June 28, 1960 N. H. HOGSTROM 2,942,758

CARTON DISPENSER WITH MEANS TO WITHDRAW THE LOWERMOST CARTON

Filed March 11, 1955 4 Sheets-Sheet 1

Fig. 1

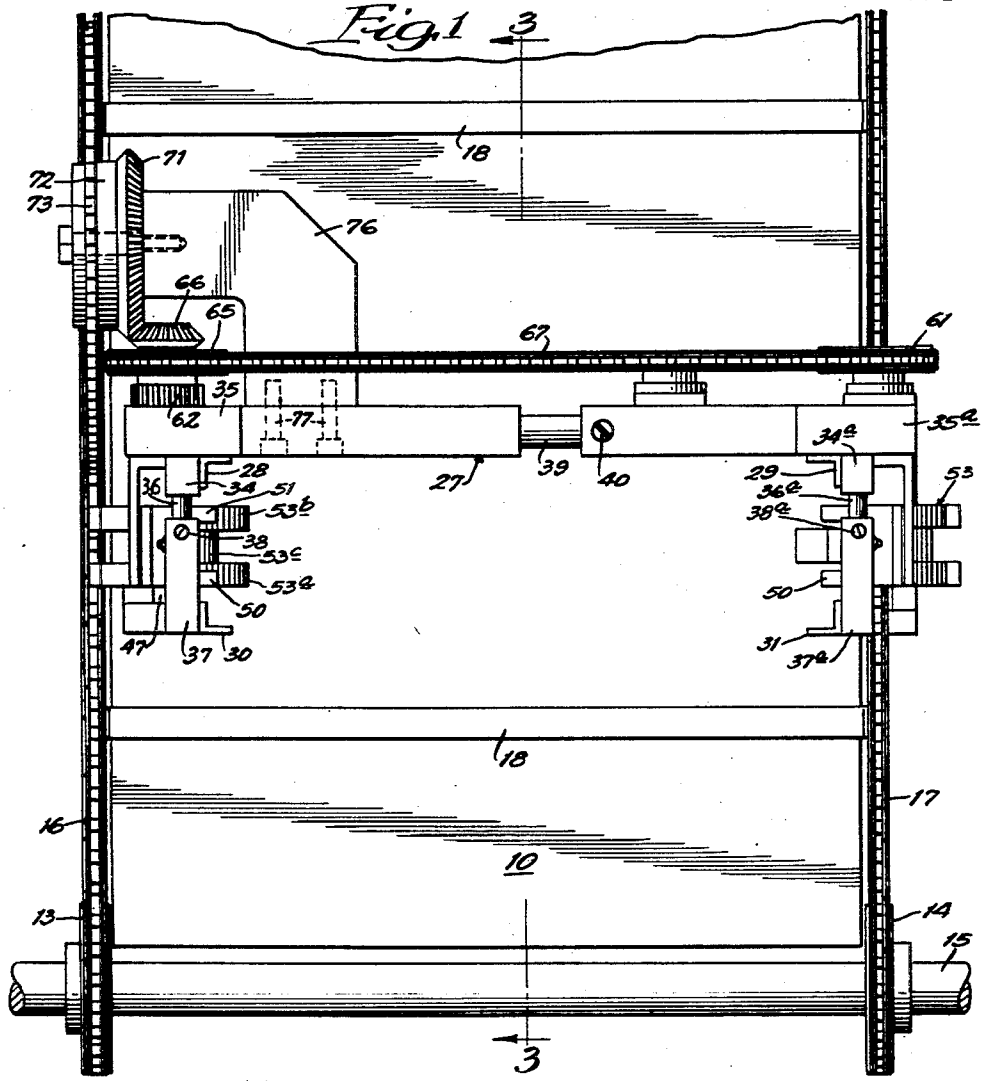
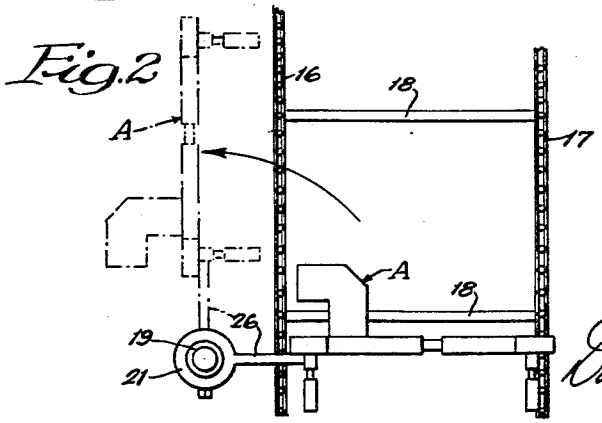


Fig. 2



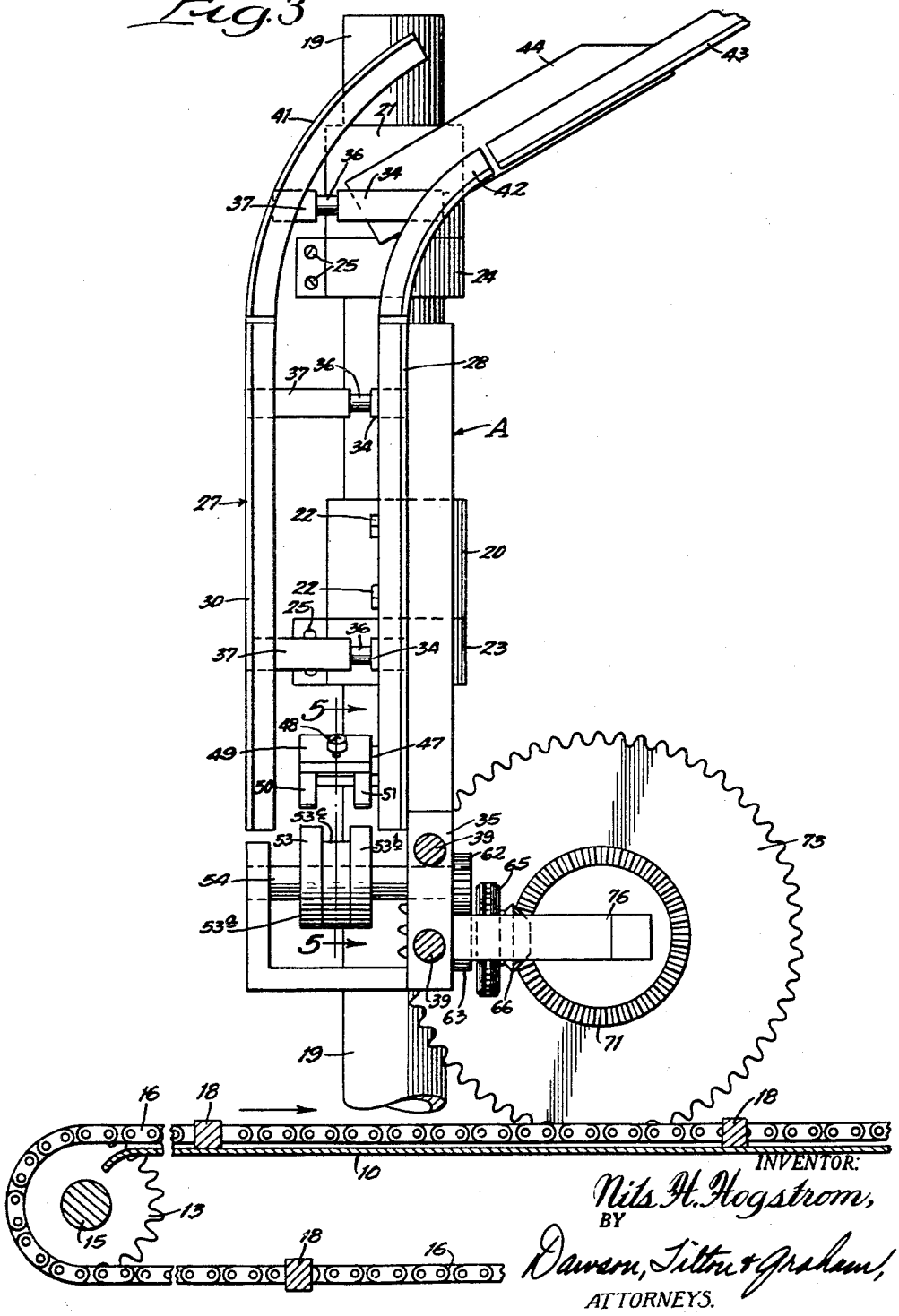
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Fig. 3



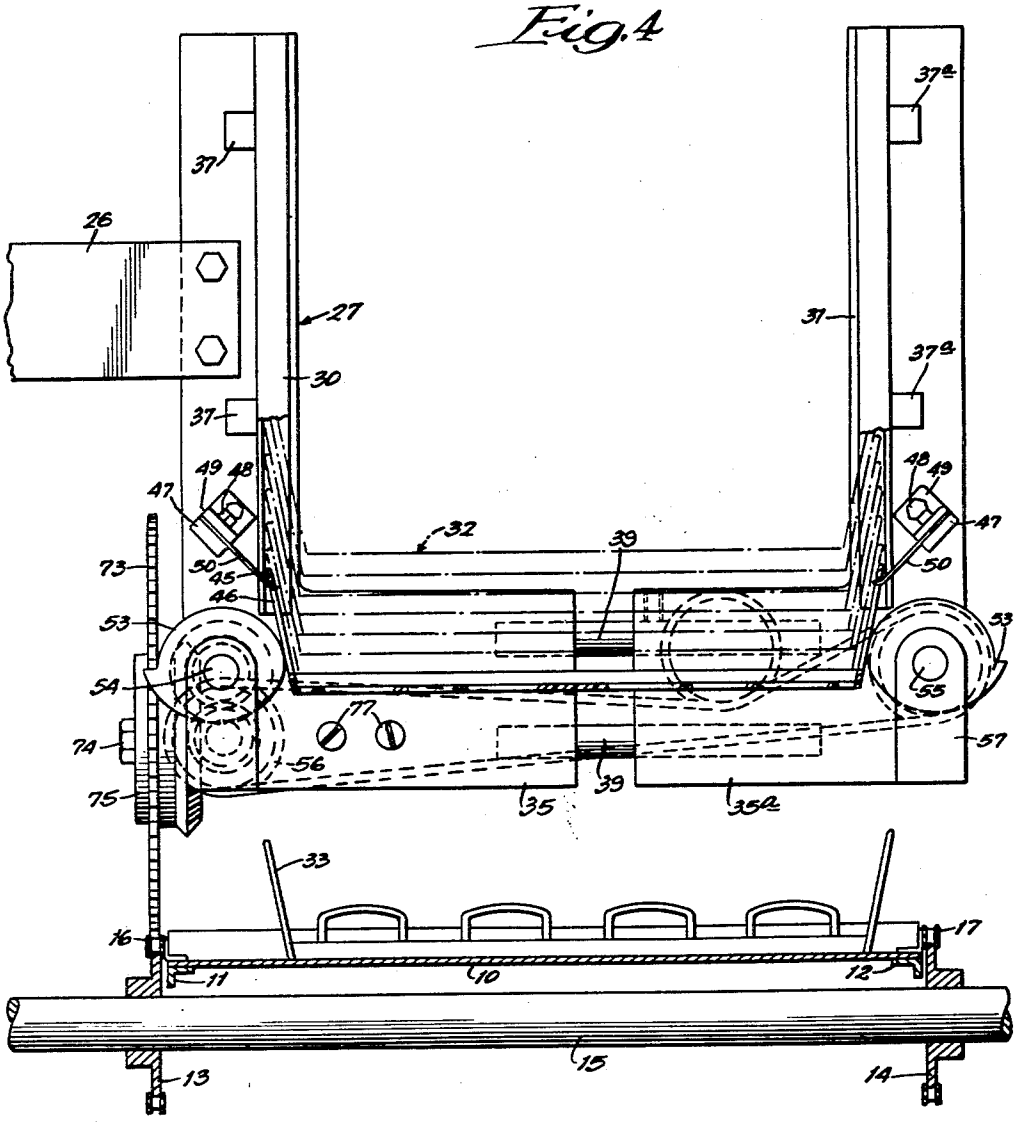
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Fig. 4



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Fig. 5

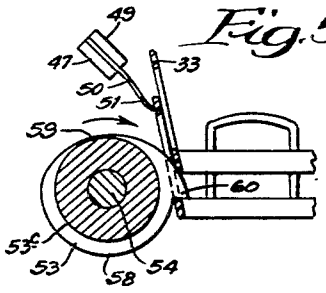


Fig. 6

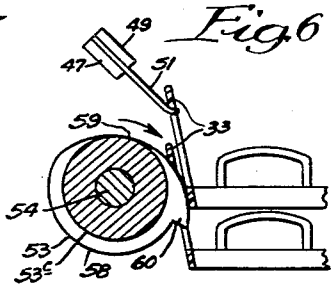


Fig. 7

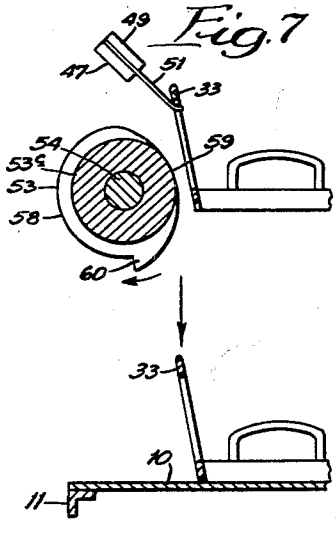
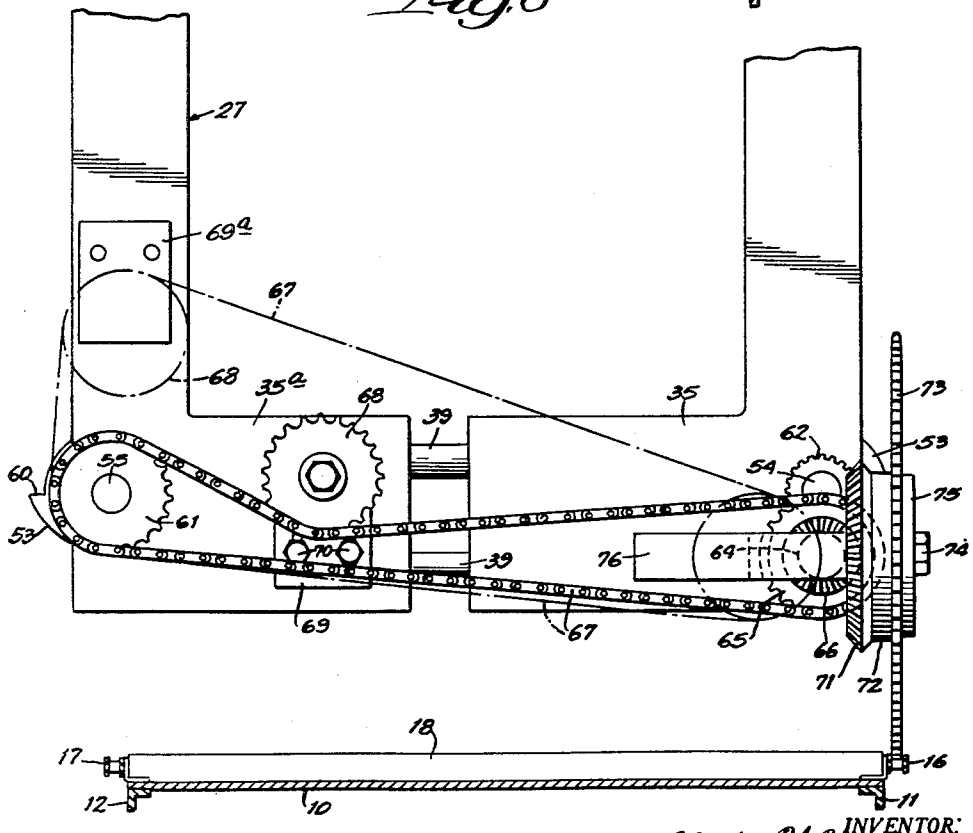


Fig. 8



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2,942,758

CARTON DISPENSER WITH MEANS TO WITHDRAW THE LOWERMOST CARTON

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Filed Mar. 11, 1955, Ser. No. 493,694

3 Claims. (Cl. 221—222)

This invention relates to a carton dispenser, and more particularly to apparatus for feeding or dispensing cartons one at a time from a stack of nested cartons. The apparatus is useful in certain packaging operations—tomato packaging, for example, wherein it is desired to feed cartons one by one onto a conveyor for subsequent filling.

In tomato packaging, cartons are advanced along a conveyor and tomatoes are ordinarily placed in the cartons by operators as the cartons are advanced. Advantageously, the packaging lines are operated at relatively high rates of speed, and for efficient operation the cartons must be properly positioned and spaced from each other along the conveyor so that they require no attention from the operators. Any attention diverted from the operation of tomato placement itself within the cartons generally causes an interruption in the smooth and continuous functioning of the packaging line.

Plastic cartons are now becoming popular in tomato packaging because of the numerous advantages they offer—visual inspection by the consumer, for example. Plastic cartons are somewhat more difficult to dispense than the customary collapsed paper carton or tube because of the occasional misalignment of at least some of the cartons in their nested relation with others in a stack. At present, no satisfactory apparatus is available for dispensing such cartons, and it is now ordinarily done by hand—a time consuming and expensive operation.

It is, accordingly, an object of this invention to provide apparatus to dispense cartons one at a time from a stack of nested cartons. Another object of the invention is in providing apparatus to dispense relatively rigid, preferably plastic, cartons one by one onto a conveyor in spaced relation with each other so that the cartons are ready to be filled with articles such as tomatoes as the cartons are advanced along the conveyor. Still another object is in providing apparatus for the dispensing of tomato cartons wherein a stack of plastic cartons in nested relation are supported in a magazine, the apparatus providing dispensing wheels or fingers operative to withdraw cartons one at a time and drop the same in righted position upon a conveyor or other receiving surface therebelow, irrespective of any misalignment of the cartons within the stack.

A further object of the invention is to provide apparatus as described wherein plastic tomato cartons are fed onto a conveyor one at a time and in spaced relation from a stack of such cartons supported in a magazine, the dispensing elements comprising eccentric cams that function to withdraw the lowermost carton in each cycle of rotation of the cams from the stack of nested cartons, and to thereafter align the withdrawn carton with respect to a conveyor positioned therebelow and prior to permitting the carton to drop onto the conveyor, whereby each dispensed carton is in perfectly righted condition when dropped onto the conveyor, irrespective of whether it is properly aligned when within the stack. Still a further object is to provide dispensing apparatus of the character described wherein the magazine and dispensing cams can be adjusted to accommodate cartons of various longitudinal and transverse dimensions. Additional objects and advantages will appear as the specification proceeds.

An embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a broken top plan view of the apparatus; Figure 2 is a broken top plan view on a reduced scale showing the apparatus in position for use above a conveyor, and also showing the apparatus swung laterally to a withdrawn position when not in use; Figure 3 is a broken longitudinal sectional view taken on the line 3—3 of Figure 1; Figure 4 is a broken rear view in elevation of the apparatus, and showing a plurality of cartons stacked within the magazine thereof; Figures 5, 6 and 7 are broken diagrammatic views showing the sequential operation of the dispensing wheels or cams in the dispensing or feeding of a carton; and Figure 8 is a broken front view in elevation showing the drive arrangement for the specific apparatus illustrated in the drawings.

The dispensing apparatus is adapted for use with conveyors which are operative to advance cartons that are discharged one by one from the dispenser. The dispensing apparatus may be arranged for use with numerous different types of conveyors, and it should be appreciated that the specific conveyor structure shown in part in the drawings is intended to be exemplary only. The specific conveyor structure illustrated, as is shown best in Figures 1, 3 and 4, comprises an elongated stationary table **10** that, as is seen best in Figure 4, is supported along the longitudinal edges thereof on L-shaped channels **11** and **12** that will be rigidly secured to suitable standards, not shown. Adjacent the in-feed end of the table **10**, and on opposite sides thereof, are a pair of sprockets **13** and **14** that are mounted upon a shaft **15** adapted to be connected to a suitable power source such as an electric motor. The sprocket wheels **13** and **14** are driven members and the table **10** has mounted at the opposite end thereof a complementary pair of sprocket wheels, not shown. Flight chains **16** and **17** extending along the longitudinal edges of the table **10** are entrained about the sprocket wheels and are driven respectively by the drive sprockets **13** and **14**. A plurality of flight bars **18** extend transversely across the table **10**, and are secured to the flight chains **16** and **17** at spaced intervals therealong. The flight bars **18**, as is seen best in Figure 3, are positioned in close proximity with the upper surface of the table **10**, and are adapted to move longitudinally therealong upon actuation of the sprockets **13** and **14** and the flight chains **16** and **17** entrained respectively thereabout. Cartons dispensed onto the table **10** and between adjacent flight bars **18** will be advanced along the table **10**.

The dispensing or carton feed apparatus, which is designated generally with the letter A, may be mounted in any suitable manner and may be oriented to fit the requirements of any particular conveyor mechanism. For example, the feed apparatus may be positioned as shown in Figures 1 and 3, or it may be preferable in certain installations to rotate the dispenser through 180° from the position shown in Figure 3. With certain conveyors it is desirable to drop the cartons thereonto so that they extend longitudinally rather than transversely, and in such event the dispenser apparatus may be rotated through 90° from the position illustrated in Figure 3. In the specific application shown, the dispenser or feed apparatus A is carried by a tubular standard **19** that, at its lower end, is adapted to be rigidly secured to the frame of the conveyor or to other suitable structure which would provide a firm and rigid mounting therefor. Receiving the tubular standard **19** are a pair of spaced-apart, split collars **20** and **21** that are each provided with a plurality of cap screws **22** adapted to tighten the collars in selected axial

positions on the standard 19. Also receiving the standard 19 are a pair of spaced-apart stop or support collars 23 and 24 that are adjustably mounted upon the standard and that are provided with cap screws 25 that permit the same to be fixed in selected positions upon the standard. The stop collars 23 and 24 serve to orient the collars 20 and 21 and to provide a type of bearing for those collars to permit upward axial and pivotal movement about the standard 19, while limiting downward movement of the collars 20 and 21 with respect to the standard. As is seen best in Figure 2, the collars 20 and 21 are equipped with laterally extending arms 26 that are affixed to the dispenser structure and that carry the same. Through this arrangement, the dispensing apparatus may be swung from the position shown in full lines in Figure 2, wherein it is intended for use, to a position laterally of the conveyor apparatus as is shown by the dotted lines in Figure 2, when the apparatus is not in use. It will be apparent that the apparatus may be lifted from the tubular standard 19 by removing the upper support collar 24.

The arms 26 are rigidly secured to the magazine of the feed apparatus, and the magazine structure is designated generally with the numeral 27. The magazine 27, as is seen best in Figure 1, is defined by four spaced-apart, L-shaped guides or channel members that are designated respectively with the numerals 28, 29, 30 and 31. The channel members 28 and 29 are aligned transversely with respect to the platform or cable 10, as are the channel members 30 and 31. On the other hand, the channel members 28 and 30, and the channel members 29 and 31, are aligned respectively along the longitudinal axis of the table 10. The channel members are adapted to receive a stack of nested cartons therebetween, as is shown in Figure 4, and which, for purposes of identification, is designated with the numeral 32. The stack of nested cartons comprises a plurality of individual cartons 33, as is also shown in Figure 4.

The channel member 28 is rigidly secured to a support member 34 that extends longitudinally along the table 10, and also to a support member 35 that extends transversely across the table 10. The support members 34 and 35 are rigidly secured together, and in turn are secured to the arms 26 with which the clamp collars 20 and 21 are equipped. Preferably, the channels 30 and 31 can be moved selectively toward or away from the channels 28 and 29 so that cartons of various transverse dimensions can be accommodated by the magazine. Such mounting is accomplished by equipping the support members 34 with reduced end portions 36 that telescopically receive support extensions 37 thereon. The extensions 37 may be moved axially relative to the support members 34, and may be locked in any selected position with respect thereto by means of the set screw 38. It will be noted that at the opposite side of the magazine, the channel members 29 and 31 are supported by identical structure and, therefore, such structure will not again be described. In the drawings the identical structural parts are designated with the same numerals, but having the letter "*a*" affixed thereto for purposes of identification. It will be apparent from the description set forth that the channel members 30 and 31 can be moved with respect to the channel members 28 and 29, so that the spacing therebetween is adjustable to accommodate cartons irrespective of the particular width or transverse dimension that they may have.

In a similar sense, it is desired to make the apparatus more flexible by permitting adjustment thereof to accommodate cartons having various longitudinal dimensions. Such adjustment is provided insofar as the magazine is concerned by equipping the support member 35 with a reduced end portion 39 that telescopically receives the support member 35*a*. The member 35*a* is axially adjustable relative to the extension 39 and may be secured in any selected position by the set screw 40. Since in effect both the channel members 29 and 31 are carried by the support member 35*a*, they are adjusted simultaneously by movement of the support 35*a*.

Any suitable means may be employed for feeding a stack of cartons into the magazine 27—for example, it may be hand-fed or various conveyor arrangements can be utilized for feeding stacks of cartons thereinto. I have found certain installations to be adapted for use with a carton feed arrangement that is shown in part in Figure 3, and that is intended to keep the magazine 27 filled with cartons. This feed device consists in effect of extending the channel members 28 through 31 that define the magazine in an upwardly and laterally oriented direction. For this purpose forward arcuate channel or guide sections 41 may be provided, and arcuate channel extensions 42 may similarly be provided and arranged with inclined feeder guides or channels 43. The members 43 may be supported by the upper clamp collar 21 through a support member 44 that is secured thereto and to the extensions 43. This arrangement permits a stack of cartons to be fed into the magazine 27 by simply laying the stack on the channel extensions 43 and permitting them to slidably support the stack of cartons so that the stack can advance of its own weight into the magazine 27.

Referring to Figure 4, it is seen that the stack 32 of cartons is held within the magazine 27 by holding the lowermost carton 33 which, in turn, supports all of the nested cartons thereabove. The holding means employed should be resilient or yieldable, so that cartons 33 can be withdrawn one at a time from the stack 32 while the remaining cartons in the stack are held in position within the magazine. It is noticed that the specific cartons shown in Figure 4 have inclined end walls 45 provided with openings 46 therein. With such cartons, the holding means (shown best in Figures 3 and 4) may be employed. In the illustration given, the holding means comprises a lower block 47 that on one side of the magazine is rigidly secured to the channel member 28, and that on the other side of the magazine is rigidly affixed to the channel member 29. Arranged to be tightened against the block 47 by means of a screw 48 is a clamp block 49. Interposed between the members 47 and 49 and held rigidly thereby are a pair of spaced-apart spring fingers 50 and 51. The spring fingers 50 and 51 extend inwardly and downwardly and are adapted to engage the lowermost carton 33 in a stack 32.

The spring fingers are inclined inwardly and downwardly, as is seen best in Figure 4, and engage the outwardly and upwardly inclined side walls of a carton 33. The fingers are yieldable and are adapted to permit the withdrawal of the lowermost carton from the nested stock 32 while gripping the next upper carton as the lowermost carton is withdrawn from the stack. The means provided for withdrawing the cartons one by one from the stack of nested cartons held within the magazine by the spring fingers comprises a pair of identical wheels or cams or dispenser fingers or elements that are designated with the numeral 53. The cams 53 are oriented on opposite sides of the magazine 27 and are mounted respectively on shafts 54 and 55 that are journaled respectively adjacent their rear ends in the members 35 and 35*a*, and at their forward ends in the bearing supports 56 and 57. As is shown most clearly in Figure 3, the bearing providing members 56 and 57 are generally L-shaped and have a base portion extending outwardly from the member 35 or 35*a*, as the case may be, and an upwardly extending leg or arm in which the shaft for the cam members is journaled.

As is shown best in Figures 1 and 3, the cam members 53 each have spaced-apart cam surfaces 53*a* and 53*b* that are formed integrally with a spacer or central hub 53*c*. Each of the cam surfaces 53*a* and 53*b* on each of the cam members has a peculiar configuration that can be seen best by reference to Figures 5 through 7. The cam surfaces have a generally arcuate, semicircular portion 58, and along the opposite side thereof is a

flattened surface area 59 terminating in a hook portion 60. As the cam members rotate, the hook portion 60 is operative to engage the lowermost carton 33 in a stack, and to withdraw it from engagement with the spring fingers 50 and 51, as is shown in Figure 5. When a carton 33 is initially withdrawn from the stack by the hook or ear 60 each of the cam members, the carton is not dropped downwardly and onto the conveyor bed or table 10 therebolew, but instead is temporarily suspended between the cam members 53, as is shown in Figure 6. Continued rotation of the cam members positions the flattened surface portion 59 adjacent the carton 33, and at such time, the carton is permitted to drop downwardly and onto the conveyor table 10, as is shown in Figure 7.

Means are provided for rotating the cam members 53 and such means are shown best in Figure 8. It is there seen that the shaft 55 extends rearwardly of the member 35*a* and has a sprocket wheel 61 secured thereto. Secured to the end portion of the shaft 54 extending rearwardly through the member 35 is a gear 62 that meshes with a gear 63 (Figure 3) carried by a shaft 64 having a sprocket wheel 65 mounted thereon intermediate its ends and having also a beveled gear 66 mounted on the end portion thereof. An endless link chain 67 is entrained about the sprocket wheels 61 and 65, and a take-up sprocket 68, releasably supported on the member 35*a*, is provided for tensioning the chain 67. The sprocket 68 is mounted upon a bracket 69 that is secured to the member 35*a* by cap screws 70. The bracket 69 may be shifted from the position shown in full lines in Figure 8 by releasing the cap screws 70 to the position shown by dotted lines in Figure 8, and such movement or shifting of the bracket and its take-up sprocket will be made to accommodate a decrease in the length of the magazine and dispensing apparatus whenever it is desired to adjust it for handling cartons of smaller length.

Means must be provided for rotating the shaft 64 so that the cams 53, which are in driving relation therewith through the mechanism described above, can be rotated to withdraw cartons one at a time from the stack of nested cartons supported within the magazine 27. It will be appreciated that numerous drive arrangements may be employed. For example, a motor may be connected directly to the bevel gear 66 for rotating the same, and in such event, the motor should be timed with the movement of the flight chains 16 and 17, and the flight bars 18 interposed therebetween. While auxiliary drive arrangements of such character will be used with certain installations, I have found it desirable where the conveyor is substantially the same as that illustrated in the drawings to drive the cams directly from the conveyor. In this manner the cams 53 and their rotary movement can be synchronized accurately with the movement of the conveyor.

In the illustration given I drive the cam members 53 by driving the bevel gear 66 through a complementary bevel gear 71 that is carried on the hub 72 having clamped thereto a large drive gear 73. The drive gear 73 may be clamped to the hub 72 by means of the cap screw 74 and large washer or backing member 75, shown most clearly in Figure 8. The large drive wheel 73 is equipped about the peripheral surface thereof with a plurality of teeth that mesh with the links of the flight chains 16, as shown in Figures 3 and 8. The hub 72 and the gears 71 and 73 that it carries are rotatably supported upon the cap screw 74 which is threaded into a generally L-shaped bracket 76 secured to the member 35 by cap screws 77 (Figures 1 and 4).

Operation

In operation of the apparatus, the machine is first installed in position above a conveyor and suitable connections are made for driving the cam wheels 53. Such driving arrangement may be provided by equipping the apparatus with an auxiliary drive means, such as a motor, or the apparatus may be connected directly to the conveyor mechanism as shown and as has been described. In the specific illustration the drive wheel 73 is arranged in meshing engagement with the chain 16. A stack of cartons is placed within the magazine 27 and such stack may be placed directly into the magazine, or it may be first placed upon the angular magazine extension shown in Figure 3 and permitted to drop downwardly and into the magazine.

The stack 32 of nested cartons is supported within the magazine by engagement of the spring members 50 and 51 with the end walls of the lowermost carton. This arrangement is shown best in Figure 4. As the conveyor apparatus is actuated the flight chains 16 and 17 move toward the right along the topside thereof, as viewed in Figure 3, and cause the drive wheel 73 to rotate. Such rotation of the drive wheel rotates the bevel gear 71, and the bevel gear 76 that meshes therewith, causing the sprocket wheel 65 to rotate and through the endless chain 67 rotates the sprocket wheel 61 and the shaft 55 upon which it is mounted. Thus, the cam wheel 53 mounted on the shaft 55 is rotated. At the same time, the gear 63 is rotated and in its meshing engagement with the gear 62 rotates it and shaft 54 to which it is secured. Shaft 54 thereby rotates the other cam member 53. As viewed in Figure 4, both of the cam members or dispenser elements rotate inwardly and downwardly and toward the stack of cartons interposed therebetween. That is to say, in Figure 4 the cam member 53 at the left rotates in a clockwise direction while the cam member 53 on the right rotates in a counterclockwise direction.

The operation of the cam members in releasing the lowermost carton to permit it to drop onto the conveyor table therebelow is best seen by reference to Figures 5 through 7. As the cam members rotate, the portion 60 of each is brought into the position shown in Figure 5 wherein they engage the lowermost carton and tend to withdraw it from contact with the spring fingers. Release of the lowermost carton from the spring fingers is shown in Figure 6, and when released, the carton drops downwardly and onto the peripheral surface of the cam members. The carton is suspended on the peripheral surface until the flattened portion 59 thereof is rotated into substantially contiguous relation with the end walls of the carton, and the carton is then permitted to drop downwardly and onto the conveyor table, as is shown in Figure 7. This step by step release of the lowermost carton from the stack consists of first releasing the carton from the stack and then suspending the released carton upon the cam members so as to permit the carton to be aligned with the horizontal table 10 therebelow. Therefore, when the carton is released and permitted to drop downwardly, it is always in proper alignment with the table and drops thereonto in an upright position and extending substantially perfectly in transverse alignment thereacross. Thus, the flight bars 18 move uniformly into engagement with the cartons throughout substantially their entire length and advance them along the table 10. The result is that even though some misalignment of individual cartons may be present when in nested relation within the magazine 27, such misaligned cartons are dropped onto the table 10 in properly aligned and in upright position.

If cartons that are somewhat wider are to be used in the machine, the forward guide or channel members 30 and 31 are simply moved outwardly from the channel members 28 and 29 by a distance sufficient to accommodate the width of the larger cartons. This adjustment is accomplished by releasing the set screws 38 and 38*a* and shifting the members 37 and 37*a* outwardly to the required point and locking them at such position by retightening the set screws. On the other hand, if cartons of shorter length are to be used with the apparatus (for example, if number "three" or "three-pack" tomato

cartons are to be employed rather than the number "four" or "four-pack" tomato cartons, shown in the drawing), the guide members or channels **29** and **31** are moved inwardly by releasing the set screw **40** and by shifting the member **35***a* inwardly to shorten the spacing between the channels **28** and **29**, and **30** and **31**. The set screw **40** is then again tightened to lock the member **35***a* in the selected position.

It will be noted that this operation brings the sprocket wheels **65** and **61** closer together and would result in considerable slack in the endless chain **67**. To maintain the chain in a taut condition, the bracket **69** is removed from the position shown in full lines in Figure 8 by removing the cap screws **70** and by shifting the bracket member upwardly along the member **35***a* to the position shown by dotted lines, and which is designated for purposes of identification with the numeral **69***a*. In this operation the bracket member is inverted so that the sprocket **68** depends downwardly therefrom, and the bracket is rigidly secured to the member **35***a* by the cap screws **70**. The endless chain **67** is then threaded over the take-up sprocket **68**, as is shown by the dotted lines in Figure 8.

When the apparatus is not in use and, if desired, although not necessarily, the entire unit may be shifted laterally of the conveyor assembly by simply releasing the collars **20** and **21** and lifting the unit upwardly along the tubular standard **19** to free the drive wheel **73** from the chain **16**. The unit is then rotated relative to the standard **19** and is permitted to move downwardly and seat upon the stop collars **23** and **24**.

The apparatus is operative to positively withdraw cartons one at a time from a stack of nested cartons positioned within a magazine while at the same time positively holding all of the other cartons within the stack in position within the magazine. The released cartons or cartons which are stripped or withdrawn from the stack are then aligned with the conveyor table therebelow, and after such alignment are permitted to drop freely thereonto where they are advanced by the conveyor and are in proper position for hand filling.

While in the foregoing specification an embodiment of the invention has been set forth in considerable detail for purposes of illustration, it will be apparent to those skilled in the art that numerous changes may be made in these details without departing from the spirit and principles of the invention.

I claim:

1. In combination, a stack of packaging cartons each having a pair of spaced apart, corresponding walls diverging outwardly and upwardly and each wall being defined by a perimetric frame providing a lower frame portion, an upper frame portion spaced laterally outwardly therefrom and an open area interposed therebetween, magazine means for receiving said stack of cartons, releasable fingers mounted at the outlet end of said magazine for gripping engagement with the lowermost carton in said stack to support the stack, a pair of dispenser fingers supported for synchronous rotation in opposite directions downwardly along the respective corresponding walls of the lowermost carton in said stack for engagement, in the rotational movement thereof, with the respective lower frame portions thereof to withdraw the carton from said stack, said dispenser fingers, following such withdrawal of the lowermost carton, being disposed below and in alignment with the respective upper frame portions of said corresponding walls for receiving the upper frame portions to support the withdrawn carton through a subsequent portion of the rotational path of movement of the dispenses fingers, and means for rotating said dispenser fingers.

2. The combination of claim 1 in which said releasable fingers comprise resilient spring fingers depending downwardly from said magazine means and toward each other for releasable engagement with the lowermost carton in said stack.

3. The combination of claim 1 in which said dispenser fingers in the rotational movement thereof are oriented to subscribe an arc of travel through said open areas in the respective corresponding walls of the lowermost carton in said stack.

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