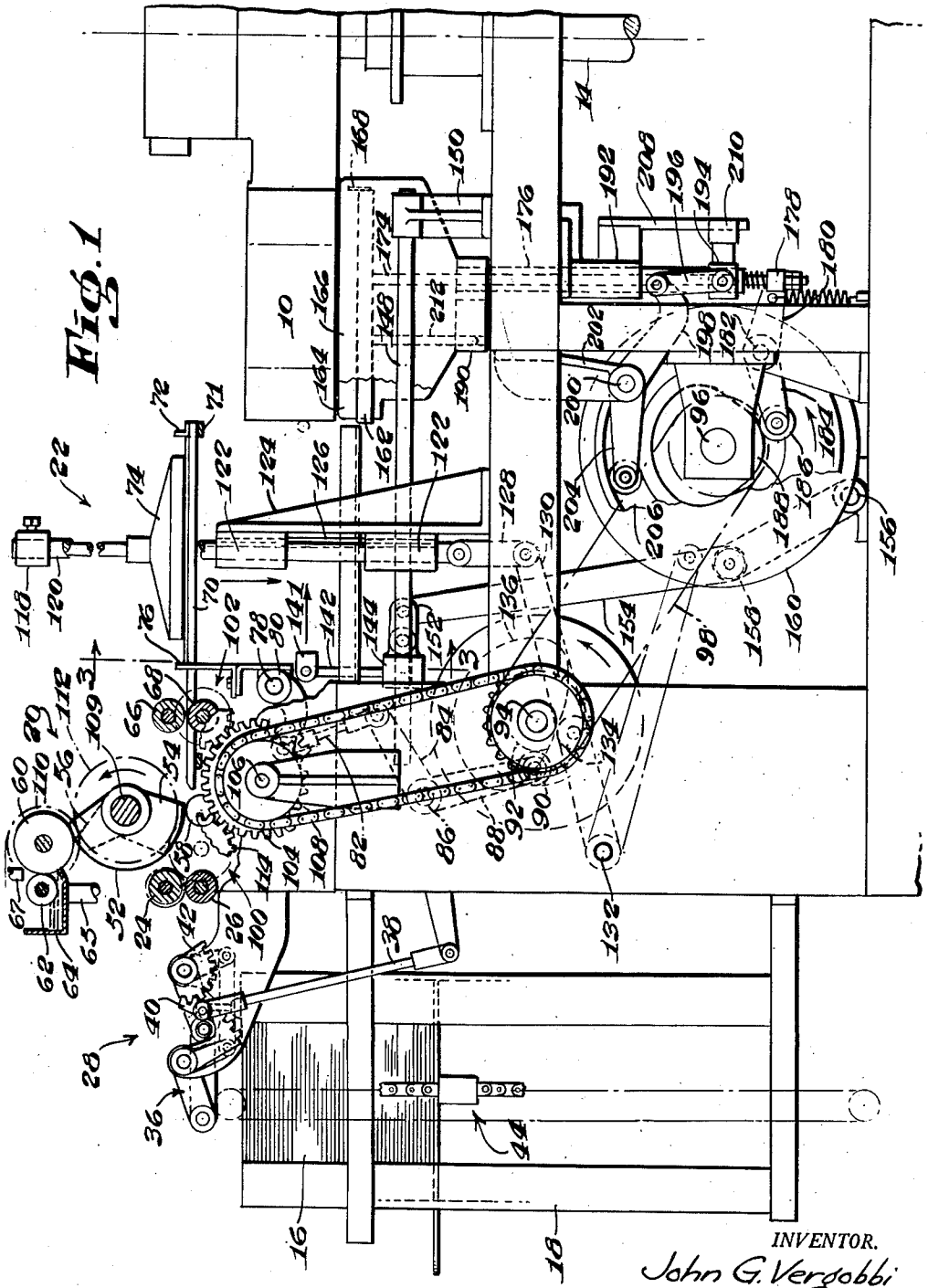
Nov. 23, 1954 J. G. VERGOBBI 2,694,966

CONTAINER-FORMING MACHINE

Filed May 3, 1951 3 Sheets-Sheet 1

Fig. 1



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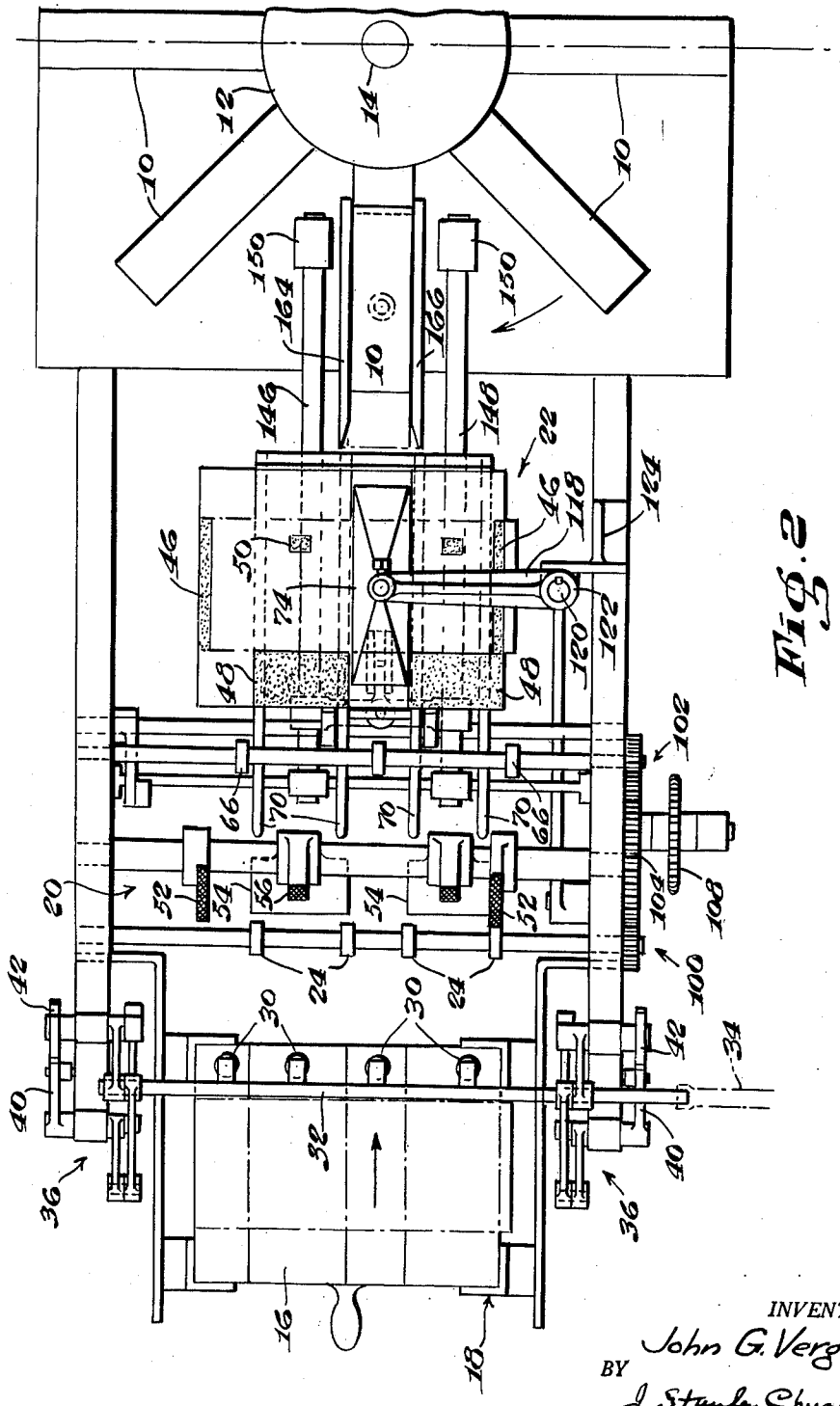


Fig. 2

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CONTAINER-FORMING MACHINE

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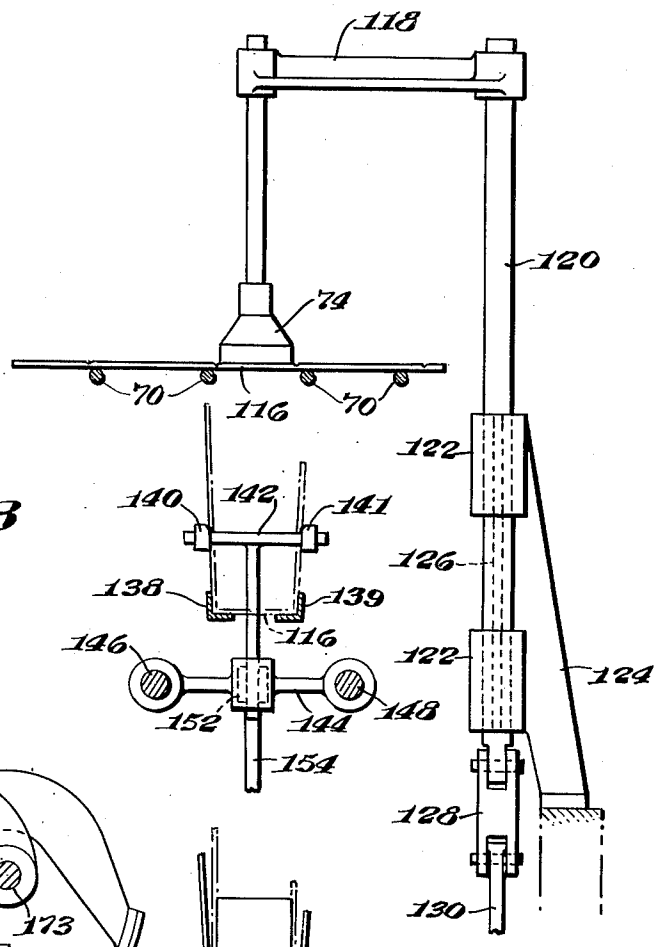


Fig. 3

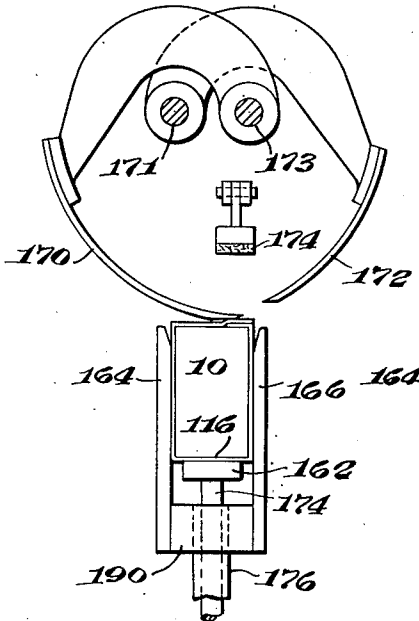


Fig. 5

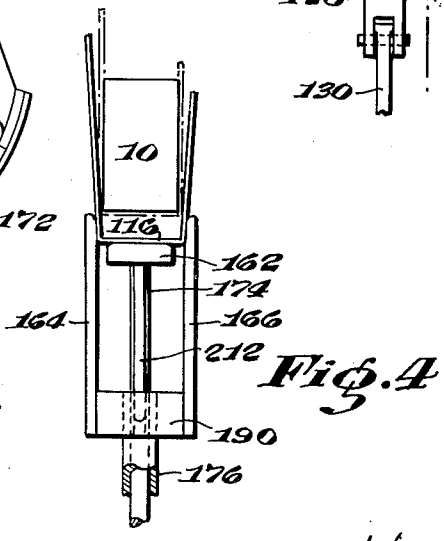


Fig. 4

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United States Patent Office 2,694,966
Patented Nov. 23, 1954

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CONTAINER-FORMING MACHINE

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Application May 3, 1951, Serial No. 224,293

12 Claims. (Cl. 93—44.1)

This invention relates to a container-forming machine.

The invention has for an object to provide a novel and efficient container-forming machine of the type embodying at least eight forming blocks radially extending in equally spaced angular relation arranged to be intermittently rotated to present each block to successive stations where the lining is formed by being wrapped about the block and then the container is formed by being wrapped over the lining, and wherein provision is made for enabling the machine to operate upon containers and particularly cartons of a size greater than the maximum size upon which comparative machines of this type could operate.

With this general object in view, and such others as may hereinafter appear, the invention consists in the container-forming machine and in the various structures, arrangements, and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a side elevation of a sufficient portion of a container-forming machine embodying the invention to enable the present invention to be understood; Fig. 2 is a plan view of the same; Fig. 3 is a detail view in cross section, as viewed from the line 3—3 of Fig. 1, and illustrating the preliminary folding mechanism; Fig. 4 is a detail view of the initially folded container-forming blank in operative position to be folded about a forming block; and Fig. 5 is a view showing the blank folded about the block.

The present invention is shown as embodied in a carton-forming machine known in the trade as a double-package maker adapted to form an inner lining and an outer carton upon a forming block, and in general, the machine is provided with a plurality of and at least eight radially arranged forming blocks secured to a central shaft which is rotated intermittently to present the forming blocks successively to the various liner and carton-forming stations of the machine. In the operation of the prior container-forming machines of this type, a sheet of lining material is presented under one of the horizontally disposed and radially extended forming blocks and then elevated and folded about the block to form a tube, and the longitudinal edges of the tube are sealed together to form the side seam of the inner liner. At a succeeding station, the extended edges of the liner are folded over the end of the forming block to produce the bottom of the liner, and at subsequent stations, an outer carton, usually of cardboard, is formed over the block and the liner whereupon the composite liner and carton is stripped from the forming block ready to be filled and the tops thereof closed and sealed.

In practice, carton-forming machines of the type described are manufactured in one or two standard sizes, in which the radially extended blocks are arranged at angles to one another not exceeding 45°. When a carton blank is folded under a particular block preparatory to being wrapped about the block, the width of the blank is limited by the position of the two blocks immediately adjacent the block at the container-wrapping station. The length is limited by the length of the block. When the width of the blank exceeds a certain amount, the inner corners of the blanks are disposed under these two adjacent blocks, thus preventing the wrapping of the blank about the intermediate block at the wrapping station.

The present invention seeks to provide a machine of the type wherein so-called oversize containers or cartons may be successfully run on a standard machine without interference with the carton-wrapping operation by the described disposition of the forming blocks. As used throughout the specification and claims, cartons of a width greater than the maximum width for which the standard machine has been designed will be referred to as "oversize" cartons.

In the preferred embodiment of the invention, this is accomplished by the provision of mechanism for initially folding the container-forming sheet or blank into a U-shape before presenting the same in operative position to the container-forming block of the machine thus avoiding interference with adjacent blocks and enabling an oversize container to be subsequently formed about the block in a standard-size machine in the usual manner.

Referring now to the drawings, **10** represents the radially extended forming blocks secured to a flange **12** mounted on and rotated intermittently with a central shaft **14** of the container-forming machine to present the forming blocks to successive stations for the formation of a composite liner and carton. Inasmuch as machines of this type which are provided with mechanisms for wrapping the liner material about the forming block and subsequently the outer cardboard carton are well known in the packaging trade, only sufficient portions of the machine have been herein illustrated and will be hereinafter described as will enable the present invention to be understood. Reference is made to the United States patent to Vergobbi, No. 2,364,406.

In general, the prior machines above referred to and as indicated in Fig. 2, the illustrated machine are provided with radially extended forming blocks **10**, only five of which are shown, the space on each side of a forming block and between it and the adjacent blocks limiting the maximum width of a flat container blank which may be presented under the forming block and then wrapped about the block in such machines, and in order to adapt the machine to enable it to produce an oversize container from a blank of greater than such permissible maximum width, provision is made in accordance with the present invention for initially folding the container-forming blank into a U-shape and then moving the U-shaped blank in operative relation to the forming block to enable it to be subsequently folded about the block.

In the illustrated embodiment of the invention, the container-forming blanks, herein shown as comprising flat prescored carton blanks, are arranged to be fed from a stack **16** stored in a magazine **18** and advanced to adhesive-applying mechanism, indicated generally at **20**, and then to the initial folding mechanism, indicated generally at **22**, and after folding, the initially folded blank is transferred into operative relation to the forming block **10**. As herein shown, the uppermost carton blank in the stack is transferred into the bite of a pair of feed rollers **24, 26** by suction transfer means **28** arranged to withdraw the uppermost blank from the stack and to lift the blank upwardly and forwardly to present the forward edge of the blank between the feed rollers **24, 26**.

The suction transfer mechanism **28** may be of a known type, and as herein shown, includes a plurality of suction cups **30** carried by a hollow pipe **32** connected to a source of suction through a flexible hose **34**, as indicated in Fig. 2. The pipe **32** is carried by parallel linkage **36** arranged to be operated from the container-forming machine through connections including a cam-operated link **38** and intermeshing segmental gears **40, 42** designed to rock the parallel linkage to effect the transfer operation. The stack of blanks **16** may be kept at a constant level in the magazine by known elevating mechanism, generally indicated at **44** and which operates to automatically elevate the stack periodically to compensate for the blanks which have been withdrawn by the suction transfer mechanism **28**.

During the advance of the prescored carton blank beyond the feed rollers **24, 26**, strips of adhesive **46, 48, 50** may be applied to selected portions of the blank by rotary adhesive-applying members **52, 54, 56** respectively in cooperation with a backing roller **58**. As herein shown,

adhesive may be supplied to the rotary applying members 52, 54, 56 by a transfer roller 60 engageable with a supply roller 62 rotatably mounted in a glue pan 64 to which adhesive may be supplied and recirculated in any usual or preferred manner through pipes 65, 67. In operation, the adhesive strips are applied during the continuous advance of the blank between the backing roller 58 and the rotary applying members, and the blank is gripped between a second pair of feed rollers 66, 68 which are arranged to advance the blank onto an elongated support comprising a plurality of spaced and longitudinally extended rods 70, which may be supported upon cross bars 71 attached to the machine frame. When the blank thus advanced passes beyond the feed rollers 66, 68, provision is made for further advancing the blank to present its front edge against a stop member 72 in registered relation to an elongated and vertically reciprocal plunger 74 forming a part of the initial folding mechanism 22, and as herein illustrated, this may be accomplished by cam-operated fingers 76 fast on a rocker shaft 78 arranged to be rocked to cause the fingers to engage the rear edge of the blank and to push the blank forward against the stop. As herein shown, the rocker shaft 78 is provided with an arm 80 connected by a link 82 to one arm 84 of a bell crank pivotally mounted at 86, the second arm 88 of the bell crank being provided with a cam roll 90 for cooperation with a cam 92 fast on a cam shaft 94. The cam shaft 94 may be driven from the main cam shaft 96 of the machine by a chain and sprocket drive, indicated at 98, and the main cam shaft 96 may be rotated in any usual or preferred manner such as by an electric motor, not shown.

The feed rolls 24, 26 and 66, 68 may be driven through gear trains 100, 102 arranged to mesh with a gear 104 fast on a shaft 106 which is connected to the cam shaft 94 by a chain and sprocket drive 108. The rotary adhesive-applying members which are fast on a shaft 109 may be connected to rotate together by intermeshing gears 110, 112, the latter being in mesh with a gear 114 forming a part of the gear train 100.

From the description thus far, it will be seen that the adhesively coated blank is advanced into operative position relative to the vertically reciprocal plunger 74, and as shown in Fig. 3, the elongated plunger may be of a width corresponding to or slightly less than the width of an intermediate scored panel 116 of the prescored blank, such panel corresponding to the width of the forming block 10 about which the blank is subsequently wrapped. The adjacent supporting rods 70 are spaced apart a distance slightly greater than the width of the panel 116, so that in operation, upon descent of the plunger 74, the prescored blank is folded into a U-shape as indicated by the broken lines in Fig. 3. The plunger 74 may be adjustably carried in an outboard bracket 118 fast on a vertically reciprocal shaft 120 slidably mounted in bearings 122 formed in a bracket 124 mounted on the machine frame. The shaft 120 may be provided with an elongated key 126 for cooperation with keyways formed in the bearings 122 to prevent rotation of the shaft. The lower end of the shaft 120 is connected by a link 128 to a cam lever 130 pivotally mounted at 132 and provided with a roller 134 for cooperation with a cam 136 fast on the cam shaft 94.

In operation, the plunger 74 passes down between the adjacent spaced rods 70 carrying the blank with it and effecting folding of the blank along the adjacent score lines, and when the plunger reaches the lower end of its stroke, the bottom of the U-shaped blank is received between angle-bar tracks or guide rails 138, 139 supported from the machine frame. During its downward passage, the rear side edges of the upwardly folded portions of the blank engage opposed side guides 140, 141 for retaining the blank in its U-shaped form after the upper edges of the blank pass beyond the spaced rods 70 and the plunger is again elevated. Immediately thereafter provision is made for advancing the U-shaped blank longitudinally along the guide rails 138, 139 into operative position to be wrapped about the block 10.

As herein illustrated, the mechanism for advancing the U-shaped blank into operative position to be wrapped about the forming block may comprise a T-shaped pusher member 142 engageable with the rear edges of the panel 116 and the upwardly folded side-wall portions of the blank. The pusher member 142 may be mounted on a slide bracket 144 arranged to be reciprocated on horizontally extended guide rods 146, 148 supported in brackets 150 attached to the machine frame. It will be observed that the vertical leg of the T-shaped pusher 142 extends upwardly between the guide rails 138, 139 and that the sidewall guides 140, 141 are carried on the ends of the cross arm of the T and remain in engagement with the side walls of the blank during the transfer operation. As herein shown, the slide bracket 144 may be reciprocated on the guide rods 146, 148 through connections including a link 152 connecting the slide bracket to the upper end of a cam lever 154 pivotally mounted at 156 and provided with a cam roll 158 cooperating with a cam 160 fast on the cam shaft 96.

As illustrated in Figs. 1 and 4, the U-shaped blank is transferred onto an elevating platform 162 and between the partially extended upper ends of vertically reciprocal folder blades 164, 166 in operative position to be folded about the block 10, the front edges of the folder blades being beveled, as shown in Fig. 2, to receive and guide the front edges of the blank under the forming block, the blank being advanced up against a stop member 168 carried by the elevating platform 162. In the continued operation of the machine, the T-shaped pusher member 142 is returned to its retracted position, and provision is made for thereafter elevating the platform 162 and the side folder blades 164, 166 simultaneously for a short distance until the elevating platform engages the bottom of the block 10 lifting the blank up against the underside of the block. Thereafter, the side folder blades continue upwardly to fold the side portions of the blank against the sides of the block, as shown in Fig. 5, and the upwardly extended portions of the blank are then folded over into overlapping relation against the upper surface of the block by a pair of curved and pivotally mounted folder plates 170, 172. The folder plates 170, 172 are fast upon rocker shafts 171, 173 respectively forming a part of and operated in timed relation to the carton-forming machine, as illustrated and described in the Vergobbi Patent No. 2,364,406, December 5, 1944. When the top folder plates 170, 172 are retracted, a top presser member 174 may be lowered into engagement with the overlapped seam to set the adhesive, thus forming a tubular carton about the block. Thereafter, the elevating platform 162 and the side folder blades 164, 166 are retracted and the forming block 10 is intermittently moved to succeeding stations of operation where the extended end flaps of the carton are folded over and adhesively secured to form the bottom of the carton in the usual manner, and the carton may then be stripped from the block ready to be filled and sealed.

As shown in Fig. 1, the elevating member 162 is mounted on the upper end of a vertical rod 174 slidingly mounted for vertical reciprocation in a hollow shaft 176 and is connected at its lower end by a swivel member 178 to one arm 180 of a lever pivotally mounted at 182. The second arm 184 of the lever is provided with a roller 186 cooperating with a cam 188 fast on the main cam shaft 96. As also shown in Fig. 1, the side folder blades 164, 166 are carried by a bracket 190 fast on the upper end of the hollow shaft 176, the latter being slidingly mounted in a bearing 192 attached to the machine frame. A bracket 194 adjustably clamped to the lower end of the hollow shaft is connected by a link 196 to an arm 198 fast on a rocker shaft 200 journaled in a bracket 202 attached to the machine frame. An arm 204 also fast on the rocker shaft is provided with a cam roll cooperating with a cam 206 fast on the cam shaft 96. A vertical bar 208 carried by the bearing member 192 is arranged to slidingly engage a slotted member 210 carried by the clamp bracket 194 to prevent rotation of the hollow shaft 176, and a rod 212 carried by the elevating platform 162 is arranged to engage an opening in the bracket 190 for a similar purpose.

From the above description, it will be observed that the present invention enables an oversize container to be formed on a standard-size container-forming machine in a simple and efficient manner. The invention has been herein illustrated and described as adapted for cooperation with the outer container-forming station of a double-package maker, it being understood that previous to arriving at the illustrated station, the forming block 10 may be provided with an inner liner formed into a U-shape and advanced and wrapped about the forming block in a similar manner as set forth in U. S. Patent No. 2,364,406.

It will be apparent that the present container-forming

machine embodying mechanism for initially folding a blank into a U-shape before being wrapped about the forming block is of substantial commercial utility in that it permits the machine manufacturer to standardize his production on standard machines of one or two sizes for handling the majority of the commercial sizes of the containers, while at the same time economizing on the expense of manufacture and the floor space in the customer's plant.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks.

2. In a container forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, said initial forming means including a non-rotatable support for the blank having an elongated opening therein, a plunger, and means for reciprocating the plunger through said opening to effect folding of the blank into said U-shape.

3. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, said initial forming means including a non-rotatable support for the blank having an elongated opening therein, a plunger, and means for reciprocating the plunger through said opening to effect folding of the blank into said U-shape, the width of said opening and said plunger corresponding substantially to the width of the forming block.

4. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, said blank-moving means including a pusher member, guide means for the U-shaped blank arranged in radial alignment with the forming block and said means for retaining the blank in U-shape comprising side wall guides integral with said blank-moving means, and means for reciprocating said pusher to advance the U-shaped blank along said guide means and and into operative position relative to the forming block.

5. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, said initial forming means including a pair of spaced non-rotatable rods upon which a flat blank is supported, a plunger, and means for reciprocating said plunger to push the blank between and completely through said rods and effect folding of the blank into said U-shape.

6. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, means for retaining said blank in said U-shape, and means for moving the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, said blank-moving means including a pusher member, said means for retaining said blank in U-shape form supported by said pusher member, a pair of spaced guide rails arranged in alignment with said forming block and between which said U-shaped blank is received, and means for reciprocating said pusher to advance the U-shaped blank along said rails and into operative position relative to said forming block.

7. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended intermittently movable forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, means for initially completely forming the blank into a U-shape, including a non-rotatable support for the blank having an elongated opening therein, a plunger, and means for reciprocating the plunger through said opening to effect folding of the blank into said U-shape, means for supporting the U-shaped blank in radial alignment with the forming block, transfer means including a pusher member, and means for reciprocating said pusher member to advance the U-shaped blank into a position below one of the forming blocks, and means for elevating the U-shaped blank to partially wrap about the forming block whereby to enable an "oversize" container to be formed about a forming block without interference with adjacent radially extended forming block, and means integral with said pusher member to maintain said U-shaped blank in such shape during its advance to said forming block.

8. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, blank-feeding means, adhesive-applying means, means for initially completely folding the blank into a U-shape, and means for transferring the blank in its U-shaped form into a position below one of the forming blocks, and means for elevating the U-shaped blank to at least partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks.

9. In a container-forming machine, in combination, a plurality of equally spaced radially and horizontally extended forming blocks about successive of which a blank of container-forming material may be wrapped to form

a container, adjacent of said blocks being disposed at an angle to one another of substantially less than 90°, blank-feeding means, adhesive-applying means, means for initially folding completely the blank into a U-shape, means for retaining said blank in said U-shape, and means for transferring the blank in its U-shaped form into a position below one of the forming blocks, and means for elevating the U-shaped blank to at least partially wrap about a forming block whereby to enable an "oversize" container to be formed about a block without interference with adjacent radially extended forming blocks, and means for wrapping the U-shaped blank about the block including an elevating platform, means for elevating the platform to present the blank into engagement with the underside of the block, folder blades engageable with the side walls of the blank, means for reciprocating the blades to fold the blank against the side walls of the block, and a pair of curved folder plates adapted to fold the extended portions of the blank into overlapping relation on the upper side of the block.

10. In a container-forming machine as defined in claim 9 wherein the elevating platform and the side folder blades are arranged to receive and guide the U-shaped blank into operative position to be wrapped about the block when the blank is advanced by said transferring means.

11. In a container-forming machine as defined in claim 4 wherein the pusher member is provided with means for engaging the side walls of the initially folded blank to retain the blank in its U-shaped formation during its transfer to the forming block.

12. In a container-forming machine as defined in claim 8 wherein the blank-feeding means includes means for advancing the blank into registered position relative to said initial folding means.

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