Jan. 25, 1927. 1,615,649

R. B. PRINDLE

HEAT INSULATED RECEPTACLE

Filed Aug. 30, 1924

Fig. 1.

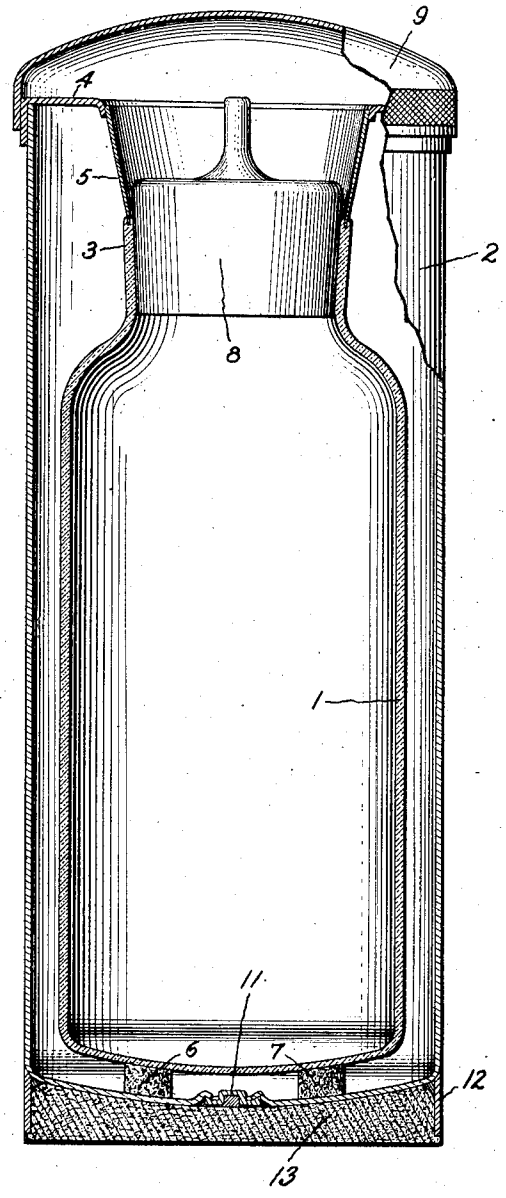


Fig. 3.

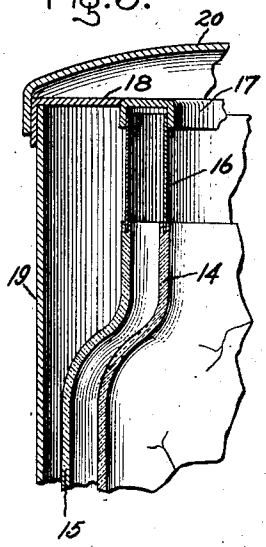
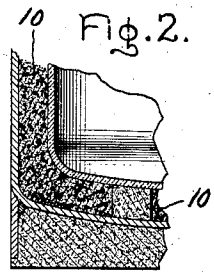


Fig. 2.



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UNITED STATES PATENT OFFICE.

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HEAT-INSULATED RECEPTACLE.

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The present invention relates to the construction of receptacles of the Dewar flask type which are constructed to afford heat insulation between its contents and the exterior by an evacuated space.

Receptacles of this type when consisting entirely of glass are fragile and especially susceptible to damage at the neck where the inner and outer walls are joined to each other. On the other hand vacuum-insulated receptacles made entirely of metal are subject to greater heat losses by conduction from the inner to the outer wall.

In accordance with my invention I have provided a heat-insulated container in which the inner wall consists of glass which is joined to the outer wall, which may consist either of metal or of glass, by a ring of metal which is so thin as to be yielding to shocks, and which makes a vacuum-tight seal with the inner and outer walls.

The accompanying drawing shows in Fig. 1 a vertical section of a metal and glass device embodying my invention; Fig. 2 illustrates in section part of a device having inner and outer walls of glass and Fig. 3 is a fragmental view of a modification.

The device shown in the drawing comprises a somewhat cylindrical receptacle 1 of glass, which is adapted to contain a liquid. Surrounding this receptacle is a metal jacket 2. The receptacle 1 may consist of ordinary lead glass. The jacket 2 may consist of steel or other suitable metal. The lip 3 of the receptacle 1 and the inwardly extending rim 4 of the jacket 2 are joined by a ring-shaped member 5, which preferably is somewhat tapered or cone shaped in form. This member or sleeve 5 consists of a metal having about the same coefficient of expansion as the glass constituting the receptacle 1. For example, when the receptacle 1 consists of lead glass the sleeve 5 may be composed of an alloy known as invar, consisting of nickel and iron (65 parts iron, 35 parts nickel) and preferably is copper coated at the region sealed to the glass. An alloy of 80 parts iron and 20 parts chromium and containing 0.1% carbon also may be used. When glass other than lead glass is used the composition of the sealing ring 5 should be chosen accordingly to have substantially the same coefficient of expansion as the glass. In the case of pyrex glass, a thin copper sleeve may be used. Platinum although usable in case of lead glass is not to be recommended because of its cost.

The sleeve 5 preferably should be sufficiently thin to permit it to flex or yield when thermal changes occur in the walls. At its junction with the glass it is only a few mils in thickness. In the case containers of ordinary size, say from a pint to a gallon capacity the sleeves may be about 4.5 mils (.0045 inch) in thickness at the edge where the glass is sealed. It may be as thick as 90 mils (.020 inch) at the opposite end where it is welded to the metal jacket 2.

At the end opposite the seal between the inner container and outer wall a cushioning means may be provided such as the pads 6, 7 which may consist of felt, wool, or other resilient material, whereby the effect of shocks may be absorbed so as to prevent breaking of the seal. The inner receptacle 1 is provided as usual with a stopper 8 which may consist of ground glass, of cork, or of other suitable composition. The upper end of the jacketing member 2 is preferably provided with a cover 9 which may make a frictional fit as indicated.

The space between the inner and outer walls of the receptacle either is evacuated and then sealed or as shown in Fig. 2 is evacuated and filled before sealing with a finely divided material 10, preferably a material, such as finely divided carbon, which has been preheated and hence is capable of absorbing gas.

The seal at the connection to the vacuum system may be made in any known way. For example, the plug 11 may be sealed into the jacket 2 by the fusion of solder or other low melting metal by local heating while the receptacle is supported in an evacuated space, such as a vacuum furnace in which the parts are baked out and evacuated. The plug 11 may be protected by extending the wall of the outer container as indicated at 12 and filling the space within this extension with a composition material 13 such as ground cork compacted with a suitable binder.

My invention also may be embodied in a device in which both the inner and outer wall of the heat-insulated receptacle consist of glass. Fig. 3 is a fragmental sectional view of such a device showing part of the neck of a glass container in which the inner

wall 14 and the outer wall 15 both consist of glass and are joined by a double walled ring 16 consisting of an alloy of iron with nickel or chromium, such as above described, having substantially the same thermal coefficient of expansion as the glass. The edges of the open end of this double walled cylinder are joined by fusion to the glass walls 14 and 15 as indicated and the closed end of the cylinder is preferably joined by soldering or brazing to a ring 17 of steel, or other suitable metal, which in turn is joined by brazing or otherwise to the flange 18 of a metal housing 19. A cap 20 may be fitted frictionally upon the housing 19 as indicated. The space between the two glass walls 14 and 15 may be evacuated through a glass tube and sealed off by fusion. The exhaust tip has not been shown in this figure, as this method of exhausting and sealing are well understood.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A heat-insulated container comprising a sealed double-walled receptacle, the inner wall at least of which consists of glass and a ring of metal, the metal being sufficiently thin to be yieldable to shocks.

2. A heat-insulated container for liquids, or the like, having a plurality of walls spaced apart, one of which consists of glass and a ring of thin, resilient metal, said ring making a vacuum-tight joint between said walls, and having substantially the same coefficient of expansion as the glass wall the space between said walls being evacuated.

3. A heat-insulated container comprising an outer casing of metal, an inner vitreous receptacle spaced from said outer casing, and a resilient sleeve of metal wholly within and spaced from said casing, said sleeve having substantially the same thermal coefficient of expansion as said vitreous receptacle joined by fusion to said casing and to the upper edge of the receptacle, the space between said casing and receptacle being evacuated.

4. A heat-insulated container comprising an outer casing of metal, an inner receptacle of glass spaced away from said outer casing and wholly within said casing, and a tapered sleeve of metal sealed into said glass wall and welded to the metal wall, said sleeve having a thickness of a few mils adjoining said seal into the glass wall and being of increasing thickness in the direction of the weld to the metal wall.

5. In combination, an outer metallic casing and an inner vitreous receptacle, means for supporting said receptacle wholly within the casing, said means including a yieldable metallic ring extending downwardly into said casing and permanently connected to the upper end of said casing and to the upper edge of said receptacle, the space between said casing and receptacle being evacuated.

6. In combination, a metallic casing, an inwardly and downwardly extending rim adjacent one end of the casing, a vitreous receptacle supported wholly within the casing, the supporting means including a yielding metallic ring permanently united with the said rim and the upper edge of said receptacle.

In witness whereof, I have hereunto set my hand this 28th day of August, 1924.

RAYMOND B. PRINDLE.