Oct. 25, 1966 JEAN-LUC BERRY ETAL 3,280,532

METHOD OF CLOSING AND FORMING PLIABLE CONTAINERS FILLED WITH A LIQUID

Filed May 27, 1963 2 Sheets-Sheet 1

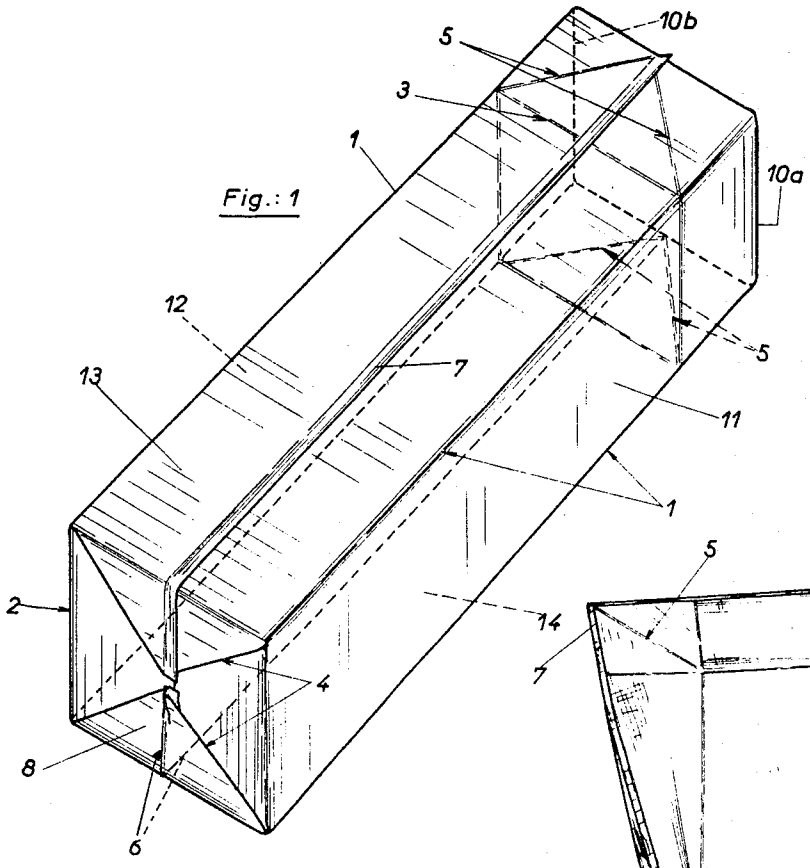

Fig.: 1

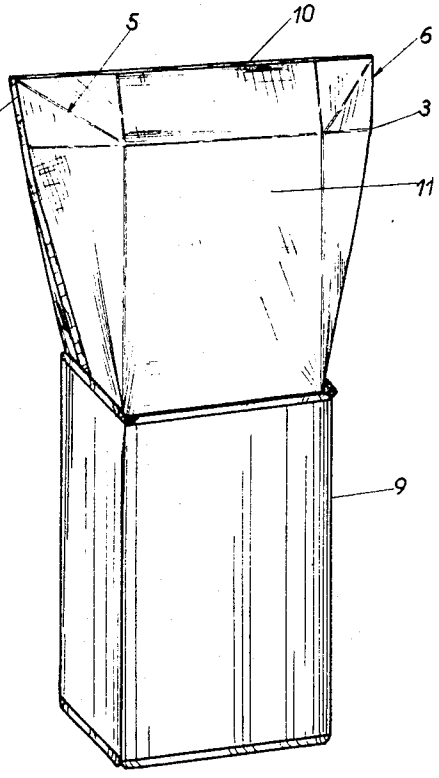

Fig.: 2

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2 Sheets-Sheet 2

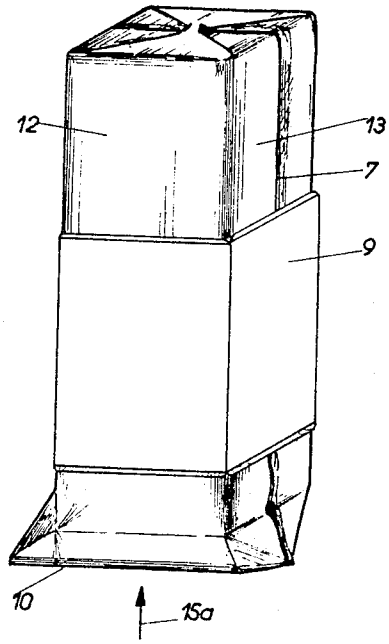

Fig.: 3

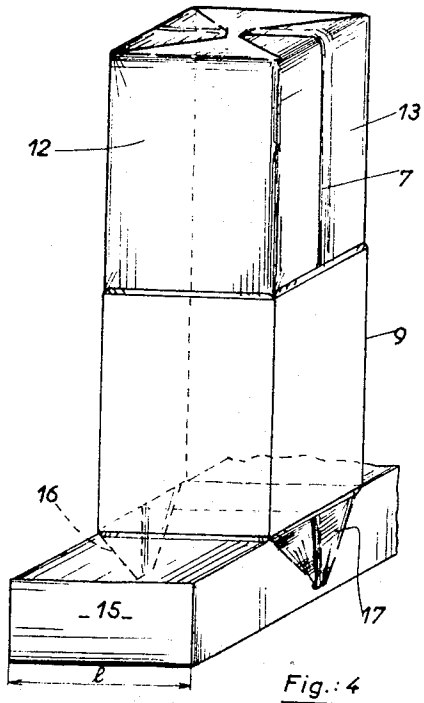

Fig.: 4

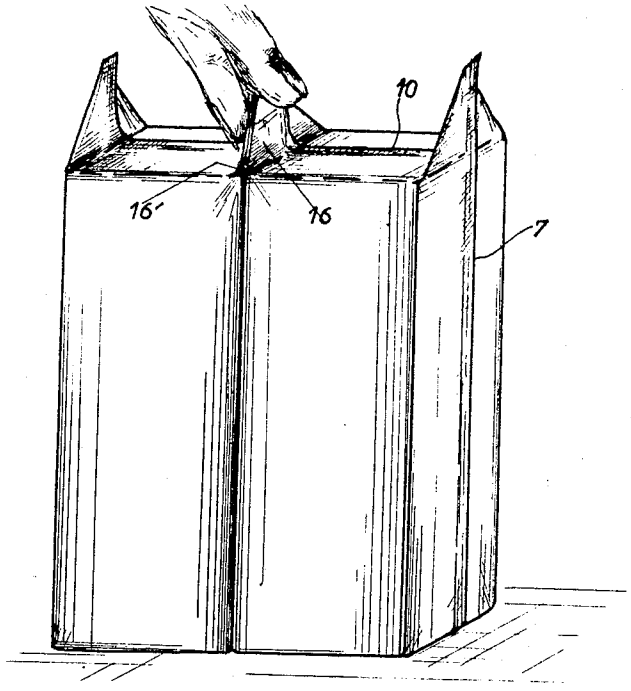

Fig.: 5

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METHOD OF CLOSING AND FORMING PLIABLE CONTAINERS FILLED WITH A LIQUID

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This invention relates to pliable containers or cartons for liquids and is concerned more particularly with the closing of the upper end of prismatic containers already filled with liquid.

These containers or cartons are usually parallelepipedic and are generally made of a pliable or semirigid sheet which can for example be of plastic material or preferably a complex comprising a resistant paper coated on both surfaces with a substance capable of being heat-welded, such as polyethylene. Using this sheet, a parallelepipedic bag or carton is formed, the base of which is welded in liquid-tight manner and folded to form a rectangular end, but it is obvious that such a carton could be obtained by any other means; it could comprise, for example, an end joined to the pliable or semirigid parallelepipedic walls. After having filled the carton with liquid, for example milk, the upper parts of its lateral walls are folded and closed so as to form a liquid-tight cover or upper end of rectangular form. All these operations are carried out by machine and there is thus obtained containers filled with liquid which can be easily grouped in packages of reduced volume because of their parallelepipedic form.

Known methods of closing cartons filled with liquid consist in folding the upper part of the lateral walls in the form of a rectangular end before carrying out the liquid-tight welding, or in carrying out the two operations simultaneously, the deformation and the folding being effected in an absolutely mechanical manner and associated with the welding. For example, a matrix maintains the parallelepipedic form of the part of the carton filled with liquid, while the upper part is deformed by means of fingers which extend into the carton and gripper devices which engage these edges and fold them flat in order to form a rectangular end, while other members carry out the liquid-tight welds. The machines carrying these methods into effect necessarily comprise mouldable members executing complex movements and are consequently very complicated. Furthermore, these machines comprise fingers which are introduced into the cartons, thereby providing the danger of introducing impurities into the liquid which they contain and of polluting or contaminating the said liquid. This is a serious disadvantage, especially when this liquid is a food such as milk.

The invention has for its object to provide a method of and a means for enabling the closing and the shaping of the upper end of the cartons filled with liquid to be carried out by very simple operations and under perfectly hygienic conditions. The invention also covers the containers which have this closure means.

According to one aspect of the invention there is provided a method of closing and shaping the upper end of a parallelepipedic container having pliable or semirigid walls and filled with liquid, which method comprises closing the upper opening of the container in a liquid-tight and complete manner, and deforming the upper part of the container thus closed in order to obtain a flat end connected to two ears, shaping of the upper end being effected by giving the upper part of the lateral walls of the package a progressively prismatic form at the same time as flattening the closed upper part, as a result of which the previous

closing of the upper opening is final and the ears form spaces which constitute part of the internal volume of the container.

According to a second aspect of the invention there is provided a container having pliable or semirigid walls and filled with liquid, comprising in its upper part a flat end connected to two triangular ears, each formed of two walls respectively fast with the flat end and a lateral wall of the container, in which the ears constitute liquid-tight spaces communicating freely with the internal volume of the container.

These ears are a very interesting feature of the invention, because they constitute two projections enabling one carton or two juxtaposed cartons to be gripped between two fingers of the same hand. Moreover, the internal volume of the ears forms part of the volume of the container. It is sufficient to cut the point of one ear in order to obtain a very convenient pouring spout.

The liquid-filled carton is preferably positioned with its opening at the top and the lower part of the carton is kept in parallelepipedic form over a small height, for example by means of a matrix or a sleeve, and the lips of the openings are brought together along a straight line parallel to two of the faces of the said cartons, the upper unsupported part of the carton being deformed as required. The opening is then closed by continuous tight welding from one end to the other of the lips thus brought together. The upper part of the carton is then progressively made parallelepipedic and pressure is simultaneously applied to the upper welded part, which is deformed in order to produce a flat end connected to two triangular ears.

One example of the method of this invention and the container used therewith will now be described with reference to the accompanying drawings in which:

FIGURE 1 shows an open and unfilled container, seen in perspective.

FIGURE 2 shows the container filled with liquid and at the moment of closing the same.

FIGURES 3 and 4 show the container in two different stages during the operation of shaping the upper end.

FIGURE 5 shows two containers which are filled and closed and are ready to be packed for delivery.

The carton shown in FIGURE 1 is made from a complex material formed by a sheet of kraft paper coated with polyethylene on its two surfaces, the paper having been first of all marked with longitudinal creases **1**, which define its lateral corners and transverse creases **2**, which define the contour of its lower end and transverse creases **3** which define the liquid level and the contour of the upper end. Inclined score lines such as **4** and **5** respectively mark the position of the folds of the bottom end and upper end. The sheet is then folded at **6** and the margins **7** thereof which have been brought together are welded to form a tube. This tube is given a parallelepipedic shape and its lower part is welded and flattened along the folds **2** and **4** in order to form a rectangular end **8**. All the operations are well known to persons skilled in the art and they will not therefore be described in detail. A parallelepipedic carton is obtained which has a rectangular end **6** and four lateral faces **11**, **12**, **13** and **14**, the face **13** containing the weld **7** and the face **14** having the score line **6**.

The carton is positioned vertically and filled with liquid up to the level of the folds **3**, and FIGURE 2 illustrates the first operation of closing the upper end.

The carton is placed, preferably before filling, in a rigid sleeve **9** which is of rectangular section and has a height substantially smaller than the carton, said sleeve strictly maintaining the parallelepipedic form of the lower part of the carton. The upper margins **10***a* and **10***b* of two opposite faces **11** and **12** of the carton are brought

together so as to obtain two lips which are applied one against the other at **10** along a straight line extending from the weld **7** to the score line **6**. It will be seen from the drawing that the upper part of the carton, due to the pliability of its walls and the fluidity of the liquid container therein, then takes the rough form of a half tetrahedron merging into the lower part which is kept parallelepipedic by the sleeve **9**.

The liquid-tight heat-welding or sealing of the two lips brought together at **10** is then carried out by a known means, this welding being effected over the entire length of the lips, from the weld **7** to the score line **6** and consequently completely and finally closes the carton.

In order to give the upper end its rectangular form, the procedure is as indicated in FIGURES 3 and 4. The carton is turned upside down and it is positioned on a pressure member **15**, which is shown diagrammatically in FIGURE 3 by the arrow **15***a*, so as to subject it to a thrust in the direction of this arrow. At the same time, the sleeve **9** is slid downwardly along the lateral faces of the carton. In positioning the carton on the pressure members **15**, care is taken to flatten the weld **10** in the same direction as the weld **7**. The pressure member **15** preferably has an upper rectangular face, the width *e* of which is equal to or slightly less than the width of the faces **11** and **12**.

FIGURE 3 shows the progressive deformation of the carton, whereby it is possible on completing the operation (FIGURE 4) to obtain a rectangular end which is defined by the folds **3** and connected to two ears **16** and **17** of general triangular form which are an extension of the faces **13** and **14**. These ears are formed by the faces **13** and **14** being folded flat along score lines **5**.

The sleeve **9** is then gripped and the container turned over, the said container sliding easily out of this sleeve. The use of the sleeve **9** thus enables the container to be manipulated from the formation of the lower end **8** until it is placed in position for dispatch, without having to touch the container itself and consequently of providing the danger of damaging or soiling it.

This rigid sleeve thus makes it possible for the pliable or semirigid containers, which are empty or full, closed or unclosed, to be manipulated by entirely mechanical means exactly in the same way as rigid objects, for example bottles.

It is to be observed that the score lines **1**, **2**, **3**, **4**, **5** and **6** are not essential and that the method of procedure described gives equivalent results when these score lines are not present. It should on the other hand be noted that if pressure member **15** had a width greater than that of the faces **11** and **12**, the ears **16** and **17** would also be formed and would be located in the extension of the upper end.

In addition to the advantages already referred to in connection with the method according to the invention, the reversing of the container after having effected the welding of the lips brought together at **10** assures that the liquid is brought into contact with this weld and consequently the latter is cooled. This cooling is particularly advantageous, because it improves the mechanical resistance of the weld at a moment when the operation described with reference to FIGURES 3 and 4 cause it to be subjected to forces.

Nevertheless, it would also be possible for the method according to the invention to be applied without reversing the carton. The sleeve **9** could, for example, be telescopic and have a lower part which holds the lower part of the carton and a part which slides upwardly in order to ensure the shaping of the upper part of the carton and the rectangular upper end, in association with a member similar to **15** bearing downwardly on the weld **10** and the adjoining part. It is seen that the operations of closing the carton and of shaping the upper end only require very simple accessories and movements. These operations can be carried out by machines comprising a very small number of elements and extremely reduced kinematics.

FIGURE 5 shows how it is possible simultaneously to lift two cartons by gripping the ears by **16** and **16'** thereof between two fingers.

If desired, the elements which initially maintain the shape of the lower part of the carton and then reestablish the parallelepipedic form of the part adjoining the upper end need not be sliding sleeves, but can for example be matrices with movable elements.

What we claim is:

1. A method of sealing and shaping the open end of a substantially rectangular container having pliable lateral walls and filled with a substantially fluid material, comprising the steps of juxtapositioning the free marginal edges of said walls along a straight line, securing said edges together from end to end to finally seal said open end, sliding a rectangular sleeve having a cross section substantially equal to that of said container along said walls in a direction towards said sealed end, while applying a flat surface under pressure to said sealed end in an opposite direction to the movement of said sleeve, whereby a flat rectangular end is formed which is connected to two triangular tabs.

2. A method according to claim **1** in which said flat surface has a length extending along said secured edges which is smaller than the corresponding width of the completed flat rectangular end so that said tabs form upright triangular projections.

3. A method according to claim **1** further comprising the step of turning the sealed end of said container down after said step of securing said edges together.

4. A method according to claim **3** wherein the sealed end of said container is maintained down during said step of sliding until said sleeve reaches the level of said flat rectangular end and further comprising the steps of then turning said sealed end upwards and removing said sleeve.

5. A method according to claim **1** wherein said sleeve is positioned over a portion of said container adjacent said edges prior to said step of securing said edges together, so that said portion is maintained in parallelepipedic form while the remainder of the lateral walls takes a substantially semitetrahedral form before the shaping of the sealed end is effected.

6. A method of sealing and shaping the open end of a substantially rectangular container having pliable lateral walls and filled with a substantially fluid material, comprising the steps of placing said container with said open end upwards, juxtapositioning the free marginal edges of said walls along a straight line, placing a rectangular sleeve having a cross section substantially equal to that of said container at the bottom portion thereof, securing said edges together from end to end to finally seal the said open end, turning said sealed end downwards, sliding said sleeve along said walls in a direction towards said sealed end to apply a first inwardly directed pressure to said walls while applying a second inwardly directed pressure against the outer surface of said sealed end to flatten it, turning said sealed end upwards, and removing said sleeve from said container.

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