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(54) Method and device for connecting a metal can body to a metal cover by means of a seam-folded connection

(57) A method for connecting a metal can body to a metal cover by means of a seam-folding operation comprises the following steps, to be performed in suitable sequence, of:

(a) providing a metal can body provided with a bottom;
(b) filling the body with hot food product;
(c) after an optional short injection of steam into the upper zone of the body above the food product, placing loosely on the mouth rim of the body a cover with a recessed central part and an elevated peripheral part in which a ring of sealing mass is pre-arranged;
(d) placing a seaming chuck in this recessed part with some clearance relative to the elevated peripheral part;
(e) pressing a pressure roller with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside; and
(f) performing step (e) at a temperature of at least the seaming chuck and the roller at which the sealing mass has a plasticity such that the total resulting seam-folded edge acquires a radial thickness corresponding with a nominal thickness within the set tolerance.

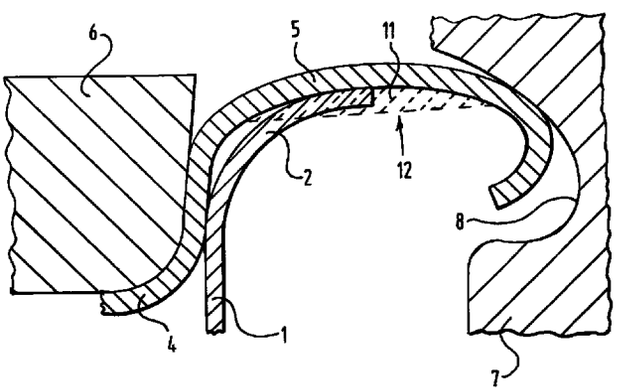

FIG. 1

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Description

A method is generally known for connecting a metal can body to a metal cover by means of a seam-folding operation, comprising the following steps, to be performed in suitable sequence, of:

(a) providing a metal can body provided with a bottom;
(b) filling the body with hot food product;
(c) after an optional short injection of steam into the upper zone of the body above the food product, placing loosely on the mouth rim of the body a cover with a recessed central part and an elevated peripheral part in which a ring of sealing mass is pre-arranged;
(d) placing a seaming chuck in this recessed part with some clearance relative to the elevated peripheral part; and
(e) pressing a pressure roller with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside.

It is found that the seam-folded edge obtained with this known method has a radial thickness which, within a set tolerance, does not always correspond with a nominal thickness. It occurs that a seam-folded edge has locally a considerably enlarged radial thickness. This implies that the seam-folded edge as a whole is insufficiently compressed locally and that there is the danger that locally the hermetic seal is not guaranteed.

The described undesirable phenomenon, which is designated a "bump seam", is not acceptable in respect of a possible, for instance bacterial, contamination from outside of the food product present in the closed can.

An accumulation of sealing mass has occurred in the zone of relatively great thickness.

Forming the basis of the invention to be described hereinbelow is the insight that, in the zone where the finished folded seam exhibits an increased thickness, an effective accumulation of sealing mass has occurred. The invention to be described hereinbelow therefore originates from the insight that the described undesirable phenomenon can be limited or even wholly eliminated if use is made of the relationship between specific relevant parameters which essentially determine the final form of the seam-folded edge.

According to the invention it is now of essential importance that the effective temperature in the zone of the seam-folding operation must have a relation with the plasticity-temperature characteristic of the sealing mass such that the described undesirable phenomenon does not occur.

It must generally be assumed that, during the operation in question. i.e. the effective forming and compressing of the seam-folded edge, the sealing mass may possess only a limited plasticity or deformability.

On the basis of the considerations stated very summarily in the foregoing, the invention now provides a method for connecting a metal can body to a metal cover by means of a seam-folding operation, comprising the following steps, to be performed in suitable sequence, of:

(a) providing a metal can body provided with a bottom;
(b) filling the body with hot food product;
(c) after an optional short injection of steam into the upper zone of the body above the food product, placing loosely on the mouth rim of the body a cover with a recessed central part and an elevated peripheral part in which a ring of sealing mass is pre-arranged;
(d) placing a seaming chuck in this recessed part with some clearance relative to the elevated peripheral part;
(e) pressing a pressure roller with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside; and
(f) performing step (e) at a temperature of at least the seaming chuck and the roller at which the sealing mass has a plasticity such that the total resulting seam-folded edge acquires a radial thickness corresponding with a nominal thickness within the set tolerance.

A specific method according to the invention comprises step

(g) choosing a sealing mass which has said plasticity at an operating temperature which is considerably increased relative to the environment, for instance 90°-130°C.

An alternative method has step

(h) choosing a sealing mass which has said plasticity at an operating temperature which is increased to a limited extent relative to the environment, for instance 40°-60°C; and
(i) cooling at least the seaming chuck and the roller to a temperature in the vicinity of said temperature.

The advantage of the latter specified method is that it is performed with a known and usual sealing mass. A drawback could be discerned in the fact that use must be made of a cooling process.

The latter specified method can advantageously comprise step

(j) performing step (i) by carrying therealong a relatively cold flow of medium, for instance a liquid such

as water, or a gas such as air.

The invention further relates to a device for connecting a metal can body to a metal cover by means of a seam-folding operation for applying the method as according to any of the foregoing claims, which device comprises:

a seaming chuck for placing in the recessed central part of the cover with some clearance relative to an elevated peripheral part thereof;
means for loose placing of a cover with a recessed central part on the mouth rim of the body; and
a pressure roller for pressing with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside
which device is provided with cooling means for cooling the seaming chuck and/or the roller.

The cooling means can be of any suitable type. A relatively cold flow of medium, for instance a liquid such as water, or a gas such as air can for instance be used. Continuous cooling of the relevant surfaces of the seaming chuck and/or roller can also be provided. Although probably not the most practical option, it is nevertheless noted for the sake of completeness that cooling channels can be arranged for this purpose in the relevant components. The drawback to applying this per se known technique (for instance injection moulds) is that the cooling medium (for instance water) must be supplied and discharged via rotating sealing couplings.

Another possibility is the use of Peltier elements which can provide cooling of the components in question in electrical manner.

If use is made of for instance a relatively cool air flow for cooling of the components in question, these can be provided with surface-enlarging provisions, for instance cooling ribs, cooling wires or the like, in order to increase the effectiveness of the cooling.

The invention will now be elucidated briefly with reference to the annexed drawings. In the drawings:

figure 1 shows a detail cross-section of the peripheral part of a cover and the mouth rim of a can body at the beginning of a seam-folding operation;
figure 2 shows a view corresponding with figure 1 at the end of the seam-folding operation;
figure 3 shows a view corresponding with figure 2 wherein a different seaming roller is applied in a further operation;
figure 4 shows a view corresponding with figure 3 at the end of the seam-folding operation;
figure 5 shows a view corresponding with figure 4 of a finished seam-folded edge in which sealing mass is arranged; and
figure 6 shows a top view of the combination of a can body connected to a cover via a seam-folded edge, wherein the defects of the prior art are shown in slightly exaggerated manner.

Figure 1 shows a can body 1 which is provided in advance with a widening mouth rim 2. Placed thereover is a cover 3 with a recessed central part 4 and an elevated edge 5. A seaming chuck 6 is placed in recessed part 4. A seaming roller 7 is pressed radially inward with force in a revolving movement such that in a number of revolutions the folded seam is formed as drawn in figure 2.

The final form of the part 5 corresponds with the form of the modelling surface 8 of roller 7.

Figure 3 shows a situation corresponding with figure 2. However, the roller 9 has a different modelling surface 10. This serves in a second operation to further deform the somewhat provisionally folded seam of figure 2. The second seaming roller is pressed radially inward with force in the same manner in a number of revolutions.

Finally, figure 4 shows the finished folded seam.

The described figures relate to generally known seam-folding techniques.

Figure 5 shows that an annular sealing mass 11 is enclosed in the folded seam and thus ensures an hermetic seal.

This also forms part of the prior art. It is usual to provide the cover shown in figure 1 in the zone of its elevated peripheral part 5 with a sealing mass introduced in advance as designated schematically with dashed line 12.

When the known technique according to figures 1-5 is used, the undesired phenomenon may occur that, at the in practice greatly increased operating temperature of seaming chuck 6 and second seaming roller 9, the sealing material 11 is heated such that it plasticity increases considerably, thus resulting in the form shown in figure 6, wherein seam-folded edge 12 displays a local thickening 13 which seriously compromises the hermetic seal.

In the foregoing is described the manner in which the invention eliminates the described undesirable phenomenon, or at least reduces it to completely harmless proportions.

It should be appreciated that it is essential for the invention that, at least in the second seam-folding operation as according to figures 3 and 4, there is the relationship described in the foregoing between the effective local temperature and the plasticity of the sealing mass.

Claims

1. Method for connecting a metal can body to a metal cover by means of a seam-folding operation, comprising the following steps, to be performed in suitable sequence, of:

(a) providing a metal can body provided with a bottom;
(b) filling the body with hot food product;
(c) after an optional short injection of steam into the upper zone of the body above the food product, placing loosely on the mouth rim of the body a cover with a recessed central part and an elevated peripheral part in which a ring of sealing mass is pre-arranged;
(d) placing a seaming chuck in this recessed part with some clearance relative to the elevated peripheral part;
(e) pressing a pressure roller with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside; and
(f) performing step (e) at a temperature of at least the seaming chuck and the roller at which the sealing mass has a plasticity such that the total resulting seam-folded edge acquires a radial thickness corresponding with a nominal thickness within the set tolerance.

2. Method as claimed in claim 1, comprising step

(g) choosing a sealing mass which has said plasticity at an operating temperature which is considerably increased relative to the environment, for instance 90°-130°C.

3. Method as claimed in claim 1, comprising step

(h) choosing a sealing mass which has said plasticity at an operating temperature which is increased to a limited extent relative to the environment, for instance 40°-60°C; and
(i) cooling at least the seaming chuck and the roller to a temperature in the vicinity of said temperature.

4. Method as claimed in claim 3, comprising step

(j) performing step (i) by carrying along a relatively cold flow of medium, for instance a liquid such as water, or a gas such as air.

5. Device for connecting a metal can body to a metal cover by means of a seam-folding operation for applying the method as claimed in any of the foregoing claims, which device comprises:

a seaming chuck for placing in the recessed central part of the cover with some clearance relative to an elevated peripheral part thereof;
means for loose placing of a cover with a recessed central part on the mouth rim of the body; and
a pressure roller for pressing with force to the seaming chuck in a revolving movement in order to bring about a corresponding plastic deformation of at least the part of the mouth rim of the body and/or the cover located furthest to the outside
which device is provided with cooling means for cooling the seaming chuck and/or the roller.

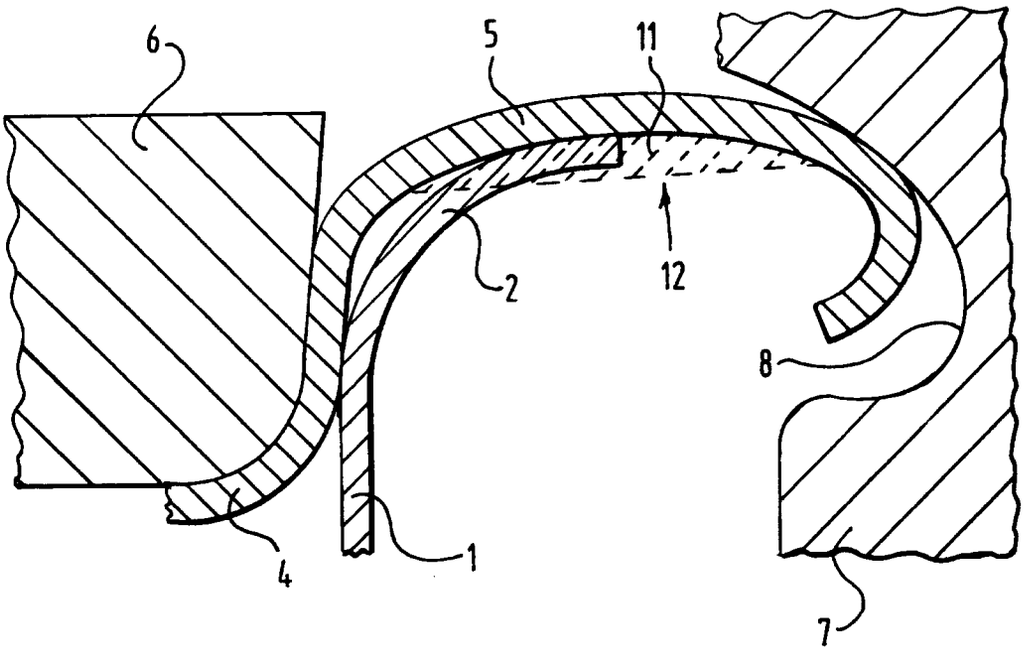

FIG. 1

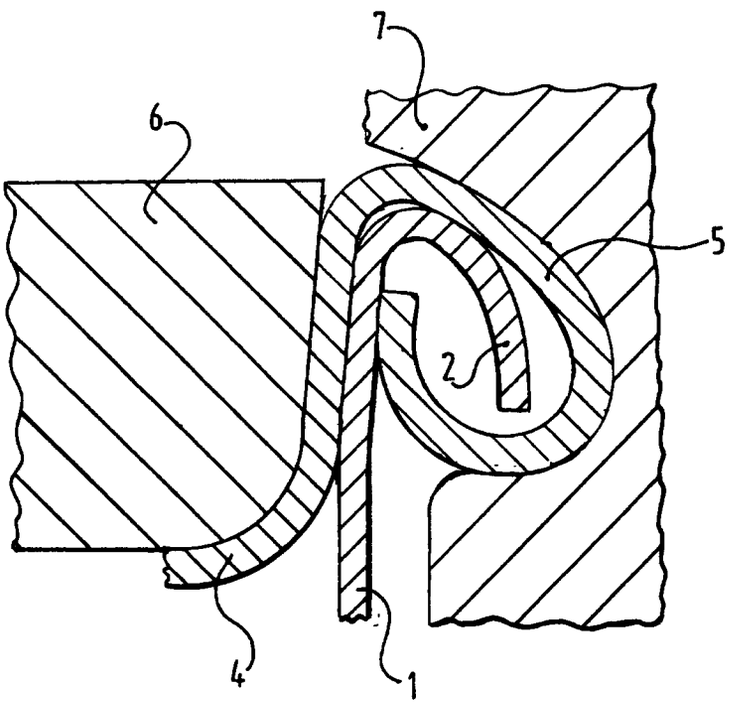

FIG. 2

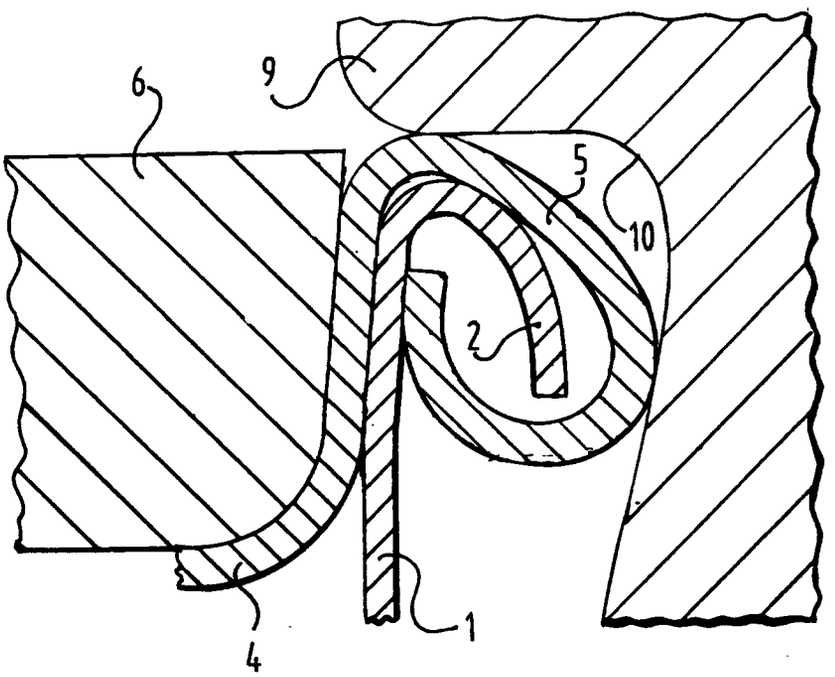

FIG. 3

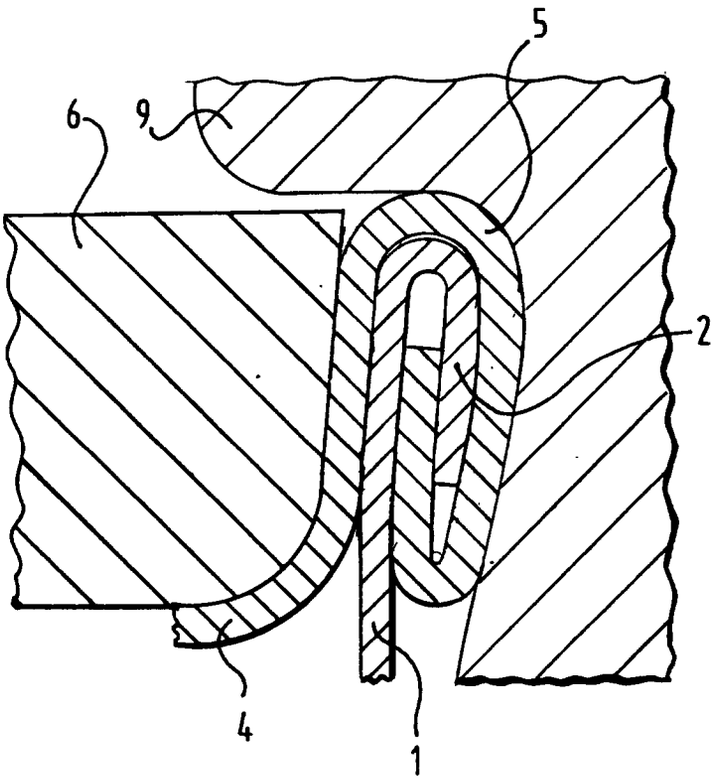

FIG. 4

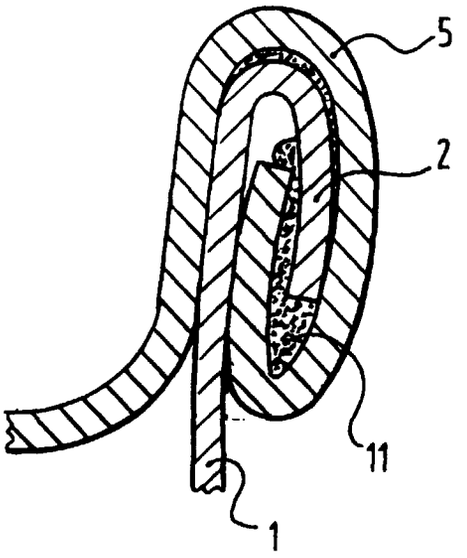

FIG. 5

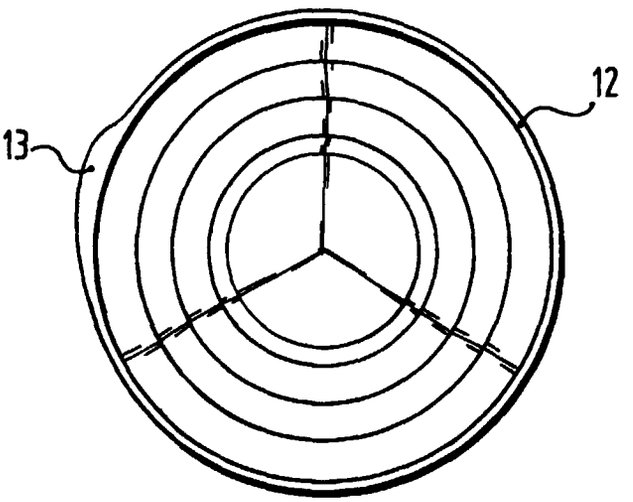

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 2200

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 3 774 560 A (HARTZ T) 27 November 1973 * the whole document *	1,2	B21D51/32
X A	CH 422 690 A (HOFFMANN) 29 April 1967 * the whole document *	1,2 5	
A	GB 2 089 191 A (TOYO SEIKAN KAISHA LTD) 23 June 1982		
A	WO 85 05299 A (METAL BOX PLC) 5 December 1985		
A	EP 0 365 063 A (LEER KONINKLIJKE EMBALLAGE) 25 April 1990		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 September 1998	Peeters, L

CATEGORY OF CITED DOCUMENTS

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