(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 178 702**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **85201473.7**

(22) Date of filing: **13.09.85**

(51) Int. Cl.⁴: **B65D 5/02**

(30) Priority: **14.09.84 DK 4382/84**

(43) Date of publication of application:
23.04.86 Bulletin 86/17

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

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(54) A cardboard box with closing flaps for semi-automatic closing.

(57) For manual packing of various objects is used a box member which is erected to form a rectangular tube having at both ends four closing flaps, of which first two side flaps (2) are folded in for closing the box end, whereafter a third flap (4) and finally a fourth flap (6) are folded in, the fourth flap (6) being glued to the outside of the third flap (4). The folding in and the glueing of the third and fourth flap may be effected by a simple apparatus, which, however, requires the two side flaps (2) to be entirely folded in. In practice it has been necessary, therefore, to manually hold and guide the boxes during their introduction into the closing apparatus. The invention provides for a special corner connection (8) between the respective two side flaps and the said third flap, whereby the third flap (4) will act as an arresting member for the folded in side flaps (2), such that these flaps are prevented from leaving their folded in positions, while the third flap (4), upon a temporary outward folding during the folding in of the side flaps (2), will reassume its normal position for final closing in the closing apparatus.

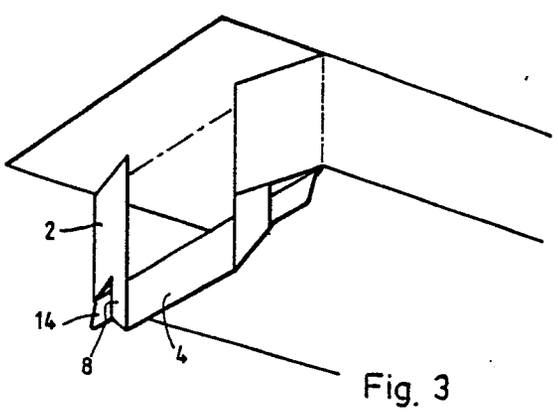

Fig. 3

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A Cardboard Box with Closing Flaps for Semi-Automatic Closing.

The present invention relates to a cardboard box of the type, which is erectable to form a rectangular tube having closing flaps at both ends, the box being usable for receiving, through one end, an object to be packed, whereafter the box is closable at that end by a successive folding in of the closing flaps, viz. first a folding in of two opposed flaps, then a folding in of the flap of a third side of the box and finally a folding in of the closing flap on the opposed, fourth side panel, whereby the box may be finally closed by fastening, e.g. by glueing, the fourth closing flap to the third closing flap.

Machines have, long ago, been developed for carrying out both the filling and the closing of such boxes, but the machinery is costly and will normally require to work with high output capacities. At places where the output is quite low it is customary to put the objects into the boxes manually and also to close the boxes manually, by applying glue to the fourth closing flap, while by intermediate capacities simple closing apparatuses will be economically well usable for carrying out the closing operations. Normally such an apparatus will handle the boxes by or during a through-flow thereof, and it is required that each box is fed to the closing apparatus upon a manual folding in of the two first closing flaps, while the said third and fourth flaps should stand laterally outwardly from the box. The apparatus will then operate to fold in the third flap, to apply glue to the fourth flap, and to finally fold in the fourth flap.

It is an associated problem, however, that a closing apparatus of a reasonably simple design do not operate with the required safety unless the two first closing flaps have been entirely folded in and are maintained folded entirely in until the folding in of the third flap has been initiated in or by the apparatus. Due to the tension created in the cardboard material by the folding in of each of the two first closing flaps it is rather difficult or troublesome to achieve that the two flaps remain entirely folded, i.e. it is normally required to manually hold the flaps folded in while the box is being introduced into the closing device. For the same reason the filled boxes cannot be supplied to a buffer magazine, from which they could be automatically transferred to the closing device for successive closing, unless some rather expensive additional equipment is used.

The invention, which seeks to provide a solution to the above problem, is based on the idea that no apparatus modification will be needed when instead the boxes are designed in such a manner that the folding in of the two first closing flaps will result in a positive locking of the flaps in their entirely folded in positions. It has been found that this is in fact possible to achieve without considerable extra costs or even without any extra costs or drawbacks of other kinds.

According to the invention there is provided a box of the said type, which is characterized by the features stated in the characterizing clause of claim 1. The said oblique folding lines at the opposite sides of the third flap will thus confine respective transverse strip portions connecting the outer side edges of the two first flaps with the adjacent outer side edges of the third flap behind the said folding lines, and when the two first side flaps are folded in simultaneously these strip portions will push the third flap outwardly until the side flaps have been folded in almost entirely, whereby the strip portions will be entirely folded out such that they are laid against the inner side of the third flap. Hereby the third flap will be free to pivot back towards its original position projecting axially from the end of the tube, and such a pivot back will occur automatically by virtue of the material bias as produced by the previous outward pivoting of the third flap from its natural position. When thus the third flap pivots back or just somewhat towards its initial position the two side flaps will get locked against being folded out from their now entirely folded in positions, because it will require a large outwardly directed pressure on the insides of these flaps to provoke a renewed folding out of the third flap.

It should be mentioned that it is known in the art to make use of closing flaps, where the two side flaps are connected with the third flap through triangular portions as defined by the folding line a, with the latter extended all the way to the corner root, but without the known art having any relevance to the problems here discussed. In the said known art the triangular portions are fully intact, e.g. for enabling a surface welding of the triangular portions to the inside of the third flap and/or to the outside of the two side flaps upon the folding in of the third flap, such a purpose, however, being entirely irrelevant to the invention.

With the use of such intact triangular portions for the purpose of the invention the problem would arise that the folded together corner panel portions would show a considerable thickness along the side edges of the third flap, whereby an undesirable "unflat" closure would result from the fourth closing flap being folded into an adhering engagement with the outside of the third flap.

In the following the invention is described in more detail with reference to the drawing, in which

Figs. 1-5 are perspective views of one end of a box member according to the invention, illustrating successive phases of the closing of the box end.

The box member shown is a cardboard member, which from a relevant carton factory is supplied as a flat tube member, which is erectable to the rectangular tubular shape as shown in Fig. 1. The open end of the box has two opposite side flaps 2, a lower closing flap 4 ("third flap"), and an upper closing flap 6 ("fourth flap"). In a conventional manner the corner lines between the flap 6 and the two side flaps 2 are cut up, while the lower flap 4 is connected integrally with the two side flaps 2 through transverse strip portions 8.

The non-illustrated opposite end of the box may be designed in a fully similar manner, though this will of course not be necessary in any way; thus, the other end of the box member may be provided with a so-called self-erecting end closure, which is automatically actuated to close the box end already by the erection of the flat starting member into its rectangular tubular shape.

The said strip portions 8 each constitutes a rudiment of a triangular outer area of the lower flap 4 as defined by an oblique folding line a between the portions 4 and 8, this line being directed towards the root corner between the flaps 4 and 2. The folding line a, starting from the outer edge of the flap 4, continues inwardly into a transverse slot portion 10 as constituting one leg of an angular slot, the other leg portion 12 of which stretches inwardly along the corner line between the flaps 4 and 2, whereby the slot portions 10 assist in confining the strip portions 8. On the flap 4 the angular slot 10,12 leaves an outwardly projecting triangular flap portion 14.

When the object to be packed has been filled into the box member the operator folds in the side flaps 2 by applying a finger pressure to the area just outside the strip portions 8. The folding lines a are pressed into the material from the outside thereof, such that by the pressing in of each side flap 2 the strip portions 8 will show a natural

tendency to push the lower flap 4 downwardly, see Fig. 2. The associated downward pivoting of the flap 4 will continue until the side flaps 2 as shown in Fig. 3 have reached a position, in which the strip portions are oriented practically vertically downwardly.

When the side flaps 2 are pressed to or almost to their positions, in which the strip portions 8 are vertical, the lower flap 4 will start pivoting upwardly by its own tension in the folding line area thereof, and this pivoting will occur almost smackwise to a horizontal position or to a position slightly below the horizontal plane (Fig. 4), whereby the side flaps 2, through the strip portions 8, are caused to be entirely folded in. Hereafter a considerable pressure on the inside of the side flaps 2 will be required for unfolding these flaps, and in practice the result will be a self holding locking of the closed side flaps 2.

If the other end of the box member is designed correspondingly the operator may start closing or half-closing the other end as here described, whereby the side flaps will form an introduction stop for the article to be packed.

Partly closed box members as shown in Fig. 4 may be fed to a buffer or feeding magazine for automatic transfer to a simple end closing apparatus, which will cause the lower flap 4 to be folded upwardly (Fig. 5), to apply a gluestuff to the underside of the upper closing flap 6, and to pivot the latter flap downwardly for adhesively fastening it to the flap 4 over the area shown in hatched lines in Fig. 5, whereafter the box is finished.

From Fig. 5 it will be noted that the projecting triangular portions 14 at the opposed outer sides of the closing flap 4 will serve the purpose of contributing to an effective adherence of the outermost flap 6, such that the latter will be adhesively secured over its entire width. The areas 14 are laid flat against the flaps 2 by intermediate of but a single layer thickness, whereby -despite the folded corner areas - a neat, flat closing of the flaps will be achievable. The areas of double layer thickness, i.e. the areas along the strips 8, are located well spaced from the ends of the glued area, such that they are easily pressed slightly inwardly in the box when the outermost flap 6 is closed, i.e. the folding connections used will not affect the visual appearance of the closed box end.

Boxes according to the invention may be produced just as cheap as conventional boxes having four disintegrated closing flaps, only with the use of a modified punching tool.

Claims

1. A cardboard box of the type, which is erectable to form a rectangular tube having at least at one end four closing flaps projecting lengthwise of the tube, viz. two opposed side flaps (2), a third flap (4) therebetween, and an opposite fourth flap (6) adapted to constitute, by the closing of the box end by folding in of the four flaps, the outermost or lastly folded in flap, which is fastened such as by glueing to the outside of the said third flap, characterized in that the respective two side flaps (2) are coherent with the third flap (4) along an outer portion of their common edge line, while the innermost portion (12) of this line is cut up, this cutting line from its outer end continuing inwardly (10) over the third flap to an oblique folding line (a) provided in the outer end area of the third flap along a line directed towards the respective corner between the roots of the two adjacent flaps (4,2) at an angle of 45° with the length direction of the third flap (4).

2. A box according to claim 1, characterized in that the cutting line (10,12) is shaped as an angular slot leaving a planely projecting corner portion (14) on the third flap (4).

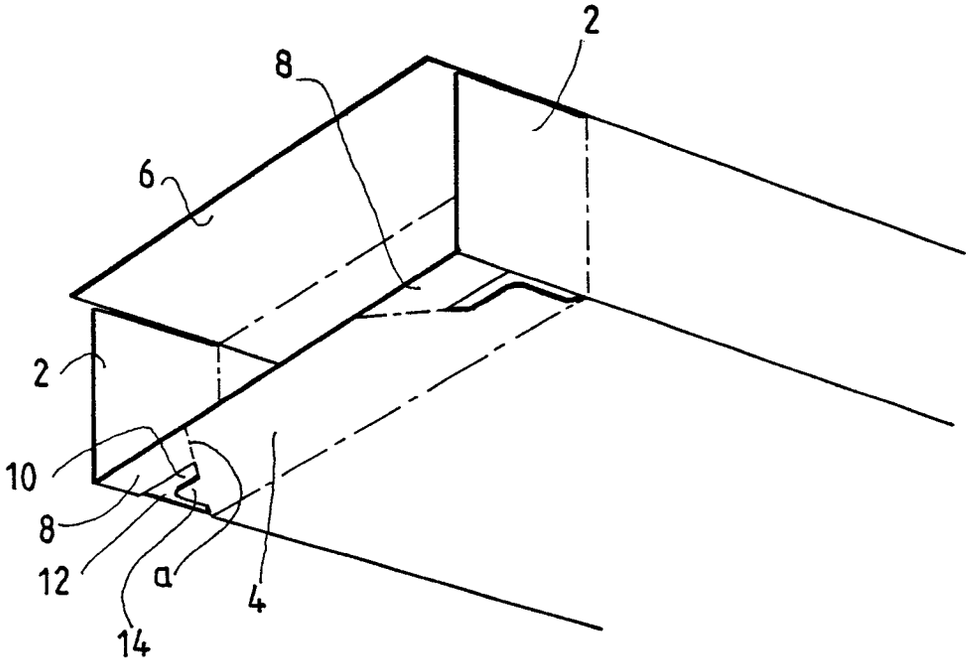

Fig. 1

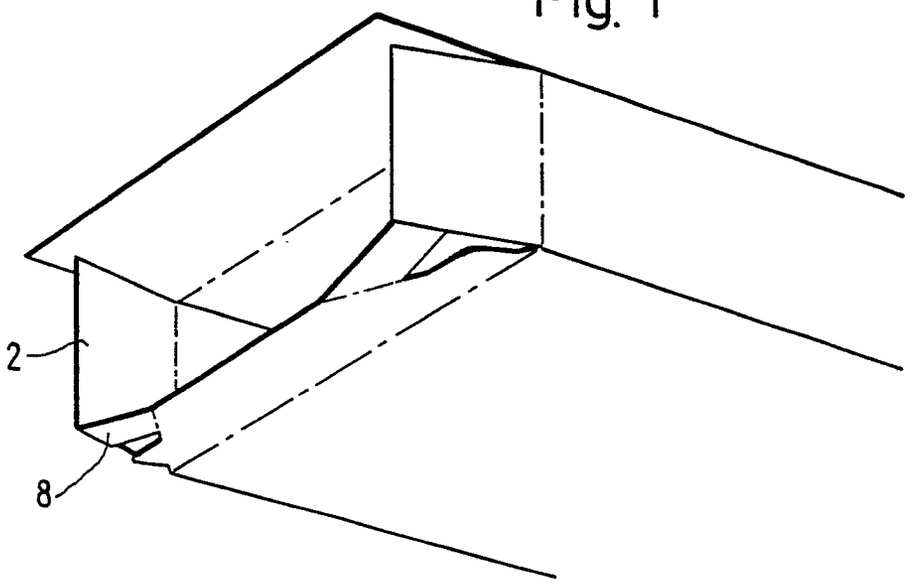

Fig. 2

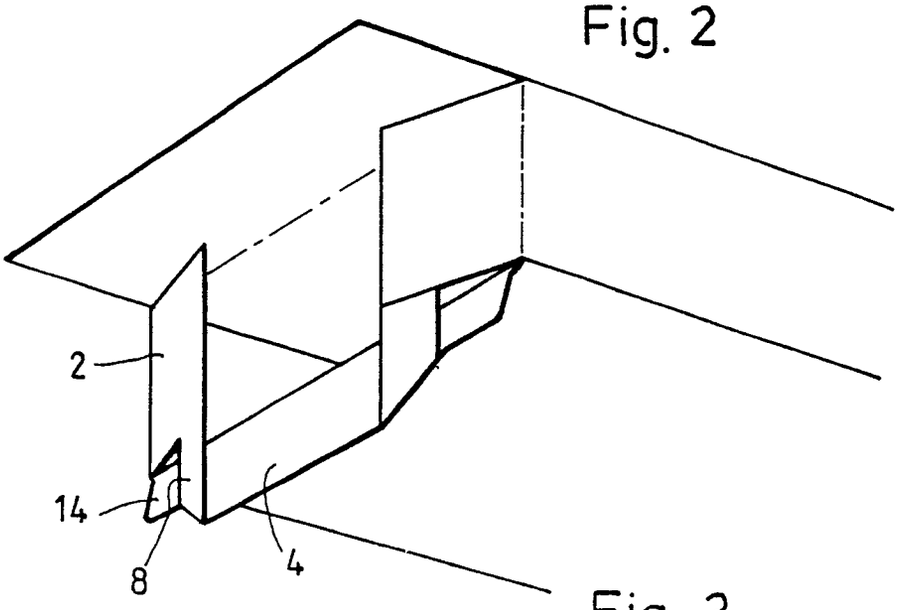

Fig. 3

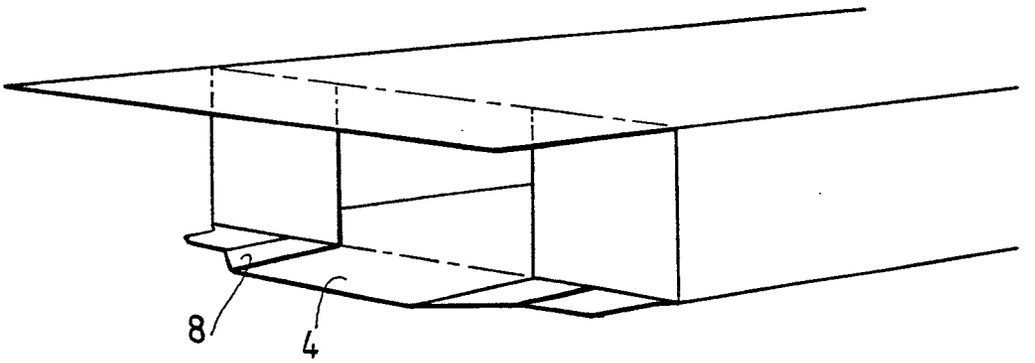

Fig. 4

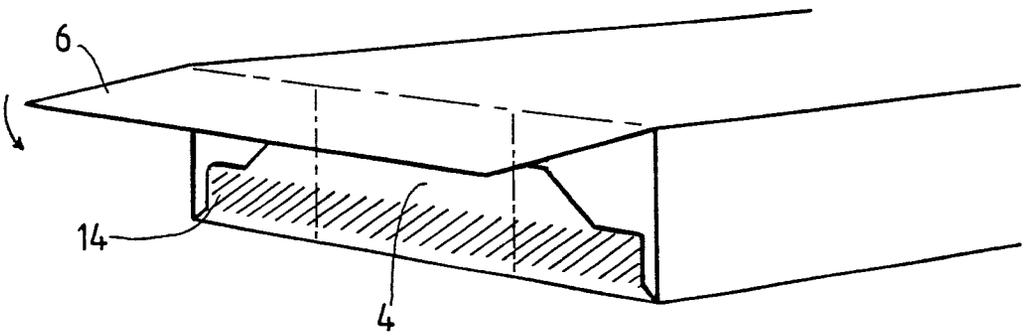

Fig. 5