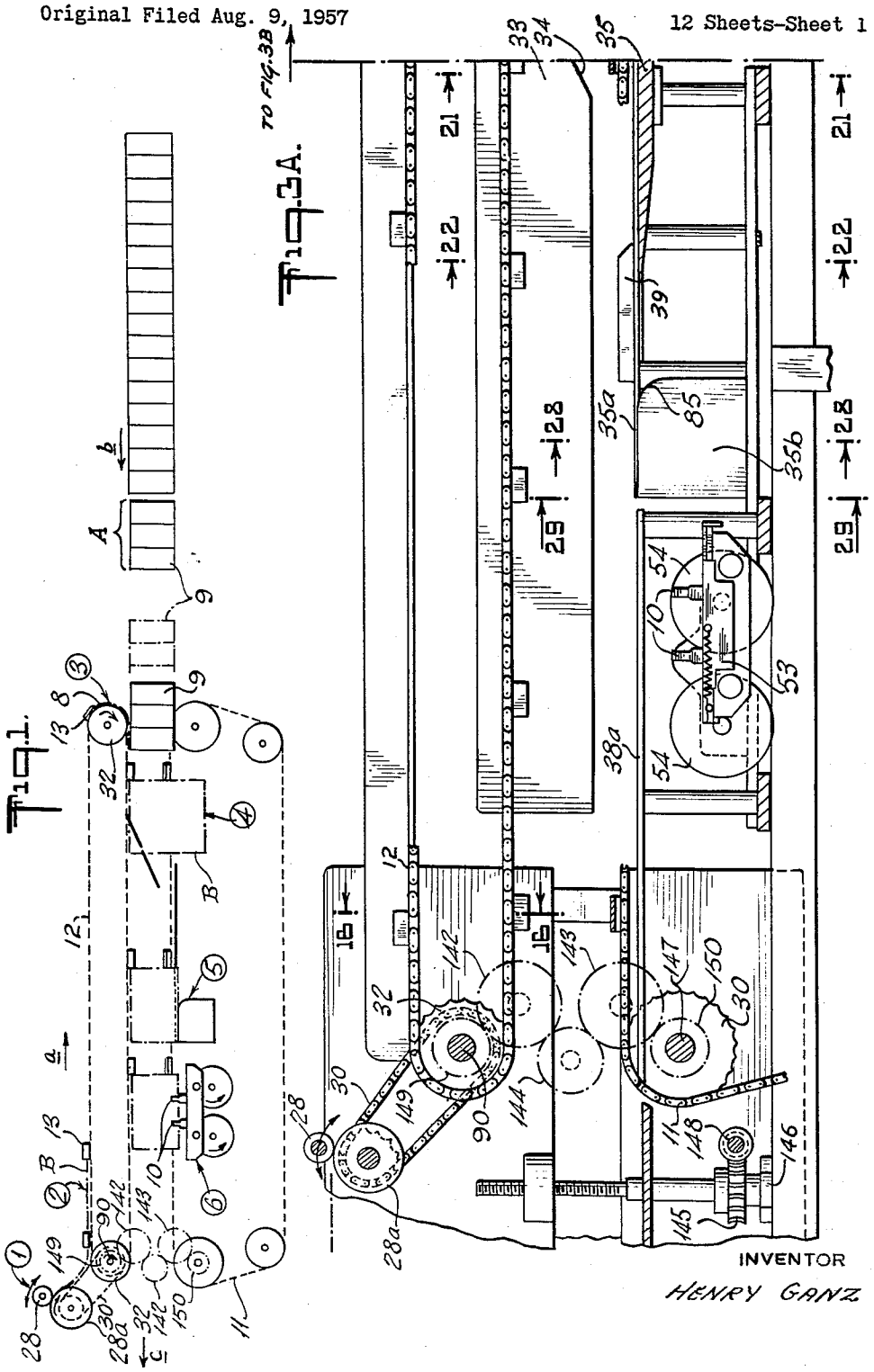
April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 1



April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 2

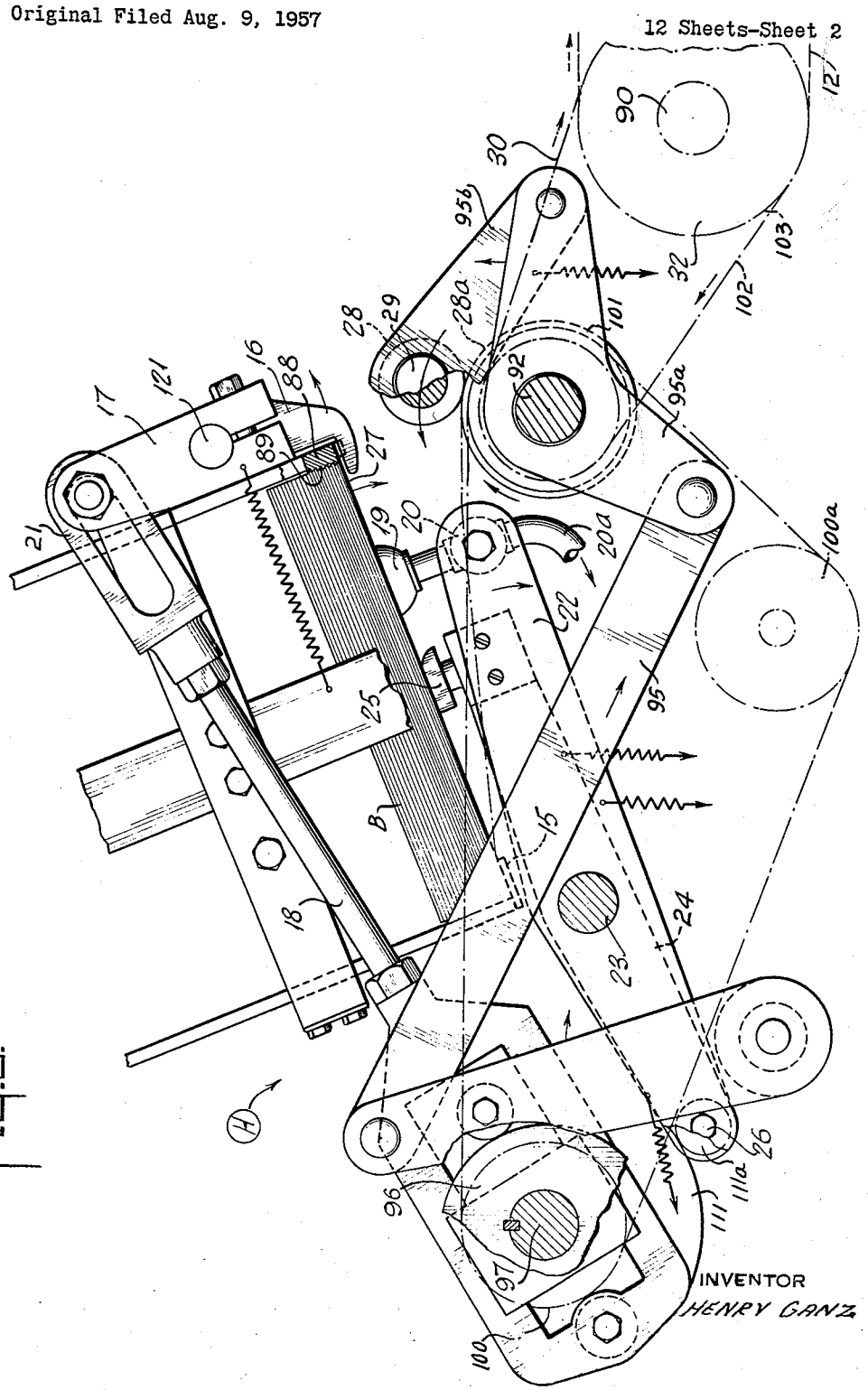


Fig. 2.

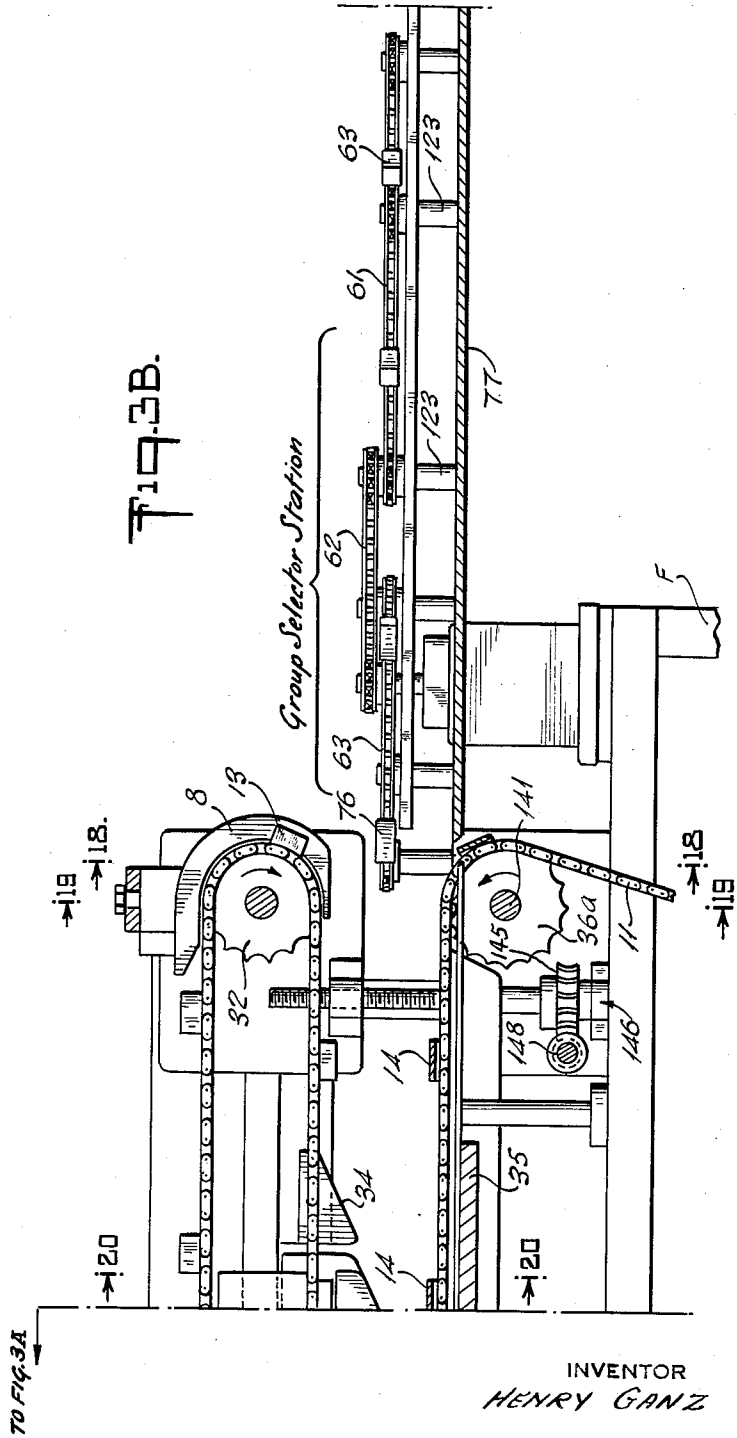
INVENTOR
HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 3

Fig. 3B.



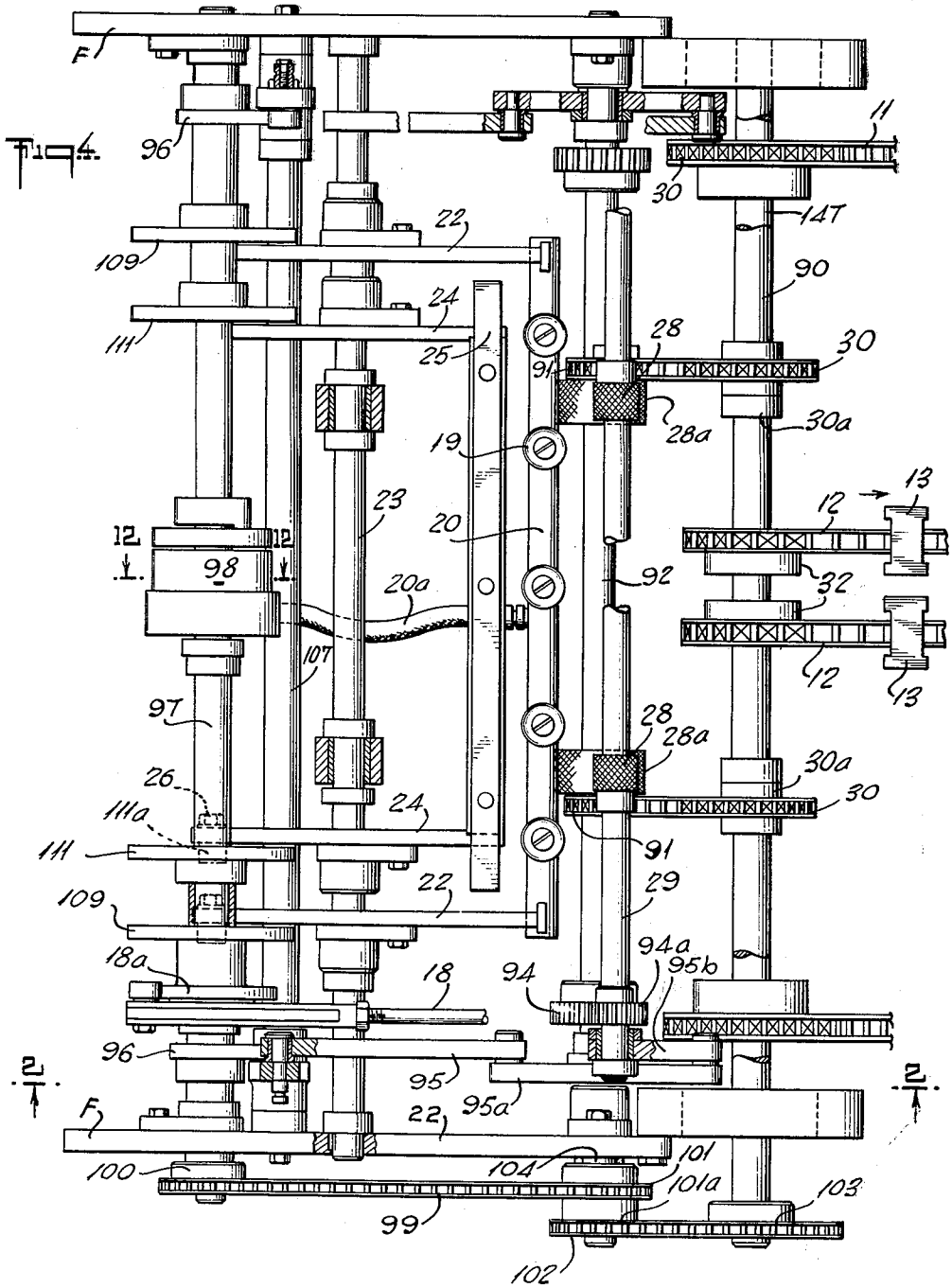
INVENTOR
HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 4

Fig. 4.



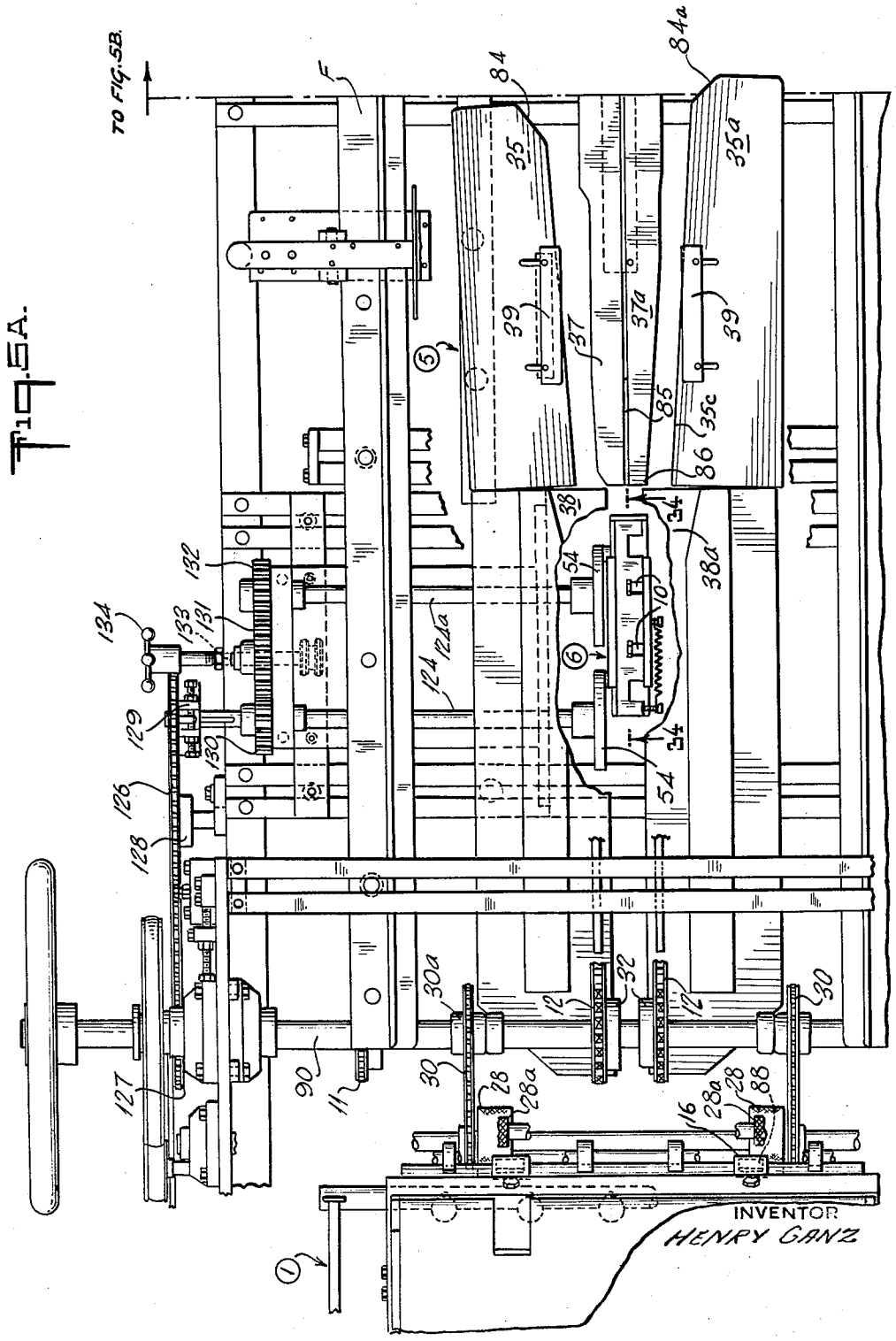
INVENTOR
HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 5

FIG. 5A.



April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 6

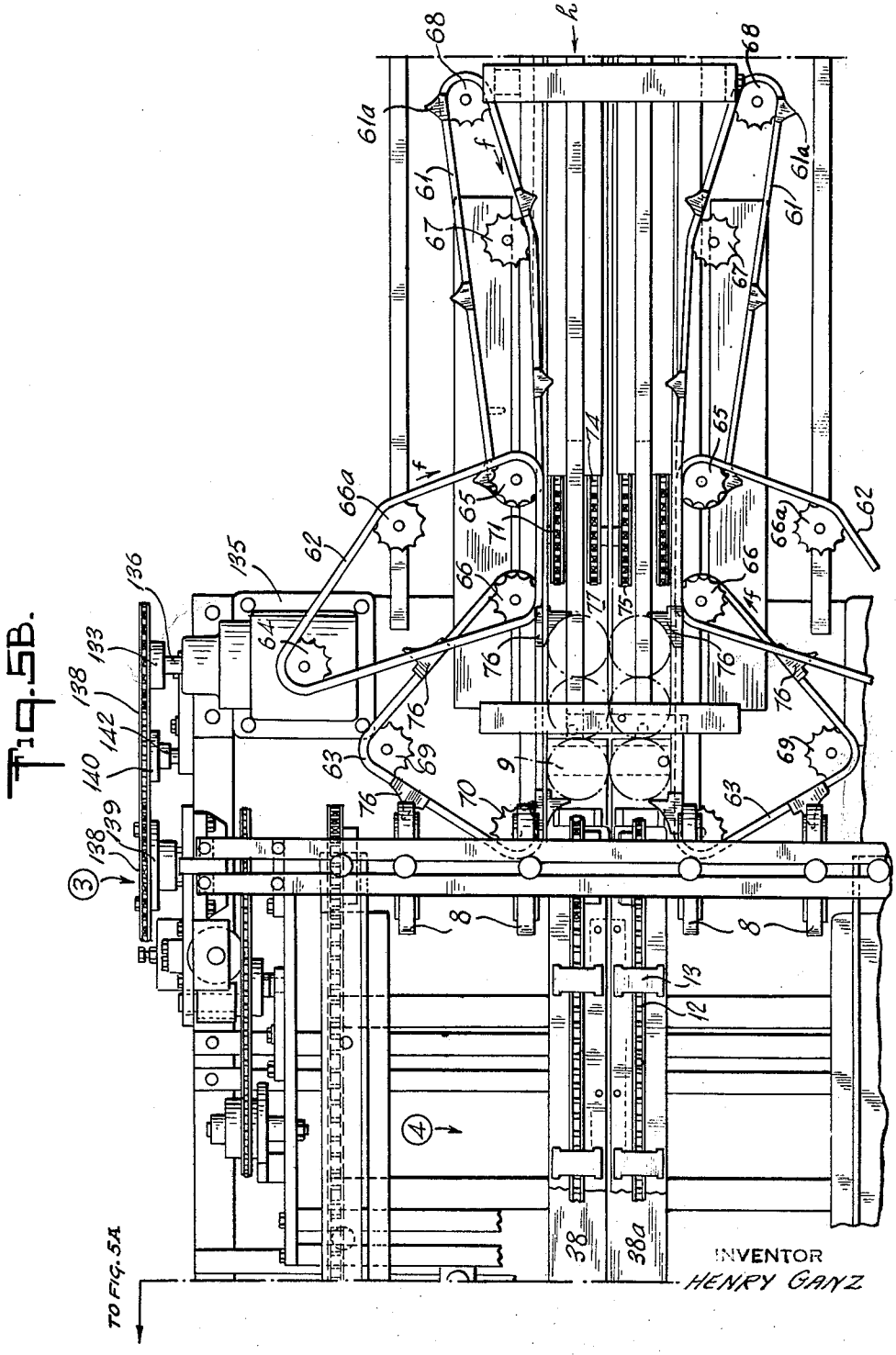


FIG. 5B.

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 7

Fig. 6.

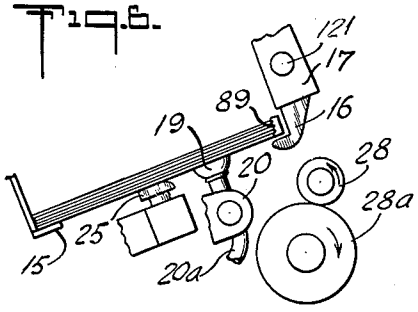


Fig. 7.

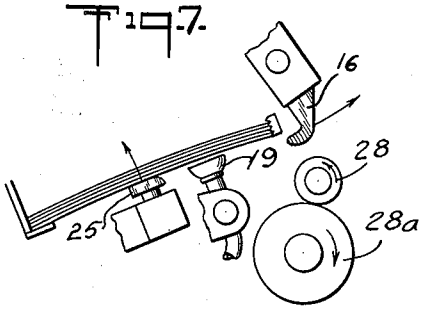


Fig. 8.

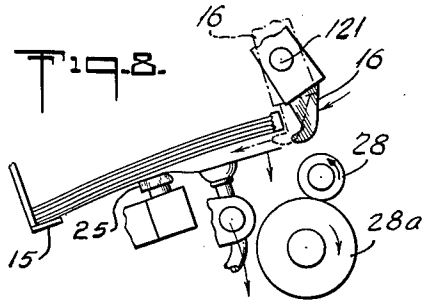


Fig. 9.

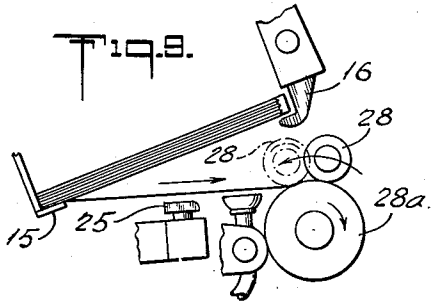


Fig. 10.

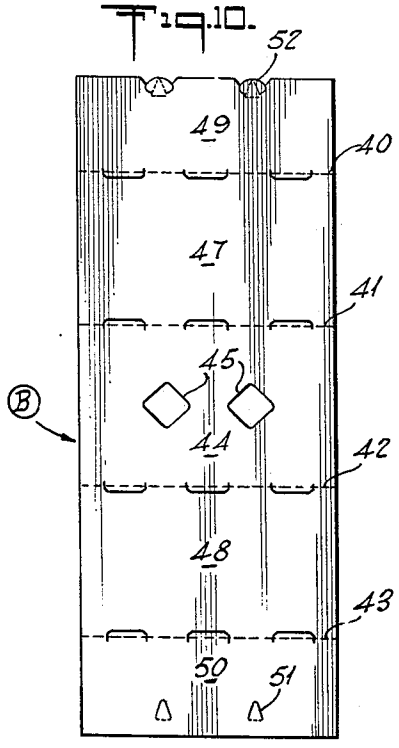
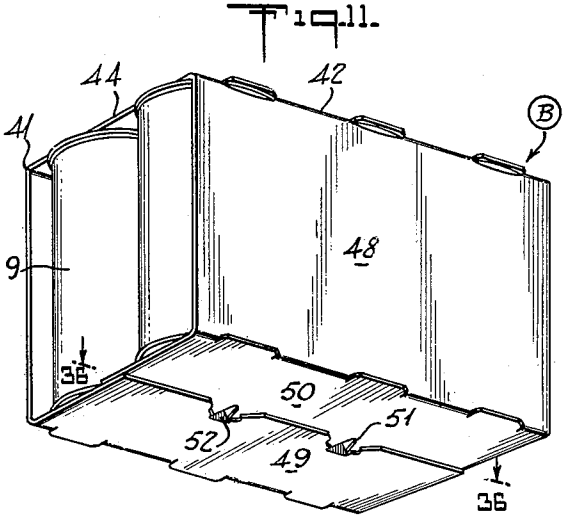


Fig. 11.



INVENTOR

HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 8

Fig. 12.

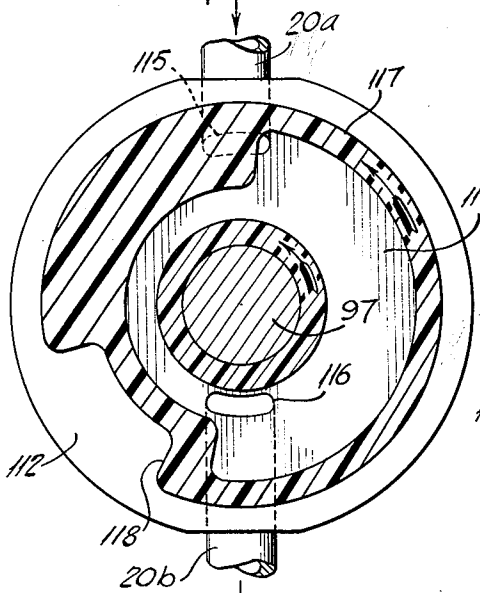


Fig. 13.

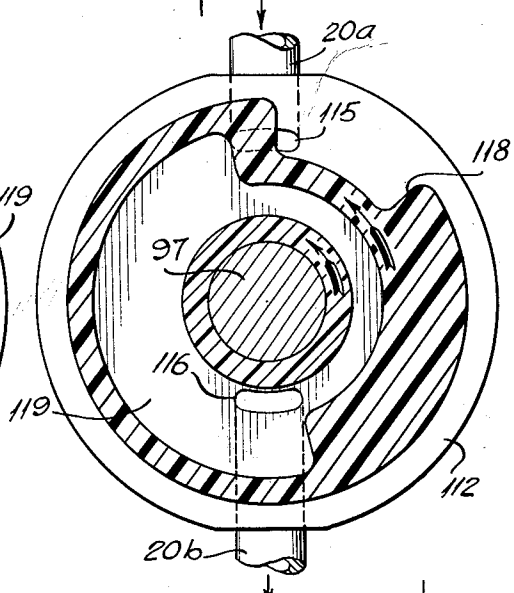


Fig. 14.

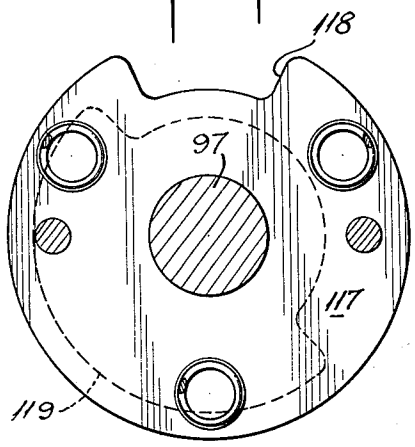
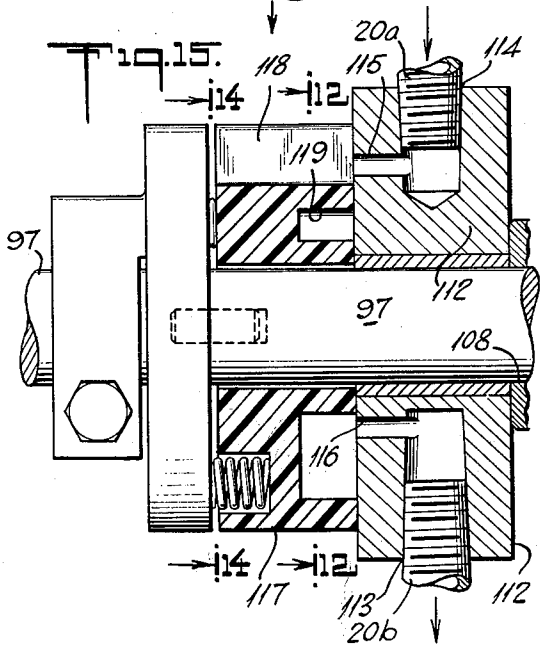


Fig. 15.



INVENTOR

HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 9

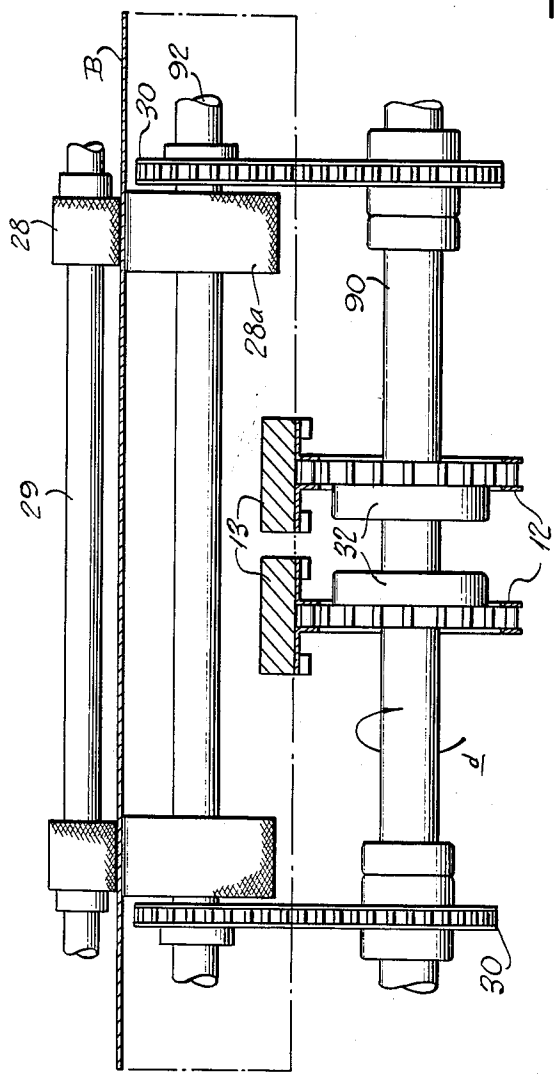


Fig. 15.

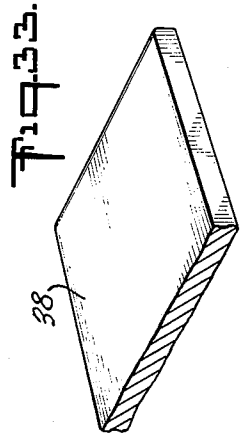


Fig. 33.

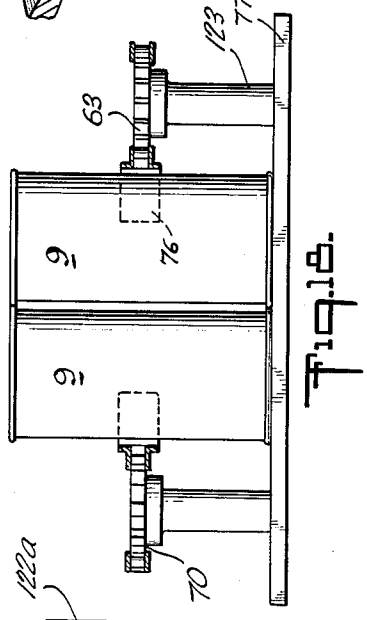


Fig. 18.

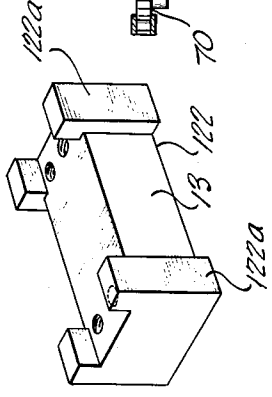


Fig. 17.

INVENTOR
HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 10

Fig.19.

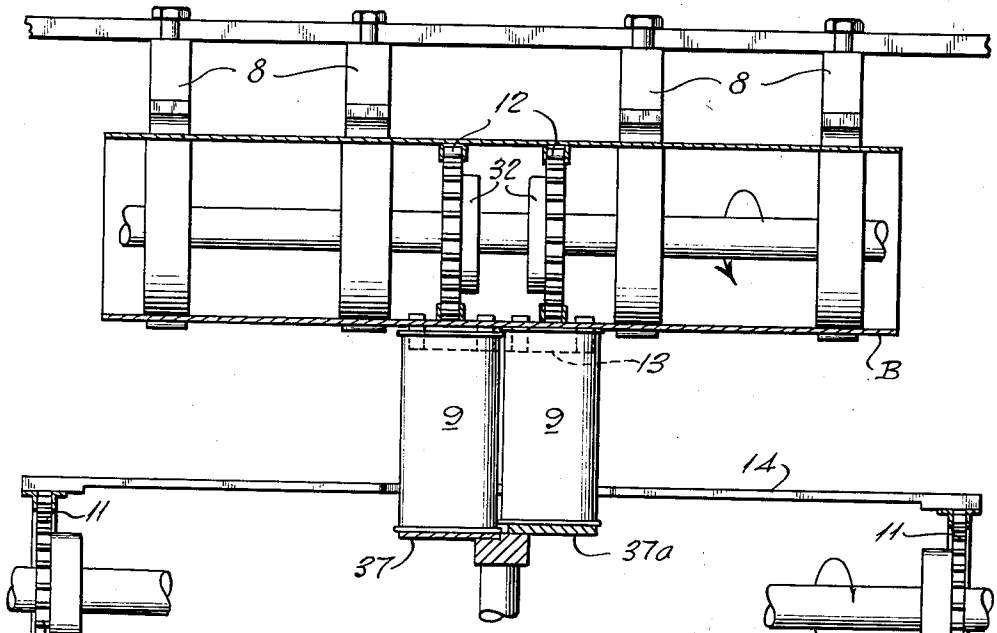
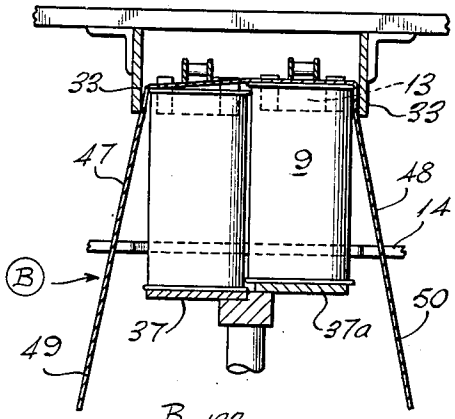


Fig.20.

Fig.21.



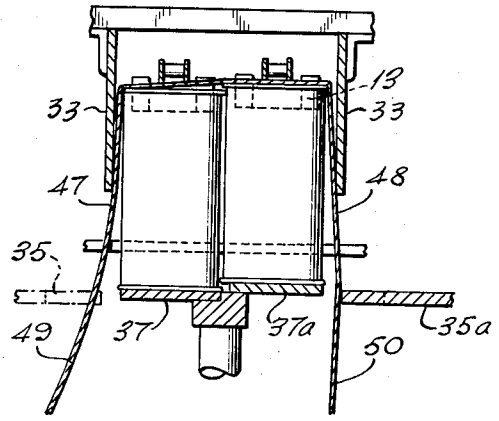


Fig.25.

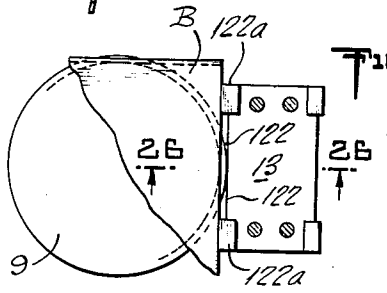
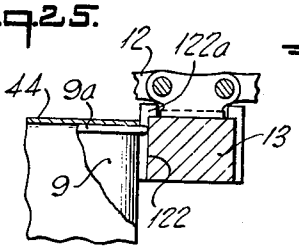


Fig.26



INVENTOR
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April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 11

Fig. 22.

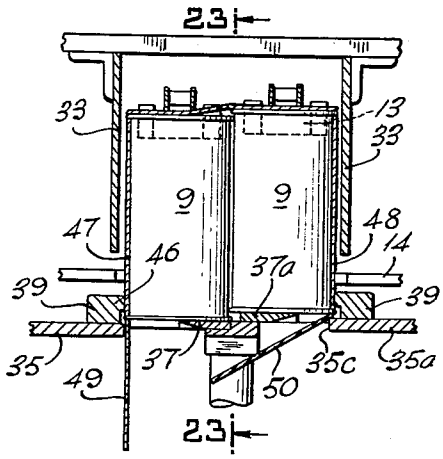


Fig. 23.

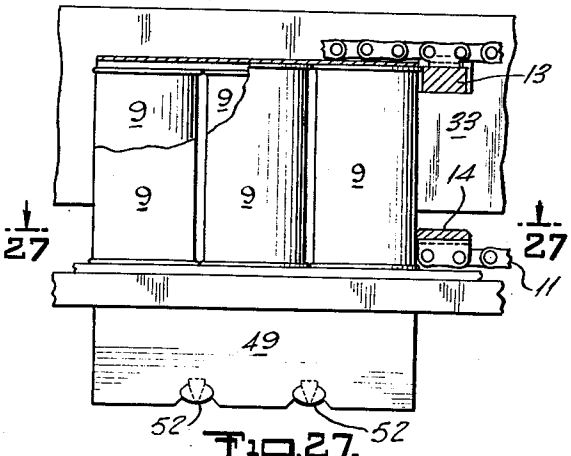


Fig. 24.

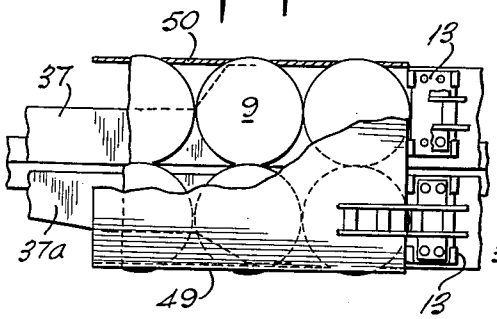


Fig. 27.

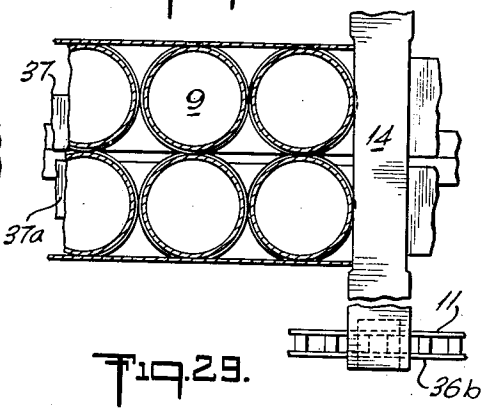


Fig. 28.

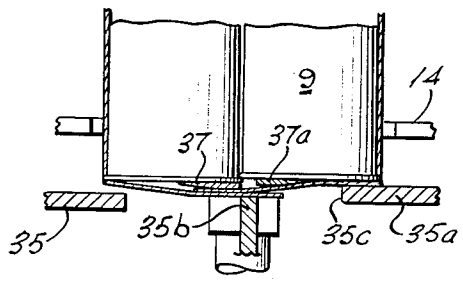


Fig. 29.

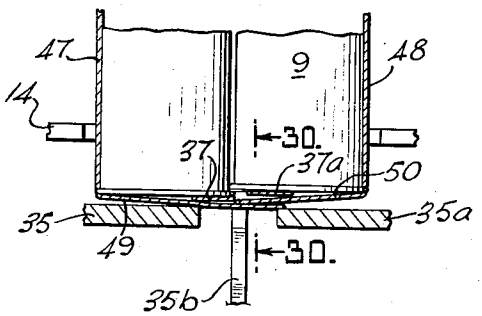
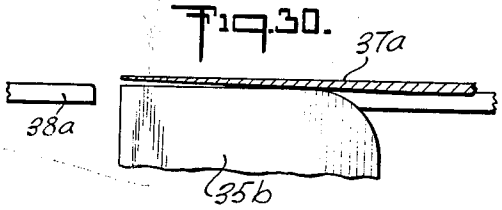


Fig. 30.



INVENTOR
HENRY GANZ

April 2, 1963 H. GANZ 3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Original Filed Aug. 9, 1957 12 Sheets-Sheet 12

Fig. 34.

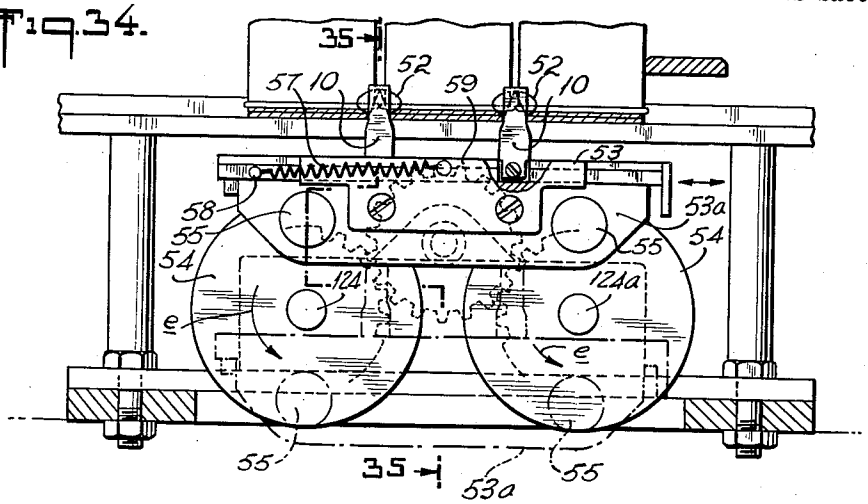


Fig. 35.

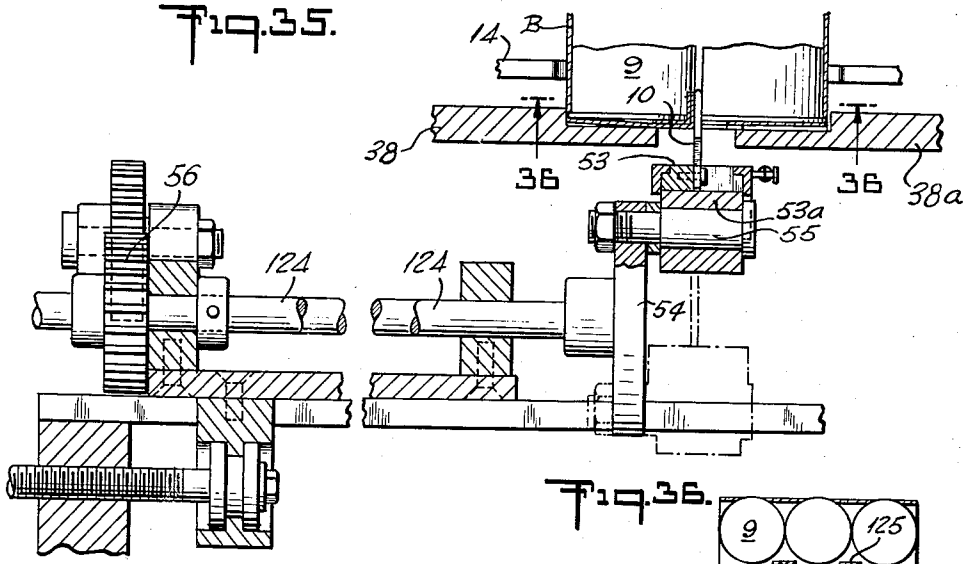


Fig. 36.

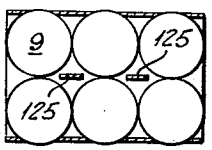


Fig. 31.

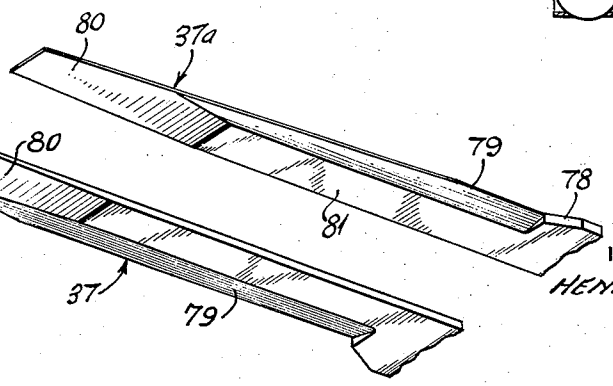


Fig. 32.

INVENTOR
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United States Patent Office 3,083,510 Patented Apr. 2, 1963

3,083,510

METHOD AND MACHINE FOR PACKAGING ARTICLES

Henry Ganz, Teaneck, N.J., assignor to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Continuation of application Ser. No. 677,387, Aug. 9, 1957. This application Aug. 4, 1960, Ser. No. 47,892
19 Claims. (Cl. 53—48)

This invention relates to new and useful improvements in machine and methods for automatically packaging cans, bottles and similar articles. This application is a continuation of my copending application Serial No. 677, 387, filed August 9, 1957, now abandoned.

More particularly, the invention relates to such machines and methods for packaging such articles in open-ended paperboard wrappers as well as in closed or partially closed cartons.

Briefly, the invention covers the arrangement of causing continuously travelling articles to be packaged; of the separation of the said travelling articles into predetermined groups; of the delivery of paperboard blanks from the hopper of said machine; the inversion of the said blanks; the alignment of one of said wrapper blanks or cartons on top of each travelling predetermined group; the closing of such blank about said group; and, finally, delivering the completely finished package to a receiving platform.

The objects of the invention will become obvious from a reading of the detailed description of my invention in connection with the accompanying drawings in which is illustrated a preferred embodiment of the invention showing such parts of my machine as may be necessary for a complete understanding of the said method and machine.

Referring now to the various figures of the drawings, it will be seen that:

FIG. 1 is a diagrammatic side view of the machine of my invention;

FIG. 2 is a detailed side view of the hopper;

FIGS. 3A and 3B, when positioned together at the indicated dot and dash lines, give a side elevational view of my machine;

FIG. 4 is a top plan view of the hopper of FIG. 2;

FIGS. 5A and 5B, when positioned together at the indicated lines, give a top plan view of the balance of the machine;

FIGS. 6, 7, 8 and 9 are side elevational views showing the details of the hopper;

FIG. 10 is a blank used to wrap around the cans;

FIG. 11 is a completed package;

FIGS. 12, 13, 14 and 15 are details of the vacuum operation of the hopper;

FIG. 16 is a sectional view looking in the direction of the arrows **16—16** of FIG. 3A;

FIG. 17 is a view showing the details of a pusher block;

FIG. 18 is a sectional view looking in the direction of the arrows **18—18** of FIG. 3B;

FIG. 19 is a sectional view looking in the direction of the arrows **19—19** of FIG. 3B;

FIG. 20 is a sectional view looking in the direction of the arrows **20—20** of FIG. 3B;

FIG. 21 is a sectional view looking in the direction of the arrows **21—21** of FIG. 3A;

FIG. 22 is a sectional view of FIG. 3A looking in the direction of arrows **22—22**;

FIG. 23 is a sectional view looking in the direction of arrows **23—23** of FIG. 22;

FIG. 24 is a top plan view showing a group of cans with the blank folded down over them;

FIG. 25 is a top plan view, in section, showing the relationship of a block pusher to the cans and the blank when the machine is in operation;

FIG. 26 is a sectional view of FIG. 25 taken along the lines **26—26**;

FIG. 27 is a top plan view, in section, looking in the direction of the arrows **27—27**;

FIG. 28 is a sectional view of FIG. 3A looking in the direction of the arrows **28—28**;

FIG. 29 is a sectional view of FIG. 3A looking in the direction of the arrows **29—29**;

FIG. 30 is a sectional view of FIG. 29 taken in the direction of the arrows **30—30**;

FIG. 31 is a perspective view of the upper bottom folding blade;

FIG. 32 is a perspective view of the lower bottom folding blade;

FIG. 33 is a perspective view of the forward end of one of the receiving blades;

FIG. 34 is a sectional view of FIG. 3A looking in the direction of the arrows **34—34**;

FIG. 35 is a view, in section, of FIG. 34 taken along the lines **35—35**; and

FIG. 36 is a top plan view of a section of a completed package.

Referring now to the various figures of the drawings for a detailed description of my invention, FIG. 1 illustrates the various positions of one blank as it travels through the machine from the hopper H at station **1**, its delivery onto the block chains **12** at station **2**, into guide members **8** at station **3** where the blank is inverted and placed on the tops of cans **9**, then on to station **4** where its side walls are folded downwardly, then on to station **5** along supports under which the bottom flaps are overlapped, then to station **6** where these flaps are interlocked.

As shown in FIG. 1, a blank B made of fiber board like material, scored and die-cut in the manner of the blank shown in FIG. 10, is fed by the hopper H at station **1** onto a pair of parallel but laterally spaced short moving sprocket chain belts **30** and then onto chain belts **12** at station 2. The belts **12** travel in the direction indicated by the arrow *a* immediately above it. Positioned at predetermined intervals along moving belts **12** are a series of blocks **13** which are secured thereto in any suitable manner. These belts **12** with their attached blocks travel around sprocket wheels **32** which are mounted upon rotatable shafts, as hereinafter more fully explained.

At station **2** it will be seen that blank B has been moved into a position between two of said blocks **13**. As will be seen (in FIGS. 4 and 5A) there are two upper laterally spaced endless sprocket chains **12** travelling in spaced apart parallel paths and each belt has a series of blocks **13** attached thereto. The blocks on one belt are aligned with the blocks on the other belt and travel parallel to each other so that a single blank can be placed between four blocks. The leading side edge of a blank, as it travels along its path, abuts two blocks in front, one on one belt and one on the companion belt, and its trailing side edge also abuts two blocks, one on one belt and one on the other. The blank bridges across the space between the two endless belts. These belts are so operated by the rotation of the same rotatable shafts that they always travel at the same speed, thus insuring that when the blocks of one belt are transversely aligned with the blocks of the other belt, the blocks will always remain in the same position relative to each other during their movement.

The chains with their attached blocks, and carrying the blanks B, travel around curved guides **8** at station **3**. The blank, when it is fed from the hopper onto the belts, is placed face downward with that side of the blank which forms the outer side of the package facing onto the belt

so that when the blank B travels around the curved guide **8**, it comes into contact with the cans **9** face up.

At the same time that the blanks B are fed onto the belts and travel along their paths, a plurality of containers, in this instance cans **9**, are fed along a path, as illustrated in FIG. 1. These cans are fed along in two parallel rows in the direction as indicated by the arrow *b*. As they reach the group selector station, they are separated into predetermined groups by a group selector mechanism. In the illustration, each of the two parallel rows is separated into groups of three, thus selecting a group of six cans ready to be packaged into one unit.

As a group of six cans arrives at station **3**, one of the blanks B is placed onto said group and travels in the same path and direction to station **4**, where means, such as a folding plate, are provided to cause the sides of the blank B to be bent or folded down against both sides of said group.

The group next travels to station **5**. In its travel from station **4** to station **5**, the bottom flaps of the carton were folded upwardly into full overlapping position. At this point, the group of six cans is still resting upon the supports **37**, **37***a* along which it has been travelling. After the bottom flaps have been completely overlapped, the group with the carrier wrapped around it leaves its support so that the bottoms of the cans are now in contact with the overlapped flaps of the bottom of the carrier.

From station **5** the package now travels to station **6** where the bottom flaps are locked together by locking fingers **10**, as will be more fully described hereinafter. After the bottom flaps have been interlocked, the package is complete and leaves the machine in the direction of the arrow *c*.

At the bottom of FIG. 1 there can be seen one of the lower endless sprocket chain belts **11** positioned beneath one of the upper endless chain belts **12**. These chains are powered by the same motor and operated by the same interconnected shafts and gears so that they are synchronized to travel at predetermined speeds in timed relation to each other, as hereinafter more fully described.

The blocks **13** attached to the upper endless sprocket chain belts **12**, in addition to guiding the blanks B along the top and around the curved guides **8** onto the cans **9**, also push the upper portion of the cans and the blank along its path of travel. At the same time that these blocks **13** are pushing, the pusher bars or flights **14** which are attached to the lower endless chain belts **11** act to push the bottom portion of the can group and carrier, thus giving a uniformly even push to the top and bottom of the cans, and carrier, simultaneously.

In FIG. 2, which is a detailed side view of the hopper of my invention, there is shown a magazine or stack of blanks B. These blanks are placed into the hopper H by hand or other suitable manner. This stack is supported at the bottom by flange **15** and by movable fingers **16**, which latter are pivotally attached to rocker arm **17**. This rocker arm is connected to link **18** which is in turn actuated by cam **18***a* (see FIG. 4) in any usual standard manner so as to impart a back and forth rocker motion to rocker arm **17**, which pivots about shaft **121** (as illustrated in FIG. 2) suitably connected to frame F.

Positioned beneath the stack of blanks B in hopper H are suction cups **19**. These cups are aligned and are connected to pipe **20** which in turn is connected by hose connections **20***a* to vacuum manifold **98** (see FIG. 4). The latter is connected to a vacuum pump (not shown). The pipe **20** is connected to and supported upon rocker arm **22** which is pivotally supported upon a rotatable shaft **23** which in turn is supported in the usual manner to the standards which support the machine elements.

Pivotally attached to the same shaft **23** is another rocker arm **24** having a bar **25** extending upwardly from its free end, while at the other end of arm **24** is secured by nut and bolt **26** a roller **111***a* upon which means, such as a cam **111**, operates for moving said rocker arm **24**. When the cam end of arm **24** is pulled downwardly, the other end with its bar **25** moves upwardly against the bottom of the stack of blanks B.

When the bar **25** is in contact with the stack, the suction cup **19** is also in contact with the stack, which is resting upon and is supported by fingers **16** and flange **15**.

At a predetermined time the finger support **16** is caused to move outwardly away from the stack by movement of link **18** pulling upon end **21**, causing the arm **17** to pivot about shaft **121**. The removal of this support causes the weight of the stack to rest upon bar **25**, and gives a flush contact with suction cup **19**. The support arm with its bar **25** moves upwardly to take the weight. At a predetermined point the vacuum goes on and the suction cup begins a downward pull on the forward edge portion **27** of the blank (as hereinafter more fully explained). When the edge portion of the blank is pulled down a sufficiently short distance, the fingers **16** begin to return to their normal position to support the stack of blanks. However, since the bottom blank is held away from the stack by the suction cups, the fingers **16** do not touch the held-away blank but continue in their path of movement above it and in under the stack. As soon as the fingers **16** come into supporting contact with the stack, the bar **25** moves away from the stack, thus leaving the bottom blank free to be pulled away.

During the time the bottom blank is being moved from beneath the stack, nip rollers **28**, **28***a* are in operation. These rollers during the operation of the machine are continuously rotating. These rollers are positioned adjacent the forward end of the bottom of the stack so that as the suction cup brings a single blank B downward, its edge touches the lower nip roller **28***a*. At this time, the upper nip roller shaft **29** about which roller **28** is rotating is caused to move in an arc in a direction towards the free edge **27** of the blank B. And, since both rollers are rotating about their shafts in the direction of the arrows, they will grip the edge of the blank when the smaller or upper nip roller shaft **28** in its arcuate movement comes into contact with the top of the blank B.

As the blank B moves between these nip rollers **28**, **28***a*, it travels down onto endless chain belts **30** for delivery to endless chain belts **12** (see FIG. 3B). The chain belts **12** travel around sprocket gear wheels **32** in the direction of the arrow, as indicated. This causes the blank B to be inverted and to be positioned upon the incoming cans, as herein more fully explained.

Following the same path as the belt, the carton sides are caused to be bent in a downward direction along score lines **41**, **42** (see FIG. 10) along the sides of the cans **9**. The means for doing this are the two side wall folding blades **33**. As the leading edges of the horizontally extended sides of the carrier come into contact with blades **33**, they are gradually caused to fold downwardly as a result of the inclined downward cut of the blades **33** as indicated at **34** in FIGS. 3A, 3B. As the carton sides hit the points **34** of the blades **33**, the continued pressure of the carton against said edges of said blades causes the carton sides to follow the path of the inclined edge in a downward direction until said sides are forced against the outer sides of the can group **9**.

As the carton travels along with its sides folded down, the bottom flaps are now being folded inwardly and upwardly towards the bottom of the said can group. This is accomplished by means of bottom folding blades **35**, **35***a* acting in cooperation with vertical folding plate **35***b*.

The cans **9** travel from the group selector mechanism (as shown in FIGS. 1 and 3B) and pass onto the can support swords **37**, **37***a*, at which point the blank B is placed on the cans at station **3**. They continue their travel onto and along said supporting swords **37**, **37***a* under which the bottom flaps are completely overlapped, after which the package in continuing its travel leaves the said supporting swords **37**, **37***a* and travels onto receiving platform **38**,

38*a* along which the said bottom flaps are interlocked, as explained hereinafter.

In order to clearly understand the interlocking and how it is accomplished by means of fingers 10 (see FIGS. 1 and 3A), we will first refer to the blank illustrated in FIG. 10. This blank is scored along transverse lines 40, 41, 42 and 43, which score lines divide the blank into a top wall 44, side walls 47, 48 and two bottom half flaps 49 50. The top panel member 44 has two apertures 45 for finger gripping of the carrier.

The side wall panels 47 48 are joined to opposite edges of the top panel 44. Each of the side wall panels 47, 48 has attached at its bottom through score lines 40, 43, respectively, bottom closure flaps 49, 50. At the outer edge of bottom flap 49 there is cut a locking tab 52. This tab is forced into aperture 51 of flap 50 by fingers 10 after the carton has been completely wrapped around the cans 9 as the package travels through the machine.

The said fingers having forced the locking tab 52 into aperture 51 the two bottom flaps 49 and 50 are thus held in overlapped relation and are prevented from spreading apart while the glue, which has been applied to these flaps, sets.

Now referring to the fingers 10 of FIGS. 1, 3A and 34, it will be seen at this point that the two bottom closure flaps 49, 50 have been completely overlapped, with flap 49 on the inside and flap 50 on the outside (as shown in FIG. 11). With these flaps in this position, the fingers 10 are caused to rise to contact the bottom of the carton, each finger hitting a locking tab 52 (as herein explained). The size and shape of each finger is such that they fit into apertures 51 so that with the continued upward movement of the fingers, the locking tabs 52 are forced into apertures 51 until the shoulders of the tabs 52 rest on the inner surface of flap 50, thus locking one flap to the other. Any number of locks may be used. Also, any number of fingers may be employed, as desired.

These fingers 10 (as shown in FIG. 34) are supported in a vertical position on plate 53. This plate 53 is in turn movably supported by support 53*a*, which is supported by two rotatable circular discs 54 to which it is connected by means of shafts 55. The construction, which is shown in FIG. 34, consists of short shafts 55 upon which said discs 54 are mounted. Each shaft 55 is positioned off-center preferably near the periphery of the said discs. These shafts 55 are aligned and the plate 53*a* is secured thereto by inserting the shafts 55 into apertures so that when the discs 54 are rotated in the direction of the arrow *e* (FIG. 34), they cause the plate 53*a* to rise and to travel in a circular motion. In FIG. 34, the locking fingers and supporting mechanism are shown in upper position with the fingers 10 inserted into the apertures 51 while at the bottom there is shown, in phantom, the same mechanism in its lowermost position. The fingers 10, which follow the motion of the plate, rise in a circular motion, enter into the apertures 51 of the bottom flap, causing the lock 52 to also enter the said apertures. Since the carton is continuously travelling in a straight forward line, it is necessary for the fingers to force the lock tab into the aperture, enter the aperture while at the same time travel in the same direction as the carton and then leave the said apertures. The fingers leave the apertures when they continue their circular motion which brings them downward, as indicated by the arrow *e* of FIG. 34, into the position indicated in phantom.

The diameter of the discs 54 and the vertical height of the fingers are predetermined so that one continuous circular motion brings the fingers into the apertures of a moving carton directly above them, continues along its path to leave the apertures, go downward and then begin to rise to enter the apertures of the next oncoming carton B.

This continuous circular motion of the fingers 10 thus enables the continuously moving cartons above them to have the bottom flaps of the blanks B locked together without any interruption in the flow or travel of the cartons.

In order to provide protection for the fingers 10 and the package in the event the fingers for some reason do not freely enter the apertures, or if the carton presses against the fingers, there is provided a spring 57 which is connected at one end 58 to the forward end of the movable platform 53*a* and at its other end 59 to the top movable plate 53 which supports the fingers 10. Thus, when pressure is exerted in a direction against the fingers, the said fingers and plates tend to move away from the pressure and then return under the spring tension after the pressure has eased off.

Up to this point we have followed the travel of the carton from the hopper H onto the cans and from station 1 through stations 2, 3, 4, 5 and 6. We will now look at FIGS. 1 and 5B to follow the travel of the cans 9 as they are fed into my machine and as they travel into and through the selector station shown in FIG. 3B.

This selector mechanism is best understood by referring to FIG. 5B, which is a top plan view of the group selector and can infeed end of the machine. It comprises endless sprocket chain belts 61, 62 and 63 which travel in horizontally disposed paths. These chain belts travel in paths that are in a plane at right angles to the plane of the travel paths of belts 11 and 12. Securely attached to chain belts 16 are a series of spacer elements 61*a* which are spaced apart a distance equal to the diameter of three cans to be packaged. These spacer elements separate each row of cans into groups of three. As they travel in the direction of the arrow *f*, the cans 9 travel in the direction of the arrow *h*. The chain 61 travelling around horizontally disposed sprocket wheels 68 causes the spacer elements, which are secured thereto in any suitable manner, to enter the space between two cans. And since these elements 61*a* are spaced apart as aforesaid, these elements will group cans 9 in each row in groups of three.

Endless chain 62 is operated by sprocket wheel 64 which is connected in any standard mechanical manner to a source of energy. Chain 62 also encircles sprockets 65, 66 and 66*a* to keep the travel of chains 61 and 63 at the same rate of speed. Chain 61 encircles sprocket 65 and sprockets 67, 68 while chain 63 encircles sprocket 66 which drives said chain. It also encircles and meshes with sprocket wheels 69, 70.

Chain 63 has securely affixed to it a series of elements 76 that act to keep the can groups of three separate while at the same time pushing the said groups forward onto plates 37 and 37*a*, where the blocks 13 of chain 12 and the pusher bars 14 of chain 11 (see FIG. 3B) take over the pushing of the groups of cans in their travel through stations 4, 5, and 6 of FIG. 1.

As shown in FIG. 5B, there are two sets of such chains and sprockets, one for one row of cans as heretofore explained, and the other set for the companion row of cans. As the cans 9 are fed into the infeed end of the machine, they are pushed by members 61*a* on endless chains 61 which propel or carry the cans into and through the group selector mechanism in two parallel rows so that as the cans come under the blanks being carried on upper chain 12, said blanks are placed upon each group of six cans 9.

The cans are placed on delivery chains 74 in two parallel rows so that we have cans coming along in the direction of the arrow *h* and under the moving power of endless chains 74, and while so travelling they come under the action of the group selector chain 61 and spacers 63. They continue moving on chains 74 to the end of the said chains at 75 where the pusher members 76 seucured in any standard manner to said chain 63 take over the pushing forward of the can groups and push them from platform 77 onto plates 72, 73 located between the ends 75 of the chains 74 and supporting swords 37, 37*a*.

As the can groups leave the pushers 76, the pusher bars 14 come up from the bottom, as shown in FIG. 3B, to take over the pushing of the groups of cans while the pusher

blocks 13 of chain 12 come down from the top to push the tops of the cans, as heretofore described.

Similarly, spacer elements 76 travel in alignment so that as they engage the two trailing cans of a group of six, they keep these cans travelling parallel to each other and in transverse alignment with each other.

The cans have now been selected into groups of six, and as the blank B of FIG. 10 comes under the pressure of side wall folding blades, the side walls 47, 48 extend downwardly on both sides of the group of six cans with bottom flaps 49, 50 also extending downwardly.

As the group continues its travel, the downwardly extending flaps 49, 50 come into contact with bottom flap folding blades 35, 35*a* (see FIG. 5A). These two folding blades converge slightly, as shown in FIG. 5A. In addition, each blade is shaped as shown in FIG. 5A with their inner corner ends cut diagonally, as at 84.

With the blades thus shaped and when in position in the machine, as shown in FIG. 5A, and with their inner corners 84 each cut at an angle to the path of travel of the group of cans 9 with the blank B placed on top of said cans and with the sides of the blank folded down parallel to the sides of the cans being packaged, the downwardly hanging bottom flaps 49, 50 hit against the cut inner corners 84. Flap 50 comes into contact first with blade 35*a*.

The size of blank B is such, and the folding blades 35, 35*a* are so positioned beneath the supporting swords 37, 37*a* that the downwardly extending flaps 49, 50 extend downwardly lower at this point of the machine than the said blades. This causes the flaps 49, 50 of the blank B to come into direct contact with sections 84 of said folding blades 35, 35*a* (see FIG. 5A).

As flap 50 comes into contact with edge 84*a* of blade 35*a*, the flap is urged inwardly towards sword 37*a*. Immediately after flap 50 hits edge 84*a*, its companion flap 49 comes into contact with edge 84 of blade 35. This urges flap 49 inwardly beneath sword 37. This inward motion of both flaps also causes these flaps to be urged upwardly. As the flaps rise, the bottom surfaces thereof come into contact with the infeed end portions of the said blades 35, 35*a*. As the cans and blank continue their travel, the bottom flaps ride over the tops of said blades. At this point, with the extended shoulder portions 84 extended towards each other, the flaps 49, 50 are now completely overlapped and folded at right angles to the side walls 47, 48 of the blank B, as shown in FIG. 29. In this condition the package enters between flanged members 39. There are two of these members. One is secured to and positioned on blade 35, while the other is secured to and positioned on blade 35*a*, as shown in FIG. 5A. The inner portions of these members are flanged at 46, as shown in FIG. 22. The flanged edges of both members are so spaced from each other that when the package travels between them, the flanged edges 46 press tightly against the sides 47, 48 of the carton B, thus tightening the carton about the cans 9. As illustrated in FIG. 22, the edges 46 press against the sides 47, 48 at a point above the extending chimes of cans 9. By the use of the flanges, pressure is allowed to be exerted against sides 47, 48 and still the chimes of the cans are allowed to pass beneath said flanges.

In order to maintain the complete folding and overlapping during the remainder of the travel of the wrapped-around group of cans, the center folding vertical plate 35*b* is positioned beneath supporting swords 37, 37*a* and transversely between folding blades 35, 35*a*. In this connection, it should be noted that folding blades 35, 35*a* extend in a plane below supporting swords 37, 37*a* which support the travelling cans 9 in their travel from position 4 to position 5 and that these blades do not extend beyond the ends 86 of swords 37, 37*a*, so that the flaps 49, 50 are completely overlapped when they enter upon receiving blades 38, 38*a*.

Blade 35*b* is supported in any well known manner to frame F and extends upwardly and then arcuately to a point 85 beneath swords 37, 37*a*, and then extends substantially parallel to the bottom of swords 37, 37*a* (as shown in FIG. 3A) so that the bottom surface of overlapped flap 49 comes into contact therewith to maintain said overlap in the travel of the package from the supporting swords onto the receiving blades so that said flaps 49, 50 will be in fully overlapped position while the package is on said swords 38, 38*a* and continues so until the locks have secured said flaps together. These locks keep the flaps 49, 50 together to enable the glue to set with the flaps in place.

The locking tabs 52 are pushed through apertures 51 of the blank B (illustrated in FIG. 10) by the locking mechanism shown in detail in FIG. 34 and shown in top plan view in FIG. 5A where a portion of the receiving plates 38, 38*a* have been cut away for a better view of the said locking mechanism and its position in the machine.

At the package discharge end of the machine there is also illustrated a top plan sectional view of the hopper H showing the movable fingers 16, heretofore referred to in the description of FIG. 2.

As shown in FIG. 2, there are serrated grippers 88 positioned between the fingers 16. Also shown are two endless sprocket chains 30. Transversely, these chains are positioned between the lower chains 12 and the upper endless chains 11 and are used to aid in the travel of the blanks B from the hopper H in a forward and downward direction onto chains 12 which carry the blank to the inversion element 8 at station 3.

The serrated grippers 88 are also shown in cross-sectional view in FIG. 2. There are a plurality of transverse serrations 89. Each serration is about the width of the thickness of the blank 10. As the blanks in the magazine or hopper descend towards the fingers 16, they are separated at this point from each other by these serrations. The forward edges of the blanks snap from one serration to the next lower one in their downward travel. This allows the bottom blank at this point to be separated from the one above it when the suction cups 19 pull the bottom blank at its forward edge further downward after the fingers 16 have been moved outwardly and away from the stack. It prevents more than one blank at a time from being pulled downwardly by the suction cups 19.

Referring now to FIG. 4, there is shown the upper chains 12 with their attached pusher blocks 13. These chains 12 are driven by the usual mechanical means. In this instance the chains are propelled by sprocket wheels 32 mounted upon rotatable shaft 90 driven by mechanical means connected to a source of energy, such as a motor.

Endless chains 30 also travel over sprocket wheels 91 mounted on rotatable shaft 92. Mounted on the same shaft 92 is the lower nip roller 28*a*. Positioned immediately above this shaft is the upper nip roller 28 mounted upon and rotatable with shaft 29. This latter shaft is connected to lower shaft 92 through meshing gears 94, 94*a* so that the motion of each shaft and its connected sprocket wheels and attached chains are synchronized and travel in a preset and predetermined speed and relation to each other.

The planetary motion of upper nip roller 28 in relation to lower nip roller 28*a* is controlled through arm and link connections 95, 95*a*, 95*b*, which in turn are actuated by cam means 96. The latter is mounted upon a main drive shaft 97 and activates arm and link connections 95, 95*a*, 95*b* at predetermined times in accordance with the rise or dwell of said cam 96. As shaft 97 rotates, it rotates cam 96.

Connected to the same shaft 97 are the arm supports 22 for the pipe 20 upon which is supported suction cups 19, the support arm 24 for the bar 25, and the manifold 98; and the endless chains 99 riding over and being supported by sprocket wheel 100 and by wheel 101 mounted in shaft 104. Mounted on rotatable shaft 104 is sprocket wheel 101*a*, over which rides endless chain 102, which lat-

ter also rides over sprocket wheel 103. Thus it can be seen that the pulling down of the blank B by suction cups 19, the delivery of the blanks over chains 30, the speed of chains and the moving of fingers 16 and bar 25 as well as the speed of chains 30 are all controlled by, and timed by the main drive shaft 97 which is connected to a source of energy in any suitable mechanical manner.

In addition, by connecting manifold 98 to shaft 97 the vacuum and the breaking of same is controlled through vacuum hose 20*a*, which is connected to the pipe 20 which is in turn connected to suction cups 19. The manner of making and breaking this vacuum is more fully explained hereinafter in connection with FIGS. 12, 13, 14 and 15.

The pipe 20 and the suction cups 19 are supported by arms 22, which in turn are supported upon shaft 23 actuated by cam 109 on shaft 97, as shown in FIG. 4, thus causing pipe 20 to ascend and descend in a predetermined arc so that its supported suction cups 19 hit the bottom blank in the magazine and then pull said blank downwardly at its forward edge after fingers 16 pull away from the stack of blanks, allowing the blank to be pulled therefrom, and thereafter the fingers 16 return to hit the bottom of the next blank in the magazine.

In this same figure the bar 25, which in its upward movement supports the stack of blanks when finger 16 is moved therefrom, is shown supported by arms 24 connected to and pivoted about shaft 23. The rocker arms 24 are actuated by cam 111 in any usual standard manner. Said cam is mounted upon rotatable shaft 97.

Also attached to and supported by rotatable shaft 97 is vacuum manifold 98, the details of which are illustrated in FIGS. 12, 13, 14 and 15. In FIG. 12 there is shown the hose connection 20*a* leading to vacuum cups 19. At the bottom of this figure there is shown the hose connection 20*b* to the vacuum pumps (not illustrated). Between 20*a* and 20*b* there is shown the valve mechanism for making and breaking the vacuum in the suction cups 19. As there shown, a stationary hermetically sealed enclosure 112 is provided. Within this enclosure, as illustrated, is rotatable shaft 97.

Surrounding shaft 97 there is provided a plate 112 with an aperture 114 (FIG. 15) at the top portion thereof adapted to receive hose 20*a* which connects to the suction cups 19. At the bottom portion there is provided a second aperture 113 adapted to receive hose 20*b* connected to the usual vacuum pump. Plate 112 is stationary, while shaft 97 rotates within central aperture 103.

Within aperture 114 is an opening 115, while aperture 113 has opening 116 leading therein. Directly positioned against the lefthand side of plate 112 (as shown in FIG. 15) is another plate 117. This latter plate surrounds shaft 97 and is securely attached thereto so that it rotates with said shaft.

This plate 117, shown in FIG. 14, has a cut-out portion 118 along its circumference. Plate 117 also has a recessed portion 119 cut out on its inner side, as shown by the dotted lines of FIG. 14, which latter FIG. 14 is a view along the lines 14—14 of FIG. 15.

FIG. 12 is a cross-sectional view along the lines 12—12 of FIG. 15. As there shown, the plate 117 rotates in the direction of the arrow in FIG. 12 about shaft 97. In its travel, and as illustrated in FIG. 12, the hose opening 115 is about to be crossed by the recessed portion 119 so as to permit the air to be sucked from the suction cups 19. This plate 117 continues its rotation until cut-out portion 118 travels across opening 115. This cut-away portion 118 thus vents air into said opening 115 and shuts off the vacuum from suction cups 19 which releases blanks B which said cups had previously drawn from the hopper H.

Opening 116 is always within recess 119 so that the vacuum pump (not shown) can remain in continuous operation at all times while the machine is in operation.

As the plate 117 continues its rotation, air is always being sucked from recess 119 so that when recess 119 travels across opening 115, the suction is communicated to said opening 115 and to cup 19, which sucks the bottom blank towards said cups 19.

FIGS. 6, 7, 8 and 9 illustrate the movements of the suction cups 19, the support fingers 16, and the bar 23, together with the operation of the nip rollers 28 and 28*a*. As there shown, the bottom portion of the hopper H is illustrated in FIG. 6 in its normal position. The blanks, such as the blanks of the carrier B (FIG. 10) are stacked in the magazine and are supported at the bottom by flange 15 and fingers 16 and by the support bar 25 with suction cup 19 pressed against the bottom blank. Fingers 16 are pivotally movable about shaft 121, as heretofore explained in connection with FIG. 2.

In its motion the support bar 25 is raised to take the weight of the stack off of fingers 16, the weight on flange 15 remaining as it was. As the weight is lifted off fingers 16 by bar 25, said finger moves outwardly from under said stack in the direction of the arrow of FIG. 7 and the suction cup is retracted downwardly, bringing with it the forward edge of the bottom blank, as shown in FIG. 8.

When the suction cup has lowered the bottom blank a predetermined distance, the finger 16 is then moved back in between the forward edge portion of the bottom blank, and the stack, which during the movement of the finger 16 was supported by support bar 25, is now supported by the finger 16 and flange 15. The bar 25 then descends so that it is out of contact with said bottom blank while the suction cup brings the said blank down into contact with lower nip roller 28*a*. At this point the plate aperture 118 crosses opening 115 (FIG. 13), thus breaking the vacuum and freeing the blank from the hopper.

And while the movements of the support bar 25, fingers 16, suction cups 19 were taking place, nip roller 28*a* was continuously rotating clockwise (as viewed in FIGS. 6, 7, 8, 9) in the direction of the arrow and nip roller 28 was continuously revolving in a counterclockwise direction, as indicated. Rotating nip roller 28*a* remains in its position so that the forward or leading edge portion of the blank comes to rest thereon. As the blank was descending, the upper revolving nip roller 28 was moving in an arc about roller 28*a* from its position shown in FIG. 6 to the position shown in phantom in FIG. 9 so that both nip rollers now act on the moving blank to propel it through said nip rollers onto chains 30, which latter carry said blank onto chain 12 in a forward and inclined downward direction.

In FIG. 16 there is shown a sectional view taken in the direction of the arrows 16—16 of FIG. 3A. Nip rollers 28 and 28*a* are propelling carton blank B forward, as heretofore explained. Endless chains 30, onto which blank B is propelled, carry the carton from said nipper rollers onto chains 12. Chains 30 are supported by and ride over sprocket wheels connected to shafts 90, 92. Shaft 90 also supports sprocket wheels 32 over which ride endless sprocket chains 12 carrying block pushers 13.

The details of these block pushers are shown in FIG. 17. They are rectangular and are attached in any well known manner to said chains 12. The blocks on one chain are transversely aligned with the blocks on the companion chain so that when they push the blank B by its trailing edge, they keep said blank at right angles to the path of travel of said chains.

Each block has its center portion cut out, as at 122, sot hat when the cans or the chimes of the cans protrude from the blank, the pressure of these blocks will be against the cans 9 and simultaneously against the trailing edges of the carton blanks instead of against the cans 9 alone or the blank alone, which will be more fully explained hereinafter in connection with FIGS. 25 and 26.

FIG. 18 is a sectional view taken along the lines 18—18 of FIG. 3B showing the two trailing cans of the selected group of cans being pushed forward by the separator elements 76 (shown in phantom). These separators 76 are carried by endless chains 63 in a horizontal

path about sprocket wheels 70 supported upon rotatable shafts 123. These cans are being pushed along platform 77 as herein described.

FIG. 19 is a sectional view taken along the lines indicated by arrows 19—19 of FIG. 3B showing the carton B as it travels through the inversion elements or curved guide members 8. In this view the carton blank B is being positioned onto cans 9 which are travelling along on support swords 37, 37a under the pushing action of flights or pusher bars 14 attached to endless chains 11 propelled by sprocket wheels 36a, as illustrated in FIG. 1.

At this point it should be noted that supporting blade or sword 37a is at a higher plane than its associated blade or sword 37. This is positioned so that the bottom half flap 50 is folded upwardly in advance of the bottom half flap 49, as herein more fully described and illustrated in FIGS. 22 and 28.

FIG. 20 is a view taken along the lines 20—20 of FIG. 3B. In this figure there is shown the pusher blocks 13 which are attached to endless chains 12 pushing blank B and the cans 9 along support blades with the flights 14 also aiding in pushing the cans forward. On both sides of the path along which the cans and carton blank travel are side folding blades 33 (see FIG. 3). This figure shows the blank just after it comes under the influence of the downwardly inclined edge of said blades 33, causing the sides to be bent downwardly against the sides of the selected group of cans.

As these cans and blanks continue their travel, the side walls 47, 48 continue in contact with the side folding walls or blades 33 and come under the influence of the lower portion of the inclined forward or leading edge of the same side walls, thus continuing to cause the side walls 47, 48 to move closer to the side walls of the cans to be packaged. At this point it should be noted that the bottom half flaps 49, 50 are extending in a downward direction, at which time these half flaps come into contact with bottom folding blades 35 and 35a. Flap 50, as it is to be folded upwardly first, comes into contact with bottom folding blade 35a before flap 49 comes into contact with bottom folding blade 35, as shown in FIGS. 21, 28.

Also, the inner edge portion 35c of blade 35a gradually extends inwardly further than the inner edge of 35 to also cause flap 50 to precede flap 49 in its upward folding, as shown in FIGS. 22, 28 and 29.

Similar parts are identified by the same numerals throughout the many figures in the drawings, so that no further reference need be made to the remaining details of this figure.

FIG. 22 shows the cans and carrier in a still further advanced position and is a view taken along the lines 22—22 of FIG. 3A showing the flap 50 being advanced towards the bottoms of the cans 9 while flap 49 has not as yet come into contact with bottom folding blade 37.

FIG. 23 is a view taken along the lines 23—23 of FIG. 22, and shows the bottom flap 49 extending downwardly. Part of the carton has been torn away to show the cans 9.

FIG. 24 is a plan view along the lines 24—24 of FIG. 23 with a top part of the carton torn away to disclose the cans 9 travelling along the supporting swords 37, 37a with the top pusher blocks 13 pushing them forwardly.

FIG. 25 is a top plan detailed sectional view showing the pusher block 13 pushing against the can 9, which extends into opening 122 of said block 13 while the leading portions 122a on both sides of the said opening 122 push against the trailing edge of the blank B.

FIG. 26 is a detailed sectional view along the lines 26—26 of FIG. 25 showing the chimes 9a of the cans 9 in contact with the portion 122 of the block 13 while the portion 122a is in contact with the trailing edge of the top panel blank B. Blocks 13 are attached to and supported by endless chains 12.

FIG. 27 is another detailed sectional plan view. It is along the lines 27—27 of FIG. 23 and shows the pusher bars or flights 14 attached to and supported by lower endless chains 11 travelling around and supported by sprocket wheels 36b. These wheels are supported upon rotating shafts suitably journalled in the frame F and mechanically connected to a source of power, as herein described. These flights 14 push against the lower portions of the cans 9 while the blocks 13 simultaneously push against the upper portions of the same cans 9.

FIG. 28 is a detailed sectional view taken along the lines 28—28 of FIG. 3A. This figure shows the further advancement of the cans 9 and carton B. And, it further shows the inward and side tapering of the supporting swords 37, 37a with the flap 50 coming into first contact with the bottoms of the cans 9 with flap 49 coming into overlapping relationship with said flap 50. This figure also illustrates the offset of the bottom folding blades 35, 35a (see FIG. 31), as well as the offset of the supporting swords 37, 37a, so that flap 50 is folded inwardly in advance of flap 49.

FIG. 29 is a detailed sectional view along the lines 29—29 of FIG. 3A, and shows the two bottom flaps in completely overlapped, folded relation to each other and to the side walls 47, 48 of blank B and the cans 9. Immediately beneath the supporting swords 37, 37a there is positioned a vertical folding plate 35b. As the carton has its bottom flaps thus overlapped they then come under influence of this vertically positioned folding plate 35b. The forward edge and the forward end of the top edge of plate 35b are both curved downwardly, as illustrated in FIG. 30. The overlapped flaps come between the top portion of said plate 35b and the bottom portions of supporting swords 37, 37a, thus pushing said flaps against said swords to completely avoid any possibility of the said flaps sagging. In this fully overlapped position beneath said supporting swords, the package is now transferred over onto transfer blades 38, 38a, as a result of the continuous pushing of the carrier and cans by pusher blocks 13 and flights 14, as heretofore described.

In addition to the said support swords 37, 37a being in different planes to permit the folding of one bottom half flap 50 before the other 49, the top surfaces of one sword 35a has a portion thereof in a higher plane than the top surface of the other sword 37, as illustrated in FIG. 22. This, together with the spacing of the side guide members 39 a predetermined distance from each other, causes the chimes of the cans 9 in one row to ride over and upon the chimes of the adjacent row, also illustrated in the same FIG. 22. The distance between the guide walls 39 (FIG. 22), where this overriding takes place, is less than the outside of the diameter or periphery of the chimes of two such cans or other articles being packaged. Thus the cans 9 travel along these swords 37, 37a which form the bottom of the passageway along which these cans travel and in doing so, one row is higher than the adjacent row of cans. The guide walls cause one row to press close to the other row, as shown in FIG. 22.

A portion of these two swords 37, 37a is shown in FIGS. 31 and 32, respectively. Both these views are of the bottom sides of said swords and are perspective views looking up from under the machine.

The sword of FIG. 31 has a portion cut off diagonally, as at 78, to permit flap 50 to start its folding move first. Both the swords of FIG. 31 and FIG. 32 have flat portions 81 and tapered portions 79 to allow for easier folding. At the ends of both swords there are further tapering portions 80 for the same purpose.

FIG. 35 is a sectional view taken in the direction of the arrows 35—35 of FIG. 34. As there shown, a group of cans 9 with the blank B wrapped thereover have travelled to a position immediately above the flap-locking mechanism of station 6 (see FIG. 1 for the location of this station in the complete machine). Flap 50 with its aper-

tures 51 is positioned above flap 49 with each of its lock tabs 52 positioned directly beneath the respective aperture 51 of flap 50.

As the fingers 10 rise, as heretofore explained in connection with FIG. 34, they will push tabs 52 into apertures 51 to such an extent that the shoulders of the tabs will rest upon inner surface of the flap 49, thus securely locking flaps 49 and 50 together. This locking of these two flaps keeps the flaps together while the glue heretofore applied to said flaps is setting.

The fingers 10 are positioned on plate 53, which is supported by plate 53*a*. This latter is in turn supported by shafts 55, which are, in their turn, supported upon rotatable shafts 124. This shaft is suitably journalled in support frame and mechanically connected through gears 56 and chains to a power source, such as a main drive shaft connected to a motor (not shown).

FIG. 36 is a bottom plan sectional view along lines 36—36 of FIG. 35 to illustrate the position of the locking tabs 52 inserted into their associated apertures 51. This is shown at 125, and shows that these locks are positioned in the spaces between the cans 9.

The connection from the main drive shaft is through endless chains, sprocket wheels, shafts and cams, so that all moving elements of my machine are synchronized and travel in predetermined paths and at predetermined speeds, which is accomplished as follows:

Referring first to FIG. 4, it can be there seen that main drive shaft 97 is connected through mechanical means to a source of power, such as a motor (not shown). This rotatable shaft 97 has sprocket wheels 100 mounted thereon. Rotatable shaft 104 has sprocket wheel 101 mounted thereon. Endless chain belt 99 rides over and is supported by sprocket wheels 100 and 101. In this manner the speed of rotation of both shafts is maintained constant as to each other.

Also mounted on said shaft 104 is sprocket wheel 101*a*, and shaft 90 has sprocket wheel 103 mounted thereon. Riding over and supported by sprocket wheels 101*a* and 103 is endless chain belt 102, thus keeping the speed of rotation of shafts 90 and 97 constant and synchronized in relation to each other.

Also mounted on shaft 90 are sprocket wheels 32 over which ride endless chains 12, thus maintaining the speed of endless chain 12 constant in relation to the rotation of shafts 90, 104 and 97.

Transversely positioned on both sides of chains 12 are sprocket wheels 30*a* over which ride endless chains 30. These latter chains ride over wheels 91 mounted on shaft 92. Chains 30 convey blanks B from nip rollers 28, 28*a* onto conveyor chains 12.

As nip roller 28*a* is mounted on shaft 92, we then have the speed of rotation of shafts 97, 104, 92 and 90 synchronized and in constant relation to the speed of rotation of nip roller 28*a* and the speed of travel of endless chains 12 and 30.

Rotatable shaft 29 is suitably mechanically supported above shaft 92 and is connected thereto through meshing gears 94, 94*a*, mounted upon shafts 92 and 29, as shown in FIG. 4. Thus the rotational speed of nip roller 28*a* is controlled by the speed of rotation of shaft 92 through driving gear 94, thus controlling the rotational speed of driven gear 94*a* and shaft 29.

In this manner the number of rotations and the speed the nips 28 and 28*a*, and the planetary motion of roller 28 arcuately about and above roller 28*a*, is constant in relation to the movements of shafts 97, 104, 92 and 90 and also as to the speeds of chains 30 and 12.

Mounted on rotatable shaft 90 are sprocket wheels 32 over which ride chains 12. Also mounted on shaft 90 (see FIG. 3A) is a meshing gear 149, while mounted on shaft 147 are sprocket wheels 30, over which ride chains 11. Also mounted on shaft 147 is a gear 150. Shafts 90 and 147 are connected to each other through gears 142, 143, 144, 149, 150 as shown in FIG. 3A, so that chains 11 and 12 are synchronized with each other.

Referring to FIGS. 3A and 5A, shaft 147 has sprocket wheel 127 mounted thereon, over which rides endless chain 126. Chain 126 also rides over sprocket wheels 128, 129, all of which sprocket support said chain. Sprocket wheel 129 is attached to and supported by rotatable shaft 124. Also mounted on shaft 124 is a driving gear 130 which meshes with and drives gear 131, which in turn meshes with and drives gear 132. Gear 132 is mounted on rotatable shaft 124*a* so that both shafts 124 and 124*a* rotate at the same speed and remain constant in respect to each other.

Attached to the other ends of shafts 124, 124*a* are circular plates 54. To each of said plates are attached, as herein explained in connection with FIG. 34, the locking fingers 10.

As a result of the above connections, the motion of the fingers in relation to lower chain belt 11 is fixed and constant.

Gear 131 is mounted on rotatable shaft 133 which has a hand grip 134 by means of which said fingers may be transversely moved to insure accuracy in said fingers entering apertures 51 whenever different sizes of cartons are used, or the locks are in different transverse positions.

Now referring to FIG. 5B, it will be seen that horizontally disposed sprocket wheel 64 is connected through a bevel gear box 135 to shaft 136 upon which is mounted vertically disposed sprocket wheel 133. Endless chain 138 rides over said sprocket wheel 133, over wheel 139, and over sprocket idler wheel 140. The position of sprocket wheel 140 is adjustable in a well known manner to tension said endless chain 138, whenever desired. Rotatable shaft 141 has mounted thereon sprocket wheel 139, while wheel 140 is mounted on rotatable shaft 142 journalled in frame F.

Shaft 141 is the shaft upon which is mounted sprocket wheels 36*a* over which travel endless chains 11 which have flights or pusher bars 14 attached thereto. In this manner the movement of the group selector mechanism is synchronized with the travel of the chains 11 so that the flights 14 arrive at station 3 directly in back of the selected group as it leaves pushers 76 (see FIG. 3B).

Endless chains 11 and 12 are synchronized through a series of gears 142, 143, 144 suitably supported upon shafts journalled in frame F intermeshed with gears 149 and 150 mounted on shafts 90 and 147. It should be understood that in place of meshing gears 142, 143, 144 we may substitute sprocket wheels mounted on shafts 90 and 147 plus an endless chain riding over such sprockets so as to interconnect said shafts.

In addition to synchronizing all moving elements, there is also provided means for adjusting the height of the upper endless chain section by mounting said section on jacks 145, 146 adjustable by cranks 148 in any well known manner.

While I have provided two laterally spaced top endless chains 12, as shown in FIGS. 1 and 16, I can provide a single top endless chain upon which is supported a plurality of spaced pusher blocks of sufficient width for each single block to push against two transversely aligned cans or rows of cans. Each of such single blocks can be provided with two scalloped or cut-out edge portions to perform the same function as the cut-out edge portion 122 of FIG. 17.

I claim:

1. In an automatic packaging machine, the method of packaging cans consisting of the steps of delivering to said machines the said cans to be packaged, then causing said cans to travel along a predetermined path while simultaneously delivering paperboard blanks with one face coated, coated faces downward, from a hopper to an endless conveyor belt, then causing said blanks to travel through semi-circular guide slots to invert said

blanks, then causing said blanks to lie one at a time, coated face upward, upon a selected group of cans to be packaged in said blank, then causing said blank to be folded about said cans, then securing the free ends of said blank to complete said package.

2. In an automatic packaging machine for cans and the like, a frame, a passageway along which cans can travel, said passageway supported by said frame, said frame having mounted thereon a plurality of rotatable shafts journalled in said frame, said shafts having fixedly mounted thereon sprocket wheels, said wheels supporting two upper laterally spaced movable endless sprocket chain belts whose lower reaches travel in substantially horizontal paths, others of said wheels supporting two lower laterally spaced movable endless sprocket chain belts whose upper reaches travel in substantially horizontal paths, each of said belts having secured to their outer surfaces a plurality of pusher members, said members being adapted to push cans forward during the process of being packaged, said members on each belt being spaced apart from each other a distance substantially equal to the length of the final package, one pair of belts being movable in a clockwise direction and the other pair being movable in a counter-clockwise direction so that the upper horizontal reaches of the lower belts and the lower horizontal reaches of the upper belts with their associated pusher members travel in the same direction, said upper belts and said lower belts being separated from each other by a distance substantially equal to the height of the cans being packaged, means for rotating said shafts to cause said belts to move at the same speed and means for wrapping a carton about said cans as they travel along said passageway.

3. The machine as claimed in claim 2, in which said machine includes a hopper supported by said frame adjacent the upper reaches of said upper belts, means for delivering the paperboard blanks from said hopper onto said upper reaches of said upper belts and in which the pusher members of the upper belts on the upper reaches push the paperboard blanks delivered from said hopper so as to convey them from said hopper onto the cans to be packaged and on the lower reaches push the paperboard blanks and the cans so that they travel through the machine.

4. The machine as claimed in claim 2, in which said machine includes a hopper supported by said frame, means for causing paperboard blanks to be delivered from said hopper, and means including curved guides to cause said blanks to be inverted during their travel through said machine.

5. The machine as claimed in claim 2, including means exerting pressure against the side walls of said carton simultaneously as the package travels along said passageway to tighten said carton around said cans, said means including guide walls on both sides of said passageway, said guide walls being converged inwardly from a lateral distance larger than the width of said package to a distance substantially the width of the exterior of said completed package.

6. The machine as claimed in claim 2, wherein the upper chain pusher members are blocks having their forward portions recessed and the lower chain pusher members are elongated bars bridging from one chain to its adjacent laterally spaced chain, said bars being spaced a predetermined distance from each other and parallel to each other, said blanks on each chain being spaced a predetermined distance from each other and parallel to the blocks on its adjacent laterally spaced chain.

7. The machine as claimed in claim 2, wherein means including folding guides are provided to fold the sides of a package blank downwardly against the sides of said cans, and other means to fold the bottom flaps of a blank upwardly against the bottoms of said cans during their travel along said passageway, said other means consisting of two adjacent folding blades lying in substantially the same plane, and a third vertically disposed folding plate having its top portion positioned adjacent the inner edges of said two adjacent folding blades, said top having a portion thereof inclined downwardly.

8. The machine as claimed in claim 4, wherein the hopper includes means for supporting a stack of blanks therein, said means including flanges having serrated ends.

9. The machine as claimed in claim 4, wherein means are provided for pulling said blanks from said hopper, said means including two nip rollers in juxtaposition to each other and to said hopper, one nip roller movable accurately about the upper portion of the other nip roller, and means including mechanical connections to a source of power for actuating said rollers.

10. The machine as claimed in claim 4, wherein the said hopper includes a plurality of vertically disposed uprights, a flange on one side of said hopper and movable fingers on the opposite side, a bar supported through movable arms connected to the frame of the machine, said bar being adapted to support the weight of a stack of blanks in said hopper, and vacuum cups connected to a vacuum pump, said cups supported by a pipe connected to and supported upon movable arms, said arms being supported by said frame.

11. The machine as claimed in claim 4, including means for delivering two rows of cans toward said belts and into the paths of the pusher members, and group selector means supported on said frame for selecting into separate groups a predetermined number of cans to be packaged, said group selector means including endless sprocket chain belts riding over and supported by sprocket wheels, said wheels being mounted upon vertically disposed rotatable shafts journalled in the frame of said apparatus, a plurality of spacer elements, said elements being secured to the outer surfaces of said belts and spaced apart a predetermined distance.

12. The machine as claimed in claim 11, wherein there is provided a second pair of endless sprocket chain belts mounted upon sprocket wheels supported by vertically disposed rotatable shafts journalled in the frame of said apparatus, said second pair of chain belts being mechanically synchronized with said first mentioned chain belts, pusher members, said members being secured to said second belts and being adapted to engage the sides of the last cans of a predetermined group as they travel from said first mentioned selector means.

13. The machine as claimed in claim 4, wherein said curved guide members are in juxtaposition to the upper belts and positioned about one pair of sprocket wheels about which said endless belts travel, said guide members being adapted to receive and invert blanks from said upper belts.

14. The method of packaging cans and the like which consists of applying a paperboard blank to one end portion of a group of cans to be contained therein, said one end portion being formed by the ends of the cans, applying a motive force together directly to the rear edge of the blanks and to the rear portion of the rear cans in the group, adjacent the end portion of the group to which the blank is applied, said motive force insuring the alignment of the blank with the group, and simultaneously applying a separate but similar motive force directly to the rear portion of the rear cans in the group adjacent to the end portion of the group opposite that end thereof to which the blank is applied, the spaced motive forces maintaining the upright position of the cans as they are moved, and maintaining said motive forces continuously while folding and securing the blank about the group in a manner such as to cause the articles to be relatively immovable within the folded and secured paperboard blank.

15. The method of packaging cans and the like which consists of applying a paperboard blank to one end portion of a group of cans to be contained therein, said one end portion being formed by the ends of the cans, apply-

ing a motive force together directly to the rear edge of the blank and to the rear portion of the rear cans in the group adjacent the end portion of the group to which the blank is applied, said motive force insuring the alignment of the blank with the group, and simultaneously applying a separate but similar motive force directly to the rear portion of the rear cans in the group, adjacent to the end portion of the group opposite that end thereof to which the blank is applied, the spaced motive forces maintaining the upright position of the cans as they are moved, and maintaining said motive forces continuously while folding and securing the blank about the group in a manner such as to cause the articles to be relatively immovable within the folded and secured paperboard blank and causing the group of cans to pass between spaced flanged members adapted to exert sufficient pressure against both sides of said blank simultaneously to tighten said blank on said cans, and then securing the ends of said blank together to form an open-ended package.

16. A machine for packaging cans and the like arranged in groups in a paperboard blank, wherein a group of cans having a paperboard blank applied to one end thereof is movable with a continuous movement past means adapted to fold and secure the blank about the group in a manner such as to cause the articles to be relatively immovable within the closed and secured blank, said continuous movement being effected by two sets of pushing members each set movable continuously in an endless path appropriate thereto, one of said sets of pushing members engaging an upper portion of cans of the group and the other of said sets of pushing members engaging a lower portion of cans of the group, one of said sets of pushing members also engaging the blank to apply a motive force to the blank and to upper and lower portions of the group to which the blank is applied, and means exerting pressure against the side walls of said blank simultaneously as said group travels along to tighten said blank around said group of cans, said means including guide walls converging inwardly from a lateral distance larger than the width of said group to a distance substantially the width of said group to which the blank is applied.

17. The method of packaging cans and the like which consists of applying a motive force to the paperboard blank to cause the blank to be moved along a path such that the blank is inverted, depositing the blank on to the upper end of a group of cans to be contained therein, applying said motive force to the blank and upper end portion of the group of articles and simultaneously applying a separate but similar motive force to the lower end portion of the group, and maintaining said motive forces continuously while folding and securing the blank about the group in a manner such as to cause the articles to be relatively immovable within the folded and secured paperboard blank.

18. A machine for packaging cans and the like arranged in groups in a paperboard blank, a group of cans having a paperboard blank applied to one end thereof, means for moving said groups of cans with a continuous movement, means for folding and securing the blank about the group in a manner such as to cause the articles to be relatively immovable within the closed and secured blank, said moving means including two sets of pushing members, each movable continuously in an endless path having a reach adjacent the cans and separated apart from the other at a distance substantially equal to the height of the cans and including means for maintaining the pushing members of each set substantially in alignment with those of the other, the aligned two sets of pushing members being adapted respectively to simultaneously apply a motive force together directly to the rear edge of the blank and to the rear portion of the rear cans in the group adjacent to the end portion of the group to which the blank is applied, said force insuring the alignment of the blank with the group, and a second motive force to the rear portion of the rear cans in the group, said second motive force being applied adjacent to the end portion of the group opposite the end thereof to which the blank is supplied, said first and second motive forces maintaining the upright position of the cans as they are moved.

19. A machine according to claim 18 including means for delivering the blanks into the machine and means for inverting said blanks and means for applying blanks to the cans wherein said endless path of the one set of pushing members having a reach adjacent the ends of the cans to which the blank is applied extending adjacent to said blank delivering means to receive the blanks delivered therefrom, said pushing members of said one set being adapted to apply a motive force together directly to the rear edge of the blank and to the rear portion of the rear cans in the groups adjacent to the end portion of the group to which the blank is applied, said one set of pushing members being additionally adapted to apply motive force to the blank alone before its deposition onto the group of cans to cause the blank to be moved along a path such that the blank is inverted before deposition onto the groups of cans.

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