June 26, 1956 H. G. GENTRY 2,751,730

PACKAGING METHOD AND MEANS

Filed Dec. 21, 1954 5 Sheets-Sheet 1

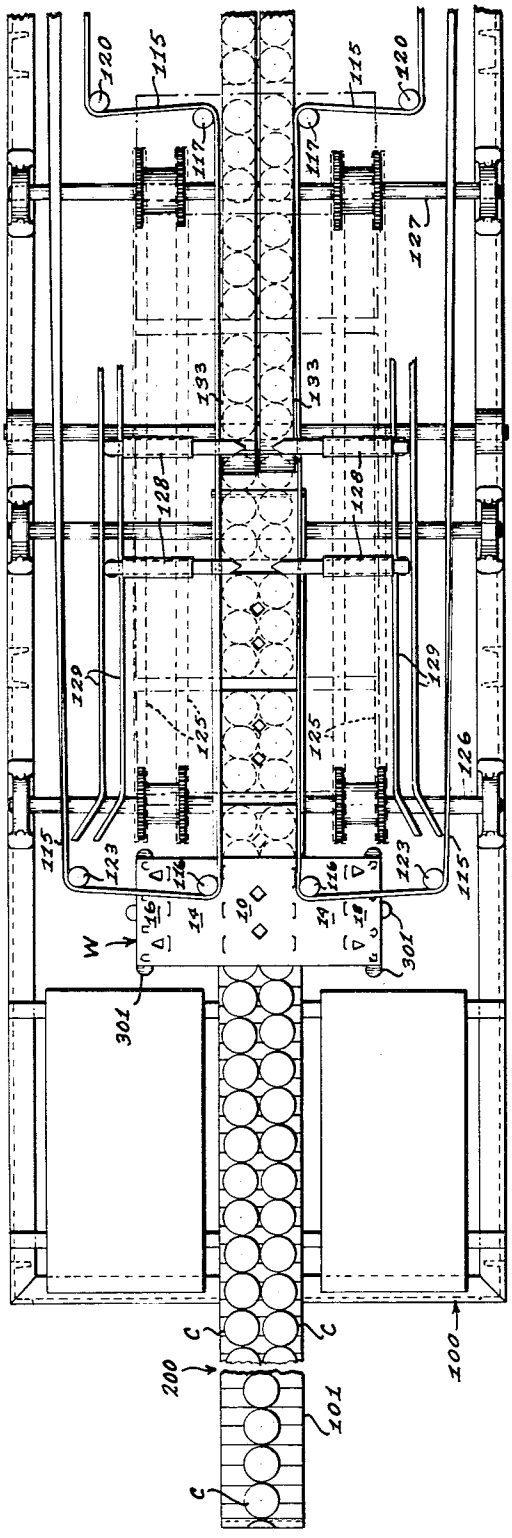


Fig. 1

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PACKAGING METHOD AND MEANS

Filed Dec. 21, 1954 5 Sheets-Sheet 2

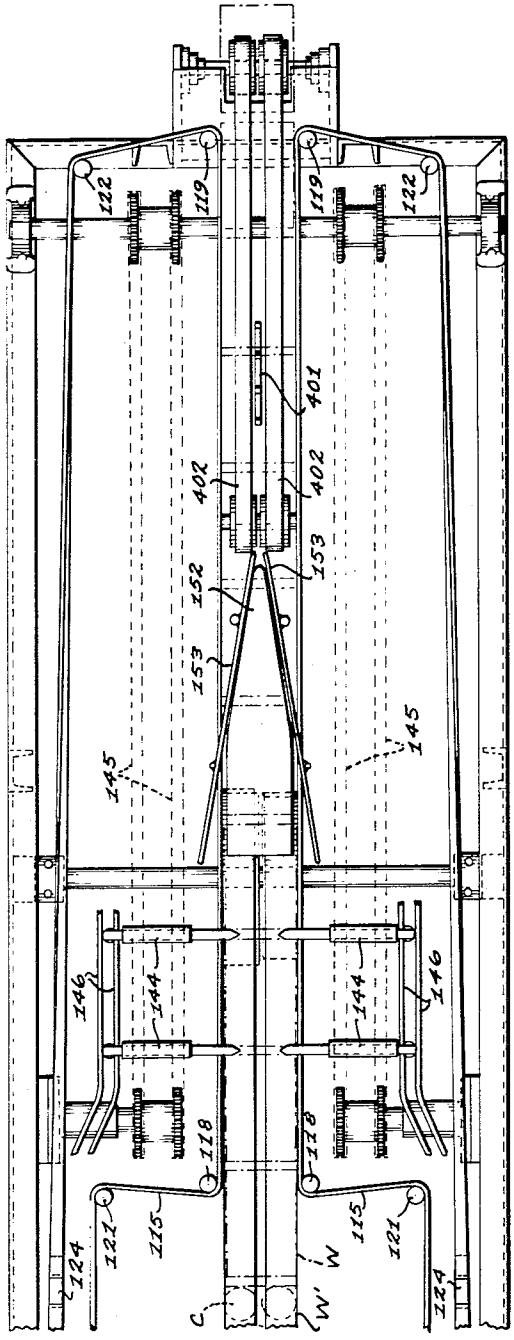


Fig. 2

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PACKAGING METHOD AND MEANS

Filed Dec. 21, 1954 5 Sheets-Sheet 3

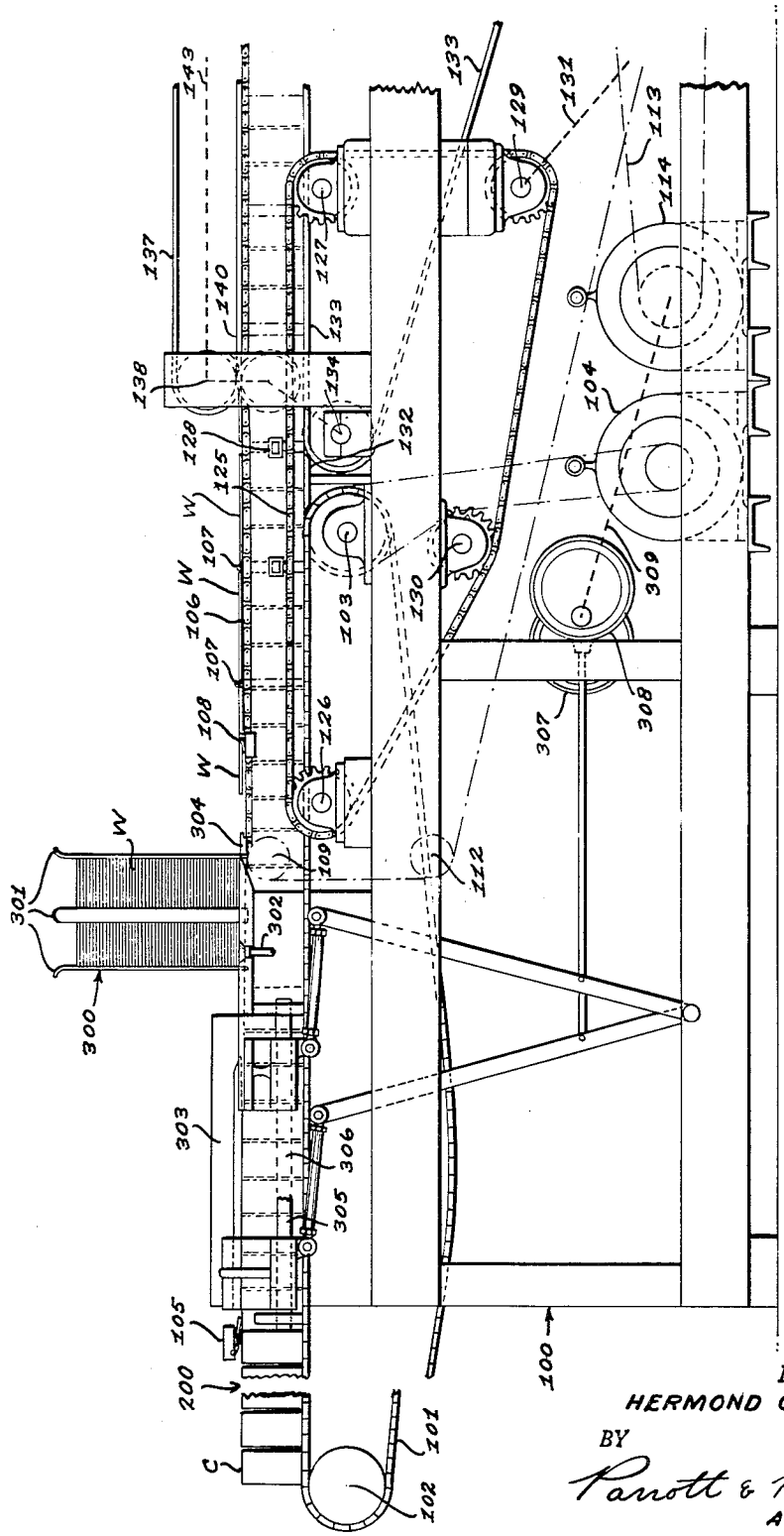


Fig. 3

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PACKAGING METHOD AND MEANS

Filed Dec. 21, 1954 5 Sheets-Sheet 4

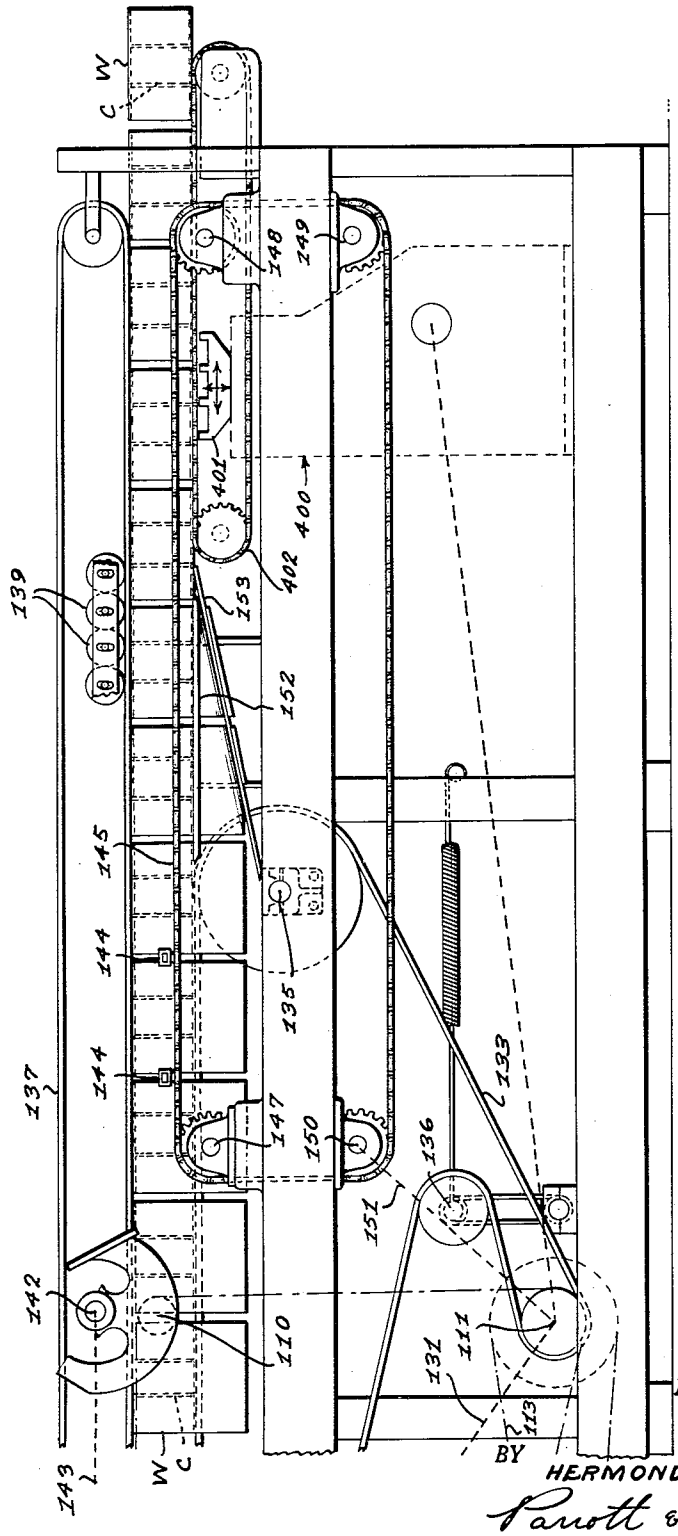


Fig. 4

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PACKAGING METHOD AND MEANS

Filed Dec. 21, 1954 5 Sheets-Sheet 5

Fig. 5

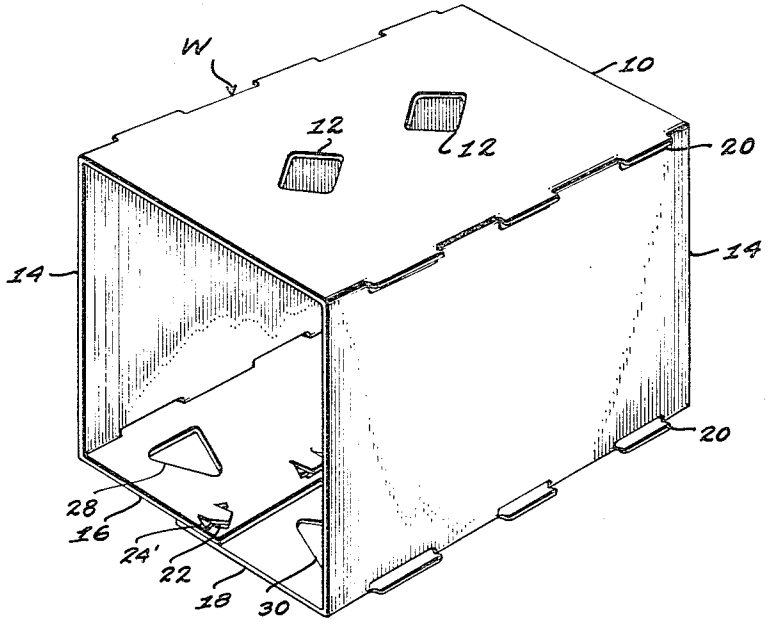
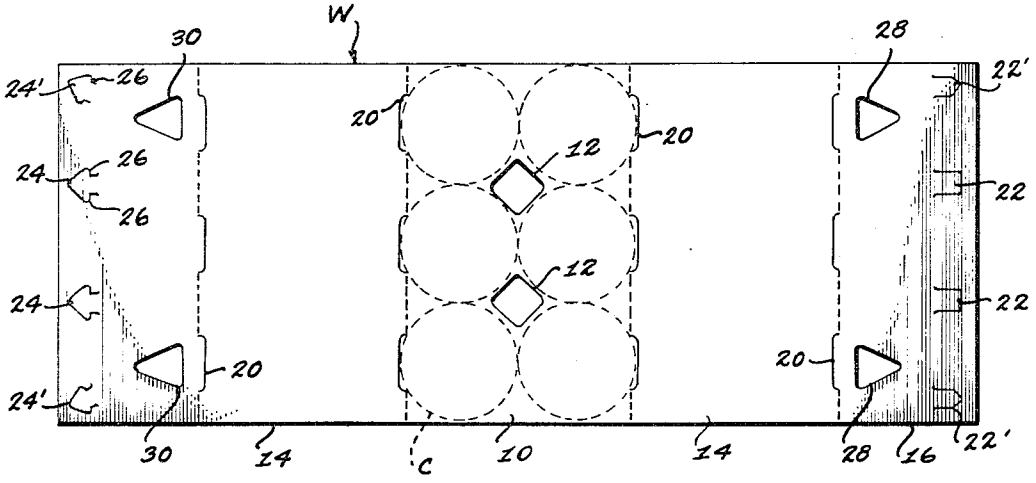


Fig. 6



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United States Patent Office 2,751,730 Patented June 26, 1956

2,751,730

PACKAGING METHOD AND MEANS

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Application December 21, 1954, Serial No. 476,650

8 Claims. (Cl. 53—32)

This invention relates to an improved method and means for packaging articles, and more particularly to a method of packaging a group of articles in an open-ended paperboard wrapper and to a machine for carrying out this packaging method. A presently important commercial application of the method and means of this invention is in the packaging of canned beer to form six-can packages enclosed in a wrapper arranged to serve as a carrier for the cans.

An important feature of the present invention is that the method and means provided are characterized by continuous travel of the articles being packaged throughout the packaging operation, so that substantially greater production rates may be obtained according to the present invention than is possible in packaging operations that require the articles being packaged to be stopped intermittently for successive packaging steps as has been characteristic of the methods and equipment heretofore in common use.

Briefly described, the packaging method and means of the present invention is characterized by: arrangement of a continuously traveling supply of the articles to be packaged; successive separation of the articles in package units from this supply; successive alignment of a wrapper blank on top of each continuously traveling package unit and maintenance of this alignment, while successively folding each aligned wrapper blank over the sides and in overlapping relation beneath each package unit and interlocking the overlapped portions of each blank; all while the separated package units are still continuously traveling.

These and other features of the present invention are described in further detail below in connection with the accompanying drawings, in which:

Fig. 1 is a partial plan view, largely diagrammatic, of a packaging machine arranged in accordance with the present invention;

Fig. 2 is a corresponding plan view of the remainder of the machine;

Fig. 3 is a partial side elevation corresponding generally to Fig. 1;

Fig. 4 is a partial side elevation corresponding generally to Fig. 2;

Fig. 5 is a perspective view of a paperboard wrapper which may be applied in packaging a group of articles according to the method and means of the present invention; and

Fig. 6 is a plan view of the blank for the wrapper shown in Fig. 5.

Referring in detail at first to Figs. 5 and 6 of the drawings, the article packaging wrapper illustrated is of the type disclosed and claimed in copending application Serial No. 459,918, filed October 4, 1954. As disclosed in this copending application, the wrapper (indicated generally by the reference character W) comprises a top wall panel **10** arranged in any suitable manner to be gripped or held for carrying as at hand hold apertures **12**, a pair of side wall panels **14** foldably hinged at opposite edges of the top wall panel **10**, and a pair of bottom wall half laps **16** and **18** foldably hinged at the respective bottom edges of the pair of side wall panels **14** and proportioned to overlap at their extending edge portions to form a rectangular four-sided wrapper W having the ends thereof entirely open as seen in Fig. 5.

The top wall panel **10**, side wall panels **14**, and bottom wall half laps **16** and **18** comprise portions of a unitary blank (see Fig. 6) which is rectangular in form and is transversely scored to arrange these portions in a foldably hinged series, with all of the portions having an equal length that is substantially equal to a multiple of the diameter of cans to be loaded in the carrier as illustrated at C in Fig. 6. The bottom wall half laps **16** and **18** when overlapped form a bottom wall having a width equal to that of the top wall panel **10** and substantially equal to twice the diameter of the cans C so that the wrapper W is arranged to enclose two rows of cans C between the pair of side wall panels **14**, and each side wall panel **14** is suitably notched adjacent its foldably hinged edges to provide positioning slots for the cans C along each side wall as indicated at **20**.

The wrapper W as arranged in the above noted manner is adapted to be applied to a load of cans C during a packaging operation, and the overlapping edge portions of the bottom wall half laps **16** and **18** are formed for interlocking engagement to secure the wrapper W in place without, if desired, requiring any glue application at the overlapped bottom wall seam. For this purpose, the inner bottom wall half lap **16** has a series of spaced retaining tabs slit along the overlapping edge portion thereof as at **22** and **22'**, and the outer bottom wall half lap **18** has a related series of locking tabs **24** and **24'** slit in the overlapping edge portion thereof.

Both of the tab series **22** and **22'**, and **24** and **24'**, are arranged to remain hinged to the bottom wall half laps **16** and **18** remotely with respect to the extending edges thereof, so that they fold in opposed relation, and the hinged extent of the retaining tabs **22** and **22'** is made slightly greater than that of the locking tabs **24** and **24'** so that the latter may be extended inwardly through the overlapping edge portion of the inner bottom wall half lap **16** at the respective retaining tabs **22** and **22'** therein. The spacing of the tab series **22** and **22'**, and **24** and **24'**, is such as to locate the respective tabs of each series at the dead spaces between adjacent cans C as disposed in the carrier (see Fig. 4), and thereby employ this dead space to provide clearance for manipulating the tabs into locking engagement. The end tabs **22'** and **24'** of each series are preferably slit on an angled axis for arranging them to the best advantage in the more restricted dead space available between adjacent cans C at each end of the carrier.

The locking tabs **24** and **24'** are further specially formed with widened extending end portions forming shoulders thereon as at **26** and **26'** which are proportioned to overlie the inner bottom wall half lap **16** at each side of the retaining tabs **22** and **22'** and thereby effect a locking engagement between the bottom wall half laps **16** and **18**. Upon extension of the shouldered locking tabs **24** and **24'** into this locking engagement, the retaining tabs **22** and **22'** are displaced upwardly to remain in partially overlying relation at the extending ends of the locking tabs **24** and **24'** so as to bias the engaged locking tabs **24** and **24'** in place.

The bottom wall half laps **16** and **18** are each further advantageously formed with apertures **28** and **30** spaced from the ends thereof and from the adjacent side wall panel **14** for location within the diameter of an end can C loaded in the carrier so as to provide clearance at these apertures **28** and **30** for gripping the bottom wall half laps **16** and **18** and holding them in proper overlapping

relation while the locking tabs 24 and 24' are manipulated into locking engagement, as explained further below.

By the method and means of the present invention, the wrapper W is applied to a group of articles to be packaged, in flat blank form as shown in Fig. 6, and is folded thereabout and interlocked in the form shown in Fig. 5, all while maintaining continuous travel of the group of articles. For this purpose a frame structure, as indicated generally by the reference numeral 100, is arranged to support means in series for performing the successive steps of the packaging operation continuously so that the articles, such as cans C, to be packaged are received at one end of the frame structure 100 and have wrappers W associated with package groups thereof, and are packaged in such groups by having the wrappers folded and secured thereabout, while traveling continuously toward the other end.

The cans C are received on a conveyor 101 at the left hand end of the frame structure 100 as seen in Figs. 1 and 3. This conveyor 101 is preferably of the chain type and is arranged over pulleys 102 and 103 to present a flat, smooth surface at its upper reach on which the cans C will slide when caused to, but will otherwise follow the conveyor movement. The pulley 103 is driven from a motor 104, or other suitable power source, to cause the conveyor 101 to travel at a rate faster (e. g., about 20% faster) than the rate at which the cans C travel during packaging, so as to maintain a continuous supply of cans C feeding thereon to the subsequent packaging means. The cans C entering on the conveyor 101 are preferably fed initially in a single row to be separated in two, adjacent, aligned rows by suitable means (not shown) provided, at the location indicated by the reference numeral 200, for this purpose, and which means may advantageously be a separating mechanism arranged in relation to the conveyor 101 as disclosed and claimed in copending application Serial No. 488,291, filed February 15, 1955. Microswitches 105 are positioned above each of the aligned rows of cans C following the above noted separation to indicate and provide for stopping the packaging operation whenever a gap occurs in either of the aligned can rows.

A supply of the wrappers W in blank form is disposed above the conveyor 101 in a hopper 300 to be fed therefrom on top of the cans C after they have been arranged in the two aligned rows as mentioned above. The hopper 300 comprises a group of upright guide strips 301 for containing the wrapper blanks W in a stack, and has a feed mechanism associated therewith comprising suction cups, as at 302, located on each side of the aligned rows of cans C to grip to lowermost of the stacked wrapper blanks W adjacent the edge thereof nearest the entrance end of the conveyor 101 and pull this edge downward far enough to allow separating swords 303 to enter the hopper 300 above the lowermost blank and lift off of it the remaining stack of blanks. Upon freeing of the lowermost wrapper blank W in this manner, feeder rods 304 are timed to follow the separating swords 303 and push the freed wrapper blank W from the hopper 300 onto the cans C traveling in the two aligned rows on the conveyor 101 below.

In this feed mechanism there are preferably two separating swords 303 used, one aligned with each of the suction cups 302; and four feeder rods 304, one located on each side of the two separating swords 303. Both the separating swords 303 and the feeder rods 304 are mounted for reciprocation on respective slide bars, as at 305 and 306, and are actuated from respective eccentrics 307 and 308 in properly timed relation, the eccentrics 307 and 308 being timed in relation to the operation of the other packaging means by a suitable drive connection as indicated by the broken line at 309. Other hopper arrangements and feed mechanisms, as desired, may be used in place of the arrangement described above.

As the wrapper blanks W are stripped from the hopper

300 and placed on top of the aligned rows of cans C in the above described manner, the wrapper blanks W come under the control of feeder chains 106 located at each side of the rows of cans C adjacent the transversely extending ends of the blanks, and fitted with spaced hooks 107 arranged to engage the trailing edges of the successively stripped wrapper blanks W so as to position and maintain them positioned in proper packaging alignment. Microswitches 108 are arranged near each end of the wrapper blanks W as they come under the control of the feeder chains 106 to sense the location of each wrapper blank W and provide for interruption of the packaging operation if a blank fails to feed onto the feeder chains 106 in regular succession, or is not properly positioned thereon for any reason. The blank feeder chains 106 are trained over sprockets 109 and 110 so as to dispose their upper reaches substantially level with the tops of the rows of cans C being packaged, and over further sprockets 111 and 112 for the return reaches thereof; the sprocket 111 being driven by a connection indicated at 113 from a main drive motor 114, or other power source, from which the other packaging means are also driven as pointed out further below.

While the aligned rows of cans C are still traveling beneath the hopper 300 on the conveyor 101, they are engaged by lateral guide belts 115 so that the can rows are held adjacent and centered on the conveyor 101 with respect to the hopper 300. These guide belts 115 are extended over pulleys 116, 117, 118 and 119 to run in lateral retaining contact with the cans C for the full remaining length of the frame structure 100, except between the pulleys 117 and 118 where the belts 115 are looped outwardly over pulleys 120 and 121 for a purpose that will be explained presently. The return reach of each guide belt 115 between back pulleys 122 and 123 is made to loop into a horizontal plane for tensioning by a cluster of pulleys at 124 and at which a suitable drive connection (not shown) is made from the main drive motor 114.

Just beyond the hopper 300, pairs of can feed plunger chains 125 are extended between sprocket shafts 126 and 127 to carry spaced plungers 128, actuated from cam bars as indicated at 110, for extension transversely of the aligned rows of cans C so as to separate in these rows successive package units, or groups of cans C, of the size to be packaged in the wrapper blanks W (e. g., groups of six cans C arranged in two aligned rows of three each). The pairs of can feed plunger chains 125 have the return reaches thereof trained over further sprocket shafts 129 and 130, and are driven at the sprocket shaft 129 through a drive connection as indicated at 131 from the main drive motor 114 in timed relation to the other packaging means.

As centered on the conveyor 101 by the lateral guide belts 115, the aligned rows of cans C are fed beneath the hopper 300 so that the wrapper blanks W stripped therefrom are placed on the cans C with the top wall 10 thereof aligned transversely across the tops of the cans C, and the respective side walls 14 and associated bottom wall half laps 16 and 18 extending at each side. The feeder chains 106 immediately take control of the wrapper blanks W through the spaced hooks 107 thereon to maintain this alignment, and the can feed plunger chains 125 are timed so that the plungers 128 are caused to separate the rows of cans C transversely in relation to the position of the wrapper blanks W maintained by the feeder chains 106, so that the resulting separated package units of cans C are likewise maintained in proper alignment with the wrapper blank W for packaging therein.

At this stage, control of the continuous travel of the cans C is taken over by the can feed plunger chains 125, and the cans C are caused to slide on the faster traveling conveyor 101 until transferred therefrom across a stationary gap plate 132 onto a pair of carrier belts 133, which might be arranged as a single belt if desired, but

which are more easily tensioned for even support of both rows of cans C in the paired arrangement shown. The pairs of carrier belts **133** have the top reaches thereof trained over pulleys at **134** and **135**, and their return reaches are looped by tension pulleys at **136** for driving from the same drive connection **113** provided for the blank feeder chains **106**.

Just beyond the entrance end of the carrier belts **133**, an aligned pair of top pressure belts **137** are extended from pulleys at **138** with the lower reach thereof weighted by floating pressure rolls, as indicated at **139**, to bear on top of the wrapper blanks W, traveling under the control of the feeder chains **106**, and the separated package units of cans C aligned therewith under the control of the can feed plunger chains **125**. The pressure belts **137** are driven at the pulleys **138** through a connection indicated at **140** from the adjacent carrier belt pulleys **134** to travel at an equal rate with the carrier belts **133**, and these pressure belts **137** extend to a point closely adjacent the discharge end of the frame structure **100** where they are trained over pulleys **141**.

The separated package units of cans C remain under the control of the can feed plunger chains **125** until they are well within the opposed reaches of the carrier belts **133** and top pressure belts **137**, after which the plungers **128** are withdrawn and the separated groups of cans C are then carried by the belts **133** and **137** past a rotating folder **142** that operates to pull the extending end portions of the wrapper blanks W off of the feeder chains **106** and fold the respective side walls **14** downwardly over the sides of each related group of cans C with the associated bottom wall half-laps **16** and **18** extending below. The lateral guide belts **115** are looped outwardly, as previously mentioned, to clear this folding operation, but return to retaining portion to hold the downwardly folded wrapper blank W in place before it is released by the rotating folder **114**. The rotating folder **114** is timed for operation in relation to the travel of the separated can groups C and aligned wrapper blanks W through a drive connection indicated at **143** from the adjacent top pressure belt pulleys **138**.

Just beyond the rotating folder **114**, the groups of cans C and folded wrapper W aligned therewith are engaged again by a second set of separating plungers **144** carried by pairs of can feed plunger chains **145** for actuation from cam bars **146**, the feed chains **145** being trained over sprocket shafts **147**, **148**, **149** and **150**, and driven at the sprocket shaft **150** through a drive connection indicated at **151**, to control and time the feeding of the groups of cans C and folded wrappers W therefor during the remainder of the packaging operation.

The pulleys **135** at the discharge end of the carrier belts **133** are provided in a relatively large diameter so as to allow discharge of the groups of cans C therefrom directly onto an elongated plate member or bottom folding sword **152**, along which they are caused to slide by can feed plunger chains **145**. This folding sword **152** is supported adjacent its entrance end in fixed relation on the frame structure **100** in any suitable manner (not shown), and is wide enough at this entrance end to support in turn (but no wider than) the groups of cans C with the bottom half laps **16** and **18** of the folded wrappers W extending downwardly below each side thereof. Beyond this supported entrance end portion the folding sword **152** is tapered substantially to a relatively narrow extending discharge end, and folding bars **153** are arranged with an angled disposition below the folding sword **152** to engage the downwardly extending bottom half laps **16** and **18** of the wrappers W and fold them progressively inward. The angled disposition of the folding bars **153** is such that they extend beyond the narrow discharge end of the folding sword **152** before reaching the elevation thereof, and the result of this arrangement is to overlap the bottom half laps **16** and **18** of the wrappers W so that the direct support of the can group C is transferred

thereto and the overlapping thereof is completed directly and tightly beneath the groups of cans C as and after they are slid off of the discharge end of the folding sword **152**.

From the folding sword **152**, the groups of cans C, now completely enclosed by the folded wrappers W, are transferred to have the overlapped bottom half laps **16** and **18** interlocked, as previously described, by a locking mechanism indicated generally by the reference numeral **400** and incorporating a locking head **401** actuated to move both vertically and horizontally (as indicated by directional arrows) in timed relation to the travel of the groups of cans C and enclosing wrappers W under the control of the can feed plunger chains **145**, while supported on tightener chains **402** arranged to engage the bottom half laps **16** and **18** at the previously noted apertures **28** and **30** therein to hold them tightened in proper overlapping relation until interlocked.

After the wrappers W are secured by interlocking at the overlapped bottom half laps **16** and **18**, the wrapped groups of cans C are released by the separating plungers **144** and pass out from under the top pressure belts **137** to be discharged from the frame structure **100** in any convenient manner while still moving continuously and without ever having hesitated or changed speed for any of the packaging steps.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

I claim:

1. The method of packaging which comprises supporting and causing continuous serial travel of articles to be packaged while maintaining said articles successively separated in package units, successively aligning a wrapper blank with each continuously traveling package unit and maintaining said alignment while folding each aligned wrapper blank downwardly over the sides of each package unit with end portions of said blank extending below the support for said package unit for overlapping, then progressively folding said blank end portions inwardly toward overlapping relation beneath said package unit and transferring the direct support of said package unit to said inwardly folded blank portions as the overlapping thereof is completed, whereby said blank portions are overlapped directly and tightly beneath each package unit while traveling, and finally securing the overlapped portions of each blank while thus folded about said continuously traveling package units.

2. The method of packaging a group of articles in an open-ended wrapper formed from a blank proportioned to fold about said group of articles with end portions thereof overlapping beneath said group and having means formed in said end portions for interlocking in overlapped relation, which method comprises supporting and continuously conveying a group of articles while maintaining said group positioned for packaging in said wrapper, placing said wrapper blank on top of said positioned group and maintaining said blank in alignment therewith while folding the aligned blank downwardly over the sides of said group with the blank end portions extending below the support for said group, then progressively folding said blank end portions inwardly toward overlapping relation beneath said group of articles and transferring the direct support of said group of articles to said inwardly folded blank portions as the overlapping thereof is completed, whereby said blank portions are overlapped directly and tightly beneath said group of articles, and finally interlocking the overlapped portions of said blank, all while still continuously conveying said group.

3. The method of packaging cylindrical cans in an open-ended paperboard wrapper formed from a rectangular blank proportioned to fold about and overlap beneath a group of said cans arranged in two aligned rows and having means formed in the overlapped portions thereof

for interlocking at the dead spaces between the aligned can rows, which method comprises supporting and continuously conveying a supply of said cans standing endwise, continuously arranging the cans being conveyed serially in two, adjacent, aligned rows, successively separating said aligned rows transversely into groups of cans of the size to be packaged in said wrapper while maintaining said aligned rows adjacent and said groups separate, successively placing wrapper blanks transversely across said aligned rows in alignment with said separate can groups and maintaining said alignment while successively folding each blank downward over the sides of the can group with which it is aligned and with end portions of each blank extending below the support for said can group, then progressively folding said end portions of each blank inwardly toward overlapping relation beneath said can group and transferring the direct support of each can group to said inwardly folded blank portions as the overlapping thereof is completed, whereby said blank portions are overlapped directly and tightly beneath each can group, and finally interlocking the overlapped blank portions, all while still continuously conveying said articles.

4. The method of packaging cylindrical cans in an open-ended paperboard wrapper formed from a rectangular blank proportioned to fold about and overlap beneath a group of said cans arranged in two aligned rows and having means formed in the overlapping blank portions for interlocking at the dead spaces between the aligned can rows, which method comprises delivering a supply of said cans onto a continuously moving surface, arranging the cans on said moving surface serially in two, adjacent, aligned rows and then separating said aligned rows transversely into successive groups of cans of the size to be packaged in said wrapper, successively placing wrapper blanks transversely across said aligned rows in alignment with said can groups, maintaining said aligned rows adjacent and said can groups separate and said blanks in alignment therewith while successively folding each blank downwardly over the sides of said can groups, transferring said can groups and thus folded blanks successively to an elongated stationary surface no wider than said can groups and causing said can groups to slide continuously along said stationary surface while still maintaining said can groups separate and said folded blanks aligned therewith and while further progressively folding each blank inwardly toward overlapping relation beneath said stationary surface, completing the inwardly folding of each blank and transferring the direct support of each can group to the inwardly folded portions of each blank and the overlapping thereof is completed directly and tightly beneath each can group after it is slid off of said surface, and successively interlocking the overlapped blank portions while said can groups are continuously conveyed beyond said surface.

5. Apparatus for packaging articles in a wrapper blank comprising means for continuously conveying said articles successively in separated package groups with an aligned wrapper blank folded across the top and downwardly over the sides of each package unit, an elongated stationary plate member no wider than said package groups and tapering substantially toward one end, said plate member being disposed so that said package groups are caused by said first mentioned means to slide thereon toward said tapered end with the downwardly folded portions of said blanks extending below said plate member at each side, and means for progressively folding said extending blank portions inwardly beneath said package groups after they are slid toward said tapered plate member end, said means extending beyond said tapering end so that the direct support of said package groups is transferred from said plate member to said inwardly folded blank portions and the inward folding of said blank portions is completed in overlapping relation directly and tightly beneath said package groups as they are slid off of the tapering end of said plate member.

6. Apparatus for packaging cans in an open-ended paperboard wrapper, said apparatus comprising means for continuously conveying a supply of the cans to be packaged with the cans arranged serially in two, adjacent, aligned rows, with said aligned rows separated transversely in successive groups of the size to be packaged, and with an aligned wrapper blank positioned transversely across the top and folded downwardly over the sides of each package group, an elongated stationary plate member wide enough at one end to support said aligned can rows and tapering substantially toward the other end, said plate member being disposed so that said package groups are caused by said first mentioned means to slide thereon from said wide end toward said tapered end with the downwardly folded portions of said blanks extending below said plate member at each side, and means disposed in relation to said plate member for progressively folding said extending blank portions inwardly as said package groups are slid on said plate member, said last mentioned means extending beyond the tapered end of said plate member for completing the inward folding of said extending blank portions in overlapping relation beneath said package groups after they are slid off of said tapered plate member end so that the direct support of said package groups is transferred from said plate member to said extending blank portions and the overlapping thereof is completed directly and tightly beneath said package groups.

7. Apparatus for packaging cans in an open-ended paperboard wrapper formed from a rectangular blank proportioned to fold about and overlap beneath a group of cans of the size to be packaged, said apparatus comprising an elongated stationary plate member having one end portion wide enough to support said can group and tapering therefrom to a narrow opposite end, means for causing said can group to slide lengthwise on said plate member from said wide end toward said narrow end with said wrapper blank aligned transversely across the top and folded downwardly over the sides of said can group to extend below said plate member at each side, and means disposed in relation to said plate member for progressively folding said extending blank portions inwardly as said can group is slid lengthwise on said plate member, said last mentioned means extending beyond the narrow end of said plate member for completing the inward folding of said extending blank portions in overlapping relation so that the direct support of said can group is transferred thereto and the overlapping thereof is completed directly and tightly beneath said can group after it is slid off of said narrow plate member end.

8. Apparatus for packaging cylindrical cans in an open-ended wrapper formed from a rectangular blank proportioned to fold about and overlap beneath a group of said cans arranged in two aligned rows and having means formed in the overlapping blank portions for interlocking at the dead spaces between the aligned can rows, said apparatus comprising means for continuously conveying a supply of the cans to be packaged with the cans arranged serially in two aligned rows, with said aligned rows separated transversely in successive can groups of the size to be packaged in said wrapper, and with a wrapper blank aligned transversely across the top and folded downwardly over the sides of each can group, an elongated stationary plate member having one end portion wide enough to support, but no wider than, both aligned rows of said can groups and tapering to a narrow opposite end, said plate member being disposed so that said can groups are caused by said first mentioned means to slide lengthwise thereon from said wide end toward said narrow end with the downwardly folded portions of said wrapper blank extending below said plate member at each side, means disposed in relation to said plate member for progres-

sively folding said extending blank portions inwardly as each can group is slid lengthwise on said plate member, said last mentioned means extending beyond the narrow end of said plate member for completing the inward folding of said extending blank portions in overlapping relation so that the direct support of said can group is transferred thereto and the overlapping thereof is completed directly and tightly beneath each can group after it is slid off of said narrow plate member end, and means for interlocking the overlapping blank portions beneath each can group while said can groups are still continuously conveyed by said first mentioned means beyond said plate member.

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