Jan. 9, 1968 R. M. DILOT 3,362,608

LIQUID-TIGHT CLOSURE FOR A PARALLELEPIPEDIC PACKAGE

Filed May 6, 1966 2 Sheets-Sheet 1

Fig.1

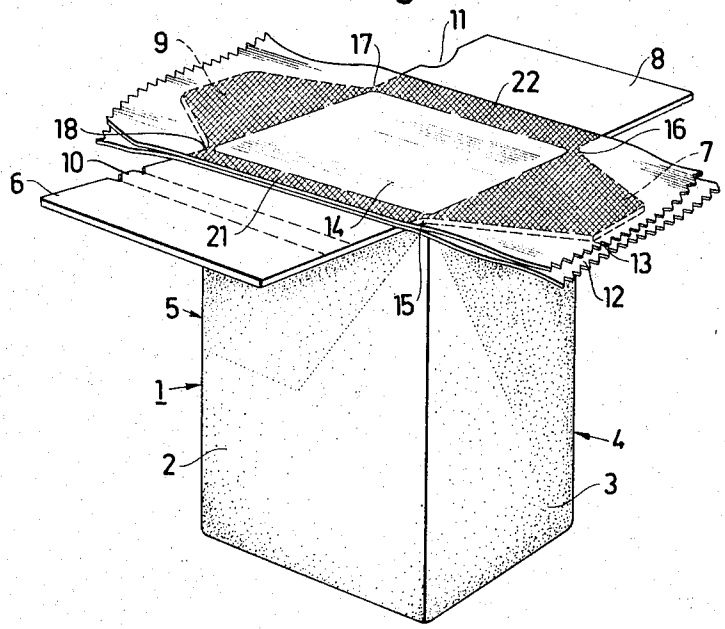

Fig.2

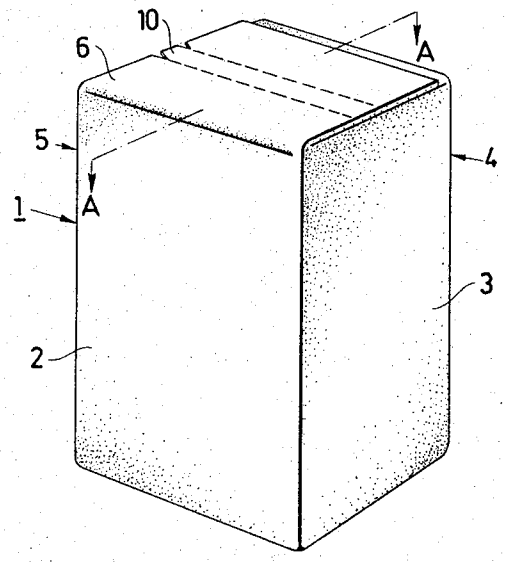

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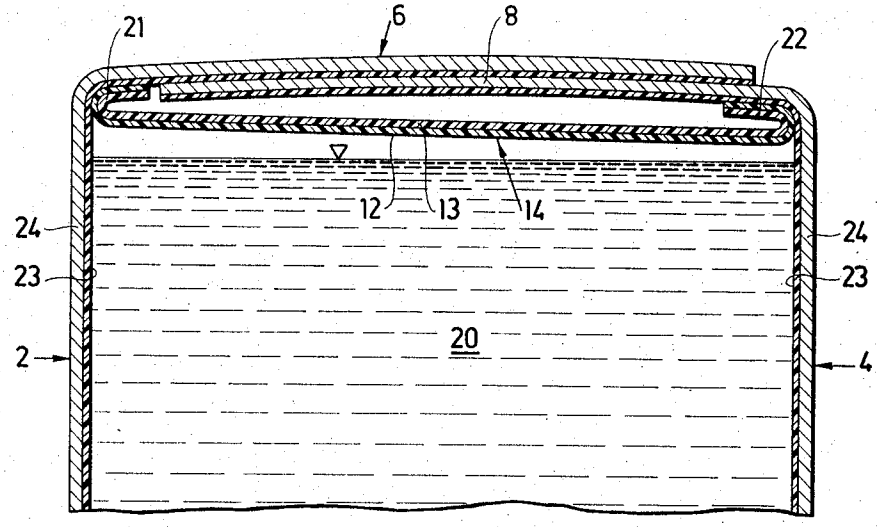
Fig.3



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3 Claims. (Cl. 229—14)

ABSTRACT OF THE DISCLOSURE

A parallelepipedic package is constituted by a bottom wall, four side walls and four ends closure flaps joined by fold lines to the side walls at the end of the package opposite the bottom wall. After the package is filled through the end opening a pair of superposed cover sheets are applied across the end opening and the marginal portions of the end flaps, these then being in their outfolded position. The inner positioned cover sheet is relatively thin and stretchable, the outer cover sheet is relatively stiff in comparison with the inner cover sheet. The two cover sheets are secured to each other along the marginal portions of the end flaps and are also secured to these marginal portions but are separate from each other throughout substantially the entire area represented by the end opening. The inner cover sheet being stretchable serves to absorb the tension forces created when the end flaps are infolded without adversely affecting the seal and the outer cover sheet serves as a protection for the inner one.

The present invention refers to a package closure, more partciularly a package closure in which closely sheets extending across an opening in the package are subjected to tensions through folding or otherwise.

It is previously known to apply closing sheets, so called wafers, across openings, e.g. pouring openings, in packages. In the case where a package is intended for storing a liquid material or where it is desirable for other reasons to provide a liquid-tight closure, a closing sheet of a material impervious to liquids has often been arranged across said opening. Preferably, this material has consisted of a thermoplastic material which normally satisfies the requirements of imperviousness to liquids. In those cases where the package and the closing sheet are subjected to tension stresses, e.g., by folding, it has however proved to be difficult to get good liquid sealing on account of breaks in the wafer material. Therefore one has attempted to solve the problem by making the closing sheet stronger. However, it thereby loses its resiliency to a high extent, so that in the case of tension stresses in the wafer these stresses influence the sealing between the wafer and the material surrounding the hole, causing a risk of leakage.

Therefore, the present invention refers to a new and practical method of solving the above mentioned difficulties by a package closure of the kind mentioned which is characterized in that the closing sheets which are larger than the package opening are at least two in number and that they are connected to each other at a joint along the circumference of the opening, and that one of the closing sheets is fixed at said joint to the package material around the opening, while the closing sheets at least within the major part of the region of the opening are not fixed to each other.

A special embodiment of the invention refers to a closure of the kind mentioned in a liquid-tight package box consisting of side walls, a bottom and flaps capable of being folded in across the package opening at the top of the side walls. The invention will be explained more closely in the following through this embodiment which

will be described with the guidance of the accompanying drawing figures, of which

FIG. 1 shows a perspective view of a package box having unfolded end flaps, illustrating the closure according to the preferred embodiment,

FIG. 2 shows the same package box having folded-in end flaps, and

FIG. 3 shows an enlarged section A—A in FIG. 2.

In FIGURES 1 and 2, **1** designates a package box having visible side walls **2** and **3**, concealed side walls **4** and **5**, a concealed bottom wall and a top consisting of four flaps **6**, **7**, **8** and **9** capable of being folded in. One of these flaps, viz flap **6**, is provided with two longitudinal perforations, whereby a tear-up strip **10** is obtained. In the opposite flap **8** there is provided a substantially semicircular notch **11** so as in, the closed package, to make the tear-up strip **10** easily accessible to the fingers of one hand.

Across the opening defined by the boundary lines between the side walls and the fold-in flaps of the package there are provided two closing sheets or wafers **12** and **13**. The inner one of said wafers is designated by **12** and the other one by **13**.

The wafers or closing sheets **12** and **13** are fixed within the regions shadowed in FIG. 1 both to each other and to the underlying package material, i.e. to the flaps **7** and **9** and to the parts **21** and **22** of the flaps **6** and **8**, respectively, adjacent the opening of the packages. Above the package opening, i.e. within the region **14**, the wafers are not fixed to each other. If considered advantageous, the two wafers may possibly, within a small part of the center portion of the region **14**, be fixed to each other without seriously impairing the properties of the closure. The main thing is that a sufficiently large part of the region **14** has wafer portions which are free in relation to each other. At the box corners **15**, **16**, **17** and **18** the covering wafers **12** and **13** are besides sealed to the top edges of the side walls in the way disclosed by the Swedish Patent No. 186,301 whereby a completely tight closure is obtained.

From FIG. 3 it is seen that the package box **1** consists of a two ply material, viz an outer stiff fibrous material **24** determining the package shape and an inner liquid-impervious material **23** which preferably consists of a thermoplastic material, laminated to the fibrous material **24**. If considered desirable the package box may obviously instead consist of a plurality of plies of material or of a single one.

Of the two covering wafers **12** and **13** at least one, viz. the inner wafer **12**, is manufactured from a thermoplastic material. This is of such quality and of such thickness that it is highly stretchable. The outer wafer **13** is intended to be manufactured from a heavier material which takes up normally occurring outer and inner forces and is relatively stiff in relation to the inner wafer **12** and which may consist of cardboard or of a thermoplastic material. Preferably, both wafers **12** and **13** are manufactured from the same kind of thermoplastic material, which is advantageous from the point of view of sealing, the material thicknesses however being different inasmuch as the inner wafer **12** is thinner than the outer one **13**. Among suitable materials may be mentioned polyethylene, polyvinyl chloride, polypropylene and others. So as to get good sealing between the fold-in flaps **6**, **7**, **8** and **9** the inner ply **23** of the box material preferably also consists of the same material as the inner wafer **12**.

The filling material **20** in the package which may be in liquid form will thus be prevented from expanding through the fibrous walls **24** of the package or through the closure as a result of the liquid-impervious materials **23** and **12**.

In the making of a package the four flaps **6**, **7**, **8** and **9** are folded outwards, so that the opening in the top of

the package will be entirely uncovered, whereupon the desired filling material 20 is supplied to the interior of the package. The closing sheets or wafers 12 and 13 initially consist of parts of web materials, which preferably are wound on to rollers. As the filled packages are advanced in the packaging machine, pieces of the web materials are continuously applied over the opening of the package and sealed both to each other and to the package by means of sealing members provided therefor. Since the inner ply 23 of the package box and the wafers 12 and 13 consist of the same kind of material, very good sealing is obtained. In connection therewith the said pieces 12 and 13 are also detached from the web materials, whereby the packages get the appearance shown in FIG. 1.

As a final phase in the production of the packages the upper flaps of the package box are folded in, the flaps 7 and 9 together with the corresponding parts of the covering wafers 12 and 13 being first folded in and thereupon the flaps 6 and 8 with the parts of said wafers within the regions 21 and 22. As will be seen from FIG. 3 the wafers 12 and 13 will thereby be doubled. For example, the portions 21 and 22 will be folded upwards and inwards, portions of the wafers being sealed to the inner ply 23 of the flaps 6 and 8. The flaps 6 and 8 are folded in one over the other with the flap 6 uppermost, whereupon heat is supplied by means of heat sealing members to the part of the flap 6 beyond the tear-up strip 10, whereby the thermoplastic material between the flaps in said regions will melt or be highly softened and stick together causing a sealing between said flaps.

By the absence of push-in flaps the flaps 6 and 8 need not be subjected to heavy stresses in connection with the closing of the package, which might damage the closure despite appropriate configuration of the latter. The production is also appreciably facilitated. It is also considerably easier to open a package of the kind described, which obviously is an advantage.

The principal advantage of the package lies however in the doubling and the special sealing conditions of the closing sheets. As will be seen from FIG. 3 a tension will be produced in the wafers as a result of the flaps 6, 7, 8 and 9 being folded in across the package opening. This tension is caused by the fact that the outer radius at the folding point, as at 21, is greater than the inner radius. This tension cannot be avoided, but according to the invention its harmful effects are eliminated. By the presence of two wafers which are free from each other and of which the inner one preferably is thinner and consequently more resilient than the outer one, the stretching tendency, instead of being concentrated to the region of the fold proper as would be the case if the wafers were

fixed to each other within the region 14, will extend across the whole surface of the inner wafer 12. The extension in said wafer per unit of surface or length will therefore be very small and will be within tolerable limits. Therefore no break will occur in the inner wafer 12. The outer wafer 13 which is made from a heavier material and which serves as a protection for the inner one may certainly show cracks in the regions of the folds. However, these do not influence the sealing conditions of the closure, because the sealing is mainly established by the inner wafer 12.

I claim:

1. In a parallelepipedic package constituted by a bottom wall, four side walls and four end closure flaps joined respectively by fold lines to said side walls at the end opposite said bottom wall, said fold lines defining the periphery of the end opening into said package for filling the package when said end flaps are in an outfolded position, the improvement wherein a pair of superposed inner and outer cover sheets are applied across said end opening and the marginal portions of said end flaps adjacent said fold lines subsequent to filling the package and with said end flaps in their outfolded position, said superposed cover sheets being secured to each other along said marginal portions of said end flaps and being secured also to said marginal portions but being separate from each other throughout substantially the entire area thereof represented by said end opening, said inner cover sheet being relatively thin and stretchable and said outer cover sheet being relatively stiff in comparison with said inner sheet.

2. A parallelepipedic package as defined in claim 1 wherein the inner surfaces of said end closure flaps and said superposed cover sheets are constituted by the same kind of thermoplastic material, and said outer cover sheet is thicker than said inner cover sheet.

3. A parallelepipedic package as defined in claim 1 wherein the inner surfaces of said end closure flaps and the inner cover sheet are constituted by the same kind of thermoplastic material and said outer cover sheet is constituted by cardboard.

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