United States Patent [19]

Doman et al.

[11] **3,755,030**

[45] **Aug. 28, 1973**

[54] **METHOD OF MAKING A COOLING CONTAINER BY FRICTION WELDING**

[75] Inventors: **Donald W. Doman**, Janesville; **Kenneth M. Douglas**, Sun Prairie; **Leroy W. Mason; Lawrence K. Sauey**, both of Baraboo, all of Wis.

[73] Assignee: **Flambeau Products Corporation**, Baraboo, Wis.

[22] Filed: **Oct. 13, 1971**

[21] Appl. No.: **188,889**

[52] **U.S. Cl.** **156/73**, 215/12

[51] **Int. Cl.** **B29c 27/08**, B65d 11/16

[58] **Field of Search** 156/73, 146; 215/12

[56] **References Cited**

UNITED STATES PATENTS

3,120,570	2/1964	Kennedy et al.	156/73
3,580,762	5/1971	Zumstein	156/73
3,244,574	4/1966	Decker et al.	156/73
3,261,516	7/1966	Allen	156/73

Primary Examiner—Douglas J. Drummond

Attorney—A. N. Molinare, Timothy J. Malloy et al.

[57] **ABSTRACT**

A product and process relating to the formation of a slush mug assembly are provided according to this invention. The slush mug is utilized to chill liquid beverages and the like for prolonged periods in relatively warm temperatures. The product and process particularly relate to a spin-welded joint for sealing a container to retain a refrigerant between the walls of the container.

1 Claim, 4 Drawing Figures

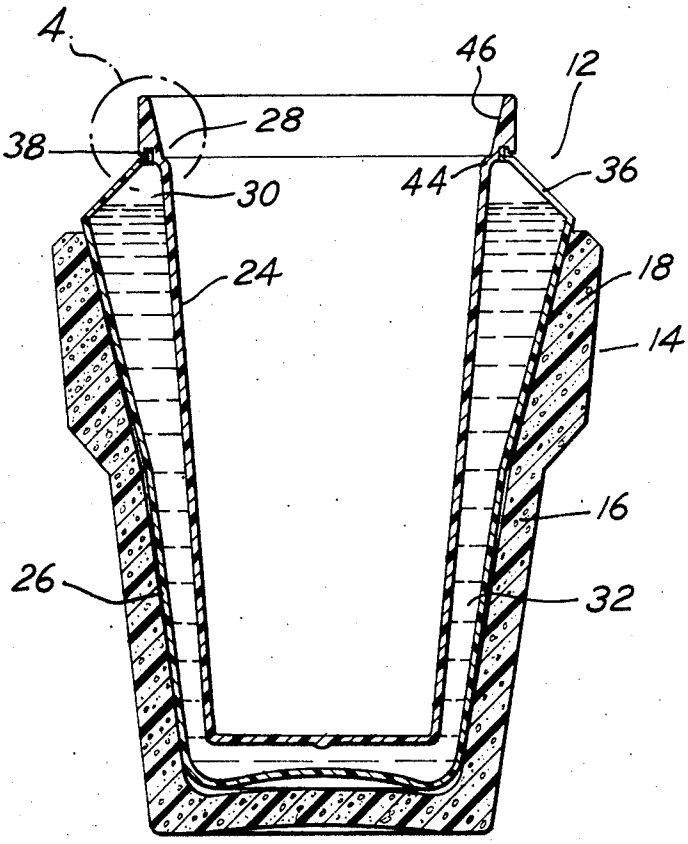


Fig. 1

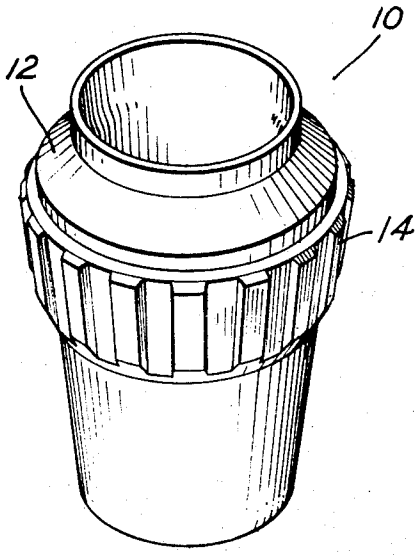


Fig. 2

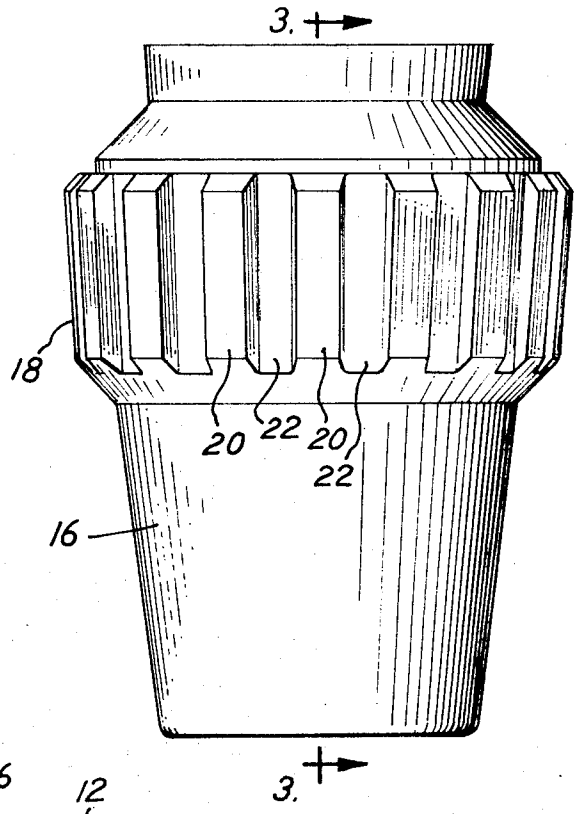


Fig. 3

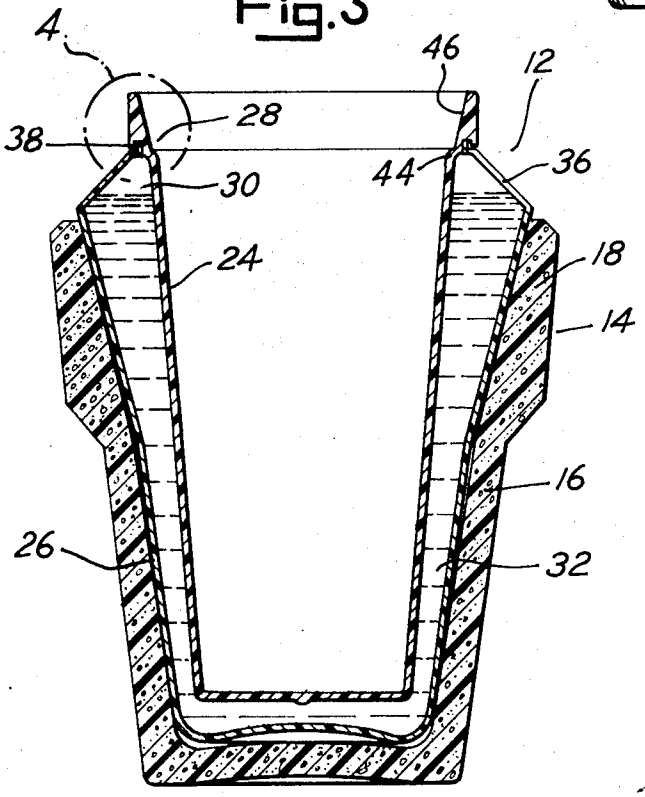
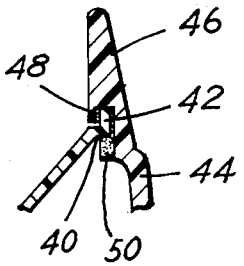


Fig. 4



INVENTORS
DONALD W. DOMAN,
KENNETH M. DOUGLAS,
BY LEROY W. MASON &
LAWRENCE K. SAUEY
Molinare, Allegretti,
Newitt & Witcoff ATTORNEYS

METHOD OF MAKING A COOLING CONTAINER BY FRICTION WELDING

BACKGROUND OF THE INVENTION

This invention relates generally to a slush mug assembly and the method of forming same. This slush mug assembly is utilized for the purpose of maintaining a refreshing beverage chilled when exposed to ambient temperatures for prolonged periods of time. Generally speaking, a slush mug is a mug for retaining a beverage which may be poured into the mug itself or which may be held in a separate container, with container placed into the mug. Such a mug utilizes a refrigerant of the type capable of changing state when exposed for a period of time to a temperature which is commonly maintained in a household freezer. Such temperatures are generally in the area of 30° F. and below. After the mug is chilled sufficiently, it may be withdrawn from the freezer or other cooling device and used to maintain a beverage in a chilled condition. This type of mug will often generate a "slush" in the beverage which is cool and refreshing. When beverages are served in warm or hot weather, the mug will chill the beverage and eliminate the need for ice-cubes which dilute and weaken the drink. This type of mug has been known and used in the prior art.

This invention is directed principally toward a joint and method of forming a joint between inner and outer portions of a container. Accordingly, it is a general object of the present invention to provide an assembly and method of forming the same which may be formed from an inner and outer shell. It is also an object of the present invention to provide such an assembly and method of forming same which is both economical and efficient. It is also an object of the present invention to provide a joint for the inner and outer shells making up the container which may be readily spin-welded together to form a tight joint to prevent leakage of the refrigerant held between the shells.

SUMMARY OF THE INVENTION

The present invention principally relates to a joint and method of forming the same for sealing inner and outer shells to form a container. The outer shell is constructed having a lip on the upper periphery thereof, formed by an inwardly extending horizontal ledge and an annular upwardly extending rim connected to the inner portion of the horizontal ledge. A second lip is formed on the upper periphery of the inner shell having a downwardly extending annular recess defined therein and adapted to receive the upwardly extending rim of the lip of the outer shell. Connected to the inner shell, between the shell and the lip for the inner shell, is an annular flange portion tapered outwardly from the inner shell.

The two shells are formed of thermoplastic material such as polypropylene, or the like and the liners are spin-welded to form a second ledge directly beneath the first horizontal ledge of the outer shell and adjacent thereto, to provide a tight joint for the two shells.

BRIEF DESCRIPTION OF DRAWINGS

There follows a brief description of the drawings showing a presently preferred embodiment of the present invention, wherein:

FIG. 1 is a perspective view of the slush mug of the present invention;

FIG. 2 is a side elevation view of the slush mug of FIG. 1;

FIG. 3 is a cross sectional view of the slush mug of FIG. 2 taken substantially along the lines 3—3 before the mug is spin-welded; and

FIG. 4 is an enlarged view of the upper joint portion of the slush mug shown in FIG. 3 after the mug is spin-welded.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring generally to FIGS. 1 and 2, there is shown a slush mug **10.** Slush mug **10** includes container **12,** which will be more fully described later and a jacket **14** adapted to snugly receive the container **12** therein. The jacket **14** is formed of a material having low heat conductive properties such as styrafoam. The jacket includes a base section **16** tapered outwardly having generally a circular cross-sectional shape. Connected to the base section **16** is an upper section **18** somewhat greater in a cross-sectional area than section **16** and having ridges **20** defined around the periphery thereof and spaced apart by recesses **22.** As will be seen more fully, the styrafoam jacket **14** is used principally as a receiver for the container **12** of the slush mug **10.**

The container **12** is used to chill its contents, such as a beverage or the like, for prolonged periods of time at ambient temperatures. The outer styrafoam jacket **14** also functions to reduce moisture build-up which would otherwise occur because of condensation of moisture at the walls of the chilled container **12.**

Referring now generally to FIG. 3, the base section **16** of the jacket **14** is integral with the upper section **18** of the jacket **14.** It may also be seen that the jacket **14** is shaped to snugly receive the container **12** therein. The container **12** is assembled from two separate shells **24** and **26.** These shells **24** and **26** are substantially circular in cross-sectional shape and are sealed along the upper peripheries thereof by a joint **28,** the construction and formation thereof, which will be described later.

When the inner and outer shells **24** and **26** of the container **12** are sealed, they define an elongated annular cavity **30** there between. The cavity **30** is utilized to retain a refrigerant **32** which will change state somewhere between ambient temperature and the temperatures commonly developed in a common household freezer. An example of the makeup of such a refrigerant is as follows:

Meth p-Hydrozybenzoate	0.1%
Sodium Chloride	5.0%
Sodium Borate (technical grade)	0.7%
Water-soluble Cellulose Ether	4.0%
Water	90.2%

In order to utilize the slush mug **10** of the present invention the container **12** housing a refrigerant **32** of the type generally described between the walls of the container **12,** should be placed in a freezer or other area of low temperature for a period of time, for example, several hours. During this time, the refrigerant **32** changes state from a liquid to a solid or partial solid and when it is removed for use, provides a low-temperature reservoir capable of chilling a beverage for up to several hours or more even in hot weather. Accordingly, when a beverage or the like is placed into the container **12,** the beverage will be maintained substantially chilled for prolonged periods of time at ambient tem-

peratures. It has been found that the beverage will often form a slush due to the chilling effect of the refrigerant 32 thereon.

CONTAINER JOINT AND METHOD OF FORMING SAME

Referring generally to FIG. 3 the container 12 may be formed in the following manner. First, the outer shell 26 is blow-molded in accordance with a process well known in the prior art. This shell 26 may be formed of a thermoplastic material such as polypropylene or polystyrene. The outer shell 26 of the container 12 has a substantially circular cross-sectional shape and it tapers outwardly from its base 34 upwards. At the upper portion of the shell 26 is an annular collar 36 directed inwardly of the container 12. On the inner periphery of the collar 36, and formed intergal therewith, is an annular lip member 38 formed by a first horizontal ledge 40 extending inwardly towards the center of the container 12 and an annular vertical rim 42 extending upwardly from and connected to, the inner portion of the ledge 40.

The inner shell 24 of the container 12 is formed by injection molding or other suitable means, well known in the art. The inner shell 24 is adapted to fit within the outer shell 26 and to define the cavity 30 therebetween.

Formed on the upper periphery of the inner shell 24 is an annular flange portion 44 tapered outwardly of the center of the container 12. Connected to this flange portion 44 is a second annular lip 46 formed intergal with the flange 44. Lip 46 includes a vertical annular recess 48 downwardly inclined and adapted to receive the upwardly extending rim 42 of the lip 38.

After the inner and outer shells 24 and 26 of the container 12 have been formed, the outer shell 26 is filled with a predetermined amount of refrigerant gel. Then, the inner shell 24 is inserted from above into the outer shell 26 with the upwardly extending rim 42 of the lip 38 fitting into the recess 48. This causes the predetermined amount of refrigerant 32 to be forced upwardly within the cavity 30 formed between the shells 24 and 26.

After the inner shell 24 has been inserted into the outer shell 26 as described, the shells 24 and 26 of the container 12 are spin-welded by rapid rotation of the shells 24 and 26 at an elevated temperature. The recommended temperature for spin-welding is approximately 270° F. Prior to spin-welding to form the joint 28, the first horizontal ledge 40 extends somewhat below the upper portion of the flange 44 and the recess 48 of the lip 46 is slightly wider than the upwardly extending rim 42 so that the rim 42 may be easily inserted into the recess 48 for easy and efficient assembly. During the spin-welding step, surplus material from the upper portion of the lip 46 of inner shell 24 moves outwardly to fill the gap left by the upwardly extending rim 42 in the recess 48 as may be seen in FIG. 4. Also, the first horizontal ledge 40 of the lip 38 is stretched somewhat outwardly of container 12 to effect a tighter seal of the lip 38 within the recess 48. At the same time, material from the flange portion 44 of the inner shell 24 is forced outwardly against the first horizontal ledge 40 of the lip 38. This material forms a second annular ledge 50 extending beneath and adjacent to the first horizontal ledge 40 of the lip 38. The ledge 50 produces a secure mechanical lock at the joint 28 of the rim 42 within the recess 48, as may be seen in FIG. 4. Accordingly, a secure, fluid tight joint 28 is formed in accordance with this invention, to seal the refrigerant 32 in the cavity 30 of the container 12.

It is to be understood that the embodiment of the present invention which has been described is merely illustrative of one application of the principles of the invention. Numerous modifications may be made to the disclosed embodiment without departing from the true spirit and scope of the invention.

What is claimed is:

1. A method for constructing a cooling container comprising the steps of:

forming an outer shell for said container, said outer shell having a protruding annular lip at the upper end thereof, said lip including a first annular horizontal ledge extending inwardly toward the center of said container and a vertical annular rim extending upwardly from and connected to the inner portion of said first ledge;

forming an inner shell for said container adapted to fit within said outer shell having an annular lip and an outwardly tapered annular flange connected between the outer periphery of said inner shell and said lip of said inner shell, said lip having a downwardly extending recess adapted to receive the lip of said outer shell;

filling a predetermined portion of said outer shell with a refrigerant;

inserting the inner shell into said outer shell with the lip of said outer shell fitting within the recess of said inner shell;

spinning said inner and outer shells at an elevated temperature to weld the inner shell to the outer shell at the interface between the lips of said sections; and

drawing a portion of said flange of said inner shell outwardly of the container to form a second ledge beneath and adjacent to the first ledge whereby an additional mechanical interlock between the inner and outer shells of said container is provided and a seal is formed to retain the refrigerant between the walls of said shells.

* * * * *