

[54] APPARATUS FOR PIERCING A
CONTAINER

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[22] Filed: May 26, 1972

[21] Appl. No.: 257,120

Related U.S. Application Data

[62] Division of Ser. No. 120,017, March 1, 1971, Pat.
No. 3,688,399.

[52] U.S. Cl. 222/83.5, 141/329

[51] Int. Cl. B67b 7/24

[58] Field of Search. 222/83, 83.5, 86, 88; 141/329,
141/330, 369, 370, 371; 30/16, 5.5

[56] References Cited

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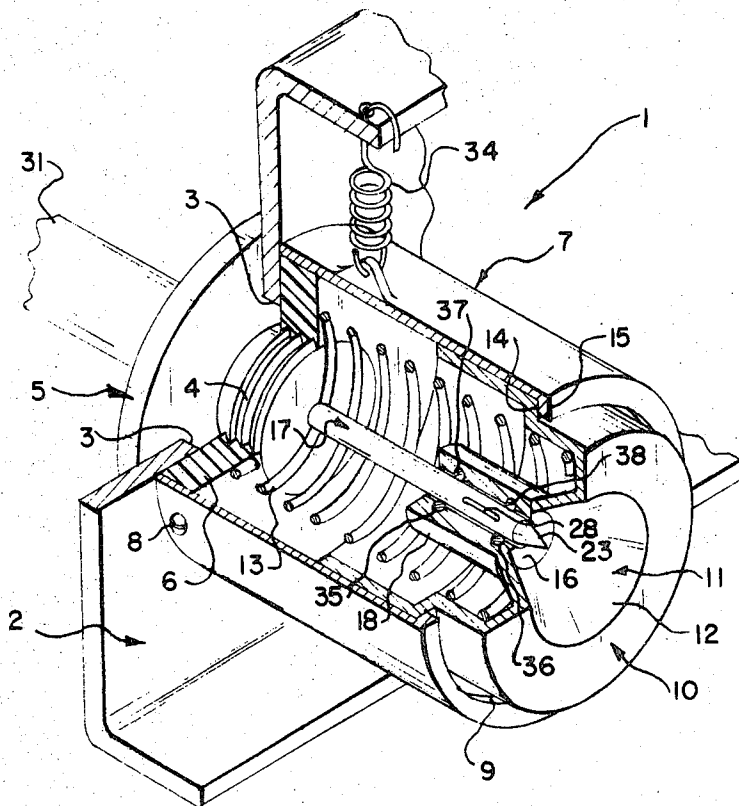
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Assistant Examiner—Joseph J. Rolla

[57] ABSTRACT

Container-piercing apparatus, wherein an inwardly tapered cup member is provided with an opening into the innermost region thereof for admitting a piercing member. The cup and the piercing member are supported for movement of one relative to the other so that the last-mentioned member can be admitted through the inner opening of the cup in a direction enabling engagement of the piercing member tip with a container received in the cup. Support of the piercing member and the cup for movement along a path transverse to the foregoing direction is provided so that the piercing member tip can be centered with respect to a predetermined location on the container as the container is received in the cup. For conveying fluid from or to a pierced container, the piercing member includes a chamber and a pair of spaced openings which communicate with such chamber.

2 Claims, 3 Drawing Figures



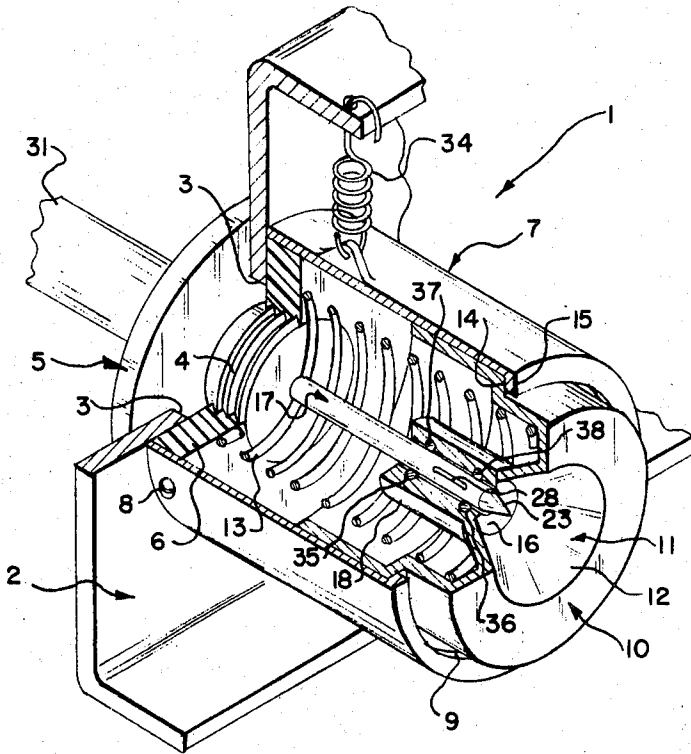


FIG. 1

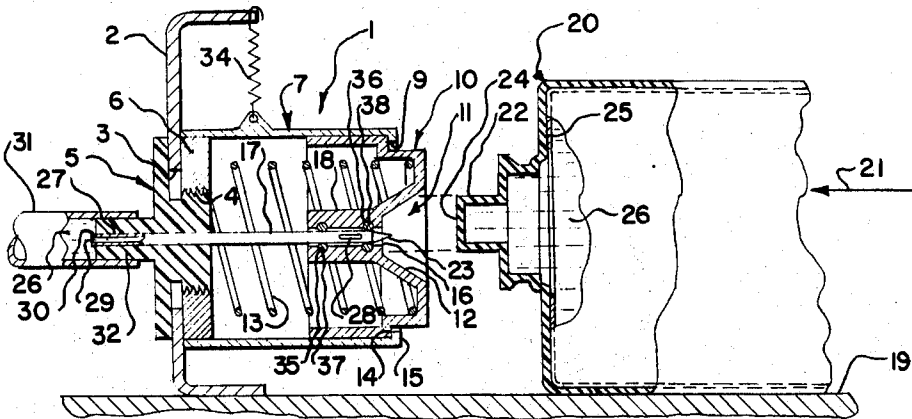


FIG. 2

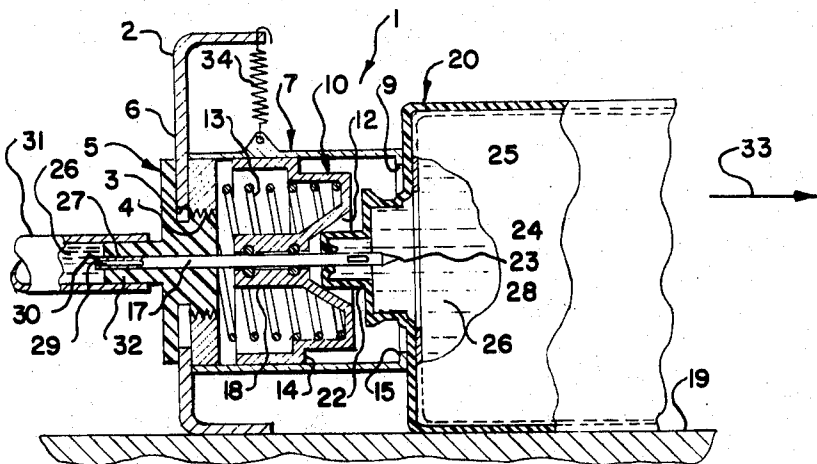


FIG. 3

APPARATUS FOR PIERCING A CONTAINER

This application is a division of application Ser. No. 120,017, filed Mar. 1, 1971, now U.S. Pat. No. 3,688,399.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to apparatus for piercing a container, and more particularly to container-piercing apparatus which provides for the entrance and exit of fluid from a container pierced by such apparatus.

2. Description of the Prior Art

Apparatus for piercing a sealed container and for either conveying fluid from a container so pierced or introducing fluid into the same, wherein a cup-like receptacle is provided with a centrally located opening in the innermost region thereof for admitting a needle-shaped probe into the cup, is generally known in the art relating to such apparatus. Typically, apparatus of this kind is operated by securely seating the neck of a container within the cup and then incrementally passing the probe through the inner opening of the cup in a direction such that the probe tip will engage and puncture the seated container. Once punctured, a fluid can be conveyed from the container or introduced therein via the probe which is adapted to function as a fluid conduit.

The cup-like receptacle of container-piercing apparatus heretofore suggested generally includes an interior surface which is shaped and dimensioned to exteriorly embrace a container neck having a predetermined diameter. Accordingly, a single location on the free end or face of such a container neck when exteriorly embraced by the cup will be aligned with the inner opening of the cup; whereby, the probe tip will be positioned to pierce the container at such location. Should the operator wish to pierce, in the same manner, a container whose neck is of a diameter less than the predetermined diameter then the operator must manually align the single location on the face of the container neck with the inner opening of the cup so that the probe tip will again be positioned to pierce the container at such location. Moreover, should a container neck have a diameter which is greater than the predetermined diameter, piercing of the container by the probe tip may be impossible as such neck will generally be too wide to be seated within the cup.

Accordingly, it can be seen that a need exists for container-piercing apparatus of the foregoing kind but which is improved so that the container-piercing member or probe is self-centering relative to a predetermined location on any one of several containers which respectively differ in diameter.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a novel and improved apparatus for piercing a container.

It is a further object of the present invention to provide an improved container-piercing apparatus which is adapted for effecting the entrance and exit of fluid from a container pierced by such apparatus.

Another important object of the present invention is to provide an improved container-piercing apparatus

which is adapted for use with containers which respectively differ in size.

Yet another object of the present invention is to provide an improved container-piercing apparatus wherein a container-piercing member is self-centering relative to a predetermined location on any one of several containers which respectively differ in size.

In accordance with a preferred embodiment of the present invention, there is disclosed hereinafter a device for piercing a container and for either conveying fluid from a container so pierced or introducing fluid into the same. Such embodiment comprises an inwardly tapered hollow defining member which is provided with an opening into the innermost region thereof for admitting a piercing member into the hollow. The hollow defining member and the piercing member are supported for movement of one relative to the other so that the last-mentioned member can be admitted through the inner opening of the hollow in a direction enabling engagement of the piercing member tip with a container received in the hollow. Support of the hollow defining member and the piercing member for movement along a path transverse to the foregoing direction is provided so that the piercing member tip can be centered with respect to a predetermined location on the container as the container is received in the hollow. For conveying fluid from or to a pierced container, the piercing member includes a chamber and a pair of spaced openings which communicate with such chamber. The chamber opening not remotely spaced from the piercing member tip can be connected to a conduit, such as flexible tubing, which in turn can be connected to a reservoir, for example. Moreover, a sealing element is provided for sealing the chamber opening closest to the piercing member tip so as to prevent undesired leakage or evaporation of residual fluid which may remain in the member chamber after the container is separated from the piercing member.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and objects of the present invention and the manner of obtaining them will become more apparent by reference to the following detailed description of the preferred embodiment of such invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a container-piercing device in accordance with a preferred embodiment of the present invention, showing a portion of the device cut away to illustrate the interior thereof; and

FIGS. 2 and 3 are typical cross section views of the container-piercing device depicted in FIG. 1 and a fluid-supporting container, sequentially showing the manner in which a container-piercing member of the device is centered relative to a predetermined location on such container.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and in particular to FIG. 1, there is shown a container-piercing device generally indicated by the reference numeral 1. A stand 2 is provided with an annular opening 3 through which extends an exteriorly threaded cylindrical member 4 of a disc-like element 5. An exteriorly threaded collar 6 is coupled in the illustrated manner to the cylindrical member 4 so as to interlock the disc 5 and the stand 2.

Moreover, since the diameter of the stand opening 3 is larger than the diameter of the cylindrical member 4, the last-mentioned member is movable both horizontally and vertically (as viewed in FIG. 2) within such opening for purposes which will become significant hereinafter.

A barrel housing 7 is secured to the collar 6 by suitable means, such as a fastener 8 for example. Slidably disposed within an annular entranceway 9 to the housing 7, there is shown at FIG. 1 a cup-like member 10 which is shaped to include a substantially conical surface 12 which, in turn, defines an inwardly tapered hollow or cavity 11. Further located within the housing 7 between the collar 6 and the cup-like member 10 is a helical compression spring 13 which is disposed to urge the cup outwardly through the housing entranceway 9. However, in order to limit such outward urging of the cup 10, the housing 7 and the cup are respectively provided with annular shoulder portions 15 and 14 which abut when the housing and the cup are positioned with respect to each other in the manner shown by FIG. 1. The cup-like member 10 is also provided with a centrally located opening 16 in the innermost region of the tapered hollow 11 for admitting a needle-like probe or piercing member 17 into such hollow upon sliding movement of the cup further into the housing 7, see FIGS. 2 and 3. Located inwardly of the cup opening 16 and aligned therewith is a tubular extension 18 of the cup 10 which supports the probe 17 for entry into the hollow 11.

In order to best understand the present invention, a typical sequence of operation will now be described in detail. As shown in FIGS. 2 and 3 the container-piercing device 1, as presented so far, is secured to a table 19. A sealed container 20 constructed of puncturable material, such as a suitable artificial rubber, is moved along the table 19 in the direction generally indicated by the arrow 21 until a neck portion 22 of the container abuts the conical surface 12 of the cup-like member 10. The container 20 may be manually moved by an operator of the device 1 or may be automatically moved by suitable mechanical means therefor (not shown). Upon continued movement of the container 20 in the direction generally indicated by the arrow 21, the cup 10 will be pushed inwardly of the housing entranceway 9 against the outward urging of the spring 13 so as to be further moved into the housing 7. Since the probe 17 is fixed to the disc-like element 5, the probe will upon such inward movement of the cup 10 be incrementally received through the cup extension 18 and into the hollow 11, see FIG. 3. Moreover, since the conical surface 12 is inwardly tapered such surface operates as a cam to shift the container-piercing device 1, with the exception of the stand 2 and the table 19, in a direction which is transverse to the direction generally indicated by the arrow 21. In the illustrated embodiment, this transverse direction is vertically upward as viewed in FIGS. 2 and 3. Such camming movement of the device 1 as shown by a comparison of FIGS. 2 and 3, operates to raise and thereby center a pointed free end 23 of the probe 17 relative to a predetermined location on a face 24 of the container neck 22, and occurs while the container neck is further pushed into the hollow 11 and the probe is correspondingly received outwardly through the cup opening 16. Accordingly, the free end 23 of the probe 17 will engage and pierce

the container 20 when the container abuts the housing 7 in the manner illustrated by FIG. 3.

By way of example, the container 20 is shown in FIGS. 2 and 3 as including a collapsible bladder 25 in which is stored a fluid 26. Therefore, upon piercing of the container 20 by the free end 23 of the probe 17 in the manner previously described, the fluid 26 can be conveyed through a chamber 27 within the probe by first entering a chamber opening 28 disposed adjacent the probe end 23 and by then exiting from the chamber via another chamber opening 29 disposed adjacent a probe end 30 which is opposite to the probe end 23. To convey the fluid 26 from the probe end 30 to a selected location (not shown), a predetermined length of flexible tubing 31 is preferably connected to a tubular extension 32 of the disc-like element 5. In such way, the container-piercing device 1 is adapted to operate as a fluid conduit; however, it will be appreciated that the device 1 while providing for the conveyance of fluid from the container 20 can similarly be used to provide for the introduction of fluid into the container.

When the fluid 26 has been completely drained from the container 20 or when it is no longer desired to convey any fluid from the container, the container should be moved in the direction generally indicated by the arrow 33 shown in FIG. 3. Whereupon, the container 20 will be disengaged from the probe 17, and the container-piercing device 1 will be returned to an idle position as shown in FIG. 2 because of the simultaneous urging of the spring 13 and the helical tension spring 34 which interconnects the stand 2 and the housing 7. Since the flexible tubing 31 remains connected to the disc extension 32, some of the conveyed fluid may remain in the probe chamber 27 after removal of the container 20. To prevent evaporation of this residual fluid and to prevent leakage of the same from the probe chamber 27, the tubular extension 18 of the cup-like member 10 is provided with a spaced pair of interiorly located annular cavities 35 and 36 in which are respectively disposed O-ring sealing elements 37 and 38 of resilient material, such as a suitable artificial rubber. As shown in FIG. 2, the O-rings 37 and 38 exteriorly embrace the probe 17 and are spaced on either side of the chamber opening 28 (when the container-piercing device 1 is disposed in the idle position) to thereby effectively seal such chamber opening from ambient conditions. Moreover, when the container-piercing device 1 is disposed in the idle position the spring 13 and the shoulder portions 14 and 15 of the cup 10 and the housing 7 cooperate with each other to yieldably retain the probe end 23 at a location adjacent the cup opening 16 and to yieldably retain the chamber opening 28 located between the O-rings 37 and 38.

It will now be appreciated by those having ordinary skill in the art that there has been described a preferred embodiment of container-piercing apparatus which, according to a particular novel aspect of the present invention, is self-centering relative to a predetermined location on any one of a plurality of containers which respectively differ in size. For example, should an operator desire to use the container-piercing device 1 with a container (not shown) whose neck portion is of a diameter greater or less than the diameter of the container neck portion 22, there is no impediment to such use as in the case of the prior art described hereinbefore. Furthermore, while the probe 17 has been described as being supported on the table 19 in stationary

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relation to the container 20 which is moved into engagement with the probe; it will also be appreciated that the container-piercing device 1 could be modified (not shown) so that the container is secured to the table and the device, with the exception of the table, is supported for movement along the table toward such a secured container.

The present invention has been described in considerable detail with particular reference to a preferred embodiment thereof, but it will be understood that variation and modifications can be effected within the scope and spirit of such invention.

I claim:

1. Apparatus for piercing a container, said apparatus comprising:
 - a piercing member;
 - said piercing member including a pointed free end and means defining a chamber having a first chamber opening disposed adjacent said pointed end and a second chamber opening spaced from said first opening;
 - means defining an inwardly tapered hollow for receiving at least a portion of a container and including an innermost region having a central opening for admitting said piercing member into said hollow;
 - first means supporting said piercing member and said hollow defining means for movement of one relative to the other along a first path between respective first positions, in which said first chamber

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opening of said piercing member is disposed outside of said hollow, and respective second positions, in which said piercing member is admitted through said central opening in said innermost region of said hollow in a direction enabling said pointed free end and said first chamber opening of said piercing member to penetrate a container portion located within said hollow;

second means supporting said piercing member and said hollow defining means for movement as a unit along a second path transverse to said first path; a tubular member fixed to said hollow defining means and, during the time said piercing member and said hollow defining means are in said respective first positions, surrounding said first chamber opening of said piercing member in spaced relation thereto; and

two resiliently compressible ring members mounted on said tubular member for exteriorly embracing said piercing member on either side of said first chamber opening to seal said first opening.

2. Container piercing apparatus as recited in claim 1, further comprising:

means for yieldably retaining said piercing member and said hollow defining means at locations with respect to each other along said first path such that said first chamber opening of said piercing member lies within said tubular member and between said ring members.

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