Oct. 27, 1959 T. N. CUMMINGS ET AL 2,909,877

CONTAINER WRAPPING ASSEMBLAGE

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Fig. 1.

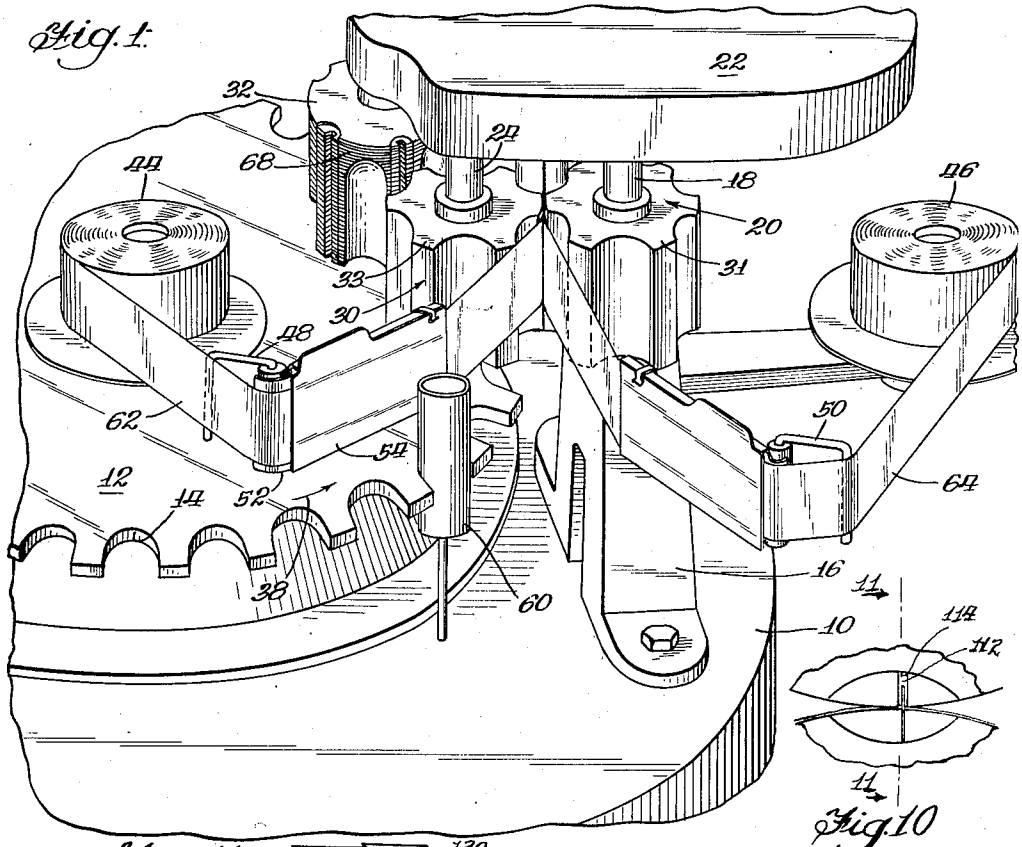


Fig. 10

Fig. 11

Fig. 6.

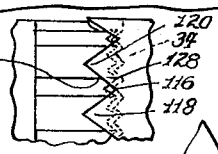
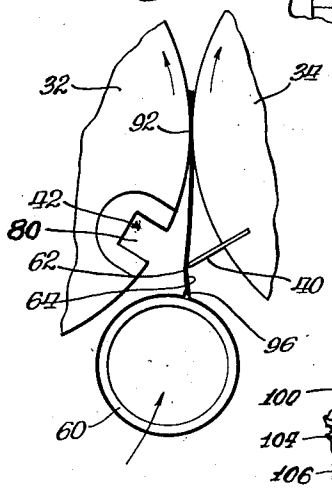
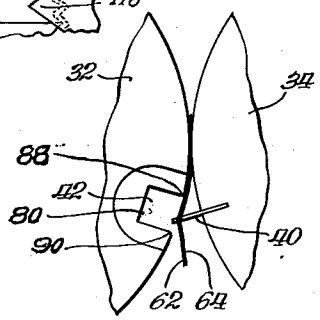
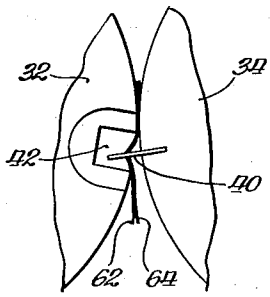


Fig. 7.

Fig. 8.







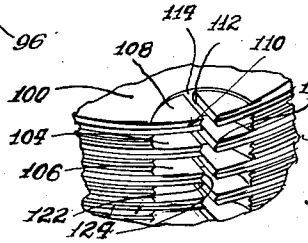


Fig. 9

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CONTAINER WRAPPING ASSEMBLAGE

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Fig. 2.

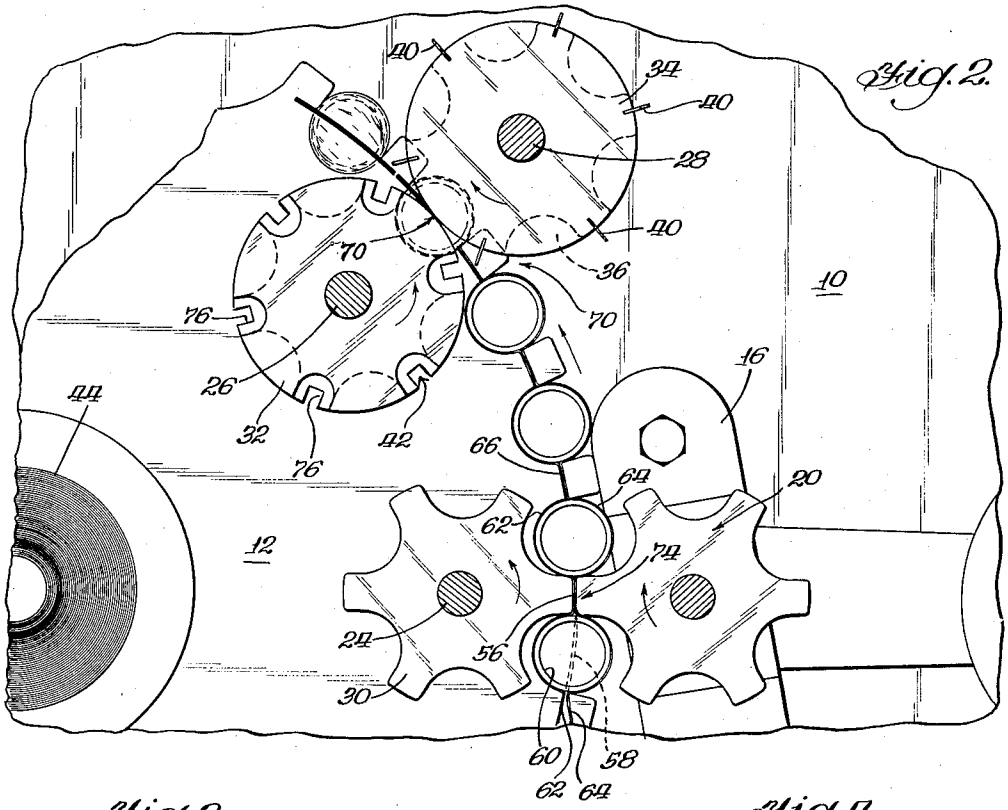

Fig. 3.

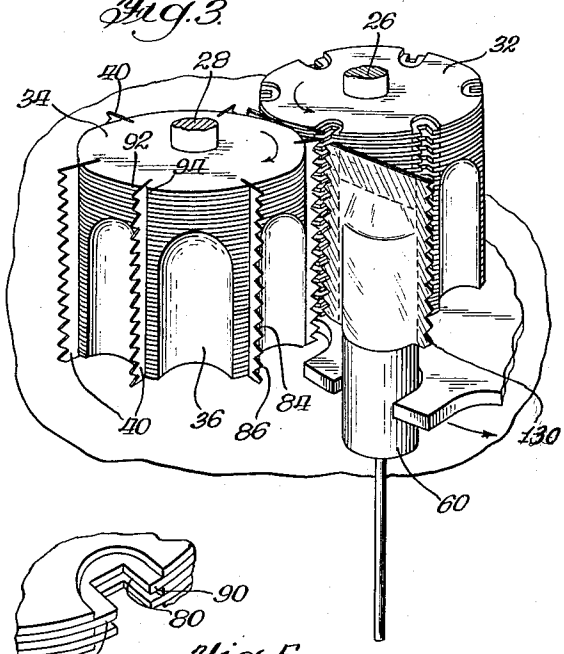

Fig. 4.

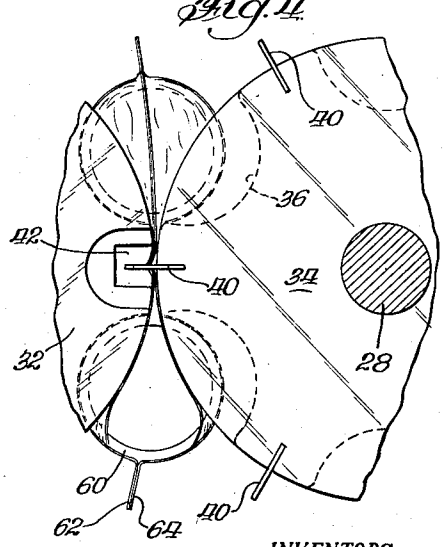

Fig. 5.

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United States Patent Office 2,909,877 Patented Oct. 27, 1959

2,909,877

CONTAINER WRAPPING ASSEMBLAGE

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Application March 8, 1955, Serial No. 493,004

6 Claims. (Cl. 53—180)

This invention relates to a machine for continuously wrapping filled containers. The specific embodiment of the invention is the removable wrapping station for the machine for filling pushups with ice cream disclosed in copending application Serial No. 379,332, filed September 10, 1953, of which this application is a continuation in part.

That application discloses a row of vertically positioned cylindrical containers having a stick fastened to a false bottom held at a point well below their rims moving in a circular path toward a delivery station. A portion of this path is shown in Figure 1 of this application. As these pushups advance, two strips of paper one on each side of the top portions of the moving cylindrical containers are brought into contact with the containers and each other, and these two strips are first sealed to each other between the cylindrical containers and then concurrently with cutting the containers apart in the seals between the containers, the tops are sealed. The movement of the conveyor carrying the pushups shown in the copending application is an intermittent one, but applicants' present apparatus will position and seal the two wrappers whether the motion is continuous or intermittent. The principal object of this invention is, therefore, to provide means for continuously enclosing the whole or part of containers in a wrapper.

The second object of this invention is to perform this closing step for upwardly-open containers moving in a row.

Another object of this invention is to provide means for cutting the formed and sealed wrappers between the containers, and to effect this without the use of moving knives. Applicants found this problem an extremely difficult one, primarily because paper dulls knives very rapidly and while a blade can be provided initially which will sever paper by simply pressing the blade against a true flat surface, as disclosed in the earlier-filed application, with the paper in between, it is only a short time before the blade is so dull that it must be replaced. One of the features of this invention is the provision of a serrated knife extending outwardly from the surface of the cylinder and parallel to its axis which sweeps through a recess in an opposing cylinder so as to first puncture the paper and then completely sever it. The action is tearing as well as cutting. As will appear later, the success of this cutting results from the clearance between shoulders in the gap and the knife, both being conditioned upon the particular weight of the paper being used.

These and such other objects as may hereinafter appear are attained in the embodiment of the invention shown in the accompanying drawings, wherein:

Figure 1 is a perspective view of the lead edge of the wrapping assemblage;

Figure 2 is a plan view of the sealing rolls taken immediately below the gear box 22;

Figure 3 is a perspective view of the cutting rolls;

Figure 4 is a plan view of the cutting rolls with a knife at the maximum point of penetration of a recess;

Figure 5 is an enlargement of an early experimental recess;

Figures 6, 7 and 8 show a knife in successive stages of cutting;

Figure 9 is an enlargement of a preferred form of blade recess;

Figure 10 is a plan view of the knife fully entered in the preferred form of recess shown in Figure 9; and,

Figure 11 is a view taken on the line 11—11 of Figure 10.

Describing first the complete wrapping of a pushup, and referring to Figure 1, 10 identifies the base machine disclosed in copending application Serial No. 379,332. Mounted centrally on this machine is a loading table 12 having around its periphery a plurality of pushup holding notches 14. Removably mounted on the base 10 is a wrapping mechanism positioned on a base 16 having a drive shaft 18 upon the upper part of which is mounted a fluted sealing member 20. The upper end of the shaft 18 is journaled in a frame inside a gear box 22 which contains a plurality of gears for driving respectively shafts 24, 26 and 28, see also Figure 2. This gear box is supported on the base 16 by means not shown. Keyed to the shaft 24 is a fluted sealing roll or iron 30 and shafts 18 and 24 are synchronized so that the arrises of iron 30 mesh with the arrises of iron 20 as illustrated in Figures 1 and 2. The irons 30 may be heated or not, depending upon whether or not the seals are to be effected by heat or merely by pressure. The irons 20 and 30 may be heated by various methods. In this case, they are heated by electrical resistance coils which are not shown but which are mounted either above or below the rolls on the shafts in close physical contact therewith.

Referring to Figure 2, the shafts 26 and 28 carry cylindrical members or rolls 32 and 34 in the lower side walls of which are apse-like recesses 36, see also Figure 3. The gear box is suspended above the loading table 12 on the base 16 with the fluted irons 20 and 30 and the cylindrical elements 32 and 34 suspended downwardly, these elements terminating above the loading table 12. The loading table carries in the notches 14 a succession of pushups which are cylindrical containers for ice cream having a bottom carrying a stick which may be used to force the bottom upwardly and thereby eject the contents of the cylinder. It is evident that as the table 12, referring to Figure 1, moves in the direction of the arrow 38, the pushups will move between the sealing irons 20 and 30, see Figure 2, and then on through the cylindrical elements 32 and 34. The rolls 18, 24, 26 and 28 are keyed to their respective shafts which are geared to each other and so synchronized that the center of a notch on the table 12 is in vertical alignment with the vertical axis of meshing flues or apses of the two pairs of rolls. In the machine shown in the copending application, the movement is intermittent, because of the construction of the filling station. The movement however could be continuous and this heat sealing station can be operated for continuous movement of the table 12 as well as for the intermittent movement thereof without alteration of structure.

Referring to Figures 2 and 3, projecting from the outer walls of the roll 34 are a plurality of knives 40, and positioned in the roll 32 are a like number of recesses 42, the knives and the recesses being so positioned that they will register with one another and they are positioned at the center of the segment of the cylindrical surface between adjacent apses 36 in either member.

Referring to Figure 1, mounted on the upper end of the shaft that carries the table 12 and freely rotatable thereon is a roll of paper 44, and mounted on an arm

supported by the base 16 is a second roll of paper 46. The paper is fed as strips from these two rolls and belayed over tensioning devices 48 and 50 and between flat surfaces such as 52 and 54 so as to be brought into face-to-face engagement between the fluted rolls 20 and 30 over the upper ends of the pushups. As the two rolls of paper pass between two flutes as at 56 in Figure 2, a vertical seal is formed extending the full width of the two strips of paper. If in the notch in the loading table 12 there is no pushup, then the paper will remain taut as indicated by the two dotted lines 58 in Figure 2, and the paper will not adversely affect in any way the function of the wrapping assemblage. It will continue to function with a minimum wastage of paper. If, on the other hand, a pushup 60, see Figure 1, is at the position indicated by the same numeral in Figure 2, the pushup has sufficient strength so it is not crushed by the tautness of the paper which is obliged to form around it and in consequence the two strips of paper 62 and 64 leave the initial sealing, which may be referred to as the vertical seal station, tightly wrapped around the pushup with a substantially continuous vertical seal 66 between adjacent pushups.

The rolls 32 and 34 also have heat-sealing capacity, whether exerted by pressure, or by heat, or both. This heat-sealing capacity is of major importance at the top of the cylindrical member such as at 68, see Figure 1, because as the pushup is moved through the cutting station, which is generally identified by the arrow 70, a seal is made across the top of the pushup. Three seals on a finished pushup are indicated by the lightly shaded portion along the side and top of the closed pushup in Figure 3. The knives sever one pushup from the other at a point midway between the pushups, that is, the cut is made in a seal which was formed at the vertical seal station identified in Figure 1 by the arrow 74. Three to four seconds elapse between the formation of the seal at the vertical seal station 74 and the time that a cut is made through the same seal at the cutting station 70.

The cutting rolls

Each knife 40 has a serrated or saw tooth edge and it moves into a recess 76, the construction of which is shown in greater detail in Figure 5. The recess is a registered stack of small recesses 80 alternately positioned between larger recesses 82. Each small recess is in transverse or horizontal alignment with a bight 84 between adjacent teeth 86 of the blade 40, see Figure 3, while the point of each tooth is horizontally centered in the large recess. This relationship is shown in greater detail in Figure 11 in connection with a preferred form of recess roll. Importantly, the shoulders 88 and 90 which form the two sides of the small recess 80 roll across the walls 92 and 94, see Figures 3 and 4, of the cylindrical member 34, thereby holding the paper together at least at the moment when the knives have fully penetrated the paper, but at that time only. This has been the crux of a difficult problem wherein applicants desired to cut the paper without employing a moving knife while yet moving the pushups and the paper steadily along the path described by the notches in the loading table 12.

The action is illustrated in Figures 6, 7 and 8. In Figure 6, the teeth on the blade 40 have just engaged the two strips of paper 62 and 64. It is important that the knife not displace the paper from a point where it is being held between the two cylindrical members at 92 and the pushup 94 because it might cause the seal to part at 96. The sharp points, therefore, are of great importance. In Figure 7, the knife has entered the recess and is now forcing the sheets of paper 62 and 64 against the shoulders 88 and 90 which form the boundaries of the small recess 80. This tends to force the paper further onto the knife point because the distance between the two shoulders 88 and 90 is quite restricted. At the same time the knife point is tending to tear the paper as well as cut it.

In Figure 8, and still later in Figure 4, the knife moves fully into the recess until for a short moment the paper is firmly held between the circular surfaces of the two cylindrical members 32 and 34 and the paper is completely severed.

A portion of a preferred embodiment of applicants' roll with recesses is shown in Figures 9, 10 and 11. Here the roll is formed of a single casting 100 with the outer surface carrying adjacent circumferential V-shaped grooves 102. The surface of the blade cylinder corresponding to 34 of Figure 3 carries like shaped grooves which when mounted in the shaft 28 mesh with the grooves 102 in the recess carrying roll 100. The manner of nesting is shown in Figure 11. The degree of nesting depends upon the weight of paper used.

In this embodiment of the roll, the large recess, that is, the part into which the point of the tooth is to move, is formed by cutting semi-circular portions out of the surface of the roll 100, referring to Figure 9, so as to form semi-cylindrical recesses such as 104 and 106. Between the recesses are lands 108 and each recess has a thickness equal to two complete grooves. Each land, therefore, has a complete groove 110 along its circumferential edge. Thereupon, a straight radial slot 112 is cut through all of the cylindrical recesses to a point of farthest penetration of the cylindrical recess as indicated at 114. Importantly, the teeth on the knife do not extend as far above the surface of the row 34 as is shown for the embodiment in Figure 3. Rather, the bights 116 between the teeth 118 and 120 are substantially at the surface of the grooves in the drum 34 as indicated by the dotted lines in Figure 11.

Also importantly, is the sharpness of the points 122 and 124, see Figure 9, formed by the two edges of a groove at the point of intersection with the vertical slot or recess 112. Referring to Figure 11, it will be seen that the point 126 on the blade must clear the point 128 of the groove on the land. This clearance is as close as possible. The effect is to make the final severance the action of the knife but also the action of these sharp edges which tear the paper. Referring to Figure 3, the serrated edge 130 is shown sharply defined, but actually close inspection shows a very fuzzy finish indicating considerable tearing.

Having thus described our invention, what we claim is:

1. A container wrapping assemblage comprising a frame, an endless conveyor on said frame, a plurality of means mounted on said conveyor for holding upwardly open containers at points substantially below their rims, a pair of fluted rolls having flutes and arrises in vertical rolling engagement with each other, the line of engagement when extended downwardly passing through the path of the holding means and the flutes being of a size such as to enclose the upper part of a container in a holding means, a second pair of rolls having fluted portions in rolling engagement with each other, a cutting blade in each arris of one roll of said second pair of rolls and a complementary cutting means in each arris of the other roll of said second pair of rolls, means for synchronizing the movement of the conveyor with both pairs of rolls, and means for feeding two strips of sheet material, one on each side of containers moving toward said rolls and above the holding means, successively into the bight of said rolls.

2. The container wrapping assemblage of claim 1 wherein the rolls are equipped with means for raising their temperature substantially above room temperature.

3. The container wrapping assemblage of claim 1 wherein the fluted portions are downwardly open apses whereby the cylindrical surface that engages the upper edge of the strip is substantially continuous.

4. The container wrapping assemblage of claim 1 wherein the cylindrical surfaces of the cutting rolls are

circularly grooved with the grooves of one roll nesting in the grooves of the other roll.

5. The container wrapping assemblage of claim 1 wherein the blade carries a row of equally spaced teeth and wherein the complementary means in the other roll is a vertical recess whose side walls vary in width so as to provide a clearance in the bight between the teeth and the recess comparable to the clearance between the points of the teeth and the recess.

6. The container wrapping assemblage of claim 1 wherein the blade carries a row of equally spaced teeth and wherein the complementary means in the other roll comprises recesses in the surface of the roll aligned parallel to its axis, and a radial slot intercepting the walls between the recesses and extending inwardly from the roll

surface, the vertical center of each recess being horizontally aligned with a tooth on the knife.

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