Feb. 2, 1932. J. WILLSON 1,843,532

PNEUMATIC SEALING AND AIR PRESSURE DEVICE

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Fig. 1

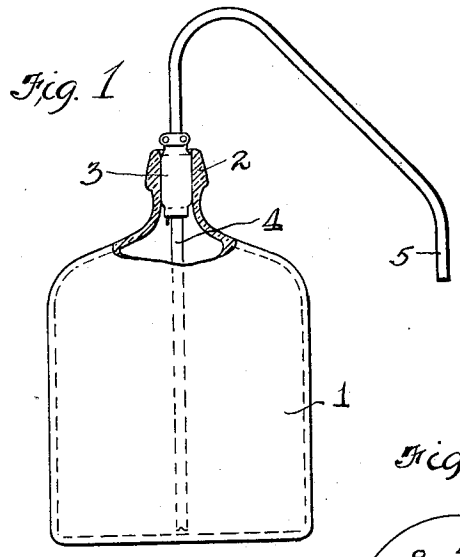
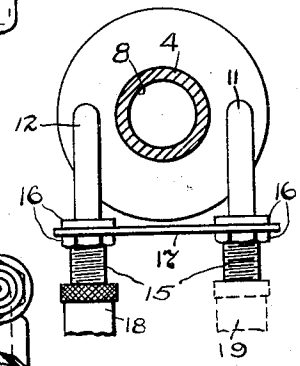


Fig. 4



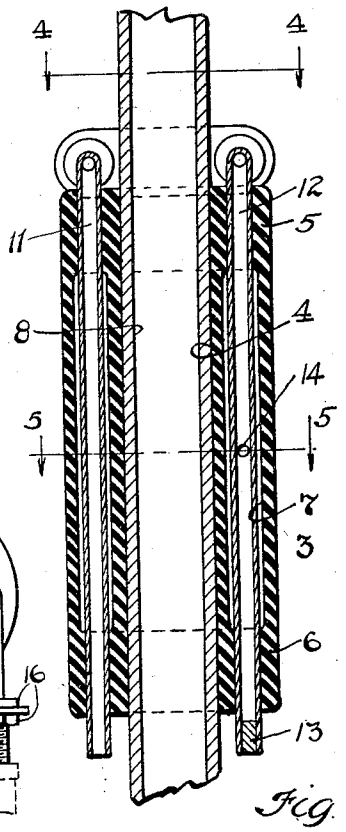


Fig. 3

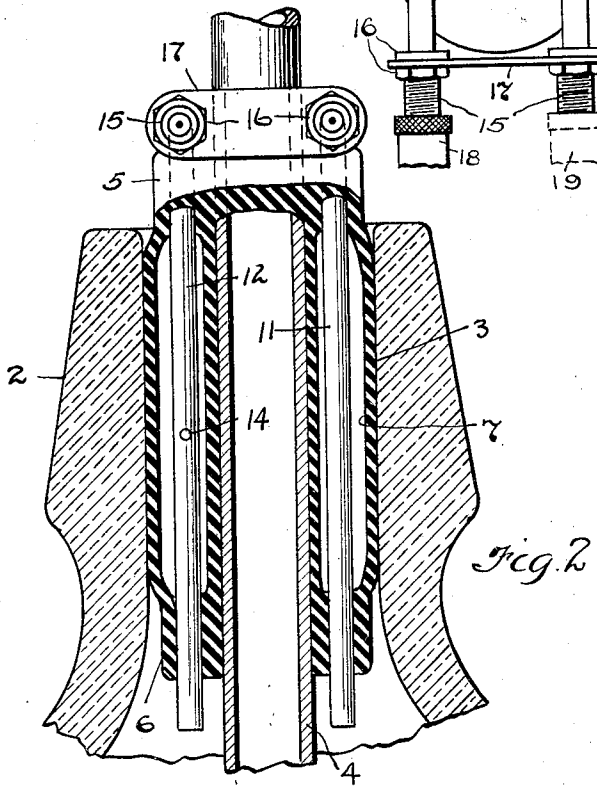


Fig. 2

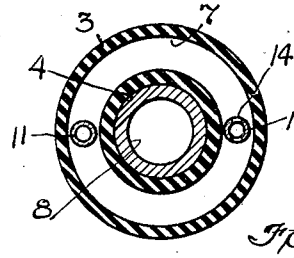


Fig. 5

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PNEUMATIC SEALING AND AIR PRESSURE DEVICE

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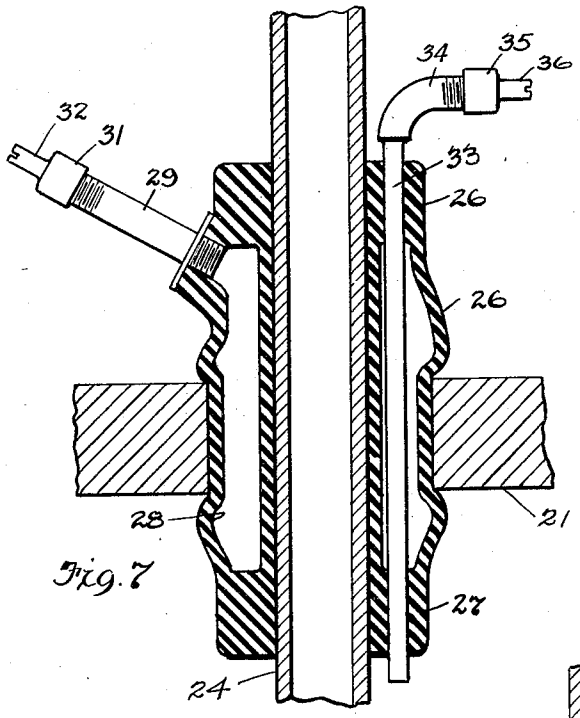


Fig. 7

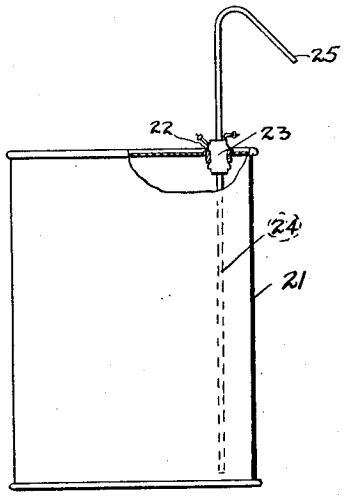


Fig. 6.

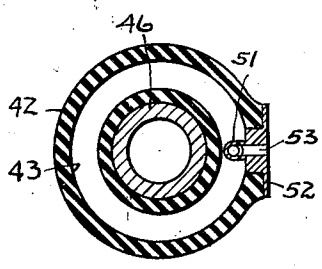


Fig. 9.

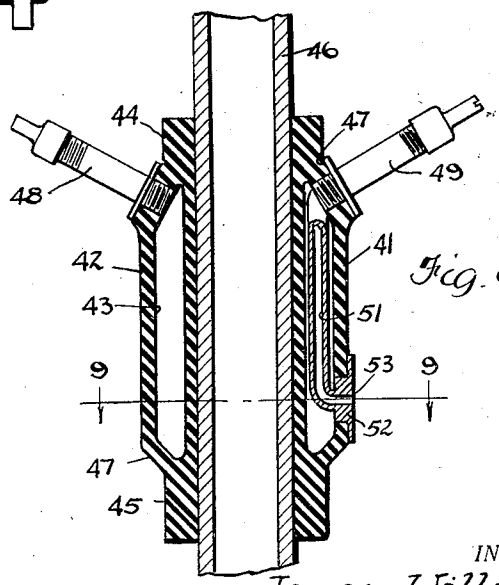


Fig. 8

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Patented Feb. 2, 1932 1,843,532

UNITED STATES PATENT OFFICE

JAMES WILLSON, OF CLEVELAND, OHIO

PNEUMATIC SEALING AND AIR PRESSURE DEVICE

Application filed April 5, 1930. Serial No. 442,015.

This invention as indicated relates to a device adapted to provide an air seal and an air pressure line whereby an opening in a container may be plugged and the contents of such containers may be caused to flow through the outlet tube. More particularly this apparatus is intended for use with carboys, drums, barrels, or any containers which it is desired to seal before applying air pressure to empty the contents thereof.

Apparatus for emptying containers by sealing the outlet aperture and by applying air pressure to the space above the liquid contents of the container have heretofore been known, but a device comprising an elastic body which combines the capacity to seal the container and clamp in secure position the outlet pipe at the same time and also to permit the applying of air pressure to the space above the liquid contents of the container so far as is known has not been heretofore disclosed in the prior art.

The present apparatus makes it possible to apply the device to a large variety of containers differing as to the size of the outlet apertures therein as well as to the depth of the liquid containers thereof and to adjust the device to securely seal the outlet opening and at the same time clamp the outlet pipe at a proper distance from the bottom of the container so as to empty the container practically completely of its contents through the application of air pressure.

The apparatus also includes features of construction of the device which permit it to be manufactured at a low cost and to be free from danger of injury through severe usage. Other and further advantages of the invention will appear in the course of the following description. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is an elevation partly in section showing an apparatus embodying the principle of my invention as applied to a carboy; Fig. 2 is an enlarged diagrammatic sectional view of the body of a preferred form of an apparatus embodying the principles of the invention as applied to the opening in the top of a bottle or carboy; Fig. 3 is a sectional view of the device shown in Fig. 2 when in a collapsed and unexpanded condition; Fig. 4 is a top plan view taken along the line 4—4 shown in Fig. 3, looking in the direction of the arrows; Fig. 5 is a sectional view taken along the line 5—5 shown in Fig. 3, looking in the direction of the arrows; Fig. 6 is an elevation partly in section showing a modified form of apparatus embodying the principles of the invention as applied to a metal drum; Fig. 7 is an enlarged vertical sectional view of the body of the elastic member shown in Fig. 6; Fig. 8 is a central vertical sectional view of another modified form of construction of the body of the expansible member of the apparatus; and Fig. 9 is a transverse sectional view taken along the line 9—9 of Fig. 8, looking in the direction of the arrows.

As is clearly shown in Figs. 1 to 5 of the drawing, the preferred form of my device comprises a bottle or carboy 1 having an apertured neck portion 2 within which is engaged an expansible sealing member 3 through a central bore of which extends an outlet tube 4 which may be suitably bent at its outer end 5 to permit the convenient discharge of the contents of the bottle or carboy at the side thereof. As is more particularly shown in Figs. 2 and 3, the sealing member 3 comprises a body formed of rubber or elastic composition having a central aperture 4 extending throughout the length thereof and having heavy end walls 5, 6, and having its intermediate portion provided with an annular air chamber 7.

Through the central opening in the body, an outlet pipe 8 is engaged, said pipe being adapted to be slidable within said body when the body is in a deflated condition and adapted to be securely clamped by the inner walls

of said body when the sealing member is inserted in an outlet aperture and air pressure is applied to the annular air chamber as will be hereinafter described. On opposite sides of the central opening, tubes 11, 12 are provided, one of said tubes 11 extending completely through the end walls of said body and through the annular air space therein and having no communication whatsoever with said air space. The other of said tubes 12 also extends completely through the end walls of said sealing member, but is provided with a plug 13 at its lower end which prevents air being passed into the interior of the container to which the sealing member is applied. The tube, at an intermediate point, is provided with one or more apertures 14 which communicate with the annular air chamber of the sealing member. The upper ends of the tubes 11 and 12 are bent at right angles and provided with valve portions 15, and are secured by suitable means, such as clamping nuts 16, to a terminal plate 17. The ends of said tubes may be suitably screw-threaded to permit the attachment of air lines 18, 19 communicating to a suitable source of air pressure.

In the form of construction shown in Fig. 6, a drum 21 sealed at the top and bottom is shown, said drum having an outlet aperture 22 at its upper end within which is engaged a sealing member 23. The sealing member is centrally apertured to slidingly receive an outlet tube 24 suitably formed at its free end 25 to permit the convenient discharge of the contents of the drum to one side thereof. The sealing member 23 is shown in enlarged cross-section in Fig. 7 and comprises a body formed of rubber or other elastic composition having heavy end walls 26, 27 and an intermediate annular air chamber 28. A suitable valve member 29 is provided communicating with the annular air chamber. Said valve may be of the usual type used for automobile inner tubes and may be provided with a cap 31 having an air release stem 32. On the side opposite the valve is shown a tube 33 extending completely through the end walls of the sealing member and through the annular air chamber and being provided with a terminal connection 34 provided with a valve and a suitable cap 35 having an air release stem 36.

In the form of construction shown in Fig. 8, the sealing member 41 is provided with an enlarged central portion 42 within which is the annular air chamber 43. The ends 44, 45 are of reduced diameter and the tube 46 extends through a central bore through the sealing member. The enlarged central portion of the sealing member is provided with tapered walls 47 merging with the end walls and a valve 48 similar to that shown in Fig. 7 is provided adjacent the upper end of the tapered portion 47. Opposite said valve another valve 49 is provided which communicates with a tube 51 which extends to a terminal plate 52 which is provided with a central orifice 53 through which air may be passed to the interior of the container when the sealing member is inserted in the outlet opening thereof.

The operation of all of the different forms of the construction shown is substantially the same. The sealing member is engaged upon the outlet tube and is then engaged within the outlet opening in the container which is located at a point above the level of the liquid within the container. The sealing member is held in position within the outlet opening until by suitable means, air pressure is applied to the air chamber within the sealing member and the walls thereof are distended to the extent necessary to thoroughly seal the container. This action of inflating the annular air chamber clamps the inner walls of the sealing member tightly upon the outlet tube and thus prevents the escape of any air from within the container. Through the air tube extending completely through the sealing member and communicating with the interior of the container, air pressure in progressively increasing amount is supplied to the interior of the container which induces a flow of the liquid contents thereof upwardly through the outlet tube to a point of discharge. The air pressure within the air chamber may be sealed when the requisite degree of pressure has been set up and such sealing may be continued so long as desired. The air inlet conduit may likewise be provided with a valve and sealed as is shown in Figs. 6, 7 and 8.

When it is no longer necessary to maintain the sealing member in association with the container, the air pressure within the container is relieved by releasing the valve communicating with the air chamber of the sealing member which will then collapse to its normal dimensions and may be readily withdrawn.

As will be readily apparent, the device is very simple in construction and is universal in its application to outlet apertures of quite a wide range of varying diameter. The sealing action of the device is far superior to that which may be attained through the use of rigid elements screw threadedly, frictionally or otherwise engaged as it provides a secure packing or sealing against the escape of air from within the interior of the container.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, an annular air chamber within said body, an outlet tube slidingly engaged centrally of said body and adjustable within said body to extend to a point adjacent the bottom of said container, means for forcing air into said annular air chamber to press the outer walls thereof into sealing engagement with the outlet opening of the container, and to press the inner walls thereof into sealing engagement with the outlet tube.

2. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, an annular air chamber within said body, an outlet tube slidingly engaged centrally of said body and adjustable within said body to extend to a point adjacent the bottom of said container, means for forcing air into said annular air chamber to press the outer walls thereof into sealing engagement with the outlet opening of the container, and to press the inner walls thereof into sealing engagement with the outlet tube, and means for forcing air into said container to remove the liquid contents thereof.

3. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, an annular air chamber within said body, an outlet tube slidingly engaged centrally of said body and adjustable within said body to extend to a point adjacent the bottom of said container, means for forcing air into said annular air chamber to press the outer walls thereof into sealing engagement with the outlet opening of the container, and to press the inner walls thereof into sealing engagement with the outlet tube, and a tube extending through said body for forcing air into said container to remove the liquid contents thereof.

4. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, an annular air chamber within said body, an outlet tube slidingly engaged centrally of said body and adjustable within said body to extend to a point adjacent the bottom of said container, means for forcing air into said annular air chamber to press the outer walls thereof into sealing engagement with the outlet opening of the container, and to press the inner walls thereof into sealing engagement with the outlet tube, and a tube extending through the walls and air chamber of said body for forcing air into said container to remove the liquid contents thereof.

5. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, said body being of substantially cylindrical form and having an opening through its center from end to end to receive an outlet tube, an annular air chamber formed centrally within said body, a pair of tubes on opposite sides of said center opening and extending through the end walls and through the air chamber of said body, one of said tubes being arranged to provide for the admission of air to the interior of said container and the other tube communicating with the interior of said air chamber to expand said body into sealing contact with said container and with said outlet tube.

6. A combined sealing and emptying device for containers comprising a body adapted to be inserted within the outlet opening of a container above the liquid level thereof, said body being of substantially cylindrical form and having an opening through its center from end to end to receive an outlet tube, an annular air chamber formed centrally within said body, a pair of tubes on opposite sides of said center opening and extending through the end walls and through the air chamber of said body, angular sections at the top of each tube secured to a terminal plate, one of said tubes being arranged to provide for the admission of air to the interior of said container and the other tube communicating with the interior of said air chamber to expand said body into sealing contact with said container and with said outlet tube.

Signed by me this 4th day of April, 1930.

JAMES WILLSON.