March 20, 1928. 1,663,032

M. P. WETMORE

DOUBLE WALLED VACUUM RECEPTACLE

Filed Jan. 4, 1927

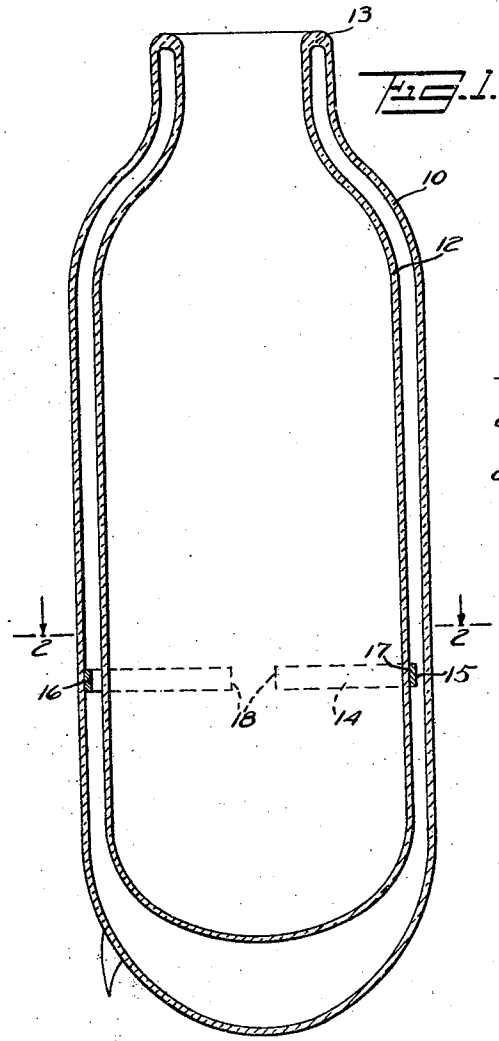


FIG. 1.

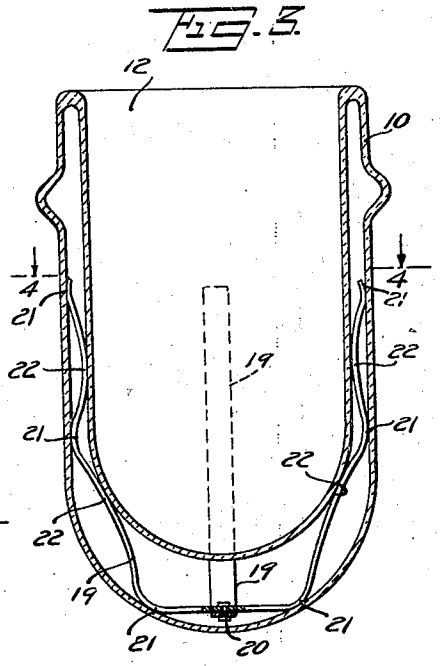


FIG. 3.

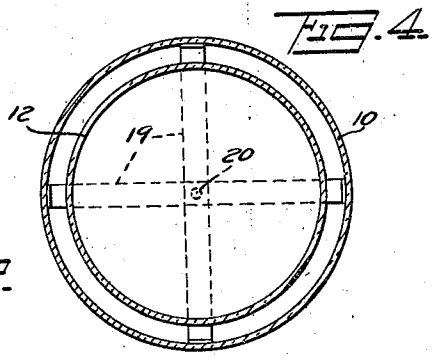


FIG. 4.

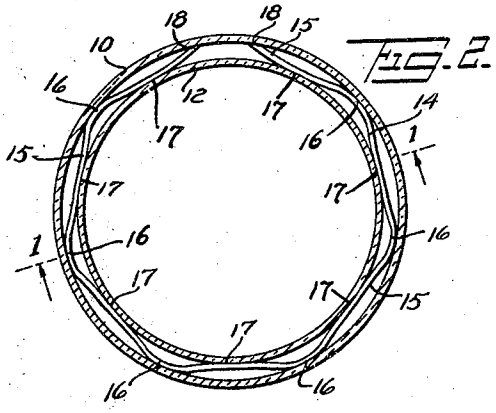


FIG. 2.

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UNITED STATES PATENT OFFICE.

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DOUBLE-WALLED VACUUM RECEPTACLE.

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My invention relates to heat-insulating receptacles of the so-called double-walled vacuum type, in which two cylinders are arranged concentrically to provide an annular vacuum chamber. These two cylinders, which are usually of thin glass, are united at the top to form the filler of the receptacle. The inner cylinder constitutes a container for liquids or solids. Since these glass cylinders are easily breakable, it is necessary to provide spacing means in the vacuum chamber at or near the lower end of the inner container, so that the latter may be protected against jars or shocks. In the finished article, the walls of the vacuum chamber are silvered and the filler is housed in a suitable outer casing.

Heretofore the most common form of spacing means for the two cylinders has consisted of small pads or disks of asbestos, which is heat-insulating. These asbestos spacing pads, which have been in use for many years, are highly objectionable for several reasons. In the first place, these pads possess so little elasticity that, when they are pushed in place between the two cylinders, the tight fit that is required often results in breakage of the filler. The width of the annular chamber between the cylinders necessarily varies in different fillers, and so it is difficult to fit the pads properly into position in each chamber. Another objection to the old spacing pads is that, after the walls of the vacuum chamber have been silvered, the pads appear as round spots on the inner containers, because they prevent the silvering solution from coming in contact with the surface of the container. The most serious objection to the asbestos pads is due to the fact that they retain considerable moisture after the silvering operation, and it is impossible to extract that moisture completely during the subsequent vacuum-forming operation. This moisture-retaining property of the asbestos pads has always made the exhaustion of fillers a difficult operation, requiring considerable time and sometimes making it necessary to stop the vacuum pumps in order to remove the moisture that has been drawn out of the pads. The presence of moisture and air in the asbestos pads, even in small amounts, will cause the vacuum to deteriorate and thereby impair the heat-insulating qualities of the bottle.

In order to overcome the foregoing and other objections and disadvantages of the old asbestos spacing pads in vacuum receptacles, I have invented a new spacing means for the cylinders in the annular vacuum chamber. Briefly stated, the spacing means of my invention consists of an open circular spring of metal mounted under tension in the vacuum chamber and so shaped as to engage both cylinders. An easy way to form this spring is to corrugate a piece of straight spring wire and cut this wire into sections of the desired length. The spacing spring is formed by simply bending each corrugated wire section until it fits into the annular chamber between the cylinders. The open or disconnected ends of the annular spring cause the contact points to adjust themselves automatically when the spring is inserted. On this account, each spacing spring fits properly in each filler, irrespective of variations or irregularities in the size of the vacuum chamber. These springs are not only cheap to manufacture and easily put in place, but they retain practically no moisture and thereby facilitate the operation of producing the required vacuum in the filler. By coating the spring with nickel or other silvery looking metal, the contact points of the spring with the cylinders are practically invisible after the silvering operation.

The practical advantages of my invention will be more fully understood from a detailed description of the accompanying drawings in which I have illustrated two embodiments of my invention. In these drawings—

Fig. 1 represents a double-walled glass filler in longitudinal cross-section, approximately on line 1—1 of Fig. 2;

Fig. 2 is a transverse cross-section on line 2—2 of Fig. 1, showing the form and arrangement of my new spacing spring;

Fig. 3 shows a modification in which two spacing springs are secured together at right angles to each other to engage the bottom portions of the outer and inner cylinders; and

Fig. 4 is a transverse cross-section on line 4—4 of Fig. 3.

In Figs. 1 and 2 there is an outer cylinder 10 and an inner cylinder 12 united at the top to form a filler for vacuum receptacles.

These cylinders are usually made of thin glass and are fused together at the top, as indicated at 13. In order to support the inner cylinder or container 12 against breakage, I provide a circular spacing spring or ring 14 of metal. The construction of this ring is shown in Fig. 2. In its general shape or contour, the ring 14 is in the form of a polygonal having sides 15 and corners 16. The corners 16 are rounded humps which engage the outer cylinder 10, while the sides 15 engage the inner cylinder 12 at the points or contact areas 17. When I speak of contact points between the spring and cylinders, I do not use the term in its strict mathematical sense, but in its practical meaning of a contact spot or place of indefinite area.

The spacing ring 14 is made from corrugated spring wire, which may be round, or a flat ribbon as shown, or of any other practical shape. At the present time I make these rings by corrugating a continuous length of spring wire to provide the humps 16. The corrugated wire is cut into pieces of the required length, depending upon the diameter of the filler, and these pieces of corrugated wire are then bent into circular shape for insertion into the annular chamber of the filler. The ends of the bent wire are free or disconnected, as indicated at 18 in Fig. 2. When the ring 14 is bent round for insertion in the vacuum chamber, it is placed under tension and the contact points of the tensioned ring automatically adjust themselves against the sides of the containers, irrespective of variations in size of the vacuum chambers of different fillers. This automatic adjustment of the contact points is due to the fact that the spacing ring is open, by which I mean that the ends are not rigidly connected together.

In the construction of Figs. 3 and 4, I employ two circular spacing springs or rings 19 connected at 20 and arranged in planes parallel with the axis of the filler. The rings 19, like the ring 14, are made of corrugated spring wire bent into polygonal shape to provide humps 21 for engaging the outer cylinder 10 and sides 22 for engaging the inner cylinder 12. What has been said about the advantages of spacing ring 14 applies to spacing rings 19 without the need of repetition. At the present time I prefer to arrange my new spacing ring in a plane at right angles to the axis of the filler as shown in Figs. 1 and 2, but the modification of Figs. 3 and 4 comes within the broad scope of my invention.

It will be clear from the preceding description that my new spacing ring is of exceedingly simple and cheap construction, is put in place with a minimum amount of labor, renders the evacuating operation to be carried out more efficiently and in less time than was possible with the use of the old asbestos pads, and finally results in a neater looking product. When heat is used in the operations on the glass fillers after the insertion of the spacing rings, the metal from which these rings are made is heat-treated, so that the high temperature to which the filler is subsequently subjected will not take the elasticity out of the spacing spring, or at least not seriously affect it.

Although I have shown and described two specific constructions, I want it understood that my invention is not limited to the exact details set forth, for my new spacing ring may be mechanically embodied in other forms than herein set forth by way of example.

I claim as my invention:

1. A double-walled vacuum receptacle in which the outer and inner glass cylinders are spaced by a one-piece open ring of spring metal provided with outwardly extending rounded humps suitably spaced and arranged to engage only the outer cylinder, said ring being so shaped that the inner cylinder is engaged only by those portions of the ring that are intermediate said humps, whereby said ring when inserted under tension into the space between said cylinders automatically adjusts itself into contact with both cylinders.

2. As a means for spacing the inner and outer cylinders of a double-walled vacuum receptacle, an open ring bent into shape from a straight piece of spring wire and formed with outwardly extending humps suitably spaced and arranged to engage only the outer cylinder, those portions of the ring between said humps being adapted to engage only the inner cylinder.

3. As a new article of manufacture for use in vacuum receptacles having outer and inner glass cylinders spaced to provide an annular vacuum chamber, a spacing member for said cylinders in said chamber consisting of an open ring bent into shape from a straight piece of spring band or ribbon which is formed with outwardly extending humps suitably spaced and arranged to engage only the outer cylinder, those portions of the ring between said humps being adapted to engage only the inner cylinder, said metal ring being heat-treated so that the heat used in the operations on said glass cylinders will not substantially affect the elasticity of said ring.

4. In a double-walled vacuum receptacle having inner and outer cylinders spaced to form an annular vacuum chamber, a spacing member for said cylinders in said vacuum chamber comprising a strip of spring metal bent to engage only the outer cylinder at certain points and to engage only the inner cylinder at points which are substantially intermediate the contact points of the outer cylinder, whereby said strip is in yield-

able engagement with said cylinders, said strip being under tension in said chamber and its ends being free so that the engaging portions of the strip automatically adjust themselves into contact with the cylinders.

5. A double-walled vacuum receptacle comprising an inner and outer cylinder, said cylinders being spaced to provide an annular vacuum chamber, a metal spacing spring mounted under tension in said chamber to space said cylinders, said spring being in the form of a polygon with free ends and so shaped that the corners of the polygon engage only the outer cylinder and the sides of the polygon engage only the inner cylinder, whereby said spring is in yieldable engagement with both cylinders.

6. A double-walled vacuum receptacle comprising an inner and outer cylinder, said cylinders being spaced to provide an annular vacuum chamber, and a tensioned metal spring bent to fit in said chamber and provided with a series of integral humps engaging only the outer cylinder, the spring sections between said humps engaging only the inner cylinder, said bent metal spring having free or open ends whereby the engaging portions of the spring automatically adjust themselves into contact with the cylinders irrespective of variations in the width of said chamber.

7. A double-walled vacuum receptacle comprising an inner and outer cylinder, said cylinders being spaced to provide an annular vacuum chamber, and an open circular spring of metal mounted under tension in said chamber and corrugated to provide a series of outwardly extending bends engaging only the outer cylinder and a series of inwardly extending bends engaging only the inner cylinder, the inner bends being radially displaced relatively to the outer bends, so that the open ends of said circular spring cause said outer and inner bends to adjust themselves automatically into contact with the cylinder when the spring is inserted into said chamber.

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