Nov. 21, 1933. F. J. DE LACKNER 1,935,832

DIE FOR FORMING PAPER CUPS

Filed July 18, 1931

Fig. 1.

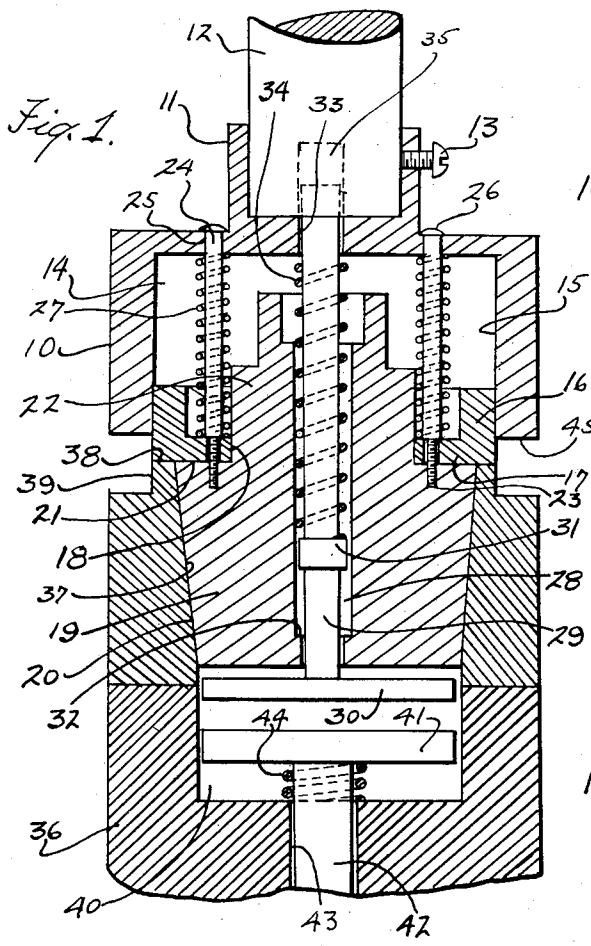


Fig. 2.

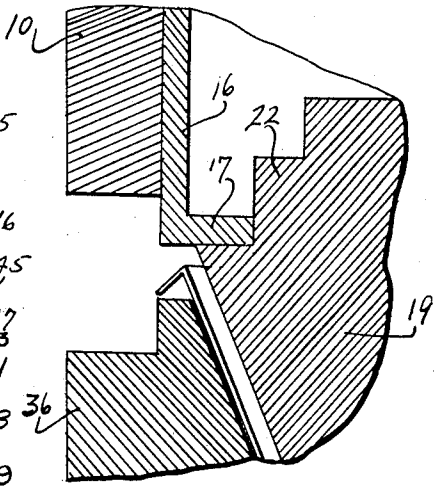


Fig. 3.

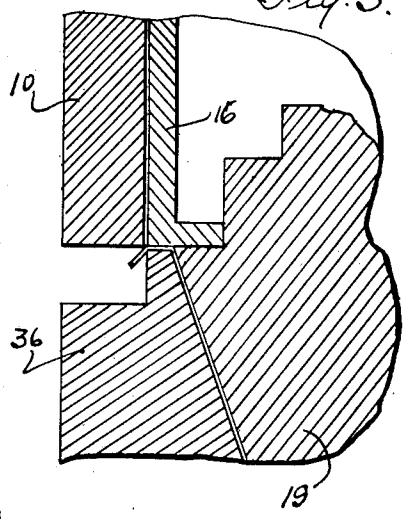
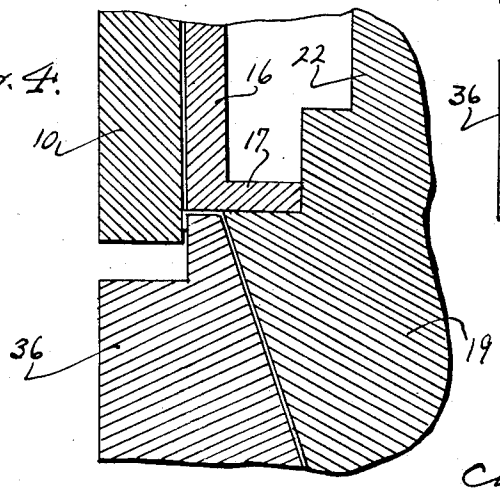


Fig. 4.



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DIE FOR FORMING PAPER CUPS

Frederick J. De Lackner, Whitestone, N. Y.

Application July 18, 1931. Serial No. 551,733

9 Claims. (Cl. 93—51)

This invention relates to paper cups and particularly to a die for forming the rim of a paper cup whereby its strength is increased and the space required for nesting a plurality of the cups is decreased.

One of the objects of the invention is to provide a die for forming the rim of the cup into a plane substantially perpendicular to the axis of the cup.

Another object of the invention is to provide a die for forming the rim of the cup in a plane substantially perpendicular to the axis of the cup with means to vary the conformation of the rim by the pressure applied to the die.

Other objects and objects relating to the method of constructing the die and the method of using it will be apparent as the description of the invention proceeds.

One embodiment of the invention has been illustrated in the accompanying drawing in which:

Fig. 1 is a sectional side elevation of the die shown in partially closed position without any paper cup;

Fig. 2 is a sectional side elevation of a portion of the die showing one side of a partially formed paper cup in position before the rim has been completed;

Fig. 3 is another sectional side elevation of a portion of the die showing the rim forming members in partially closed position; and

Fig. 4 is a sectional side elevation of the same portion of the die showing it in its closed position with the rim of the cup completely formed.

In the application of Milton de Lackner, Serial No. 547,469, filed June 29, 1931, a paper cup is described having a substantially flat rim which is perpendicular to the axis of the cup and whose extreme edge is bent downwardly at substantially right angles to the main flat surface thus greatly strengthening the rim and permitting closer stacking. The present invention is intended to operate upon a well known type of cup formed with a straight rim with a flange forming a sharp angle with the rim and lying almost parallel to the wall of the cup and reforms this flange so that it produces the cup described in the above mentioned application.

Referring now more specifically to the drawing the die comprises a cylindrical casing 10 open at its lower end and having a socket 11 in the center of its upper end to receive a movable bar 12 which may be a part of a power driven machine for operating the die, the bar 12 having limited movement along its axis. The socket 11 may be secured to the bar 12 by means of screw 13 or by any other desired means. The casing 10 is hollow providing a cavity 14 and the inner side wall 15 is machined so that a sliding fit may be had with a ring member 16 which has an inwardly extending flange 17 at its lower edge.

The inner edge 18 of the flange 17 is machined to receive snugly a solid member 19 whose lowermost portion has a surface 20 shaped to fit the contour of the cup which is to be pressed, in this case tapering to a larger diameter at the top than at the bottom. The upper edge of the surface 20 terminates in a shoulder 21 which is adapted to contact with the under surface of the flange 17. The central upper portion of the member 19 is reduced in diameter forming a cylindrical portion 22 which has a sufficient diameter to fit easily within the flange 17 as clearly indicated in the figures. The die member 19 is held rigidly against the ring 16 by means of the threaded ends 23 of a plurality of posts 24. The ends 23 extend down through the flange 17 into tapped holes in the member 19. The posts 24 being thus rigidly secured to the flange 17 extend upwardly, passing through openings 25 in the upper wall of the casing 10, and are provided with heads 26 which are larger than the opening 25 so as to prevent the posts from being withdrawn through the openings 25. A coil spring 27 is provided around each post and this spring bears against the underside of the upper end of the casing 10 and the ring and attached parts are thus urged downwardly at all times.

The member 19 is provided with a core or hollow center 28 through which passes a rod 29. The rod 29 is slightly longer than the member 19 and extends out at the bottom thereof and a disc 30 is rigidly attached to the end of the rod, this disc being the same or slightly less in diameter than the bottom of the member 19. The rod 29 is adapted to have limited axial movement through the member 19 and as the disc 30 is attached to the end of the rod this disc is permitted a slight movement toward and away from the bottom of the member 19. An enlargement 31 is provided on the rod near the lower end thereof and a shoulder 32 is formed in the member 19 extending inwardly so as to prevent the rod and assembled disc 30 from falling out of the member 19. The center upper wall of the casing 10 is provided with a hole 33 through which the upper end of the rod 29 extends, and a spring 34 is provided surrounding the upper end of the rod 29 and extending through the hole so that its lower end rests upon the enlargement 31 on the rod while its up-

per end bears against the bar 12. This urges the rod 29 downwardly so that normally it will assume a position with the enlargement 31 resting on the shoulder 32 and the disc 30 spaced from the member 19. A recess 35 is provided to receive the upper end of the rod 29 to permit the disc to move upwardly against the die member 19.

A stationary die member 36 is provided suitably anchored to a part of the machine. This member has an internal conical wall 37 shaped to conform with the wall of the member 19 and adapted to hold the cup between it and the wall of the member 19 when the latter is pressed down into the die member 36. At the upper end of the wall 37 is provided a shoulder 38 which has an outer diameter of approximately the outer diameter of the ring 16 or a trifle less than the ring 16, it being about the thickness of the material of the cup less on each side thereof. The upper and outer end of the die member 36 is cut down to form a cylindrical surface 39 which meets the shoulder 38 at substantially a right angle. The width of the shoulder 38 is made a little less than the desired width of the rim of the paper cup, and the diameter of the cylindrical surface 39 is smaller all around by the thickness of the cup than the inside of the cylindrical surface of the casing 10.

A cavity 40 is provided in the stationary die member 36 and a disc 41 is mounted therein on a post 42 which extends downwardly into a recess 43. A spring 44 surrounding the post 42 and bearing on the bottom of the disc 41 and the bottom of the cavity 40 urges the disc upwardly at all times.

In the operation of the device a paper cup is placed over the member 19 and the member 19 brought down by movement of the bar 12 into the die member 36. Inasmuch as the disc 30 extends outwardly and downwardly further than the member 19 this disc will center the cup in the die 36. As the bar 12 is moved further down the bottom of the cup reaches the upper surface of the die 41 and starts it moving downwardly against the tension of the spring 44. As the cup is pushed into the die member 36 the lower edge of the flat rim of the cup strikes against the shoulder 38 and is forced outwardly. When the cup reaches the bottom of the die the discs 30 and 41 can move no further downwardly but the bar is continuing its downward movement so that the member 19, held by the springs 27, moves downwardly until it comes in contact with the cup and presses the rim between it and the wall 37 of the die member 36. At this position the bottom outer surface of the ring 16 has flattened the rim of the cup between it and the shoulder 38 as indicated in Fig. 3 so that it forms the finished position of the cup rim.

However, the bar 12 continues to move downwardly and inasmuch as the discs 30 and 41, member 19, and ring 16 are prevented from moving downwardly by the cup and die member 37, the sleeve 10 now begins to move downwardly with respect to the ring member 16 and the die member 19 against the tension of the springs 27. As the lower end 45 of the casing 10 strikes the edge of the cup it begins to bend it downwardly and if the casing 10 is lowered far enough it will press the edge of the cup rim firmly against the surface 39 of the die member 36 thus causing this edge to assume a vertical position at right angles to the horizontal rim of the cup.

As the bar 12 is raised the casing 10 first rises, the other parts being held down by the springs 27, and when the heads of the posts 24 reach the upper surface of the casing 10 the ring 16 and associated member 19 begins to rise and the disc 30 moves relatively with respect to the member 19 urged by the spring 34. This loosens the cup from the die member 19. The disc 41 also rises because of the spring 44 and permits the withdrawal of the cup from the die member 36.

It will be evident from the above that I have provided a die which will operate upon a so-called "flat edge" cup to reform the edge into a horizontal rim having a depending flange at the outer edge thereof. This greatly strengthens the cup and permits stacking with greater economy as has been explained in the above mentioned application. The die is simply made and easily operated and although illustrated as forming an additional step in the manufacture of the cup it is obvious to those skilled in the art that the die may be combined with the die for forming the straight edge cup to make the edge in one operation.

While all of the parts of the die have been described as being cylindrical such a shape would obviously be used only in connection with a circular or round cup having a circular rim and bottom. The die, however, may be made in other shapes to be used with cups in different configuration such as polygonal cups of 4, 6, 8, or more sides, or oval cups with elliptical rims. In such cases the various cooperating parts would be made to conform to the shape of the cup.

Note should be made of the fact that after the ring 16 has been pressed firmly against the rim of the cup the horizontal flange thereof is completed. It is a feature of the invention, therefore, to vary the configuration of the extreme edge of the horizontal flange of the cup by the degree of pressure exerted upon the die after the ring 16 has become seated. A slight further depression of the die will cause the edge of the cup to flange over in a curve while the depression of the casing 10 completely down beyond the top of the shoulder 38 will cause the edge flange of the rim to assume substantially a right angle to the horizontal rim. Any desired configuration therefore of the ring between these two extremes may be had by predetermining the pressure applied to the die.

While the usual flat rim cup has an additional inturned edge I have found that with my die a cup may be made sufficiently strong with an edge having only one thickness of paper and without any binding means such as the wax used in the Lily Cup.

While a flat rim cup is specifically mentioned and illustrated the invention may be used to reform other types of cups such as the rolled rim cup.

Many modifications of the invention other than those mentioned may be resorted to without departing from the spirit thereof, and I do not, therefore, desire to limit myself to what has been shown and described except as such limitations occur in the appended claims.

What I desire to claim and secure by Letters Patent is:

1. In a device of the class described means to receive a cup, means to force a cup into said receiving means, means to extend outwardly the downwardly turned rim of the cup, means to flatten said rim in substantially a horizontal plane, and means to subsequently bend downwardly the extreme outer edge of said rim.

2. In a device of the class described a die having

a cavity to receive a paper cup, a shoulder on the upper surface of said die lying substantially in a horizontal plane, an outer surface on said die substantially perpendicular to said shoulder, means to insert a flat rim paper cup into said die with the lower edge of the rim resting upon said shoulder, means to press said cup further into said die to cause said rim to be bent outwardly, means to press said rim against said shoulder, and means to subsequently bend the outer edge of said rim downwardly forming a flange on said rim substantially perpendicular to the upper surface thereof.

3. In a device of the class described a die having a cavity to receive a flat rim paper cup, a shoulder on the upper surface of said die, an outer surface on said die substantially perpendicular to said shoulder, means to insert a cup into said die with the lower edge of the flat rim resting upon said shoulder, means to further force said cup into said die whereby said flat rim is bent outwardly, means to compress the rim of said cup against said shoulder, means to subsequently bend the outer edge of said rim downwardly and to compress it against the outer surface of said die to form a flange perpendicular to said shoulder, and means to loosen said cup from said inserting and compressing means.

4. In a device of the class described a die having a cavity to receive a flat rim paper cup, a shoulder on the upper edge of said die, an outer surface on said die substantially perpendicular to said shoulder, a second die member to conform with the inside of a flat rim paper cup, said second member being movable axially with respect to said first die member, means to move said second die member into engagement with said first die member whereby a paper cup placed on said second die member will be pressed into said first die member and the flat rim of said cup will be forced outwardly upon the upper shoulder of said first die member, a shoulder on said second die member adapted to compress the rim of said cup against the shoulder on said first die member, a member adjacent the outer surface of the shoulder on said second die member and adapted to have axial movement with respect to said die member, and means to move said last mentioned member beyond said shoulder and parallel to the outer surface of said first die member after said shoulders are compressed together.

5. A sleeve having an open end, means mounted within said sleeve and having limited axial movement therewithin means to urge said first mentioned means in an outwardly direction to the limits of its movement, a shoulder on said means having a width corresponding to the desired width of the rim of a paper cup, a die member having a cavity to receive a paper cup, a shoulder on said die member having a width a little less than the shoulder on said first mentioned member, a side surface on said die member forming substantially a right angle with said shoulder, said shoulder being adapted to cooperate with the shoulder on said first mentioned member to compress the rim of a paper cup therebetween in a plane substantially perpendicular to the axis of the cup, and means to pass said sleeve over said outer surface of said die member to press the extreme edge of the rim of said cup thereagainst.

6. In a device of the class described a die member having a cavity adapted to receive a flat rim paper cup, a shoulder on said die member defining the outer edge of said cavity and lying in a plane substantially perpendicular to the axis of said member, an outer surface on said die member substantially perpendicular to said shoulder, a sleeve having a diameter slightly larger than the diameter of said outer surface, means to mount said sleeve for reciprocating motion in the axis of said die member whereby said sleeve may be forced down over said outer surface of said die, a member mounted within said sleeve for limited reciprocation therewithin, means to urge said member outwardly from said sleeve so that it normally lies at its extreme limit of its relative movement therewith, a projection on said member adapted to fit inside of a cup, a shoulder extending around said projection and adapted to cooperate with the shoulder on said die member, and means to move said sleeve toward said die member whereby a cup may be compressed against the inner walls of said die member and the rim thereof may be reformed between the shoulder of said die member and the shoulder of said member, said sleeve being adapted upon further movement toward said die member to bend the outer edge of the rim of said cup over against the outer surface of said die member.

7. In a die for reforming a flat edge paper cup means to hold the cup in position by its bottom, and means to simultaneously compress the side walls of said cup and reform the rim of said cup in a plane substantially perpendicular to the axis thereof.

8. In a die for reforming a flat edge paper cup means to hold the cup by its bottom, means to simultaneously compress the walls of said cup and reform the rim thereof into a plane substantially perpendicular to the axis of said cup, and means to further bend the extreme edge of the rim of said cup to assume a predetermined position with respect to said rim.

9. In a device of the class described means to hold a pleated flat edge paper cup, means to alter the position of the pleats in the edge of said cup to form a flange substantially perpendicular to the axis of the cup, and means to alter the position of the pleats in the outer edge of said flange without disturbing the pleats in the remainder of said flange to form a second flange extending downwardly from said first.

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