealing nut 20 includes a handle extension portion 22 which is more adequately shown in FIGURE 6. A tapered frontal interior portion 26 of nut 20 is adapted to receive a resilient sealing or packing element 24. The taper causes sealed engagement with container housing 10 and outer mandrel 12 upon advance of nut 20. Although threads 18 have been shown as preferred, other types of quick acting lock means between nut 20 and outer mandrel 12 may be used, such as, for example, co-engageable lugs.

In close proximity to the sealing nut and towards the forward cutting blade 14, openings 28 are adapted to receive movable locking dogs 30 which are normally biased outward through the openings by a hairpin spring 32. In the preferred embodiment, locking dogs 30 include a tapered portion 29, which faces the forward, cutting blade end, of outer mandrel 12, and a portion 31 substantially perpendicular to the outer mandrel and facing the sealing nut 20. The locking dogs 30 are typically in pairs, as shown, however, this is not to be held limiting as additional pairs of dogs 30 and hairpin springs 32 may be adapted to the apparatus herein. Interiorly of mandrel 12 is a valved mandrel 34 adapted for telescopic movement therein. The front end portion of the mandrel 34 includes a splined outer portion 36 for unrestricted fluid flow into passageway 37. A tapered interior face portion 38 on the forward end of the mandrel 34 is adapted to engage with hairpin spring 32 to actuate same. A larger opening 40 is provided for receiving fluids from the container which are adapted and forced to pass into passageway 37 by O-ring seal 42. The position of the interior mandrel portion 34 is controlled and held by movement within a slotted portion 44 of the outer mandrel. Pin 48 is attached to inner mandrel 34 and movable to the various operating positions 45, 46, and 47, as hereinafter described. Terminating the back end of interior mandrel 34 is valve housing 50 which includes valve seal 52 terminating passageway 37 and valve unit 54 sealingly engaged therewith using O-ring 56. Rotation of handle 58 turns valve 54 through its threads 59, permitting control of outward flow of fluids through outlet 60.

In FIGURE 3 an additional embodiment in this invention is described using a non-tapered locking dog 30A which is adapted to be normally biased outwardly by hairpin spring 32 from outer mandrel 12. Obviously, using a locking dog of this type requires that the dogs be in the retracted position prior to insertion within the sealed container 10, thereafter released into locking position.

In FIGURES 4 and 5 a cutting element is described for attachment to the outer mandrel 12 as described by the

numeral 14*a* and includes, in addition to the front nose portion 15, a cone shaped upper, but shorter portion 62. Note that the V-shaped inset 63 is slightly offset from inset 64, which is adapted for cutting a full circle piece from the container as it is inserted and permit unobstructed movement of dogs 30.

To alleviate problems in setting the dogs 30 against the inside wall of container 10 where the cutting blade 14 is not designed or fails to cut a full opening i.e., leaves the cut piece connected at one place, the dogs should be spaced to actuate at other points, for example, a position 90° from the position of FIGURES 1 and 2.

Referring now to the apparatus described by FIGURE 6, which is an alternate embodiment to this invention for use with high pressure fluid filled containers 10. Insert 70 is threadably attached to housing 10 and includes an interior channel which is normally closed by a ball valve 74 on valve seat 72. The ball valve 74 is normally retained against seat portion 72 by the pressure differential across the container and spring 76 retained within housing 70 by ring 78. The outer mandrel portion 80 is adapted to be inserted within the interior passageway of housing 70 and includes a nose portion 82 for engagement with ball valve 74 to unseat same. A multiplicity of passageways 84 are adapted for the flow of fluids from the sealed container into the control valve. Locking dogs 30*b*, the shape of which is best seen in the view of FIGURE 8, are adapted to be received within the interior of housing 70 by portion 85. The outer mandrel 80 is sealed within the interior portion by O-ring member 86, thus preventing by-pass of fluids. In the preferred embodiment the spacing and design of nose portion 82 with respect to locking dogs 30*b* and seal 86, is critical to the extent that locking dogs 30*b* and seal 86 operate substantially simultaneously with opening of the ball valve 74 away from its seat 72. T-shaped slots or openings 28*b* are provided for dogs 30*b* to prevent lateral movement, misalignment, etc. (see FIGURE 8). Although the high pressure within the container 10 will be sufficient to hold locking dogs 30*b* in place, a locking nut 20 is adapted for threaded engagement along mandrel portion 80 with housing 70. Interiorly of mandrel 80 is valve unit 88 which includes a frontal opening portion 90, whose outlet is sealed between O-rings 92 and 94. A rear O-ring seal 96 is provided to prevent by-pass of fluids the valve unit is placed in open flow position. The valve unit 88 is adapted for movement with respect to a sealed retaining member 98 having seal 100 to prevent further fluid leakage and includes threaded portion 102 for threadably adjusting unit 88 by rotation of threads 104 with respect thereto. The valve unit includes a stem extension portion 106 and handle 108 for full control of the fluids to outlet 110. The valve forms an important feature of this embodiment in that it has no seat and coacting valve member usually found in flow control valves. Flow is controlled by longitudinal movement within housing or mandrel 80.

A further embodiment of the invention includes use of an auxiliary conduit 120 which can be connected to a pressure gage 122 for example, or other test equipment.

Operation

In operating the device as disclosed in FIGURES 1 and 2, inner mandrel 34 is placed in the position as shown in FIGURE 1 with pin 48 within the slotted portion 46. In this position the locking dogs having a tapered face towards the container are free to retract from their normally biased outward position. The apparatus, thus assembled, is thrust with sufficient magnitude for penetration of blade 14 into the container with movement to a position approximating that of FIGURE 2. The quick acting sealing nut 20 is threadably advanced into engagement with container housing 10, forcing it against face 31 of locking dogs 30. This step is accomplished in a matter of seconds with a minimum of leakage through the newly formed opening. Thereafter, by rotation of handle 58, valve 54 is moved away from its seat 52 to permit controlled flow through outlet 60.

As previously described, in using the apparatus of FIGURE 3, when it is desired to penetrate a sealed container, the inner mandrel 34 is positioned having pin 48 within the frontmost groove 47 whereby collet locking dogs 30*a* will be in a fully retracted position. After insertion of the device the inner mandrel and pin member are removed to a position approximating that shown in FIGURE 2, or in locking grooves 45 or 46, with corresponding quick acting movement of sealing nut 20 as previously described.

To remove the apparatus as described in FIGURES 1 and 2, pin 48 associated with inner mandrel 34 is moved into its forwardmost position at slot 47 which forces the inner tapered portion 38 upon the hairpin spring 32, retracting the locking dogs for removal of the assembly.

In the event that the flow through outlet 60 is insufficient for the particular needs, and if it is desired to empty the container, inner mandrel 34 is removed by movement of pin 48 into groove 44 and withdrawing to permit full flow conditions through outer mandrel 12. If it appears necessary that controlled flow conditions are necessary the unit 34 is placed within outer mandrel 12, preferably while valve 52 is in an opened position, preventing a pressure differential across the mandrel.

The apparatus of FIGURES 4 and 5 is used similarly to that shown in FIGURES 1 and 2 and provides a full opened port by the design of the cutting blade.

In using the apparatus as disclosed in FIGURE 6, it is understood that although its use is described for removing the fluids within a pressurized container, it is understood that it may also be used for filling a pressured container.

Prior to filling container 10 with a pressurized fluid, a valve housing 70 is threadably inserted therein which contains the ball valve 74, normally urged into its closed position by spring 76 and the pressure fluid within the container. When it is desired to withdraw fluid therefrom, outer mandrel 80 is inserted therein with tapered locking dogs 30*b* adapted for locking engagement with portion 85 and held by locking nut 20. As the mandrel 80 is inserted and locked, nose portion 82 is adapted to engage with ball valve 74 and unseat same for full pressure flow conditions through outlets 84. Movement of handle 108 moves shaft 106 and valve body 88 to a position where opening 90 is spaced approximately over outlet 110 for controlled flow conditions. The two O-ring seals 92 and 94 act to prevent fluid flow until movement is such that O-ring 94 passes into and past opening 110.

Generally speaking, the valve and its various components, excluding seals, packing and the like, are forged, cast or shaped from high strength metals, however it is understood that high impact synthetic resins and plastics can be substituted for the said components.

Although this invention has been described with reference to specific and preferred embodiments, it will be apparent, however, that many modifications can be made without departing from the spirit and scope of the invention. For example, locking dogs 30*b* are shown in FIGURE 8 having relatively square corners 130. It is understood that these corners may be curved to prevent protrusion from the outer mandrel in the retracted position. Accordingly, this invention should be considered not to be limited to the embodiment herein described, but should be limited only by the scope of the appended claim.

We claim:

A valved opener for containers comprising,

an open ended outer tubular mandrel having a forward end to receive a cutting blade and a rearward end having first and second position peripheral slots adjacent thereto;

a threaded sealing nut coaxially positioned on the exterior of said outer mandrel intermediate said ends;

locking dogs between said cutting blade and said nut

mounted interiorly of said outer mandrel and adapted for movement from the interior to the exterior of said outer mandrel, said dogs having a diagonal taper portion facing said forward end and a portion substantially perpendicular to the axis of said outer mandrel facing said rearward end;

a U-shaped spring positioned interiorly of said outer mandrel to normally bias said dogs exteriorly, the closed portion of said spring positioned rearwardly of said dogs;

a tubular inner mandrel telescopically movable interiorly of said outer mandrel, said tubular inner mandrel having interior surfaces contiguous to said spring, said tubular mandrel having means to cooperate with said peripheral slots to retract said dogs interiorly in said one position and to permit said bias in said second position;

sealing means between said inner and outer tubular mandrels; and

means forming a part of said inner mandrel to control the flow of fluids from said container.

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