Jan. 6, 1959 P. MESHBERG 2,867,358

AEROSOL CONTAINER WITH VALVE

Filed Feb. 6, 1956

Fig. 1

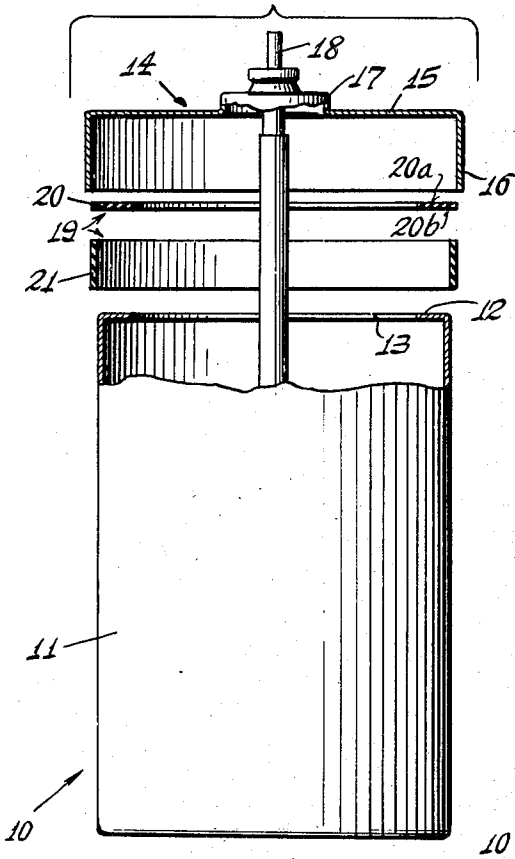


Fig. 2

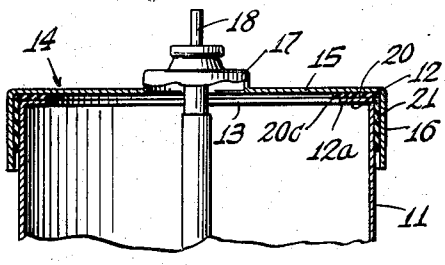


Fig. 3

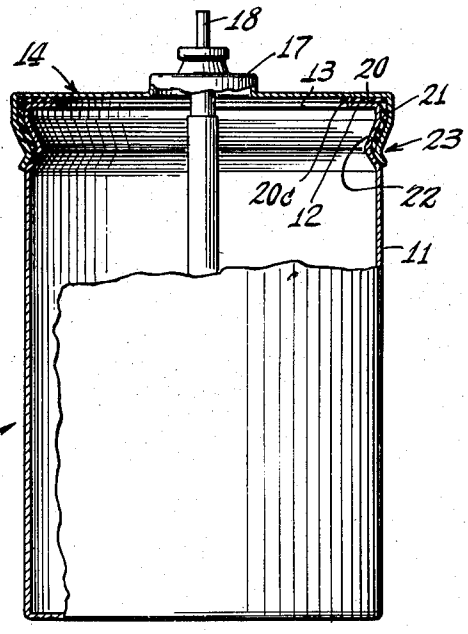


Fig. 4

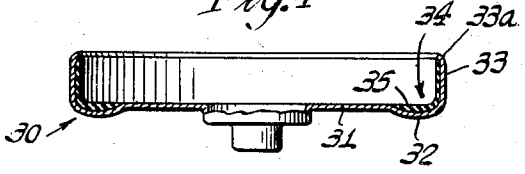
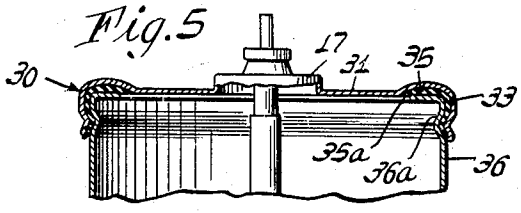


Fig. 5



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AEROSOL CONTAINER WITH VALVE

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13 Claims. (Cl. 222—394)

This invention relates to an article of manufacture and a method of making the same and more specifically to an improved aerosol receptacle for containing a substance under pressure and a method of constructing the same to render it leak-proof.

Heretofore, in an aerosol type of receptacle comprising essentially a valve member and container, the valve member was connected to the upper end of the container simply by crimping, knurling or beading the adjoining end portions of the two members together to form the sealing connection. In sealing connections of this type it frequently occurred, as a result of increased internal pressure due to temperature, geographical, or other pressure influencing factors, that the valve mounting portion would be raised and a pressure leak would develop at the seam, causing the article to be rejected.

An object of the present invention is to provide for an improved structure and method for connecting the valve member to the container so as to materially increase the sealing quality of the connection therebetween and render the same leak-proof in the event the internal pressure of the receptacle is increased beyond that pressure normally contemplated.

According to this invention, this is accomplished by disposing between an inturned flange on the wall of the container and a valve member provided with a lateral mounting portion with a depending flange to form the closure therefor, a resilient sealing means which, when said members are secured together, is wedged or compressed between the cooperating portions thereof. Further, the sealing means may also be disposed between the depending flange and underlying side wall. The members are then secured together in a manner such that any increase of internal pressure within the container tends to prevent the development of any seepage or leakage between the cooperating members.

Constructing the leak-proof seam according to this invention, is best accomplished by turning in the upper end of the container to form a flange to cooperate with the valve member to wedge or compress a resilient sealing means between the inturned flange and lateral mounting portion and depending flange and underlying wall portion of the container, as the closing seam or connection is formed. This is accomplished by rolling inwardly an intermediate portion of the depending flange and cooperating underlying wall portion of the container. If desired, to further insure against leakage, the resilient sealing means adjacent the inturned flange is projected slightly beyond the inner periphery of the latter so that the internal pressure tends to directly force the projecting portion of the sealing means into firm engagement with the surface of the lateral mounting portion of the valve member to prevent seepage around the end of the sealing means.

A feature of this invention resides in the provision that the improved receptacle is relatively simple to manufacture, inexpensive to produce and positive in operation.

Another feature of this invention resides in the provision whereby the resilient, elastomeric sealing material compressibly disposed between the walls of the container and the valve member can, in the event an internal increase of pressure causes the members to be displaced relative amounts, expand to maintain the sealing efficiency of the connection.

Other features and advantages will be apparent from

the specification and claims when considered in connection with the drawings in which:

Figure 1 is an exploded front view, partly shown in section, of the improved receptacle.

Fig. 2 is a detail sectional view illustrating the relative position of the parts prior to securing the valve to the container.

Fig. 3 is a partial sectional view illustrating the final assembled relationship of the improved receptacle.

Fig. 4 is a detail sectional view of a modified form of the valve member.

Fig. 5 is a sectional view illustrating the assembled relationship of the modified form of the invention.

Referring to the drawings, the improved aerosol type of receptacle for containing a substance under pressure comprises a container member **10** provided for enclosing wall portions **11** having inturned at the upper end thereof an integrally-formed flange **12** forming an opening **13** for the container. While the container member **10**, according to this invention, may be formed in any well known manner, the illustrated form of the container comprises the seamless type which is generally made of aluminum or the like by impact extrusion. It will be understood that while the container may take any shape or form, the cylindrical form is illustrated.

A valve member or unit **14** is fitted over the opened end **13** to form a closure for the container **10**. As illustrated, the valve member has a laterally extending mounting portion **15** provided with an integrally-formed, encircling, depending flange **16**, the central portion **17** of the valve member being raised to provide a housing for a suitable valve means **18**.

In order that the valve member **14** may be securely connected to the container **10** so as to form a leak-proof seal therebetween, a resilient, elastomeric, sealing means **19** is disposed between the valve member **14** and the container **10**. As illustrated in Fig. 1, the resilient sealing means consists of a flat, angular gasket member **20** which is adapted to seat on the inturned flange **12** of the container, and a second ring-shaped gasket **21** positioned adjacent the upper end of the container so as to embrace the walls thereof adjacent the inturned flange **12**. By so disposing gaskets **20** and **21**, it will be noted that the adjacent edge portions of the respective sealing members are in engagement with each other, thereby facilitating the formation of a leak-proof seal as will be herein described.

The valve member **14** is provided with a diameter sufficiently large so that the depending flange may snugly fit the open end of the container with the ring gasket **21** disposed between the walls of the container adjacent the open end and the depending flange **16**, see Fig. 2. With the parts assembled, as shown in Fig. 2, the valve member **14** is in position to be securely fastened to the container **10**.

According to this invention, this is accomplished by inwardly bending, as by rolling, the depending flange **16** and underlying wall portion **22** of the container to form an annular groove **23** therearound. This bending, it will be noted, tends to pull the valve member **14** down tightly onto the container. As a result, the resilient sealing members **20** and **21** disposed between the depending flange and the adjacent wall portions of the container and between the inturned flange and the mounting portion of the valve member are compressed, thus forming a leak-proof seal. Preferably, the edge of the flange is provided with a reverse bend which produces, in effect, a bend to strengthen the edge so that it will withstand greater internal pressures before yielding.

Since the force of the internal pressure acts substantially perpendicular to the walls of the container, it will be noted that the force acting on the inclined wall por-

tion 22 tends to push the same outwardly and the force acting upwardly on the inturned flange 12 tends to push the same upwardly. Should the pressure tend to lift the mounting portion 15 upwardly from the container so that a leak might occur between it and flange 12, it will at the same time lift the depending flange upwardly which would cause the inturned portion thereof to press the sealing means in the groove against the wall of the container in the groove and increase the sealing effect of the sealing material. Thus it will be noted that as the internal pressure increases, the force acting on the respective wall portion 22 and flange 12 is proportionately increased, thereby further compressing the gasket member disposed therebetween. Consequently, a tighter seal is formed as the pressure increases.

However, in the event that a pressure differential is exerted as a result of the variable force acting on the lateral extending mounting portion 15 of the valve member and the inturned flange 16 of the container, due to the amount of respective area exposed thereto, material strength of the receptacle, etc., causing the mounting portion 15 to be displaced outwardly a greater amount than the flange 12, then the compressed sealing member 20 disposed therebetween will tend to expand slightly to take up the relative difference of displacement between the valve member and container so that the upper and lower surfaces 20*a* and 20*b* respectively of the sealing member 20 are constantly maintained in engagement with both inner surfaces of the valve member and the upper surface of the flange to prevent leakage therebetween.

If desired, the gasket member 20 is provided with a projecting inner peripheral portion 20*c* which extends slightly beyond the terminating edge 12*a* of the inturned flange whereby added insurance against seepage or leakage is afforded. This is so because the force of the internal pressure exerted against the projecting tip 20*c* of the gasket 20 tends to directly maintain the projecting edge 20*c* in engagement with the lateral mounting portion of the valve member. Thus, leaking around the end and therebetween is unlikely. The second gasket 21 positioned around the wall backs up the first gasket member, thereby insuring against leakage in the event the internal pressure is so greatly built up that the force thereof causes a portion of the pressure to leak past the gasket between the inturned flange and the mounting member of the valve member.

In the modification illustrated in Figs. 4 and 5, the valve member 30 is provided with a lateral extending mounting portion 31 having an annular trough 32 adjacent the flange 33. Accordingly, the sealing means 34 consists of a resilient, elastomeric liner 35 which is "flowed in" to the valve member. This is accomplished by rapidly rotating the member 30 as the elastomeric material is flowed therein. Centrifugal force causes the material to be deposited to the member as shown. It will be noted that the peripheral portions 33*a* of the flange 34 are turned in slightly to prevent the sealing material from going beyond the edge thereof during the "flowing in" process.

As shown in Fig. 5, the valve member 30 is secured to the end of a flanged container 36 by bending the flange 33 and underlying wall portion 36*a* inwardly as hereinbefore described. Thus, the liner 35 is rendered slightly compressible as were the gasket members 20 and 21 of Figs. 1 to 3. Thus, in operation and efficiency, the seal between the lined valve member 30 and container 36 is similar to that of the gasket type seal of Figs. 1 to 3. If desired, the liner 35 adhered to the mounting portion 31 may be extended beyond the edge of the inturned flange 37 so that the force of the internal pressure may act directly on the projecting portion 35*a* as hereinbefore described.

Thus it will be seen that, according to this invention, the container member is provided with an annular flange by turning in the upper end portion thereof forming the flanged opening. The valve member is then provided with a liner either formed of a pair of gasket members disposed adjacent the flange and adjoining mounting portion at substantially right angles or by "flowing in" and adhering a unitary liner member adjacent the flange and adjoining mounting portion. In either case, the resilient gasket or liner portion adjacent the mounting section of the valve member may be rendered slightly wider than that of the inturned flange. The valve member and included lining material are then positioned over the container opening so that the depending flange of the valve member portion snugly embraces the upper end of the container so that the resilient lining material is disposed between the inturned flange and mounting portion and between the depending flange and wall of the container. The valve member is then pulled tightly down relative to the container by rolling inwardly an annular groove intermediate the ends of the depending flange and underlying wall portion of the container. By this operation, the resilient sealing means is compressed therebetween to form the leak-proof seal as hereinbefore described.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. An improved receptacle for containing a substance under pressure comprising a containing member having an annular wall portion provided with an inturned flange adjacent the open end thereof, a valve unit having a valve means and a laterally extending mounting portion provided with a depending flange at the edge thereof projecting below said laterally extending mounting portion, said valve unit being adapted to fit over said containing member forming a closure therefor with the depending flange engaging the annular wall, a pressure-sealing means including a resilient sealing member disposed between the valve unit and containing member adjacent the respective flanges thereof, and means tightly securing said valve unit to said containing member wedging therebetween the resilient sealing member so that the sealing efficiency of the sealing means is maintained in the event of increased internal pressures within said receptacle.

2. An improved receptacle for containing a substance under pressure comprising a containing member having an annular wall portion provided with an inturned flange adjacent the open end thereof, a valve unit having a valve means and a laterally extending mounting portion provided with a depending flange projecting below said laterally extending mounting portion, said valve unit being adapted to fit over said containing member forming a closure therefor with the depending flange engaging the annular wall, a pressure-sealing means formed of a resilient sealing material disposed between the valve unit and containing member adjacent the respective flanges thereof, said sealing means including a resilient gasket ring embracing said annular wall adjacent said inturned flange and a second resilient gasket overlying said inturned flange, and means tightly securing said valve unit to said containing member so that said gaskets are wedged between said depending flange and adjacent wall portion and between said inturned flange and mounting portion whereby the sealing efficiency of the sealing means is maintained in the event of increased internal pressures.

3. The invention as defined in claim 2 wherein a portion of said second gasket extends slightly beyond the inner peripheral edge portion of said inturned flange so that the internal pressure within said receptacle tends to maintain said extending portion of said gasket in engagement with said valve mounting portion to insure against leakage around the edge thereof.

4. The invention as defined in claim 2 wherein the adjacent edge portions of said gaskets are in engagement with each other.

5. An improved receptacle for containing a substance under pressure comprising a cylindrical containing mem-

ber having an annular wall portion provided with an inturned flange adjacent the open end thereof, a closure member having a laterally extending mounting portion provided with a depending flange at the edge thereof adapted to fit over said containing member forming a closure therefor with said depending flange engaging the annular wall, said closure member including a lining of a resilient sealing material on said depending flange and adjacent mounting portion, and means tightly securing said closure member to said containing member for compressing the resilient liner between said depending flange and adjacent cooperating wall portion and between said inturned flange and cooperating mounting portion whereby the sealing efficiency of the receptacle is maintained in the event of increased internal pressures.

6. The invention as defined in claim 5 wherein the portion of the lining on said mounting portion extends slightly beyond the inner peripheral edge of said inturned flange so that said internal pressures tend to maintain said extending portion in engagement with said mounting portion of said closure member to insure against leakage around the edge thereof.

7. A method of mounting a valve member having a laterally extending mounting portion provided with a depending flange to an aerosol container comprising the steps of turning in the upward end portions of the wall of the container to form an integral, annular inturned flange, positioning a resilient sealing member between said inturned flange and said mounting portion and between said depending flange and the wall of the container, and rolling the depending flange and underlying wall portions of said container at an intermediate point of said depending flange to form an inwardly extending groove therein tightly wedging therebetween the resilient sealing member and securely connecting the valve member to the container to form a leak-proof seal therebetween.

8. A method of mounting a valve member having a laterally extending mounting portion provided with a depending flange to an aerosol container comprising the steps of turning in the upward end portions of the wall of the container to form an integral, annular inturned flange, lining said valve member with a resilient liner adjacent said flange and cooperating mounting portions thereof, positioning said valve member on said container so as to position said lining between said depending flange and underlying wall portion and between said inturned flange and overlying mounting portion and rolling the depending flange and underlying wall portions of said container at an intermediate point of said depending flange to form an inwardly extending groove therearound, tightly wedging the resilient liner and securely connecting the valve member to the container to form a leak-proof sealed connection therebetween.

9. A method of mounting a valve member having a laterally extending mounting portion provided with a depending flange to an aerosol container comprising the steps of turning in the upward end portions of the wall of the container to form an integral, annular inturned flange, disposing a first resilient gasket between said inturned flange and said mounting portion and a second resilient gasket between said depending flange and the wall of the container, and rolling the depending flange and underlying wall portions of said container at a point inwardly from the edge of said depending flange to form an inwardly extending groove therearound tightly wedging therebetween the resilient gasket and securely connecting the valve member to the container to form a leak-proof seal therebetween.

10. A method of mounting a valve member having a laterally extending mounting portion provided with a depending flange to an aerosol container comprising the steps of turning in the upward end portions of the wall of the container to form an integral, annular inturned flange, positioning a unitary resilient sealing member in said valve member adjacent said depending flange and immediately adjoining mounting portion, placing said valve member on said container so that said sealing member is disposed between said inturned flange and said mounting portion and between said depending flange and the wall of the container, and rolling the depending flange and underlying wall portions of said container at an intermediate point of said depending flange to form an inwardly extending groove therein tightly wedging therebetween the resilient sealing member and securely connecting the valve member to the container to form a leak-proof seal therebetween.

11. An improved receptacle for containing a substance under pressure comprising a containing member having an annular wall provided with an inturned flange adjacent the open end, a valve unit having a valve means and a laterally extending mounting portion to fit over the open end of the containing member to form a closure therefor and having a depending flange to fit over said annular wall, a resilient sealing member between the inturned flange and mounting member and extending beyond the inner peripheral edge portion of said inturned flange so that said internal pressure within the containing member tends to maintain the projecting edge of the sealing member in engagement with the mounting member, and means tightly securing the valve unit in sealed relation with the containing member comprising an inward annular bend in said depending flange of the valve unit, said bend being spaced inwardly from the edge of the flange, and a cooperating bend in the underlying wall portion of the containing member to form interlocking grooves.

12. An improved receptacle for containing a substance under pressure comprising a containing member having an annular wall adjacent the open end thereof, a valve unit having a valve means and a laterally extending mounting portion to fit over the open end of the containing member to form a closure therefor and having a depending flange to fit over said annular wall, a resilient sealing member disposed between said annular wall and the overlying flange, and means tightly securing the valve unit to the container comprising an inward, annular bend in said flange of the valve unit, said bend being spaced inwardly from the edge of the flange, and a cooperating bend in the underlying wall portion of the containing member to form an annular groove thereabout and securely wedge the sealing member therebetween, the pressure in the container causing the valve unit to tend to move upwardly and increase the pressure of said bend on the sealing member to increase the sealing effect thereof.

13. An improved receptacle for containing a substance under pressure comprising a cylindrical container having an inturned edge adjacent an open end thereof forming a short annular flange and having an annular groove in the side wall spaced therefrom, a valve unit having a valve means and a laterally extending mounting portion to fit over the open end of the container to form a closure therefor and having a depending flange at the edge thereof and extending below said laterally extending mounting portion to fit over and engage the side wall of said container, and a resilient sealing member between the inturned edge of the container and the overlying portion of the mounting portion to form a seal therebetween, the portion of the depending flange remote from said laterally extending portion being bent into said annular groove to secure said valve unit to the container in sealing relation therewith.

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