July 27, 1937. D. E. BAXTER 2,087,963

DEVICE FOR EXHAUSTING AIR FROM CONTAINERS

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Fig. 1.

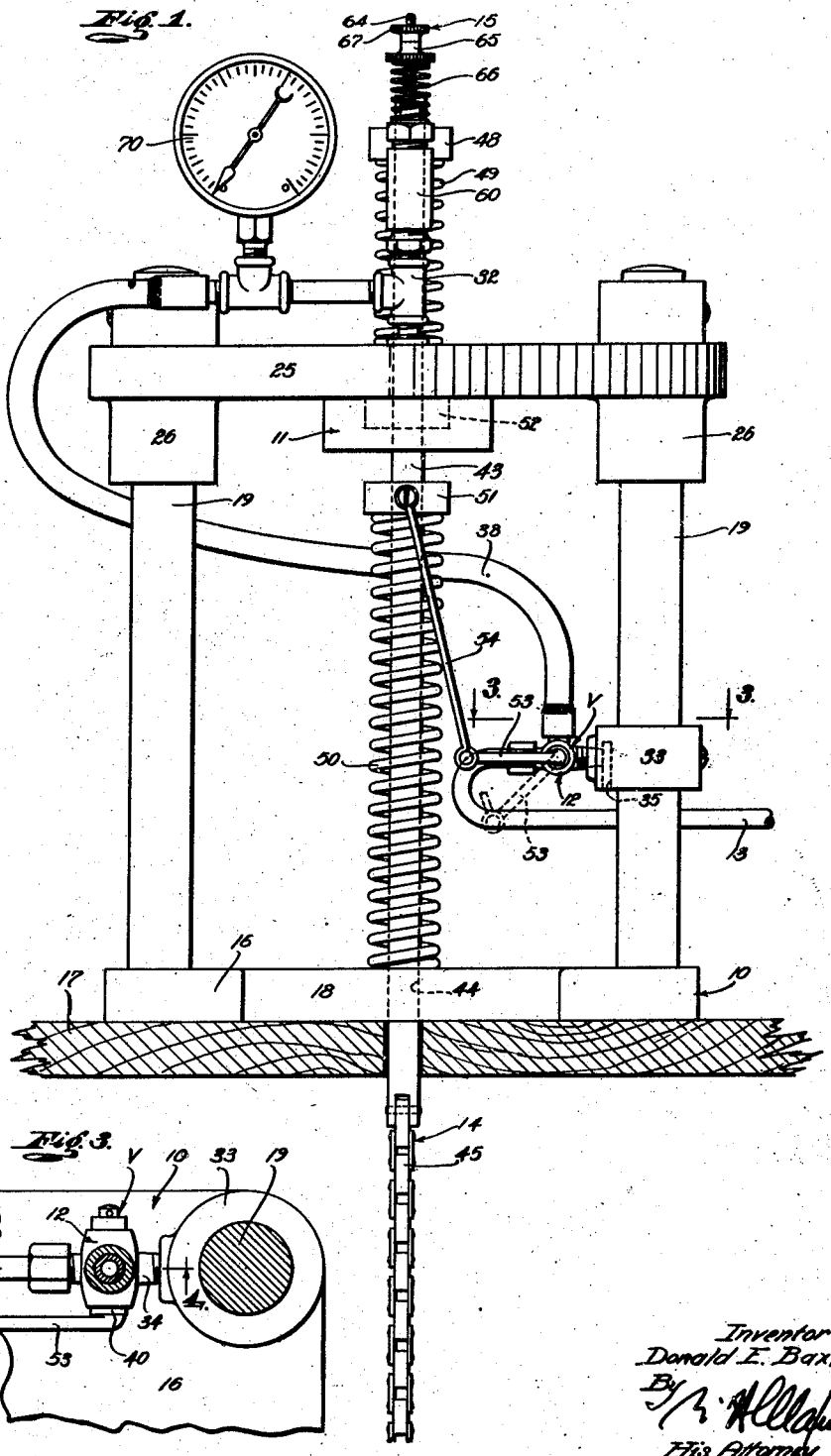


Fig. 3.

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Fig. 2.

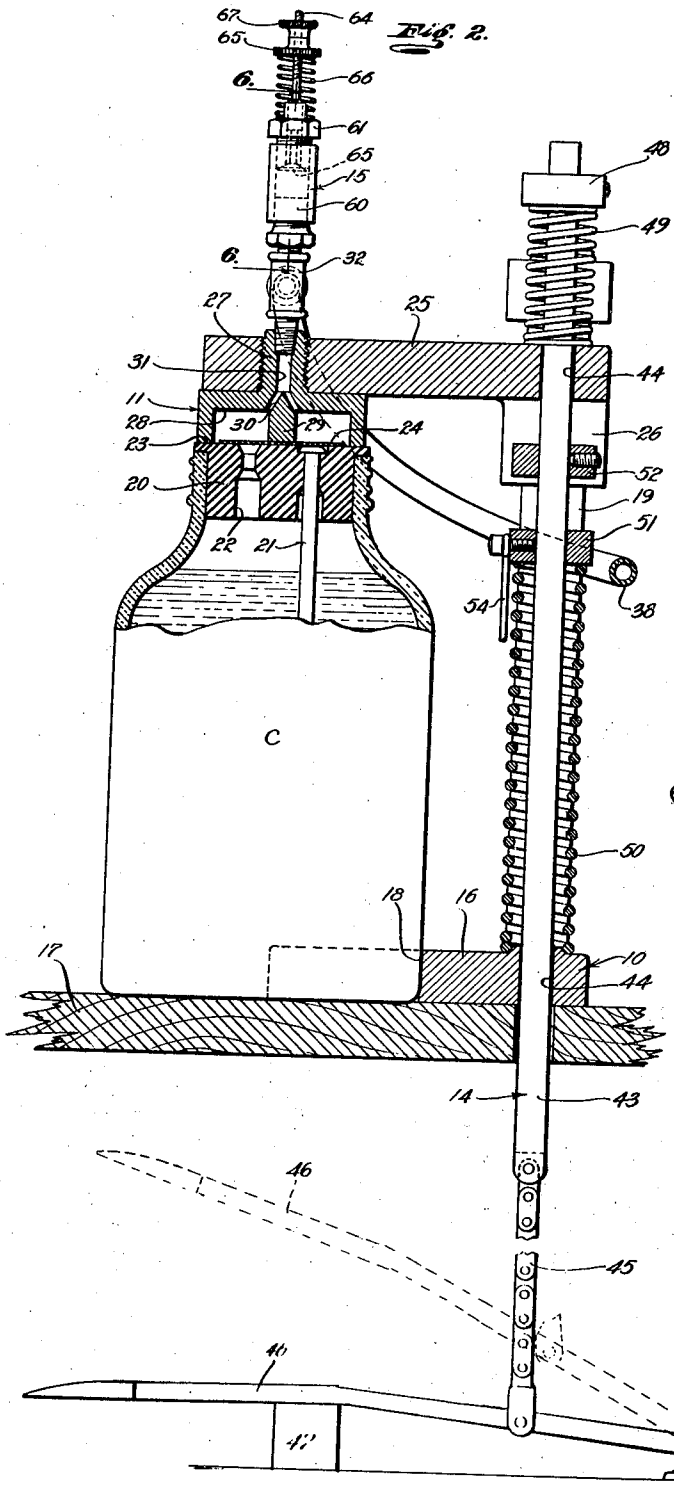


Fig. 4.

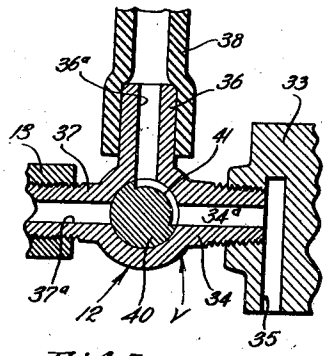


Fig. 5.

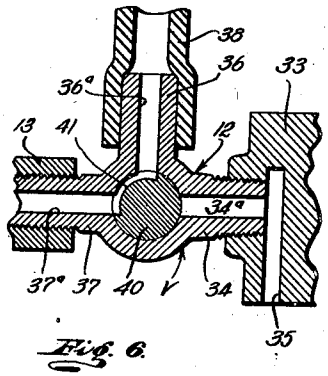
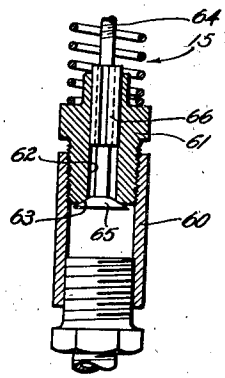


Fig. 6.



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DEVICE FOR EXHAUSTING AIR FROM CONTAINERS

Donald E. Baxter, Los Angeles, Calif., assignor of one per cent to Don Baxter Intra-Venous Products Corporation, a corporation of Delaware

Application October 27, 1933, Serial No. 695,483

13 Claims. (Cl. 99—272)

This invention relates to a device for exhausting air from containers, and it is a general object of the invention to provide a simple, practical and effective device of this character.

In preserving fluids such as intravenous solutions, and the like, it has been found that the fluids may be preserved indefinitely by a process that includes the exhausting of the air from a container holding the fluid, and the sealing of the container. The present invention relates to a device useful in connection with the carrying out of such a process, it being understood that references to this particular use of the invention is not to be considered as a restriction on its scope or application.

It is an object of this invention to provide a device for exhausting air from containers that is particularly easy and convenient to operate.

It is another object of the invention to provide a device for exhausting air from containers that is operable to quickly exhaust the air from a container to create or produce a definite reduced pressure in the container.

It is another object of the invention to provide a device for exhausting the air from containers that indicates the degree of vacuum produced in the containers and that may be regulated to provide any required or suitable rarefication of the air in the containers.

It is another object of the invention to provide a device for exhausting air from containers that does not move or shift the containers dur ng operation so that there is no tendency to spil or slop their contents.

Other objects and features of the invention will be best and fully understood from the following detailed description of a typical form and application of the invention, throughout which description reference is had to the accompanying drawings, in which:

Fig. 1 is a front elevation of the principal parts of the device showing them in the normal or unactuated positions. Fig. 2 is a vertical detailed sectional view of the device illustrating its parts in the operative positions during the exhaustion of air from a container. Fig. 3 is a transverse detailed sectional view taken as indicated by line 3—3 on Fig. 1. Fig. 4 is an enlarged transverse detailed sectional view of the valve taken as indicated by line 4—4 on Fig. 3 showing the valve in a position where the flexible conduit or line is in communication with the atmosphere. Fig. 5 is a view similar to Fig. 4 illustrating the valve in the position where the reduced pressure line is in communication with the member engaging the closure of the container, and Fig. 6 is an enlarged vertical detailed sectional view taken as indicated by line 6—6 on Fig. 2.

The present invention is capable of being embodied in forms for use with containers of various characters and in forms for exhausting air from containers provided with various types of closure or sealing devices. Throughout the following detailed disclosure, I will describe a typical embodiment of the invention for exhausting air from containers provided with sealing or closure means of the character fully described and claimed in my copending application entitled Closure for containers, filed October 27, 1933, Serial Number 695,482.

It is to be understood that the invention is not to be construed as restricted for use on containers having any specific type of closure means, but is to be taken as including any features or modifications that may fall within the scope of the claims.

The device provided by the present invention includes, generally, a frame or body 10, a member 11 shiftably carried by the body 10 and operable to engage the closure of a container C, valve means 12 operable to put the member 11 in communication with a reduced pressure line or vacuum line 13, means 14 for operating the member 11 into engagement with the closure of the container and for operating the valve 12, and means 15 for regulating the vacuum or low pressure drawn on the containers.

The body 10 is provided to carry the various other parts of the device and may be varied in construction and proportions to adapt the device for use in various situations. In the form of the invention illustrated in the drawings, the body 10 includes a base 16 adapted to be arranged or mounted on a suitable horizontal support 17. The base 16 is a simple, horizontally disposed member having a recess 18 in its forward edge for the reception of the container C. The recess 18 is shaped and positioned to properly align the container C with the member 11. The container C is adapted to be placed on the support 17 and positioned with its sides or exterior in engagement with the walls of the recess 18 as illustrated in Fig. 2 of the drawings to have its closure means in position for engagement by the member 11. The body 10 includes two upstanding rods or posts 19 projecting from the base 16. The posts 19 are spaced apart in parallel relation.

The member 11 is shiftably carried by the body 10 to be movable into and out of cooperation with the closure of the container C. Before proceeding with the description of the member 11 I will

briefly describe the closure means provided on the container C as illustrated in the drawings. The closure means of the container C includes a plug 20 of rubber, or the like, tightly fitted in the opening of the container. The plug 20 has two spaced openings one carrying an air inlet tube 21, and the other opening 22 having its end open at the top of the plug for the reception of a discharge tube. The top or outer side 23 of the plug 20 is flat, and the upper portion of the plug seats on the end of the container neck. A valve member and sealing member 24, in the form of a disc of flexible material, is arranged on the top 23 of the plug to normally cover the outer ends of the openings in the plug. The sealing disc 24 is considerably smaller in diameter than the top of the plug 20 so that the top of the plug has an annular exposed portion surrounding the sealing disc. When there is a reduced pressure in the container C, the sealing member 24 is tightly held in its closed operative position by the atmospheric pressure. The member 11 is adapted to cooperate with the plug 20 and is carried by a cross head or carrier 25 for vertical movement into and out of engagement with the plug. The carrier 25 extends between and is vertically movable on the spaced posts 19. The carrier 25 is provided with openings for passing the posts 19 and has projecting guides or bearing bosses 26 for slidably engaging the posts. The carrier 25 may be substantially triangular in plane elevation to have the posts 19 pass through openings adjacent two of its apices. The closure engaging member 11 projects from the under side of the third apex or corner portion of the carrier 25. The member 11 may be attached to the carrier 25 in any practical manner. In the particular embodiment of the invention illustrated in the drawings, the member 11 is provided with a stem or boss 27 screwthreaded through a vertical opening in the carrier 25. In accordance with the invention, the member 11 is recessed in its lower side, being provided with a socket or recess 28. A central boss or projection 29 extends downwardly from the upper wall of the recess 28. The lower end of the member 11 surrounding the recess 28 is flat and is adapted to cooperate with the exposed annular portion of the top 23 of the plug 20. The projection 29 is proportioned so that its lower end is adapted to engage the sealing member 24 at a point between the openings in the plug 20 when the lower end of the member 11 is in pressural engagement with the upper end of the plug. The member 11 is ported, having ports 30 extending from the recess 28 to a longitudinal opening 31 in the boss 27. A fitting 32 in the form of a T is connected with the boss 27 for the purpose to be subsequently described.

The valve means 12 is operable to control the connection or communication of the socket 28 of the member 11 with the reduced pressure line 13. The means 12 includes a valve V attached to or mounted on the body 10. In the typical form of the invention illustrated in the drawings, the valve V is carried by a collar 33 on one of the posts 19. The body of the valve V has a ported or tubular stem 34 threaded into an opening in the collar 33. The passage 34a in the stem 34 connects with a port 35 in the collar 33 which directly communicates with the atmosphere. The body of the valve V has two angularly related tubular projections 36 and 37. The projection 36 is spaced between and substantially normal to the projections 34 and 37. The reduced pressure line 13 is connected with the projection 37 so that the port 37a in the projection forms the reduced pressure port of the valve V. A tube or flexible conduit 38 extends from the projection 36 to the fitting 32 so that the port 36a in the projection 36 is in communication with the recess 28 of the closure engaging member 11. The body of the valve V has an opening carrying a rotatable plug 40. A circumferentially extending recess or port 41 is provided in the plug 40. The port 41 is proportioned so that it is adapted to connect the port 36a with the port 34a or connect the port 36a with the reduced pressure port 37a. The plug 40 is adapted to be turned in the manner to be subsequently described to put the recess 28 in communication with the low pressure port 37a, or the port 34a open to the atmosphere.

The means 14 for operating the member 11 into engagement with the closure plug 20 and for controlling the valve means 12 is a manually actuated means that is operatable to move the member 11 into engagement with the closure plug 20 and to hold it in tight sealing engagement with the closure plug and to then operate the valve V to put the recess 28 in communication with the reduced pressure line 13. The operating means 14 includes a shiftable or longitudinally movable operating stem 43. The stem 43 is slidable in aligned openings 44 in the base 16, and carrier 25 and passes through a suitable opening in the support 17 to project below the support. The stem 43 may be vertical and may be centrally spaced between the posts 19 as illustrated in the drawings. The lower end of the operating stem 43 is connected with a pedal 46 or other equivalent manually operating part. In the particular form of the invention illustrated in the drawings, a chain 45 operatively connects the lower end of the operating stem 43 with a manually depressible pedal 46. The pedal 46 is preferably located to be accessible for operation by the operator handling the containers. A stop 47 may be provided to limit the downward movement of the pedal 46.

A yielding or lost motion connection is provided between the operating stem 45 and the carrier 25. A collar or projecting part 48 is provided on the stem 43 at a point above the carrier 25. A helical spring 49 surrounds the stem 43 and is arranged under compression between the part 48 and the upper side of the carrier 25. Downward movement of the stem 43 is transmitted to the carrier 25 by the spring 49, and when the member 11 is moved downward into engagement with the plug closure 20, the spring 49 is compressible to permit further downward movement of the stem. Means is provided for normally holding the stem 43 and carrier 25 in the "up" or unactuated position to permit the containers to be readily positioned below the member 11. A spring 50 surrounds the stem 43 and is held under compression between the base 16 and a collar 51 on the stem. A stop 52 is provided on the stem 43 and is adapted to engage the carrier 25 to normally hold the carrier in its up position. It will be apparent how the spring 50 is operable to automatically return the carrier 25 to its up position after actuation to allow the container to be positioned under the member 11.

The operating means 14 includes an operative connection between the stem 43 and the valve V. The rotatable plug 40 of the valve V projects from an end of the valve body and carries a lateral projecting lever 53. A link 54 is pivotally connected to the collar 51 and the lever 53 to operatively connect the stem 43 with the plug 40

of the valve. The parts are proportioned and related so that the port 41 in the valve plug is not moved into register with the reduced pressure port 37a until the member 11 has been operated downwardly into tight pressural engagement with the closure plug 20. The return of the stem 43 and carrier 25 to their normal positions by the spring 50 of course results in turning of the plug 40 back to its normal position where its part 40 communicates with the ports 34a and 36a.

The means 15 for regulating the vacuum drawn on the container C is adapted to be set or adjusted to provide for the drawing of any given vacuum or reduced pressure in the container. The means 15 includes a relief valve having a tubular body 60 connected to the fitting 32 to be in communication with the conduit 38 and the recess 28. A cap or plug 61 is threaded into the body part 60 and is provided with a longitudinal opening 62. A valve seat 63 is provided on the lower end of the plug 61 around the opening 62. A valve stem 64 extends through the opening 62 and carries a valve head 65 for cooperating with the seat 63 to normally prevent the entrance of air under atmospheric pressure into the valve body 60. A grooved or fluted guide 66 is provided on the valve stem 64 to slidably operate in the opening 62. A regulating nut 65 is screw-threaded on to the stem 64 at a point spaced from the plug 61, and a spring 66 is arranged under compression between the nut 65 and the plug to normally hold the valve head 65 in its closed position. A suitable lock nut 67 may be provided to set or retain the regulating nut 65 in its adjusted position. It will be apparent how the atmospheric pressure acting on the outer side of the valve head 65 is adapted to overcome the action of the spring 66 and move the valve head to an open position when there is a pre-determined reduced pressure in the recess 28 and container C. The nut 65 may be easily adjusted to suitably regulate the action of the spring 66. A suitably calibrated gage 70 may be connected in the line or conduit 38 to indicate the partial vacuum or reduced pressure in the conduit and recess 28.

It is believed that the operation of the device provided by the present invention will be readily apparent from the foregoing detailed description. The spring 50 normally holds the carrier 25 in a position where the container C may be readily arranged on the support 17 below the member 11. The recess 18 accurately aligns or positions the container below the member 11. Upon the operator depressing the pedal 46, the downward movement imparted to the stem 43 is transmitted to the carrier 25 by the spring 49, causing the member 11 to be moved downwardly into engagement with the top of the closure plug 20. After the member 11 has come into engagement with the closure plug 20, further downward movement of the stem 43 results in, compression of the spring 49, turning of the valve plug 40 and moving of its port 41 into register with the reduced pressure port 37a. Upon the port 41 coming into register with the reduced pressure port 37a, the air is exhausted from the conduit 38 and the recess 28 so that the air under atmospheric pressure in the container C lifts the flexible sealing member 24. This lifting or raising of the sealing member 24 of course attends the exhausting of the air from the container C. The projection 29 of the member 11 engages the sealing member 24 at a point between the openings in the closure plug to prevent displacement of the sealing member. When the proper or desired reduced pressure has been drawn on the container C as indicated by the gage or indicator 70, the pressure may be removed from the pedal 46 to allow the spring 50 to return the stem 43 and carrier 25 to their normal positions. The initial upward movement of the stem 43, while it may relieve some of the compression on the spring 49, does not cause the member 11 to be unseated from the closure plug 20 but results in turning of the valve plug 40 to the position where its port 41 communicates with the port 34a which is open to the atmosphere, thus putting the recess 28 in communication with the atmosphere. The atmospheric pressure admitted to the recess 28 of course tightly forces the sealing member 24 downwardly against the end 23 of the closure plug 20 to effectively seal off the upper ends of the openings in the plug. Further upward movement of the stem 43 by the spring 50 brings the stop 52 into engagement with the carrier 25 and moves the member 11 out of engagement with the closure plug 20. In the event that an excessively low pressure is drawn on the container C when the recess 28 is in communication with the low pressure supply line, the valve head 65 opens under the influence of atmospheric pressure so that the reduced pressure is automatically relieved. It will be apparent how the nut 65 may be suitably adjusted to provide for the desired operation of the relief means or regulating means, and to provide for the drawing of a uniform or equal reduced pressure on a multiplicity of containers successively handled in the device. The device provided by the present invention is particularly simple and inexpensive of manufacture, and greatly facilitates the preservation of fluids held in containers under a vacuum or reduced pressure.

Having described only a typical form and application of my invention, I do not wish to be restricted or limited to the specific form or invention herein described, but desire to reserve to myself any variations or modifications that may be apparent to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A device for exhausting the air from a container having a closure with an opening, said device including, a member movable into engagement with the closure, the member having a recess in its closure engaging surface to register with the opening in the closure, a conduit communicating with the recess, a valve operatable to control the connection of the conduit with a reduced pressure line, operating means for moving the member into engagement with the closure and for operating the valve, and adjustable means for admitting atmospheric pressure to said recess upon the desired reduced pressure being provided in the container.

2. A device for exhausting the air from a container having a closure with an opening, said device including, a member movable into engagement with the closure, the member having a recess in the closure engaging surface to register with the opening in the closure, a conduit communicating with the recess, a valve operatable to control the connection of the conduit with a reduced pressure line, operating means for moving the member into engagement with the closure and for operating the valve, and a normally closed valve operatable to admit atmospheric pressure to the recess.

3. A device for exhausting the air from a con-

tainer having a closure with an opening, said device including, a member movable into engagement with the closure, the member having a recess in its closure-engaging surface to register with the opening in the closure, a conduit communicating with the recess, a valve operable to control the connection of the conduit with a reduced pressure line, operating means for moving the member into engagement with the closure and for operating the valve, and means for admitting atmospheric pressure to said recess upon the desired reduced pressure being provided in the container.

4. A device for exhausting the air from a container equipped with an opening, said device including, a member movable into engagement with the closure, the member having a recess in the closure-engaging surface to register with the opening in the closure, a conduit communicating with the recess, valve means operable to control the connection of the conduit with a reduced pressure line and to control the connection thereof with atmospheric pressure, operating means for moving the member into engagement with the closure and for operating the valve, and means for operating said valve means for first disconnecting said conduit with said reduced pressure line and immediately thereafter connecting said conduit with atmospheric pressure.

5. A device for exhausting the air from a container having a closure with at least two openings therein, said device including, a member movable toward said container to provide a sealed chamber about the closure thereof, a flexible seal extending over said openings, a projection carried by said member and adapted to press said flexible seal against said closure at a point between said openings when said member is moved toward said closure, and valve means for putting said chamber in communication with a reduced pressure line.

6. A device for exhausting the air from a container having a closure with at least two openings, said device including a member movable toward said container to provide therewith a sealed chamber about said closure, a flexible seal extending over said openings, a projecting device carried by said member and adapted to press said flexible seal against said closure when said member is moved toward said container, and valve means for putting said chamber in communication with a reduced pressure line.

7. In combination with a container having an opening therein, a closure for said opening, said closure being provided with two openings therethrough, and a flexible sealing member engaging the outer face of said closure and extending over said openings, a fitting provided with a recess adapted to extend over said closure and about said sealing member, means placing the interior of said recessed fitting in communication with a reduced-pressure conduit, and means carried by said fitting for locking a portion of said sealing member directly against said closure.

8. The combination of claim 7, characterized in that said locking means comprises an abutment engaging said flexible sealing member at a point between the two openings of said closure.

9. In combination with a container having an opening therein, a closure for said opening, said closure being provided with two openings therethrough, a flexible sealing member engaging the outer face of said closure and extending over said openings, a fitting having a recess adapted to extend over said closure and about said sealing member, means carried by said fitting and engaging a portion of said flexible member, and means for alternately subjecting the interior of said fitting to sub-atmospheric and atmospheric pressures.

10. A device for exhausting the air from a container having a closure with an opening, said device including, a member movable toward said closure to provide a reduced-pressure chamber about said closure, a conduit communicating with said chamber, a valve operable to control the connection of said chamber with a reduced pressure line, operating means for moving the member toward said closure and for operating said valve, and a normally closed valve operable to admit atmospheric pressure to said chamber.

11. Apparatus for evacuating a container, the container having an opening therein and a closure for said opening, said closure being provided with two openings, the container also having a flexible sealing member engaging the outer face of said closure and extending over said openings, said evacuating apparatus comprising: a fitting provided with a recess adapted to extend over said closure and to provide an air-tight chamber about said closure and sealing member, means placing the interior of said recessed fitting in communication with a reduced-pressure conduit, and means carried by said fitting for releasably locking the central portion of said sealing member directly against said closure.

12. The apparatus of claim 11, characterized in that said locking means comprises an abutment adapted to engage the central portion of said flexible sealing member and to lock it against said closure at a point between the two openings of said closure.

13. Apparatus for evacuating a container, the container having an opening therein and a closure for said opening, said closure being provided with a plurality of openings spaced apart, the container having also a flexible sealing member engaging the outer face of said closure and extending over said openings, said evacuating apparatus comprising: a fitting provided with a recess adapted to extend over said closure and to provide an air-tight chamber about said closure and sealing member, means for placing the interior of said recessed fitting in communication with a reduced-pressure conduit, and means carried by said fitting for releasably locking a portion of said sealing member between at least two of said openings directly against said closure.

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