March 1, 1966 H. S. ROTHENBERG 3,237,638

CLOSURE-SEAL

Filed Dec. 28, 1964

Fig. 1.

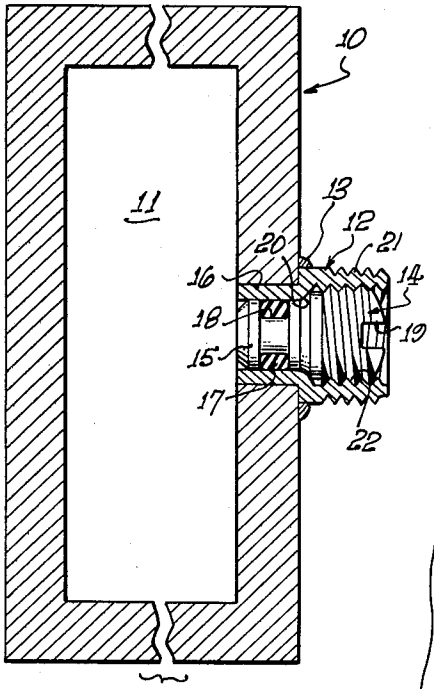
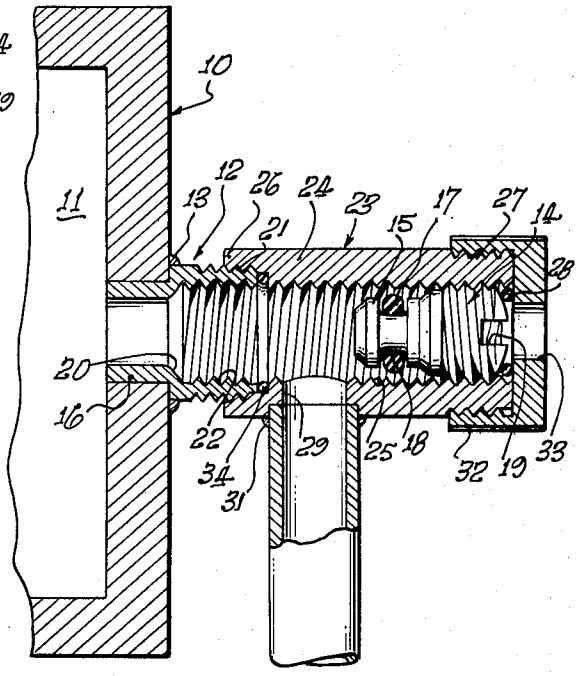


Fig. 2.



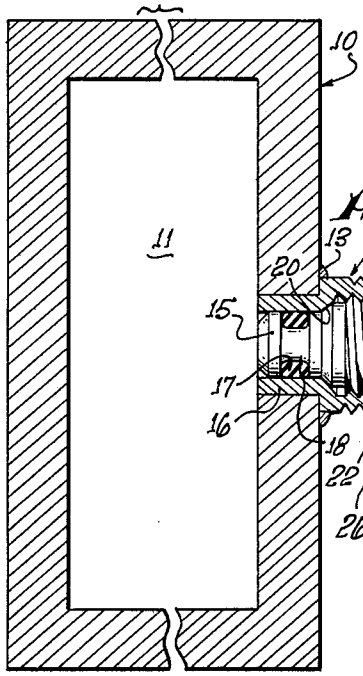
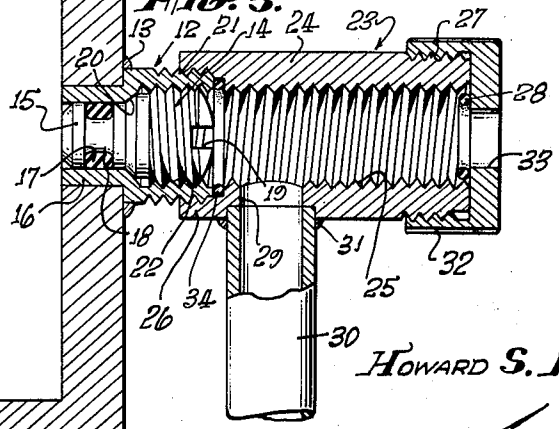


Fig. 3.



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CLOSURE-SEAL

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This invention relates to removable closure means for sealing openings and a method for installation of same; and more particularly to removable closure-seal means for chambers which are sequentially evacuated and pressurized and to a method of installation thereof.

It is well known in the art that there are many problems which arise when it is desired to provide a closure-sealing means in a container opening that can be removed and replaced without damage thereto or without loss or contamination of the media within the container. This problem is increased where containers are required to be vacuum evacuated, back filled, and maintained at the back filled pressure.

Therefore, it is an object of this invention to provide a closure-sealing means and a method of installing same.

Another object of the invention is to provide a closure-seal and a method of removing and replacing same.

Another object of the invention is to provide a closure-seal member for a container and the method of removing and replacing same whereby the container can be vacuum evacuated and back filled.

Another object of the invention is to provide a closure-seal means for a container which is required to be evacuated and filled and to provide apparatus for removing and replacing the closure and seal means without contamination thereof.

Other objects of the invention will become readily apparent from the following description and accompanying drawings wherein:

FIG. 1 is a view partially in cross-section of an embodiment of the closure-seal member of the invention as installed in a container according to the inventive method;

FIG. 2 is a view partially in cross-section showing apparatus for carrying out the method and with the closure-seal member positioned for evacuating or filling the container; and

FIG. 3 is a view similar to FIG. 2 but showing the closure-seal member positioned for sealing the container.

The invention relates to an evacuating stem arrangement for a container, the arrangement including an internally threaded adapter disposed in an evacuating opening in the wall of a container. An externally threaded closure or plug having an O-ring packing or seal is threadedly disposed within the adapter. A tubular evacuating stem is temporarily threadedly attached to the adapter the stem including internal threads forming a continuation of the adapter threads, and further including a side opening for communicating with an evacuation pump. In operation, the closure or plug is turned back by unscrewing same within the adapter and stem until the stem side opening is exposed. This allows the container to be evacuated through the communicating openings and back filled, if desired, after which the plug or closure is reseated in the adapter to seal the container, and the stem is removed to leave only the adapter and plug in the container wall.

Referring now to the drawings, FIG. 1 shows a container **10** defining a vacuum tight chamber **11** with an insert **12** bonded or otherwise fixed to container **10** by material **13** to provide a vacuum tight seal therebetween. Insert **12** is provided with internal threads at one end to receive a threaded plug or closure member **14**. Plug **14** includes a reduced diameter portion **15** which is adapted to fit within a reduced diameter portion **16** of insert **12**. A sealing member such as O-ring **17** is positioned in a groove **18** in reduced diameter portion **15** of plug **14** and forms a vacuum tight seal with the portion **16** of insert **12**. Plug **14** additionally includes a slot **19** in one end thereof by which the plug may be rotated. A sealant, such as vacuum wax, glyptol, etc., if desired, may be used to seal plug **14** to insert **12** for preventing the plug from working its way out of insert **12** due to vibrating, etc. Insert **12** is provided with an internal tapered portion or seat **20** interconnecting portion **16** and the larger diameter portion thereof. The larger diameter portion contains external threads **21** and internal threads **22** which cooperate with a coupler tool **23**. Although insert **12** has been shown as being bonded or welded to container **10**, it may be threaded into the aperture in the container and sealed by appropriate material to provide a vacuum seal therebetween.

Coupler tool **23** illustrates an embodiment of a device for inserting and/or withdrawing plug **14**. Various other configurations may be used which, for example, include an apparatus adapted to be mounted on the container for support during container evacuation operation and which is readily disassembled.

As shown in FIGS. 2 and 3, coupler tool **23** comprises a tubular body **24** having a longitudinally extending threaded aperture **25** adapted to align with the internal threads **22** of insert **12**; an internally threaded end portion **26** of larger internal diameter than threaded aperture **25** adapted to cooperate with external threads **21** of insert **12**; an externally threaded end portion **27**; and a portion in the end of body **24** adapted to receive an O-ring type seal **28**. A passage **29** is located in tubular body **24** which interconnects aperture **25** with a vacuum/back fill tube **30** which is shown attached to body **24** by a vacuum tight seal effected as by welding indicated at **31**, or by other conventional methods. A knurled nut **32** is threadedly attached to the external threaded portion **27** of tubular body **24** and abuts O-ring **28** to form a seal therebetween. Nut **32** is provided with an aperture **33** through which a tool is extended to engage slot **19** of plug **14** for moving plug **14** with respect to insert **12** and tubular body **24**. An O-ring sealing member **34** is positioned between insert **12** and tubular body **24** to provide a seal therebetween.

In operation, with the plug **14** positioned in insert **12**, and with the sealant material, if utilized, removed, coupler tool **23** is attached to plug **14** via threaded portions **21** and **26** as shown in FIG. 3, and tube **30** is connected to the vacuum/back fill equipment (not shown) but well known in the art. A tool such as a screw driver is inserted through aperture **33** of nut **32** and aperture **25** of body **24** and fits into slot **19** of plug **14**. Turning motion of the tool retracts plug **14** along threaded aperture **25** until the head portion thereof abuts O-ring **28** thus providing a vacuum tight seal and interconnecting chamber **11** of container **10** with vacuum/back fill tube **30** as shown in FIG. 2. The chamber **11** may then be evacuated as desired and back filled if desired to a pressure equal to or greater than ambient. If it is desired to retain chamber **11** under vacum conditions, plug **14** is turned inwardly by the tool while the evacuating equipment is operating whereby O-ring **17** forms a vacuum tight seal against the internal surface of the reduced diameter portion **16** of insert **12** as shown in FIG. 3. If it is desired to back fill the chamber **11**, the plug **14** is turned inwardly while maintaining the back fill pressure whereby O-ring seats against portion **16** of insert **12** thereby retaining the desired pressure within chamber **11**. With plug **14** seated in insert **12**, the tube **30** is disconnected from the vacuum/back fill equipment and coupler tool **23** is disconnected from

insert 12 thus leaving the closure-seal member inserted in container 10 as shown in FIG. 1. Note that the internal configuration (taper 20) of insert 12 assists in the compression and seating of O-ring 17 within the reduced diameter portion 16 of the insert.

It has thus been shown that the present invention provides a simple yet effective closure-seal means for a container which can readily be connected to a vacuum/back fill apparatus without loss or contamination of the material going into or out of the container.

While a specific embodiment of the closure-seal member and tool for the installation and/or removal thereof has been illustrated and described, modifications will become apparent to those skilled in the art, and it is intended to cover in the appended claims all such modifications as come within the true spirit and scope of the invention.

What I claim is:

1. Mechanism for removably sealing a container comprising: an insert member having two portions of different diameters, the first of said two portions being provided with at least internal threads, the second of said two portions being adapted to be mounted in an associated container; a closure means having a threaded head portion adapted to movably cooperate with the internal threads of said first portion of said insert member, and a reduced diameter portion adapted to move within said second portion of said insert member, said reduced diameter portion of said closure means including a groove therein, and means adapted for moving said closure means; and a seal member positioned in said groove and adapted to cooperate with said second portion of said insert member for forming a seal therebetween.

2. The mechanism defined in claim 1, additionally including removable apparatus for removing or installing said closure means, said apparatus including a body member having an internally threaded passageway adapted to define an extension of said internal threads of said first portion of said insert member; means for retaining the internally threaded passageway of said body member aligned with the internal threads of said

insert member; means for providing a seal between said insert member and said body member; said body member being provided with a passage intermediate the ends thereof and interconnecting said threaded passageway with the exterior of said body member; whereby said closure means may be moved through said internally threaded passageway of said body member so as to connect or disconnect a flow path between said second portion of said insert member and said passage in said body member.

3. The mechanism defined in claim 2, additionally including means for sealing said internally threaded passageway when said closure means is positioned so as to connect the flow path between said insert member and said body member passage.

4. The mechanism defined in claim 2, additionally including means operatively connected to said passage and adapted to be connected to vacuum/back fill equipment for evacuating and/or back filling an associated container connected to the insert member.

References Cited by the Examiner

UNITED STATES PATENTS

1,631,564	6/1927	Raalte	251—216
2,606,704	8/1952	Nichols	141—66

References Cited by the Applicant

UNITED STATES PATENTS

29,582	8/1860	Gill.
439,249	10/1890	Michaux.
535,199	3/1895	Fowler.
1,422,342	7/1922	Darling et al.
1,748,665	2/1930	Woods.
1,798,491	3/1931	Perry.
3,055,537	9/1962	Watts.
3,109,552	11/1963	Miller.

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