

Oct. 16, 1962

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3,058,209

METHOD OF MANUFACTURING A VACUUM TIGHT CLOSURE

Filed July 30, 1957

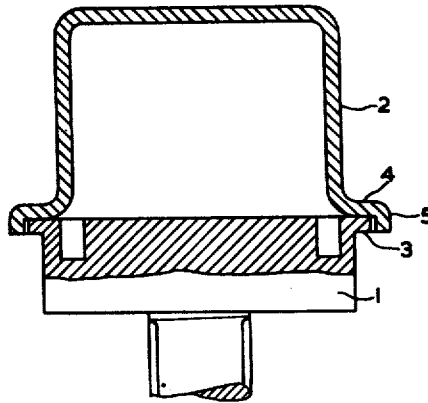


FIG. 1

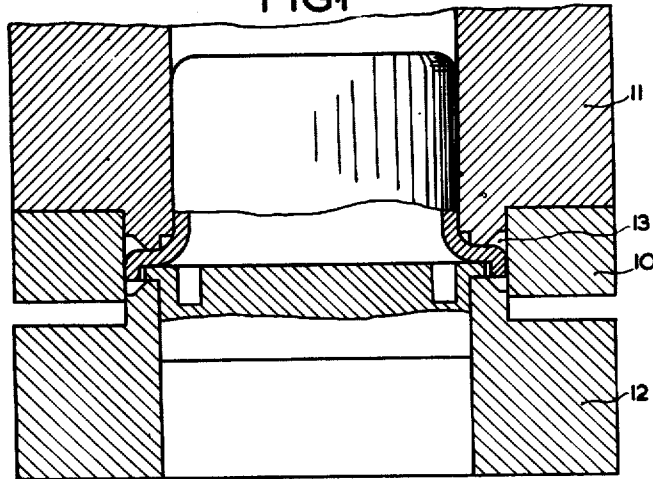


FIG. 2

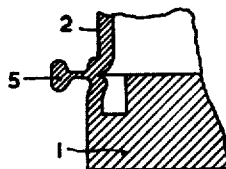


FIG. 3

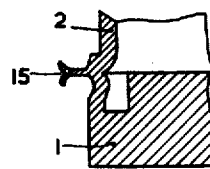


FIG. 4

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METHOD OF MANUFACTURING A VACUUM TIGHT CLOSURE

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Filed July 30, 1957, Ser. No. 675,210

Claims priority, application Netherlands Aug. 23, 1956
3 Claims. (Cl. 29—470.1)

The invention relates to a method of manufacturing a vacuum tight closure of a vessel. The term "vessel" may refer, in this case, to envelopes of apparatus, such as discharge tubes and semi-conductive electrode systems, for example transistors and crystal diodes, which operate in vacuo or in a protective gas, so that the closure must be vacuum-tight.

Sometimes such a closure must furthermore permit of being manufactured without the need for heating the parts of the vessel to be connected to a high temperature. This applies particularly to envelopes of semi-conductive electrode systems.

It is known to apply to one another the flanges of two parts to be connected to one another and consisting of comparatively soft metal and to reduce materially the thickness of the flanges at a short distance from the edges by exerting pressure by means of a die, the material thus flowing mainly transversely to the direction of pressure. This method is known as "cold welding."

The invention is based on the recognition of the fact that with this method the edges of the flanges tend to move away from one another, so that breakage may occur or a special treatment is required to remove the deviating edges.

In accordance with the invention, which purports inter alia to obviate this disadvantage, one of the flanges is provided with a bent-over collar, which embraces the edge of the other flange. The method is preferably carried out by means of a pressing device comprising a chamber in which the edges of the two flanges are enclosed during the pressing operation. Thus the edge of one flange can be pressed completely inside the collar of the other.

The invention will now be described with reference to one embodiment which is shown in the figures.

FIG. 1 is a sectional view of an envelope or vessel, in which a transistor can be housed prior to the closing operation.

FIG. 2 is a sectional view of a pressing device to be used with the method according to the invention.

FIG. 3 is a sectional view of the closure obtained by carrying out the invention.

FIG. 4 is a sectional view of a closure obtained without the use of the invention.

The vessel or the envelope shown in FIG. 1 consists of a bottom or base 1 and a hood or can 2. The bottom is provided with a flange 3 and the hood has a flange 4, which exhibits a bent-over collar or edge 5.

In order to join the two parts, which may, for example, be made of copper or aluminum, they can be introduced into a press between dies which are shown in FIG. 2. During the pressing operation the thickness of the flanges is reduced to about $\frac{1}{2}$ of the initial value. The stroke of the press is limited by a steel ring 10, which is arranged between the upper die 11 and the lower die 12. This ring encloses a chamber 13, which contributes to the formation of the profile shown in FIG. 3 on an enlarged scale.

If the upper flange should not have a bent-over collar, the profile shown in FIG. 4 would have been obtained; particularly at the slot 15 this profile is very vulnerable.

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Alternatively, the stroke of the press might not be limited by the use of a ring, but only by limitation of the exerted pressure. The use of a ring or a similar stop, however, is simple and effective.

The chamber 13 is effective in shaping the flanges during pressing, but such chamber is not essential since the collar on the upper flange may be bent in such a way over the lower flange that parting of the flanges as shown in FIG. 4 is prevented.

What is claimed is:

1. A method of effecting a vacuum-tight closure between two metal members having outwardly extending, lateral flange portions with the edge of the flange portion of one of the said members being bent substantially at right angles to its lateral direction so that it extends towards the other member when the two members are juxtaposed, comprising juxtaposing the two members so that their lateral flange portions abut and the flange of said other member fits within and is closely surrounded by the bent-over edge of the said one member, providing a solid member closely surrounding the bent-over edge to form a closed chamber enclosing the abutting flange portions to prevent outward movement, and exerting pressure on and transverse to the abutting lateral flange portions to cause material of the lateral flange portions to flow transversely to the pressing direction into the chamber to effect cold-welding of the abutting flange portions and form a bulbous portion providing a greatly strengthened closure edge.

2. A method as set forth in claim 1 wherein the inner edge of the solid member contacts the bent-over edge.

3. A method of effecting a vacuum-tight closure between two metal members having outwardly extending, lateral flange portions, comprising bending over the edge of one of the flange portions substantially at right angles to its lateral direction so that it extends towards the other member when the two members are juxtaposed, juxtaposing the two members so that their lateral flange portions abut and the flange of said other member fits within and is closely surrounded by the bent-over edge of said one flange portion, providing a solid member enclosing the flange portions to form a chamber whose inner edge contacts the outer surface of the bent-over edge to prevent outward movement, and then exerting pressure on and transverse to the abutting lateral flange portions to cause material of the lateral flange portions to flow transversely to the pressing direction into the chamber and effect cold-welding of the abutting flange portions and form a bulbous edge portion.

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