July 24, 1962 M. B. RASMUSSON 3,045,408

PACKAGING MACHINE

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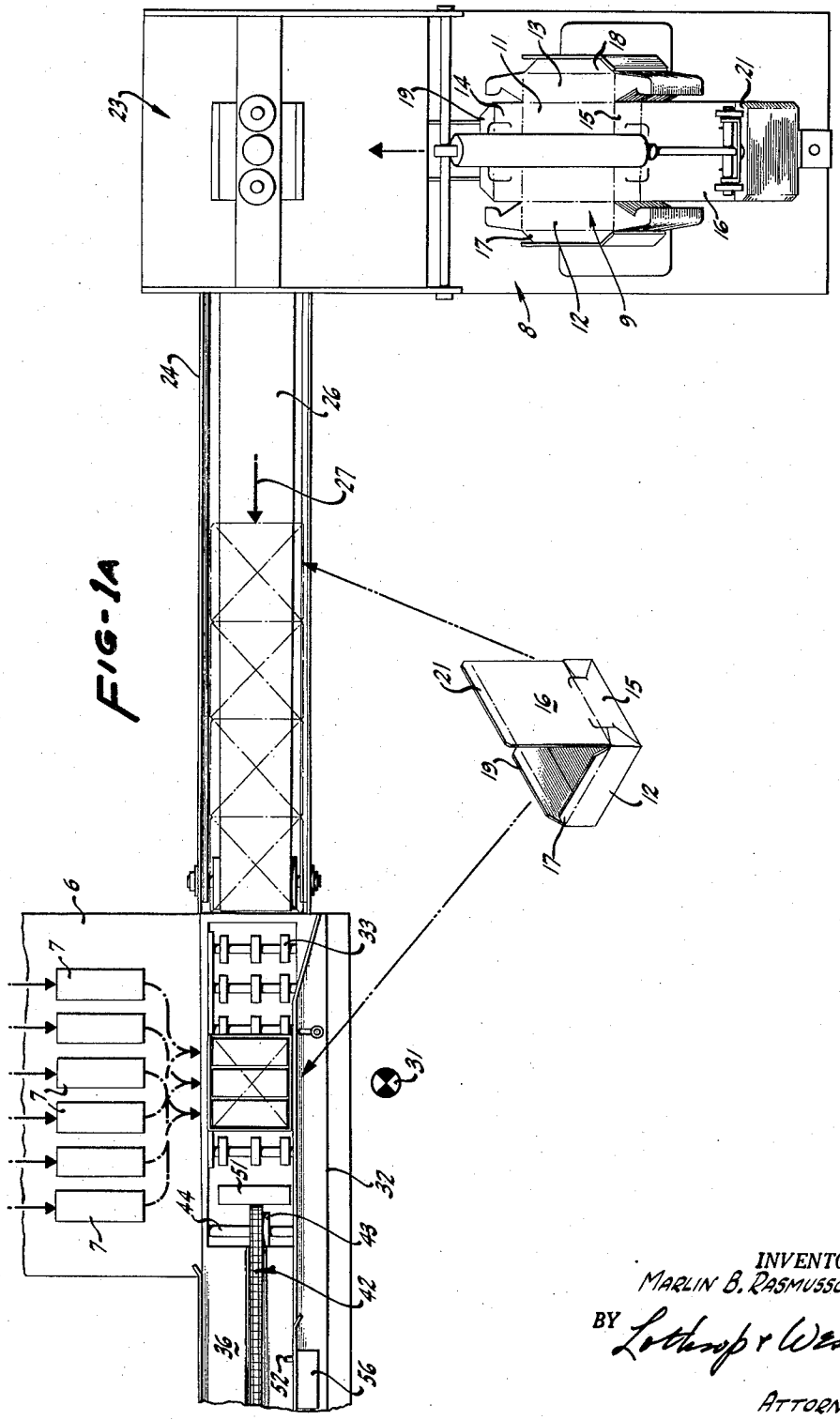


FIG-1A

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July 24, 1962 M. B. RASMUSSON 3,045,408

PACKAGING MACHINE

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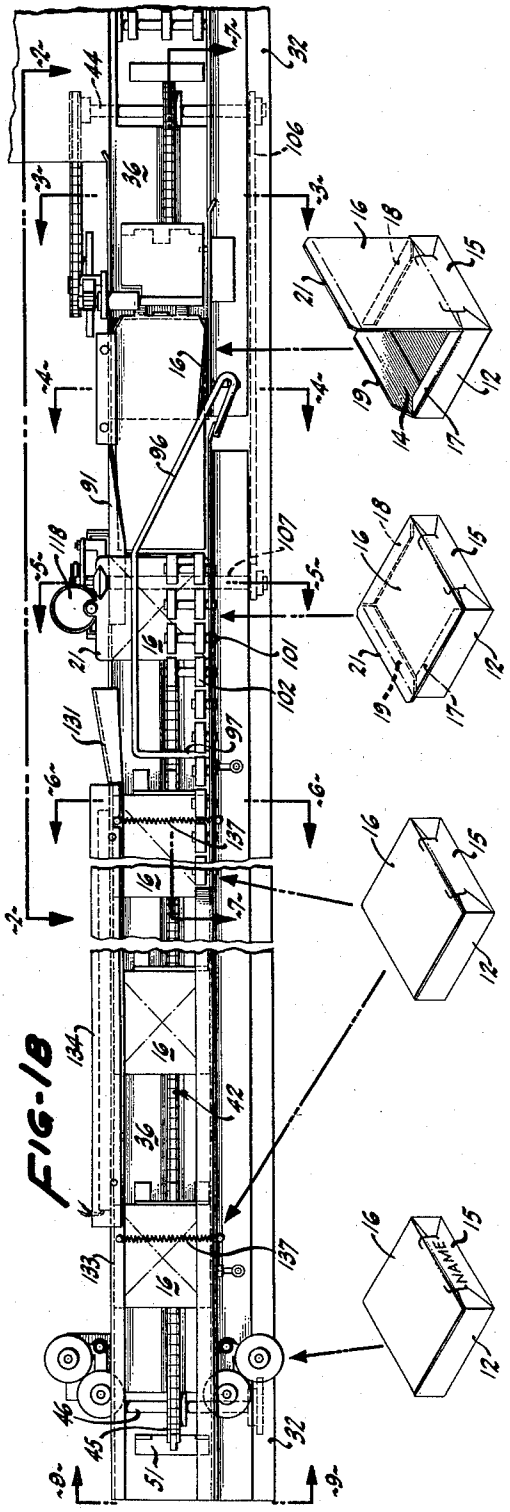


FIG-1B

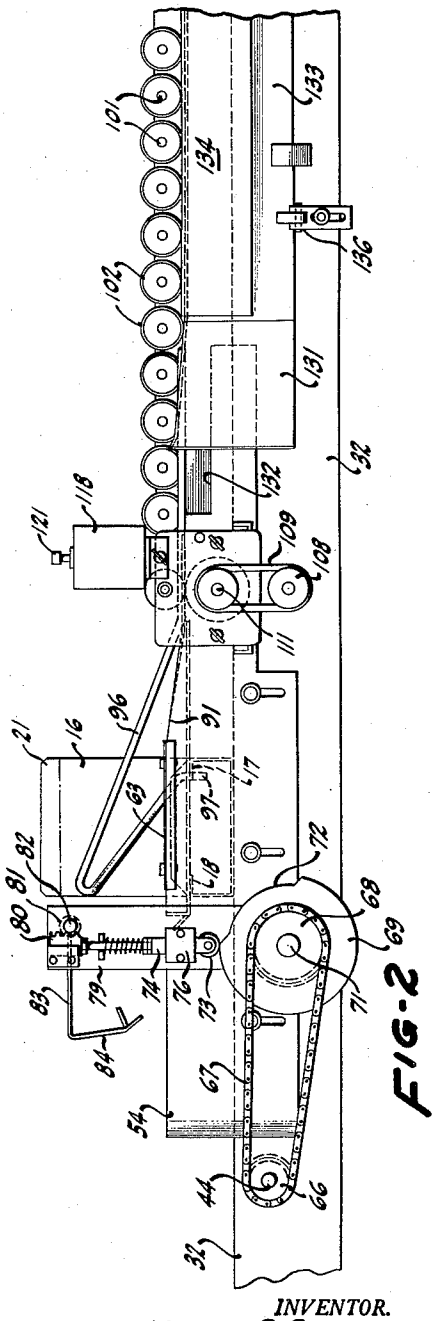


FIG-2

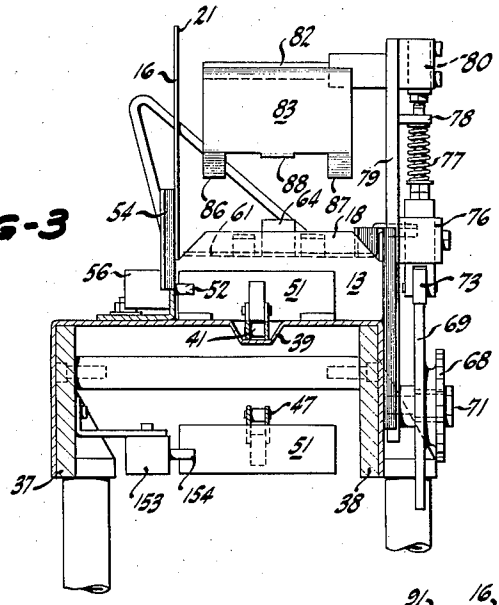
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July 24, 1962 M. B. RASMUSSON 3,045,408

PACKAGING MACHINE

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FIG-3



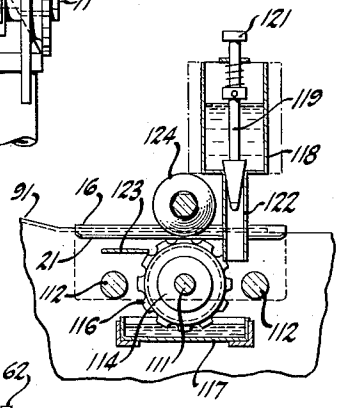


FIG-8

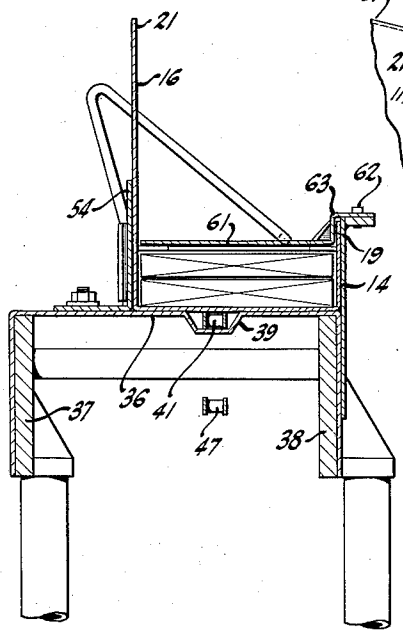


FIG-4

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July 24, 1962 M. B. RASMUSSON 3,045,408

PACKAGING MACHINE

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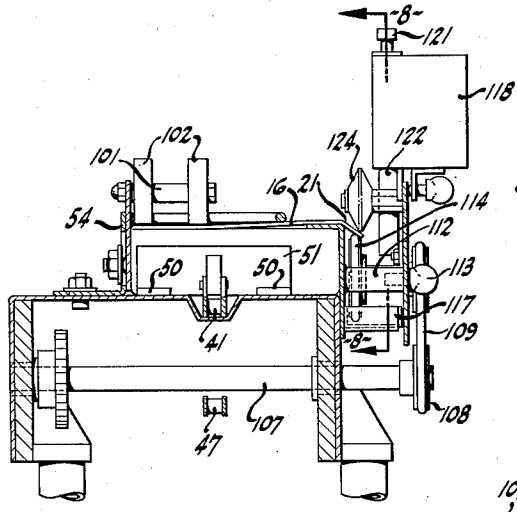


FIG-5

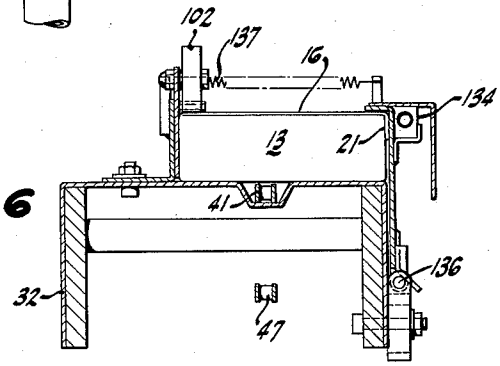


FIG-6

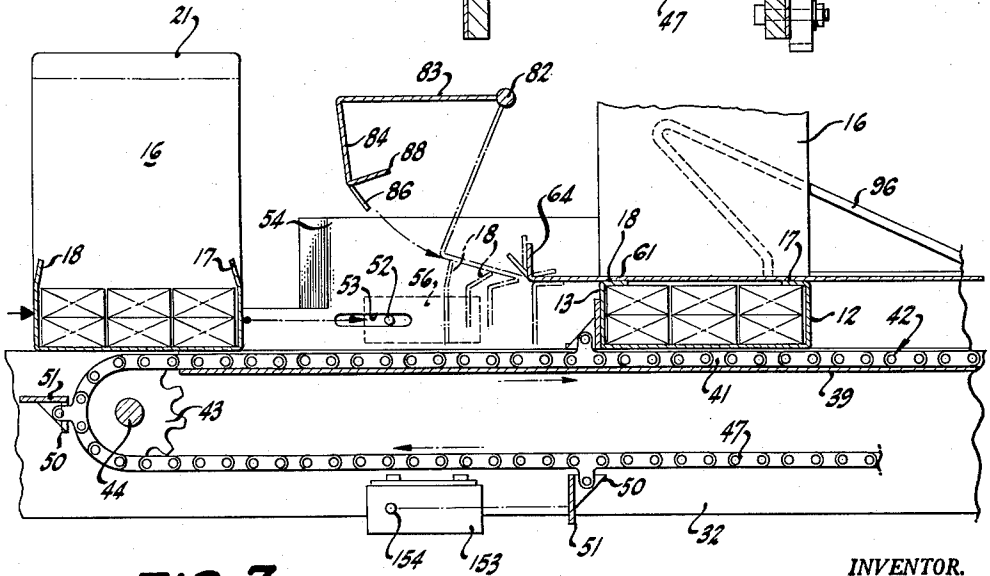


FIG-7

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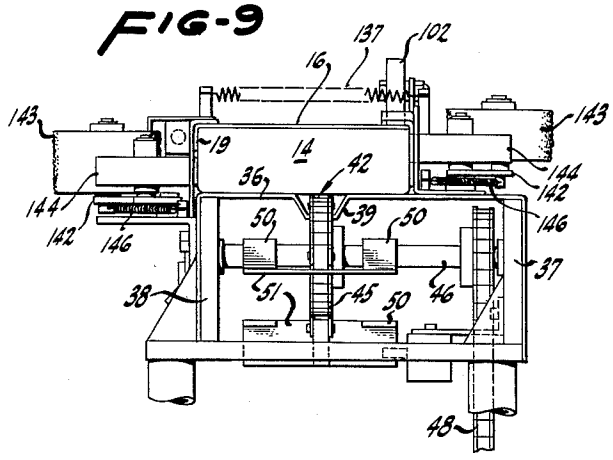
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PACKAGING MACHINE

Filed Jan. 11, 1960 5 Sheets-Sheet 5

FIG-9



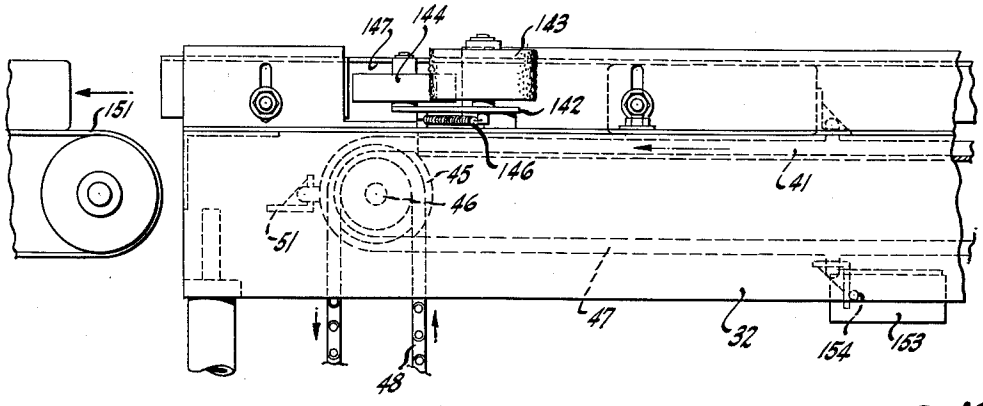


FIG-10

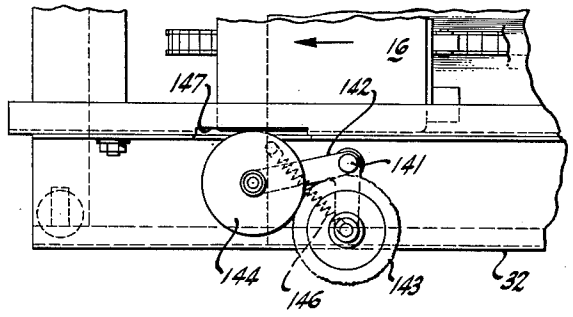


FIG-11

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United States Patent Office 3,045,408 Patented July 24, 1962

3,045,408

PACKAGING MACHINE

Marlin B. Rasmusson, 6601 Elvas Ave., Sacramento, Calif.

Filed Jan. 11, 1960, Ser. No. 1,627
3 Claims. (Cl. 53—376)

My invention relates to devices for assisting in enclosing vendible commodities in packages and is particularly concerned with a machine utilized particularly in connection with the packaging for distribution of frozen confections on a stick. These confections are usually put into bags immediately upon manufacture, each bag enclosing one confection and its stick, and a set number of confections, such as six, are packaged together in two layers within a cardboard carton. The carton itself is provided with a bottom, two side walls, leading and trailing flaps on the side walls, a front wall, a front flap on the front wall and is provided with a rear wall and a cover or top having a flap designed to be adhesively secured to the front wall of the carton after the carton has been filled and closed.

An object of the invention is to provide a packaging machine which can work in connection with the customary confection manufacturing and bagging machine and also can work with a carton erecting machine so that an operator can readily fill a partially erected carton and can dispatch it for closing and sealing in my new packaging machine.

Another object of the invention is to provide a packaging machine which will automatically close a filled carton and seal the carton with the contents therein.

Another object of the invention is to provide a packaging machine which is readily controlled by the same operator who puts the commodities into the open package.

Another object of the invention is to provide a packaging machine which starts and stops in harmony with the packaging operation.

A still further object of the invention is to provide a packaging machine which will effectively close a partially erected carton and seal it with the contents intact.

A still further object of the invention is to provide a packaging machine which can be adjusted for variations in successive packages.

Another object of the invention is to provide an entirely automatic packaging machine for effectuating the closure of filled packages.

Other objects, together with the foregoing, are attained in the embodiment of the packaging machine described in the accompanying description and illustrated in the accompanying drawings, in which:

FIGURE 1A is a plan of a portion of a packaging machine showing its relationship to the commodity supplying machine and to the machine for furnishing the partially closed cartons, the figure also disclosing a partially erected carton of the sort being handled.

FIGURE 1B is, in effect, a continuation and a partial overlap of the structure shown in FIGURE 1A and disclosing in plan the remaining portion of the packaging machine, also indicating in isometric views certain successive stages of closure of the carton.

FIGURE 2 is a side elevation of a portion of the machine shown in FIGURE 1B, the view being taken along the line 2—2 of FIGURE 1B and being shown to an enlarged scale.

FIGURE 3 is a cross-section on the scale of FIGURE 2, the plane of section being taken along the line 3—3 of FIGURE 1B.

FIGURE 4 is a cross-section similar to FIGURE 3 but taken along the line 4—4 of FIGURE 1B.

FIGURE 5 is a view similar to FIGURE 3, the plane of section being taken along the line 5—5 of FIGURE 1B.

FIGURE 6 is a cross-section similar to FIGURE 3, the plane of section being taken along the line 6—6 of FIGURE 1B.

FIGURE 7 is a longitudinal vertical section through the structure shown in FIGURE 1B, the plane of section being indicated by the line 7—7 of FIGURE 1B.

FIGURE 8 is a detail of part of the adhesive mechanism, the view being for the most part a cross-section, the plane of which is indicated by the line 8—8 of FIGURE 5.

FIGURE 9 is substantially an end view of the packaging mechanism, the plane of the view being indicated by the line 9—9 of FIGURE 1B.

FIGURE 10 is a side elevation of the terminal portion of the packaging machine.

FIGURE 11 is a plan of part of a printing mechanism with portions of the surrounding structure broken away.

While the packaging machine pursuant to the invention can be embodied in a number of different forms, depending upon the particular use to which it is to be put, it has successfully been incorporated in the form shown herein for use in packaging frozen confections on sticks, each of such confections together with its stick being discharged for packaging just after it has been enclosed in a bag in a bagging machine. As disclosed in FIGURE 1A, the discharge platform 6 of the forming or bagging machine is a horizontal table onto which the confections 7 are simultaneously deposited in groups of six, all lying substantially flat and in reasonably regular order, as illustrated, and being easily available to an operator. A confection discharging machine of this sort is shown in my issued Patent No. 2,842,921 dated July 15, 1958.

The bagged confections on the table 6 are to be packed in a carton of the sort shown in FIGURE 1A and which is partially made up or erected in a machine 8 which carries a supply 9 of carton blanks. Blanks of this sort are shown in my copending application entitled "Carton Blank," Serial No. 826,521, filed July 13, 1959. The blanks 9 are formed to include a bottom 11, sides 12 and 13, a front 14, a back 15 and a top 16. There are as well a leading flap 17, a trailing flap 18, a front flap 19 and a top flap 21. The blanks 9 are fed by an appropriate mechanism through a carton forming unit 23 which is a standard commercial device and need not be described herein.

The effect of the device 23 is to transform the blanks 9 into partially erected boxes substantially as shown in FIGURE 1A and to discharge such boxes onto a frame 24 carrying a conveyor belt 26 transporting the partially erected cartons from the machine 23 in the direction of the arrow 27 and lining such cartons up in succession to the right-hand of an operator standing immediately opposite the table 6 at a station 31 immediately alongside the frame 32 of my packaging machine. The frame 32 is of the customary sort made up of structural shapes and in its portion immediately adjacent the conveyor 26 and the table 6 is provided with a plurality of roller supports 33 substantially at the plane of the conveyor belt 26 and slightly below the plane of the table 6.

In the usual manner of operation, a carton in the condition shown in FIGURE 1A discharges from the conveyor belt 26 onto the rollers 33 with sufficient momentum to come to rest approximately in a central position opposite the station 31 and evenly supported by the rollers 33. It will be noted that the open top or cover of the carton is upright and is closest to the operator. The operator at the station 31 reaches over the empty carton and with hand movements transfers the confections 7, three at a

time, into two layers within the open carton. To facilitate this, the height of the rollers 33 is made just sufficient so that the confections can be swept directly over the front wall and front flap of the open carton to lodge easily therein.

When the hand filling of the carton has been accomplished by the operator at the station 31, the filled but still open carton is displaced by hand to the left over additional ones of the rollers 33 to a position substantially as illustrated in FIGURE 7. In this position, the carton is partially sustained on a carton support 36 preferably including a substantially horizontal plate of stainless steel overlying the side members 37 and 38 of the framework 32. The carton support 36 extends for almost the entire length of the frame 32 and in a convenient transverse location has a depressed longitudinal trough 39 within which the upper run 41 of a conveyor 42 operates.

The conveyor is trained around a forward sprocket 43 mounted on a shaft 44 spanning the framework 32 and returns around a rearward sprocket 45 on a shaft 46 (FIG. 10) to provide a lower run 47. The conveyor is driven by a drive chain 48 (FIG. 7) from any suitable source of power such as an electric motor (not shown). At appropriate intervals, the chain 48 is provided with pushers 51 including plates upstanding from the chain 48 and firmly anchored thereon. The chain is contained within the channel 39 and itself remains below the plane of the support 36 or substantially so but the pushers 51 are of considerable transverse extent and have supporting feet 50 sliding on the support 36.

Pursuant to the invention, the chain conveyor 42 is operated under the control of the operator at the station 31. As shown in FIGURE 7, there is provided on the frame 32 a longitudinally adjustable projecting actuator 52 (FIG. 3) extending through an elongated slot 53 in a transversely adjustable side plate 54 forming part of the framework 32. The projection 52 is effective when depressed to close a switch 56 mounted on the framework and controlling the circuit for the electric motor driving the chain 48 and the conveyor 42.

Thus, the operator at the station 31 moves the filled carton to the left in FIGURE 1A sufficiently so that the carton rides along the support 36 and over the upper run 41 of the conveyor 42 until the leading portion of the carton actuates or displaces the projection 52 to close the switch 56 and energize the electric motor. The previously stationary upper run of the conveyor then advances to the left in FIGURE 1B and to the right in FIGURE 7 and the next approaching pusher 51 engages the trailing edge of the filled carton. Thereafter, the upper run of the conveyor and the carton advance together. As the carton advances, it rides over the projection 52 which springs out again behind the carton but the switch 56 remains closed and the conveyor advance continues. The carton thus, at its initial stage on the conveyor, actuates the energizing switch 56 and starts the machinery which moves the carton along to subsequent stations.

As illustrated in FIGURE 4 as well as in FIGURE 1B, there is provided on the frame 32 at a second station a horizontal plate 61 which is fastened to the frame but at only one side by means of fasteners 62. At the other side, the plate 61 is slightly spaced from the upright wall 54 of the framework. The plate 61 is parallel to the carton support plate 36 and is spaced above the plate 36 a distance slightly greater than the height of the carton walls. The plate 61 extends nearly to the first station and likewise extends longitudinally of the frame through several other stations. The plate 61 is not only slightly spaced from the wall 54 to pass the upright carton top but on the opposite side of the frame is upwardly contoured to provide a channel 63 so that the still upright front flap 19 of the carton can be accommodated in an upright position.

Transversely across its leading edge, the top plate 61

is upturned to provide a leading abutment 64 directly in the path of the substantially upright leading flap 17 of the carton. As soon as the pusher 51 engages the carton and advances it, the leading flap 17 comes into contact with the upturned leading edge 64 of the plate 61 so that as the carton passes for the most part beneath such plate, the leading flap 17 is downturned to ride under the remaining portion of the plate 61 but the carton cover and the front flap are still upright as is the trailing flap 18.

Means are provided for folding over the trailing flap 18. As particularly shown in FIGURES 2 and 3, the shaft 44 of the conveyor 42 is extended to carry a sprocket 66 fixed thereon. The sprocket 66 through a chain 67 drives a sprocket 68 integral with a cam 69 rotatable on a stub shaft 71 extending from the frame 32 on the side opposite the station 31. The cam 69 is generally circular but for a portion of its periphery has a depression 72. Cooperating with the cam periphery is a roller 73 at the lower end of a follower 74 guided in a block 76 on the frame 32. A coil spring 77 is interposed between a shoulder on the follower 74 and a stationary strap 78 projecting from a superstructure 79 on the frame 32 so that the follower 74 partakes of the motion impelled by the cam 69.

At the upper end of the follower 74 there is provided a short rack 80 meshing with a pinion 81. A shaft 82 on which the pinion 81 is fastened is journalled in the superstructure 79 and extends over the plate 61 for substantially the entire width thereof. Secured to the extended portion of the shaft 82 is a tucker plate 83. This plate has a portion radial to the shaft 82 and a bent portion 84 which is approximately concentric with the shaft 82 and in addition terminates in a pair of end fingers 86 and 87 as well as a central tongue 88 (FIGS. 3 and 7).

The timing of the cam 69 is such that shortly after the carton has been advanced by the pusher 51 far enough so that the leading flap 17 is bent into closed position and rides under the leading edge 64 of the plate 61, the plate 83 is rotated by the spring 77 from the full line position into the dotted line position shown in FIGURE 7. The plate 83 moves fast enough to catch up with the advancing carton so that the fingers 86 and 87 engage behind the trailing flap 18 of the carton and bend over that flap progressively and forwardly into a horizontal position. This occurs soon enough so that the flap is bent over and is held horizontally just prior to encountering the leading edge 64 of the plate 61.

The advancing movement of the tucker plate is then arrested since the tongue 88 abuts the leading edge 64 and holds the fingers 86 and 87 in position so that they are, in effect, an inclined continuation of the plate 61, thus permitting the trailing panel 18, after it has been folded over, easily to cam under the arrested fingers 86 and 87 and to travel beneath the plate 61. As soon as this has been accomplished, the further rotation of the cam 69 lifts the follower 74 and restores the tucker plate 83 to its initial position ready for a subsequent operation on a successive package. Thus, when the carton is fully engaged beneath the leading portion of the plate 61, both the leading flap 17 and the trailing flap 18 are folded over onto the packed commodity whereas the front panel and the cover 16 are still substantially upright.

As the now partially closed carton continues to be advanced by the pusher 51, the front flap 19, previously disposed freely in the channel 63 (FIG. 4), encounters a folding plate 91 on the frame 32. The folding plate gradually changes from a vertical location continuing the channel 63 to a horizontal position overlying a portion of the plate 61. Thus, as the carton advances, the front flap 19 encountering the folding plate 91 is gradually cammed or rolled over and eventually lies just above the plate 61 and in abutment with an edge thereof. This trailing portion of the plate is cantilevered from the remaining, leading portion thereof and is not transversely

attached to the framework so that there is adequate room and freedom for the plate **91** to effectuate the folding operation. By the time the carton leaves the trailing portion of the plate **61**, the front panel **19** has been completely folded over.

In a somewhat similar fashion, there is provided a means for folding the cover **16** from a substantially vertical into a substantially horizontal position overlying and in contact with the plate **61**. As particularly shown in FIGURES 1B, 3 and 4, the frame **32** at an appropriate station is provided with a folding bar **96**. This is a bar round in cross-section having one end **97** securely anchored in the framework and having its other end bent over and secured to the framework at a point **98** on the same side thereof. Between its anchored ends, the bar is contoured so that its leading portion is substantially as high as the upwardly extending cover and is disposed to one side of the advancing carton. The bar continues inwardly of the framework and downwardly as it approaches the plate **61** and extends very nearly across the full width of the plate and then continues longitudinally of the framework at a very slight elevation above the plate **61**.

As the carton advances from its initial station and is partly folded and at about the time the front panel **19** is beginning to be cammed and folded by the plate **91**, the leading edge of the top **16** encounters the inwardly and downwardly directed portion of the folding bar **96** and is thus engaged and cammed and folded from its initial, substantially vertical position into a final, substantially horizontal position. The relationship of the height of the longitudinal portion **99** of the bar just above the trailing portion of the folding plate **91** is such that as the carton is advanced the cover is folded down over the plate **91** and so overlies the folded front flap. As the top is folded down, it carries with it the top flap **21** so that the top flap is also disposed in a horizontally extending position projecting beyond the side of the framework **32**.

To assist in holding the horizontally folded top of the carton, there project from the framework **32** a number of spindles **101**, each of which serves as a mounting for one or more rollers **102** at a height to engage against the folded cover of the carton and to bear against and guide the carton cover in its horizontal position of advance.

Since it is desired adhesively to secure the carton in its folded and closed position, means are provided, in the event the carton blank does not already carry sufficient adhesive, to apply an adhesive material thereto. Particularly illustrated in FIGURES 1B, 2, 5 and 8 is an adhesive applying mechanism. As particularly shown in FIGURE 1B, the shaft **44** is extended to drive a chain **106** which rotates a cross-shaft **107** when the conveyor **42** operates. A pulley **108** on the shaft **107** is connected by a belt **109** to rotate an applicator shaft **111** included in the adhesive mechanism.

The mechanism itself and the journals for the shaft **111** are carried in a separate frame **112** secured detachably to the frame **32** by thumb screws **113** so that the adhesive mechanism can be removed, if desired, simply by removing the thumb screws **113** and unshipping the belt **109**. On the shaft **111** is mounted an adhesive pickup and applicator wheel **114**. This wheel preferably has a rubber-like, interrupted applicator band **116** thereon. The interrupted surface makes a superior pickup and application of the adhesive.

A trough **117** supported on the frame **112** carries a pool of liquid adhesive. This is replenished from time to time from a reservoir **118** mounted on the detachable frame **112**. In the reservoir there is provided a metering valve **119** controllable by a thumb wheel **121** for releasing adhesive at the desired rate. This adhesive liquid travels through a guide tube **122** and falls into the trough **117**. The band **116** of the applicator wheel is transversely somewhat rounded, as shown in FIGURE 5, and picks up a coating of adhesive and carries it upwardly past a doctor blade **123** on the framework **112** and presents the remaining layer of adhesive at a zone near the edge of the framework **32** and at a location slightly below the horizontal portion of the folding plate **91**.

Unless deflected, the top flap **21** would ride above the adhesive wheel **114**. A deflector wheel **124** of a double conical shape is mounted on the framework **112** and is disposed in a position so that the advancing, substantially horizontal cover flap **21** is deflected and rolled downwardly into rolling contact with the rotating adhesive applicator wheel surface **116**. A succession of discrete zones of adhesive are thereby deposited on the nether surface of the downwardly deflected top flap **21**.

As the carton continues to advance within the confines of the framework, it is held in closed position all except for the adhesive top flap **21**. As this flap carrying adhesive advances, it encounters a camming plate **131** on the side of the framework **32** (FIG. 1B). During the carton advance, the top flap **21** is cammed inwardly and downwardly by the plate **131**. In this zone, the framework **32** is provided with a cutout portion **132** (FIG. 2) so that the previously confined front panel **14** of the carton is exposed. The top panel is urged through the cutout portion and downwardly and inwardly into immediate contact with the front panel so that the adhesive attaches the juxtaposed members.

Prior to this time and at about the station at which the adhesive is being applied, the carton has advanced far enough to come out of engagement with the plate **61**. When the carton advances into position to be adhesively secured, the top panel is lowered slightly more by the longitudinal portion **99** of the folding bar **96** and into immediate contact with the inwardly bent front flap **19** and into immediate contact with the leading flap **17** and the trailing flap **18**. Thus, when the top flap is secured to the front panel adhesively, the carton is tightly closed and its contents are snugly confined.

In the usual instance, it is preferred to provide a heat setting adhesive. For that reason, there is mounted on a straight continuation **133** of the camming plate **131** (FIGS. 1B and 2) a heating element **134** suitably supplied with electric current and comprising coils which radiate and conduct heat onto the immediately adjacent portions of the closed and adhesively secured carton. The plates **131** and **133** are mounted on hinges **136** (FIG. 2) so as to swing at the top transversely of the frame **32** in a slight amount under the tension of springs **137**. The heated plate **133** is thus firmly pressed against the carton top flap **21**. As the carton advances through the heating station, the adhesive is firmly set. By the time the carton has left the heating station, it is permanently closed and can only be opened by breaking some of the folds or disrupting the adhesive seal.

Ordinarily, the carton blanks are supplied without any imprint thereon and for most commercial purposes it is desired that the filled, closed and sealed cartons carry some sort of name or other indicia, as indicated in FIGURE 1B. Usually, it is preferred to have printed material appear on both sides of the carton.

Consequently, on opposite sides of the frame **32** adjacent the discharge end thereof, as illustrated in FIGURES 1B, 9, 10 and 11 imprinting mechanisms are provided. Since the imprinting mechanisms are identical except for the disposition of the parts on opposite sides of the machine, a description of one applies equally to the other. Projecting upwardly from the frame **32** in a convenient location is a shaft **141** carrying a bell crank **142**. An inking roller **143** is journalled on one arm of the bell crank and is in immediate inking contact with a printing roller **144** journalled on the other arm of the bell crank. A spring **146** urges the printing roller **144** through an opening **147** in the frame **32** into contact with the advancing panel on a carton. As the carton travels past the printing rollers **144**, it receives suitable printed indicia. The carton, having been imprinted, travels along

the terminal portion of the carton support **36** and is discharged by its pusher **51** onto a succeeding conveyor **151** to carry the filled, closed, adhesively secured and imprinted carton away for further handling.

As the pusher **51** rounds the shaft **46** and moves from the upper run **41** of the conveyor to the lower run **47** thereof, it travels from the discharge end of the frame **32** toward the loading end thereof. At a suitable location in its return movement in the lower run, the pusher **51** encounters an electric switch **153** mounted on the frame **32** and having a projecting operating button **154**. As the pusher traverses the switch **153** it momentarily depresses the button **154** and turns off the electric motor which drives the chain **48** and the conveyor **42**. Thus, the mechanism, energized by the initial manual positioning of a carton to be closed, is automatically shut off when the carton has been discharged from the machine. This operation is automatic and needs only a single carton to actuate it. In the usual instance, cartons are fed to the machine in rapid succession by the operator at the station **31** and enter the machine fast enough so that the initial energizing switch button **52** is repeatedly actuated before the switch **153** is operated, so that the conveyor **42** advances continuously. For the full capacity of the machine, each one of the pushers **51** as it rounds the shaft **44** immediately engages a carton waiting to be processed and closed. The structure is capable of handling any number of cartons from a single one up to the maximum capacity of the machine.

What is claimed is:

1. A packaging machine comprising a frame, a carton support on said frame, a conveyor on said frame for moving a carton along said support, means for operating said conveyor, means actuated by a carton at an initial station on said support for turning said conveyor operating means on, a plate on said frame at a second station positioned closely to overlie a carton on said support, means forming a leading edge on said plate for abutting and camming a leading flap on said carton under said plate, means on said frame operating in time with said conveyor for tucking a trailing flap on said carton under said plate, means on said frame at a third station and extending over said support for camming a front flap on said carton over said plate, means on said frame at a fourth station and extending stationarily over said plate for camming the top of said carton over said plate and over said front flap as said carton moves along said support, means on said frame at a fifth station for applying adhesive to the nether side of a top flap extending substantially in the plane of and from the top of said carton, means on said frame at a sixth station in position to engage the upper side of said top flap for camming said top flap downwardly with said nether side against the front of said carton, and means actuated by said conveyor for turning said operating means off.

2. A packaging machine comprising a frame, a carton support on said frame, a conveyor on said frame, a lug on said conveyor for engaging the trailing wall of a carton and moving said carton along said support, means for operating said conveyor, means actuated by a carton at an initial station on said support for turning said operating means on, a plate on said frame at a second station extending parallel to said support and disposed closely to overlie a carton on said support, means including a leading edge on said plate for abutting and camming a leading flap on said carton under said plate, means on said frame advancing faster than said conveyor for tucking a trailing flap on said carton under said plate, means on said frame at a third station for camming a front flap on said carton over said plate, means on said frame at a fourth station for camming the top of said carton over said plate and into contact with said front flap, means on said frame for holding said top in cammed-over position, means on said frame at a fifth station for applying adhesive to the nether side of a top flap extending substantially in the plane of and from the top of said carton, means on said frame at a sixth station for camming said top flap downwardly with said nether side against the front of said carton, and means actuated by said lug for turning said operating means off.

3. A packaging machine comprising a frame, a horizontal carton support extending along said frame, a conveyor on said frame for moving a carton along said support, a horizontal plate on said frame positioned closely to overlie a moving carton on said support and having a leading edge engageable by a leading flap on said carton, means on said frame for tucking a trailing flap on said moving carton under said plate, means on said frame for folding a front flap on said moving carton over said plate, means on said frame for folding the top of said moving carton over said plate and into contact with said folded front flap, and means on said frame for then folding a top flap on said folded top of said moving carton against the front face of said carton.

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