Sept. 18, 1951 J. K. M. HARRISON 2,568,284

BEVEL CUTTING DEVICE

Filed June 24, 1947

Fig. 1.

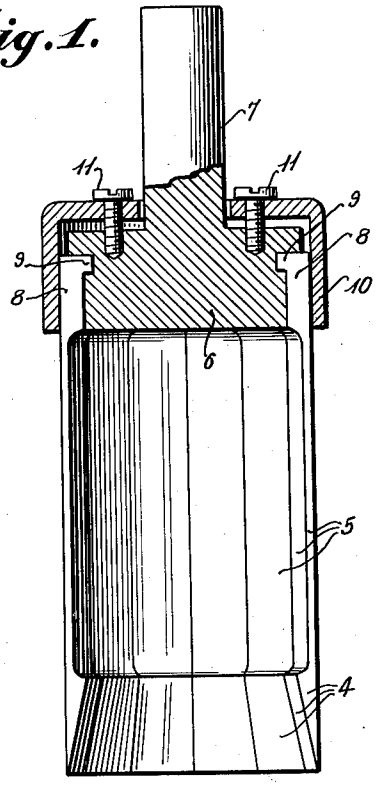


Fig. 2.

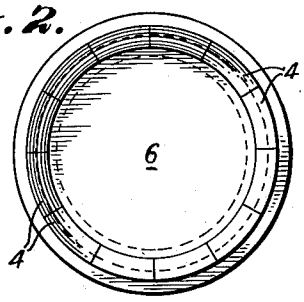


Fig. 3.

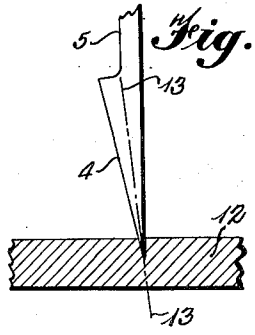
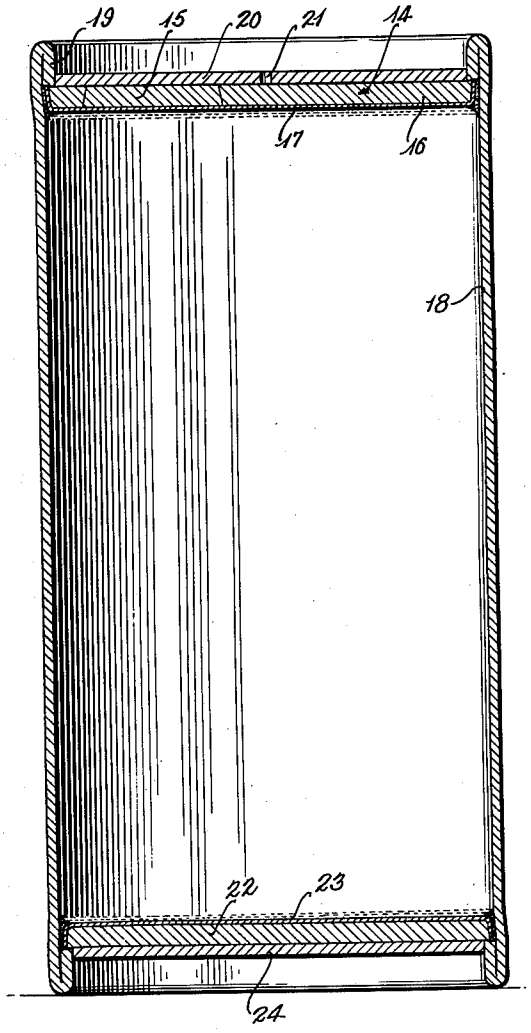


Fig. 4.



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BEVEL CUTTING DEVICE

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3 Claims. (Cl. 164—29)

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This invention relates to the manufacture of nonmetallic containers and is particularly concerned with the cutting of a section of sheet material in such manner that the line of cut is at an acute angle to the surface of said section of material and with the installation of said section of material as an end closure for a nonmetallic container.

Cutting dies, as known in the art, are normally arranged to make a cut at right angles to the surface of the sheet material. It is known to completely sever a small section from a sheet and remove it with a cutting die or eject it as the die is withdrawn to retain the cut-out section in place. Methods are also known for partially severing a section for later removal from the sheet.

In an application copending herewith I have described a novel form of paper or other nonmetallic container of cylindrical form having end closure discs provided with a partially several plug in which the lines between the disc as a whole and the cut-out section or plug are beveled to taper outwardly toward one of the faces of the closure disc. Such a closure member, interiorly lined with parchment or the like, forms a liquid-tight seal for the container and because of the beveled edge, the cut-out section has substantially the same resistance to displacement under impact of the contents during shipping as does a solid uncut disc. Such end closures cannot be prepared by cutting dies of the conventional type and I have now devised a novel method and apparatus for preparing and installing end closure discs of this type.

According to the present invention, the cutting die has a plurality of knife edges arranged to form the desired configuration for the cut-out section. These several knife edges are resiliently mounted for flexing at right angles to the edge of the knife. Each knife edge is so formed that upon entering the work to be cut, it will deflect along a plane lying at an angle to the direction of movement of the die. Its purpose is accomplished by beveling the knife edge at a greater angle on one side than on the other. In the preferred embodiment of the invention, the knife edge is beveled on only one side. By this means the knife edge is caused to move along a plane which bisects the surfaces of the knife.

For most purposes, good results are obtained by using a die of generally circular form in which the knife edges are all beveled to move outwardly as the die enters the work. This produces a closure disc having a central circular

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portion and an annular portion thereabout with the surface of demarkation between the two portions being in the form of a portion of a cone. When such a closure member is lined with parchment and employed to close a cylindrical container with the widest portion of the cut-out section toward the interior of the container; a rigid structure capable of withstanding the rigors of shipping is obtained. In spite of its high strength, the container is readily opened by thrusting a pointed instrument between the two ends of the closure and prying out the central portion.

As an added strength-imparting feature, the closure member may be covered with a separable cover disc which is readily removable and which may be installed in a novel manner to prevent premature displacement of the plug without, however, interfering with the convenient removal thereof when desired.

Other objects and advantages of this invention will be apparent upon consideration of the following detailed description of a preferred embodiment thereof in conjunction with the annexed drawings wherein:

Figure 1 is a view in vertical section of the preferred cutting die;

Figure 2 is a bottom plan view of the same;

Figure 3 is an enlarged detail view of a single blade showing the manner in which it enters a piece of sheet material illustrated in section; and

Figure 4 is a view in section of an end closure disc cut in accordance with the teachings of the present invention and installed in a paper or other nonmetallic container in accordance with the present method.

In the illustrated cutter a series of blades 4 is arranged to cut a circular portion or plug from sheet material. Each blade is beveled on its inner surface only, and is mounted yieldingly by making it integral with a relatively thin and flexible shank 5. The shanks are rigidly interconnected at their upper ends. The details of the means for this purpose are not important, but as shown, there is a solid head 6 provided with a stem 7 by which it may be attached to the plunger or beam of a press. Each shank 5 has a head 8 with an inner flange or tongue 9 seated in a groove in the head 6. The heads 8 of the shanks are fixed in place by a cap 10, with a slightly conical inner surface, which is fixed to the head 6 by screws 11.

As shown in Figure 3, each blade tends to move through the closure material 12 in the direction of the line 13—13 bisecting the angle between the inner and outer surfaces of the

blade and movement in this direction is permitted by elastic bending of the shank on which the blade is supported. When the cutter is raised again the shanks and blades spring back to their original position.

As the blades move laterally they separate slightly so that narrow uncut portions are left in the material. This causes the cut section to remain in the plane of the material when the cutter is withdrawn, so that no ejector is necessary to clear the cutter.

Although the invention is shown here in the modification which produces a frusto conical cut-out portion or plug of generally circular outline, it will be readily seen that the invention is not limited thereto. Thus the apparatus and process here disclosed is readily adapted to making cut-out sections of such outlines as triangles, ellipses, squares, etc. When the cut-out portion has the outline of a polygon it is found advantageous in some instances to bevel some of the knives to flex inwardly and others to flex outwardly. For example, a cut-out portion of square outline can be prepared in which two opposite sides are cut with knives beveled to move inwardly and the other two sides are cut with knives beveled to move outwardly. In this manner I produce a cut-out section having high resistance to accidental displacement in either direction. In most instances the contents of the container will exert sufficient resistance to inward displacement of the cut-out portion and for that reason I prefer to bevel all the knives for motion in the same direction, as more particularly shown in the drawings.

Now referring to Figure 4 of the drawings, the disc 14 there shown is provided with a cut-out plug 15 produced in the manner described above. The disc 14 has attached thereto at an annular zone 16, a disc 17 of parchment, cellophane, or other like material. The disc 17 is of a greater diameter than the disc 14 and the skirts or marginal portions of the disc 17 are bent upwardly about the edge of the disc 14 and lie between that edge and the inner wall of the cylindrical body portion 18 of the container. The end of the container 18 is spun over at 19 and a cover disc 20 provided with an air vent at 21 is inserted over the disc 14 and in peripheral engagement with the spun over portion 19.

At the bottom of the container a disc 22 is provided similar to disc 14 except that it does not have a cut-out portion, and above this disc is disc 23 corresponding in structure and function to the disc 17. Underlying the disc 22 is a cover disc 24 somewhat similar to disc 20 except that it is not perforated.

It is apparent that in the manufacture and filling of the container described in connection with Figure 4, it is necessary first to manufacture the body portion and to insert the bottom end closure comprised of discs 22, 23 and 24. This phase of the construction forms no part of the present invention and may be accomplished by conventional means which need not be described herein.

When a sub-assembly has been made comprised of the body portion 18 and the lower end discs 22, 23 and 24, it is then necessary to fill the container and to apply the end closure comprised of the discs 14, 17 and 20. This procedure is accomplished by first coating an annular zone near the upper end of the body portion with an adhesive. Thereafter a sub-assembly comprised of disc 14, having a plug 15 cut therein in the

manner described above, and disc 17 is inserted in the open end of the container to be bonded thereto by the adhesive provided in the annular zone on the inside of the upper end of the container body 18. After the sub-assembly comprised of discs 14 and 17 is in position, the spun down portions 19 are formed and the cover disc 20 is pressed into position.

In view of the fact that the conical plug 15 is arranged with its end of minimum diameter facing toward the disc 20, the insertion of the disc if permitted to compress air between itself and the disc 14 might effect sufficient displacement of the plug to cause it to rupture the disc 17 and fall into the contents of the container. This possibility is entirely avoided by provision of the air vent 21 in the disc 20, this air vent functioning to relieve air pressure between the discs 20 and 14 during the application of the disc 20 to the assembly.

While this invention has been described with reference to but one cutting tool and one process for preparing and installing the end disc, it is apparent that numerous variations in the disclosed structures and processes lie within the scope of this invention. It is, of course, possible to provide end closures with plugs at both ends of the container and it is possible to apply the precut closure disc to various types of containers of cylindrical or polygonal cross section.

What is claimed is:

1. A cutter for cutting from a blank a section having beveled edges that comprises a plurality of blades, each blade having a long shank portion and a lower portion substantially triangular in profile having one side thereof beveled to form a cutting edge and having the other side thereof parallel to the long axis of said shank, the base of said triangle being wider than said shank portion, each shank being resiliently deformable across the plane of the cutting edge but being rigid against deformation within said plane, and means holding said blades in contiguous relationship from the ends of the respective shanks remote from the cutting edges whereby when the blades are urged through a blank by the holding means each blade tends to move through the blank in a direction inclined to the blank surface.

2. A cutter for cutting a plug from a blank that comprises a plurality of blades each blade having a long shank portion and a lower portion substantially triangular in profile having one side thereof beveled to form a cutting edge and having the other side thereof parallel to the long axis of said shank, the base of said triangle being wider than said shank portion, each shank being resiliently deformable across the plane of the cutting edge but being rigid against deformation within said plane, and means holding said blades in contiguous relationship from the ends of the respective shanks remote from the cutting edges with said edges defining a closed figure and with the beveled side of all of the edges facing inwardly.

3. A cutter for cutting a plug from a blank that comprises a plurality of blades, each blade having a long shank portion of arcuate cross section and a lower portion also of arcuate cross section and substantially triangular in profile having one side thereof beveled to form a cutting edge and having the other side thereof parallel to the long axis of said shank, the base of said triangle being wider than said shank portion, each shank being deformable across the curved

plane of the cutting edge but being rigid against deformation in said plane, means holding all of said blades from the ends of the respective shanks remote from the cutting edges with said edges defining a closed circle.

JOHN KEARSLEY M. HARRISON.

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