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3,004,697

TEAR LINE CONSTRUCTION FOR PAPERBOARD CARTONS

Filed Oct. 25, 1957

2 Sheets-Sheet 1

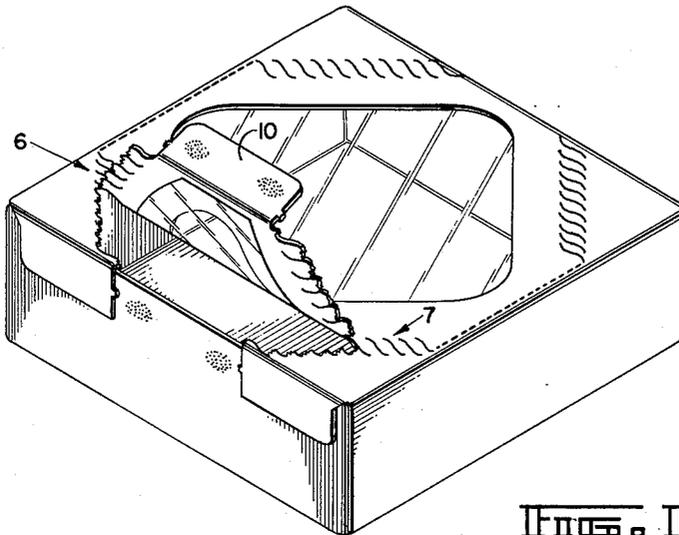


FIG. 1

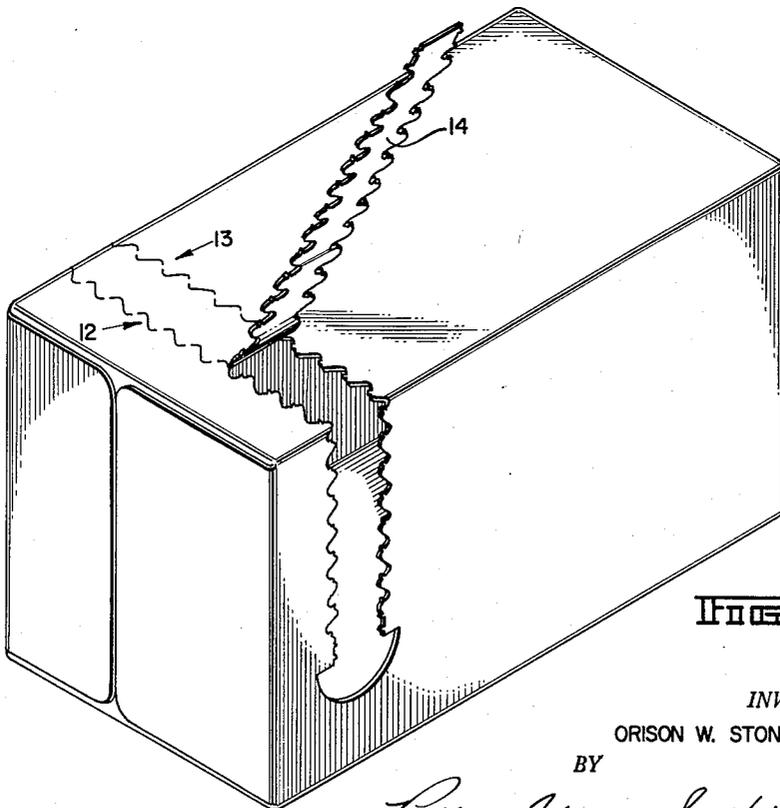


FIG. 2

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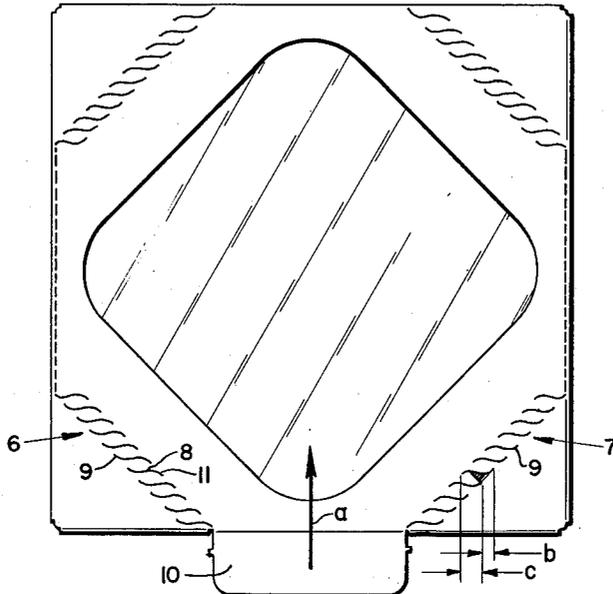


FIG. 3

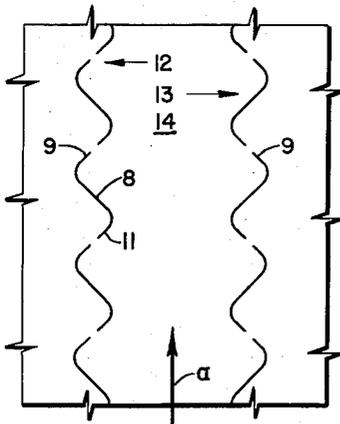


FIG. 4

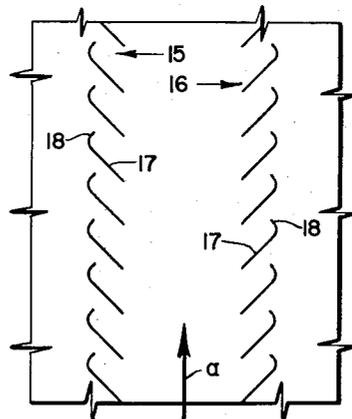


FIG. 5

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3,004,697

TEAR LINE CONSTRUCTION FOR PAPERBOARD CARTONS

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2 Claims. (Cl. 229—51)

The invention relates to improvements in the construction of tear lines, and more particularly to the configuration and arrangement of tear lines made up of a succession of spaced cut lines knifed into, or through the paperboard stock. My invention is useful wherever tear lines are employed: for example, along the edge of a cover or cover opening, around the sides of a coupon section, across or around the body of a carton to assist in opening the carton or to form a hinged cover at one end, or along the edges of a tab for a pouring opening or a re-closure and so on.

A common difficulty with tear lines is that the line of tearing will often wander away from the cuts or perforations which are supposed to control the direction, or directions, of tear. Sometimes a succession of cut lines arranged at an angle to the line of tear will be used, but the trouble with this is that there is a tendency to tear away to the outside of the forward ends of such cuts. What may happen is that the paperboard stock will begin to tear at the end of a cut, the line of tear continuing from this point to the outside of its intended course, in which circumstance the actual tear will "miss" the succeeding cut altogether. Once this occurs, the tear goes out of control and may miss a whole series of cuts before getting back on the beam.

I have found that a much more certain control of the direction and course of actual tearing can be secured by arranging a succession of spaced cut lines at an angle to the line of tear, using cut lines which are hooked around in the general direction of the line of tear. With this construction a tear which begins to wander to either side of the forward end of a cut will nevertheless be quite certain to cross the path of the succeeding cut. The effect might be described as one in which wandering of the tear is corrected within the space of two adjacent cuts. Thus the course of tearing is corrected at close intervals, the correction being made quite certain by reason of the special configuration and arrangement of the cuts. The cuts may be "hooked" only at their forward ends ("forward" in relation to the direction of tearing), or at both ends. In the first instance, the cuts may be described as having the general configuration of J's, J being defined as inclusive of its mirror image. Thus in the case of a tear tab outlined by two spaced tear lines, we might have J's along one of them and reverse J's along the other. In the second instance, the cuts may be described as having the general configuration of S's. Here we might have S's along one tear line and reverse S's along a second tear line spaced from, and perhaps parallel to the first. The hooks at the forward ends of the S-cuts and J-cuts may be generally similar to one another and in either instance the tearing action beginning at the forward hook will be quite certain to cross the path of the next succeeding cut. This is the sine qua non of a perfectly controlled tear line.

With reference to the drawings I shall now describe the best mode contemplated by me for carrying out my invention.

FIG. 1 is a perspective view of a window cover having tear lines constructed according to my invention for tearing open the cover across the corners of the carton.

FIG. 2 is a perspective view of another form of carton

to illustrate how my improved tear line construction can be applied to a tear-out strip extending around one or more sides of the carton.

FIG. 3 is a top view of the carton of FIG. 1.

FIG. 4 is an enlarged view of a section of the tear-out band and adjacent portions of the side wall of the carton of FIG. 2.

FIG. 5 is a view similar to FIG. 4, showing a modification of my tear line construction.

In the construction shown in FIGS. 1 and 3, there are spaced tear lines 6 and 7 each comprising a succession of spaced cut lines 8 arranged at an angle to the line of tear and having hooked ends 9. Notice that the ends 9 are hooked around in the general direction of the line of tear; and that when cover tearing tab 10 is broken out and away from the front of the carton, and is pulled up and over as shown in FIG. 1 the hooked ends 9 are effective to control the course of tearing so that it will cross the path of each succeeding cut 8. This will be explained more exactly with reference to FIG. 3 in which the arrow *a* represents, diagrammatically, the direction of pull. Relative to direction *a*, the forward end of each hook 9 lies within the ends of the succeeding cut 8 (by the distances represented at *b* and *c* respectively). If the tear which begins at the tip of the hook 9 wanders as much as 45° to port or starboard of the direction of pull *a*, it will nevertheless cross the path of the next succeeding cut 8 which in turn will direct the beginning of a new tear at its tip 9, and so on. The tiny triangular shaded area in FIG. 3 illustrates the action diagrammatically with reference to the assumed 90° sector over which tearing might take place. This sector would encompass the most extreme variations in the course of tearing which normally could be anticipated. In any event, and regardless of the theory which may be suggested to explain the tearing action control, I have found that my hooked-end cut lines, when arranged as shown and described, are most effective in producing a tearing action which follows its intended course.

The cut lines 8 have been described as having ends 9 hooked around in the general direction of the line of tear. These cut lines are characterized further by the fact that the end portion 9 of each is turned in toward an adjacent portion of the succeeding cut line. Also, in the particular embodiments shown in FIGS. 1 to 4 inclusive, the opposite end portion 11 of each cut line is turned in the opposite direction. This results in a tear line construction 6 which may be described as comprising a succession of similarly disposed spaced cut lines of the general configuration of S's; or, defining S as being inclusive of its mirror image, this will include also the tear line construction 7 in which the S's are reversed. In either case 6 or case 7, the forward end 9 of each cut is hooked around in the general direction of the line of tear and is turned in toward an adjacent portion of the succeeding cut lines. Also in each case the opposite end of each cut is turned in the opposite direction. Thus the diverging spaced tear lines 6 and 7 of the construction shown in FIGS. 1 and 3 are complementary, as are also the parallel spaced tear lines 12 and 13 of the construction shown in FIGS. 2 and 4. The latter construction is utilized here to provide a tear-out strip 14 extending around three sides of the carton.

In the modified construction shown in FIG. 5, complementary tear lines 15 and 16 comprise a succession of spaced cut lines 17 arranged at an angle to the line of tear and having ends 18 disposed in the manner already described in detail with reference to the ends 9 of cuts 8, and for the same purposes. This results in a tear line construction 15 which may be described as comprising a succession of similarly disposed spaced cut lines of the

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general configuration of J's; or defining J as being inclusive of its mirror image, this will include also the tear line construction 16 in which the J's are reversed. In either case 15 or 16, the forward end 18 of each cut is hooked around in the general direction of the line of tear and is turned in toward an adjacent portion of the succeeding cut line. The cut lines comprised in tear line 16 are arranged at a reverse angle to those comprised in tear line 15 and the two tear lines are thus complementary to one another.

The terms and expressions which I have employed are used in a descriptive and not a limiting sense, and I have no intention of excluding such equivalents of the invention described, or of portions thereof, as fall within the scope of the claims.

I claim:

1. In a carton made of paperboard stock, a tear line which comprises a succession of similarly disposed spaced cut lines arranged at an angle of approximately forty-five degrees to the line of tear, each cut line having at its forward end a hooked portion directed sharply around toward the line of tear at an angle of approximately forty-

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five degrees to the line of tear with the end of the hooked portion pointing to the central portion of the adjacent cut line at approximately right angles thereto.

2. In a paperboard carton according to claim 1, the construction in which the succession of similarly disposed spaced cut lines is constituted by cut lines of the general configuration of J's and in which the hooked portions forming the bases of the J's are located at the forward ends of the cut lines (i.e. "forward" in relation to the direction of tearing).

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