

Oct. 28, 1958

E. ARDELL ET AL

2,857,721

PACKING MACHINES FOR CANS OR THE LIKE

Filed Feb. 4, 1955

8 Sheets-Sheet 1

FIG. 1

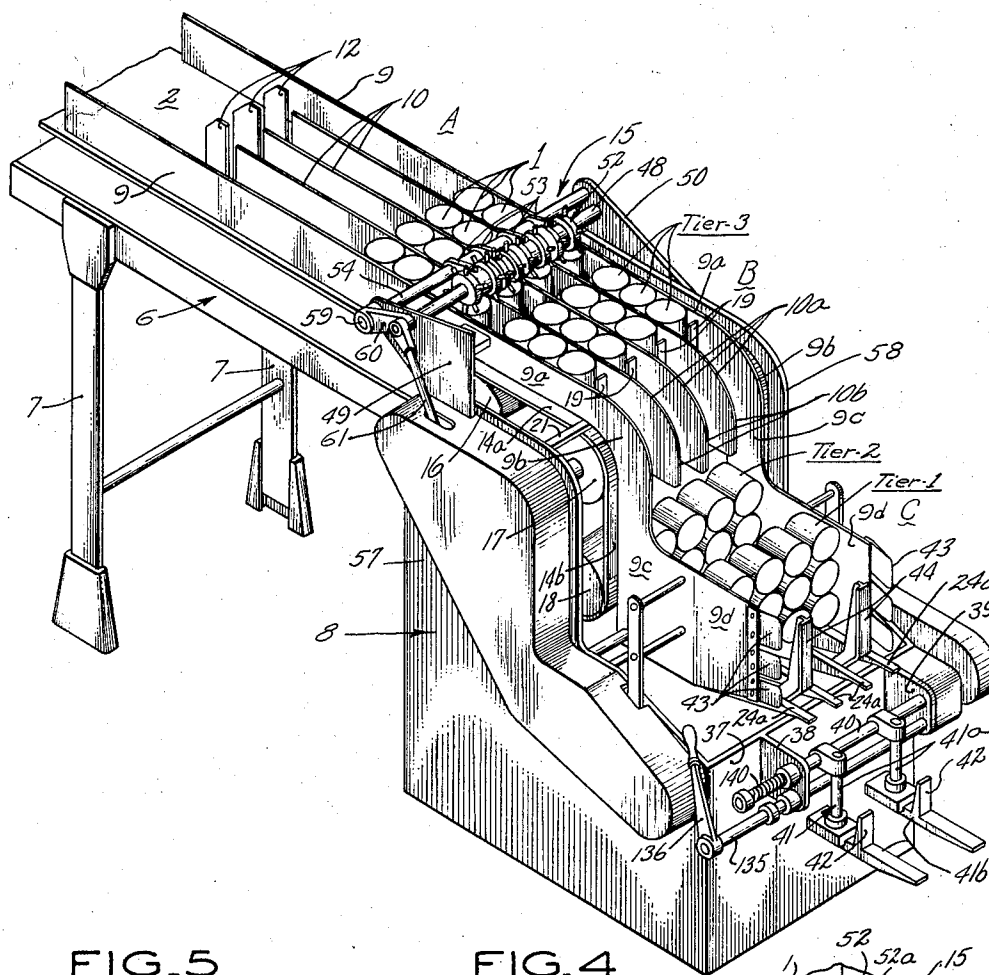


FIG. 5

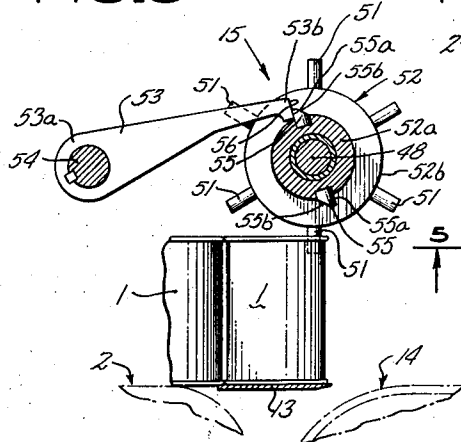
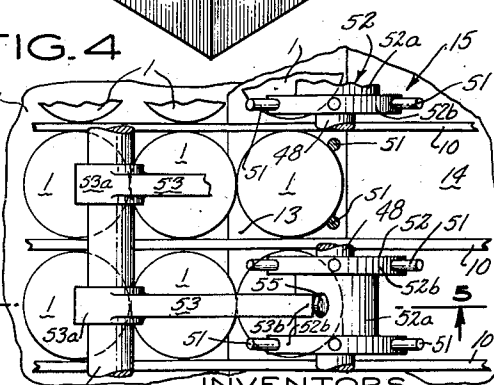


FIG. 4



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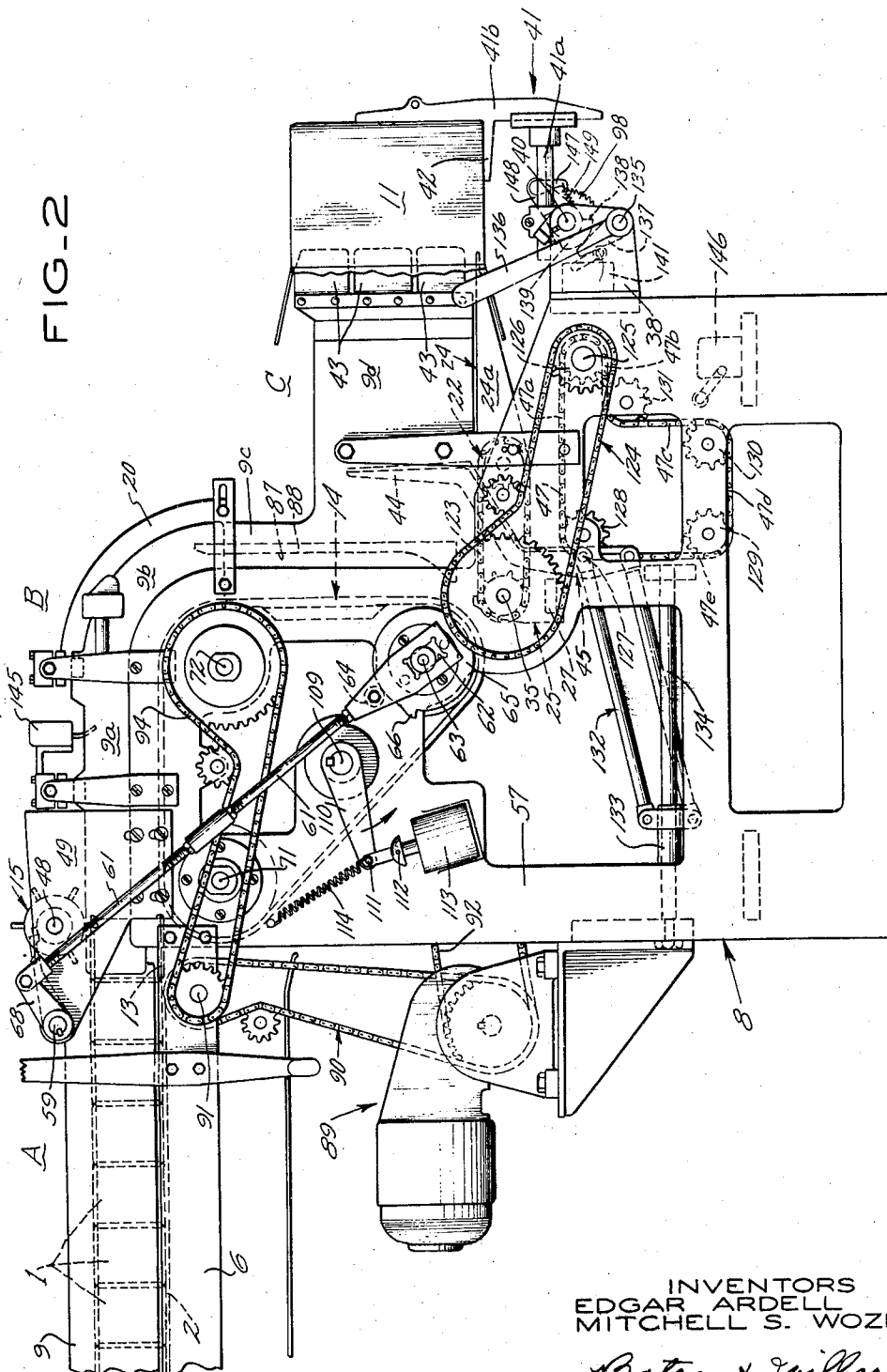
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FIG-2



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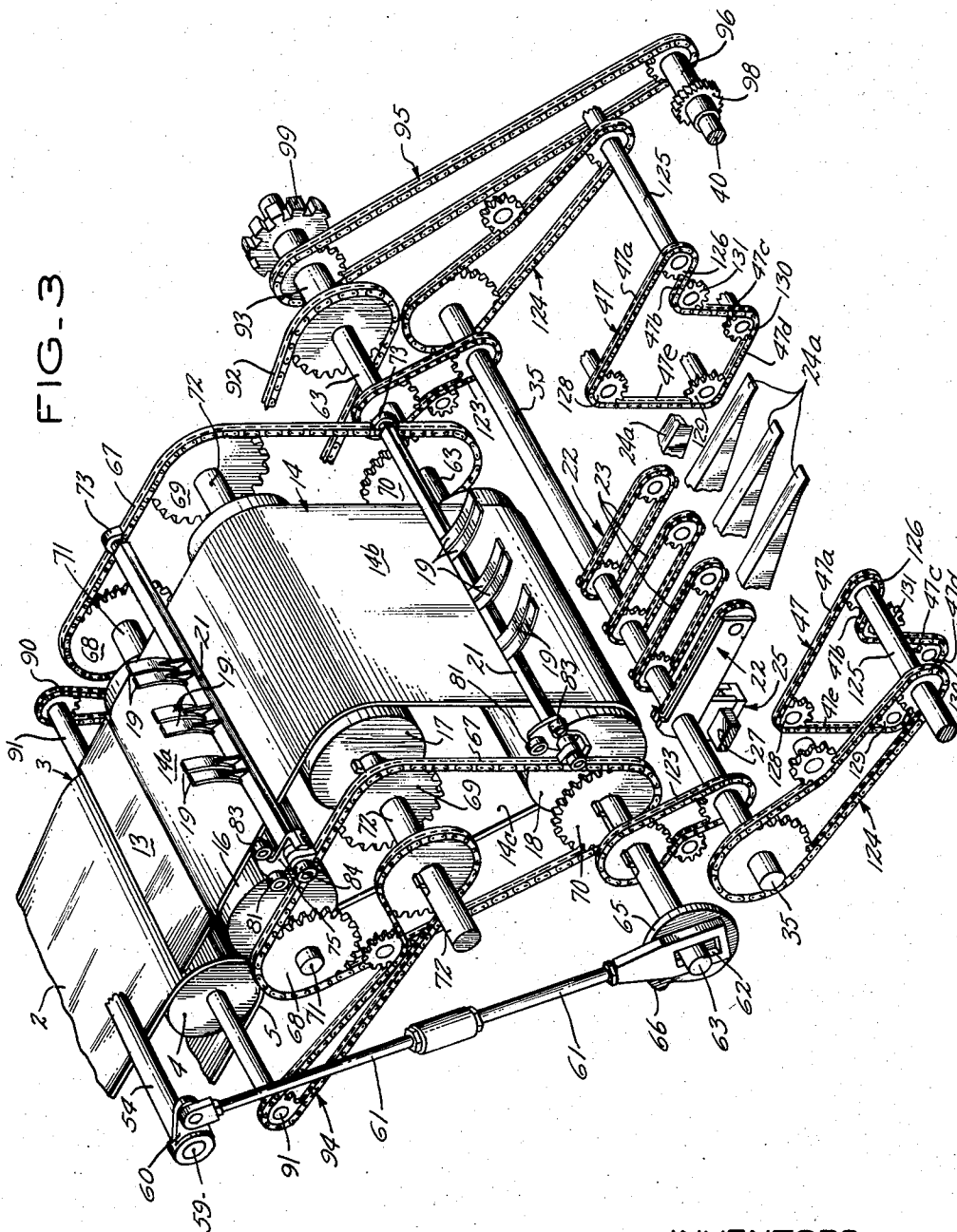
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FIG. 3



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FIG. 6

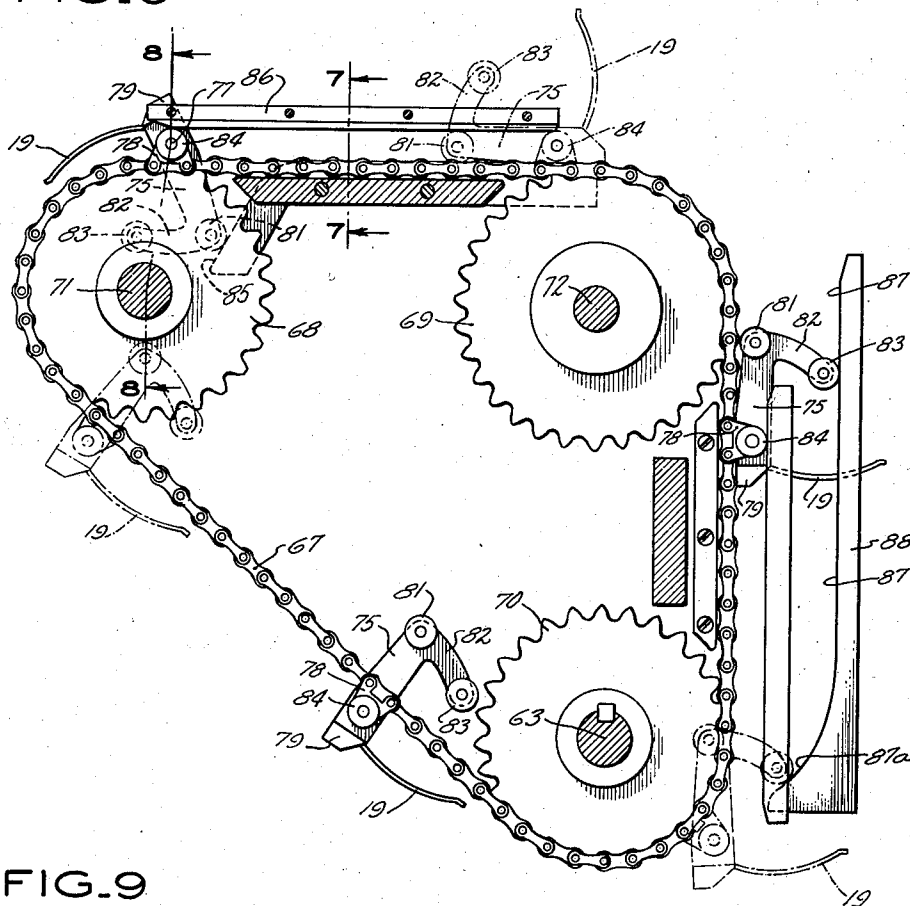


FIG. 9

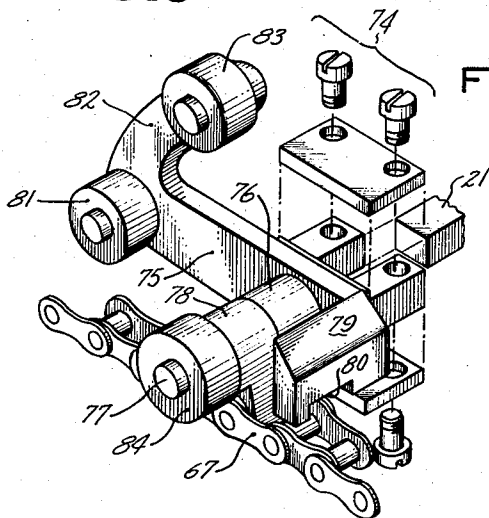


FIG. 7

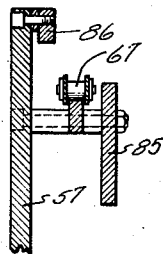
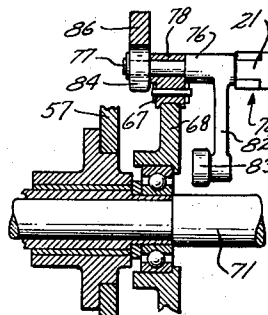


FIG. 8



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FIG. 10

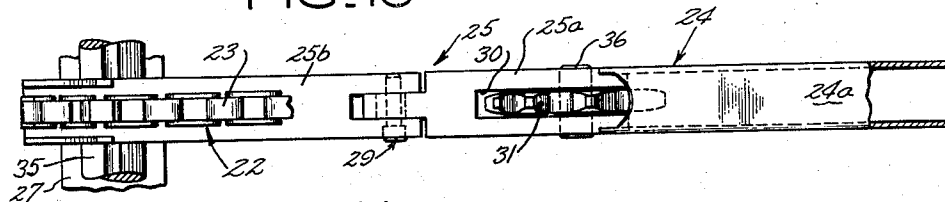


FIG. 11

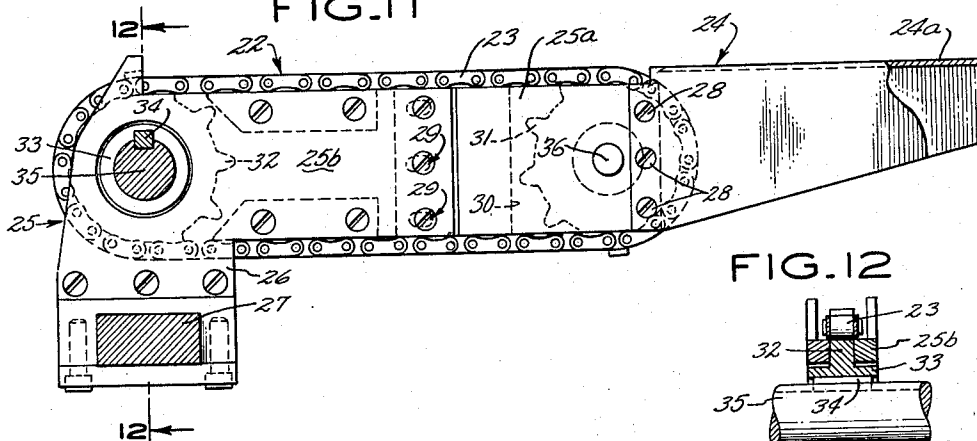


FIG. 12

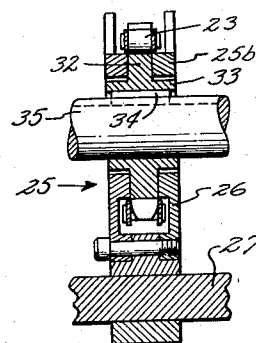


FIG. 13

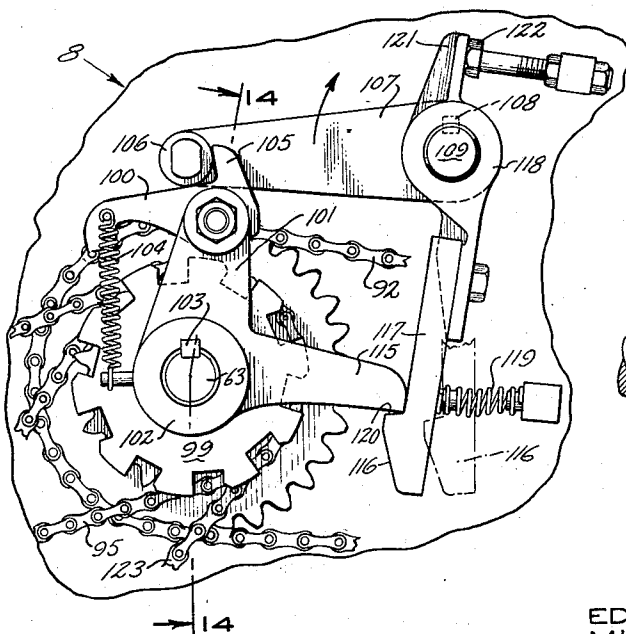
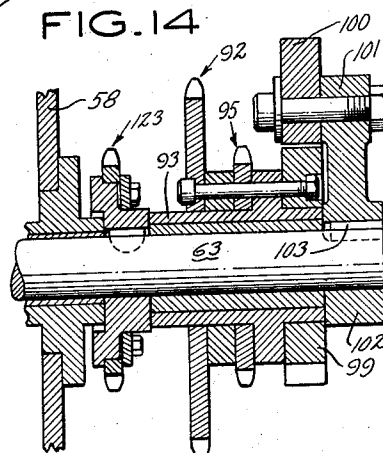


FIG. 14



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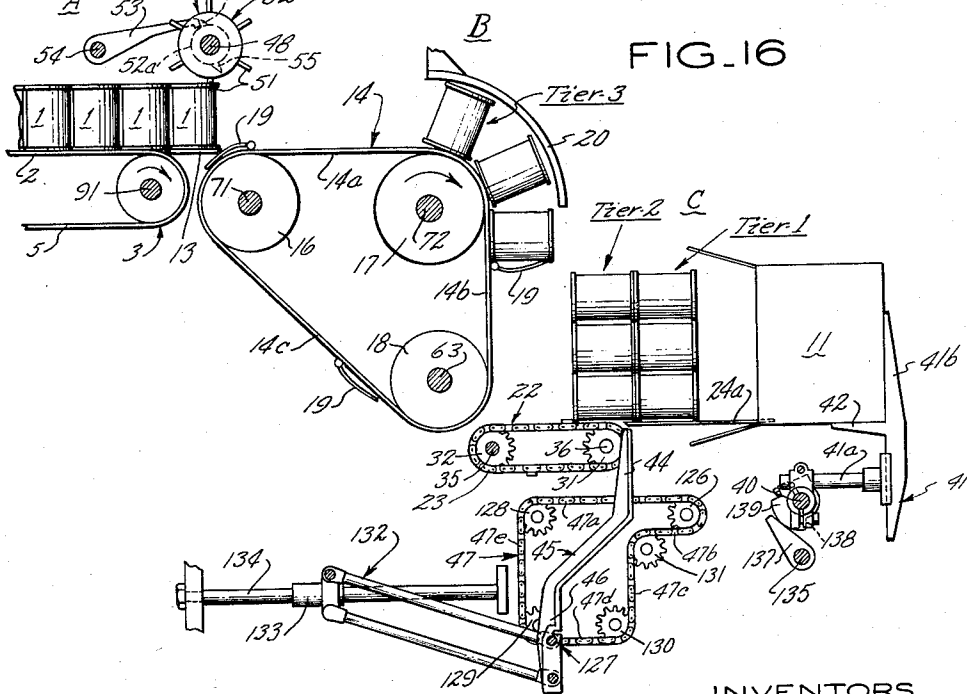
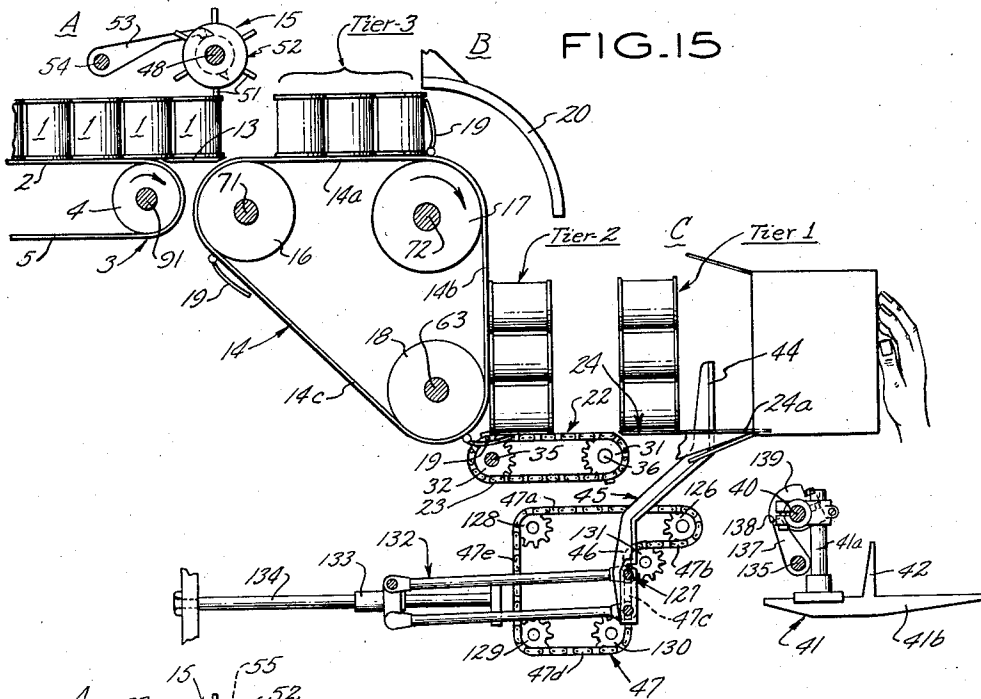
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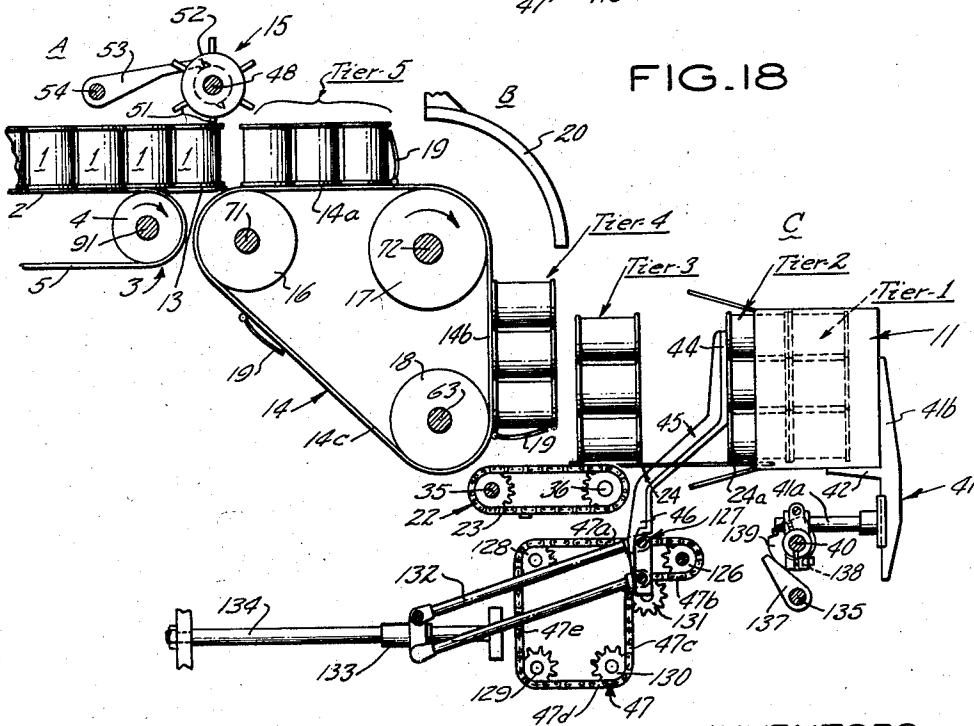
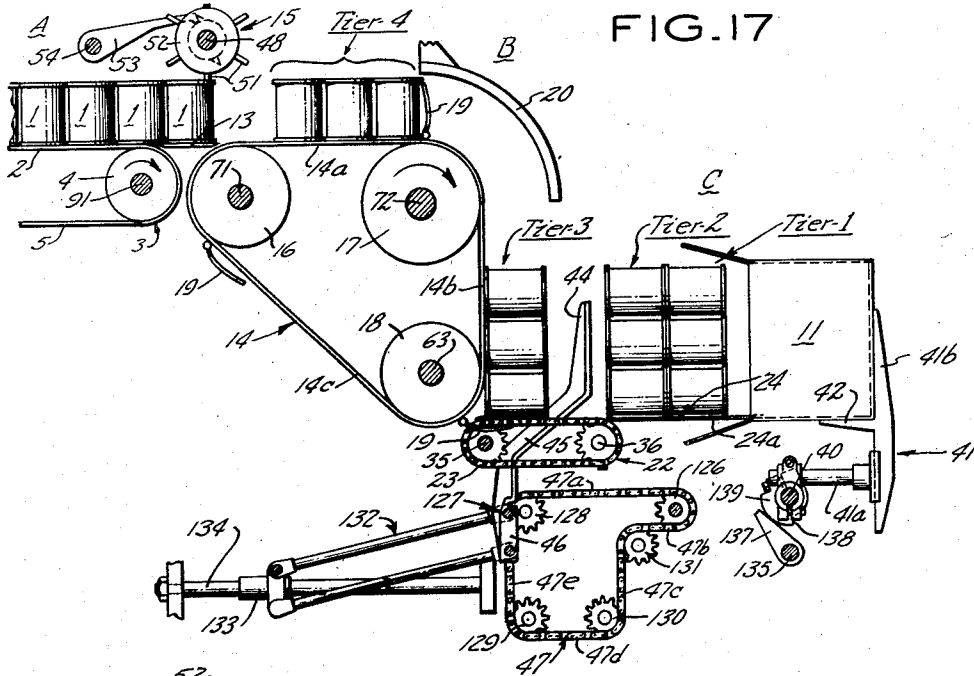
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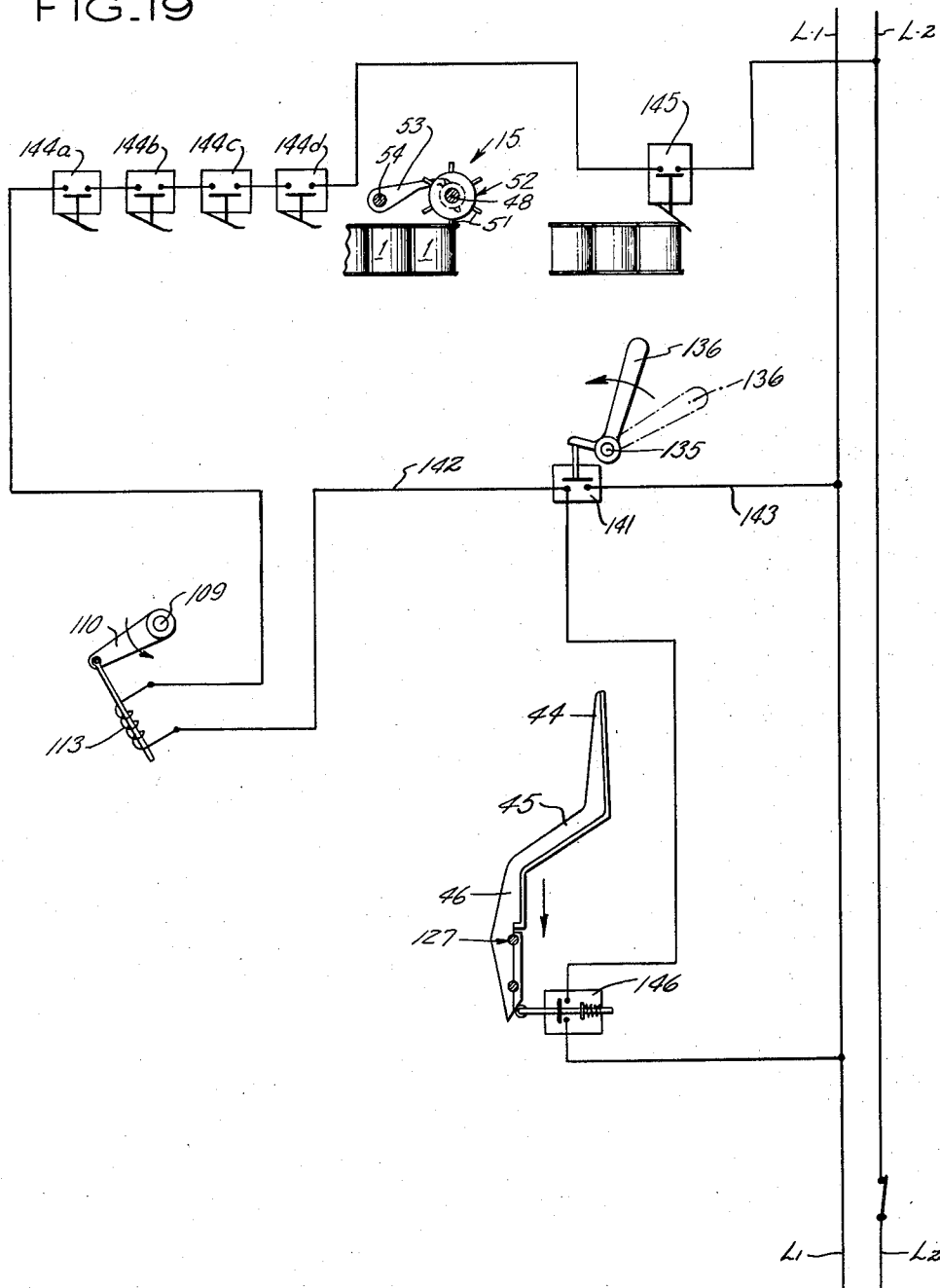
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FIG. 19



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PACKING MACHINES FOR CANS OR THE LIKE

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Application February 4, 1955, Serial No. 486,062

21 Claims. (Cl. 53—26)

This invention relates generally to improvements in machines for packing canned goods or like articles in cartons for shipment or other purpose and more particularly to a machine for packing cartons which are adapted to contain a plurality of layers or tiers of the packed articles.

An object of the invention is to provide a machine of the character described which will function in an improved manner to pack at one operation each of successively presented cartons with the plurality of layers or tiers of canned goods or containers required completely to fill that carton.

A further object of the invention is to provide a packing machine of the character described which will effect the packing operation without jolting or handling the canned goods or containers roughly, whereby containers filled with vegetables or other products which are likely to be broken up or otherwise impaired by sudden jarring or violent agitation thereof can be packed without impairment.

A further object of the invention is to provide a packing machine of the character described having a novel arrangement of co-acting elements to turn forwardly moving upright cans of a segregated quota 90 degrees so as to provide a stack of superposed cans adapted to form a layer or tier of cans in a waiting carton and to assemble in a loading position in relation to such carton the plurality of layers or tiers required completely to fill such carton.

A further object of the invention is to provide a packing machine of the character described which will perform the successive operations required to provide a load consisting of a plurality of tiers of the containers to be packed and to insert the load in a suitably positioned carton at the end of the path of travel of the containers through the packing machine with a minimum need to arrest forward movement of the containers and without any upward or lateral diversion of such containers from said path of travel.

A further object of the invention is the provision in a packing machine of the character described of a novel container stacking mechanism by which upright metal containers are received from a horizontal infeed conveyor at one level, segregated as a group comprising sufficient rows of sufficient containers to form a layer or tier adapted to fit in a carton to be packed, and moved forwardly and downwardly and delivered onto a lower level horizontal outfeed conveyor with the relative positions and arrangement of the individual containers in the group unchanged but with the axes of the individual containers turned from the vertical to the horizontal.

In carrying out our invention to attain the foregoing and other objects thereof, we may provide a forwardly moving horizontal infeed conveyor by which a plurality of parallel lines or files of upright containers to be packed may be advanced to feed successive containers of the several files over a narrow dead plate onto a coplanar horizontal upper stretch of a moving endless stacking conveyor belt. When sufficient containers for the

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group which is to form a layer or tier in the carton to be packed have been thus fed onto the horizontal stretch of the stacking conveyor belt, a suitably timed stop mechanism may act temporarily to arrest passage of further containers over the dead plate onto the stacking conveyor belt.

The stacking conveyor belt, which may be metallic, passes over a transversely disposed upper front roller, which may be magnetic, thence downwardly around a lower transverse roller adjacent to the rearward receiving end portion of a horizontal outfeed conveyor, and finally upward and around a rear upper roller adjacent to the dead plate.

Rest fingers, carried by an intermittently operated chain carrier system are provided and operated in relation to the operation of the stop mechanism to be contacted by and give support to the leading containers of the several rows of the segregated group on the upper stretch of the stacking conveyor belt from a time prior to that at which such leading containers will be carried forwardly and downwardly over the periphery of the upper front roller until such containers have been lowered thereby onto the outfeed conveyor. Suitable spaced side boards and restraining guide bars positioned in front of and concentric with the front upper stacking conveyor roller will cooperate with the rest fingers to maintain the individual containers of the group in substantially the same relative positions throughout their individual turning movements from the vertical to the horizontal as they are carried forwardly over the front upper roller and are lowered and delivered to the outfeed conveyor in stacked or superposed on their side positions. The front upper roller may be made magnetic in any suitable known way to aid in providing the desired result.

The stacked containers on the outfeed conveyor are suitable for insertion as a layer or tier in the carton to be packed when the latter is presented at the outer end of a loading platform with which the outfeed conveyor is operatively associated and onto which the tier of stacked containers will be fed.

The carton is adapted to hold two tiers and a second tier of containers, formed in the manner described, will be delivered by the outfeed conveyor against the first tier on the loading platform, moving the latter forward on the platform to the extent required to make way for the second tier.

At this stage in the operation of the machine, previously inactive load pusher means will act to push both tiers, constituting a load, into the waiting carton and to impel the filled carton away from the loading platform.

The several sections of the machine are constructed and arranged for cooperative actions to provide successive loads, each consisting of a plurality of tiers of containers, in the loading position on the loading platform, and for insertion of each load as an entity into its carton. Adequate safety provisions are included in the machine to assure desirable continuity of action throughout each carton loading cycle of the machine, provided that cans are being supplied to fill out the rows of each tier and that there is nothing out of order or irregular in the operation of any of the component parts of the machine. In the latter event, the operation of the machine will be halted until the condition has been remedied.

A further and more detailed explanation of a practical embodiment of the invention will hereinafter be given with reference to the machine shown in the accompanying drawings, in which:

Fig. 1 is a perspective view of the machine, showing cans both in advance of and behind the stop mechanism at the junction of the infeed section with the stacker sec-

tion and showing stacked cans of two spaced tiers in a lower level portion of the machine;

Fig. 2 is a side elevation of the machine, showing part of the drive and control means and showing also a carton to be filled in its loading position at the outer end of the loading platform;

Fig. 3 is a perspective view of the driving and transporting elements of the machine, with other parts omitted;

Fig. 4 is a relatively enlarged fragmentary plan view of portions of two of the lanes extending from the infeed section to the stacker section and showing elements of the stop mechanism;

Fig. 5 is a fragmentary sectional view of the stop mechanism in active or can-stopping position, the view being taken along the line 5—5 of Fig. 4;

Fig. 6 is a schematic view in side elevation to show the rest fingers and means for supporting, guiding and controlling the position of the rest fingers during a cycle of movements thereof;

Fig. 7 is a section along the line 7—7 of Fig. 6;

Fig. 8 is a section along the line 8—8 of Fig. 6;

Fig. 9 is a relatively enlarged perspective view to show the details of the connection of a cross rod for carrying the rest fingers with a carrying chain and associated position-control means;

Fig. 10 is a fragmentary view showing in plan one of the outfeed conveyor units with its connected loading platform strip;

Fig. 11 is a side elevation of the elements shown in plan view in Fig. 10;

Fig. 12 is a transverse section along the line 12—12 of Fig. 11;

Fig. 13 is a fragmentary end view of clutch mechanism for intermittently driving certain of the conveyors of the machine;

Fig. 14 is a section through this clutch mechanism substantially along the line 14—14 of Fig. 13;

Figs. 15, 16, 17 and 18 are similar views which schematically show in side elevation the structural parts involved in the operations of forming upright cans into tiers of cans in a lying-down position, forming a load consisting of two of the tiers, and pushing the load as an entity into a waiting carton, the successive views showing successive stages in the operation of loading a carton, removing the loaded carton, and presenting a fresh carton in a loading position at the outer end of the loading platform; and

Fig. 19 is a diagram of electrical and certain other control parts of the machine.

The illustrative machine shown in the drawings may be described as comprising successive container infeed, stacking and loading sections, respectively generally designated A, B and C, Figs. 1, 2 and 15-18, inclusive. Articles, such as metal containers or tin cans designated 1 in Fig. 1 and other views of the drawings, are brought into the infeed section A on a forwardly moving continuously driven horizontal conveyor 2 which, as is apparent from Figs. 3 and 15-18, inclusive, may be the forward portion of a belt 3 which, on completion of its upper forward run passes downwardly partly around a transversely disposed horizontal conveyor front roller or drum 4 and then turns rearwardly at 5 to become the rearwardly moving return run of the complete conveyor. The complete infeed conveyor is not shown since it may lead from any suitable source of supply of the cans to be packed and it does not per se form part of the present invention. It will suffice to say that the forward portion of the conveyor belt 3 and its supporting front roller 4 are mounted upon a conveyor bed or framework 6, Fig. 1, having supporting legs 7 adapted to rest upon a factory floor or the like. At its forward end, the infeed conveyor framework or bed may be joined to the upper portion of a box-like frame structure 8, Fig. 1, which also is adapted to stand on the factory floor and provides sup-

port for components of the stacking and loading sections of the machine as hereinafter will be explained.

A pair of longitudinally extending transversely spaced side boards 9 extend above the infeed conveyor 2 adjacent thereto and slightly inward from the side edges thereof, and may be supported or retained in place by any suitable fastening or supporting means, none being shown. The space above conveyor 2 between the side boards 9 is divided into a plurality of longitudinally extending divisions or lanes by transversely spaced longitudinally extending division boards 10. In the example shown, there are three of these boards 10 so that four lanes are provided between the side boards 9, this being the number of rows of cans 1 required for a tier or layer of cans to be packed into a carton, such as that indicated at 11 in Figs. 2 and 15-18, inclusive. The rearward ends of the division boards 10 terminate in advance of the rearward ends of the side boards 9 in the example shown and suitable known can dividing or guiding means, represented by the elements indicated at 12 in Fig. 1, may be provided at the rearward ends of the division boards and operated in a known manner to prevent any jam of cans on the conveyor 2 at the rearward, entrance ends of the can lanes. It will be understood that in practice, the conveyor 2 will bring cans to these lanes in sufficient quantity and at a sufficiently high speed to keep these lanes full of cans.

The infeed section A includes a narrow dead plate 13, Figs. 3 and 15-18 inclusive, which is located at the same level as the conveyor 2 in a plane tangent to the upper portion of the periphery of the front conveyor supporting roller 4 and adjacent thereto. The operation of conveyor 2 tends to feed forwardly moving files or processions of cans from the lanes of the infeed section onto and across the dead plate 13 onto a forwardly moving co-planar upper stretch or run 14a of an endless stacking section conveyor belt 14, Figs. 3 and 15-18, inclusive. However, the forward progress of these files or processions of cans is temporarily arrested at the dead plate 13 at suitable times in the operation of the machine by the contact with cans there of elements of a stop mechanism generally indicated at 15 in Figs. 1, 4, 5, and 15 to 18, inclusive, the structure and operation of which will be presently described.

The stacking section conveyor belt 14, Figs. 3 and 15-18, inclusive, is trained about upper rear and front rollers 16 and 17, respectively, and a lower front roller 18 so that in addition to the forwardly moving horizontal upper stretch or run 14a thereof, it also has a descending vertical stretch or run 14b and a rearwardly and upwardly inclined return or idle stretch or run 14c.

As is clear from Fig. 1, the side boards 9 of the infeed section are continued forward in the stacking section above and close to the upper stretch 14a of the stacking conveyor 14 as indicated at 9a, thence forwardly and downwardly concentric with front upper roller 17 as indicated at 9b, and finally straight downward along the descending stretch 14b of the stacking conveyor belt as indicated at 9c. The longitudinal division boards 10 similarly extend forward in the stacking section above and close to stacking conveyor stretch 14a as indicated at 10a and then curve forwardly and downwardly as indicated at 10b concentric with roller 17. Continuous lanes for the moving cans thus are provided in side-by-side relation from the infeed section forwardly through the upper part of the stacking section and thence angularly in a forward and downward direction part way around the axis of roller 17. In the example shown, the lane-defining division boards terminate at their forward ends at about the level at which the portion of the stacking conveyor belt passing downwardly around roller 17 begins its descent as the stretch 14b of that belt while the side boards continue on downward to about the level of the lowermost portion of that belt.

In Fig. 1, the forward motion of the cans in the infeed

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section has been temporarily arrested by the stop mechanism 15. Immediately prior to such arrest, cans had been fed into the stacking section to provide the four longitudinal rows of three cans each shown in the upper portion of the stacking section and collectively designated "Tier 3." Two such tiers with the corresponding cans thereof in end-to-end relation are required completely to fill the carton 11, Figs. 2 and 15-18, inclusive, hereinbefore mentioned. The cans of Tier 3 are at this time on the upper stretch of the stacking conveyor belt 14, which may be driven continuously, preferably at a speed slightly higher than that of the infeed conveyor belt 2. See Fig. 15 also. The cans of the several rows will be kept in line as they are moved by the stacking conveyor belt to and over roller 17. Rest fingers 19, Figs. 1 and 15, are moved along in front of and in contact with the leading cans of the several rows as the cans of such rows are carried forwardly and downwardly over the roller 17, as shown in Fig. 16. These rest fingers will provide support for such leading cans as they are turned forwardly from the vertical to the horizontal. The leading cans of the several rows will in turn furnish support for the following cans as they are similarly turned during their movement over the roller 17. Stationary arcuately curved restraining bars 20, Figs. 2 and 15-18, inclusive, are provided for the several lanes in suitably spaced concentric relation to the portion of the stacking conveyor 14 passing over the periphery of the roller 17 so as to prevent the cans from pitching forward as they are turned from the vertical to the horizontal. The radial distance of the restraining bars 20 outward from the portion of the conveyor belt 14 with which they are concentric is only enough greater than the length of the cans passing over the roller 17 to preclude any undesirable frictional contact of the outer ends of the cans with such bars. The outer ends of the cans will spread slightly apart in the direction of travel as they turn from the vertical in passing over roller 17 but will close as they attain the horizontal so that the cans of each of the several rows will be stacked in superposed relation with the cans on their side and turned in a fore-and-aft direction as such stacked cans are lowered by the descending rest fingers 19 to the position indicated for Tier 3 in Fig. 17.

While unnecessary for satisfactory stacking and maintenance of pattern of the containers of a tier suitable for the carton to be packed in most instances, there are some instances, as when the containers to be stacked and packed are empty and therefore relatively light, when it is desirable to hold the bottom ends of the containers against the stacking conveyor belt by means acting directly on such ends rather than by reliance on the restraining bars 20 alone. To this end the roller 17 preferably is magnetic and the conveyor belt is of woven wire or other suitable metallic construction. The magnetic roller thus will exert a magnetic force through the portion of the metallic stacking belt 14 in contact therewith on the bottoms of the cans so as to hold each such can in its turn truly radial with respect to the axis of rotation of roller 17 as that can is turned from the vertical to the horizontal. The action is illustrated in Fig. 16. The magnetic force exerted by roller 17 may be sufficient to prevent any forward propulsion of the cans by centrifugal action even though the restraining bars 20 were lacking, but it is preferred to take advantage of the cooperative action of both the magnetic attraction of roller 17 and the physical restrain provided by the bars 20 so as to assure complete absence of any relative out-of-control movements of the individual cans of a file or row during their travel from the upper run 14a of stacking conveyor belt 14 to downward movement along run 14b of that belt. All shocks and jars because of knocking of adjacent cans of a file together, with possible consequent agitation and impairment of contents of the cans, thus are effectively obviated.

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The rest fingers 19 are carried by transversely extending rest finger rods 21 which are carried and moved by means presently to be described in a path spaced slightly outward from and parallel to the endless path of movement of the stacking belt 14. A plurality of the rest finger rods 21, each with rest fingers 19 thereon, is provided, the respective rods being spaced apart along the path of travel thereof and their operations being coordinated with the segregation of the cans of each tier on the upper stretch 14a of the stacking belt. This will be further explained in connection with a detailed description of the means for supporting and operating the rest finger rods.

The stacked cans of Tier 3 are shown in Fig. 17 as resting on a horizontal outfeed conveyor, generally indicated at 22. As seen in Fig. 3, the outfeed conveyor 22 comprises a row of laterally spaced endless chains 23, there being one at the bottom of the path of downward movement of the stacked cans of each row or file of a tier. The rest fingers 19 are withdrawn downwardly through spaces between the adjacent chains 23 when the stacked cans have been lowered onto such chains.

While Tier 3 is being lowered to rest on the outfeed conveyor 22 as just described, Tier 2 which had occupied that position, as shown in Fig. 15, will be moved forward by the conveyor 22 to and against Tier 1 which is then resting on the rearward portion of a loading platform generally designated 24. The action is illustrated by Fig. 16 which shows the positions of Tiers 1 and 2 just after Tier 2 has started to push Tier 1 forward on the loading platform. The continued movement of Tier 2 as it is delivered by the conveyor 22 onto the platform 24 will push Tier 1 outward on the platform sufficiently to provide a space thereon for the reception of Tier 2, as shown in Fig. 17.

Loading platform 24 comprises a plurality of transversely spaced horizontal platform strips or bars 24a, each of which, as shown for the platform strip 24a in Figs. 10 and 11, is a forward extension of a forwardly projecting elongate frame structure 25 which at its inner end has a supporting base 26 mounted on a supporting cross bar 27. See Fig. 12 also. Each of the frame structures 25 may comprise an outer end section 25a, to which the inner end of the corresponding platform strip 24a is rigidly secured, as by screws 28, and an inner end section 25b to which the outer end section 25a is adjustably fastened, as by the screw and slot arrangements indicated at 29 in Figs. 10 and 11. Outer end section 25a may be vertically apertured as indicated at 30 to accommodate a sprocket 31. Inner end section 25b may comprise laterally spaced parts to accommodate a sprocket 32 having a hub 33 keyed as at 34 to cross shaft 35. Cross shaft 35, as shown in Fig. 3, and as hereinafter will be explained, is one of a connected arrangement of driving and supporting elements for the several conveyors of the machine and is actuated in a manner to be explained so as to drive the chains 23, which are trained about the sprockets 31 and 32, intermittently and at appropriate times in the operation of the machine. Sprocket 31 is mounted on a short shaft 36 fixed in the end section 25a at opposite sides of aperture 30. The adjustability of the end sections 25a and 25b of frame structure 25 is to assure desirable tautness of the chain 23.

The outer ends of the platform strips 24a extend above and beyond the upper edge of a front wall of 37, Fig. 1, of the box-like machine frame structure 8. See also Fig. 2. Projecting forwardly from the upper portion of this front wall structure 37 are laterally spaced supporting ears 38 and 39, respectively. Spanning the space between these ears 38 and 39 and journaled therein is a rock shaft 40 which carries a pair of generally L-shaped rocker arms 41. Each of the rocker arms 41 has a vertical portion 41a and a projecting horizontal portion 41b when the arms 41 are in the position shown in Fig. 1. In that position, the horizontal members 41b are at the limits

of their outward and downward swinging movements. Horizontal supporting arms 41b have upwardly projecting integral arms 42. Now, when the rock shaft 40 is turned counterclockwise 90° from the position shown in Fig. 15, as to the position shown in Figs. 2, 17 and 18, the arms 41b will be rotated to vertical positions against the bottom of a carton 11 which has been positioned for loading, with the open top portion of the carton, which is on its side, overlapping the end portions of the platform strips 24a and also slightly intumed spring end strips 43 of side board members 9d, all as clearly appears in Fig. 2. The case thus is in position to receive a load consisting of two tiers of the cans, the cans of each tier being stacked on their side and turned endwise in the direction of the open end of the carton.

As best seen in Fig. 1, the transversely spaced side boards, 9, 9a, 9b, 9c and 9d, form a continuous way for cans or the like extending through the infeed, stacking and loading sections A, B and C, respectively, of the illustrative machine. This continuous way has a substantially horizontal initial portion extending above the infeed conveyor 2 in the infeed section A, across the narrow dead plate 13 at the juncture of the infeed section A and stacking section B, and thence straight forward at the same level above the upper stretch 14a of the stacking conveyor belt 14 to the place at which such belt starts to turn forwardly and downwardly over the transverse roller 17. The way then curves forwardly and downwardly along the similarly curved portion of the belt 14 in contact with roller 17, then straight downward along the descending stretch 14b of such belt to a level directly above the plane of the upper stretches of the lower lever chains 23 of the horizontal outfeed conveyor 22, Figs. 2 and 3. Thence the way extends horizontally forward at this relatively lower level above the loading platform 24 between the side board members 9d and the slightly intumed spring end strips 43 projecting forwardly therefrom, Fig. 1, so as to terminate within the confines of a carton which has been positioned on its side with its open top portion overlapping the end portions of the platform strips 24a and of the spring end strips 43, as in the position of the carton 11 shown in Fig. 2.

The longitudinally extending transversely spaced division boards, 10, 10a, 10b, Fig. 1, divide this continuous way in part into a plurality of open-ended adjacent lanes which start in the infeed section A and terminate in the stacking section B at a level above that of a tier of stacked cans on the outfeed conveyor 22, as hereinbefore has been described.

Upwardly extending vertical pushers 44, Figs. 15-18, inclusive, are formed as forwardly off-set upper end portions of bars 45 having vertical lower end portions 46 mounted for travel with chains 47 which are driven along endless paths lying in vertical planes parallel to the vertical planes of the outfeed conveyor chains 23. When two tiers, constituting a carton load, are on the loading platform as in Fig. 17, the pushers, of which there are two in the example shown, will be moved in unison from lower retracted positions below the level of the loading platform upwardly between adjacent outfeed conveyor chain frame structures to raised positions at the rear of the tiers on the loading platform, as shown for one of these pushers in Fig. 17. These pushers thereafter may be moved outward between adjacent platform strips and together will push against rearward ends of all the cans of vertical rows of the more rearwardly disposed of the two tiers on the loading platform. The cans of this tier, that of Tier 2 as shown in Fig. 17, will push the cans of Tier 1 ahead of them until both tiers are in carton 11 which then will be completely filled. Fig. 18 illustrates the operation at a stage just before completion of the carton filling operation.

The loading movement of the pushers may be continued sufficiently to impel the carton supporting arms 41b of the rockable carton carrying assembly past the center of

gravity of that assembly so that these arms will swing downwardly by gravity until the filled carton has been lowered to a position like that shown in Fig. 15 at which it and the cans therein will be upright. The filled carton may be removed manually and placed on an adjacent suitable conveyor, not shown, or its removal effected in any other suitable known way. Provision is made to dampen the downward gravity movement of the filled carton and its supporting arms. This will be explained later as will the other details of the carton holding and lowering mechanism.

After the carton loading stroke of the pushers as just described, the pushers will be moved to lowered, out-of-the-way positions. The pusher operating mechanism will be described in detail later herein.

It will be noted that at the stage of operations illustrated by Fig. 18, Tier 3 will be in the course of outfeed movement onto the loading platform while an additional tier of stacked cans, designated Tier 4, is being lowered onto the conveyor 22 and a still further tier, designated Tier 5, is on the upper stretch 14a of the stacking conveyor belt 14.

The container infeed stop mechanism, Figs. 1, 2, 4 and 5

A cross rod 48, carried by fixed supports 49 and 50, Fig. 1, extends across the space above the dead plate 13, Fig. 5, so that each of a series of regularly spaced, projecting radial stop pins 51 on the periphery of each of a longitudinal series of freely turnable stop wheels 52 on the cross rod will project downwardly into the path of forward movement of a can that has been advanced in that lane onto dead plate 13 when that wheel is in an angularly turned position about the axis of the supporting cross rod so that that particular stop pin is at the bottom position of the wheel. There is a stop wheel 52 for each of the four can lanes shown in Fig. 1. Each wheel has a hub 52a provided with a flange 52b at each of its opposite ends. Each flange 52b carries six of the stop pins 51. Corresponding stop pins 51 are in like positions on the flanges of each wheel, thus being transversely aligned. See Fig. 4. The transverse spacing of each two corresponding stop pins of each stop wheel is less than the diameter of the cans 1 so that each can in the course of advancement in a lane over the dead plate 13 will bear against two corresponding stop pins of the associated wheel at transversely spaced points on its leading surface near the top thereof. As such a can is moved forward by line pressure in the lane it will push the contacted stop pins out of its way and thus impart a rotary movement in a counterclockwise direction to the associated wheel.

Rotation of the stop wheels by the pressure of advancing cans on their stop pins is prevented periodically by means which will now be described. Such means comprises a plurality of latch bars 53, one for each of the stop wheels 52. Each latch bar 53 has an end portion 53a mounted on and keyed to a rock shaft 54 and a free opposite end portion 53b riding on the periphery of the hub portion of its associated stop wheel when the latch bar is in its lowered, active position as shown. Each wheel hub is provided at diametrically opposite places on its periphery with rigid abutment elements 55, each having a contact face or shoulder 55a, facing in a counterclockwise direction, against which an end face 56 of the lowered latch bar will bear and stop the rotation of the wheel. The outer surface of abutment element slopes as indicated at 55b to the periphery of the wheel hub so that the free outer end of the latch bar will ride thereover onto the hub periphery without stopping rotation of the wheel should the latch bar be lowered from a raised, inactive position while an abutment element is therebeneath.

Rock shaft 54 is disposed parallel to cross rod 48 rearwardly thereof and at a slightly lower level. It may be operatively supported by the supporting members 49 and 50 and these may be fixed in any suitable known manner to upper edge portions of side walls 57 and 58, respectively, Fig. 1, of the box-like frame structure 8.

Rock shaft 54 has a projecting end portion 59 carrying a rocker arm 60 which is operatively connected to the upper end of a connecting rod 61. See Figs. 1, 2 and also 3. As shown in Figs. 2 and 3, rod 61 has its lower end portion slotted, as at 62, and mounted slidably on an end portion of a shaft 63 so that a cam follower 64, Fig. 2, which is mounted on a slightly higher portion of this connecting rod, rides continuously on the periphery of a cam 65 on shaft 63. Cam 65 has a rise portion 66 which will actuate the connecting rod 61 through cam follower 64 so as to impart an upward throw to the rocker arm 60, briefly, once during each rotation of the cam. This upward throw of rocker arm 60 will cause an upward rocking of the latch bars 53 so as to raise the free ends of such bars out of engagement with abutments 55 on the stop wheels. This will permit rotation of the wheels by oncoming cans passing over dead plate 13 until there has been an infeed of three cans per lane from the infeed section A to the stacking section B of the machine. The latch bars will then engage the second abutments on the rotating stop wheels to arrest movement of further cans into the stacking section until there has been another cam-actuated upward rocking of the latch bars.

The container rest finger mechanism, Figs. 1, 3 and 6-9, inclusive

The cross rods 21, carrying the container rest fingers 19, are mounted at their opposite ends on chains 67, each of which, as best seen in Fig. 3, is trained about sprockets 68, 69, and 70, respectively. The sprockets 68 are loose on a cross shaft 71 on which the rear upper roll 16 of the stacking conveyor belt assembly is mounted. Sprockets 69 are loose on a cross shaft 72 on which conveyor roll 17 is mounted. Sprockets 70 are keyed to the shaft 63. The lower conveyor roll 18 of the stacking conveyor assembly is loose on this shaft 63. The chains 67 thus are moved in vertical planes along closed paths parallel to the path of movement of the stacking conveyor belt 14.

The rods 21 are three in number in the example shown. One end of each of these rods is journaled in a bearing lug 73 on one of the chains 67, as the far chain, as shown in Fig. 3. At its opposite end the rod 21 is clamped firmly, as by the clamping means, collectively designated 74 in Fig. 9, to the inner side of a rigid bar 75 which, at its side opposite the rod 21, has a boss 76 provided with a projecting journal pin 77 axially aligned with rod 21 and journaled in a bearing lug 78 on the adjacent chain 67.

Bar 75 has an integral laterally turned lug 79 at the forward side of the axial line of rod 21, this lug being slotted at its bottom, as indicated at 80 in Fig. 9, to ride along chain 67 in overlapping relation therewith when the rod 21 has been turned to a certain angular position about its own axis. The opposite or rearwardly extending end portion of the bar 75 is provided with a guide roller 81 on the same side thereof as the lug 79. This latter end portion of bar 75 has an upwardly and rearwardly extending short arm 82 which carries a guide roller 83 on the same side thereof as roller 81. Also, the journal pin 77 projects beyond its bearing lug 78 and carries a guide roller, designated 84.

As aforesaid, there are three of the cross rods 21 in the example shown, and these are spaced uniformly apart around the path traversed by the chains. In moving around a sprocket 68, roller 81 will strike an inclined stationary cam rail 85, Fig. 6, while roller 84 is passing beneath a fixed hold-down bar 86. As roller 84 rolls along beneath this hold-down bar, the cross rod 21 will be turned angularly about its longitudinal axis from a position which causes the rest fingers 19 to trail the rod to an upright position as indicated by the dot and dash lines showing the rest fingers 19 in the upper right hand portion of Fig. 6. At this time, the contact of the slotted bottom 80 of guide lug 79 with the roller chain in advance of the bearing lug 78 will maintain the rest fingers firmly in their raised position against pressure tending to move

them clockwise from that position. Thus, when the containers of a segregated tier bear on the rest fingers in passing around roll 17, the fingers 19 will provide the desired support for the stacks of containers resting thereagainst.

When a cross rod 21 is being moved downward, as shown for the rest finger assembly at the right hand side of Fig. 6, the roller 83 will ride along a cam surface 87 of a fixed vertical cam bar 88 and will be guided by an inwardly and rearwardly curved lower portion 87a of that cam surface so that the rest fingers will be withdrawn downwardly and rearwardly from beneath the stack of containers which have been lowered thereby onto the outfeed conveyor 22.

After passing the sprocket 70, the rest finger assembly will be carried upwardly and rearwardly without need for controlled guiding of the rest fingers.

The driving mechanism, Figs. 2, 3, 13 and 14

Power for operating the driven parts of the machine may be derived from a motor 89, Fig. 2. This motor has a chain and sprocket type driving connection indicated at 90, Figs. 2 and 3, with transversely disposed shaft 91 which carries the front roll 4 of the infeed conveyor. Motor 89 has a second chain and sprocket type driving connection 92 with a sleeve 93 which is rotatably mounted on an end portion of shaft 63. Shaft 91 has a chain and sprocket type driving connection, indicated at 94, with shaft 72 on which the front upper roll 17 of the stacking conveyor belt is mounted. Thus, when the motor is in operation, infeed conveyor 2 and stacking conveyor belt 14 are driven constantly. Sleeve 93 also is driven constantly and has a chain and sprocket driving connection, indicated at 95, Fig. 3, with a sleeve 96 which is loose on rock shaft 40 and carries a ratchet wheel 98, the speed of rotation of which determines the maximum speed of lowering movement of a filled carton from its raised position as shown in Fig. 2, to a lowered position which will permit removal of the filled case. The specific means for providing this speed control will hereinafter be explained.

The sleeve 93 has a ratchet wheel 99, Figs. 3 and 14, fixed thereon. A pivoted pawl 100 for engaging with the teeth of the ratchet wheel at times is carried by a radial arm 101 having a hub 102 keyed at 103, Figs. 13 and 14, to an end portion of shaft 63. A tension coil spring 104, Fig. 13, tends to urge the pawl 100 to position for engagement with the teeth of ratchet wheel 99. However, an upwardly projecting integral lug 105 on the hub portion of pawl 100 is engaged by a lateral stop element 106 on the end of an arm 107 which is keyed at 108 to one end of a rockable cross shaft 109 which extends transversely through the upper part of framework structure 8 and at its opposite end carries a rocket arm 110, Fig. 2, operatively connected at 111 to the extremity of the movable element 112 of a solenoid 113 and also to a tension coil spring 114 which constantly tends to swing the arm 110 clockwise against the resistance opposed by the solenoid. When solenoid 113 is energized, which is accomplished at a time and by means presently to be described, it will act in opposition to spring 114 to swing rocket arm 110 counterclockwise, thereby turning the shaft 109 in the same direction and raising latch arm 107 out of the path of the latching lug 105 on pawl 100. Pawl 100 will immediately swing into position to engage the first tooth available of the rotating ratchet wheel 99. Thereafter, ratchet wheel 99, pawl arm 101 and the engaged pawl 100 will be rotated in unison in a counterclockwise direction, imparting like rotation to the shaft 63. When one revolution of the shaft 63 has been completed, lug 105 will again contact with stop element 106 on arm 107 which in the meantime has been returned by the action of the spring 114, Fig. 2, to its active pawl engaging position, as shown in Fig. 13, thereby declutching shaft 63 from continuously driven sleeve 93. Pawl carrying arm 101 is integral with an arm 115 which projects from hub 102 at about approxi-

mately a right angle with arm 101. The extremity of arm 115 will engage an inclined surface 116 on the adjacent side of a depending swingable latching arm 117 carried by a hub 118 which is loose on shaft 109, forcing the arm 117 outward against the resistance of compression spring 119 until the extremity of arm 115 has been raised far enough to permit the spring 119 to position an upwardly facing shoulder 120 on arm 117 beneath the extremity of rotating arm 115. An integral upwardly projecting lug 121 on hub 118 will contact a fixed stop 122 which limits the inward swinging movement of arm 117 under the influence of spring 119.

Shaft 63 has sprockets 70, Fig. 3, fixed thereto so that the cycle of rotation of such shaft causes a cycle of movement of the chain means 67 carrying the rest finger rods 21. The rotation of shaft 63 also causes a rotation of cam 65 and one actuation of the rock shaft 54 to raise the latch bars 53 of the can infeed stop mechanism 15.

Shaft 63 has a driving connection through the sprocket and chain arrangements indicated at 123, Fig. 3, with the shaft 35 which operates the outfeed conveyor chains 23. Shaft 35 is operatively connected by a sprocket and chain driving means indicated at 124, Fig. 3, with aligned short shafts 125 carrying sprockets 126 which drive the chains 47 carrying the pusher bars 45. Thus, the clutching of the shaft 63 to the constantly revolving sleeve 93 will produce cycles of operation of the container rest finger mechanism, of the can infeed stop mechanism, of the pusher assembly, and of the outfeed or carrying away conveyor.

The pusher mechanism, Figs. 2, 3, and 15-18, inclusive

The rearwardly off-set vertical lower end portions 46 of the pusher bars 45 are pivotally connected at 127 to the chains 47, each of which is trained about idler sprockets 128, 129, and 130, in addition to its driving sprockets 126. Each chain is kept taut and its path is given the configuration of a rectangle lying in a vertical plane and having a forwardly projecting upper portion around the driven sprocket 126 by a cooperative idler sprocket 131 which engages the chain at the outer side thereof below and rearwardly of the sprocket 126. With this arrangement, each chain has a forwardly moving upper run 47a, a short rearward run 47b at a slightly lower level, a downwardly moving vertical run 47c from sprocket 131 to sprocket 130, a rearward lowermost horizontal run 47d between sprockets 130 and 129, and an upward relatively long vertical run 47e between sprockets 129 and 128.

The lower portion 46 of each pusher bar 45 is connected by a parallel motion frame arrangement indicated at 132, with a control sleeve 133 slidable fore-and-aft on a fixed position horizontal rod 134. The arrangement is such as to maintain the upper vertical can engaging portions 44 of the pusher bars 45 constantly vertical during each complete cycle of movements thereof. Thus, starting with the pusher bars lowered and out-of-the-way, as shown in Fig. 16, they will first be moved rearwardly a short distance as their chains move around sprockets 129, then vertically upward as shown in Fig. 17, then forward at their highest as shown by Fig. 18 to push the two tiers of stacked cans from the loading platform into the waiting carton and to impel the loaded carton outward about the axis of rock shaft 40. This will be followed by a slight downward and rearward retraction of the pusher bars around driving sprockets 126, followed by a descending movement along chain runs 47c as illustrated by Fig. 15.

Safety and control provisions, Figs. 1, 2, and 15-19 inclusive

Adjacent to rock shaft 40 and directly therebeneath is a rockable operations-starting shaft 135, provided at one end with a handle 136, Figs. 1, 2, and 19. Shaft

135 carries a fixed latching element 137 projecting upwardly therefrom in position to engage beneath a downwardly facing shoulder 138 on a sector plate 139 fixed to rock shaft 40, Fig. 15, to keep the carton holding and lowering arms 41 lowered. A torsion spring 140, Fig. 1, tends to rotate rock shaft 40 counterclockwise to raise the arms 41 to the position shown in Figs. 2 and 16-18, inclusive. This is prevented, however, by the engagement of latch member 137 with cooperative element 139 on shaft 40 until the handle 136 has been grasped and manipulated to turn shaft 135 counterclockwise to the positions shown in Figs. 2 and 16-18, inclusive, thereby swinging the latch 137 out of engagement with element 139.

Handle 136 may thereafter be turned further counterclockwise to close a normally open switch 141, Figs. 2 and 19. One side of switch 141 is connected by a wire 142 to one side of solenoid 113 which controls the clutch engaging mechanism of the machine. The other side of switch 141 is connected by a wire 143 to an electric main L1, Fig. 19. Solenoid 113 is connected electrically with a second electric main, indicated at L2, Fig. 19, through a series of four identical micro-switches 144a, 144b, 144c, and 144d and a further micro-switch 145 when all of these switches are closed.

Switches 144a, 144b, 144c and 144d are intended to be kept closed by oncoming cans in the four lanes of the infeed section of the machine when such lanes are filled with cans and in practice are located in positions, not shown, appropriate for that purpose. Switch 145 is located in a suitable position, Fig. 2, over the upper stretch 14a of the stacking conveyor belt 14 so as to be closed by a leading can of a segregated tier-group moving on the upper run of the stacking conveyor when the leading cans of that tier-group have arrived at a predetermined position in relation to the rest fingers 19, Fig. 1, on which such leading cans are to rest during their travel downward to the lower level outfeed conveyor as has hereinbefore been explained. Thus, the switch 145 preferably will be closed when the leading cans of a tier-group have been moved against the rest fingers involved or close enough to that position to attain such contact without any opportunity for unsupported falling movement as their path of further movement turns downward from the horizontal to the vertical. The rest fingers are carried by an intermittently driven carrier and the speed of their movement may be slightly slower than the corresponding movement of the cans on the continuously driven stacking conveyor belt so that the cans on the latter will catch up with their rest fingers before turning downward even if the movement of the rest fingers should be started just before actual contact of such cans with these fingers.

To initiate a cycle of operations of the intermittently operated elements of the machine, the handle 136 first is moved from the dotted line position to the full line position of Fig. 19 to unlatch the carton holding and lowering mechanism. This is done after a carton has been positioned at the outer end of the loading platform, ready for filling. The handle 136 then is turned further to the left or counterclockwise as viewed in Fig. 19 to close switch 141. This will close a circuit to energize solenoid 113 when the other switches in series with the solenoid are closed as hereinbefore described. The energization of this solenoid will cause operation of the clutch mechanism for operatively connecting continuously rotating sleeve 93 with shaft 63, Fig. 3, so as to initiate a single revolution of the latter. This, through connections which have been described in detail, will cause the intermittently operated elements of the machine to perform their respective functions.

The machine should be primed before initial starting thereof so that tiers of cans will be in the machine as shown in Fig. 17. The first cycle of the intermittently operated elements then may be initiated by use of han-

dle 136 in the manner described. The handle 136 may be returned to its full line position, Fig. 19, when this cycle has been initiated and the switch 141 will open automatically. Since the cartons are to be filled by a charge or load of two tiers each, it is desirable that the second of each two cycles required to provide a load for a carton should be initiated automatically. To this end a normally open switch 146 is provided in parallel with switch 141 between electric main L1 and wire 142 leading to solenoid 113. Switch 146 is positioned to be closed by one of the pusher bars 45 as the latter descends to a lowered position. See Figs. 2 and 19.

Operation of the pusher means will swing the filled carton and its supporting arms 141 forward and outward sufficiently to cause them to drop by gravity from their raised positions. The ratchet wheel 98, Fig. 3, turns constantly and slowly. A pawl 147, Fig. 2, carried by an arm 148 on rock shaft 40, is urged continuously against ratchet wheel 98 by a spring 149. The ratchet wheel will turn freely under the pawl when it is rotating clockwise, as viewed in Fig. 2. The pawl likewise may be swung counterclockwise during raising of the arms 41 without interference with the rotation of the ratchet wheel. However, when the filled cartons start downward, the pawl will be moved downward and its engagement with the teeth of the rotating ratchet wheel will prevent any faster movement of the filled case than is permitted by the relatively slow rotation of such ratchet wheel.

When the filled case has been lowered, the handle 136 will be returned from the full line position to the dotted line position of Fig. 19 so that rock shaft 40 will be latched against return counterclockwise turning movement until a further carton is to be held in its position for loading.

Many modifications of and changes in the details of the illustrative machine shown in the drawings and herein described will now be obvious or will readily occur to those skilled in the art and we therefore do not wish to be limited to such details.

We claim:

1. In a packer for cans and like articles, a pair of transversely spaced parallel side boards arranged to form a continuous way for the articles to be packed and arranged so that said way extends straight forward at one level for part of its length, then turns downward from that level to a lower level, and then extends straight forward at said lower level, a conveyor system operatively associated with said way for advancing articles therethrough, means to divide said articles into spaced successive groups during the advance thereof through said higher level straight forward portion of said way, and means to retain the articles of each of said groups in said way and in substantially their same relative positions in the group during their passage from the higher level straight forward portion of the way through its downwardly turned portion to the lower level straight forward portion thereof.

2. In a packer for cans and like articles, the combination specified by claim 1 wherein said last named means is constructed and arranged to cooperate with the adjacent portions of said way and said conveyor system to turn the articles of each group individually in a forward direction through approximately 90 degrees and to stack such articles in a superposed relation during their downward travel to said lower level portion of the way.

3. In a packer for cans and like articles, the combination specified by claim 2, and, in addition, a loading platform at the final end of the lower level portion of said way, means to support an open empty carton in a position to receive articles pushed thereinto from the loading platform, said carton being of a size to require a plurality of aligned successive stacks of the articles for

complete filling of the carton, and intermittently acting pusher means for pushing into the carton at one operation the plurality of stacks of articles required to fill the carton.

4. In a machine for packing cans or like articles in cartons, transversely spaced side boards arranged to form a continuous way for the articles, said way comprising a substantially horizontal portion located at one level, a forwardly and downwardly curved further portion, and a horizontal final portion located at a lower level, a first conveyor on which articles to be packed may stand upright and be advanced only partway through the first named horizontal portion of the way, a second conveyor in advance of the first conveyor for receiving standing articles from the first conveyor and advancing such articles through the remainder of said first named horizontal portion of the way to and through the forwardly and downwardly curved further portion of said way, means for periodically interrupting movement of articles from the first conveyor to the second conveyor so that the articles received by the latter will be advanced thereby in groups spaced apart in the direction of their travel, article rest means movable through the forwardly and downwardly curved portion of said way and downwardly to the lower level horizontal portion of the way in under-supporting relation to each group of articles so as to lower said articles in a stacked condition into the lower level horizontal portion of said way, and a third conveyor for receiving from said article rest means each stacked group of articles that has been lowered into the lower level horizontal portion of the way and for advancing said stacked group of articles in the latter.

5. In a machine for packing cans or the like, the combination specified by claim 4 wherein said way comprises a plurality of lanes extending in the first named horizontal portion thereof and to and through the forwardly and downwardly curved further portion of said way so that each group of articles advanced to the latter portion of the way will comprise a plurality of parallel files of the articles, and wherein said article rest means comprises rigid fingers travelling in contact with only the leading articles of the several files of the group.

6. In a machine for packing cans or the like, the combination specified by claim 4 and, in addition, means for restraining independent movement of the articles of a group relative to said second conveyor during passage of said articles through said forwardly and downwardly curved portion of said way.

7. In a machine for packing cans or the like, the combination specified by claim 6 wherein said last named means comprises curved restraining bar means spaced outwardly from and concentric with the portion of said second conveyor passing through the forwardly and downwardly curved portion of said way.

8. In a machine for packing cans or the like, the combination specified by claim 6 wherein said last named means comprises a magnet located at the inner surface of the portion of the second conveyor passing through said forwardly and downwardly curved portion of said way to exert a strong magnetic force on the adjacent ends of magnetizable articles at the outer surface of that portion of said conveyor.

9. In a machine for packing cans or the like, the combination specified by claim 6 wherein said last named means comprises curved restraining bar means spaced outwardly from and concentric with the portion of said second conveyor passing through the forwardly and downwardly curved portion of said way and a magnet located at the inner surface of such portion of the second conveyor to exert a strong magnetic force on the adjacent ends of magnetizable articles at the outer surface of that portion of said conveyor.

10. In a machine for packing cans or like articles in cartons, the combination specified by claim 6, and, in

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addition, means for presenting an empty carton at the outer end of said lower level final portion of the way so that an open end of the carton is in register with said end of said way, platform means for receiving a plurality of successive stacks of articles from said third conveyor and for positioning said stacks for insertion in said carton, and cyclically operable means for pushing said plurality of stacks into said carton.

11. A packing machine of the character described comprising successive infeed, stacking and loading sections for cans or like articles, said infeed section comprising means for feeding multi-file groups of the articles in an upright position to the stacking section intermittently and along a horizontal path located at one level, the articles of the individual files of each group being in line contact with one another, said stacking section comprising means for receiving at the same level each of such multi-file groups of articles and, while maintaining substantially unchanged the relative positions of all the articles in the group, moving said articles forwardly at said level and then downwardly therefrom through an arc of approximately 90 degrees and then further downward as a stack of superposed on-their-side articles to a lower level in the stacking section, said stacking section also including means for receiving each such stack at said lower level and for advancing it as a unit into the loading section, said loading section having a loading platform for receiving each such stack from the last named means of the stacking section and for supporting thereon a plurality of such stacks successively delivered thereto, together with cyclically operable means to present an empty carton having an open end in an operative position with respect to the loading platform and pusher means for pushing the plurality of stacks as a unit from the loading platform into said carton.

12. The method of packing cans or like articles into cartons comprising the steps of positioning a carton in a loading position on its side at one level, the carton being open at a horizontally facing end thereof, forming a multi-file group of the articles to be packed at a place located at a higher level than said carton so that all the articles of the group are upright and the articles of each file are in line contact with one another, said group containing sufficient articles for a tier in said carton, moving the articles of said group forwardly at said higher level and then downwardly therefrom to a lower level position in advance of the open end of said carton and in the course of said movement turning the articles from upright positions approximately 90 degrees in the direction of said carton and depositing them at said lower level position as a stack of superposed, horizontally disposed, on-their-side articles, and moving said stack into said carton through the open end thereof.

13. The method of packing cans or like articles into cartons comprising the steps of positioning a carton in a loading position on its side at one level, the carton being open at a horizontally facing end thereof, forming a multi-file group of the articles to be packed at a place located at a higher level than said carton so that the articles of the group are upright and the articles of each file are in line contact with one another, said group containing sufficient articles for a tier in said carton, moving the articles of said group forwardly at said higher level and then downwardly therefrom to a lower level position in advance of the open end of said carton and in the course of said movement turning the articles from upright positions approximately 90 degrees in the direction of said carton and depositing them at said lower level position as a stack of superposed, horizontally disposed, on-their-side articles, moving said stack horizontally toward the open end of the carton to provide room for a succeeding stack, repeating the aforesaid steps until sufficient stacks have been accumulated in front of the carton completely to fill said carton, and pushing all of

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said stacks into said carton through the open end thereof.

14. In a packing machine for cans or like articles, a horizontal first conveyor for the articles to be packed, a second conveyor for such articles having a horizontal run in line with the first conveyor for receiving articles from the latter, said second conveyor having a downward run at the end of its horizontal run remote from the first conveyor, a horizontal third conveyor extending in a forward direction from a place adjacent to the lower end of the downward run of the second conveyor, and article rest fingers separate from and mounted for movement along a path extending horizontally and thence downwardly close to the horizontal and downward runs, respectively, of the second conveyor for co-acting with the latter to stack articles onto the third conveyor.

15. In a packing machine for cans or like articles, an article stacking mechanism comprising an endless stacking conveyor having a horizontal forward run and a downward run at the conclusion of its forward run and a lower level horizontal outfeed conveyor operatively positioned adjacent to the lower end of the downward run of the stacking conveyor, means to feed articles to the stacking conveyor so as to provide spaced multi-file groups of such articles in an upright position on the latter during its horizontal run, means co-acting with said stacking conveyor to limit independent bodily movement of the individual articles of each such group as such articles are advanced from the forward run to the downward run of the stacking conveyor so as to cause said articles to turn forwardly from their upright positions to horizontal positions and to form a stack of such articles for delivery to the lower level outfeed conveyor at the conclusion of the downward run of the stacking conveyor, said last named means comprising a carrier having a pair of chains respectively mounted for movement along the lateral margins of the stacking conveyor, spaced cross bars carried by said chains so as to extend across the stacking conveyor outwardly therefrom and adjacent thereto, a set of transversely aligned article rest fingers on each of said cross bars, and cyclically operable means for operating said carrier to cause the rest fingers on a cross bar to travel in contact with the leading articles of each group during movement thereof from the horizontal forward run to and through the downward run of the stacking conveyor, and stationary bar means operatively positioned in respect to the stacking conveyor to limit independent bodily movement of the articles of each group during forward turning movement of said articles as they pass from the horizontal forward run to the downward run of said conveyor.

16. The combination specified by claim 15 wherein said last named means also includes a means located at the opposite side of the stacking conveyor from the rest fingers for subjecting the articles on the stacking conveyor to a strong magnetic force during movement of said articles from the horizontal forward run to the downward run of said conveyor.

17. In a packing machine for cans or like articles, an article stacking mechanism comprising an endless stacking conveyor having a horizontal forward run and a downward run at the conclusion of its forward run and a lower level horizontal outfeed conveyor operatively positioned adjacent to the lower end of the downward run of the stacking conveyor, means to feed articles to the stacking conveyor so as to provide spaced multi-file groups of such articles in an upright position on the latter during its horizontal run, means co-acting with said stacking conveyor to limit independent bodily movement of the individual articles of each such group as such articles are advanced from the forward run to the downward run of the stacking conveyor so as to cause said articles to turn forwardly from their upright positions to horizontal positions and to form a stack of such articles for delivery to the lower level outfeed conveyor at the con-

clusion of the downward run of the stacking conveyor, and in addition a co-planar loading platform positioned to receive successive stacks of articles fed thereto by the outfeed conveyor, said outfeed conveyor being cyclically operable to feed a stack of articles onto the platform on each cycle thereof, manually operable means to present an empty carton adapted to hold a plurality of said stacks of articles in an operative position in relation to the platform, and pusher means acting automatically to push from the platform into the carton the plurality of stacks required to fill it.

18. In a packing machine of the character described, a continuously moving horizontal conveyor for cans or like articles, a second continuously moving conveyor having a horizontal run beginning slightly in advance of and at the same level as the adjacent end of the first conveyor, a narrow dead plate over which articles may be pushed by line pressure from the first conveyor onto the horizontal run of the second conveyor, a cross rod above the dead plate, a wheel freely turnable on the rod above the path of movement of articles over the dead plate, said wheel having projecting rigid pins spaced angularly around its periphery and each depending into the path of movement of the articles over the dead plate when that pin is in a lower part of its path of movement by the wheel around the axis of the latter, whereby the wheel may be turned counterclockwise by the contact of successive articles of a single file passing over the dead plate with successive pins carried by the wheel, latching means operable to engage said wheel to prevent further counterclockwise turning movement thereof when a certain number of articles of the file have passed over the dead plate onto the second conveyor, and cyclically operable means to disengage the latching means from the wheel to permit passage of a like number of further articles of the file over the dead plate to the second conveyor.

19. In a packing machine of the character described, an endless conveyor belt, means including a pair of spaced, transversely aligned horizontal rolls located at one level for operatively supporting and driving said belt so that it has a horizontal run from one of said rolls to the second roll and then turns forwardly and downwardly over the latter, said second roll being a magnet so as to provide a strong magnetic field to which articles on the conveyor belt will be subjected in passing forwardly and downwardly over the second roll, stationary curved bar means spaced outwardly from and concentric with said second roll to restrain outward displacement of articles from the conveyor belt as they are carried thereby forwardly and downwardly over the second roll.

20. In a packing machine of the character described, a stationary loading platform comprising a plurality of transversely spaced longitudinally extending components and having open longitudinally extending spaces between adjacent such components, vertical pusher bar means

mounted for movement along an endless path in a vertical plane such that a complete cycle of movements thereof comprises a horizontal movement at a relatively high level at which the pusher bar means extends upwardly through spaces between platform components above the level of the platform adjacent to one end of said platform toward its opposite end, a downward movement to a low level to retract the pusher bar means to a level below the platform, a horizontal movement at that low level and an upward movement to the relatively high level position, cyclically operable means to feed each of successive stacks of articles, each suitable for a tier in a carton to be packed, onto the first end of the platform, manually operable means to present a two-tier carton in an operative position at said opposite end of the platform and to initiate a cycle of operations of the means to feed a stack of articles onto the first end of the platform and part only of a complete cycle of the pusher bar means, and means actuated by said pusher bar means at one point in its travel for said part of its cycle automatically to initiate a second cycle of the stack feeding means and the remaining part of the cycle of the pusher bar means, during which the pusher bar means will push two aligned stacks of articles as a unit from the platform into the waiting carton.

21. In a packing machine of the character described, a loading platform having an end over which cans or like articles may be pushed into a waiting carton, a transversely disposed horizontal rock shaft in advance of and below the level of said end of the platform, rigid arm means fixed to the rock shaft at the opposite side of the rock shaft from the platform and at a lower level when the arm means is in a lowered position relatively remote from the platform, spring means tending to rock said rock shaft about its axis in the direction required to swing said rigid arm means upwardly and toward said end of the platform so as to hold a carton in a position at said end of the platform to be filled with articles pushed thereinto from the platform, releasable latching means to prevent said rocking of the rock shaft by said spring means, means to release said latching means to permit said rocking, means to push articles into said carton to fill it and to initiate a return downward swinging movement of the carton holding and lowering arms under the weight of the filled carton, said spring means being too weak to prevent such return movement, and other means to limit the speed of the return downward swinging movement of the filled carton supporting arms.

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