

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) A METHOD FOR SEALING A METAL CONTAINER OR TUBE AND A CONTAINER OR TUBE SEALED BY THE METHOD

(71) We, BRISTOL-MYERS COMPANY, incorporated in the State of Delaware, United States of America, having its principal office at 345 Park Avenue, New York, New York, 10022, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a method of sealing a metal container or tube including an outer receptacle and an internal receptacle member.

- When sealing containers including an outer receptacle and an internal receptacle member and having a peripheral edge extending along the inner side of the terminal end portion of the container, it has been usual practice to join the two parts by welding, so that the container is able to resist a certain internal pressure. However, in some cases an internal receptacle member has been secured in a container by means of a metal ring which is bent tightly around the side by side arranged edge portions of the outer and internal receptacles. For instance, such a sealing method is used for sealing of known heaters for hair curlers having a closed tubular container, one end of which is closed by a case extending into the container and forming an inner wall, defining the internal container space, i.e. the annular space between the walls, which is at least partly filled with a heat retaining substance, said substance being heated before the curler is used. Even if the containers which are used as hair curler heaters and which are sealed by a metal ring in this manner, are able to resist the internal pressure arising during heating of the container, it is still desirable to be able to produce an effective tight sealing without the use of a metal ring and in a simple and economic manner without the use of welding or other expensive sealing

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methods. It is now possible to save not only an extra working operation and material for the ring, but it is also possible to obtain a better space utilization adjacent the joint as well as to eliminate the risk of galvanic corrosion by using metal ring which usually is made from a different material from the container.

The invention is concerned with providing a simple and cheap method of sealing containers, providing a container able to resist a high internal pressure, and especially a container of the above mentioned type for use in heating hair curlers.

From one aspect the present invention provides a method of sealing the terminal edge portions of a metallic container or tube, said container including an outer receptacle and an internal receptacle member, and said internal receptacle member having a terminal edge portion whose outside dimension is slightly larger than the inside dimension of the terminal edge portion of said outer receptacle, comprising inserting said internal receptacle member into said outer receptacle, the receptacle and receptacle member being so formed, that, when so inserted, a space exists between the walls of said internal receptacle member and said outer receptacle and the terminal edge portion of said internal receptacle member is in sealing engagement with the corresponding portion of said outer receptacle and impressed against said outer receptacle wall to cause a slight deformation in one or both opposing surfaces, said internal receptacle member being inserted to a position so that the terminal edge portion of the outer receptacle projects a little beyond the terminal edge portion of said internal receptacle member, and bending this projecting edge portion over the edge portion of said internal receptacle member.

Surprisingly it has proved that the joint between the outer receptacle and the internal

receptacle member produced by this simple method is more safe and more effective than joints provided with a metallic ring and needs correspondingly lesser check of the correct accomplishment of the joint. As an example it may be mentioned that experiments have shown that heaters for hair curlers, in which during normal use by heating there is produced a pressure at about 3 to 4 atm., have been able to resist pressures about up to 18 atm. without the joint between the two receptacles becoming leaky. Since the joint is made without the use of a special metal ring, savings of material and labour can be obtained and the risk of galvanic corrosion owing to the metal ring is eliminated. The heavy metals which are used for metallic sealing rings in the known sealing methods are inclined to react with plastics materials, and it is an advantage of the method according to the present invention that this risk has also been entirely eliminated.

Usually the container will be a straight circular cylinder and the edge portion of the internal receptacle member will be a cylindrical surface, the outer diameter of which being slightly bigger than the internal diameter of the container. However, the method may also be used for the sealing of containers having for instance elliptical or oval cross section or prismatic containers having rounded edges. Further securing and tight bonding of the edge portions may be obtained when the extending terminal edge portion of the outer receptacle is bent over the peripheral edge of the internal receptacle member so that it bears tightly against a part of the inner surface hereof. The bent edge portion coacts with the forces between the abutting faces of the edge portions to prevent the internal member from being forced out of the outer receptacle, when a super-atmospheric pressure is produced therein.

When using materials having a uniform structure, and a constant pressure of impressing is used during assembly, the internal member is pressed an exactly pre-determined length into the outer receptacle. Further to ensure that the internal member is pressed an exact distance, so that the height of the projecting terminal edge portions of the container is always the same, it may sometimes be advantageous to form a bead in the wall of the outer receptacle. This also aids in strengthening the outer receptacle.

The method may be used for sealing a container having the form of a double-walled tube, the annular chamber of which is closed at both ends. In such a case, the internal receptacle member is tubular and its opposite end portions having different outside diameters are impressed in the corresponding opposite edge portions of the outer receptacle.

From another aspect the invention provides a metallic container including an outer receptacle and an internal receptacle member, a terminal edge portion of the internal receptacle member forming an interference fit with the corresponding portion of the outer receptacle, and the receptacle and receptacle member being so formed that a sealed space exists between the walls of the internal receptacle member and the outer receptacle; the terminal edge portion of the outer receptacle projecting a little beyond the terminal edge portion of the internal receptacle member and the terminal edge portion of the outer receptacle being bent over the terminal edge portion of the internal receptacle member.

The invention will now be described by way of example with reference to the accompanying drawing, in which:

Figure 1 shows a longitudinal section through one end of a container sealed by the method according to an embodiment of the invention; and

Figure 2 shows on a smaller scale a section through a container sealed in the manner shown in Figure 1.

Referring to the drawings, a metal container comprises an outer receptacle 1, defining an internal space 3. The space 3 is sealed by an internal receptacle member 2, which may be shaped like a case as shown in Figure 2, or just may be formed like a bowl. Alternatively, member 2 may be formed like a tube open at both ends, in which case the tubular metal container 1 is also formed open at both ends, and the closed space 3 comprises the annular space between the parts 1 and 2, which parts, at the end not shown in Figure 1 in this case, are joined together in the same manner as at the end shown in the Figure. However, in this case the outer dimension of the edge portion of the part 2 (not shown) is lesser in order that it may be introduced into the part 1.

The method of assembling the container is as follows: the member 2 is inserted in the receptacle 1 such that a terminal edge portion 4 of the receptacle 1 and an edge portion 5 of the internal member 2 are pressed tightly together with slight deformation. This deformation arises since prior to insertion, the outer diameter of the edge portion 5 is slightly greater than the inside diameter of the terminal edge portion 4. Thus, the member 2 is a friction or interference fit within the receptacle 1. After impression of the member 2 into the receptacle 1 the projecting portion 6 of the terminal edge portion 4 is bent inwardly about the outer-most portion of the edge portion 5 in tight connection therewith both at the outer and inner surface and at the edge itself. In the drawing the

portion 6 is shown bent at an angle of 180°, but experience has shown that for many purposes a satisfactory sealing is obtained by bending at an angle of 90° only.

- 5 For further stiffening of the wall of the metal receptacle 1, which is subjected to vigorous forces during sealing, a bead 7 is formed in the wall and serves also as abutment for the edge portion 5 of the member 10 2, when pressed into the container, whereby the length of the portion 6 which is to be bent is exactly determined.

- Although the joint between the internal receptacle member and the outer receptacle 15 is hermetically tight and sufficiently strong for most purposes, if desired, for further strengthening of the joint, intermediate packing material or glue between the joint surfaces may be used.

- 20 In the drawing, the internal member is shown having an S-shaped cross section, but it is evident that the wall of the receptacle 1 may also be formed with a corresponding S-shaped cross section, and that the edge 25 portion of the internal member in this case may either be S-shaped as shown or may be formed as a right cylinder, but with the edge portion 5 having slightly greater outside dimensions than the inside dimensions 30 of the terminal edge portion 4.

WHAT WE CLAIM IS:—

1. A method of sealing the terminal edge portions of a metallic container or tube, 35 said container or tube including an outer receptacle and an internal receptacle member, and said internal receptacle member having a terminal edge portion whose outside dimension is slightly larger than the 40 inside dimension of the terminal edge portion of said outer receptacle, comprising inserting said internal receptacle member into said outer receptacle, the receptacle and receptacle member being 45 to formed, that when so inserted a space exists between the walls of said internal receptacle member and said outer receptacle and the terminal edge portion of said internal receptacle member is in sealing engagement with the corresponding 50 portion of said outer receptacle and impressed against said outer receptacle wall to cause a slight deformation in one or both opposing surfaces, said internal receptacle 55 member being inserted to a position so that the terminal edge portion of the outer receptacle projects little beyond the terminal edge portion of said internal receptacle member, and bending this projecting edge 60 portion over the edge portion of said internal receptacle member.

2. A method according to Claim 1, wherein the projecting edge portion of the outer receptacle is bent at an angle of 180° 65 so that it grips around the edge portion of

the internal receptacle member and abuts tightly against a part of the inner surface thereof.

3. A method according to Claim 1 or Claim 2, wherein the outer receptacle is provided with a peripheral bead against which the internal receptacle member abuts.

4. A method according to Claim 1 or Claim 2, wherein the internal receptacle member is tubular and its opposite end portions having different outside diameters are 75 impressed in the corresponding opposite edge portions of the outer receptacle.

5. A metallic container or tube including an outer receptacle and an internal receptacle member, a terminal edge portion of the internal receptacle member forming an interference fit with the corresponding portion of the outer receptacle, and the receptacle and receptacle member being so formed that a 85 sealed space exists between the walls of the internal receptacle member and the outer receptacle; the terminal edge portion of the outer receptacle projecting a little beyond the terminal edge portion of the internal 90 receptacle member and the terminal edge portion of the outer receptacle being bent over the terminal edge portion of the internal receptacle member.

6. A container or tube according to Claim 5, wherein the terminal edge portion of the outer receptacle is bent at an angle of 180° so that it is located is sealing abutment with the outer surface as well as with the edge itself and with the inner surface of 100 the terminal edge portion of the internal receptacle member.

7. A container or tube according to Claim 5 or Claim 6, wherein the outer receptacle is provided with a peripheral 105 bead against which the internal receptacle member abuts.

8. A method of forming a double-walled container or tube substantially as hereinbefore described with reference to the 110 accompanying drawings.

9. A double-walled container or tube when made by the method according to any one of Claims 1 to 4 and 8.

10. A double-walled metallic container or 115 tube wherein an end portion of the inner wall is sealingly engaged with the outer wall, said end portion forming an interference fit with said outer wall and an end portion of said outer wall being bent into sealing 120 engagement with the end of said inner wall.

11. A double-walled container or tube according to Claim 10 wherein said inner wall is spaced from said outer wall by a portion of said inner wall flared inwardly 125 from said end portion thereof.

12. A double-walled container or tube according to Claim 11 wherein the shoulder formed by said flared portion abuts an internal beading in said outer wall. 130

portion 6 is shown bent at an angle of 180°, but experience has shown that for many purposes a satisfactory sealing is obtained by bending at an angle of 90° only.

- 5 For further stiffening of the wall of the metal receptacle 1, which is subjected to vigorous forces during sealing, a bead 7 is formed in the wall and serves also as abutment for the edge portion 5 of the member 2, when pressed into the container, whereby the length of the portion 6 which is to be bent is exactly determined.

- 15 Although the joint between the internal receptacle member and the outer receptacle is hermetically tight and sufficiently strong for most purposes, if desired, for further strengthening of the joint, intermediate packing material or glue between the joint surfaces may be used.

- 20 In the drawing, the internal member is shown having an S-shaped cross section, but it is evident that the wall of the receptacle 1 may also be formed with a corresponding S-shaped cross section, and that the edge portion of the internal member in this case may either be S-shaped as shown or may be formed as a right cylinder, but with the edge portion 5 having slightly greater outside dimensions than the inside dimensions of the terminal edge portion 4.

WHAT WE CLAIM IS:—

1. A method of sealing the terminal edge portions of a metallic container or tube, said container or tube including an outer receptacle and an internal receptacle member, and said internal receptacle member having a terminal edge portion whose outside dimension is slightly larger than the inside dimension of the terminal edge portion of said outer receptacle, comprising inserting said internal receptacle member into said outer receptacle, the receptacle and receptacle member being formed, that when so inserted a space exists between the walls of said internal receptacle member and said outer receptacle and the terminal edge portion of said internal receptacle member is in sealing engagement with the corresponding portion of said outer receptacle and impressed against said outer receptacle wall to cause a slight deformation in one or both opposing surfaces, said internal receptacle member being inserted to a position so that the terminal edge portion of the outer receptacle projects little beyond the terminal edge portion of said internal receptacle member, and bending this projecting edge portion over the edge portion of said internal receptacle member.

2. A method according to Claim 1, wherein the projecting edge portion of the outer receptacle is bent at an angle of 180° so that it grips around the edge portion of

the internal receptacle member and abuts tightly against a part of the inner surface thereof.

3. A method according to Claim 1 or Claim 2, wherein the outer receptacle is provided with a peripheral bead against which the internal receptacle member abuts.

4. A method according to Claim 1 or Claim 2, wherein the internal receptacle member is tubular and its opposite end portions having different outside diameters are impressed in the corresponding opposite edge portions of the outer receptacle.

5. A metallic container or tube including an outer receptacle and an internal receptacle member, a terminal edge portion of the internal receptacle member forming an interference fit with the corresponding portion of the outer receptacle, and the receptacle and receptacle member being so formed that a sealed space exists between the walls of the internal receptacle member and the outer receptacle; the terminal edge portion of the outer receptacle projecting a little beyond the terminal edge portion of the internal receptacle member and the terminal edge portion of the outer receptacle being bent over the terminal edge portion of the internal receptacle member.

6. A container or tube according to Claim 5, wherein the terminal edge portion of the outer receptacle is bent at an angle of 180° so that it is located sealing abutment with the outer surface as well as with the edge itself and with the inner surface of the terminal edge portion of the internal receptacle member.

7. A container or tube according to Claim 5 or Claim 6, wherein the outer receptacle is provided with a peripheral bead against which the internal receptacle member abuts.

8. A method of forming a double-walled container or tube substantially as hereinbefore described with reference to the accompanying drawings.

9. A double-walled container or tube when made by the method according to any one of Claims 1 to 4 and 8.

10. A double-walled metallic container or tube wherein an end portion of the inner wall is sealingly engaged with the outer wall, said end portion forming an interference fit with said outer wall and an end portion of said outer wall being bent into sealing engagement with the end of said inner wall.

11. A double-walled container or tube according to Claim 10 wherein said inner wall is spaced from said outer wall by a portion of said inner wall flared inwardly from said end portion thereof.

12. A double-walled container or tube according to Claim 11 wherein the shoulder formed by said flared portion abuts an internal beading in said outer wall.



13. A double-walled container or tube substantially as hereinbefore described with reference to the accompanying drawings.

14. A heater for a hair-curler comprising a double-walled container or tube according to any one of Claims 5 to 7 and 9 to 13.

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