

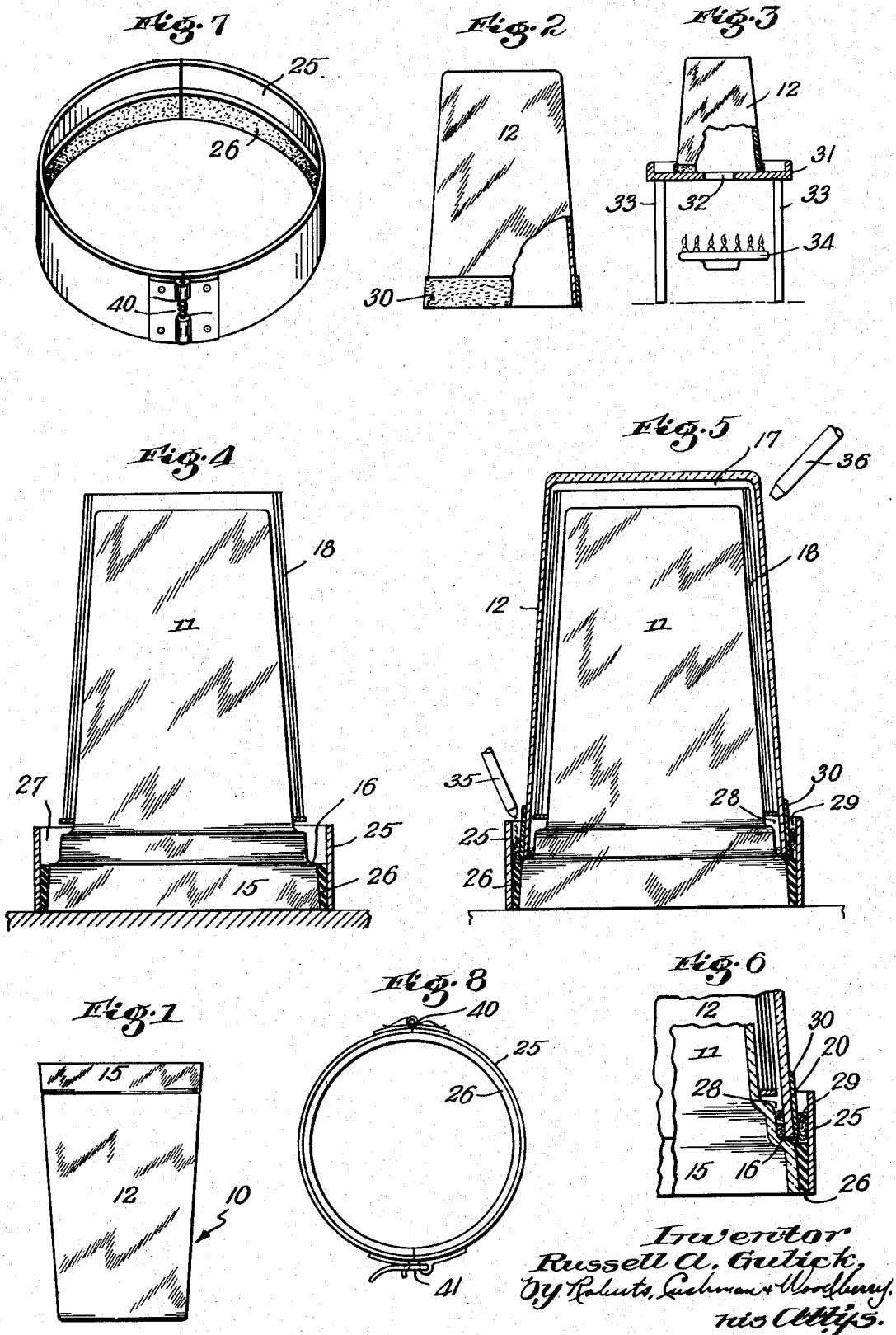
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METHOD OF MAKING DOUBLE WALLED VESSELS

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METHOD OF MAKING DOUBLE WALLED
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This invention relates to an improvement in the manufacture of double walled vessels of the type having nested inner and outer containers with a ring of cement in the circumferential space between the containers near their upper ends, such ring serving to connect the containers and seal the space therebetween. Such vessels are useful as containers for foods and liquids such as tumblers, cocktail shakers, ice pails, tea pots, butter dishes, etc.

The primary object of this invention is to provide a method of making such vessels which is simple and efficient in operation, which provides an effective seal between the two containers, and which may utilize any liquid or semi-plastic cement which is best suited to the material of which the containers are formed and the uses to which the resulting vessel is to be put. Other objects are to provide means for carrying out such method which are simple and inexpensive to construct, which are durable and reliable in operation and by which a satisfactory product is uniformly produced.

In one aspect the invention involves a method of making double walled vessels of the type having inner and outer containers nested together with a sealing space therebetween inside the mouth of the outer container and a cement gasket in the space, which comprises inverting both containers, forming a pool of cement around the inner container, immersing the edge of the outer container in the pool with some of the cement extending into said space, and then permitting the cement in the space to set.

In another aspect the invention involves a method of building a ring of cement for connecting the containers of a double walled vessel in which the inner container is nested in an outer container with the mouth of the inner container projecting beyond the mouth of the outer container to form the lip of the vessel, such ring of cement being in contact with the inner face of the outer container adjacent its mouth and the outer face of the inner container along an annular zone below the mouth thereof and separated from the lip by an annular shoulder. Specifically the method comprises the following steps: The lip portion of the inner container is surrounded by a metal ring which includes a band of rubber or other compressible material which covers the outer surface of the lip up to said shoulder while the ring extends a substantial distance beyond said shoulder. The outer surface of the mouth of the outer container is masked, the temperature of the con-

tainer is raised by any suitable means and the heated container nested with the inner container with its mouth within said ring and resting upon the shoulder of the inner container.

5 A predetermined quantity of cement in fluid condition is introduced into the space provided between the outer surface of the outer container and the ring, and the outer container is cooled to lower its temperature rapidly. When the
10 containers are nested, the heat emanating from the outer container raises the temperature of the air in the space between the containers, and the expansion of the air results in expelling some of the air from the space. This action
15 takes place before the cement is introduced into the space between the outer container and the ring. The cooling of the outer container reverses the action, the differential in air pressure causing the cement to be drawn into the space
20 between the mouth of the outer container to form a gasket which completely seals the space between the containers.

The cement used to form the gasket is preferably of the type which hardens relatively
25 slowly, i. e., from twenty to twenty-four hours at room temperature before it completely sets. During this setting period the ring and masking tape are removed from the vessel. The ring is removed as soon as the initial setting has taken
30 place, usually after from ten to twenty minutes; and the tape is stripped off when the cement has set to such an extent that the vessel can be handled without injury to the seal, and while the cement is still soft enough so that any excess on the outer surface of the vessel can be
35 dislodged easily with abrasive or solvent, a suitable tool, such as a narrow blade, may be used to remove and trim any excess cement in the crack along the line of contact between the shoulder 16 of the inner container 11 and the rim of the outer container 12.

These and other objects of the invention will appear from an examination of the following description and of the accompanying drawing
40 in which:

Fig. 1 is a view in elevation of a double walled vessel made in accordance with this invention;

Fig. 2 is a view in elevation partly broken away of the outer container of a vessel to which
50 a strip of masking tape has been applied;

Fig. 3 is a view in elevation with parts in section of the outer container being heated.

Fig. 4 is a view in elevation of an inner container partly in section with a ring mounted
55 thereon;

Fig. 5 is a view similar to Fig. 4 with the containers nested, and the cement being supplied to the space between the outer container and the ring;

Fig. 6 is a sectional view of one corner of the vessel with the ring of cement in final position;

Fig. 7 is a perspective view of the ring adapted to be mounted upon the inner container as shown in Fig. 4; and

Fig. 8 is a top plan view of such ring.

The invention will be described as employed in the manufacture of a double walled vessel 10 which comprises an inner container 11 nested within an outer container 12. When the containers are nested, the mouth of the inner container projects beyond the mouth of the outer container to form a lip 15 defined at its lower edge by an annular shoulder 16. The lip 15 is preferably of such diameter that its outer surface forms a continuation of the outer surface of the outer container with the mouth of the outer container adjacent to or in contact with the shoulder 16.

In the drawing, the lip 15 of the inner container is shown of such length that when the containers are assembled it extends an appreciable distance beyond the mouth of the outer container. However, it will be understood that the lip may be of any length desired, depending, for example, upon the use to which the vessel is intended to be put. In fact, the lip 15 may, under certain conditions, terminate at the shoulder 16.

The outer container 12 is out of contact with the inner container except possibly at the shoulder 16, thus providing a space 17 in which may be placed suitable insulating material 18. The space 17 has an annular outlet defined by the mouth of the outer container 12 and the adjacent wall of the inner container 11. A gasket 20 in such outlet having contact with the inner surface of the outer container adjacent its mouth and the outer surface of the inner container adjacent the shoulder 16 seals the space 17 and connects the containers.

The method and means by which the gasket 20 is formed in situ constitutes the present invention. In brief, the gasket 20 is preferably of liquid or semi-plastic cement which possesses the property of plasticity whereby uniform distribution may be obtained at the time the gasket is formed and which thereafter slowly solidifies and hardens and which should possess the following characteristics: good adhesion to the containers, approximately the same coefficient of expansion as the material from which the containers are formed; substantially no shrinkage or expansion on setting; resistant to water and preferably also to alcohol; and substantially non-porous.

The lip 15 of the inner container is surrounded by a ring 25 usually and preferably of metal having an inner lining 26 of rubber or other compressible material. The lining 26 covers the outer surface of the lip and forms with the shoulder 16 the bottom of an annular channel 27 open at the top and having side walls formed by the outer surface of the inner container and the portion of the ring 25 beyond the lining 26. (See Fig. 4.)

When the outer container is nested with an inner container having its lip surrounded by the ring 25, the mouth of the outer container enters the channel 27, as shown, and divides it into inner and outer pockets 28 and 29, respectively, in Fig. 5. Previous to such nesting, however, the

outer surface of the outer container adjacent its mouth is covered or masked as by a strip of tape 30 (Fig. 2), and thereafter is heated as shown in Fig. 3. The heating means employed comprises a table 31 having a central opening 32 therein and supported on legs 33. The opening 32 in the table 31 may be omitted if desired. Suitable heating means, such as a burner 34 for gas or oil, is mounted below the table 31. The outer container is inverted on the table 31 and remains there until its temperature has been raised to the extent found to be desirable.

The heated outer container is thereupon nested with the inner container as shown in Fig. 5. The heat emanating from the outer container acts to raise the temperature of the air trapped in the space 17, causing it to expand rapidly so that an appreciable portion of the air, thus heated and expanded, escapes from the space 17 through the pockets 28 and 29 since the edge of the outer container rests lightly only on the shoulder 16.

A predetermined amount of cement is now fed into the pocket 29 as by a nozzle 35, and at the same time or shortly thereafter the temperature of the outer container 12 is lowered by any suitable cooling means such as a blast of cold air through a nozzle 36 or by a fan or by applying ice directly to the bottom wall of the container or by suitable means. The cement is usually of such consistency that it flows very slowly, and hence either the nozzle 35 is moved around the vessel or the vessel is rotated so that the entire pocket 29 is uniformly supplied with cement. The cooling of the previously heated and expanded air remaining in the space 17 causes contraction of that air so that the fluid cement in the pocket 29 not only flows into the pocket 28 but is in fact forced into the pocket 28 by the pressure exerted by the outside air. The amount of cement fed to the pocket 29 is such that the pocket 28 is, as shown in Fig. 6, substantially filled evenly by the cement which, when it has set, forms the gasket 20.

The setting of the cement takes place while the vessel 10 is allowed to stand through a period of twenty to twenty-four hours at room temperature, which period may, if desired, be reduced by the application of heat. During this setting period, the ring 25, masking tape 30 and any excess cement left on the outer surface of the vessel are removed so that when the cement has completely set the vessel is finished. The ring 25 is detached from the inner container as soon as the cement has started to set, usually after the vessel has stood from ten to twenty minutes. This is a relatively simple operation, the ring being, as set forth below, so constructed that it can be detached without materially disturbing the relation of the containers. The removal of the masking tape and the excess cement requires much more handling of the vessel and hence is delayed until the cement has set sufficiently so that the seal will not be broken or the connection of the cement with the containers will not be impaired. It has been found that, with a cement which forms a proper gasket, the vessel should be allowed to stand approximately four hours at normal room temperature after the ring has been detached before this second handling takes place.

The ring 25 may be of any desired construction to facilitate its application to and removal from the lip 15. The form of ring 25 shown in the drawing has proven satisfactory and comprises two semi-circular bands permanently joined at

one end by a spring hinge 40 and removably connected at the other end by a latch 41.

Another and easier method of forming the gasket 20 will now be described. After the ring 25 has been mounted on the inner container 11 (see Fig. 4), cement in semi-plastic condition is supplied to the channel 27 in the form of a non-continuous band having one or more gaps therein. The unheated outer container 12 having the masking tape 30 thereon is then nested with the inner container, its mouth being forced into the mass of cement until it reaches the shoulder 16. The excess air trapped between the walls of the containers escapes through the gap or gaps in the cement band and then a relative rotation of the containers is set up to cause the cement to close the gap or gaps and thus form continuous pools of cement in the pockets 28 and 29. The cement in the pocket 28 when set forms the gasket 20 by which the space 17 is sealed and the containers 11 and 12 are connected. The detaching of the ring 25, stripping off of the masking tape 30 and removing of the excess cement are performed in the manner previously described.

From the foregoing it will be evident that instead of telescoping the two containers together before the cement is poured into the channel 27, the cement may be poured in before the outer container is nested. In either case a pool of cement is formed around the inner container and the edge of the outer container is immersed in the pool.

It will be noted that in both embodiments of the invention described in detail an essential feature of the invention is the removal of air from the space 17 and its replacement by the gasket 20. In the first method this feature is attained by varying the temperature of the air in the space 17, first raising the temperature to expand the air and expel the excess through the outlet, and then lowering the temperature to contract the air and set up a differential in air pressure which causes the cement to enter and form the gasket 20.

In the second method the cement is first supplied to the channel 27 in the form of a non-continuous band so that when the lip of the inverted container 12 enters the channel the cement partially fills the space 17, and the air thus displaced is expelled through the gap or gaps in the band. Upon completion of this movement a relative rotation of the containers causes the cement in the space 17 to close the gap or gaps and form the gasket 20.

While two embodiments of this invention have been described in detail, it will be understood that the invention is not limited thereto, and that the invention includes other embodiments which fall within the spirit and scope of the following claims.

I claim:

1. In the art of making double walled vessels of the type including inner and outer containers nested together and a gasket sealing the outlet of the space between the two containers, the mouth of the inner container projecting below the mouth of the outer container, that method which comprises telescoping the two containers together, mounting upon the mouth of the inner container a ring which forms an annular channel with the outer face of the inner container, the mouth of the outer container entering said channel and defining with the inner container the outlet from said space, and forming a pool of ce-

ment in said channel to close the outlet to said space and form a gasket in said outlet.

2. In the art of making double walled vessels of the type having inner and outer containers nested together with an annular space therebetween having an annular outlet at the mouth of the outer container and a cement gasket in said space by which the containers are connected and the outlet of the space is sealed, the method which comprises the steps of nesting the containers in an inverted position, introducing a non-continuous band of cement having a gap therein into said space, the air displaced by the cement being expelled from the space through the gap in the band of cement and setting up relative rotation between said containers to close said gap.

3. In the art of making double walled vessels of the type including inner and outer containers nested together and a gasket sealing the outlet of the space between the two containers, the mouth of the inner container having a lip projecting below the mouth of the outer container, that method which comprises mounting upon the mouth of the inner container a ring which forms an annular channel with the outer face of the inner container, forming in said channel a non-continuous band of cement having at least one gap therein, nesting the two containers, the mouth of the outer container entering the band of cement in the channel and defining with the inner container the outlet from said space, and setting up relative rotation between the containers to close the gap in the cement and form a continuous band of cement which seals the outlet.

4. In the art of making double walled vessels of the type including inner and outer containers nested together and a cement gasket sealing the outlet of the space between the two containers, the method which comprises telescoping the two containers together, applying fluid cement to said outlet, and producing a difference of pressure inside and outside said space, with the outside pressure greater than the inside pressure, to cause the cement to flow into the outlet.

5. In the art of making double walled vessels of the type including inner and outer containers nested together and a cement gasket sealing the outlet of the space between the two containers, the method which comprises telescoping the two containers together, with the nested containers in inverted position immersing said outlet in a pool of cement, and producing a difference of pressure inside and outside said space, with the outside pressure greater than the inside pressure, to cause the cement to flow into the outlet.

6. In the art of making double walled vessels of the type including inner and outer containers nested together and a cement gasket sealing the outlet of the space between the two containers, the mouth of the inner container projecting beyond the mouth of the outer container, the method which comprises telescoping the two containers together, applying a cement holder around the mouth of the inner container in close contact with its outer surface adjacent said outlet, the holder overlapping the end of the outer container with an annular channel therebetween, with the nested containers in inverted position pouring liquid cement into said channel to a depth sufficient to cover said outlet, and producing a difference of pressure inside and outside said space, with the outside pressure greater than the inside pressure, to cause the cement to flow into the outlet.

7. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, which method comprises the following steps: nesting the inner and outer containers, expanding the air in the space between the containers, supplying a body of cement in fluid condition at the outlet of said space and contracting the air in said space whereby the differential in air pressure causes cement to enter the outlet and form a gasket between the containers.

8. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, which method comprises the following steps: nesting the inner and outer containers, heating the air in the space between the containers, supplying a body of cement in fluid condition at the outlet of said space and chilling the air in said space, whereby the differential in air pressure set up by the cooling air causes cement to enter the outlet and forms a gasket between the containers.

9. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, the mouth of the inner container projecting beyond the mouth of the outer container, which method comprises the following steps: mounting a ring upon the mouth of the inner container, nesting the containers, the mouth of the outer container being surrounded by said ring to define an annular pocket, expanding the air in the space between the containers, supplying cement in fluid condition to said pocket, which cement covers the outlet of said space and contracting the air in said space whereby the differential in air pressure causes cement from the pocket to enter through said outlet and form a gasket between the containers.

10. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, which method comprises the following steps: heating one of the containers, nesting the containers, supplying a body of cement in fluid condition at the outlet of said space and cooling the heated container whereby the air in the space is cooled and the differential in air pressure thus set up causes cement to enter the outlet and form a gasket between the containers.

11. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a

5 cement gasket connecting the opposed faces of the containers and sealing said space, the mouth of the inner container projecting beyond the mouth of the outer container and forming a lip, which method comprises the following steps: mounting a ring on the outer surface of said lip, which ring projects rearwardly from the mouth of the container, heating one of the containers, nesting the containers, the mouth of the outer container being surrounded by said ring and forming a pocket therewith, supplying cement in fluid condition to said pocket, which cement covers the outlet of said space and cooling the containers whereby the air in the space is cooled and the differential in air pressure thus set up causes cement in the pocket to enter through said outlet and form a gasket between the containers.

12. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, the mouth of the inner container projecting beyond the mouth of the outer container and forming a lip, which method comprises the following steps: mounting a ring on the outer surface of said lip, which ring projects rearwardly from the mouth of the container, heating one of the containers, nesting the containers, the mouth of the outer container being surrounded by said ring and forming a pocket therewith, supplying cement in fluid condition to said pocket, which cement covers the outlet of said space and cooling the heated container whereby the air in the space is cooled, and the differential in air pressure thus set up causes cement in the pocket to enter through said outlet and form a gasket between the containers.

13. The method of making double walled vessels of the type including inner and outer containers nested with a space therebetween and a cement gasket connecting the opposed faces of the containers and sealing said space, the mouth of the inner container projecting beyond the mouth of the outer container and forming a lip, which method comprises the following steps: mounting a ring on the outer surface of said lip, which ring projects rearwardly from the mouth of the container, heating the outer container, nesting the containers, the mouth of the outer container being surrounded by said ring and forming a pocket therewith, supplying cement in fluid condition to said pocket, which cement covers the outlet of said space and cooling the outer container whereby the air in the space is cooled and the differential in air pressure thus set up causes cement in the pocket to enter through the outlet and form a gasket between the containers.

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