

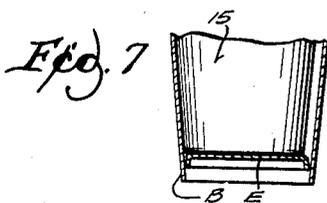
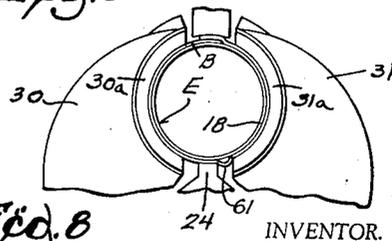
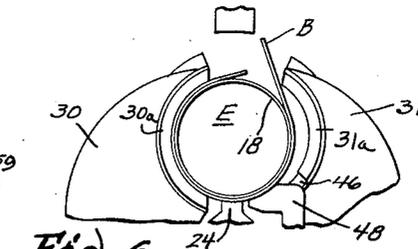
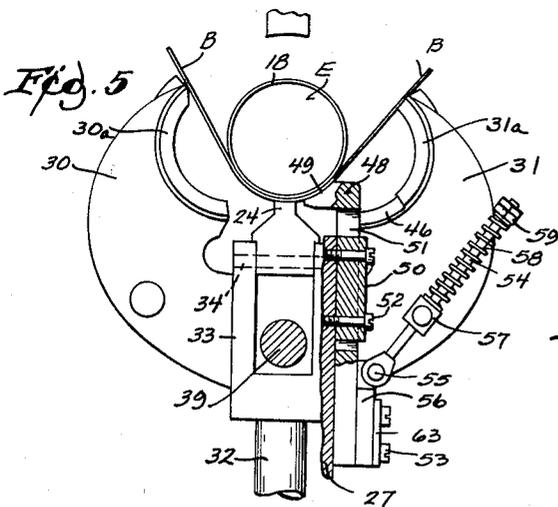
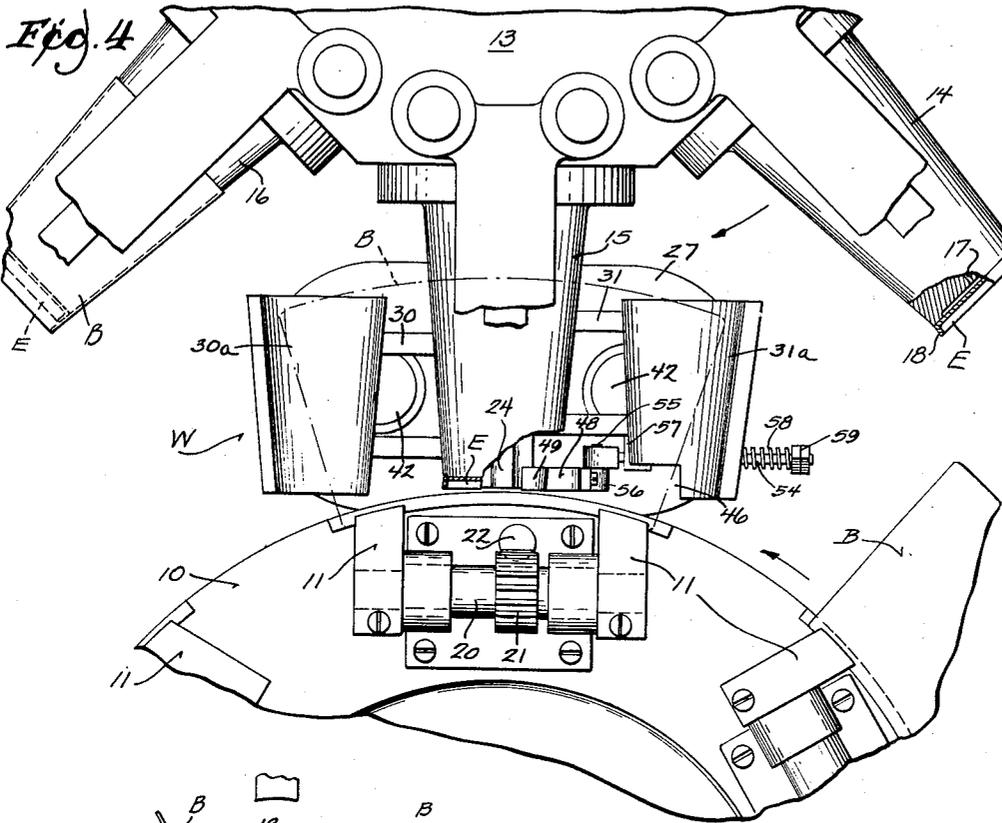
June 28, 1960

R. E. BODENDOERFER
BLANK WRAPPING MECHANISM FOR FRUSTO-CONICAL
CUP MAKING MACHINES

2,942,530

Filed Dec. 24, 1958

2 Sheets-Sheet 2



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2 Sheets-Sheet 1

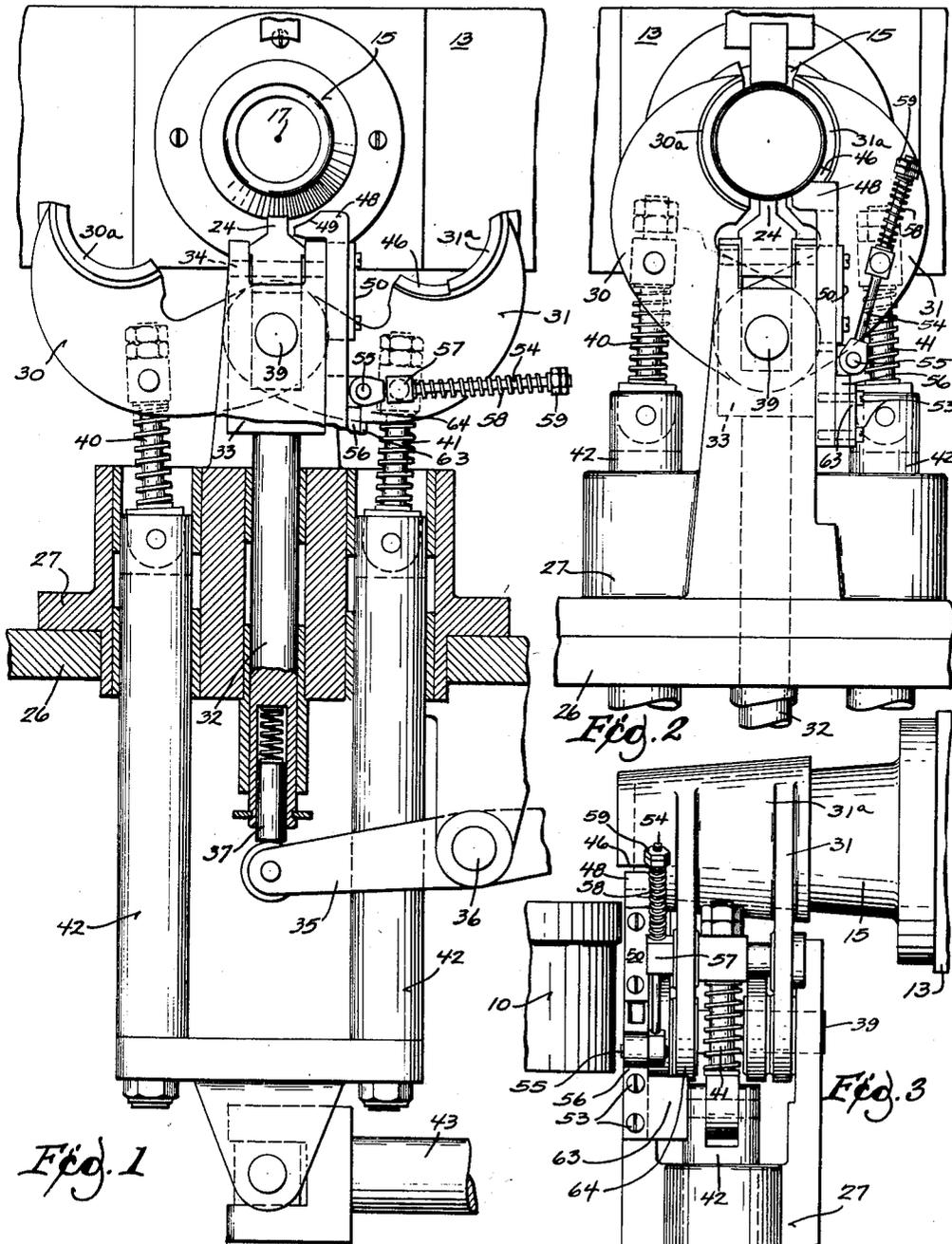


Fig. 1

Fig. 2

Fig. 3

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1

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BLANK WRAPPING MECHANISM FOR FRUSTO-CONICAL CUP MAKING MACHINES

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Filed Dec. 24, 1958, Ser. No. 782,712

7 Claims. (Cl. 93—36.1)

This invention relates generally to machines for making two-piece paper cups and, more particularly, to an improved mechanism for wrapping the blank into frusto-conical shape around its forming mandrel and the cup bottom carried thereby.

The subject matter of this invention is in the nature of an improvement over blank wrapping mechanism of the general character shown in Figures 35 and 26 of the Wessman at al. U.S. Patent Number 1,766,420 which issued on June 24, 1930.

In machines of this type, frusto-conical mandrels are carried on a rotatable turret and the circular cup bottom having a generally axially extending flange is placed on the end of the mandrel and held there by vacuum in the mandrel. The turret is then rotated to eventually advance this mandrel to the station where the body blank of the cup is swung adjacent to the mandrel and a pair of wrapping arms cause the body blank to be wrapped around the mandrel and bottom blank in overlapping relationship.

It is necessary to tightly wrap this body blank around both the mandrel and cup bottom to insure a proper side seal on the cup and also a good joint with the bottom piece of the cup. To do so, the wrapping action must take place without the formation of any wrinkles in the cup body.

Certain prior art devices of this character have heretofore been unsatisfactory because of the formation of wrinkles in the cup body, particularly those which extend in an axial direction, which are pressed by the wrapping arms to permanently deform the cup. This not only causes an unpleasingly appearing cup but one which may be subject to subsequent leakage.

I have found that the cause of this formation of an axially extending wrinkle near the bottom of the cup is due to the fact that the flange on the cup bottom flares outwardly before assembly, in spite of creasing operations thereon at a previous station before the body blank is wrapped around it. Due to the resulting difference in angles between this flange and the sides of the mandrel, as the first wrapping arm swings around the mandrel and cup bottom, that side of the body blank being wrapped first forces the cup bottom laterally from its centered position on the mandrel end. This shifting of the cup bottom tends to hold the opposite or second side of the body blank away from the mandrel and as the second wrapping arm then swings to force this second blank side around the mandrel, a buckling action occurs in the blank and a portion of the blank is squeezed between the lower clamp and the second wrapping arm. In other words, the blank material is bunched up to form a wrinkle between the central lower blank-holding clamp and the second wrapping arm, and this wrinkle is compressed therebetween to permanently deform the cup in this area.

Accordingly, the present invention provides an improved blank wrapping mechanism which overcomes the above mentioned difficulties.

2

More particularly, the invention provides a blank wrapping mechanism of the above type, which mechanism has a bottom positioner operable by, and prior to the operation of, the second wrapping arm. This bottom positioner acts as an auxiliary holding or clamping means and prevents shifting of the bottom piece and consequent movement of the body blank away from the mandrel. The action is such that it prevents shifting of the bottom piece and causes the body blank to wrap tightly around the bottom piece and press the latter's flange into the correct position.

These and other objects and advantages will appear later as this disclosure progresses, reference being had to the accompanying drawings, in which:

Figure 1 is a front elevational view of a blank wrapping mechanism made in accordance with the present invention and showing the wrapping arms in the fully open position, certain parts being in section or broken away for clarity;

Figure 2 is a view generally similar to Figure 1 but showing the arms in the fully closed position;

Figure 3 is a side elevational view of the mechanism as shown generally in Figure 2;

Figure 4 is a fragmentary plan view of the mechanism of Figure 1 and showing its relationship to the blank transferring table, certain parts being shown in section, broken away or removed for clarity in the drawings;

Figures 5 and 6 are fragmentary and schematic views taken in the same direction as the device of Figure 1, and showing the lower center clamp and the auxiliary clamp in blank holding position and the wrapping arms in various stages of forming the blank;

Figures 7 and 8 show prior art devices, Figure 7 being a fragmentary plan view in section and the bottom piece position after the left hand wrapper arm has closed, and Figure 8 being a front elevational schematic of the Figure 7 device but when the wrapping arms both have closed.

Referring in greater detail to the drawings, and particularly to Figure 4, a rotatable table 10 has a series of blank gripper means 11 spaced around its periphery for holding the body blanks B and transferring them from the blank cutting and the blank glue applying stations (not shown) to the wrapping station W shown in this figure. The rotatable turret 13 carries a plurality of tapered mandrels such as those designated by reference numerals 14, 15 and 16. These mandrels have vacuum passages 17 which terminate in their outer flat ends, and by means of which the cup bottoms E are held thereon.

The bottom pieces E are circular in shape and have a flange 18 around their periphery which has been formed at a previous station of the turret and applied to the mandrel end. Certain prior art machines also may apply a creasing operation on this bottom E in an attempt to prevent the flange 18 from excessive outward flaring in a radial direction. However, due to the resilience or elastic memory of the paper material, the flange is generally flared outwardly as shown when it reaches the station W.

The grippers 11 are mounted on an oscillatable shaft 20 on which is secured the pinion 21. The rack 22 meshes with pinion 21 and is shifted vertically by conventional means (not shown) to rotate the shaft and open the grippers as the lower clamp 24 moves upwardly to hold the blank B tightly against the lower side of the mandrel.

The blank wrapping mechanism is located between the rotatable table 10 and turret 13 at the wrapping station W. This mechanism is mounted in the top plate 26 of the cup making machine proper by its base 27.

The lower central clamp 24 is of a length generally

co-extensive with that of the wrapping arms 30 and 31, and its upper surface is curved to complement the curvature of the mandrel. This bar or clamp 24 is vertically shiftable by the vertical rod 32 which extends through the base 27, as clearly shown in Figure 1. This rod has a bifurcated upper end portion 33 in which the clamp is pivoted on pin 34. A lever 35 pivoted at 36 is actuated (by means not shown) to cause vertical shifting of the rod 32 through the spring cushioned plunger 37.

The wrapping arms 30 and 31 are pivotally mounted on the shaft 39 which is carried in the upper bifurcated end of base 27. These arms 30, 31 have curved sections 30a and 31a which complement the curved and tapered surface of the mandrel. Adjustable spring struts, 40, 41 pivotally connect their respective arms 30 and 31 to the carriage 42 which is vertically shiftable in the base 27 by the actuating arm 43. Arm 43 is operated by conventional means (not shown) in timed relation to the operation of lever 35. It is believed sufficient to say that lever 35 is actuated slightly in advance of the actuation of arm 43 so that the clamp 24 securely holds the blank B against the mandrel before upward movement of the wrapping arms commences.

The wrapping arm 30 completes its wrapping operation before arm 31 has moved its full upward distance, as shown in Figures 5 and 6. This provides an overlapping of the blank ends, one of which contains a glued area, to thereby form a longitudinal seal. This staggering of arm travel is accomplished in the known manner by adjusting the spring strut 40 so as to be slightly longer than the strut 41. The spring struts provide for overtravel of the carriage 42 and insure a firm pressing of the arms around the mandrel.

It will be noted, as clearly shown in Figure 4, that the arm portion 31a has been cut away as at 46 to form a rectangular opening at its front inner corner. A bottom positioner 48 is adapted to extend through the opening 46 when the arm 31 is closed, and has a curved upper surface 49 which complements that portion of the mandrel surface against which it is adapted to be pressed. This bottom positioner acts as an auxiliary clamping means for the front end of the blank B and also acts to prevent the bottom piece E from shifting to the right (as viewed in Figs. 1, 2 and 4). The positioner extends slightly past the end of the mandrel to thereby bear against the blank B and support piece E.

This positioner 48 is slidably mounted on the side of the upper portion of base 27 by means of the guide 50 which extends through a slot 51 in the positioner and is held by screws 52 on the base.

The positioner 48 is shifted into holding position as soon as the wrapping arms commence their upward swinging movement. This is accomplished by the strut 54 which is pivotally connected at 55 to the bracket 56 secured to the positioner by screws 53, and which strut extends through the block 57 carried on the arm 31. A spring 58 acts between the block 57 and the nuts 59 on the free end of the strut and as the arm 31 begins to swing upwardly from the position shown in Figure 1, the positioner 48 is yieldingly urged upwardly.

As indicated in Figure 5, when the arms 30 and 31 have moved upwardly a certain distance, the positioner 48 is bearing firmly against the blank B and bottom piece E. As the left arm 30 completes its wrap as shown in Figure 6, the positioner has prevented the bottom E from shifting the right side of blank B to the right, i.e., away from the mandrel. As a result the arm 31 finishes its wrapping action without causing a buckling of the blank B or the formation of a wrinkle in the area between the clamp 24 and the lower edge of the arm 31.

Figures 7 and 8 illustrate a prior art device and the difficulty encountered therewith. Figure 7 shows the shifted position of the bottom E and right side of the blank B after the left wrapping arm has moved a distance upwardly. The bottom E has been shifted from its original

central position on the mandrel end because of the left side of blank B being pushed against the outwardly flaring flange of the bottom E. Consequently, as the right arm completes its upward swing, it pushes the right side of the blank B in a general direction toward the mandrel and often causes the blank B to buckle out immediately beneath the lower edge of the arm, thereby causing the formation of a wrinkle 61 along the lower end of the finished cup.

As shown best in Figures 2 and 3, means are provided for positively withdrawing the positioner 48 from the mandrel after the forming operation. This is desirable because of the lack of a positive withdrawal force on the part of the spring 58 and strut 54 as they swing from the position shown in Figure 2 upon opening of arm 31. This means comprises a plate 63 which is also secured by the screws 53 to the positioner and extends rearwardly into the path of the gusset 64 of arm 31. The arrangement is such that as the arm 31 swings downwardly sufficiently far, the gusset 64 strikes plate 63 and thereby forcibly retracts the positioner.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a two-piece paper cup making machine of the type having a tapered mandrel adapted to hold a cup bottom on its outer end, said machine having a clamp for holding a body blank against the mandrel and a pair of wrapping arms for shaping the body blank around the mandrel and bottom, said clamp being shiftable to holdingly engage the blank first and then one of said arms operating in advance of the other to overlap the longitudinal edges of the shaped body; the improvement comprising, a bottom positioning member on the side of the mandrel opposite to that of said one arm and shiftable toward said mandrel to hold said bottom from shifting laterally of said mandrel as said one arm operates to wrap the body blank.

2. A two-piece paper cup making machine having a tapered mandrel adapted to hold a cup bottom on its outer end, and also having a clamp for holding a body blank against the mandrel and a pair of wrapping arms for shaping the body blank around the mandrel and bottom, said clamp being adapted to holdingly engage the blank before one of said arms operates in advance of the other arm to overlap the longitudinal edges of the shaped body; the improvement comprising, a bottom positioner shiftablely mounted adjacent that side of the mandrel opposite to said one arm, said positioner connected with said other arm and shiftable thereby in a direction toward said mandrel to hold said bottom and said blank from shifting laterally of said mandrel as said one arm operates to wrap the body blank.

3. A device as defined in claim 2 further characterized in that said other arm is engageable with said positioner to forcibly withdraw the latter from said mandrel as said other arm swings away therefrom.

4. In a machine for making two-piece paper cups and having a tapered mandrel including a flat end for holding a cup bottom having an outwardly flaring flange, said machine also having a clamp for holding a body blank against the mandrel and a pair of wrapping arms for shaping the body blank around the mandrel and bottom, said clamp being shiftable to hold the blank against the mandrel before one of said arms operates in advance of the other arm to overlap the longitudinal edges of the shaped body; the improvement comprising, a bottom positioning member on the side of the mandrel opposite to that of said one arm and movable by said other arm toward said mandrel to hold said bottom from shifting on said flat end as said one arm operates to wrap the body blank.

5. In a machine for making two-piece paper cups and

5

having a tapered mandrel including a flat end for holding a cup bottom thereon, a shiftable clamp for holding a body blank against the mandrel, a pair of wrapping arms for shaping the body blank around both the mandrel and bottom, said clamp being shiftable to hold the blank against the mandrel before one of said arms operates in advance of the other arm to overlap the longitudinal edges of the shaped body, a bottom positioner shiftable mounted adjacent the side of the mandrel opposite to said one arm, and a resilient linkage connection between said positioner and said other arm whereby the latter shifts the former toward said mandrel to hold said bottom from shifting laterally on said flat end as said one arm operates to wrap the body blank.

6. The combination of claim 5 including a one-way connection between said positioner and said other arm

whereby swinging movement of the latter away from said mandrel forcibly shifts the positioner away from the mandrel.

7. A device as set forth in claim 5 further characterized in that said other arm has an opening there-through and through which said positioner extends, said other arm and said positioner each having curved surface which together form a continuous surface complementary to said mandrel for securely holding said blank there-against.

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6