

July 3, 1962

R. K. POTTLE

3,042,286

CONTAINER

Filed Dec. 17, 1958

4 Sheets-Sheet 1

Fig. 1

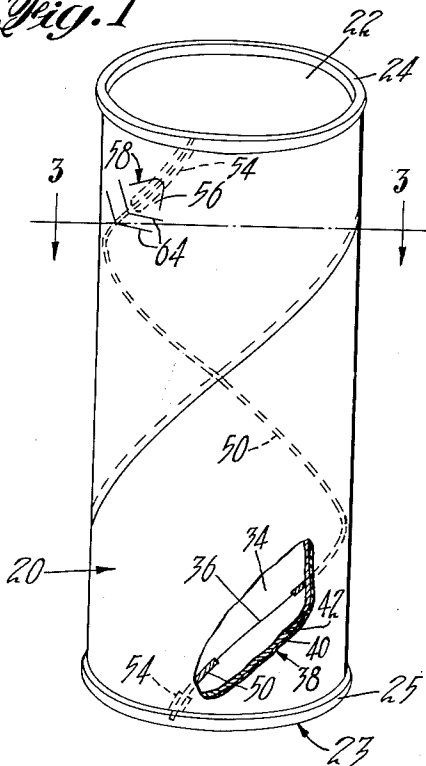


Fig. 2

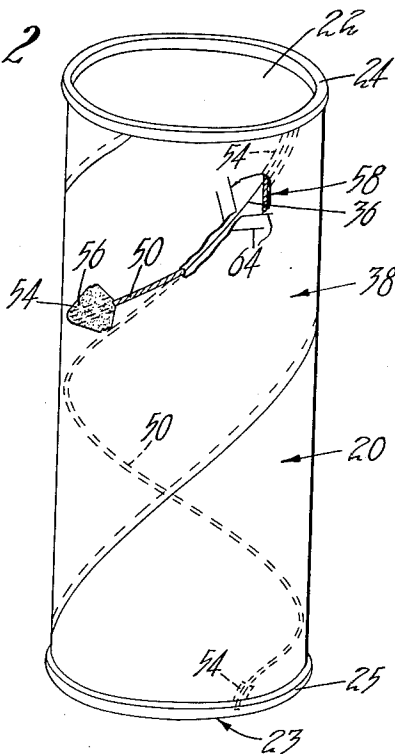
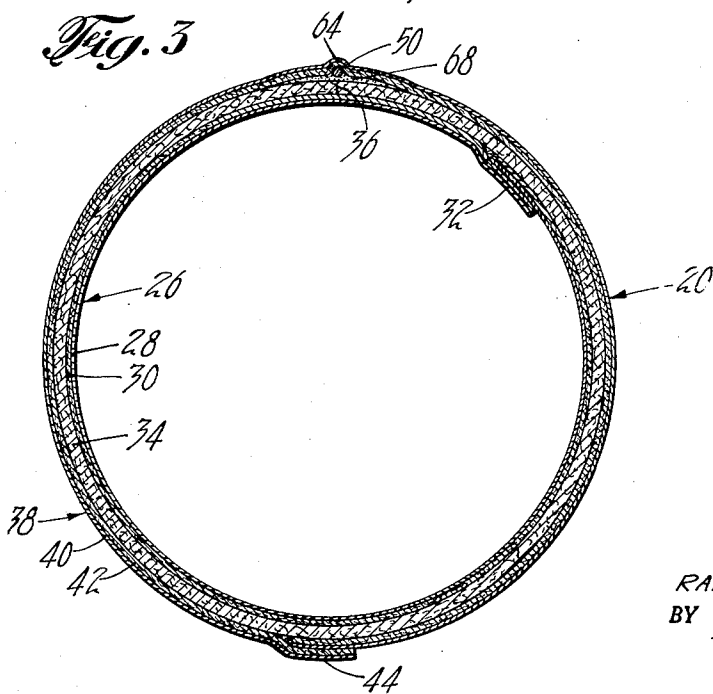


Fig. 3



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Fig. 4

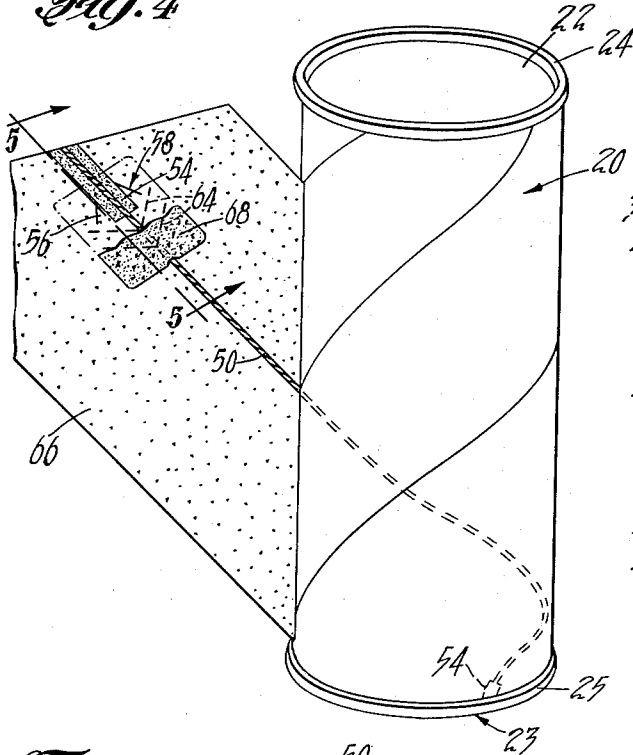


Fig. 5

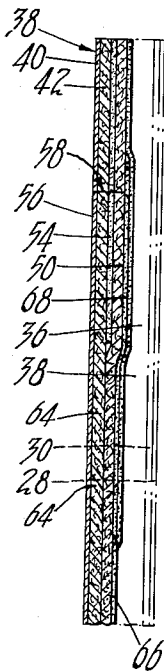


Fig. 6

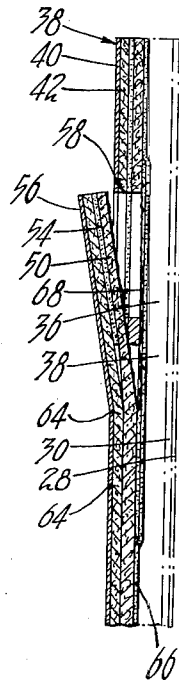
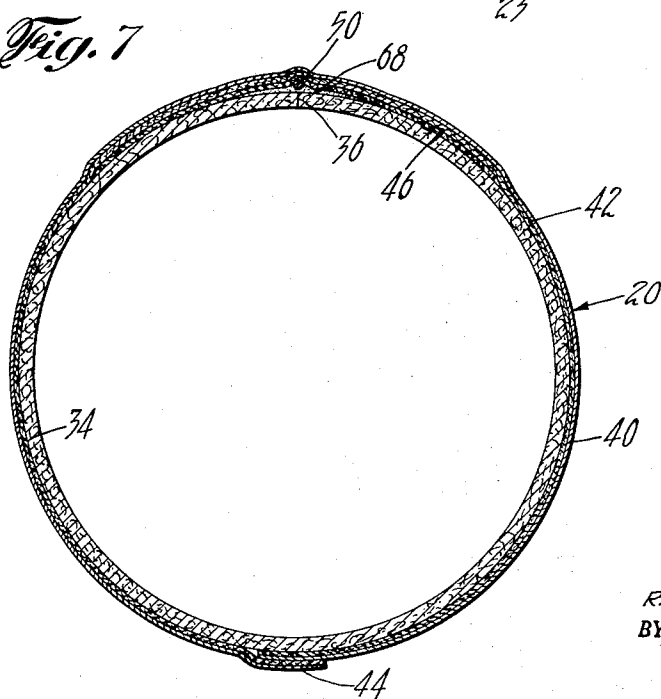


Fig. 7



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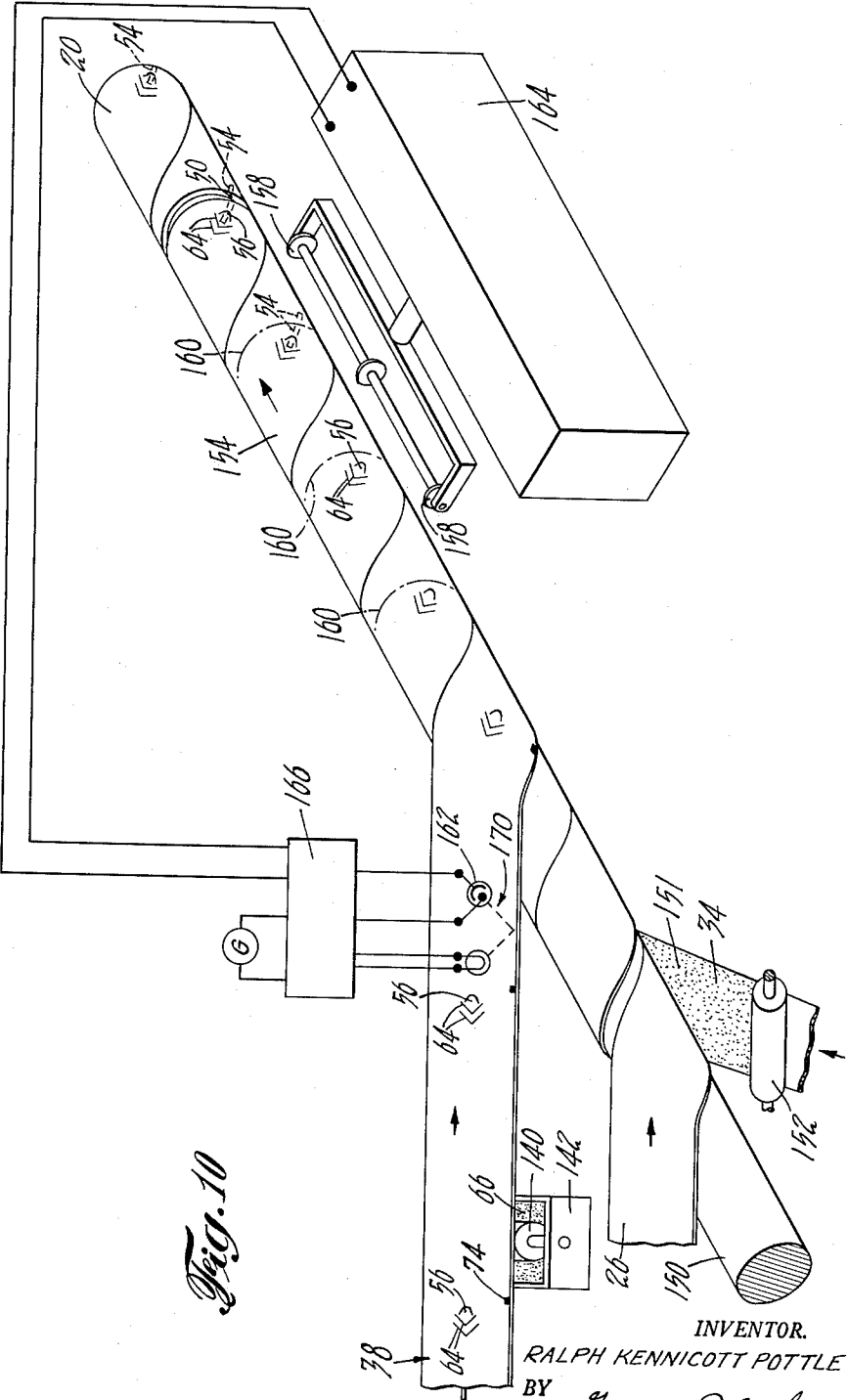


Fig. 10

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3,042,286

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3 Claims. (Cl. 229—51)

The present invention relates to fibre bodied containers and has particular reference to a multi-ply helically wound container wherein a pull tab is cut in the outer body ply and secured to one end of a helically positioned pull-string to provide a simple easy-opening feature, and to a method of making the same.

At the present time, there is a considerable need for an easily opened, helically wound container capable of holding various products. One such product is raw biscuit dough, which is considered a hard-to-hold product because of the considerable pressures which it develops during the proofing and handling periods, and also because it contains moisture and is stored under refrigeration. Helically wound containers are ideal for such a product, since they can easily be made to meet the strength requirements and can be provided with moistureproof external and internal surfaces which are applied during the winding operation and form an integral part of the body.

This invention contemplates the provision of such a container wherein a pull string is positioned beneath the outer body ply in order to permit the container to be easily opened by the ultimate consumer. The pull string extends helically around the container body substantially from its top to its bottom outwardly of but in superposed registration with the butt joint of the underlying body ply, and is secured at one end to a pull tab cut in the outer body ply. When the pull tab is bent away from the body, the end of the string is made accessible to the consumer, thus permitting the latter to pull on the string and create a helical tear through the outer body wall ply to so weaken the body that it may easily be twisted open.

The method used to form the container body contemplates that the string be secured to the outer body ply and the pull tabs thereafter formed in that ply prior to the time the ply is wound into body shape in the spiral winding machine. To accomplish this, the string is adhesively secured at spaced intervals longitudinally along the endless web which comprises the outer body ply. With the string thus positioned, a series of substantially U-shaped cuts are made in the web at predetermined intervals to create the pull tabs. These cuts are made in longitudinal alignment with the preapplied string and in the areas where the string is glued to the web, so that the string is severed at the apex of each pull tab and is also glued to the tab. Thereafter the web is wrapped around a winding mandrel to form the outer ply of a continuous length of tubing, and the tubing is cut into individual can bodies, each of which contains a pull tab properly positioned adjacent one of its ends.

In order to insure that the pull tabs are properly positioned on the individual can bodies, an index mark is provided somewhere on the outer ply to indicate the proper position of each pull tab. These index marks are repeated along the outer body ply at intervals which equal the developed length of each helically wound can body, and are also utilized to indicate where the circumferential cuts which sever the wound tube into individual can bodies should be made. As a result, each finished body bears a pull tab which is properly positioned relative to one of its ends. In normal commercial practice these index marks are utilized to actuate mechanical devices which automatically cut the pull tabs in the body ply and sever the wound tubes into can body lengths.

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An object of the instant invention is the provision of an easily-opened helically wound pull string container which is provided with a pull tab which renders the string conveniently accessible to the consumer.

Another object is to provide such a container wherein the cuts made in the outer body wall ply to provide the pull tab are sealed off so that moisture cannot penetrate to the underlying plies of the body and deleteriously affect the strength and holding qualities of the container.

Still another object is the provision of a practical method of manufacturing such containers wherein the string is maintained under positive control at all times.

Yet another object is to provide a method of making pull string containers which insures that the free end of the string is secured to a pull tab and that the latter is correctly positioned on the finished container.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

FIGURE 1 is a perspective view of a container constructed according to the principles of the present invention, parts being broken away;

FIG. 2 is a view similar to FIG. 1, showing an initial stage in the opening of the container, parts being broken away;

FIG. 3 is an enlarged sectional view taken substantially along the line 3—3 in FIG. 1; but showing the container rotated approximately 90° in a clockwise direction from its position in FIG. 1;

FIG. 4 is a view similar to FIG. 1, but showing the outer ply partially unwound in order to more clearly show the construction of the container in the area adjacent the pull tab;

FIG. 5 is an enlarged sectional view taken substantially along the line 5—5 in FIG. 4, this view showing the position of these parts relative to the underlying plies in their normal position in the finished container, the underlying plies being shown in dot and dash lines;

FIG. 6 is a view similar to FIG. 5, but showing an initial stage in the breaking out of the pull tab from the body wall;

FIG. 7 is a view similar to FIG. 3, but showing a slightly modified form of construction; and

FIGS. 8, 9 and 10 are perspective views taken in succession illustrating the sequence of method steps utilized to form the container bodies of the instant invention.

As a preferred and exemplary embodiment of the instant invention, FIGS. 1—6 illustrate a biscuit dough container having a body 20 formed of three plies helically wound in the same direction at the same angle and having substantially all of their mutually contacting surfaces glued together. The ends of the body are closed by means of upper and lower metal end members 22, 23, which are suitably crimped in position on the ends of the body in the usual manner to form end seams 24, 25.

The inner ply comprises a liner ply 26 formed of a layer of aluminum foil 28 laminated to a kraft backing 30 in the usual manner and having its helical edges overlapped to form a water, moisture and grease resistant lap joint 32. A main body ply 34 is disposed outwardly of the liner ply 26 and is formed of comparatively heavy stock such as chipboard or kraft. The edges of this ply are butted to form a butt joint 36 which is offset from the lap joint 32. The third or outer ply 38 is disposed outwardly of the main body ply 34 and is composed of an aluminum foil label 40 mounted on a paper reinforcing backing 42 of sufficient strength to prevent bursting of the container when subjected to internal pressures. The

edges of this layer are overlapped to form a lap seam 44 disposed in offset relationship to the butt joint 36. In the drawings, the lap seam 44 and butt joint 36 are in diametrically opposed relationship.

It will be obvious that the materials of the various plies of the body may be varied to meet the requirements for different products, also that fewer or more numerous plies can be used, as needed. As one example, FIG. 7 shows a modification wherein the liner ply is omitted; also the reinforcing kraft backing 42 of outer ply 38 is made of thinner and weaker material than the backing 42 of FIG. 3, and a reinforcing layer 46 is prelaminated to the backing 42 in position to bridge the butt joint 36 and supply the requisite strength to the container.

As previously stated, the body plies 26, 34 and 38 of FIGS. 1-6 are glued together to provide a solid body structure. This gluing is preferably accomplished by coating the inwardly facing surfaces of the main body ply 34 and the outer body ply 38 with glue just prior to the formation of the body.

In order to permit easy opening of the container, a pull string 50 is provided in the body between the plies 34, 38 in registration with the butt joint 36 of the ply 38. This pull string 50 extends helically around the body (see FIGS. 1 and 2) and extends into the end seam 25 at the bottom end of the container and is thereby secured against movement longitudinally of the body.

In order to make the pull string 50 accessible to the consumer, one end is secured by adhesive 54 to a pull tab 56 which is formed adjacent the upper end of the body by a substantially U-shaped cut or line of severance 58 which extends completely through the outer body ply 38. As seen in FIG. 1, the cut 58 is disposed in transverse overlying relation to butt joint 36, and with the open end of the U-shaped cut 58 facing inwardly of the adjacent end of the tear string 50. The adhesive 54 securing the string 50 to the ply 38 need not be limited to the pull tab, and may extend for the full length of the string. However, it has been found that under some circumstances the string does not tear through the body ply 38 cleanly at the areas in which the two are glued together. It is thus preferred that the glue be omitted from the main portion of the string.

It is advantageous, however, that the other end of the pull string 50 be also secured by adhesive 54 at a spot adjacent the lower end of the body 20, in order to provide additional anchorage for the string and to thus cooperate with the bottom seam 25 to restrain the string from sliding in a helical path longitudinally along the body when it is pulled to tear through the body wall.

A plurality of weakness lines or chevron shaped guide scores 64 are cut in the outer body ply 38 immediately below the base of the pull tab 56 and inwardly of the adjacent end of string 50. The weakness lines 64 are disposed transversely of tear string 50 and in overlying relation thereto. Thus, when the tab is bent away from the body wall and the string pulled, the lines of tear in the outer body ply 38 which extend from the ends of the pull tab 56 are directed convergently toward the string 50 with the result that in a comparatively short time the tab separates completely from the outer ply 38 and the only tearing action is that done by the string 50 as it tears helically through the outer body ply 38. This is clearly indicated in FIG. 2. These guide scores 64 may be cut either into the inside or outside surfaces of the outer body ply 38.

As previously indicated, the body plies 38 and 34 are glued together by a substantially continuous application of adhesive 66 (see FIG. 5) which preferably is applied in the body winding machine. Obviously, the pull tab 56 cannot be glued down to the body ply 34. To prevent this, a spot application of a glue repellant material 68, such as paraffin or microcrystalline wax, is applied to the underside of the ply 38 in the general area of the tab 56 prior to the application of the adhesive 66. The material 68 is also preferably water repellant, and covers the un-

dersurface of the pull tab 56 and the area surrounding it, including the area in which the guide scores 64 are located. Thus, this material 68 also serves to seal off the U-shaped cut 58 and the guide score 64, and prevent the penetration of moisture therethrough into the main body ply 34.

To open the container, it is only necessary for the consumer to pick-up the pull tab 56 with a fingernail. The tab 56 and the string 50 can then be securely grasped and pulled, thus causing the string to tear through the outer body ply 3 and create a helical line of severance which is in outward registration with the butt joint 36 of the main body ply 34. In the container of FIG. 7 this effects a complete severance of a body and a consumer need only grasp the ends and twist in opposite directions to unwind the body from its cylindrical form and release its contents. When the liner ply 26 of FIG. 3 is utilized, the same twisting action will usually suffice to open the body, since the liner ply 26 usually is formed of thin and comparatively weak material. However, if the liner ply 26 is of such strength that this cannot be done easily, it is usually only necessary to digitally depress the body along the helical tear line in order to tear through the liner ply 26 and thus complete the severance of the body.

FIGURES 8, 9 and 10 illustrate the sequence of steps comprising the preferred method of forming the container of the subject invention. In all of these figures, a web of material which is subsequently to become the outer ply 38 is shown as moving from left to right and the various steps necessary to prepare the ply for incorporation in the finished container are effected on the ply 38 as it is moved continuously from a supply roll (not shown) to the spiral winding machine which forms the bodies.

As seen in FIGS. 8-10, index marks 74 are provided on the upper surface of the ply 38 at intervals which equal the developed length of this ply in the helically wound finished container. Thus, one of these marks is provided for the length of ply stock necessary to form each container. These marks 74 are preferably merely ink marks which differ in reflectivity from the adjacent areas of the ply 38, and may be applied at the same time as the label design, if any, is printed on the ply 38. They are preferably placed along the edge of the ply 38 which becomes the underlap portion of the lap seam 44, and thus are not visible in the finished container body.

After being pulled from the supply roll, the strip which comprises the outer ply 38 is passed beneath a conventional photoelectric detector unit 75 which is positioned to detect the index marks 74. The detector unit 75 comprises a source of light 76 which is aimed so that a beam of its emitted light is reflected from the underlap edge of the ply 38 into a photoelectric cell 78. Whenever an index mark 74 passes beneath the detector unit 75, the intensity of the reflected light is altered, and consequently the output of the photoelectric cell is also altered. This altered output is fed into an amplifier 80 of conventional construction, and is utilized by the amplifier to momentarily close a normally open relay 82, thus closing its circuit and energizing a solenoid 84. This causes the solenoid armature to move to the left thereby pulling the pawl 86 of a conventional single revolution clutch unit, generally designated by the numeral 90, out of engagement with the single tooth of the clutch unit 90, thus permitting a constantly rotating drive shaft 92 to rotate a driven shaft 94 through a single revolution.

The rotation of the driven shaft 94 causes a scoring roll 96 to make a complete revolution, with the result that its scoring knives 98 cut the chevron shaped score lines 64 in the upper surface of the ply 38 in predetermined spaced relationship to an index mark 74. The scoring roll 96 is backed up by a supporting roll 100 which is disposed beneath the ply 38 and driven from the shaft 94 through a pair of spur gears 101, 102.

The driven shaft 94 is connected to a second driven shaft 104 through a belt 106. This second shaft 104 is

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provided with a spur gear 108 which meshes with another spur gear 109 to drive a shaft 110 which carries a glue applying roller 112 mounted in a glue pot 114 beneath the ply 38. A suitable back-up roller 116 is mounted on the shaft 104. The roller 112 is provided with a raised glue applying land 118 which remains out of contact with the ply 38 until such time as the roller 112 is rotated in response to the detection of an index mark 74 by the photoelectric unit 75.

When a mark is detected, the engagement of the single revolution clutch unit 90 also causes the roller 112 to make a complete revolution, with the result that a pattern of adhesive 54 is applied to the undersurface of the ply 38 by the land 118. The spacing between the shafts 94 and 104 is such that the adhesive 54 is applied immediately ahead of the scores 64, in the area in which the pull tab 56 will be located.

After the scores 64 have been cut and the adhesive 54 applied, the next step in the instant method comprises the application of the string 50 to the undersurface of the ply 38. The uncut string 50 is supplied from a supply spool 120 and is passed over a grooved guide roller 122 which presses it against the ply 38 in longitudinal alignment with the apexes of the scores 64 and the glue 54. As a result, the string is embedded in the glue and is thus secured to the ply 38.

The ply 38 is now preferably passed through a drying oven or chilling device for the length of time necessary to set the glue 54. This step is not shown in the drawings but would take place in the break area which separates the showing of FIG. 8 from FIG. 9. It should of course be realized that the ply 38 is actually continuous between FIGS. 8, 9 and 10, and is shown as broken merely to meet the exigencies of the drawings.

After the glue 54 has set sufficiently, the ply 38 is passed beneath a second photoelectric detector unit 124 (see FIG. 9) which is identical with the first unit 75. This unit 124 detects the index marks 74 and controls the rotation of shafts 126 and 128 in exactly the same manner as the unit 75 controls the rotation of the shafts 94 and 110. To accomplish this, a duplicate set of mechanisms identical to the amplifier 80, relay 82, solenoid 84, pawl 86, drive shaft 92, single revolution clutch 90, belt 106, sprockets 101, 102, 108, 109, etc. are required, but these are not shown in FIG. 9 for the sake of simplicity.

When an index mark 74 is detected by unit 124, the shafts 126, 128 each make a complete revolution. A tab cutting roll 130 carrying a U-shaped knife 132 is carried by the shaft 126. Thus, each time a mark 74 is detected, a cut 58 is made completely through the ply 38 and also through the string 50, and a pull tab 56 is thus formed. This cut is made into the area in which the glue 54 was previously applied by the roll 112, so that a portion of the severed string immediately behind the cut 58 is secured to the pull tab 56 by the glue 54, and the portion of the string 50 immediately ahead of the cut is also secured by the glue 54. Thus, the string remains under control.

Simultaneously with the cutting of the pull tab 56, the patch of adhesive repellant wax 68 is applied to the previously cut pull tab by a roller 134 carried by the shaft 128. The roller 134 is partially immersed in a wax reservoir 136 located beneath the ply 38 and is provided with a land 138 which applies the wax 68 to the ply in the area beneath the tab 56 and scores 64. The ply 38 is then passed through a suitable chilling device to set the wax 68. This step is also not shown, but would take place between FIG. 9 and FIG. 10.

The ply 38 is next passed over a glue roll 140 which is suitably mounted in a glue pot 142 (see FIG. 10) and a film of glue 66 is applied over its entire undersurface including the adhesive repellant wax 68. The ply 38 is now helically wound around a mandrel 150 which forms a part of a conventional spiral winder. Since this type

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of machine is well known in the art, it is not thought necessary to give a detailed description of it.

The inner ply 26 and the main body ply 34 are also wound on the mandrel 150 as part of the same winding operation, the ply 26 being the first one to be applied and thus being the ply in actual contact with the mandrel 150, as seen in FIG. 10. The main body ply 34 is next applied, a film of glue 151 being applied to its inner surface by a glue roll 152 in order to cause it to adhere to the ply 26. The ply 38 is next applied, the glue 66 on its undersurface causing it to adhere to the main body ply 34 at all areas except in the area around the pull tab 56, where adhesion is prevented by the adhesive repellant wax 68. In winding, the plies are so aligned that the pull string 50 is positioned in outward registration with the butt joint 36 of the main body ply 34.

As a result of this winding operation, a continuous three-ply tube 154 is formed, with the pull tabs 56 spaced along the tube at body length intervals. This tube 154 is now cut into individual body lengths, preferably by gang cutting knives 158, in order to form the individual can bodies 20. To do this the gang cutting knives are reciprocated along the path of travel of the tube, the forward component of this reciprocating movement being made at the forward speed of the time. During this forward movement, the knives are moved into contact with the tube 154, and circumferential cuts are made in the tube 154 along lines indicated by the numerals 160. These cuts are positioned closely adjacent the pull tabs 26, and extend through the adhesive 54 which secures the tear string 50 to the ply 38. Thus after the cuts have been made, the string 50, which is of course also severed by the knives 158, still remains secured to the ply 38 at each end of each body, as seen in FIGS. 1 and 10.

The subsequent operations effected on the individual bodies 20, which include the seaming operations necessary to clinch the end closures 22, 23 in place on the body ends, are completely conventional, and are thus not illustrated. The product is of course filled into the container prior to the seaming on of the final end closure.

In order to insure that the cuts are made at the proper positions along the tube relative to the pull tabs 56 and the glue 54, the index marks 74 are utilized to control the operation and position of the cutters 158 in the manner shown and described in United States Patents Re. 23,899 and 2,737,091, issued November 23, 1954, and March 6, 1956, respectively, to Ernest Bradbury Robinson. This is accomplished by passing the ply 38, just before it is wound on the mandrel 150, beneath a third photoelectric detector unit 170 and utilizing the output variations of the photoelectric tube 162 which are produced by the index marks 74 to actuate the cutter positioning mechanisms, illustrated generally by numeral 164, through the medium of suitable controls 166. The actual construction of these parts forms no part of the instant invention. It is sufficient to say that the construction and operation of suitable devices are illustrated in the above mentioned Robinson patents, as well as in United States Patents 2,623,443; 2,712,778 and 2,734,432 issued to the same inventor.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts of the apparatus mentioned herein and in the steps and their order of accomplishment of the method described herein, without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the apparatus and method hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A cylindrically wound tear string container having end members secured thereto in end seams, comprising

an inner body ply of moistureproof material, a main body ply wound upon and adhesively secured to said inner ply and having a helical line of opening defined by a butt joint, an outer ply helically wound upon and adhesively secured to said body ply, a helically wound tear string on the inner surface of said outer ply disposed in overlying relation to said butt joint, said outer ply having a pull tab defined by a substantially U-shaped line of severance adjacent one end of said tear string, said outer ply having a weakness line disposed helically inwardly of said tear string one end and in spaced relation to said line of severance, said weakness line lying transversely of said tear string for cooperation with said pull tab when the latter is lifted and drawn to effect complete separation of said pull tab from said outer ply, and said tear string having said one end thereof adhesively secured to said pull tab and the other end secured to the container, whereby when said pull tab is manually drawn outwardly from the container said weakness line will rupture to separate the pull tab from the container and permit grasping thereof, and upon further manual drawing of said separated pull tab said tear string will create a helical line of tear in the outer ply outwardly of said helical line of opening to facilitate quick opening of the container therealong by a subsequent twisting action.

2. The container of claim 1, wherein said pull tab U-

shaped line of severance is disposed in transverse overlying relation to said butt joint with its open end facing helically inwardly of said tear string one end.

3. The container of claim 2, wherein said weakness line is of chevron-like configuration converging helically inwardly of said tear string one end with the apex thereof overlying said tear string, thereby limiting tearing action of the pull tab to the full separation of the pull tab from the outer ply while simultaneously guiding said tear string into said apex whereby subsequent tearing of the outer ply from said apex is effected solely by said tear string.

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