Nov. 29, 1966 R. M. DILOT 3,288,345

PACKAGING BOX

Filed May 12, 1964

Fig.1

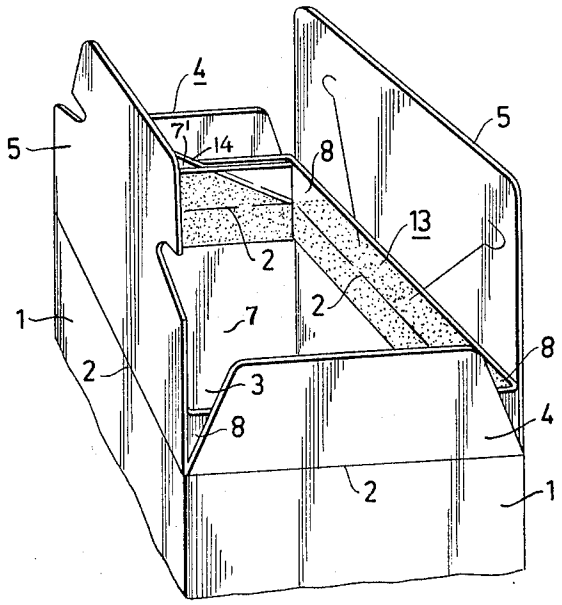
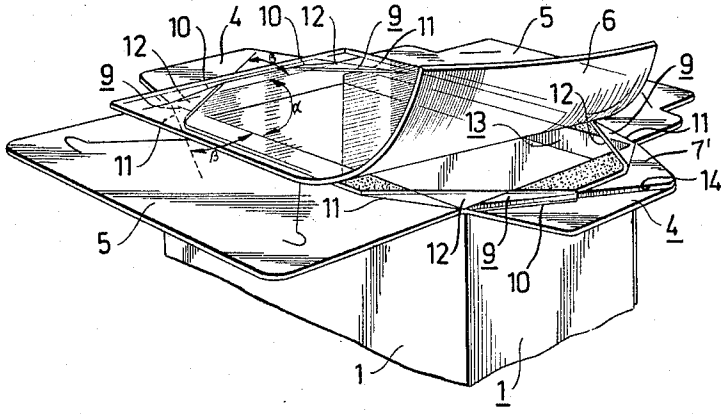


Fig.2



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PACKAGING BOX

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The present invention relates to a packaging box having a multicornered box opening lying in one plane and above which there are provided sealing flaps foldable inward about each one of the sides of the opening and separated from each other by cuts or the like extending to the edge of the opening, and which is intended to be sealed by means of a separate sealing diaphragm which is larger than the box opening and is placed over the opening with the sealing flaps folded outward therefrom so as to cover said opening, and which is fixed to the box along its circumference in a continuous joint.

In order to permit the forming of the unbroken sealing diaphragh joint it has previously been proposed with respect to boxes of this kind that the joint either be disposed inside the plane of the box opening or that the box be coated on the inside, at least in the area of the edge of the box opening, with a film which extends continuously over the innermost portion of the cuts and consists of a relatively stretchable material, whereby it may be stretched at the outward folding of the flaps without being ruptured and so as to form the innermost portion of corner pieces bridging the angular openings defined between adjacent outwardly folded flaps. In the former case the diaphragm is introduced past the plane of the box opening and is sealed to the inside of the box adjacent the edge of the box opening. In the latter case the sealing diaphragm joint is essentially disposed in the plane of the box opening and is allowed to extend along the stretched corner pieces formed by the film on the inside.

Both of these earlier technical solutions have their own advantages, but at the same time they have disadvantages which limit the usefulness of this type of box.

According to the present invention, a third solution is proposed which has the advantages but not the disadvantages of the previously known solutions. The packaging box according to the invention is essentially characterized in that at each corner of the box opening it has an interior piece of lining consisting of film or a similar relatively thin and flexible material, which lining continuously bridges the innermost portion of the cut between the said flaps prior to the outward folding of the two flaps adjacent to the corner and which has such an extension and is besides secured in such a way at least to the flaps in question on their inside that at the outward folding of the flaps with a portion not adhering thereto it will be folded inward over itself, essentially without being elongated along two straight lines starting from the corner point proper and extending essentially in the inside plane of each of the two flaps, and that with a central part of the said portion it will form a corner piece continuously bridging the innermost corresponding corner portion of the box opening and essentially pulled flat when the flaps are folded outward to the plane of the box opening, in order that the said unbroken sealing diaphragm joint at the corner of the box opening may extend along these corner pieces.

Further particulars and advantages of the invention will be apparent from the appended drawing showing an embodiment of the invention chosen by way of example, and where

FIG. 1 is a perspective view of the box prior to the outward folding of the sealing flaps, and

FIG. 2 is a perspective view of the box after the outward folding of the flaps and while the sealing diaphragm is being applied.

The package box shown as an example is assumed to have been punched in one piece from carton or a similar fibrous material, and has four side wall panels **1** connected by crease lines and four sealing flaps **4** and **5**, which are each connected with a panel **1** by the end margins of the panels **1** and consequently by folding lines **2** defining the sides of the box opening, and are spaced from each other by cuts **3**. The cuts **3** extend to the folding lines **2**.

The box also comprises a separate sealing diaphragm **6** which is larger than the box opening and is adapted to be applied when the flaps **4** and **5** are folded outward from the box so as to cover the box opening and to be fixed to the box in a joint which is continuous along the circumference of the box opening.

The blank forming the box has a gluing panel **7** and gluing flap **7'** for gluing together the sides of the blank so as to make it assume tubular shape. In the glued box the said panel **7** and flap **7'** extend along a side wall panel **1** and along a sealing flap **4** connected with the said panel.

According to the invention, the box has at each corner of its box opening an interior piece of lining **8** consisting of film or a similar relatively thin and flexible material. Prior to the outward folding of the flaps **4**, **5** and **7'** adjacent to the corner, the piece of lining **8** bridges the innermost portion of the cut **3** between the said flaps, as shown in FIG. 1. For the rest, the lining **8** has such an extension and is besides fixed in such a way at least to the flaps **4**, **5** and **7'** on the inside thereof that at the outward folding of the flaps with a portion **9** not adhering to the said flaps it is folded inward about itself, essentially without being stretched, along two straight lines **10** and **11** starting from the corner point proper. The said lines **10** and **11** are essentially contained in the inside plane of each of the flaps **4**, **5** and **7'**, an intermediate portion of the said lining portion **9** forming a corner piece **12** continuously bridging the innermost corresponding corner portion of the box opening. When the flaps are folded outward to the plane of the box opening the corner pieces **12** are essentially flattened in this plane. Due to these corner pieces **12** the sealing diaphragm **6** may be united with the rest of the box when the sealing flaps **4**, **5** and **7'** are folded outward, so as to form an unbroken joint extending along the flap insides and the corner pieces **12**.

If the corner angle between the two box opening sides in one box opening corner is α, the angle β between the folding line **10** and **11**, respectively, and the corresponding box fold line **2** is essentially

$$\text{arc tg } (1-\sin \tfrac{1}{2}\alpha)/\cos \tfrac{1}{2}\alpha$$

In the present case, where the corner angles α are 90°, angle β is 22.5°.

Although the pieces of lining **8** according to the invention may, of course, be separated from each other and may each correspond as to its form to for instance the lining portion **9**, i.e. be triangular with a top angle of $(180°-2\beta)$, and exceed the demensions of the said lining portion to such an extent that it can be attached to the inside of the box along the sides enclosing the top angle and corresponding to the folding lines **10** and **11**, they should preferably be continuous and consequently constitute sections of a lining **13** extending along the whole circumference of the box opening and be in the shape of a strip, said lining **13** having at least a local extension on both sides of the plane of the box opening.

A prerequisite for the corner pieces **12** effectively sealing the corresponding corners of the box opening, both

when the pieces of lining **8** are separate and when the lining is in the shape of a strip of the type shown in the drawing, is that each lining **8** is attached to the insides of the two adjacent sealing flaps in a single joint which is common to both flaps. This joint must consequently extend inside the plane of the box opening. Preferably, the joint in question is limited outward by the two folding lines **10** and **11**. The linings **8**, which constitute parts of a lining **13** limiting with its inside the whole packaging cavity of the packaging box, do not, however, for this purpose require any continuous fixing joint extending inside the box opening plane. They merely have to be fixed in such a way to the respective flaps **4**, **5** and **7'** that they are folded along the lines **10** and **11** when the flaps are folded outward. In principle, it would consequently be sufficient to have one glue spot on each flap.

In the strip shaped lining **13** which is shown in the drawing it may be advisable to attach the lining strip to the inside of the box in a joint which is common to all pieces of lining **8** and extends along the flap insides and inside the plane of the box opening.

Although it has been mentioned above that the lining portion **9** does not adhere to the flap insides but may be folded inward about the lines **10** and **11** at the outward folding of the flaps **4**, **5** and **7'**, this should not be taken too literally. As a matter of fact, it is entirely possible to let the portions **9** adhere to the flaps **4**, **5** and **7'**, prior to folding these flaps outward, provided that the union between the portion **9** and the area overlapped thereby along the insides of the flaps can be automatically broken open up to the folding lines **10** and **11** when the flaps are folded outward.

As a consequence of the gluing together of the box by means of the panel **7** and the gluing flaps **7'** the gluing flap **7'** is overlappingly attached to the outside or inside of one of the sealing flaps **4**. In the present case both the flap **7'** and the sealing flap **4** united therewith extend along the whole corresponding fold line **2** of the box opening. In principle, however, the flap **7'** does not have to extend along the whole box opening side but only along that portion thereof which corresponds to the respective piece of lining **8**.

In addition, the flap **7'** has a defining edge **14** coinciding with the corresponding folding line **10** for the lining **8** attached thereto. When the flaps **4**, **5** and **7'** are folded outward the lining will therefore be folded inward over this defining edge **14**, whereby the lateral gluing joint of the box will not make it difficult to obtain the unbroken and closed sealing diaphragm joint along the circumference of the box opening. This fact is best illustrated in FIG. 2, which shows how the sealing diaphragm **6** is applied over the box opening in connection with the sealing of the diaphragm to the box. Preferably, the sealing of the box opening takes place by means of the diaphragm **6** at sealing flaps **4**, **5** and **7'** folded outward essentially to the plane of the box opening. In

that connection the diaphragm **6** is disposed so as to cover the box opening and is sealed to the inside of the sealing flaps **4**, **5** and **7'** and to the corner pieces **12** in a continuous joint and extends along the whole circumference of the box opening.

In the case shown, this sealing joint may be established entirely between the diaphragm **6** and the strip shaped lining **13**, if this is desired but nothing will of course prevent that the joint extends outside the lining, except at the corners of the box opening, and is established only between the diaphragm **6** and the flap inside proper for a corresponding part of its extension.

What is claimed is:

1. A box having rectangular side panels surrounding a top opening, a separate sealing flap attached to the upper boundary of each side panel at a folding line lying in the plane of said top opening, a strip of flexible material bridging the innermost portion of each space between the side edges of each adjacent pair of sealing flaps and extending downwardly on said side panels, said strip of flexible material being continuously adhesively attached to the inner surfaces of said side panels adjacent to said top opening and to the inner surfaces of each of said sealing flaps only in an area of each sealing flap surface adjacent to the area covered by that portion of said strip that folds inwardly substantially without elongation into the plane of said top opening when said sealing flaps are folded outwardly into the plane of said top opening and a sealing diaphragm which is larger than said top opening sealed continuously around its periphery to said sealing flaps and to said inwardly folded portions of said strip.

2. A box as defined in claim **1** in which said strip of flexible material is a continuous strip extending completely around said top opening.

3. A box as defined in claim **1** in which said strip folds inwardly along lines at an angle

$$\beta = \text{arc tg } (1 - \sin \tfrac{1}{2}\alpha)/\cos \tfrac{1}{2}\alpha$$

with the upper boundary of the adjacent side panel, when α is the angle between adjacent side panels.

4. A box as defined in claim **3** comprising a gluing panel overlapping and adhesively attached to one of said side panels, a gluing flap attached at a fold line in the plane of said top opening to said gluing panel, the upper edge of said gluing flap being at said angle β to said fold line.

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