

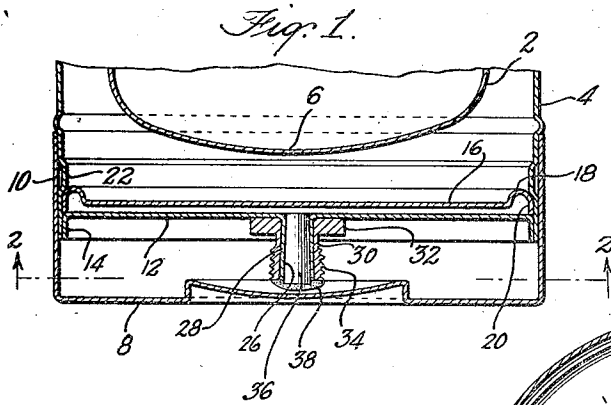
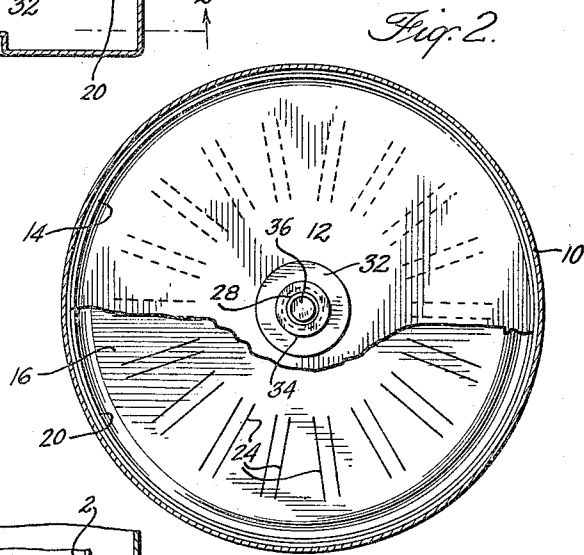
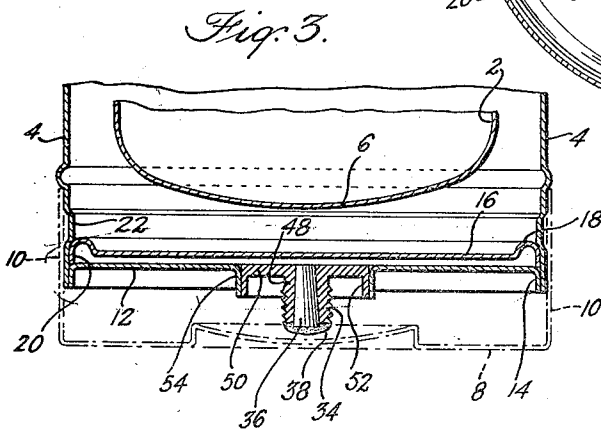
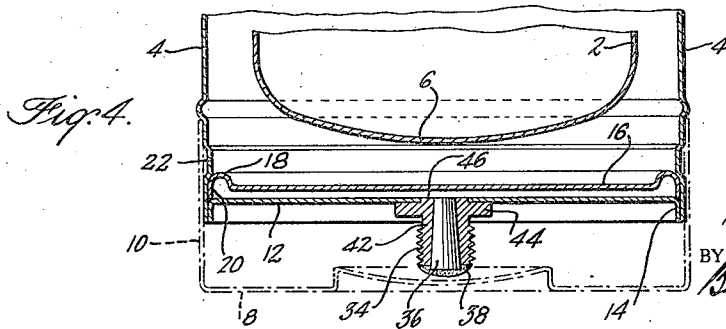
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H. M. BADGER

VACUUM VESSEL SEALING

Filed Feb. 12, 1925



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VACUUM VESSEL SEALING.

Application filed February 12, 1925. Serial No. 8,703.

My invention relates to vacuum bottles and other containers, and to a method of making the same. The invention relates more particularly to containers of the all metal type having inner and outer walls or shells of sheet metal which are spaced apart, with the space between the shells filled with a suitable granular insulating material, the air and gases being exhausted from the space between the shells after the insulating material has been placed therein.

Heretofore in sealing such chambers after exhausting the air and gases, it has been customary to close by solder the end of a lead tube leading from an aperture in the outer wall of the container, after the air and gases have been exhausted through the tube by means of a suitable exhausting apparatus. It has been found, however, that when a lead tube is thus employed, it is not possible to heat the container to a sufficiently high temperature to permit the occluded gases in the walls of the container to be effectively removed during the exhausting operation.

The object of the present invention is to provide a sealed container of the character indicated having provision of means for use in sealing the same after exhausting the air and gases from the space between the walls of the container which is so constructed as to permit the container to be heated to the required degree during the exhausting operation to produce the best results.

The several features of the invention whereby the above mentioned and other objects may be attained will be clearly understood from the following description and accompanying drawings, in which,

Figure 1 is a vertical sectional view showing the lower portion of a vacuum bottle of the all-metal type embodying my invention;

Fig. 2 is a section on the line 2—2, Fig. 1, with certain parts broken away;

Figs. 3 and 4 are vertical sections of other embodiments of my invention.

The vacuum bottle as illustrated in the drawings, is provided with an inner shell 2 and an outer shell 4 which are spaced apart. The inner shell is provided with a closed bottom 6, and the outer shell is provided with a bottom 8 having a flange 10 that telescopes over and is welded or otherwise secured to the lower end of the outer shell.

In accordance with my invention the bottle

is further provided with a false bottom 12 having a depending flange 14 which is received in and is welded to the lower end of the outer shell. A baffle 16 is also provided which consists of a sheet metal disk spaced a slight distance above the false bottom 12, and provided with an upwardly rolled marginal bead 18 and a depending flange 20. The depending flange 20 tightly fits the outer shell, and the baffle is tightly held between an inwardly rolled bead 22 on the outer shell and the false bottom 12. The baffle 16 is provided with a series of slits or cuts 24 which are so fine as to prevent the granular insulating material within the space between the shells of the container from passing there-through but permitting air and gases to freely pass during the exhausting operation. Each two adjacent cuts or slits 24 are formed by punching downwardly a portion of the metal to separate it and then forcing it back to its original position. The baffle thus formed is substantially homogeneous, the faces of the slits being of the same metal as the body of the sheet.

The false bottom 12 is provided with an inwardly tapering conical air exhaust opening or port 26. In the embodiment of Figs. 1 and 2 this port is provided by forming a downwardly extending tubular projection 28, the projection tapering inwardly and being integral with the disk-like portion 12. A sleeve or tube 30 of steel, which may be formed on a screw machine, surrounds the tubular projection and is provided with a flange 32 that engages the under side of the false bottom and is electrically welded thereto. The lower end portion of the tube 30 is provided with external screw threads 34. The flange 32 has an external face forming a seat for an exhaust coupling (not shown).

The screw-threaded end 34 of the sleeve or tube 30 permits it to be coupled with suitable exhausting apparatus which exhausts the air and gases through the port 26 from the space between the shells of the container. At the completion of the exhausting operation and before the apparatus is disconnected, a tapering plug 36 shaped to fit the port is forced tightly into the tubular projection 28, and after the apparatus is disconnected the plug is hermetically sealed so as to provide a metal seal for the port. This is preferably done by solder 38 applied to seal the joint. The

plug 36 is preferably made of an alloy which has a slightly higher fusing point than lead but is softer than the walls of said port and sufficiently malleable to permit it to conform closely to the port in the tubular projection 28 when it is forced therein as above described. I have found that an alloy composed of lead 65% and antimony 35% gives satisfactory results although other alloys have also been found to be suitable.

It has been found that no sheet metal is perfectly homogeneous, there being pipes, due to traces of slag and other imperfections through which molecules of gas and air can quite freely pass. As the piece is heated the gas contained in the minute pipes will expand and open the metal which make a free passage for air and other gases. In the construction above described, however, the grain of the metal of the tubular projection 28 surrounding the plug 36, is parallel to the surface thereof instead of being cross-grained, and with such a construction there is not the danger of serious trouble in the form of leaks.

In the modified form of container shown in Fig. 3 the exhaust opening extends through an exhaust tube 48 having a laterally extending flange 50 at its upper end which in turn is provided with a depending peripheral flange 52, the lower end of the tube 48 being provided with external screw threads corresponding to the screw threads 34 of the form shown in Figs. 1 and 2. The exhaust tube 48 is inserted in an opening in the false bottom of the container having a depending flange 54, the exhaust tube being secured to the false bottom by electrically welding the flanges 52 and 54. The port is closed by a hermetically sealed metal plug as in Fig. 2.

In the modified form shown in Fig. 4, the exhaust opening extends through a steel tube 42 which is provided with a flange 44 engaging the under side of the false bottom, and an annular upward projection 46 which fits into an aperture in the false bottom, the flange 44 of the exhaust tube 42 being electrically welded to the false bottom. The forms shown in Figs. 3 and 4, while more liable to leakage because of piping, have advantages in manufacture.

With these constructions, it will be apparent that during the exhausting operation the walls of the container may be heated to

a much higher temperature than though the air and gases were exhausted through a lead tube as has heretofore been customary, thus insuring an effective elimination of the occluded gases in the metal of the walls of the container.

In exhausting and sealing the vessel the same is heated to above the melting point of lead, preferably to about eight hundred degrees Fahrenheit (800° F.) and while so heated the air is exhausted therefrom by suitable exhausting and plug inserting means connected to the exhaust part. The plug is then inserted and forced into position by pressure while the vacuum is retained and subsequently, as soon as the exhausting apparatus is disconnected, hermetically sealed, preferably with solder. In this way a high vacuum is secured and maintained within the vacuum chamber.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A circular baffle plate for a cylindrical metallic vacuum vessel having an outer shell, a granular filling and an exhaust port, consisting of a sheet of metal located adjacent to said exhaust port and engaging the interior surface of the wall of the outer shell of the vessel and having a plurality of slits with contacting edges permitting air to pass but preventing the passage of the granular material, the faces of the slits being of the same metal as the body portion of the plate.

2. A circular baffle plate for a cylindrical metallic vacuum vessel having an outer shell, a granular filling and an exhaust port, consisting of a sheet of metal located adjacent to said exhaust port and engaging the interior surface of the wall of the outer shell of the vessel and having a plurality of slits with contacting edges permitting air to pass but preventing the passage of the granular material, said slits being arranged in pairs, the slits of each pair being parallel, the faces of the slits being of the same metal as the body portion of the plate.

In testimony whereof, I have signed my name to this specification this 9th day of February, 1925.

HARRY M. BADGER.