

Nov. 6, 1945.

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2,388,375

METHOD OF MAKING CLOSURE MEMBERS

Filed Oct. 29, 1943

2 Sheets-Sheet 1

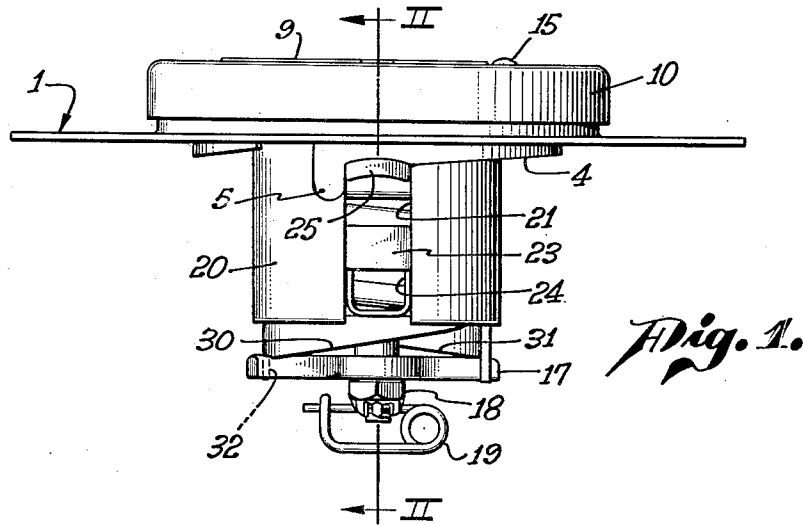


Fig. 1.

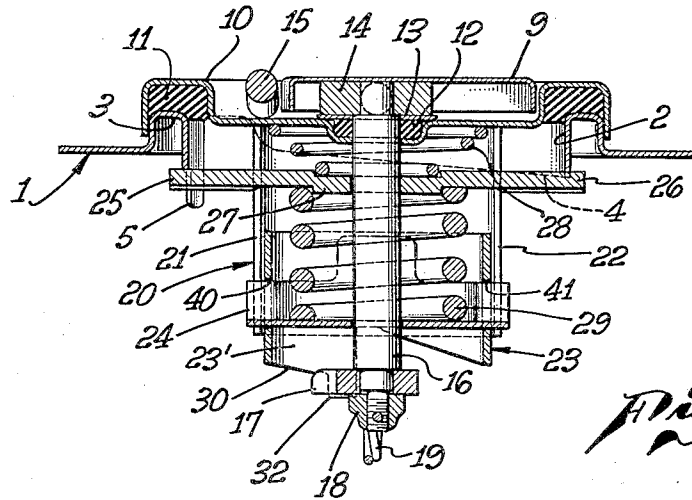


Fig. 2.

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2 Sheets-Sheet 2

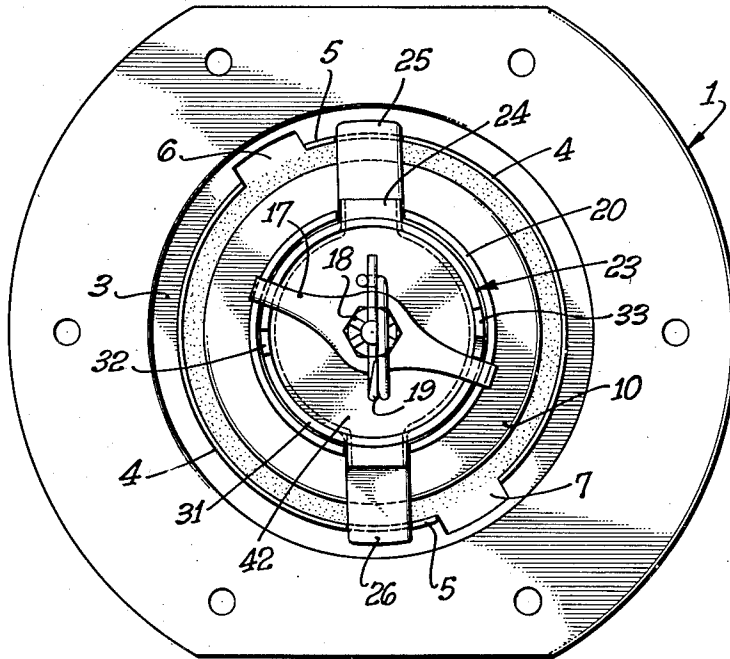


Fig. 3.

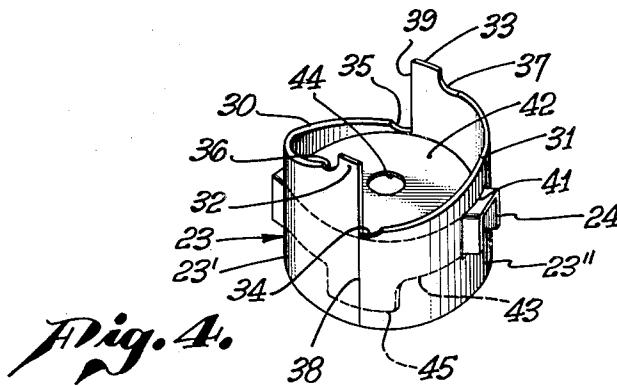


Fig. 4.

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UNITED STATES PATENT OFFICE

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METHOD OF MAKING CLOSURE MEMBERS

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2 Claims. (Cl. 113—116)

This invention pertains to improvements in closure members and is particularly directed to spring-actuated, vapor and gas-tight closures for use with containers of volatile liquids, fuels, organic solvents, etc.

There has been a long-standing demand for a closure for tanks, drums and other containers, which closure is gas and vapor tight, is rapidly actuated during opening or closing of the port in the container, and which does not subject the gasketing material employed to prolonged and unnecessary abrasion. The gasketing material should be under considerable pressure when the cap or closure is locked so as to prevent the loss of volatile constituents from the tank or container.

The present invention pertains to a closure member which is rapidly and easily applied to the opening or port in a container and which firmly and positively compresses the gasketing material without subjecting the gasket to abrasion and unnecessary wear. The invention also contemplates a closure member which is opened or closed by a single revolution of a hand grip or handle and automatically maintains the closure in either locked or unlocked position. The invention also provides a simple and effective method of manufacturing the closure so that the desirable objectives may be attained without excessive cost.

An object of the invention, therefore, is to disclose and provide a method of making a simple, efficient, positive closure or cap for ports in a tank, container or other receptacle in which liquids, vapors or other relatively volatile materials are contained.

A further object of the invention is to disclose and provide a simple and inexpensive method of construction.

These and other objects, uses, adaptations and modifications of the invention will become apparent from the following detailed description, reference being had to the appended drawings illustrating a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevation of a closure member in position upon a port in a container.

Fig. 2 is an axial section taken along the plane II—II of Fig. 1.

Fig. 3 is a bottom view of the device shown in Figs. 1 and 2.

Fig. 4 is a perspective of a cam tube used in the device.

In the exemplary form of device shown, a cam plate or aperture plate is indicated at 1. This

aperture plate may be a part of the tank or other container. The circular aperture is indicated at 2 and it will be noted that an upstanding seat 3 is formed around the port 2. A downwardly extending cam may be formed around the port 2 and integral with the aperture plate 1. Two similar cam surfaces or edges, indicated at 4, terminating in the stops 5, may be formed in this downwardly extending edge. Partly cut-out entry ways 6 and 7 may be formed in the seat 3 for purposes hereinafter described.

The closure may consist of a cap member 10 pressed out of suitable metal, plastic or the like and adapted to retain a gasket 11 in a circular channel formed in the outer portions of the cap. The centrally disposed portion of the cap may be depressed as shown. A circular area immediately around a centrally located opening may be still further depressed so as to receive a gasket 12. A washer 13 may be positioned between the gasket 12 and the hub 14, the hub 14 being provided with a suitable handle or grip, such as the pivoted hand grip 15. The hub 14 is firmly connected to an actuating pin 16, the lower end of such pin being square so as to receive a locking cam follower 17, this cam follower being locked in position as by means of the lock nut 18 threaded upon the threaded end of the actuating pin 16, the lock nut being sealed as by means of wire 19.

Attached to the lower side of the cap 10 is a retainer or cage 20 provided with a pair of diametrically opposed longitudinal slots 21 and 22. The cage or retainer 20 is attached to the lower surface of the cap 10 in any suitable manner. In order to expedite manufacture and reduce costs, the retainer is preferably provided with two or three prongs whereas the cap 10 is provided with two or three holes or ports, so that the prongs of the retainer may extend through the ports and be riveted thereover. After such preliminary locating operation, the retainer 20 may be furnace-welded to the cap 10 in a manner to be described hereinafter.

A cam tube, generally indicated at 23, is slidably carried within the retainer, the lower edge of the cam tube being provided with cam edges including sections for releasably holding the cam follower 17 in locked and in released positions. The cam tube 23 is preferably provided with a transverse partition and with wings or guiding elements indicated at 24, which extend through the slots 21 and 22 so that the cam tube 23 can not rotate with respect to the retainer 20 but is movable along the actuating pin 16.

A holding bar is movably positioned within the

retainer 20, end portions 25 and 26 extending through the slots 21 and 22. The central portion of the holding bar is enlarged so as to virtually fill the cage 20 and is provided with a port through which the actuating pin 16 extends.

Surrounding this port is a recessed portion 27 adapted to form a seat for a relatively light spring 28 which bears against the seat and against the lower cam surface of the cap 10. A relatively heavy spring 29 is positioned between the holding bar and the transverse partition of the cam tube 23. The two springs are so arranged that the holding bar is normally maintained spaced from the lower surface of the cap 10.

The method of manufacture of cam tube 23 is of great importance. As shown in Fig. 4, the preferred form of the cam tube includes two similar cam surfaces or edges 30 and 31, as well as stops 32 and 33 and sections 34 and 35 for releasably holding a cam follower in released position, as well as depressions 36 and 37 for holding the cam follower 17 in locked position. It has been found substantially impossible to manufacture a cam tube with such intricate cam facing by ordinary milling or cutting methods and the cost of such machinery is excessive and renders the manufacture of the device virtually impractical. In accordance with the present invention, two stampings or cold punchings from flat stock are made, each of these members having a length of one-half of the circumference of the finished tube, each member having an edge representing one-half of the desired cam. For example, as shown in Fig. 4, longitudinally extending lines of separation are indicated at 38 and 39 so that the entire tube is made of the two parts 23' and 23''. The two flat stock members can be readily formed by punching and are then formed into semi-cylindrical shape. During the punching operation, ports or apertures 40 and 41 are formed in the flat stock members. In a separate operation, a transverse partition member 42, cap-shaped in form and having a circular body portion provided with upstanding edge portions 43 and a central port 44, is separately made. This partition member 42 may be provided with upstanding wings 45. The two semi-circular sections of the cam tube are placed around the partition member with the wing elements 24 extending through the ports 40 and 41 respectively. These two semi-circular portions 23' and 23'' can then be readily tack-welded onto the upstanding edge portions 43 of the partition 42. Preferably, such tack-welding takes place in a zone where the opposing longitudinal edges of the semi-circular portions 23' and 23'' come together. After such tack-welding operation, the three elements are furnace-welded together. This is most easily accomplished by laying a copper wire along the circular line of contact between the members 23', 23'' and the circular body portion of the partition 42, and subjecting this assembly to a welding heat in a reducing atmosphere so as to weld the parts together. The use of lithium in the furnace assures perfect welding conditions, thereby avoiding all carburizing or de-carburizing. Any neutral or reducing atmosphere may be employed, however. Such welding procedure may also be employed in firmly welding the retainer 20 to the bottom of the cap 10. In the event a cover plate, such as is shown at 9, is used, similar furnace-welding may be employed in firmly attaching the hub 14 to the cover plate.

The operation of the closure described herein will now be readily understood. In unlocked po-

sition, the cam follower 17 is at rest in the sections 34, 35, of the cam edge carried by the cam tube 23, and the holding bar is spaced from the bottom of the cap 10 by the light spring 28. The entire closure member is inserted through the port 2, the ends 25 and 26 of the holding bar passing through the lightly cut out portions 6 and 7 of the upstanding flange 3 of the aperture plate 1. The hand grip 15 is then partly rotated, causing a partial rotation of the entire closure. The ends 25 and 26 of the holding bar will in this manner engage the lower edges of the cover plate and come in contact with a stop or stops 5. If the lower edge of the aperture plate 15 is provided with a gentle cam, such as the cam 4, light contact will be made between the seat 3 and the gasket 11. After the holding bar has come into contact with the stop 5, no further rotation of the cover plate 10 can take place and the closure will maintain its position but will not be gas or vapor tight. The hand grip 15 is then rotated a further half turn, causing the cam follower 17 to leave the recesses 34 and 35 and to move along the inclined cam edges 30 and 31 of the cam tube 23 until the cam follower 17 abuts the stops 32 and 33 and is locked in the recesses 36 and 37. During this partial rotation of the hand grip, actuating pin and cam follower 17, the cam tube 23 has been forced upwardly towards the cap 10, causing the heavy spring 29 to be compressed, thereby placing the pin 16 under tension. This tension is distributed by means of the washer and gasket 11 to the cap plate 10, compressing the gasket 11 and causing a gas and vapor-tight seal to be formed.

In conducting the furnace-welding operation referred to hereinabove, brazing metals other than copper, may be employed although copper and its alloys have been found to be particularly effective inasmuch as copper appears to have a preferential attraction for steel and its alloys such as chrome-molybdenum steels from which the various parts are readily manufactured. The furnace-welding operation may also be termed "copper hydrogen brazing" and for the purposes of this case, furnace-welding and furnace-brazing are deemed to be synonymous. As previously stated, any neutral or reducing atmosphere is satisfactory, an atmosphere containing appreciable quantities of carbon monoxide and hydrogen being used in practice. Moreover, it is desirable at times to tumble the various parts before assembling them for the furnace-welding or brazing operation or otherwise prepare the various parts so as to remove undesired burs along the edges of the stampings, thereby making certain that the parts or sections thereof which are to be brazed together are closely adjacent so that only a minimum of copper or other brazing metal is needed to produce the desired bond therebetween. These various parts which are to be brazed or welded together should be free from scale, oil or grease and in actual practice such parts are cleaned with carbon tetrachloride or other organic solvent before being placed in the welding furnace. The temperature of the furnace will, of course, vary somewhat with the brazing metal employed; when copper is being used, a maximum furnace temperature of 2025-2100° F. may be used, this temperature being sufficient to liquefy the brazing metal and cause it to flow into the interstices between adjacent parts which it is desired to weld or braze together.

Although the use of brazing metal in the form of wire has been specifically referred to, the braz-

ing metal may be sprayed upon the parts in the region of the desired weld. Powdered brazing metal may be used; a paste or suspension of brazing metal in an adhesive medium may be used; molten brazing metal may be sprayed upon the parts.

After furnace-welding the elements such as, for example, the various elements which make up the cam tube, the cam tube is heat-treated to relieve strains and hardened or tempered, if desired, and may then be plated or subjected to any other desired finishing operation. Cadmium plating has been found to be particularly effective on the closures described hereinabove.

All changes, modifications and adaptations coming within the scope of the following claims are embraced thereby.

I claim:

1. A method of making a cam tube provided with a cam shaped edge and laterally supported walls comprising punching two identical members out of flat stock each having a length equal to one half of the circumference of the finished tube, and each having an edge representing one half of the desired cam and forming thereon a configuration for a release position, a configuration for a lock position and a stop, then bending said stock members into semicylindrical shape, preparing a circular partition element having an upstanding edge portion cylindrical in form and having an outside diameter equal to the inside diameter of the stock members, preparing the respective edges and surfaces of the stock members and partition element for a brazing operation, applying the stock members to the partition element so that prepared side surfaces of each are in contact and so that the end edges of the stock members are in edge to edge relation, tack welding the stock members to the partition element at the contacting portions at a temperature suf-

ficient to hold the parts together during a subsequent brazing operation, then placing wire brazing metal throughout lines of contact between said members and said element, inserting the tack welded assembly in a furnace and there subjecting the assembly in its entirety to a brazing heat in a reducing atmosphere for a length of time sufficient to complete the brazing of the parts together and thereby sealing the space between said parts with the aid of said brazing metal.

2. A method of making a cam tube provided with a cam shaped edge and laterally supported walls comprising punching two members out of stock each having a length equal to one half of the circumference of the finished tube, and each having an edge representing one half of the desired cam, then bending said stock members into semicylindrical shape, preparing a partition element having an upstanding edge portion cylindrical in form and having an outside diameter equal to the inside diameter of the stock members, preparing the respective surfaces of the stock members and partition elements for a brazing operation, applying the stock members to the partition element so that prepared side surfaces of each are in contact, tack welding the stock members to the partition element at the contacting portions at a temperature sufficient to hold the parts together during a subsequent welding operation, then placing wire brazing metal throughout lines of contact between said members and said element, inserting the tack welded assembly in a furnace and there subjecting the assembly in its entirety to a brazing heat in a reducing atmosphere for a length of time sufficient to complete the brazing of the parts together and thereby sealing the space between said parts with the aid of said brazing metal.

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