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MEANS FOR PERFORATING PAPERBOARD

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FIG. 1 FIG. 2 FIG. 3

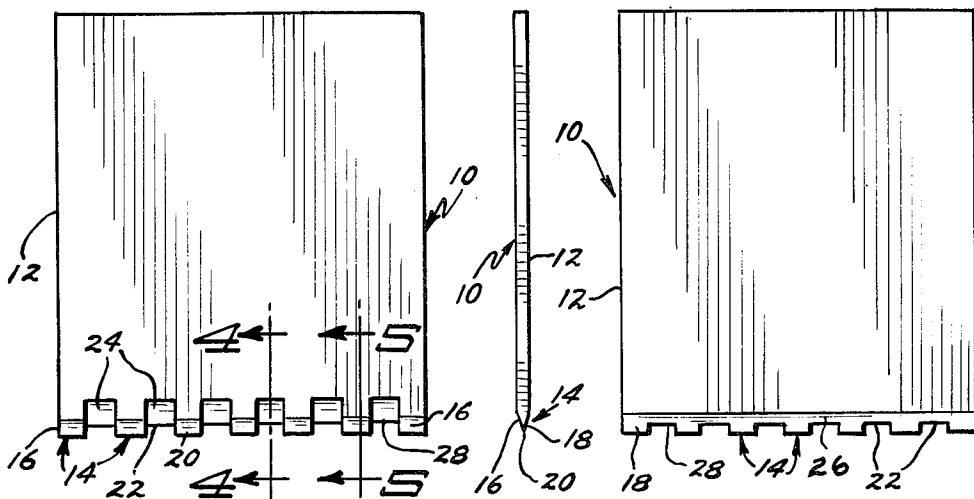


FIG. 4

FIG. 5

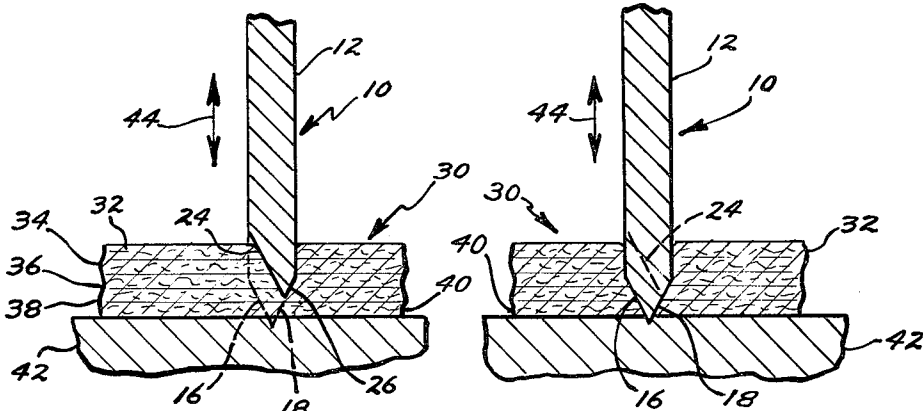


FIG. 6

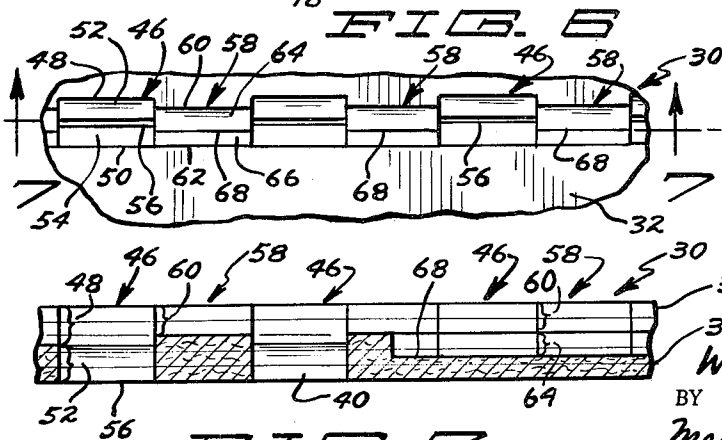


FIG. 7

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MEANS FOR PERFORATING PAPERBOARD
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3 Claims. (Cl. 83-660)

This invention relates generally to the perforating of paperboard. More specifically, the invention envisages the production of a series of spaced cuts that extend completely through the thickness of the paperboard and intermediate cuts that extend only partially therethrough.

One object of the invention is to provide paperboard having perforated lines of a character that greatly facilitate the tearing of the paperboard as compared with conventional perforated lines. In this regard, sheets of paperboard and cartons fabricated therefrom have perforated lines so that portions can be torn for the purpose of separating the sheet into individual sections and also for removing strips from cartons so that the contents can be removed readily; it is an aim of this invention to make this task as easy as possible.

Another object of the invention is to provide perforated lines so that the tearing operation always automatically follows the given line or pattern.

Yet another object of the invention is to provide a perforated line that will have a neat appearance, it being planned that ragged edges accompanying the tearing operation with the conventional type of line be obviated.

Still further, the invention has for an object the production of such perforated lines in one operation. In this regard, it is within the contemplation of the invention to utilize conventional apparatus that has heretofore been used for making perforated lines and doing so in one stamping operation with a perforating rule constructed in accordance with the teachings of the instant invention. In other words, it is only necessary to modify the rule or cutting die in order to realize the advantages of my invention.

These and other objects and advantages of my invention will more fully appear from the following description, made in connection with the accompanying drawing, wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIGURE 1 is a front elevational view of a rule or die configured so as to produce perforated lines in accordance with the teachings of the present invention;

FIGURE 2 is a right hand or side elevational view corresponding to FIGURE 1;

FIGURE 3 is a vertical elevational view taken from the rear of FIGURE 1;

FIGURE 4 is a sectional view taken in the direction of line 4-4 of FIGURE 1 but showing the rule in the process of forming a perforated line in a sheet of paperboard, the scale being considerably larger than that shown in FIGURE 1;

FIGURE 5 is a view corresponding to FIGURE 4 but taken in the direction of line 5-5 of FIGURE 1;

FIGURE 6 is a plan view of a portion of paperboard after the perforated line has been made in the manner shown in FIGURES 4 and 5; and

FIGURE 7 is a sectional view taken in the direction of line 7-7 of FIGURE 6, the line 7-7 being in one plane with respect to the left hand portion of FIGURE 6.

Referring first to FIGURES 1-3, the rule or die for producing a perforated line has been denoted generally by the reference numeral 10. The rule 10 includes a blade 12 formed with a series of spaced rectangular teeth 14 having tapered surfaces 16, 18 which provide a sharp-

ened cutting edge 20 at the free or projecting end of each tooth. Intermediate the various teeth 14 are rectangular notches 22 that are formed with tapered surfaces 24, 26 which provide a sharpened cutting edge 28. The surfaces 18 and 26 reside in a common plane, but the surfaces 16 and 24 reside in parallel planes that are slightly displaced from each other. These planes are better seen in FIGURES 4 and 5.

The sheet of paperboard that is to be perforated by the rule or knife 10 has been denoted generally by the reference numeral 30 and is comprised of plies 32, 34, 36, 38 and 40. The specific number of plies, it will be understood, are relatively unimportant to a practicing of the invention, for the rule can be of a size to perforate any given thickness of paperboard irrespective of the number of plies constituting same.

In FIGURES 4 and 5, there has been illustrated a plate 42 which serves as an anvil or platen on which the paperboard 30 is placed when making the perforation. Inasmuch as the apparatus for pressing or forcing the rule 10 downwardly to make the perforation is old and well-known, only an arrow 44 has been applied to show the direction of movement of the rule 10 in these two figures. Stated somewhat differently, a press normally would be utilized for forcing the rule 10 downwardly against the paperboard 30 and also withdrawing the rule after the perforated line has been made. For the sake of clarity, though, the paperboard 30 has been exaggerated as to its thickness in FIGURES 4 and 5 and the same degree of exaggeration has been incorporated into FIGURES 6 and 7.

FIGURES 6 and 7 picture the paperboard 30 after it has been perforated by the rule 10. Thus, a series of pockets or recesses 46 appear in these two figures which are a result of the penetration of the teeth 14 into the paperboard 30. Actually, the teeth 14 cut completely through the particular thickness of the paperboard and this is shown in FIGURE 7. In forming the pockets or recesses 46, the rule 10 produces substantially vertical walls 48, 50. Although it will be obvious to those familiar with the art, paperboard due to its fibrous character will possess a resilient quality that will cause the walls 48, 50 to expand somewhat into the void constituting the pocket or recess 46. However, such a distortion, which is perfectly acceptable in the practicing of the invention, has not been incorporated into FIGURES 6 and 7 for obvious reasons. It will be appreciated that the tapered surfaces 16, 18 form sloping walls 52, 54, respectively. The cutting edge 20, on the other hand, will produce a slit 56 at the bottom of each pocket. The point to be emphasized is that the teeth 14 cut completely through the paperboard. In other words, there is a complete severance from the upper surface of the ply 32 through the lower surface of the ply 40 of the paperboard 30.

Whereas the teeth 14 pass completely through the paperboard 30, the recessed cutting edge 28 formed by the tapered surfaces 24, 26 of each notch 22 does not pass completely through the paperboard 30. The notches 22 thereby produce pockets or recesses 58 having vertical walls 60, 62 and sloping walls 64 and 66. The sloping walls 64 and 66 by reason of their convergence produce a bottom apex or vertex 68 that lies approximately midway between the upper and lower surfaces of the ply labeled 38, as can be readily seen from an inspection of FIGURE 7. Thus, in the illustrative situation, there remains approximately 1½ plies that are not cut by the rule 10. The number of plies that remain uncut or unsevered will depend upon the particular quality of paperboard and the degree of tearing ease that is preferred for the particular sheet or carton making use of the paper-

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board 30. For instance, the partial cut resulting from the action of the tapered surfaces 24, 26 might well only go halfway through the thickness of the paperboard 30. As already indicated, the extent of the partial cut will depend largely upon the type of paperboard and the use to which the paperboard is put plus the facility or ease with which the paperboard is to be torn.

From the information herein presented, it will be apparent that the instant invention provides an improved type of perforated line. Only a relatively small portion of the paperboard requires tearing by the user in the regions that are not completely cut through. Inadvertent or unwanted tearing is resisted, though, by the slight lateral offsetting of the pockets 58 from the pockets 46; this condition can best be discerned by noting the relationship of the slits 56 and the apices 68 with respect to each other.

While the invention will find utility in a number of situations, it can be pointed out that the invention has a decided advantage where the upper and lower surfaces of the particular paperboard are calendered. Calendered surfaces resist tearing to a greater degree than uncalendered surfaces. Hence, it will be perceived that where the cut extends completely through the thickness of the paperboard, then two calendered surfaces will be cut or severed, and where a partial cut is made, then one of the calendered surfaces will be cut so that only one such surface remains. The remaining surface extends only throughout fragments of the entire perforated line and provides very little resistance to being torn. However, it is to be expressly understood that the invention is in no way limited to paperboard that is calendered, either on both sides or just one side.

It will, of course, be understood that various changes may be made in the form, details, arrangements and proportions of the parts without departing from the scope of my invention as set forth in the appended claims.

What is claimed:

1. A rule for perforating paperboard comprising:

- (a) a strip member formed with a series of spaced rectangular teeth having aligned sharpened edges,
- (b) said strip member having rectangular notches in-

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termediate said teeth which are also provided with sharpened edges, said last-mentioned edges being displaced slightly laterally from said first-mentioned edges,

- (c) whereby the sharpened edges of said teeth in use will completely penetrate a section of paperboard having a given thickness and the sharpened edges of said notches will only partially penetrate the same thickness of paperboard.

2. A rule for perforating paperboard comprising:

- (a) a blade member formed with a series of spaced teeth having first and second tapered surfaces to provide a cutting edge at the free end of each tooth,
- (b) said blade member having a notch between each pair of teeth having first and second tapered surfaces to provide a cutting edge recessed from the cutting edges of said teeth,
- (c) said first tapered surfaces residing in the same plane, and
- (d) said second tapered surfaces residing in different planes.

3. A rule for perforating paperboard in accordance with claim 2 in which:

- (a) said second tapered surfaces reside in planes parallel to each other.

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