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Schiesser

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[54] **METHOD FOR CLOSING PLASTIC CONTAINERS**

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[52] **U.S. Cl.** **53/39,** 156/196, 156/306

[51] **Int. Cl.** **B65b 7/00**

[58] **Field of Search** ..... 264/94, 96, 98, 296, 264/322, 327; 206/56 AA; 215/1 C, 27, 32, 80; 53/39

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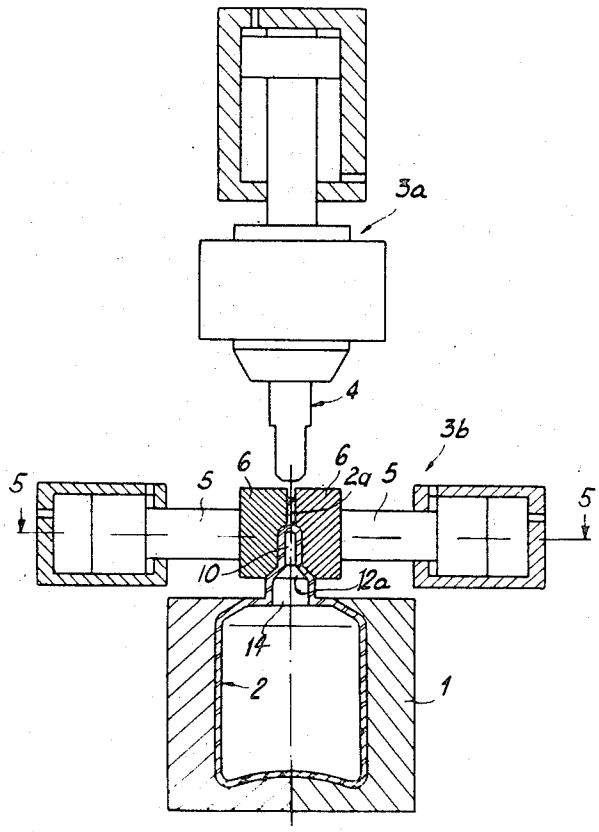
[57] **ABSTRACT**

A plastic container is molded to form an elongated spout or neck portion and the spout is closed by first heating the entire interior circumference by applying a heater into the interior of the spout. The heating is completed around the circumference adjacent the outer end or top of the spout and an additional heating is applied at two diametrically opposite locations in a contiguous zone extending toward the interior end of the spout. Thereafter the outer continuously heated top portion is pressed flat in a plane passing through the center to cause a welding and a flattening of the outer end of the spout and the formation of a tear flap which extends diametrically across the spout. This process leaves the remaining portion which is partly flattened to form an upper removable tip which remains secured to the tear flap. The area immediately below this tip is flared or formed conically inwardly to provide for a change from the widened diameter lower portion of the spout to a smaller diameter tip portion. The pressure which is applied from opposite sides is carried out by means of oppositely acting ram heater members or jaws having specially shaped cavities to form the desired tear flap, nozzle tip portion, and transition portion between the nozzle spout wide diameter portion and the tip portion. The ram heaters each include means for forming transversely or diametrically extending weakened lines to facilitate the tearing off of the flap and the nozzle tip in order to open the container.

5 Claims, 6 Drawing Figures



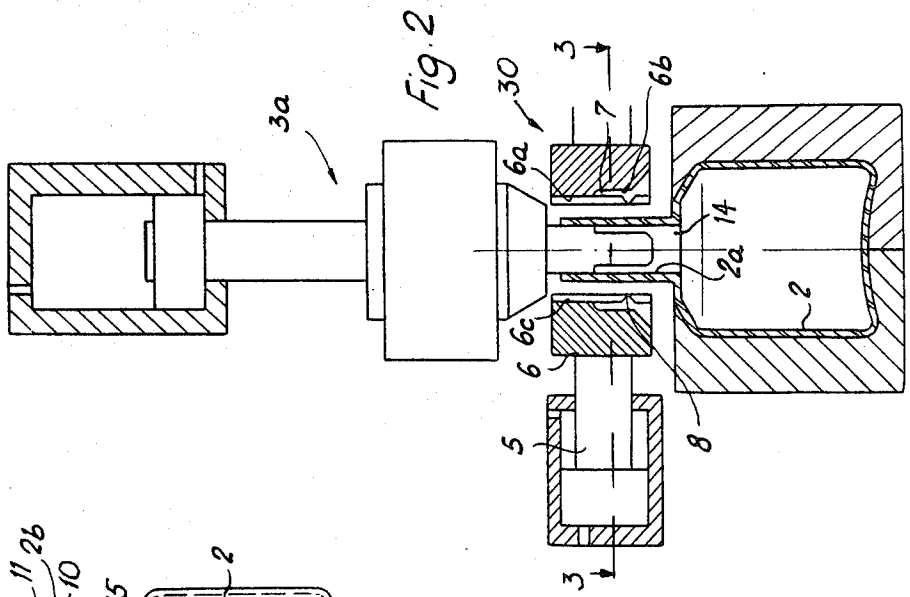


Fig. 2

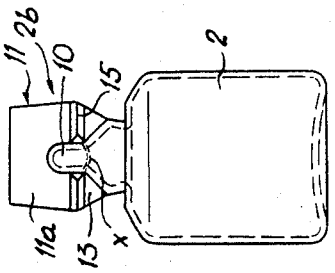


Fig. 6

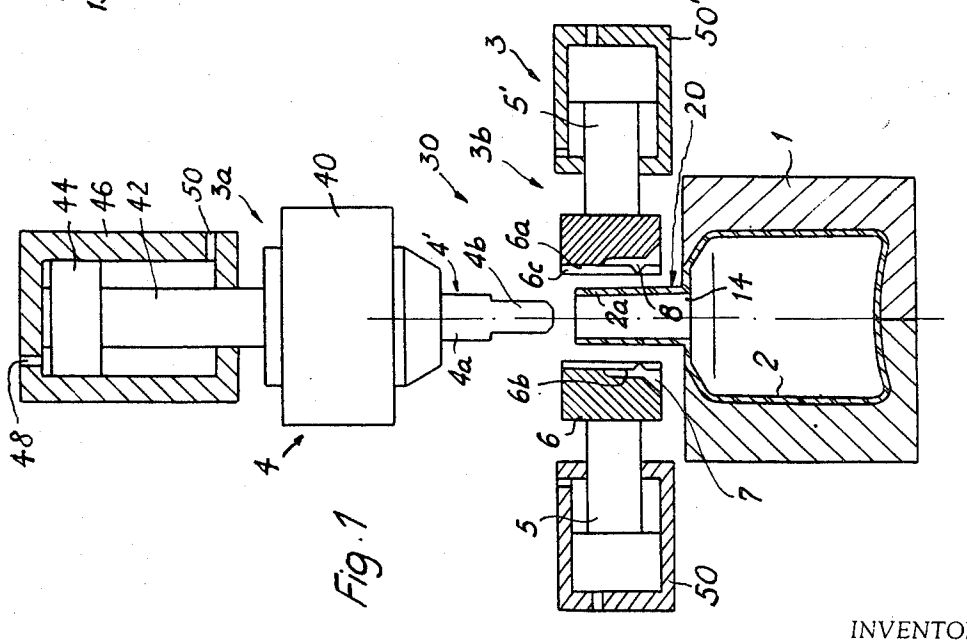


Fig. 1

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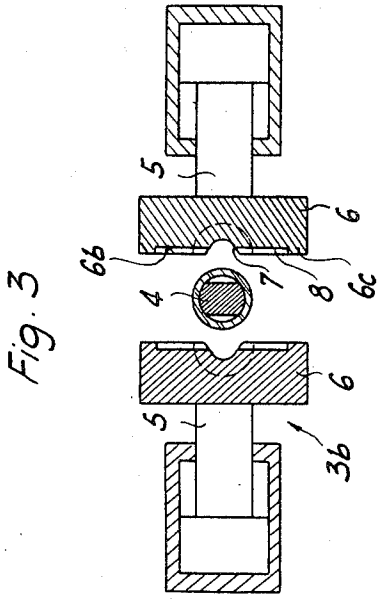

Fig. 3

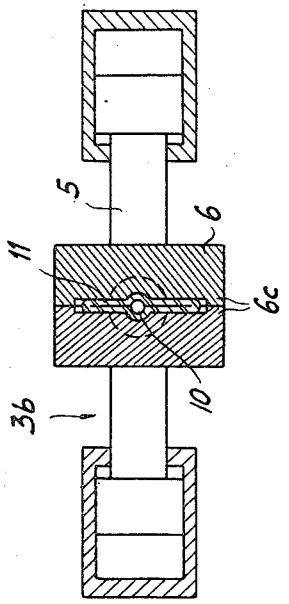

Fig. 5

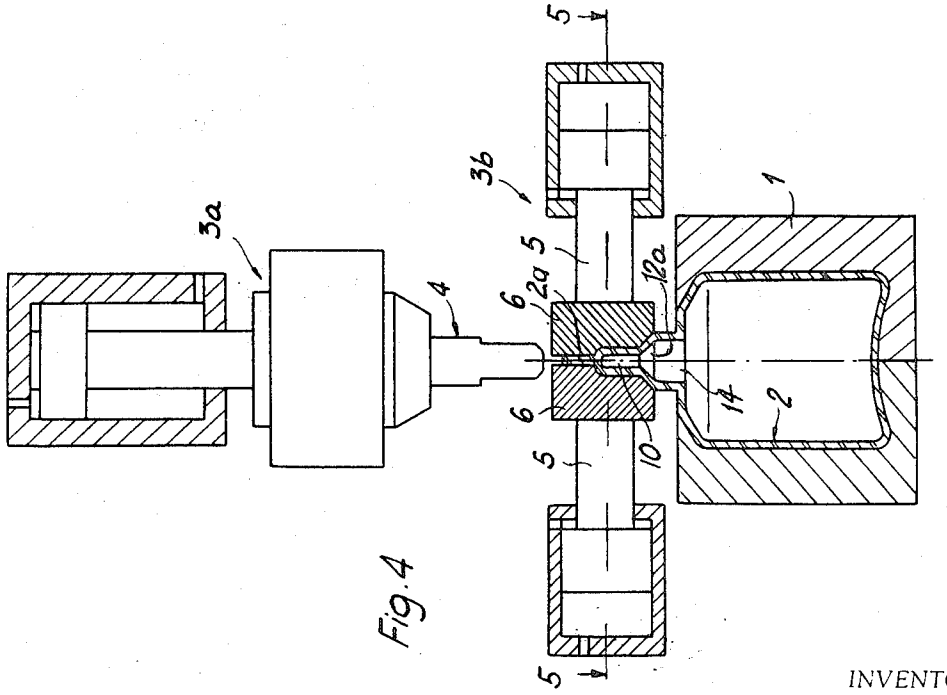

Fig. 4

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METHOD FOR CLOSING PLASTIC CONTAINERS

SUMMARY OF THE INVENTION

This invention relates in general to containers and to a method and apparatus for closing and sealing containers and in particular to a new and useful method and apparatus for closing containers having an elongated pouring spout at the top thereof by forming the spout into a flat welded tab portion and a removable nozzle tip portion of small diameter which may be torn off with the tab along a weakened line formation.

At the present time it is known to close plastic containers which are still in a hot state from the preceeding fabrication process, such as a blowing process, by pinching the two opposite ends of the wall together by clamping jaws which also effect the welding together of these walls and the closing of the pouring aperture. Plastic containers which are no longer in a plastic or pliable condition are closed by supplying heat to the other circumference of the aperture part or spout, for example through clamping jaws which are used to pinch these walls together to thereby make the material of the container sufficiently plastic to cause a welding of the aperture when the clamping operation is effected. The heat requirement for sufficient plastisizing of the aperture part to be welded is relatively great. In addition, by means of the heated clamping jaws it is not possible to produce, in the aperture portion to be welded, a local weakening of the material to form a tear line in order to facilitate the subsequent opening of the container by tearing along this line.

In accordance with the invention the disadvantages of the prior art are overcome by the method of the invention by first heating the interior of the outer or top end of the pouring spout portion of the container while a contiguous zone of the spout located directly interiorly of the outer zone is heated only at two opposite circumferential portions to render these opposite ends plastic. In a second step exterior means are applied to press the opposite sides flat at the outer part of the spout in order to form a completely flat transversely extending closure while the inner part is only pressed flat at the two heated portions in a plane passing through the center of these portions and through the center axis of the pouring spout. In accordance with a preferred method, simultaneously with the pressing flat of the outer end of the spout, the intermediate portion of the spout is formed into a cylindrical tip of relatively small diameter and a transition is formed between this tip of small diameter and the remaining portion of the spout which is of increased diameter. The closing forces are applied by two oppositely directed ram heater members are also effective to supply sufficient heat to form tear lines extending along the flattened flap which is formed and which are located in alignment with the small diameter tip portion. When the flattened flap is subsequently removed in order to use the contents of the container the tearing through in the plane intersecting the small diameter tip portion permits the severance of this tip portion and its removal to completely open the remaining portion of the spout.

Accordingly it is an object of the invention to provide an improved method for heat sealing and closing the spout of a container which includes first heating the interior of the spout by a heater applied to the interior along two diametrically opposite flattening lines at the inner end and around the complete circumference at

the outer end, thereafter pressing the spout so that the outer end is flattened to weld the spout aperture closed and to form a flattened tear flap, and, while the flattened tear flap is formed, to form an intermediate portion of the spout into a cylindrical tip portion by flattening each side at the diametrically opposite heated areas.

A further object of the invention is to provide a method of forming a closure in a container which includes heating the spout of the container, both interiorly and exteriorly to permit it to be pressed together to form an outer flattened closure flap which completely closes the aperture of the spout, and also to form an intermediate cylindrical tip portion and a transversely extending tab portion.

A further object of the invention is to provide an apparatus for forming closures in a container which includes a central heater member having an outer portion of a size to enter into a container spout and to heat two diametrically opposite sides of the interior of the spout and which also includes an inner cylindrically portion of a size to completely heat the entire circumference of the interior of the spout adjacent the outer end thereof; and further including first and second ram members mounted on respective opposite sides of the holder for the container and spout and which are movable in opposite directions to engage and flatten the outer or top end thereof and to form the inner portion into a cylindrical tip at a transition leading to the inner spout diameter.

A further object is to provide a container having a spout with a transversely extending integral flap which may be torn away to open the spout.

A further object of the invention is to provide an apparatus for closing a container spout which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is an axial sectional view of an apparatus for closing and sealing a container spout constructed in accordance with the invention;

FIG. 2 is a view similar to FIG. 1 with the apparatus shown in an advanced stage of operation;

FIG. 3 is a section taken along the line 3—3 of FIG. 2;

FIG. 4 is a view similar to FIG. 1 of a further advanced condition of the operation of the device;

FIG. 5 is a section taken along the line of 5—5 of FIG. 4;

FIG. 6 is a side elevational view of a container formed in accordance with the invention.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular the invention embodied therein comprises an apparatus for forming a container for a hollow body 2 to provide a closure for

a pouring spout or a neck portion **20.** The apparatus for carrying out the method includes a blow mold **1** in which the container **2** is formed with the spout portion **20** protruding from the top of the mold. In FIG. **1** the container **2** is already filled with a material and it is located adjacent spout closing means generally designated **30** which includes interior heating means generally designated **4** and exterior heating and closing means generally designated **3.**

The nozzle spout **20** may be of any tubular configuration for example square, rectangular, cylindrical or even conical.

In accordance with the invention the apparatus for forming the enclosure includes the heater part **4** which comprises an interior heater or mandrel member **4'** which is mounted at the end of a holder **40** which is in turn, carried on a piston rod **42,** the piston rod **42** is connected to a piston **44** which is movable in a cylinder **46.** The cylinder may be selectively and alternatively admitted through apertures **48** and **50** with a pressure fluid in order to cause a selected movement of the piston **44** and either a raising or a lowering of the heater **4'.**

The heater **4'** is in the form of a mandrel which includes a lower portion **4*b*** of a size to heat two diametrically opposite areas at the interior of the spout **20** when the heater is lowered into the spout during the first stage of the closing operation. The mandrel **4'** also includes an inner cylindrical area **4*a*** which is of a size to completely heat the interior wall of the spout **20** at the location of an outer or top end zone **2*a***. In some instances the portion **4*b*** is formed with diametrically opposite axis-parallel flattened portions or axis-parallel grooves. The heating mandrel **4'** is connected interiorly with means for applying heat thereto so that it may be brought to a predetermined adjustable temperature.

The closing apparatus also includes the oppositely acting and heat applying closing means **3** which includes rams **5** and **5'** which are respectively slidable in cylinders **50** and **50'** located at respective opposite sides of the spout **20.** Each ram carries a clamping jaw **6** having interior or outer surfaces which are formed in a complimentary manner and which include an upper planar area portion for forming a flattened closure flap **11** (FIG. **6**) and a lower recessed area portion **6*b*** which include a cutout **7** at the lower end for forming a transition in the nozzle spout between the indicated spout diameter of FIG. **1** and the smaller diameter or tip **10** to be formed for the purpose of forming an openable spout passage. The cutout **7** provides a formation of a transition zone of conical configuration **12** between the normal diameter portion **14** of the spout **20** and the tip portion **10.** Each clamping jaw **6** also includes a transversely extending rib portion **8** which forms tear lines or weakened areas **15** in the final closure flap formation **11** as shown in FIG. **6.** The rib **18** may be cuneiform or bent instead of straight as indicated.

The method of operation of the invention to close the spout **20** is as follows:

After the plastic hollow body or container **2** is filled the spout **20** is orientated between the clamping jaws **6, 6** as indicated in FIG. **1.** The heating mandrel **4'** is brought to the desired temperature and is introduced through the top of the spout **20** and moves to the position indicated in FIG. **2.** The wall portions of the outer part of the spout at the location **2*a*** come into contact with the area **4*a*** and opposite parts of the wall portions in the cylindrical nozzle section **10** are subjected to heating at diametrically opposite locations which are located at right angles to the plane of the drawing. These opposite wall portions are thereby brought to welding temperature along with the outer circumferentially heated portion and then the heating mandrel **4'** is withdrawn.

The clamping jaws **6** are then moved toward each other as shown in FIGS. **4** and **5** to a position at which the two side faces of the jaws abut at the outer ends and they cause the flattening of the outer end portion of the spout **20** to form the flattened closure tab or flap **11** with the flat portion **11*a***, the tear lines **15** and a small area **13** immediately below the tear lines. This flap area is pressed substantially flat so that it forms a welded closure of the spout passage. In addition the cavity of the jaws **6, 6** are shaped to form the cylindrical nozzle or tip portion **10,** the intermediate portion **12** and the lower transition portion **14.** The outer portion of the heater **4*b*** is constructed so as to insure that the tip portion **10** is not welded closed but does form an opening which when the flap **11** is torn away will provide an opening for the large diameter lower portion **14** of the spout **20.** The ribs **8** press themselves into the flattened zones and considerably weaken the flap **11** along transversely extending tear lines of **15** as shown in FIG. **6.**

After the jaws **6** are withdrawn the container **2,** as shown in FIG. **6,** is completely closed and is provided with a top flap **11** and the cylindrical tip **10** which may be easily torn away along the tear lines **15** to open the container and to permit access to the material contained therein. The flattened parts **11** may be completely torn off along with the upper portion of the cylindrical tip **10** to open the spout in the area of the tip **10.**

The disclosed closing method is especially suitable for the closing of relatively small hollow bodies such as small packs for coffee cream or ampoules for pharmaceutical purposes and the like since a relatively large tearoff lobe is formed. If the tear aperture should not be touched when the tearing off of the lobe **11*a*** is to take place in order that the contents remain sterile, the tear line around the tip **10** which normally lies in a plane perpendicular to the axis of the passage of the tip can be shifted out of the zone of the tearoff lobe **11*a*** by forming an additional pinch line bent downwardly out of the normal tear plane as indicated at X in FIG. **6.** Instead of rectangular weakened areas such as the areas **15** which extend perpendicular to the axis of the passage, arcuate or curved weakened areas may be provided.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A method of closing a container having a pouring neck or spout portion of tubular configuration and using a heater which is insertable into the interior of the spout portion and exterior pressing jaws which are operable to flatten the spout portion by engagement with respective opposite sides, comprising inserting the heater into the spout to heat substantially an entire cylindrical area of the spout adjacent the outer or top end thereof and to heat a contiguous area directly inwardly from this area at two diametrically opposite locations,

withdrawing the heater and engaging the spout to flatten it by exerting pressure at diametrically opposite sides causing a flattening of the heated inward area and also the formation of a tip within the spout of relatively small diameter and the formation of a flattened tab extending across the spout and having a tear line extending through the tab to permit severing of the tab and the nozzle tip to open the spout.

2. A method according to claim 1, wherein the tear line is formed by weakening the flap by pressure engagement in a plane perpendicular to the axis of the spout.

3. A method according to claim 1, wherein the spout is engaged from the opposite sides in a manner to form a completely flattened outer end flap, an intermediate tip of relatively small diameter, a transition portion, and a remaining portion of said spout diameter which is larger than said tip.

4. A method according to claim 1, wherein said tear lines are formed between the nozzle tip portion and the remaining portion of said spout.

5. A method of closing a container having a cylindrical spout of heat-sealable material with an open outer end, comprising heating a an entire cylindrical area adjacent the open outer end to a welding temperature and heating curved partial areas on diametrically opposite sides immediately inwardly of said marginal annular area to a welding temperature, and applying a sealing pressure to the respective diametrically opposite sides of said spout overlying said curved partial areas and said marginal annular area to flatten and close said marginal annular area and the open end of said spout and to flatten the curved partial areas together and to shape the areas on each side of the curved partial areas to form a central smaller diameter spout portion and to form tabs of said curved partial areas extending outwardly on each side of smaller diameter spout portion.

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