April 11, 1967 A. KATELL 3,313,444

COMBINED CONTAINER COVER AND VACUUM PUMP

Filed Nov. 19, 1964 3 Sheets-Sheet 1

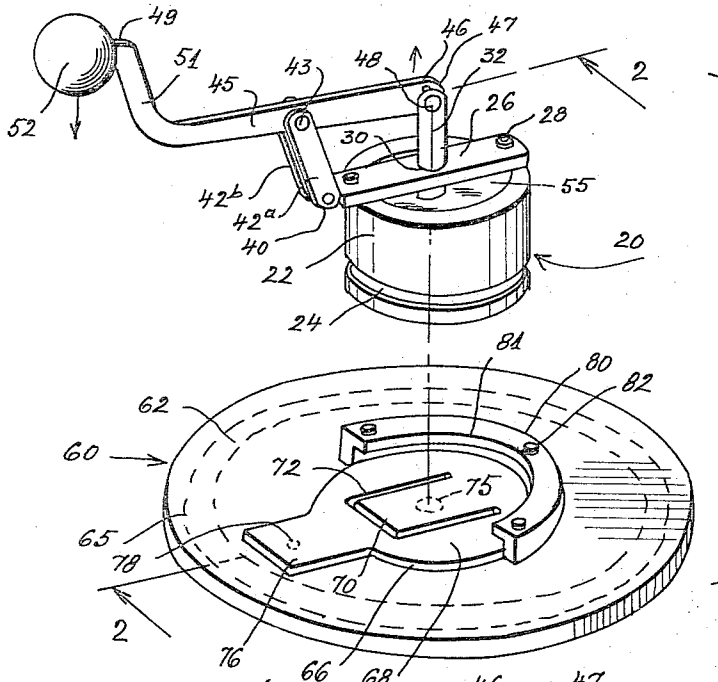


Fig. 1.

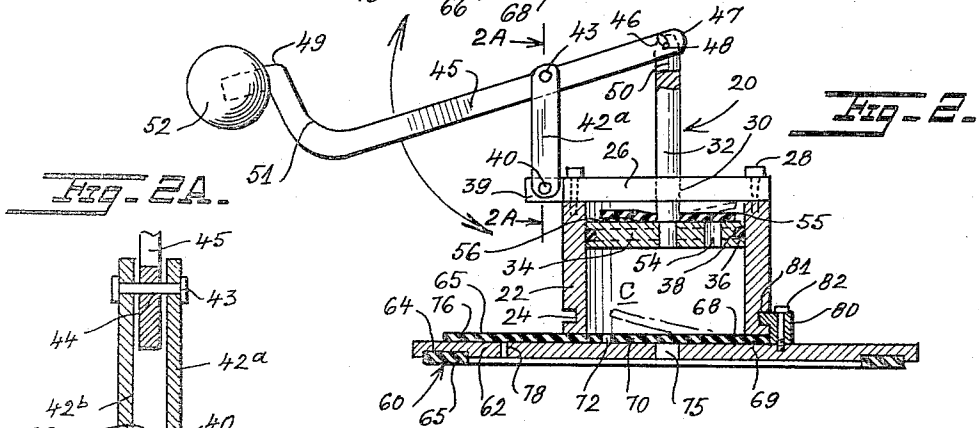


Fig. 2.

Fig. 2A.

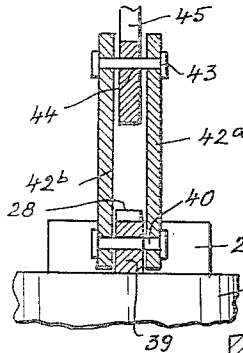
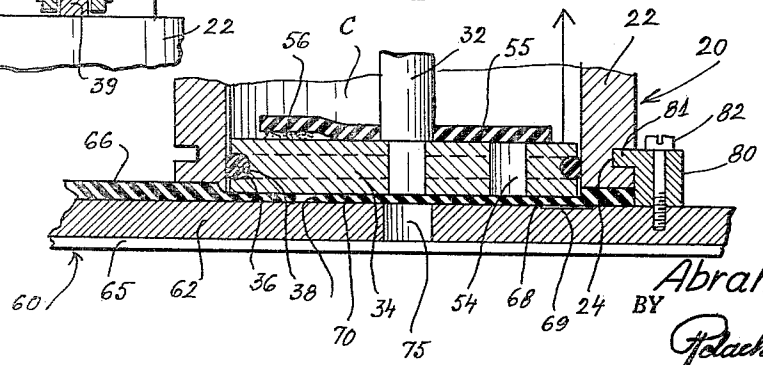


Fig. 3.



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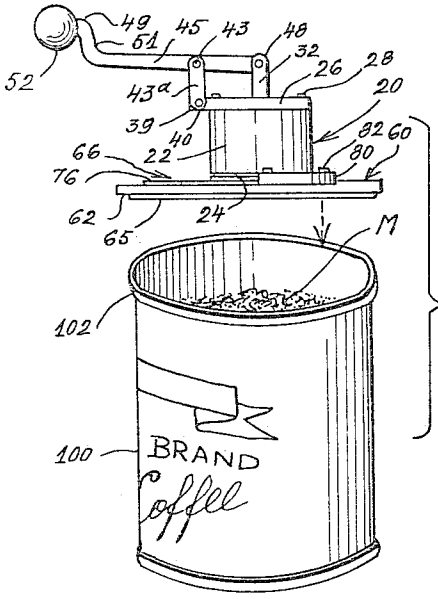

Fig. 4.

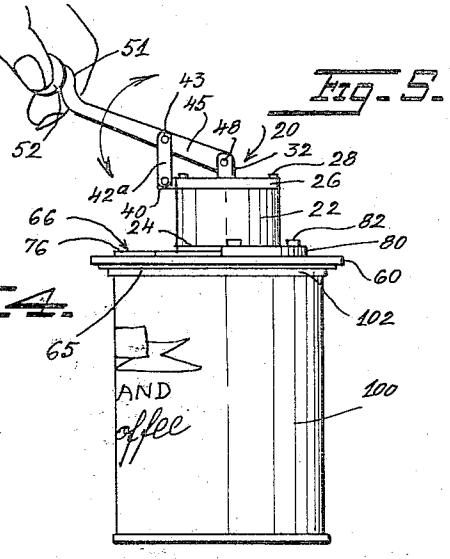

Fig. 5.

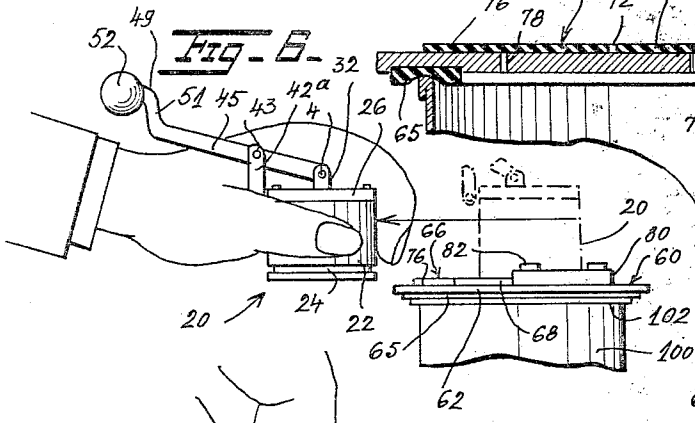

Fig. 6.

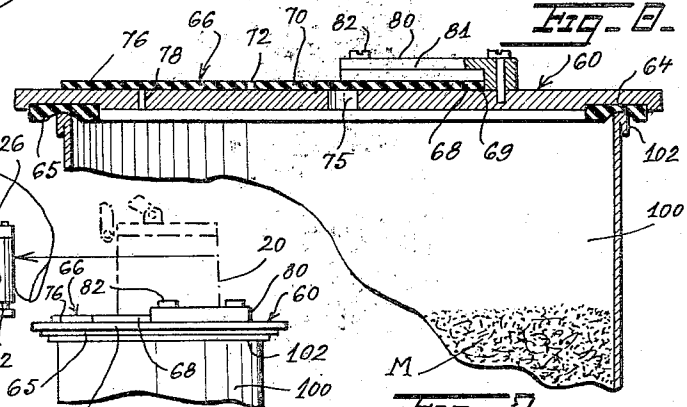

Fig. 8.

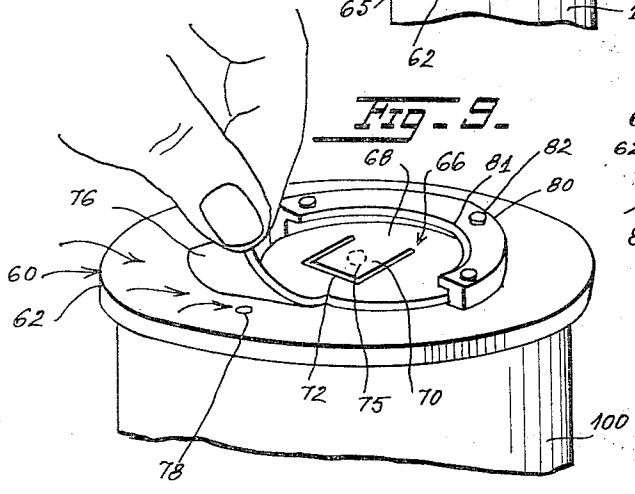

Fig. 9.

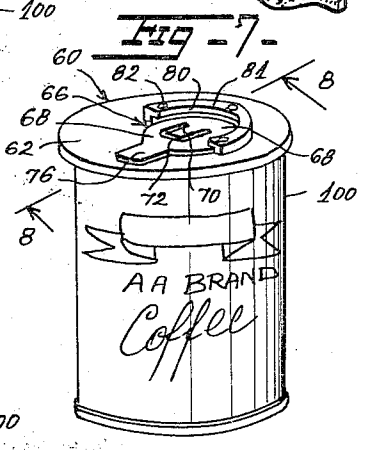

Fig. 7.

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COMBINED CONTAINER COVER AND VACUUM PUMP

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Fig-10.

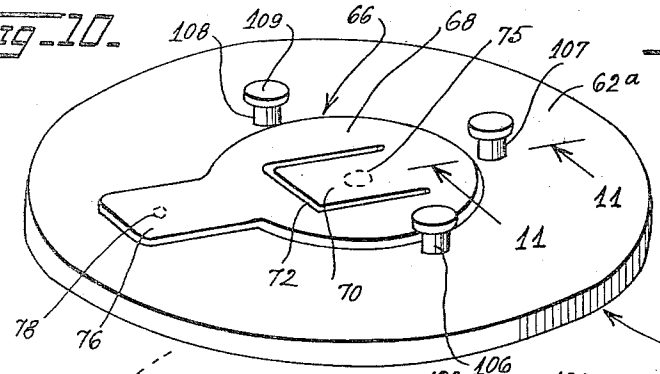


Fig-11.

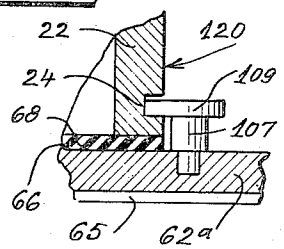


Fig-12.

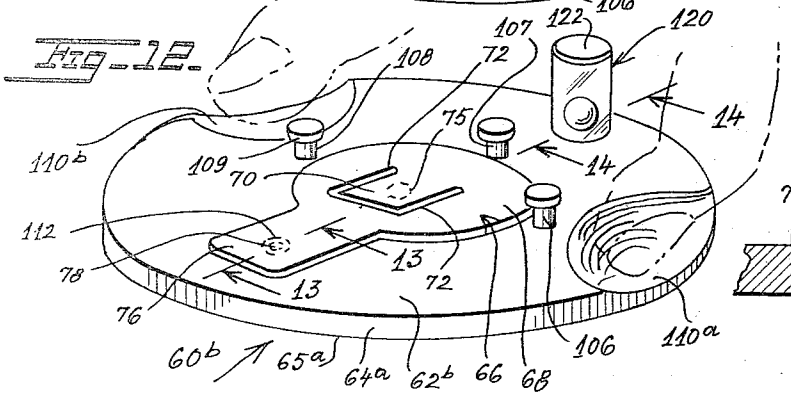


Fig-13.

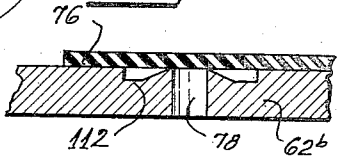


Fig-14.

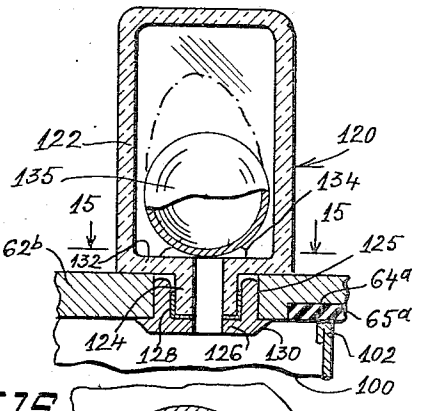


Fig-16.

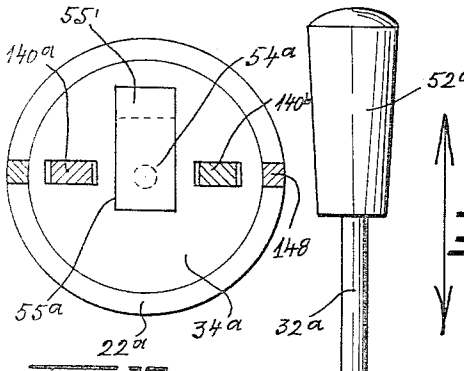


Fig-17.

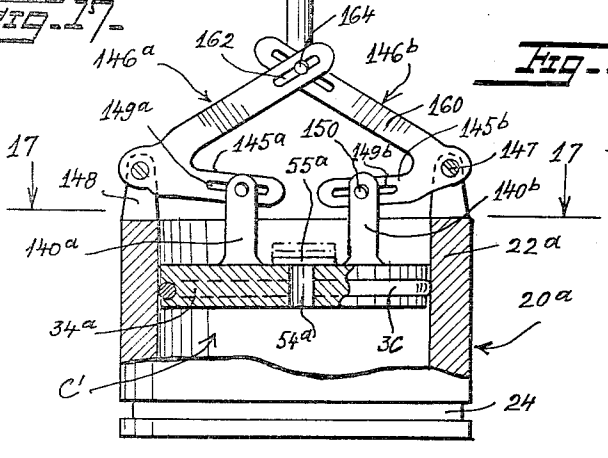
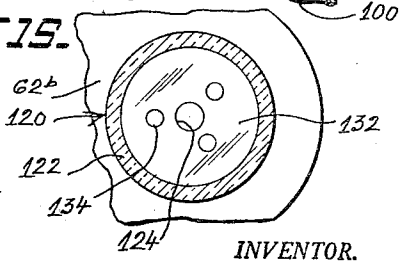


Fig-15.



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3,313,444

COMBINED CONTAINER COVER AND VACUUM PUMP

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Filed Nov. 19, 1964, Ser. No. 412,547
14 Claims. (Cl. 220—44)

This invention concerns a cover and associated detachable pump for application to an opened container to establish and maintain a vacuum in the container.

The invention is particularly applicable to containers, such as cans, jars, and similar containers in which food, paint and other material is stored and best preserved in the absence of air. This device may also be used for small industrial operations requiring vacuum processing.

According to the invention there is provided a substantially flat circular cover which may be applied to the rim of an opened container such as an open can. A vacuum producing manually operable pump is removably mounted on the cover and operated to draw a vacuum in the container. The pump can then be removed and the cover can be left in place on the container sealing it off from the outside air. The cover is provided with a one-way check valve which enables air to be drawn out of the container and which seals the container when the pump is removed. A flexible flap is provided over an aperture in the cover for relieving the vacuum when the cover is to be removed from the container. The cover is provided with a socket structure in which the pump is removably mounted when in place on the cover to draw a vacuum in the container. The cover can be provided with an indicating device which will show visually the vacuum condition in the container.

It is therefore a principal object of the invention to provide a cover for an open container, the cover including valve means to enable evacuation of air from the container, vacuum release means, and means for removably holding a vacuum drawing pump on the cover.

A further object is to provide a cover as described with a manually operable vacuum drawing pump cooperating with the valve means in the cover to draw a vacuum in the container.

Another object is to provide a cover as described, with a vacuum indicator including an auxiliary vacuum chamber in which is an inflatable ball containing air, the chamber communicating with the container through the cover so that the ball expands while a vacuum is being drawn and maintained in the container, to provide a visual indication of a vacuum condition in the container.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings and to the appended claims in which the various noval features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIGURE 1 is an exploded perspective view of a vacuum pump and cover embodying the invention.

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1, the pump being shown mounted on the cover with its piston in elevated position.

FIG. 2A is an enlarged fragmentary sectional view taken on line 2A—2A of FIG. 2.

FIG. 3 is another enlarged fragmentary sectional view of the pump and cover similar to part of FIG. 2, showing the piston in lowered position.

FIG. 4 is an exploded perspective view of an assembled cover and pump, and an associated open cylindrical container.

FIG. 5 is a side view of the pump, cover and container shown in operating position.

FIG. 6 is a further side view of the pump and cover with part of the container, illustrating a further step in operation.

FIG. 7 is a perspective view of the container with cover mounted thereon, sealing a vacuum therein.

FIG. 8 is an enlarged fragmentary sectional view taken on line 8—8 of FIG. 7.

FIG. 9 is an enlarged fragmentary perspective view of the container and cover mounted thereon, showing how the vacuum is relieved in the container.

FIG. 10 is a perspective view of another container cover according to the invention.

FIG. 11 is an enlarged fragmentary sectional view taken on line 11—11 of FIG. 10 and showing part of a vacuum pump mounted on the cover.

FIG. 12 is a perspective view of another container cover.

FIG. 13 and FIG. 14 are fragmentary sectional views taken on lines 13—13 and 14—14 respectively of FIG. 12.

FIG. 15 is a cross sectional view taken on line 15—15 of FIG. 14.

FIG. 16 is a vertical sectional view of part of another vacuum pump.

FIG. 17 is a cross sectional view taken on line 17—17 of FIG. 16.

Referring first to FIGS. 1–6, there is shown a vacuum pump 20. This pump has a cylindrical rigid body on casing 22 open at opposite ends. A circumferential groove 24 is formed in the outer side of body 22 near its bottom end. Extending diametrically across the top end of body 22 is a bar 26 secured in place by bolts 28 anchored in the annular top of body 22. The bar has a central hole 30 and a shaft 32 extends slidably through this hole axially of body 22. The lower end of the shaft is secured in the center of a circular piston 34 movable axially in the hollow body 22. A resilient O-ring 36 is seated in circumferential groove 38 in the periphery of the piston 34 and maintains a hermetic seal between the piston and interior of the body 22. Bar 26 has a narrow finger 39 extending radially outward of the body 22. Pivotally attached to this finger by a pin 40 are two upwardly extending links 42*a*, 42*b*. A cross pin 43 is anchored in the upper ends of the links. This pin extends through a hole 44 through a lever 45 between its opposite ends. Near one end 47 of the lever is another hole 46 through which extends a pin 48 pivotally anchoring this end of the lever in a slot 50 formed at the upper end of shaft 32. At the other end 49 of the lever 45 is a knob or handle 52 which can be grasped for operating the pump. The lever extends radially outwardly of the pump and terminates in an end portion 51 on which knob 52 is mounted.

A hole 54 is provided in piston 34 for passing air therethrough. This hole is spaced radially from shaft 32. A flexible disk 55 overlays the piston and covers hole 54. The disk is not attached to the piston at this point but is secured by cement 56 to the upper side of the piston in an area diametrically opposite from hole 54.

The cover 60 shown in FIGS. 1–9 includes a circular rigid disk 62 formed with a circumferential groove 64 in its underside. A resilient, annular gasket 65 is seated in this groove. On the upper side of the disk 62 is a flexible valve member 66 including a circular portion 68 which is cemented by an adhesive 69 to the top of the disk. A generally rectangular flap 70 is formed in the valve member by a U-shaped slit 72. The flap is hinged to the circular portion 68 at its outer end and is free at its other end. The free end of the flap overlays a hole 75 in the disk. The valve member 66 has a radial extension in the form of another rectangular flap 76 which has a free end that is not attached to the disk 62. This free end of the flap overlays a small hole 78 located

between hole 75 and gasket 65. Extending circumferentially about half way around the valve member 66 is a semi-circular flange ring 80. The ring is secured to the disk 62 by screws or rivets 82. The ring defines a semi-circular groove with the top of disk 62. This serves as a socket for detachably engaging the pump body 22. Horizontal flange 81 extends radially inward of the ring and is spaced from the top of disk 62. This flange engages in groove 24 of the pump body and holds the pump body steady on the disk 62 with the flat bottom end of the pump body pressed down in a hermetic seal with the top of the valve member. The pump body has an external diameter which is no greater than the outside diameter of annular valve portion 68.

In operation of the pump and cover, a cylindrical container 100 shown in FIGS. 4–9 having an open circular end 102 is to be evacuated of air. The container may contain ground coffee or any other material M which is to be subjected to or kept under vacuum in the container. The pump is assembled with the cover by engaging the flange 81 in groove 24. The flange ring 80 thus serves as a socket for removably holding the pump and cover together. The cover is then axially aligned with the top of the container so that the rim or end 102 of the container underlays the annular gasket 65. It will be noted that air is trapped between the piston 34 and the valve member 66 inside the body 22. It is desirable that the underside of gasket 65 be moistened slightly before it is placed down on the rim 102 of the container 100 to insure a hermetic seal thereat. The operator should press the cover down on the top of the axially vertical container with one hand and simultaneously should raise the handle 52 with the other hand. This will lower the piston down to the top of cover 60 and cause the trapped air to be expelled through hole 54 in the piston as the free portion of disk 55 yields and flexes and separates slightly from the piston to permit the air to pass therethrough and out of the pump body. Then the operator will press down on handle 52 which will cause the lever 45 to elevate the piston in the pump body, to the position of FIG. 2. This will cause air from container 100 to enter the pump body through hole 54 in disk 62 as the flap 70 flexes upwardly. The free portion of disk 55 is pressed down on the piston at this time due to higher outside air pressure. Air enters the pump body since it has previously been almost completely exhausted of air when the piston reaches the top of the cover as shown in FIG. 3, so that the air pressure in the container 100 is higher than it is in chamber C in the pump body 22.

After several reciprocatory movements of the pump handle, the air in container 100 will be substantially completely evacuated. The pump 20 can then be removed from cover 60 as shown in FIG. 6 by pulling the pump radially away from the cover and container. The cover will remain attached to the container because the outside air pressure acting on its upper surface presses it down on the container. When it is desired to release the cover from the container the flap 76 may be lifted as shown in FIG. 9 to expose hole 78, whereupon air will enter the container to equalize pressure on both sides thereof. The cover can then be lifted freely off the container. A plurality of similar covers 60 can be provided for sealing a plurality of containers. The same pump can be used with all covers.

It will be noted that successful operation of the device depends on the one-way check valve 70 in the valve member 66 and the other one-way check valve member 55 on the top of the piston. These valve members should be made of tough, durable natural or artificial rubber or flexible plastic material to withstand repeated flexing and high air pressure at the holes 75 and 38 in the disk 62 and piston 34. The gasket 65 should also be made of tough durable resilient material. It should be securely seated in the recess or groove 64 so that it cannot be pushed radially inward of the cover when subjected to atmospheric pressure while there is a vacuum in the container.

In FIGS. 10 and 11 is shown another container cover 60*a* which is similar to cover 60 and corresponding parts are identically numbered. This cover has three posts or pegs 106–108 spaced apart on the disk 62*a* of the cover. The posts have large flanged heads 109. These heads engage in groove 24 of pump body 22 as shown in FIG. 11 and serve as a retaining socket to hold the pump on the cover 60*a*. Posts 106 and 108 are spaced apart at diametrically opposed positions at opposite edge points of valve member 66. Post 107 is located midway between posts 106, 108 at the edge of the valve member 66. This provides a three point engagement for the pump body which is sufficient to hold the pump body and to permit quick release when required.

FIGS. 12 and 13 show another container cover 60*b* which is similar to cover 60*a* and corresponding parts are identically numbered. Diametrically opposed recesses 110*a*, 110*b* are formed in the top of the cover disk 62*b* near its rim for engagement by the operator's fingers to facilitate placement of the finger in proper position on the cover. Gasket 65*a* is seated in a recess 64*a* at the periphery of the cover disk 62*b*. Around holes 75 and 78 in disk 62*b* is an annular recess 112 which serves to catch particles of granulated or powdery material which may be drawn up through the holes when the valve flaps 70 and 76 are flexed upwardly. The narrow annular rim of holes 75 and 78 permit unobstructed seating of the flaps.

A vacuum indicator 120 is provided on the cover 60*b*; see FIGS. 12, 14, 15. This indicator includes a transparent cylindrical housing 122 having a neck 124 engaged in a hole 125 in the disk 62*b* by a flanged ring 126 and a cylindrical gasket 128. The ring 126 has a flange 130 engaged at the underside of the disk 62*b*. The housing has a bottom annular wall 132 connected with neck 124. On wall 132 are projections 134 spaced apart as shown in FIGS. 14 and 15 and supporting an elastic ball 135 above the entrance to neck 124. The ball is filled with air. When air is exhausted from the container 100 and from the housing 122 through the neck 124, the ball 135 expands. The expansion of the ball indicates that the container 100 is under vacuum. When the vacuum is relieved in the container 100, air enters housing 122 and the ball 135 contracts to normal size and spherical shape.

FIGS. 16 and 17 show a pump 20*a* which is similar to pump 20 and corresponding parts are identically numbered. On piston 34*a* of this pump are two posts 140*a*, 140*b* spaced apart diametrically of the piston and with hole 54*a* in the piston disposed therebetween. A flexible valve member 55*a* is secured at one end 55′ to the upper side of the piston and has an unattached end overlapping hole 54*a* to serve as a one-way check valve. Engaged with upper ends of the posts are lower arms 145 and 145*b* of two bell crank levers 146*a*, 146*b*. The levers are pivotable on pins 147 supported on posts 148 extending upwardly of the upper end of the pump body 22*a*. The arms 145*a* and 145*b* respectively have slots 149*a* and 149*b* in which are slidably engaged pins 150 carried by posts 140*a*, 140*b*. Upper arms 160 of the bell crank levers have crossed slots 162 in which is engaged a finger 164 at the lower end of shaft 32*a* having handle 52*a* at its outer end. When the handle 52*a* is moved axially up and down, the piston 34*a* moves axially up and down in the housing 22*a* and air is successively discharged through hole 54*a* from chamber C′ and admitted to the chamber from the container 100 on which the pump will be mounted. The pump can be removably mounted on any of covers 60, 60*a* or 60*b* previously described.

The pump 20*a* may be preferred for some applications where a smaller size pump is required. The pump 20

will be preferred where the advantage of the leverage afforded by the longer lever 45 is required.

The pumps and plates can be made of metal, plastic or other suitable rigid material.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

What is claimed is:

1. A device for drawing and maintaining a vacuum in a container having an open end, comprising a cover adapted to overlie the open end of the container, a sealing gasket at one side of the cover for overlaying and sealing said open end of the container, said cover having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said cover also having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the cover, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole and elevatable by pressure of air passing through the second hole to clear the second hole, and a socket structure on said other side of the cover for removably receiving and holding a vacuum pump.

2. A device for drawing and maintaining a vacuum in a container having an open end, comprising a cover adapted to overlie the open end of the container, a sealing gasket at one side of the cover for overlaying and sealing said open end of the container, said cover having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said cover also having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the cover, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, and a semi-cylindrical flange structure on said other side of the cover for removably receiving and holding a cylindrical body of a vacuum pump.

3. A device for drawing and maintaining a vacuum in an opened container having an open end, comprising a cover adapted to overlie said open end of the container, an annular sealing gasket at one side of the cover for overlaying and sealing said open end of the container, said cover having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said cover also having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the cover, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, and a plurality of spaced posts on said other side of the cover, said posts having flanged heads for removably receiving and holding a cylindrical body of a vacuum pump.

4. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a

second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a socket structure on said other side of the disk for removably receiving and holding a vacuum pump, and a visual indicator of a vacuum condition in the container mounted on said other side of the disk.

5. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a socket structure on said other side of the disk for removably receiving and holding a vacuum pump, and a visual indicator of a vacuum condition in the container mounted on said other side of the disk, said visual indicator including a cylindrical transparent housing, said disk having a third hole therein, said housing being engaged with the disk at said third hole to communicate therethrough with the container when the disk is mounted thereover, an elastic ball in said housing, and projections in said housing elevating said ball above said third hole to provide a clear passageway for air to enter and leave said housing, whereby the ball expands when a vacuum condition exists in said housing and the ball contracts when the vacuum in the housing is relieved.

6. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, and a plurality of spaced posts on said other side of the disk, said posts having flanged heads for removably receiving and holding a cylindrical body of a vacuum pump, said visual indicator including a cylindrical transparent housing, said disk having a third hole therein, said housing being engaged with the disk at said third hole to communicate therethrough with the container when the disk is mounted thereover, an elastic ball in said housing, and projections in said housing elevating said ball above said third hole to provide a clear passageway for air to enter and leave said housing, whereby the ball expands when a vacuum condition exists in said housing and the ball contracts when the vacuum in the housing is relieved, said disk having recesses formed in its other side to facilitate manipulating the cover in mounting and holding it on the container.

7. A device for drawing and maintaining a vacuum in

a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a socket structure on said other side of the disk, a vacuum pump having a cylindrical hollow body removably engaged in said socket structure, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container.

8. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a semi-cylindrical flange structure on said other side of the disk, a vacuum pump having a cylindrical hollow body with a circumferential slot therein detachably engaged with said flange structure, said valve member being circular in form and at least equal in diameter to said hollow body so that the hollow body bears on said valve member, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container.

9. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a plurality of spaced posts on said other side of the disk, said posts having flanged heads, a vacuum pump having a cylindrical hollow body with a circumferential slot therein detachably engaged with the heads of said posts, said valve member being circular in form and at least equal in diameter to said hollow body so that the hollow body bears on said valve member, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container.

10. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a socket structure on said other side of the disk, a vacuum pump having a cylindrical hollow body removably engaged in said socket structure, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the nast named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container, the first named valve member being circular in form and at least equal in diameter to said hollow body so that the hollow body bears on said first valve member.

11. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than the open end of the container to fit thereover in sealing relationship, a first check valve on said disk for admitting air in only one way through the cover from said container, a vacuum pump, means detachably secur-

ing said pump to the cover, said pump including a cylindrical hollow body, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container.

12. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlayilng and sealing the second hole to clear the second hole, a socket structure on said other side of the disk, a vacuum pump having a cylindrical hollow body removably engaged in said socket structure, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container, said lever means including two bell crank levers having two arms pivotally carried by said hollow body, said lever having two arms respectively connected to said piston, and two other arms respectively connected to said shaft.

13. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than said open end of the container, an annular sealing gasket at one side of the disk for overlaying and sealing said open end of the container, said disk having a first hole therein for admitting air therethrough to the container to relieve a vacuum therein, said disk having a second hole spaced from the first hole for passing air therethrough out of the container to draw a vacuum in the container, a flexible valve member having a portion secured to the other side of the disk, said valve member having a first free flexible portion overlaying and sealing the first hole and manually elevatable to clear said first hole, said valve member having a second free flexible portion overlaying and sealing the second hole to clear the second hole, a socket structure on said other side of the disk, a vacuum pump having a cylindrical hollow body removably engaged in said socket structure, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container, said lever means including a single lever pivotally attached at one end to the shaft and hollow body and having another end extending radially away from said hollow body, said handle being attached to said other end of the lever.

14. A device for drawing and maintaining a vacuum in a cylindrical container having an open end, comprising a circular cover including a disk having a diameter larger than the open end of the container, to fit thereover in sealing relationship, a first check valve on said disk for admitting air in only one way through the cover from said container, a vacuum pump, means detachably securing said pump to the cover, said pump including a cylindrical hollow body, a piston coaxial with and inside said hollow body and axially movable therein, a shaft connected to said piston, lever means operatively connected to said shaft and hollow body for moving the piston axially in the hollow body, said piston having an axially extending hole therein, and a flexible check valve member having one portion secured to the piston and having a free portion overlaying the hole in the piston to seal the same from air pressing down on the piston, the last named valve member being elevatable from the hole in the piston to pass air therethrough when the piston is lowered in the hollow body toward the disk on which said hollow body is mounted, and a handle on said lever means for actuating the same repeatedly to draw said vacuum in the container, said lever means including two bell crank levers having two arms pivotally carried by said hollow body, said lever having two arms respectively connected to said piston, and two other arms respectively connected to said shaft.

No references cited.

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