Dec. 1, 1942. H. SCHERBAK 2,303,766

VACUUM SEALING DEVICE

Filed Aug. 19, 1939

Fig. 4



Fig. 3

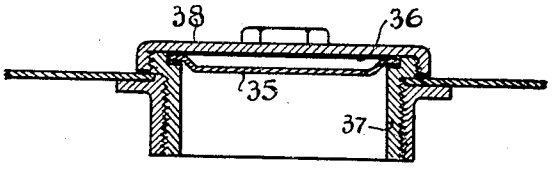


Fig. 5

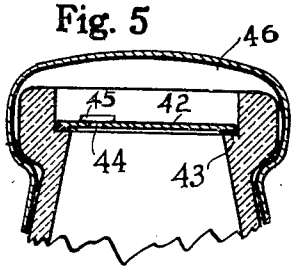


Fig. 6

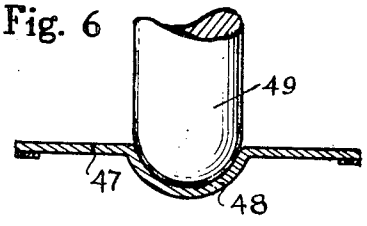


Fig. 1

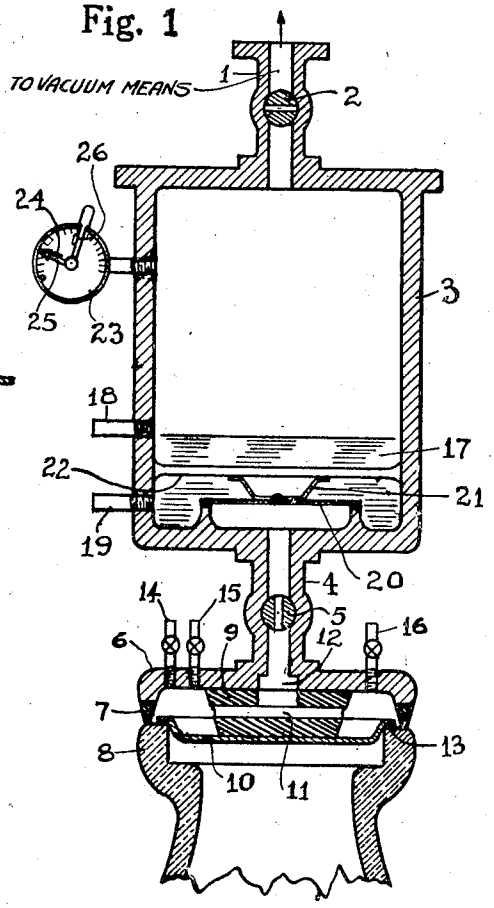
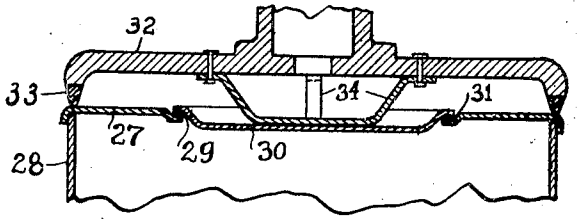


Fig. 2



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VACUUM SEALING DEVICE

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5 Claims. (Cl. 226—82)

The object of the invention is a vacuum sealing device for containers, in which goods, as e. g. foodstuffs, are to be preserved.

The device comprises, in combination, a container for the goods to be sealed, an opening in the wall of said container, a lid adapted to close said opening hermetically under the influence of the atmospheric air pressure, and a suction head so proportioned as to be adapted to be attached directly to said container over said opening and said lid.

It is a feature of the invention that said suction head comprises, in addition to yielding means adapted to exert pressure upon said container, other yielding means adapted to exert pressure upon said lid.

A more important feature, however, of the invention is an automatically controlled evacuation valve repeatedly and rapidly opened for the evacuation of each container, whereby, with use of one or more evacuation tanks, the very desirable "jerky" evacuation is obtained, obtainable before this invention only by direct action of reciprocating evacuation pumps.

Other features and purposes of the invention will become apparent from the following specification in connection with the annexed drawing in which:

Fig. 1 is a vertical section, through the characteristic part of a device for sealing milk bottles;

Fig. 2 is a vertical section through the lower part of a device for sealing cans;

Fig. 3 is a vertical section through a screw closure for a barrel provided, in addition, with a vacuum closure;

Fig. 4 is a partial vertical section through a modified form of lid;

Fig. 5 is a vertical section through the upper part of a milk bottle provided with a modified form of closure;

Fig. 6 is a vertical section through a further modification of the lid.

From a main vacuum tank, not shown, a pipe 1, provided with a valve 2, leads to an intermediate vacuum tank 3, of limited volume. From this tank a pipe 4, provided with a valve 5, leads to a suction head 6. This head has the form of a cap provided with a yielding rim or gasket 7 of rubber so proportioned as to be adapted to seal the head 6 hermetically on the milk bottle 8 or the like if pressed thereagainst.

The head 6 is provided with a second yielding means in the form of a rubber block 9 adapted to exert yielding pressure upon the closure lid 10 of the bottle 8 when the gasket 7 is pressed against said bottle as described.

In this way two different yielding pressures are exerted at two places of the container.

The rubber block 9 is traversed by suction channels 11, 12 connecting the inner space of the head 6 with the pipe 4. This not only is the simplest way of connection, avoiding expensive provision of channels in metal parts, but also increases the elasticity of the block 9.

The lid 10, consisting e. g. of aluminum or the like, is at its outer edge provided with an adhesively secured narrow annular lining 13 of a softer packing material like rubber. It has been found that a simple coating of rubber solution, latex or rubber paint is completely satisfactory. For the "jerky" and/or vibratory evacuation aimed at by the inventor it is very important to avoid separate loose gaskets like rubber rings which would be subjected to a strong danger of becoming dislodged during this kind of evacuation.

The head 6 in accordance with the invention is provided with valved connections 14, 15, 16 for the introduction of a chemical disinfectant, a sterilizing agent like superheated steam or hot air and other air respectively. The air introduced through 16 may be sterilized for avoiding contamination as much as possible.

In the intermediate tank 3 a liquid seal 17 is maintained preventing contamination. Pipe connections 18, 19 are provided for keeping the liquid in circulation and facilitating the sterilization thereof. The liquid may also be used for recovering any valuable substance evacuated from the bottles 8. This may be important in the event of sealing, in the latter, chemicals or the like.

The liquid seal is separated from the pipe 4 by a disk check valve 20 loaded by one or more U-shaped leaf springs 21 abutting against one or more cross beams 22 of the tank 3. It is important that the area of this valve is very large and its peripheral passage channel, consequently, very extended so that the valve opens only a minimum amount during each evacuation period and responds to the slightest changes of pressure.

The tank 3 is provided with a vacuum meter or vacuum gauge 23 used for controlling the operation of the valves 2 and 5. This, for the sake of simplification, is indicated merely by an electric contact 24, secured to the pointer 25 of the gauge, and by an adjustable contact 26 adapted to cooperate therewith.

The device functions as follows:

By one and the same operation the filled bottle is pressed against the yielding gasket rim 7 and the lid 10 against the yielding rubber block 9. The valve 5, at this time, is closed and the valve 2 is open so that a vacuum is produced in the relatively small tank 3. Now, by means not shown, the valve 2 is closed and the valve 5 is rapidly opened. This situation is shown in Fig. 1. Thereupon the vacuum in the tank 3 opens the check valve 20 and the lid 10, acting as a check valve because of its elasticity and because

of the elastic block 9, for a minimal amount and with a sharp and sudden jerk evacuating partly the contents of the bottle 8.

In the next moment the valve 5 is closed and the valve 2 opened restoring the vacuum in the tank 3.

This action is repeated until the vacuum in the tank 3 and in the bottle 8 have reached the predetermined degree, when the contact 24 engages the contact 26 and, by means which need not be shown, terminates the actuation of the valves 2 and 5 and opens the vent 16. The pressure of the atmospheric air entering now the head 6 keeps the lid 10 closed like a check valve and permits an easy separation of the now hermetically sealed bottle 8 from the head 6.

The speed of movement of the valve 5 and, if desired, of the valve 2 is adjustable by any means, not shown, in accordance with the desired jerk, buffer function, and vacuum.

The relative location, in the direction of pressure, of the pressure exerting surfaces of the yielding means 7 and 9, and thereby the pressure of the block 9 against the lid 10, is adjustable by any means, not shown. The simplest way would be by shims regulating the height of the block 9.

For sealing cans by the new device it would not be advisable to use the whole bottom of the can as a lid.

Consequently the inventor, as shown in Fig. 2, provides the bottom 27 of the can 28 with a relatively small opening 29 for evacuation. This opening is covered by the lid 30 having an attached gasket 31 as described.

It has ben found, surprisingly, that the height and shape of the cans 28 is uniform enough to make posible, at the periphery of the can, a leakproof connection between the latter and a correspondingly large suction head 32 by means of an ordinary flat-sealed rubber gasket 33 instead of the formerly used rubber sleeve packings which are very inconvenient in operation. For securing a still more reliable hermetic contact a gasket may be applied or attached to the can too.

According to Fig. 2 the head 32 is provided with U-shaped leaf springs 34, arranged crosswise, instead of a rubber block. These springs consist of stainless steel or other material having a corrosion-proof surface like rubber.

Fig. 3 shows a vacuum seal lid 35 combined, as an additional safety device against tampering and leakage, with a screw cap barrel closure. The lid 35 closes the opening 36 of the screw bushing 37 which opening is closed also by the screw cap 38.

Fig. 4 shows a lid 39 provided with an annular recess 40 into which the annular packing 41 is embedded.

In Fig. 5 is shown a modification of the seal in which the sealing disc 42, instead of being seated upon the outer front edge of the bottle, is seated upon the inner shoulder 43. The disc 42 is provided with a small aperture 44 sealed adhesively by a patch 45 of parchment or the like. For opening the bottle for use of its contents the patch 45 can be easily scratched off or perforated for admission of the atmospheric air into the bottle. A known cap 46 of parchment or the like covers the head of the bottle.

In Fig. 6 the lid 47, for increasing its elasticity, is provided with a central recess 48 engaged by the pressure member 49 of the machine. This arrangement also acts as a centering device.

The described evacuation by numerous small jerks, besides permitting accurate regulation, is very important for avoiding the dangers of dislocation of the lids, soiling of the sealing surfaces by particles sucked off from the contents of the containers and back leakage of air into the containers. These dangers are unavoidable in one-stroke evacuation causing excessive lifting of the lids and high velocity of the air currents.

The invention described in connection with Fig. 1, providing the lid on the outermost mouth edge of the milk bottle, makes unnecessary the expensive and undesirable formation, at the mouth of milk bottles, of the usual recess and inner shoulder necessary for the usual cardboard sealing disc. Such recess and shoulder have been shown in Fig. 1 for characterizing the container as a milk bottle.

Containers sealed in accordance with this invention may be used in hospitals etc. for preserving in sterile condition instruments, bandaging materials and chemicals. For such purposes the containers may be provided with suitable internal supports, subdivisions and equipments.

What I claim is:

1. A vacuum sealing device, comprising, in combination, a source of vacuum, a suction head adapted to air-tight contact with a container to be evacuated, a small tank arranged close to said head, in a conduit between said head and said source, a liquid seal in said tank in series with said head and source for the evacuation of air through said liquid seal, and a check valve arranged in said liquid seal for the evacuation of air through said head and said valve.

2. A vacuum sealing device as claimed in claim 1, said valve consisting of a stiff elastic diaphragm.

3. A vacuum sealing device as claimed in claim 1, said valve consisting of a stiff elastic diaphragm loaded in the central zone.

4. A vacuum sealing device, comprising, in combination, a source of vacuum, a suction head adapted to airtight contact with a container to be evacuated, a small tank arranged close to said head in a conduit between said head and said source, a liquid seal in said tank in series with said head and source for the evacuation of air through said liquid seal, a check valve in said liquid seal, a control valve in said conduit between said source and said check valve, and a second control valve in said conduit between said check valve and said head.

5. A vacuum sealing device comprising, in combination, a source of vacuum, a suction head adapted to airtight contact with a container to be evacuated, a small tank arranged close to said head in a conduit between said head and said source, a liquid seal in said tank in series with said head and source for the evacuation of air through said liquid seal, a check valve in said liquid seal, said valve consisting of a stiff elastic diaphragm elastically loaded in the central zone, a control valve in said conduit between said source and said check valve, and a second control valve in said conduit between said check valve and said head.

HERMANN SCHERBAK.