Dec. 27, 1949 W. F. PUNTE 2,492,886

METHOD OF AND APPARATUS FOR FORMING PAPER END CLOSURES

Filed June 30, 1944 2 Sheets-Sheet 1

Fig. 1

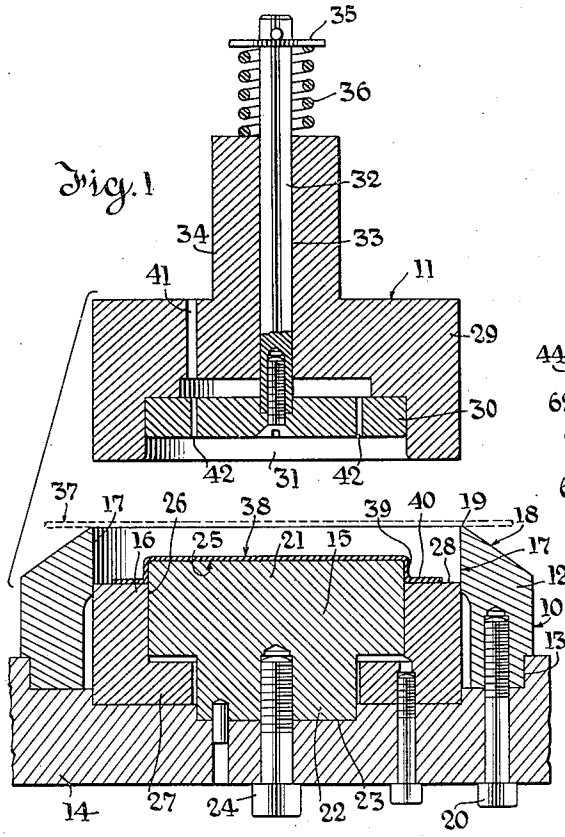


Fig. 2

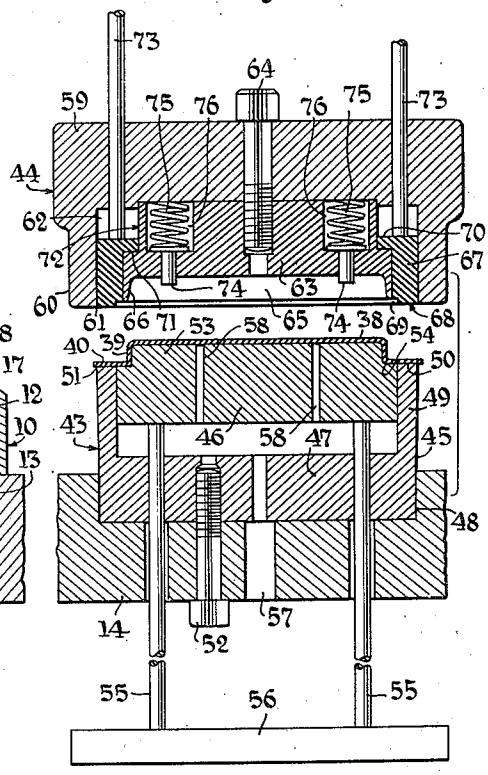


Fig. 3

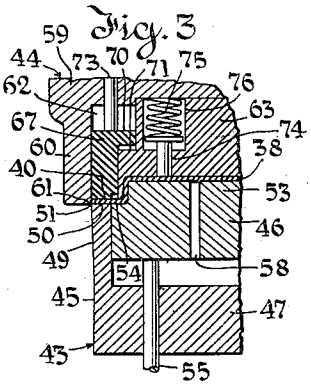
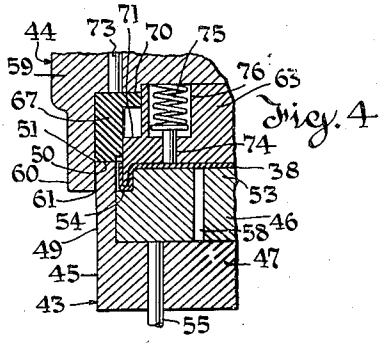


Fig. 4



Inventor
William F. Punte

By

Mason, Porter & Diller
Attorneys

Dec. 27, 1949 W. F. PUNTE 2,492,886

METHOD OF AND APPARATUS FOR FORMING PAPER END CLOSURES

Filed June 30, 1944 2 Sheets-Sheet 2

Fig. 5

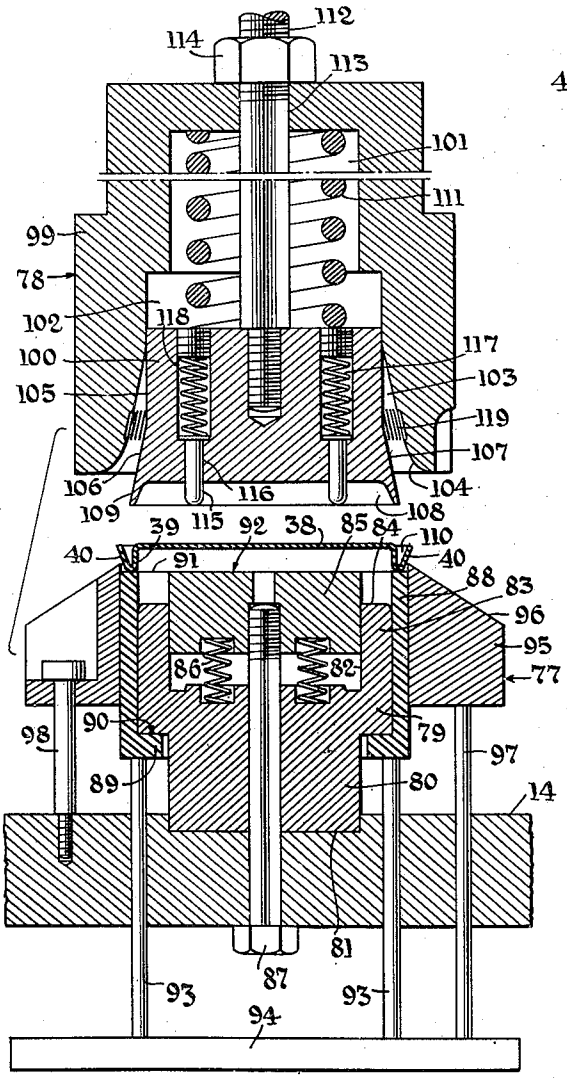


Fig. 7

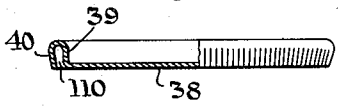
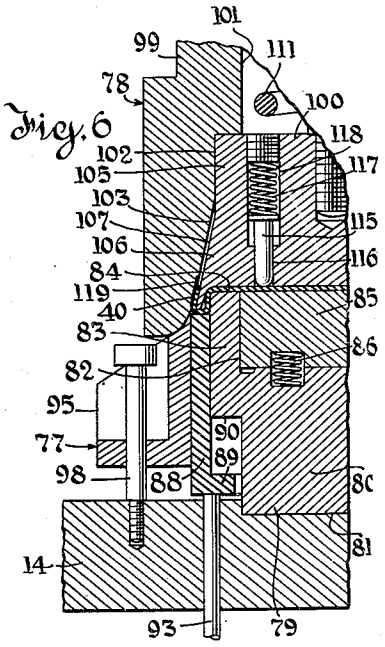


Fig. 6



Inventor
William F. Punte

By
Mason Porter & Diller
Attorneys

Patented Dec. 27, 1949 2,492,886

UNITED STATES PATENT OFFICE

2,492,886

METHOD OF AND APPARATUS FOR FORMING PAPER END CLOSURES

William F. Punte, Passaic, N. J., assignor to Continental Can Company, Inc., New York, N. Y., a corporation of New York

Application June 30, 1944, Serial No. 542,960

15 Claims. (Cl. 93—36)

1

This invention relates to a novel method and novel means for making paper end closures for use on containers.

More specifically, paper container ends of the type under consideration are circular in shape and have formed therein annular channels or grooves to receive the end edges of the walls of the container. Usually one or both ends or closures are adhesively secured to the edge of the container walls, although one of said ends, or if desired both ends, may be held thereon by friction without the use of any adhesive, depending upon the use to which the container is to be put. It is old in the art to stamp out ends of this general type in which both walls of the groove are formed over a die ring having parallel cylindrical wall portions. However when made in this form and by this manner, the outer wall or skirt, having a certain amount of inherent resiliency, does not retain its perfect cylindrical form so as to snugly fit the adjacent portion of the container end wall, but flares more or less outwardly thereby failing to make or maintain a tight joint with the wall.

An object of the invention is to provide an improved method for manufacturing said ends and novel means for effectively carrying said method into successful operation.

More specifically, the improved method consists in first cutting the blank from a sheet of material, and shaping the same to form the body portion, a peripheral wall or heel portion at substantially right angles thereto and an outwardly extending flange; second, trimming said flange to correct size and turning it into substantial parallelism with said peripheral wall, and then bending said flange, which forms the outer wall of the peripheral groove or channel slightly inwardly in channel restricting relation to said peripheral wall and cramping the fibers of said outer wall to form a smooth inner surface thereon adapted for snug engagement with the wall of the container and to cause the outer wall to lose its tendency to spring outwardly when released.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawing.

In the drawings:

Figure 1 is a sectional view of a die for initially stamping the end from a sheet of stock material and shaping the same in the first stage, with the outwardly extending peripheral flange.

2

Figure 2 is a similar view of the die for accurately trimming the edge of said peripheral flange and turning said flange at substantially right angles to the plane of the end, to form the skirt, said die being shown in open position.

Figure 3 is a detail section of the die structure of Figure 2 illustrating the same at the instant of trimming the edge of the flange.

Figure 4 is a similar view illustrating the position of the several parts upon turning the flange.

Figure 5 is a similar view of the die mechanism for completing the operation by turning the flange or skirt slightly inwardly, and cramping the same in said inturned position, the said die being shown in open position.

Figure 6 is a detail sectional view of the same in closed position.

Figure 7 is an edge elevation, partly in section, of the completed end or closure.

In carrying out the invention, the blanks from which the ends are made are first stamped from a sheet of material, preferably paper, by means of a suitable stamping die such as illustrated in Figure 1 of the drawings, and by the same device pressed or drawn to form the body portion with a peripheral wall at substantially right angles thereto, and an outwardly extending flange. As illustrated in said Figure 1, the die comprises a stationary cutting and molding portion 10 and a reciprocating portion 11 for cooperation therewith. The stationary portion consists in a cutting ring 12 nesting in a seat 13 in a base or support 14, a central molding block 15, and a ring 16 between said block and the ring 12. The ring 12 has a bore 17 of a dimension somewhat larger than the blank used for the finished article, and its upper end is tapered downwardly and outwardly as at 18, forming a cutting edge 19. The ring 12 is secured in the seat 13 by screws 20. The molding block 15 which is arranged centrally within the ring 12 comprises an enlarged upper portion 21 shaped to form the body portion which the end is to have when completed, and a reduced lower end 22 held in a seat 23 in the support 14 by suitable securing means, such as a screw 24. The body portions of the finished ends are usually flat and circular to fit within the walls of a cylindrical receptacle, and will be so referred to hereinafter, but it is to be understood that, if preferred, the body may be arched or cupped, and may be circular, oval or polygonal to fit receptacles of any desired shape. The upper face 25 of the block 15 is below the plane of the cutting edge 19, and between said block and the cutting ring is the ring 16 having a bore 26

snugly receiving the upper portion 21 of the block 15, and a base flange 27 extending under the portion 21 to adjacent the reduced portion 22. The upper face 28 of the ring 16 is in a plane below the upper face 25 of the block 15 a distance substantially equal to the depth of the annular groove or channel to be formed.

The upper or reciprocating portion of the die comprises a shearing block 29 which fits substantially snugly in the bore 17 of the cutting ring, and a knock-out block 30 which also conforms to and cooperates with the upper face 25 of the molding block 15 to shape the body portion of the closure. This knock-out block is arranged within a bore 31 in the block 29 and is supported by a stem 32 reciprocable in a bore 33 extending through said block and a central extension 34 thereon. The stem extends above the upper end of the portion 34 and is provided with an abutment 35 between which and said end is a spring 36 normally holding the block 30 retracted.

In operation a sheet of stock material is positioned above the cutting ring, as indicated at 37 in dotted lines, and the reciprocating die element 11 is lowered. As the bottom end of the die element 11 enters the ring 12 the member 29 severs the blank from the sheet, and upon further downward movement, shapes the blank over the upper end of the molding block 15 forming the body portion 38, the peripheral wall 39, and the outwardly extending flange 40, which is flattened against the upper face 28 of the ring 16 by the lower annular face of the die 11. When the die element 11 is raised, the end being formed, usually is lifted therewith, and is ejected therefrom by the knock-out block 30 when the upper end of the stem 32 strikes an abutment (not shown). Air vents 41 and 42 are provided in the shearing block 29 and knock-out block 30, respectively, to insure rapid disengagement of the article.

The closure is then further shaped by intermediate dies illustrated in Figures 2, 3 and 4, wherein 43 indicates generally the lower or stationary die portion and 44 the upper or reciprocating portion, which trims the flange 40 to the correct size and uniform width and then bends the same into parallelism with the wall 39. In the initial stamping as hereinbefore described, there is no assurance of the raised body portion 38 being exactly centered in the disc which is severed by the cutting edge 19 for as soon as the dies begin to shape the blank, the periphery of the blank is contracted and drawn away from the inner face of the ring 12, and there is no way to maintain the blank perfectly centered on the block 22. It is for this reason that the diameter of the blank as severed is larger than ultimately necessary and the flange 40 is usually irregular or uneven in width. Therefore, it is necessary to trim the flange to a true or even width in the secondary stage of the operation, so that the ultimate outer flange or skirt will be exactly even and uniform in depth.

As shown, the die portion 43 comprises a hollow cylindrical stationary member 45, an axially movable block 46 therein, and means for raising and lowering said block. The member 45 consists in a base portion 47 arranged in a recess 48 in the support 14, and an upwardly extending cylindrical wall 49 having a flat upper face 50, the outer edge 51 being sharp for a purpose hereinafter mentioned. This cylindrical member is securely held in position within the recess 48, as by screws 52.

The block 46 is cylindrical and is formed with a raised portion 53 having a diameter and depth to fit snugly in the body portion of the closure within the wall 39 as formed in the preceding stage, and a peripheral face 54 to fit under the inner portion of the flange 40. The block 46 is initially held in raised position by rods 55, so that the face 54 is flush with the upper face 50 of the wall 49 as illustrated in Figure 2 of the drawings. When the block is in its lowermost position, the bottom thereof preferably rests on the top of the base 47, and the upper face of the portion 53 is then in a plane slightly below the plane of the upper end of the wall 49, or approximately the distance equal to the thickness of the paper stock. See Figure 4. The rods 55 extend through the base 47 and support 14 and are connected by an operating plate or yoke 56. A vent 57 permits free actuation of the block 46, and vents 58 in block 46 permit ready disengagement of the end from the block.

The reciprocative portion 44 of the die comprises a head having a shearing edge, a forming flange, and an interposed releasing or stripping ring. The head consists in a disc or block 59 formed with a depending annular wall 60 having a cutting edge 61 which cooperates with the edge 51 to trim the outer portion of the flange 40. The wall 60 forms a cylindrical recess 62 within which is centrally fixed a block 63, as by a screw 64. The under face of the block is shaped to conform to and fit snugly over the body portion 38 and wall 39 of the closure as it rests on the block 46, and to this end has a recess 65 to receive the raised central portion of the block and the corresponding portion of the closure, and a peripheral flange 66 defining said recess and about which the flange 40 is turned up to form the annular channel in the manner illustrated in Figure 4. The outer diameter of the flange 66 is less than the internal diameter of the cylindrical wall 49 for a purpose hereinafter described, and the lower edge of the flange 66 is in a plane slightly above the plane of the cutting edge 61, or substantially the thickness of the paper stock, so that as the upper die assembly is lowered the flange 66 will engage and clamp the flange 40 against the face 54 as the edges 51 and 61 shear off the surplus edge, as illustrated in Figure 3 of the drawings. During continued downward movement of the head 44, the block 46 is forced downwardly until it rests on the base 47, and the flange 40 of the closure is bent upwardly by the wall 49 against the forming flange 66 as illustrated in Figure 4.

Interposed between the wall 60 and the flange 66 is a disengaging or stripping ring 67 having a limited reciprocating movement. The lower edge of the ring 67 has a face 68 equal in width to that of the upper face of the wall 49, and which lies in the plane of the lower face of the wall 60 when said ring is in lowermost relative position, that is when the die portion 44 is raised, and the inner edge of the face 68 is rabbeted as at 69 to lie in the plane of the edge of the flange 66 at such times. The vertical movement of the stripping ring 67 within the head 44 is substantially equal to the depth of the upturned outer flange of the closure for reasons appearing hereinafter. Its upward or retracted movement is limited by contact with the lower face of the disc of block 59, as shown in Figure 4, and its downward movement is limited by an inwardly extending flange 70 on the ring which engages a shoulder 71 formed on the block 63 by reducing the diameter of the inner or base

portion thereof as indicated at 72. Rods 73 are provided for actuating the ring 67, said rods extending upwardly through the block 59. A plurality of headed knock-out pins 74 project through the bottom of the block 63 into the recess 65, and are yieldingly pressed downwardly by springs 75 located in pockets 76 formed in the base of said block.

In operating the intermediate die, the blank which has been partially formed in the preceding step of the operation, is placed on the block 46 as shown in Figure 2 and the upper die portion 44 lowered. This causes the lower face of the block 63 to fit over the partly formed blank on the block 46 and hold the same firmly in place while the cutting edges 51 and 61 trim the edge of the flange 40 of the closure true and even. With further downward movement the block 63 forces the block 46 downwardly until it rests on the base 47, and the flange 66 forces the flange 40 of the closure blank into an annular recess thus formed between the portion 53 of the block 46 and the wall 49, bending the flange 40 upwardly as illustrated in Figure 4. At this time the ring 67 is forced upwardly by contact with the upper edge of the wall 49. As the die portion 44 is raised the ring 67 is lowered relatively to the body of the upper die portion and engages the edge of the upturned flange 40 to strip it from the die flange 66. At this time the annular groove formed by the rabbet 69 receives the edge of said flange 40 and prevents spreading of the same. Simultaneously therewith, the knock-out pins 74, which have been retracted by contact between the die blocks 46 and 63, are released and are projected by the springs 75 to assist in disengaging the paper end from the upper die member.

The closure is now provided with the annular groove to receive the end of the receptacle, but the outer flange or skirt is not in the best form or of the desired rigidity to clamp upon the receptacle wall as desired. It should be understood that the portion of the original blank which eventually constitutes the outer flange or skirt 40 is successively reduced in diameter although containing the same amount of fiber or material of which the closure is made. With the first step above described, the flange 40 is contracted in diameter substantially equal to the depth of the wall 39. This would normally cause said flange to become ruffled or uneven, but the pressure between the members 16 and 29 flattens the flange and causes a condensing of the fibers. In the second step the flange is turned upwardly into substantial parallelism with the wall 39 and this further decreases the diameter of the edge, with a progressive increase of density from the base to the edge of the flange. This would normally produce a ruffled or corrugated flange or skirt, but an object of this invention is to provide the skirt with a smooth regular surface in its inner face to form a continuous tight joint with the adjacent portion of the container wall when applied thereto. To this end a pair of finishing dies are provided, as illustrated in Figures 5 and 6 of the drawings. These comprise a stationary lower die assembly 77, and an upper cooperating die assembly 78.

The lower die assembly includes a fixed cylindrical member 79 having a reduced base portion 80 resting in a seat 81 in the support 14, and the larger upper portion having a bore 82 of large diameter leaving an upstanding peripheral wall 83 having an annular flat face 84. Mounted for vertical reciprocation in the bore 82 is a block 85 between which, and the base of said bore, are a plurality of springs 86 tending to maintain the upper face of the block above the level of the face 84 of the wall 83. A headed stem 87 fixed to said block and extending through the base of the member 79 and support 14, limits the upward movement thereof. Fitting snugly about the wall 83 is a sleeve 88, having a flange 89 at its lower end extending under and normally engaging a shoulder 90 formed by the overhang of the upper portion of the member 79. When in normal position the upper face 91 of the sleeve 88 is in the same plane with the upper face 92 of the block. The sleeve is supported by rods 93 extending through the support 14 and engaging a die cushion 94. Surrounding the sleeve 88 is an annular centering or positioning member 95, which in normal position extends slightly above the upper face of the sleeve 88, and the upper face 96 of said positioning member is downwardly and outwardly inclined as will be more fully described hereinafter. This member 95 is held in elevated position by a rod or rods 97 interposed between the same and the die cushion 94. The upward movement of said member 95 is limited by headed member or members 98 fixed to the support 14.

The upper die assembly comprises a cylindrical body 99 and a cooperating forming block 100. The body 99 has a longitudinal bore 101 which toward the lower portion is enlarged in diameter as at 102 and terminates in a conical portion or face 103 having a rounded or bell shaped terminal edge 104. The forming block 100 comprises an upper cylindrical portion 105 mounted for reciprocation within the bore 102, and a lower conical portion 106 with its conical face 107 parallel with the conical face 103 of the body 99. The lower face of the block is formed with a recess 108 to receive the body portion of the end being made and forming a peripheral flaring flange 109 which enters the peripheral channel 110 formed in the paper end by the intermediate die hereinbefore described. A spring 111 of considerable resistance is interposed between the upper end of the bore 101 and the upper end of the block 100, normally projecting the flange 109 below the plane of the lower end of the body 99. To limit the downward movement of the block with relation to the body 99, a rod 112 is fixed to the block, extends through an aperture 113 in the body, and is provided with a nut 114 threaded thereon. It is obvious that by this arrangement the normal position of the flange 109 with relation to the body 99 may be nicely adjusted. Means are provided to disengage the completed ends from the forming block 100. To this end the block is provided with a plurality of headed knock-off pins 115 extending through perforations 116 in the bottom of the block and yieldingly projected by springs 117 in recesses 118.

After the end has been formed by the intermediate die it is placed in the finishing die above described, with the bottom of the grooved portion 110 resting on the upper end of the sleeve 88, as shown in Figure 5, where it is held in position by the upper edge of the member 95 which is raised above the sleeve end for this purpose. The upper die assembly is then lowered and the flange 109 on the forming block first enters the channel 110 of the end. Continued downward movement of the body 99 increases the pressure of said flange through the medium of the spring 111. The lower bell shaped end 104 then engages the upper edge of the skirt or flange 40 and turns

the same inwardly into the path of the conical face 103 which now clamps the flange firmly between the same and the conical face 107 of the flange 109; forming a smooth, slightly conical inner face to the skirt so that said face will fit snugly against the adjacent wall of a container to which it is applied. Formed in the face of the conical wall 103 is an annular series of grooves or corrugations 119 into which a portion of the outer face of the skirt is pressed to take up a portion of the excess mass of material as above described, and corrugate said outer portion, thereby adding strength to and increasing the rigidity of the skirt.

From the above described method it will be apparent that an improved end is formed comprising a body portion 38 of the size and shape to fit within the end of the container for which it is designed, an annular wall 39 at substantially right angles to the body and a skirt 40 spaced from said wall forming a peripheral groove 110 for the reception of the end of the container wall, the said skirt being slightly inwardly inclined with the inner face thereof being smooth and the outer face corrugated.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. The method of making paper ends for containers consisting in cutting a disc from a sheet of material, stamping the same to form a body portion of the desired dimensions with a peripheral wall at substantially right angles to said body portion and an outwardly extending flange in a plane substantially parallel with the plane of said body portion, trimming said flange to uniform width, bending said flange to form with said wall an annular channel, then compressing said flange to incline the same inwardly.

2. The method of making paper ends for containers consisting in cutting a disc from a sheet of material, stamping the same to form a body portion of the desired dimensions with a peripheral wall at substantially right angles to said body portion and an outwardly extending flange in a plane parallel with the plane of said body portion, trimming said flange to a uniform width, bending said flange to form with said wall an annular channel, and then compressing said flange between an inner smooth surface and a corrugated outer surface to produce a smooth inner face and a corrugated outer face on said flange.

3. In a method of forming peripheral flanges on paper ends for containers, the steps of stamping a blank to form a body portion and a peripheral flange and then compressing said flange between an inner smooth conical face and an outer corrugated conical face.

4. In a device for forming paper ends for containers, means for stamping a blank from a sheet of material and shaping the blank to form a body portion with a peripheral wall at an angle to the body portion and an outwardly extending flange, means for trimming said flange to a uniform width and bending the same to form with said wall an annular channel and means for clamping said flange slightly inwardly.

5. In a device for forming paper ends for containers, means for stamping a blank from a sheet of material and shaping the blank to form a body portion with a peripheral wall at an angle to the body portion and an outwardly extending flange, means for trimming said flange to a uniform width and bending the same to form with said wall an annular channel, means for clamping said flange slightly inwardly and compressing the same to form a smooth inner face.

6. In a device for forming paper ends for containers, means for stamping a blank from a sheet of material and shaping the blank to form a body portion with a peripheral wall at an angle to the body portion and an outwardly extending flange, means for trimming said flange to a uniform width and bending the same to form with said wall an annular channel, means for clamping said flange slightly inwardly and compressing the same to form a smooth inner face and a corrugated outer face.

7. In a device for forming paper ends for containers, means for stamping a disc from sheet stock, means for shaping the disc to form a body portion with a peripheral wall and an outwardly extending flange, means for bending said flange into substantial parallelism with said wall, means for turning the flange inwardly and contracting the edge thereof and means for cramping the same in the contracted form.

8. In a device for forming paper ends for containers, means for cutting and shaping a blank to form a body portion with a peripheral wall at substantially right angles thereto and an outwardly extending flange, in combination with an intermediate die comprising a stationary assembly including an annular wall having an upper end of less diameter than the diameter of said outwardly extending flange and adapted to support the same with the edge of the flange projecting beyond the same, a reciprocating assembly including an annular wall adapted to cooperate with the said annular wall of the stationary assembly to trim said flange, and cooperating means in said stationary and reciprocating assemblies to bend said flange into substantial parallelism with said peripheral wall of the blank, and means for cramping the edge of said flange inwardly.

9. In a device of the class described, means for shaping a blank to form a body portion with an annular skirt, and means for finishing said skirt comprising an inner conical member adapted to be positioned within said skirt and a cooperating hollow conical member movable axially over the first said conical member to clamp said skirt between them, the portion of said hollow conical member which engages said skirt being corrugated.

10. In a device of the class described, means for shaping a blank to form a body portion with an annular skirt, and means for finishing said skirt comprising an inner conical member adapted to be positioned within said skirt and a cooperating hollow conical member movable axially over the first said conical member to clamp said skirt between them, the portion of said hollow conical member which engages said skirt being corrugated and the face of the inner conical member being smooth.

11. The method of making paper ends for containers consisting in cutting a disc from a sheet of material, shaping the disc to form a body portion of the desired size with a peripheral wall at substantially right angles to said body portion and an outwardly extending flange in a plane parallel with the body portion, bending said flange

to form with said wall, an annular channel, then compressing said flange between an outer smooth continuous and flared coniform surface and an inner flared coniform surface having longitudinal grooves therein of depth insufficient to form folds in said flange thereby to incline the flange inwardly.

12. The method of making paper ends for containers consisting in cutting a disc from a sheet of material, stamping the same to form a body portion of the desired dimensions with a peripheral wall at substantially right angles to said body portion and an outwardly extending flange in a plane substantially parallel with the plane of said body portion, bending said flange to form with said wall an annular channel, then compressing said flange between an inner smooth coniform surface and an outer coniform surface having narrow closely spaced longitudinal grooves therein of a depth less than the thickness of the paper thereby to provide an outer channel defining wall which is internally smooth and continuous and inclined inwardly relatively to said annular wall and having outstanding shallow ribs at its outer surface.

13. In apparatus of the character described, means for shaping paper ends each having a central body portion and inner and outer wall portions connected with each other and said body portion and defining a body end receiving channel, said means including a flared coniform edge insertable in said channel as a backing for said outer wall portion, and a coniform presser wall engageable with the outer surface of the outer wall portion to cramp the same against said coniform edge to bend and hold said outer wall portion inclined inwardly with relation to said inner wall portion.

14. In apparatus of the character described, means for shaping paper ends each having a central body portion and inner and outer wall portions connected with each other and said body portion and defining a body end receiving channel, said means including a flared coniform edge insertable in said channel as a backing for said outer wall portion, and a coniform presser wall engageable with the outer surface of the outer wall portion to cramp the same against said coniform edge to bend and hold said outer wall portion

inclined inwardly with relation to said inner wall portion, the outer surface of said coniform edge being smooth and continuous, and the inner surface of said coniform presser wall where it opposes the outer paper end wall portion being continuous and corrugated.

15. In apparatus of the character described, means for shaping paper ends each having a central body portion and inner and outer wall portions connected with each other and said body portion and defining a body end receiving channel, said means including a flared coniform edge insertable in said channel as a backing for said outer wall portion, and a coniform presser wall engageable with the outer surface of the outer wall portion to cramp the same against said coniform edge to bend and hold said outer wall portion inclined inwardly with relation to said inner wall portion, said coniform edge extending from a cylindriform carrier, and said coniform presser wall being formed on a cylindriform carrier slidably telescoped over the first mentioned carrier.

WILLIAM F. PUNTE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
138,721	Wilson et al.	May 6, 1873
353,439	Butters	Nov. 30, 1886
929,594	Hunter	July 27, 1909
1,035,984	Malde	Aug. 20, 1912
1,180,469	Blakeslee	Apr. 25, 1916
1,477,139	Lucas et al.	Dec. 11, 1923
1,551,832	Miller et al.	Sept. 1, 1925
1,575,300	Weeks et al.	Mar. 2, 1926
1,619,509	Groves	Mar. 1, 1927
1,668,349	Baum	May 1, 1928
1,698,407	Johnson	Jan. 8, 1929
1,707,891	Allison	Apr. 2, 1929
1,837,720	Luce et al.	Dec. 22, 1931
1,975,150	Henry	Oct. 2, 1934
2,250,450	Faber	July 29, 1941
2,325,161	Goodwin et al.	July 27, 1943
2,407,465	Zesbaugh	Sept. 10, 1946
2,413,591	Sturdy	Dec. 31, 1946