Dec. 29, 1953 P. E. FISCHER 2,664,034

METHOD AND APPARATUS FOR MAKING CARTONS FOR PACKAGING OF LIQUIDS

Filed Sept. 2, 1952 4 Sheets-Sheet 1

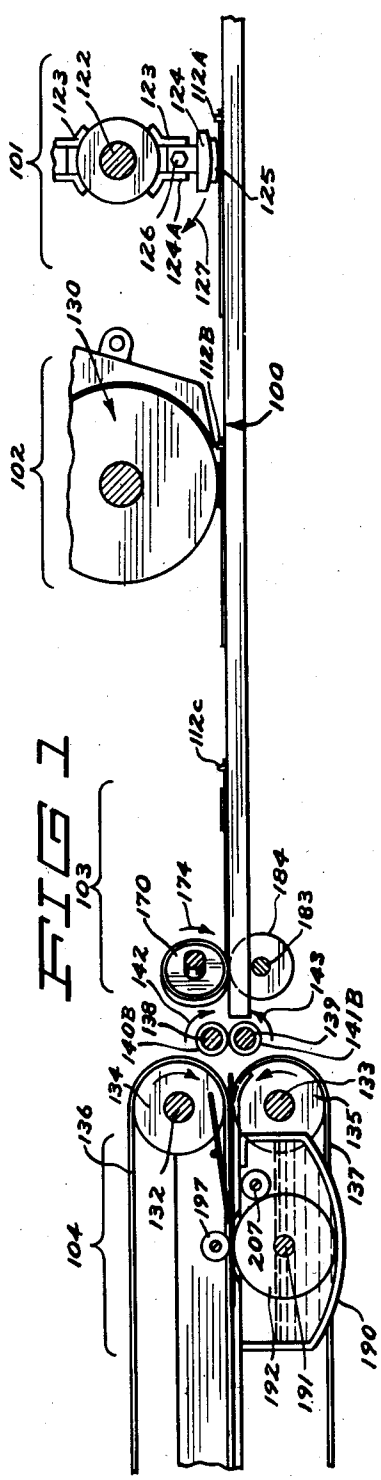


FIG 1

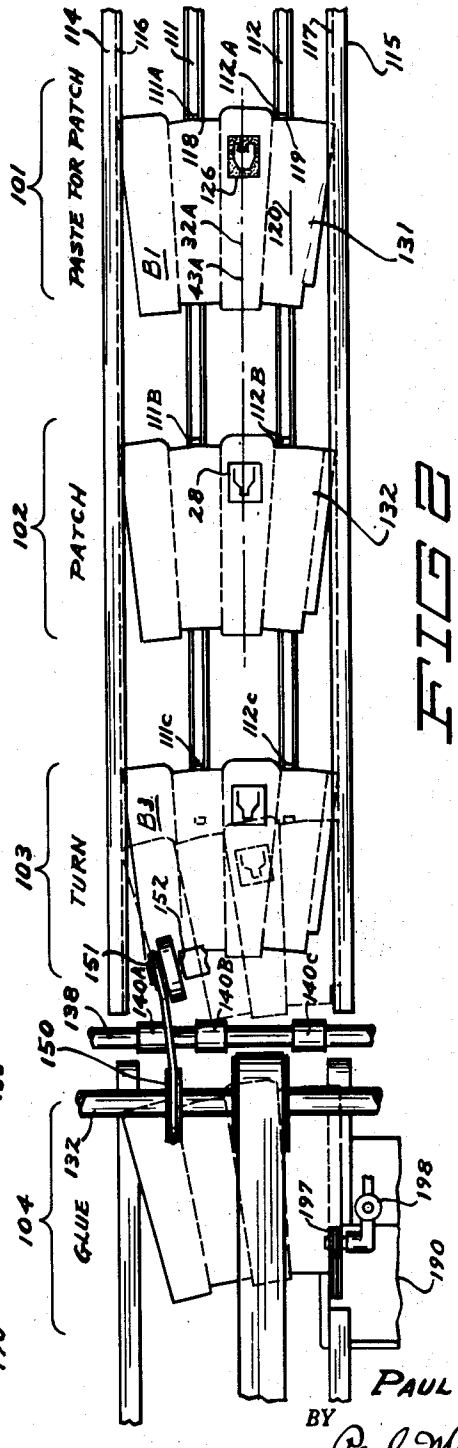


FIG 2

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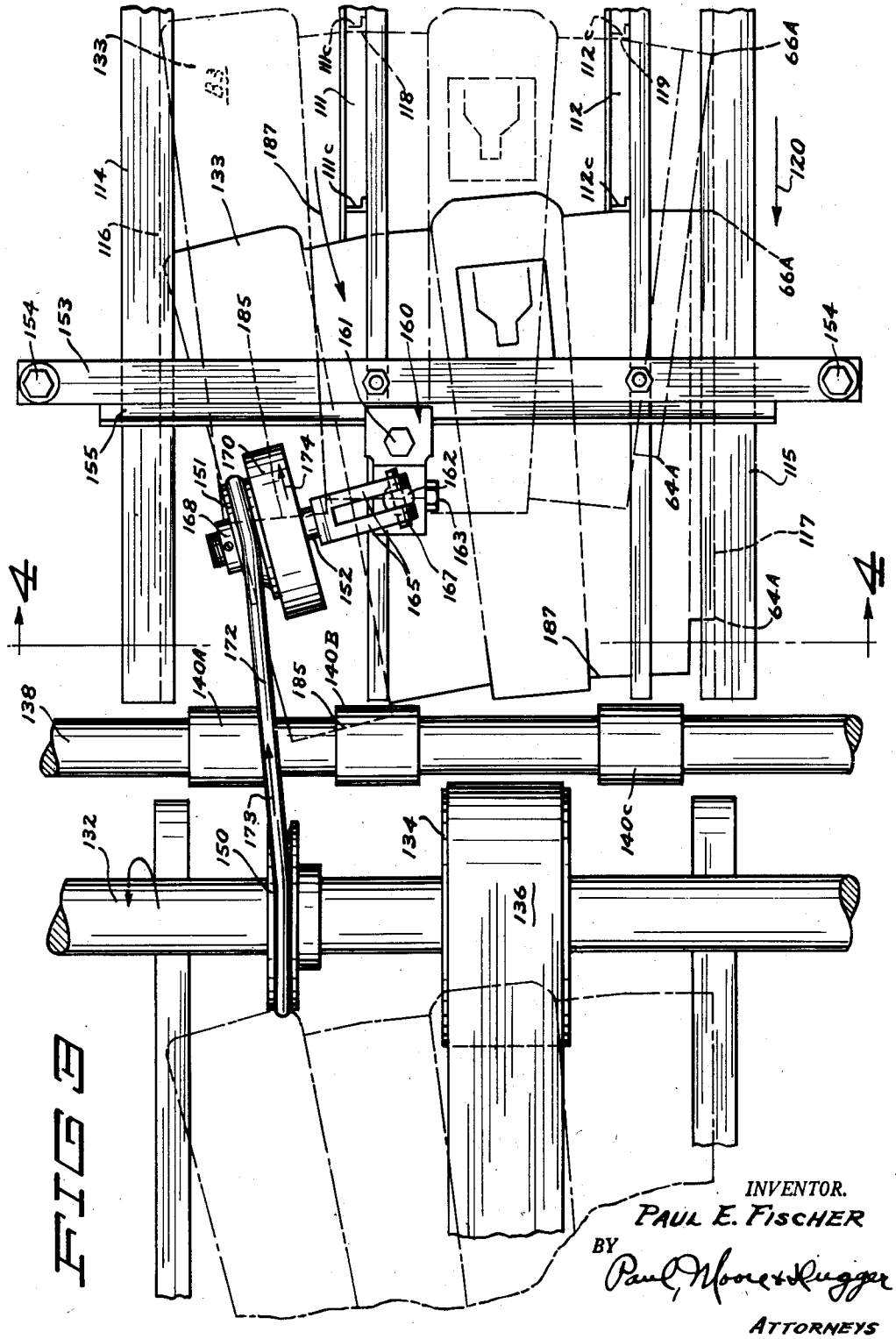


FIG 3

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FIG 4

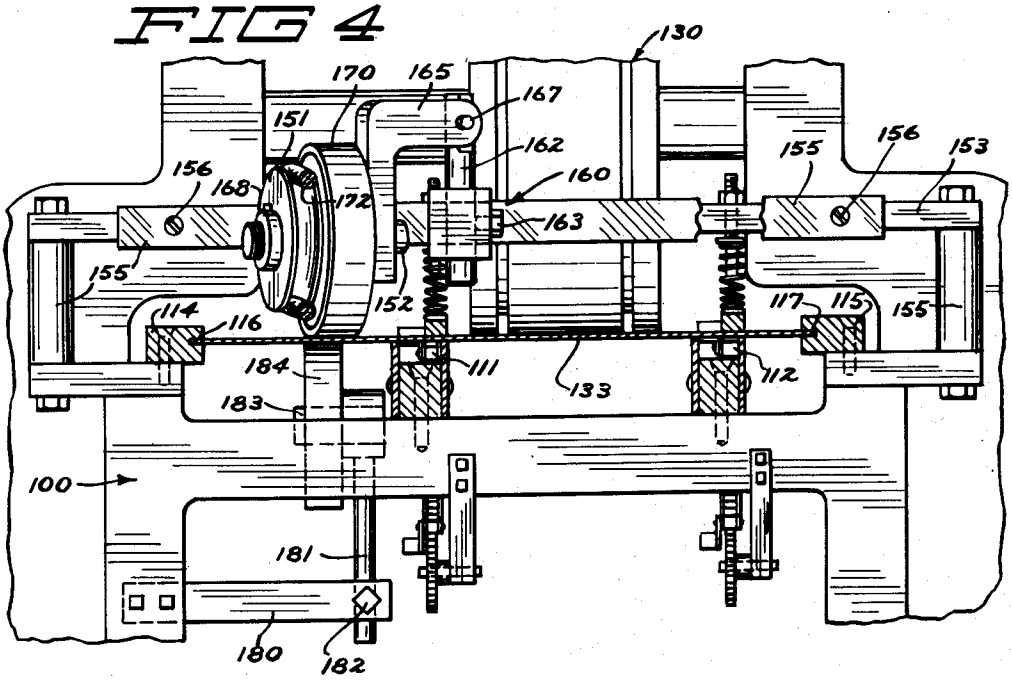


FIG 5

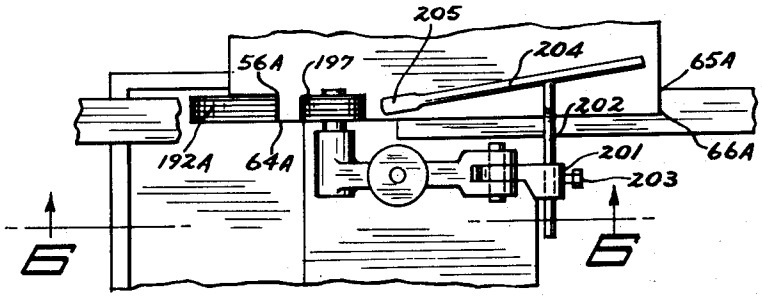
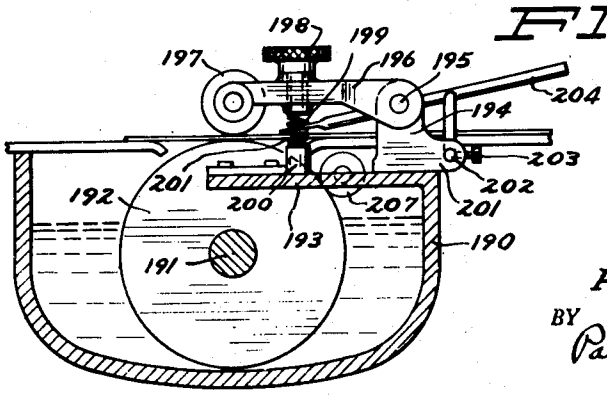


FIG 6



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FIG 9

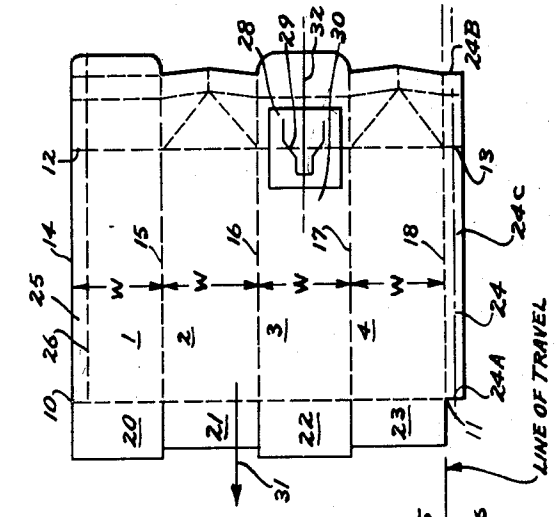


FIG 8

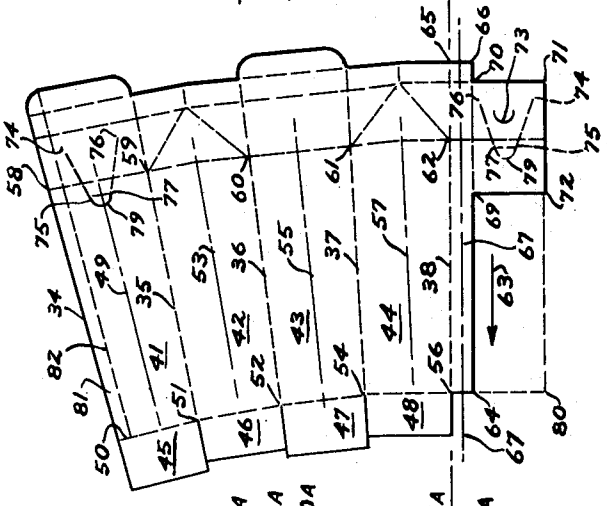
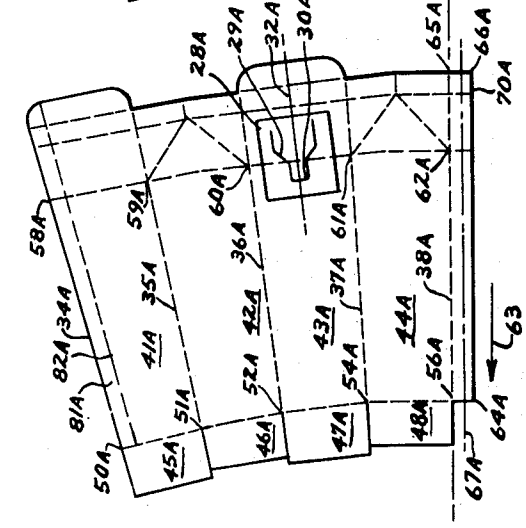


FIG 7



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UNITED STATES PATENT OFFICE

2,664,034

METHOD AND APPARATUS FOR MAKING CARTONS FOR PACKAGING OF LIQUIDS

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Application September 2, 1952, Serial No. 307,512

9 Claims. (Cl. 93—36)

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This invention relates to method and apparatus for making cartons for the packaging of liquids. The packaging of liquids, particularly for sale at retail levels has been carried out in two fairly common ways. In the one method, the liquid is packaged in a bottle or can for which the customer is charged a certain deposit, and this deposit is then returned to the customer when the bottle or can is returned to the dealer. This is known as the returnable bottle or package system. According to another well known system of operation the merchandise is packaged in a container that can easily be disposed of by the consumer, such containers being thus used only once. One prominent field of retail distribution in which the packaging has been carried out in both ways is the dairy field. For many decades fluid milk and other dairy products have been packaged and delivered in glass bottles that were returned to the dairies for cleansing and re-use. More recently there have been developed cardboard cartons that are capable of containing the fluid milk for a sufficient length of time for delivery to the purchaser. These paper "milk cartons" as they are most commonly called are shown in numerous United States patents, among which there may be mentioned the following: 2,079,875; 2,079,876; 2,218,670; 2,263,957; 2,270,617. There are also other patents relating to various features and improvements of this class of cartons.

The paper "milk carton" has earned and deserves a wide acceptance because it is light in weight, sanitary, delivers the milk in good order to the consumer, it is easily disposable by the consumer and presents cost advantages. The disadvantage, however, with such cartons is that they must be made where they are filled, that is to say in the dairy itself. This is due to the fact that the carton is of rectangular parallelepipedon shape and has a uniform cross sectional area from bottom to top. In the usual form the side walls are rectangles of equal size, the bottom is a square, and the carton has the same square horizontal cross section from the bottom to the shoulder where the side walls are bent inwardly to form the "gable roof" or top closure of the carton. This shape, while it serves admirably for the intended purpose of containing the liquid product being packaged and sold, presents the disadvantage that it is incapable of being shipped "flat" or "nested," and consequently only those producers of liquid merchandise, who produce exceedingly large quantities of merchandise, have been able to afford the relatively large and expensive machinery necessary for making the

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paper cartons. Accordingly, the small "dairy" serving a limited area has not been able to avail itself of the advantages presented by the disposable paper cartons. It has heretofore been proposed to make a paper carton of steep frustoconical shape capable of being nested in the unclosed (and unfilled) condition. Such a carton construction has the advantage that a large number of cartons may be nested together, thereby reducing the bulk so as to allow economical shipment of the cartons from their place of manufacture to their place of filling. While this idea is very excellent, it has not been adopted readily due to the difficulty of making a carton of frustoconical shape on existing carton-making machinery and utilizing existing carton-making methods. Furthermore, the design of the carton blank involved so much wastage of paper material as to make the cost of the cartons relatively higher, and hence the economies involved in the use of the disposable paper carton by the ultimate user (the dairy for example) were less, and as a consequence such frustoconically shaped cartons have not been widely accepted.

It is an object of the present invention to provide improved methods and apparatus for making frustoconically shaped cup-like cartons which are capable of being nested before filling and closing.

It is a further object of the invention to provide improved methods and apparatus for making liquid-containing cartons of the frustoconical shape wherein the carton blank utilizes a lesser amount of paperboard material than heretofore.

It is another object of the invention to provide methods and apparatus capable of being adapted to existing carton-making machines and methods for the production of frustoconically shaped nestable liquid-containing cartons.

It is an additional object of the invention to provide improvements in carton-making machinery applicable to existing carton-making devices wherein suitably shaped blanks may be properly handled on the machine without difficulty in gluing or otherwise.

It is a further object of the invention to provide improvements in carton making methods and apparatus whereby the pouring spout of the carton is applied at one position and the blank then re-oriented for application of glue which provides for closure of the carton to a tapered tubular form.

It is an additional object of the invention to provide a method and apparatus for adjusting the position of a flat carton blank relative to its first line of travel and as it moves during carton-mak-

ing so as to permit subsequent travel of the blank in a position angularly disposed with respect to the first position, for application of glue along a path paralleling the direction of motion but across a portion of the blank angularly disposed with reference to a line on the blank parallel to the first line of motion.

Other and further objects of the invention are those inherent in the apparatus herein illustrated, described and claimed.

The invention is illustrated with reference to the drawings in which corresponding numerals refer to the same parts and in which

Figure 1 is a fragmentary vertical sectional view through a portion of a standard carton-making machine, to which the improvements of the present invention have been applied;

Figure 2 is a fragmentary plan view corresponding to the elevational view of Figure 1, illustrating the path of movement of a carton blank, according to the improved methods and utilizing the improved apparatus of the present invention;

Figure 3 is an enlarged fragmentary plan view of the carton-making machine showing the portion of Figure 2 that is designated "Turn";

Figure 4 is a fragmentary vertical sectional view through the carton making machine improvements of the present invention, taken along the line and in the direction of arrows 4—4 of Figure 3;

Figure 5 is a fragmentary plan view illustrating on a slightly enlarged scale a portion of the gluing station of Figure 2;

Figure 6 is an enlarged fragmentary vertical sectional view taken along the line and in the direction of arrows 6—6 of Figure 5;

Figures 7, 8 and 9 are plan views of representative carton blanks, Figure 7 illustrating the blank utilized in the methods and apparatus of the instant invention; Figure 8 illustrating a blank of corresponding size but utilizing an earlier and somewhat wasteful form of blank pattern; Figure 9 illustrating the blank from which cartons of rectangular parallelepipedon shape, such as those illustrated in the United States patents previously mentioned herein.

Referring to Figure 9 there is illustrated a blank of the form capable of being folded into a carton of the type illustrated in the above mentioned United States patents. In this carton blank the side panels 1, 2, 3 and 4 have a vertical length (when the carton is pasted and set up) determined by the distance between the lines 10—11 and the line 12—13. The horizontal width of each of the rectangular side panels is the same. Thus, the width of panel 1 is the distance W between the lines 14 and 15, the width of panel 2 is likewise W and is the distance between the lines 15 and 16, the width of panel 3 is the width W and is the distance between lines 16 and 17, and the width of the panel 4 is the width W and is the distance between the lines 17 and 18. Each one of the side panels has an integral flap to the left of the line 10—11 in Figure 9, thus the flaps 20, 21, 22 and 23. These are folded in overlapping relation so as to form a rectangular bottom when the carton is set up. In addition, the panel 4 has a rectangular edge at 24 which overlies a corresponding rectangular edge 25 between the lines 14 and 26 of panel 1 when the carton is set up in tubular form. In making the carton, glue is applied to the edge 24 and then the carton blank, which is suitably scored, is folded over so as to bring the flap 24 into overlying relation with the area 25, and when pressure is applied they are adequately pasted together in liquid tight relation. The portion of the blank to the right of the line 12—13 has to do with the top closure or "roof" construction, and it is unnecessary to refer to it in detail, other than to say that the roof construction, which is fully described in the patents cited above, is left open until the dairy or other user of the carton fills the carton with milk or similar liquid product and then the roof construction is folded in in accordance with the fold lines scored into the blank and sealed adequately.

Likewise, on the panel 3 or upon some other one of the panels there is pasted a flap 28 which is cemented onto that side of the carton blank which becomes the inside of the finished carton. This rectangular patch 28 has score lines at 29 partially cut through, and the carton blank is likewise suitably scored at 30 so that the user can lift up a little portion of the carton and easily make a pouring hole through which the liquid contents of the carton, when filled, may be dispensed. It will be apparent from the above mentioned patents and Figure 9 that the cartons made from the exemplary blank of Figure 9 have a uniform square cross section from bottom to top and even before its top is closed, the carton cannot be nested with another carton of the same size.

In making liquid cartons of the "rectangular" or "square" type from blanks as exemplified by that of Figure 9, the blank is carried along a carton-making machine in a direction parallel to the lines 14, 15, 16, 17 and 18. The blank usually moves in the direction of arrow 31. In the usual operation, the blanks which are precut to perimeter shape are fed one at a time in spaced relation and are carried through the carton-making machine. At one station of the carton-making machine score lines are added, and any additional cutting that may be required on the blank which was not made during the original cutting of the perimeter of the blank is added. Then as the blank proceeds along, at another station a small patch of paper, such as that illustrated at 28, Figure 9, is cut and applied and the necessary cutting or partial cutting through the original blank and the patch is made. All the while the blank travels in the direction of arrow 31 which is parallel to the lines 14 through 18, inclusive. Then as the blank is moving along, its projecting area 24 runs between rollers and by means of these rollers, lines of glue or other cement are applied throughout the length of the rectangular edge area 24. In this connection, it is worthwhile noting that the glue as thus applied must run continuously from the one end 24A of the rectangular edge to the other end 24B, so that when the carton is folded over, a tight and liquid-proof joint will be made. This is especially true at the edge 24A, which ultimately is near the bottom part of the carton and hence is subjected to maximum hydrostatic pressure. The application of the glue in the strip upon the area 24 is accordingly a sensitive operation and it must run continuously from one end of the strip to the other.

In the operation just illustrated, the patch 29 has an axis along the line 32 which is parallel to the direction of motion 31, and likewise the axis 24C of the edge rectangular strip 24 is also parallel to the direction of motion 31. Therefore, no problem is presented so far as con-

cerns running in the strip material from which the patches 28 are cut and of applying them to the blank, nor is any problem presented in holding the blank positioned so that the axis 24C coincides with the direction of movement 31.

The desire to produce a nestable paper carton evolves the blank pattern as shown in Figure 8. In this form the pattern is shaped so as to produce a frustoconical shape. The side panels 41, 42, 43 and 44 are defined, respectively, by the lines 34, 35, 36, 37 and 38. The bottom of the carton, when it is folded into shape is defined by the bottom tabs 45, 46, 47 and 48. The side panel 41 has a vertical axis along the line 49 and the scoring line 50—51 is at right angles to the axis line 49. Similarly, the score line 51—52 of panel 42 is at right angles to its axis 53, the line 52—54 is at right angles to its axis 55 and the line 54—56 is at right angles to its axis 57. The upper scoring line 58—62 defines the portion, to the right of which in Figure 8, are the roof construction parts of the blank. These correspond to the roof construction parts to the right of line 12—13 of the blank in Figure 9 and when properly folded along the scoring lines permits a "gable roof" to be folded on the carton when it is filled and closed. In the carton shown in Figure 9, the pouring spout patch 28 was applied to the panel 3 and it could as easily have been applied to the panel 1, so long as the patch avoided the double portion of the carton occasioned by the overlap of part 24 on part 25. In the carton shown in Figure 8 the entire blank is moved through the carton-making machine in the direction of arrow 63, which is parallel to the line 38. Below the line 38, there is provided the sealing flange which consists of the rectangle defined by the corners 56, 64, 65 and 66. The blank, which is pre-cut and often pre-scored, is moved through the carton-making machine in the direction of arrow 63 and hence parallel to the line 38 and parallel to the axis 67 of the rectangular pasting area just defined. Accordingly, glue may be spread throughout this area from the edge line 56—64, which ultimately is adjacent the bottom of the carton, to the edge lines 65—66 which are ultimately adjacent the top of the carton. The fact that the entire blank moves parallel to its line 38 necessarily means therefore that the remainder of the blank moves with lines 37, 36, 35 and 34 at increasing angles, respectively, to the direction of movement represented by arrow 63. However, since no work is done in the carton-making machine on the portions of the blank above line 38, other than folding, this can be accomplished adequately. In the carton shown in Figure 8 no separate "pouring spout patch" is applied, but instead a projecting rectangular area, defined by the corners 69, 70, 71 and 72 is cut on the blank. This area has an arcuate cut 73 provided and in the cutting of the blank there are also provided partially cut lines 74—75 and 76—77. There is also provided an aperture defined by the lines 75—77 and an arcuate line 79. When the carton is folded, the partially cut lines 74—75 and 76—77 as well as the aperture defined by the lines 75—77 and the curved line 79, come into the position shown by the dotted line in the tabular area around the arcuate cut 73. Therefore, as the blank moves through the machine the prescored blank is folded over and the pouring spout portions, just described, are brought together.

The only disadvantage with the carton shown in Figure 8 and its method of manufacture has to do with the wastage of material in the rectangular area defined by the corners 64, 69, 72 and 80. This area cannot be salvaged and is wholly wasted. Accordingly this form of blank has not received wide acceptance.

Referring now to Figure 7 there is illustrated the form of blank utilized in accordance with the present invention. In this form the main areas of the side walls, bottom and gable roof forming features may be the same as shown in Figure 8, however, no tabular rectangle for forming the pouring spout, such as the rectangle 69, 70, 71, 72, is provided, and instead a pouring patch exactly similar to the patch 28 of Figure 9 is utilized. For convenience in nomenclature, the numbers of Figures 8 and 9, where they correspond to areas and shapes of Figure 7, will be utilized, with the suffix "A". Thus the sides 41A through 44A correspond in shape to the sides 41—44 of Figure 8. The lines 50A—56A correspond to the lines 50—56. The lines 58A—62A correspond to the lines 58—62. Similarly, the bottom tabs 45A—48A correspond to the bottom tabs 45—48, respectively. The only difference therefore for a correspondingly shaped carton would be that the tabular portion 69, 70, 71 and 72 is removed, thus leaving only the pasting area 56, 65, 66, 64 which, when the box is folded, overlies the area 81 of the panel 41, between the lines 34 and 82. Similarly, the pasting area 56A, 65A, 66A, 64A overlies the area 81A between the lines 34A and 82A. In this form of carton there is provided the pouring spout patch 28A having an axis 32A that coincides with the vertical axis of the panel 43A, when the carton is set up. The axis 32A is at right angles to the folding line 60A—61A between the panel 43A and the slanting roof panel at the top of the carton, which is to the right of the line 60A—61A and between the lines 36A and 37A. The patch 28A is provided with the line scores or cuts 29A and 30A, as described with reference to the similar pouring spout patch of Figure 9.

In order that the pouring spout patch 28A be applied utilizing existing machinery, it is desirable that the entire blank of Figure 7, be moving in the direction of the axis line 32A, when the patch 28A is applied. At the same time, in applying paste to the pasting edge 56A, 65A, 66A, 64A, it is equally desirable that the blank be moving parallel to the axis 67A. Due to the configuration of the blank, which is necessitated by its nestable, frustoconical shape, the axes 32A and 67A can never be parallel. In order to utilize the most desired path of movement for application of patch 28A and at the same time utilize the desirable path of movement along axis 67A for application of the paste, there is provided in accordance with this invention improved methods and apparatus. The methods are best illustrated with reference to Figures 2 through 6, to which reference is now made.

The improvements of the present invention are generally applicable to machines of the type set forth in Patent 2,395,352. In general these machines include an elongated frame 100, Figure 1 hereof, along which are arranged a plurality of work stations where the carton blanks are worked upon, for converting them into the desired carton structure. Thus, as shown in Figures 1 and 2, along the frame 100 there are arranged a plurality of stations, station 101 for

applying paste by which the pouring spout patch is attached to the blank; a station 102 where the pouring spout patch is cut and applied to the paste area, and a subsequent station 104 where glue is applied to the edge of the blank preparatory to folding it and fastening it into a tubular form. In addition, the instant invention includes a station at 103 where the blank is turned slightly as will be described.

The frame 100 includes two or more chains or belts 111 and 112 that move linearly along the frame for pushing the carton blanks at a uniform rate of speed through the successive work stations. These belts or chains 111—112 are driven by suitable mechanisms not illustrated but travel at the same rate of speed, and along each of the belts or chains there are a plurality of upstanding fingers, thus fingers 111A through 111C and fingers 112A through 112C.

For the purposes of this invention it will be assumed that the blanks shown in Figure 2 or as shown in Figure 7, are precut and scored, either in the machine or exteriorly and fed to the machine and that they travel between the guide rails 114 and 115. These guide rails are preferably provided with slight grooves at 116 and 117 in which the edges of the carton blank are adapted to be guided.

To the right of station 101, the station at which the paste for the patch is applied, the blanks are suitably fed to the belts 111 and 112 in a position such that the axis 32A of the patch which is to be applied is parallel to the axis of panel 43A and the two axes are in turn parallel to the path of movement of the belts 111 and 112. In order that the blank shall be maintained with the axis 32A running parallel to the belt, the fingers 111A—111C and the fingers 112A—112C are adjusted relative to each other so that they just abut against the edges 118 and 119 of the blank, when the axis 32A is parallel to the path of movement of the belt. Thus, the blank, such as blank B1 at station 101 is pushed in the direction of arrow 120 by the fingers 111A and 112A which contact the appropriate trailing edges of the blank. The belts 111 and 112 are made adjustable longitudinally relative to each other so that this positional arrangement of the blanks is maintained as the blank is moved along through stations 101 and 102.

At station 101 there is provided on the machine a rotatable shaft 122 upon which are a plurality of brackets 123—123 to which there are bolted the paste applying heads, of which one such head 124 is illustrated. The head has a paste applying pad 125 of appropriate shape so that when the pad runs into contact with the blanks moving along beneath it, there will be applied an area of paste, as indicated by the shaded area 126 of blank B1, Figure 2. The pads 125 are arcuately shaped about the axis of shaft 122 and are adjustable radially by means of the arm 124A that is attached by the studs 126. The shaft 122 is rotated at a speed and in the direction of arrow 127 such that it travels at the same rate of movement as do the blanks, as they progress through and pass the station 101. Furthermore, shaft 122 is run in close synchronization to the movement of the belts 111 and 112 so that the area of paste 126 as applied to each blank occupies the same position relative to the score lines and edges of the blank as on every other blank.

Then as the blanks are progressed in the direction of arrow 120, they pass under stations 102, where, by suitable mechanism generally designated 130, there is applied to the pasted area a precut rectangle 28 of paperboard which is cut and scored so as to produce the appropriately shaped pouring outlet. Obviously, the shape of the patch and the pouring outlet may be varied in accordance with the design of the box, as desired. The apparatus for applying the paste and for cutting, scoring, and applying the patch, per se, forms no part of the present invention other than that the patch is applied parallel to the longitudinal axis of one of the sides of the blank and hence defines the position of the blank on the machine as it travels through the stations 101 and 102.

As hereinbefore explained, the application of paste to the area 56A—65A—66A—64A, Figure 7, is a critical operation in that the paste must be applied uniformly from the line 56A—64A to the line 65A—66A, along the axis 67A. In order to do this the paste applying roll might be made spirally, if the blanks were maintained at stations 101 and 102, but the timing and shape of such a glue-applying apparatus is beset with difficulty, both in its manufacture and operation.

According to the present invention the blanks are each rotated about an axis perpendicular to the plane of the blank between the patch applying station 102 and the glue applying station 104. To accomplish such rotation the apparatus is provided as follows:

Referring to Figures 1 through 5, at the gluing station 104 there are provided a pair of shafts 132 and 133 upon which there are mounted pulleys 134 and 135, which in turn carry the belts 136—137. The position of the shafts 132—133 is such that the surfaces of the belts run in contact with each other along the line of travel of the blanks and are adapted to receive and carry the blanks along the travel of the machine once they are returned in position. Shafts 132—133 are geared together so that they rotate at the same speed and so as to provide a peripheral speed of the belts 136—137 in the direction of the arrows shown on pulleys 133 and 135, equal to the linear speed of travel of the belts 111 and 112. Immediately ahead of the belts 136 and 137 there are provided a pair of roll shafts 138 and 139 having a plurality of roll surfaces 140A, 140B and 140C, on the shaft 138 and corresponding mating roll surfaces on the shaft 139, of which the surface 141B is shown in Figure 1. The shafts 138 and 139 are geared together so as to rotate in the direction of the arrows 142 and 143 at a speed such that the peripheries of the rollers 140A through 140C and the rollers 141A through 141C on the shaft 139 is the same as the speed of travel of the blanks as pushed along by the belts 111 and 112. The rollers 140A through 140C are arranged so as to provide an adequate amount of gripping surface against the top and the bottom of the blank, and the shafts 138 and 139 are provided with bearing adjustments so that the pressure exerted by the rolls 140A—140C against the underlying rolls 141A—141C is sufficient so as to hold the blanks tightly and propel them along as each blank runs into the nip of the rollers and is picked up and propelled by them.

Upon the shaft 132 there is also provided a pulley 150 which is belted so as to drive another pulley 151 on the shaft 152. The shaft 152 is mounted upon a fully adjustable bracket 153 attached by the bolts 154—154 to the upstanding frame studs 155—155 mounted upon the main frame 100 of the machine. The bracket 153 is essentially a cross bar at an elevated position on

the machine above the path of travel of the belt. Upon the bar 153 there is attached a bar 155 set edgewise and attached by screws 156 to the edge of the bar 153. The bar 155 thus presents upper and lower edges which forms a gib to which the slide bracket generally designated 160 is adapted to be clamped by means of the cap screw 161. The bracket 160 has a vertical hole through it in which there is positioned the round rods 162, as shown in Figures 3 and 4, the rod being held in place by means of a set screw 163. The upper end of the rod 162 has flattened faces upon which the clevis end 165 of the shaft 152 is attached and held fixedly in place by means of the through bolt 167. Accordingly, the position of the shaft 152 may be universally adjusted transversely of the main frame 100 of the machine, it may be lifted and lowered by sliding the mounting rod 162 up and down and the level of the shaft 152 may likewise be adjusted, or the shaft 152 may be tilted up or down, as desired. The pulley 151 is journalled on the shaft 152 and is held in place by the collar 168. To the pulley there is attached a propelling roller 170 which runs concentrically with the pulley and is provided with a rubber or other surface having a relatively high coefficient of friction. The pulley 151 runs slightly out of alignment with the drive pulley 150 on the shaft 132, but the misalignment is not sufficient to cause the belt 172 to run off the pulley. Accordingly, as the shaft 132 is rotated in the direction shown by the arrow adjacent it in Figure 1, the upper course of travel of the belt 172 will likewise travel as shown by the arrow 173, causing rotation of the pulley 171 and the frictional drive roll 170 as shown by the arrow 174 of Figures 1 and 3.

Upon the frame 100 there is also mounted a bracket 180 which extends inwardly beneath the course of travel of the blank as shown in Figure 4. This bracket serves as a support for the vertical rod 181 which is held in adjusted position by means of a set screw 182. At the upper end of the rod 181 there is a sideward extending stub shaft 183 upon which there is journalled a supporting roll 184 the periphery of which runs in contact with the under side of the blanks as they progress along past station 103. The roller 184 may be of hard material, such as metal, and it is adjusted in position so as to be immediately below the point of contact of the driving roller 170.

As the blanks progress along through stations 101 and 102 they maintain a position such that the axis 32A of the patch 28 is parallel to the line of travel of the driving belts 111 and 112. The blanks are maintained in this position by the dogs 111A—111C and 112A—112C in contact with the trailing edges of the blanks as they are pushed along. Such position is maintained until the leading edge of each blank runs under the revolving drive roller 170 just described. Thus, as the blanks reach the dotted line position shown in Figure 3, the edges 118 and 119 are still in contact with the dogs 111C and 112C. Then just as a forward edge of the blank runs into contact with the drive roller 170, the blank begins to be turned. The pulley 150 is made slightly larger than the pulley 151 in a proportion such that the periphery of the drive roller 170 will rotate at a speed slightly in excess of the lineal speed of motion of the driving belts 111 and 112. Consequently, as the edge 185 of the blank B3, for example, runs into contact with nip between the rolls 170 and the supporting roller 184, that portion of the blank contacted by said rollers begins to be propelled at a faster linear speed than the blank as a whole is traveling. Accordingly, the blank, as for example blank B3 at station 103, is caused to be rotated generally in the direction of arrow 187, of Figure 3, the rotation taking place substantially about the propelling dog 112C on the belt 112. The speed of rotation of the roller 170 is adjusted so that while the blank as a whole is being propelled in the direction of arrow 120, Figure 3, from the dotted line position to the full line position, that portion of the blank in the upper part of the figure, as contacted by the rolls 170 and 184, will be propelled at a slightly more rapid speed and as a result the edge defined by the corners 64A—66A is brought around from the dotted line position to the full line position, and in the latter position it is in contact with the bottom of the groove 117 of the supporting side rail 115. Just at this same instant the leading edge 185 of the blank runs into the nip between rollers 140B and 141B on the shafts 138 and 139, respectively, and very slightly afterwards the edge 187 does likewise between the rollers 140C and 141C. As soon as said rollers take hold of the blank, it is propelled in the newly established position, regardless of any tendency of the turning effect of the roller 170. The correct position of the roller 170 is readily attained by adjusting its position transversely on the gib 155. Obviously, the position must be adjusted widely for larger or smaller size blanks. It may be stated parenthetically, however, that in the usual paper milk carton of this style, the size of the top of the carton remains constant and the volume is diminished merely by reducing the height of the carton. Accordingly, the size of the pouring spout and of the carton remains the same, but the length from left to right, in Figures 1, 2, 3 and 7 is diminished for the smaller sizes of cartons. The proper adjustment of the roll 170 accordingly depends upon the size of the carton and the amount of turn desired, the latter being determined by the amount of convergence of the frustoconical sides of the carton itself, this likewise being a matter of design.

Accordingly, the carton block as turned from the dotted to the full line positions shown in Figure 3, is then propelled by the rollers 140A—140C and 141A—141C in the new direction, which is propelled in the direction of the line 64A—66A. As the blank progresses it is then run between the belts 136 and 137, the backs of which travel in contact with each other, as previously explained, and the blanks are then pulled along to the dot-and-dash line position as shown in Figure 3, and as illustrated for station 104 in Figure 1.

At station 104 there is provided a pair of glue-applying rolls illustrated in Figures 1, 2, 5 and 6. These glue-applying rolls are, per se, no part of the present invention, they being standard equipment, except that according to this invention for the first time the tapered form of paper carton may now be glued as herein described. Thus, at the pasting station there is provided a paste or glue pot 190 in which the roll shaft 191 is journalled. The shaft 191 carries a glue-applying roller 192, the lower portion of which is submerged in the glue. Upon the surface 193 of the glue pot there is mounted a bracket 194 and on it there is pivoted at 195 the arm 196 carrying the roller 197, which is pulled down by the adjusting nut 198 on the shaft 199 threaded into the boss 200 in plate

193. A spring 201 serves normally to push the arm 196 upwardly. The bracket 194 is also provided with a side arm 201 in which the stem 202 is mounted by means of a set screw 203. The stem serves as a support for the resilient hold-down finger 204 having a lower end 205 that runs in contact with the upper surface of the blank. It is to be understood that the glue is applied to the under-surface of the blank and the roll 192 is customarily provided with circumferential ridges at 192A, as shown in Figure 5, the surface of the roller 197 may likewise be ridged if so desired. The position of the rollers 192 and 197 is adjusted on the frame so that as each edge of the blank moves along it will pass between them and the glue is applied on the under-surface by rotation of the circumferential ridges of roller 192 in contact with such under-surface. Usually the glue pot also includes a spreading roller at 207 so as to level the glue on the roller 192 before it is applied. Other forms of glue applying rollers may be used if desired. It will be noted in this connection that the area defined by the points 56A, 65A, 66A and 64A of each blank, see Figures 5 and 7, is all that runs between the rollers 192 and 197. Also, that since the edge 56A—64A runs into the nip between the rollers 192 and 197, and the edge 65A—66A runs out from between the rollers, it follows that the glue is applied uniformly and in an even line throughout the length of the strip between these edges as well as entirely to each edge. In this way the number of leaky cartons, due to ineffective and improper application of the glue, especially to the edge 56A—64A is substantially reduced.

After the paste is applied, as described, the blank is moved as described in the patent aforesaid, and folded along the folding lines of the blank until the edge to which paste has been applied is brought into contact with the surface 81A, Figure 7. Pressure is then applied for completing the formation of the tubular blank, which at that time is flattened. Subsequently, the end flaps 45A—48A are infolded and cemented in place, and the cartons can then be nested in the same manner as conical cups, for shipment to the places where they are filled and closed. In this manner shipping costs are greatly reduced and the smaller users are provided a mode of operation by means of which such desirable disposable paper cartons may be used in trade, without the necessity of installing large and expensive equipment at their place of business.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments herein.

What I claim is:

1. In the manufacture from flat blanks of nestable cartons of generally frustoconical shape having right rectangular bottom and cross section, downwardly convergent side walls, portions integral with the side walls capable of being infolded to form a gable top closure and a cemented-on pouring spout forming a patch on the interior thereof, the method comprising moving a blank that is cut and scored so as to be foldable to form said carton, said blank including contiguous convergent side walls and an elongated rectangular protruding flap on the edge of one side wall, in a direction parallel to the axis of one side wall and at an inclined angle to the elongated rectangular protruding flap, while so moving said blank applying a glue area thereto, then applying to said glue area a pouring spout forming a generally rectangular flap, the axis of which is generally parallel to the axis of the side wall, then rotating the blank about an axis normal to the plane thereof as it is moved until the length of said elongated rectangular protruding flap is parallel to the direction of motion, and then applying glue from end to end of said flap.

2. In the manufacture from flat blanks of nestable frustoconical cartons intended for the marketing and dispensing of liquids, such cartons being characterized by having convergent contiguous sides defined by convergent folding lines, one side side of said blank having a gluing flap, the longitudinal axis of which is parallel to one of said convergent folding lines defining one of the edges of said blank, the method comprising progressing said blank in a direction of travel parallel to a line bisecting the angle between adjacent convergent folding lines, and as the blank is so moved adhesively attaching to said blank a pouring opening forming patch, the axis of said patch being oriented parallel to the direction of movement of the blank, then as the blank is moved further in the same direction slightly rotating it about an axis normal to the plane of the blank until the longitudinal edge of the gluing flap is brought parallel to the direction of travel of said blank, and applying glue along the length of said gluing flap.

3. The method of claim 2 further characterized in that the blank is rotated by propelling it at one rate at one place across the width thereof and at a more rapid rate for a short time period at another place across the width thereof.

4. In an apparatus for making cartons from blanks having a pasting flap along one edge comprising a frame, blank carrier means mounted on the frame for movement along a path longitudinally of the frame for progressing carton blanks therealong with said pasting flap at an angle to the direction of motion, means for pasting a pouring opening forming patch on the blank as it moves, means for rotating the blank about an axis normal to the plane of the blank as the blank is moved for aligning said pasting flap parallel with the path of movement longitudinal of the frame of said blank carrier means, and means for then applying glue to the aligned pasting flap.

5. The apparatus of the type described in claim 4 further characterized in that said means for rotating the blank comprises a roller mounted so as to run in contact with the surface of the blank as it is progressed by said blank carrier means, said roller being spaced transversely of the frame relative to said blank carrier means, and means for rotating said roller at a peripheral speed slightly in excess of the speed of movement of said blank carrier means.

6. The apparatus of the type described in claim 5 further characterized in that said blank carrier means comprises a belt having spaced protuberances therealong adapted to engage a trailing edge of the blank for progressing it along the frame and said means for rotating comprises a roller mounted for running contact with the surface of each blank as it is progressed, a supporting roller mounted under the frame for supporting the blank where it is contacted by the first mentioned roller, said first mentioned roller being

arranged at a slight angle to a line transverse of the frame.

7. In an apparatus for making cartons from blanks having a pasting flap along one edge comprising a frame, a pair of flexible elements guided on the frame for linear movement therealong in spaced relation, upstanding fingers on each of said elements for engaging the trailing edge of blanks and for progressing them linearly along said frame with said pasting flap at an angle to the direction of movement, means for pasting a pouring outlet forming patch on the blank as it is moved, means for rotating the blank after the pouring outlet patch has been applied thereto, said means including a turning roll having a periphery of material having a high coefficient of friction, said turning roll being mounted by running contact with a surface of the blank disposed from one of said linearly movable elements, means for rotating said roll at a speed such that its periphery moves slightly faster than said linearly movable elements and in the same direction, a guide along the frame adjacent said roll for engaging the pasting flap when it is brought into

contact therewith, said guide being parallel to the path of movement of said linearly movable elements, and means for applying paste to the patch as the thus turned blank is moved linearly therealong.

8. The apparatus of claim 7 further characterized in that a supporting roller is provided on the frame and mounted below the turning roll for supporting the under side of the blank below said turning roll.

9. The apparatus of claim 7 further characterized in that a pair of roller means are mounted on the frame transversely thereof and in a position to have the peripheries of said roller means run in contact with each other along the plane of movement of said blanks, and means for driving said roller means at a speed equal to the speed of movement of said linear means for moving the blank, said roller means being positioned for receiving the blank after it is turned by said turning roll.

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No references cited.