May 5, 1953 A. L. ESHELMAN 2,637,450

ARTICLE STACKING APPARATUS

Filed Oct. 14, 1949 4 Sheets-Sheet 1

Fig. 1.

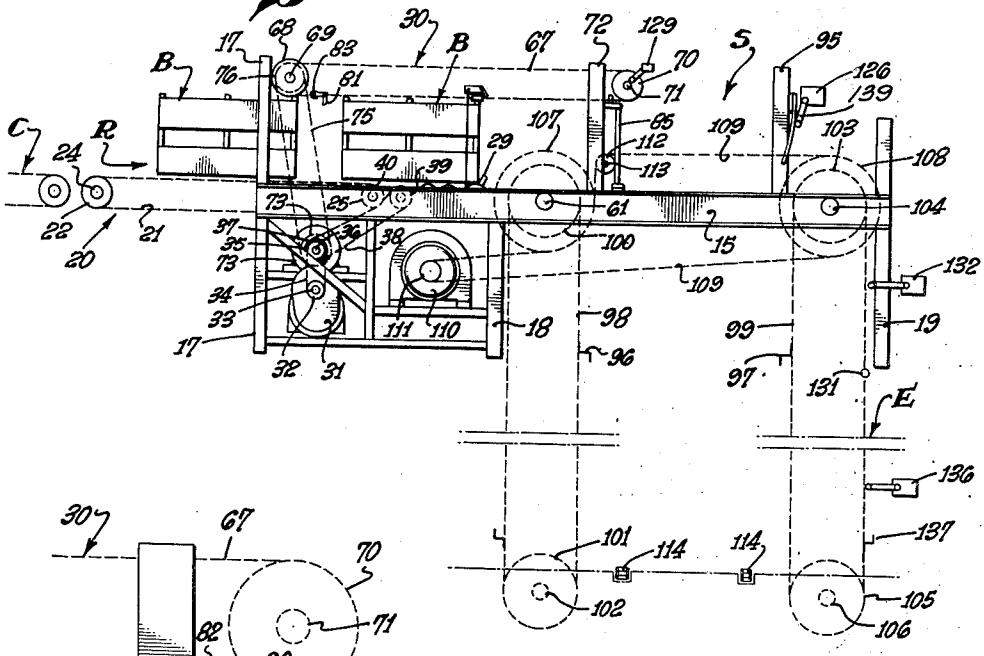
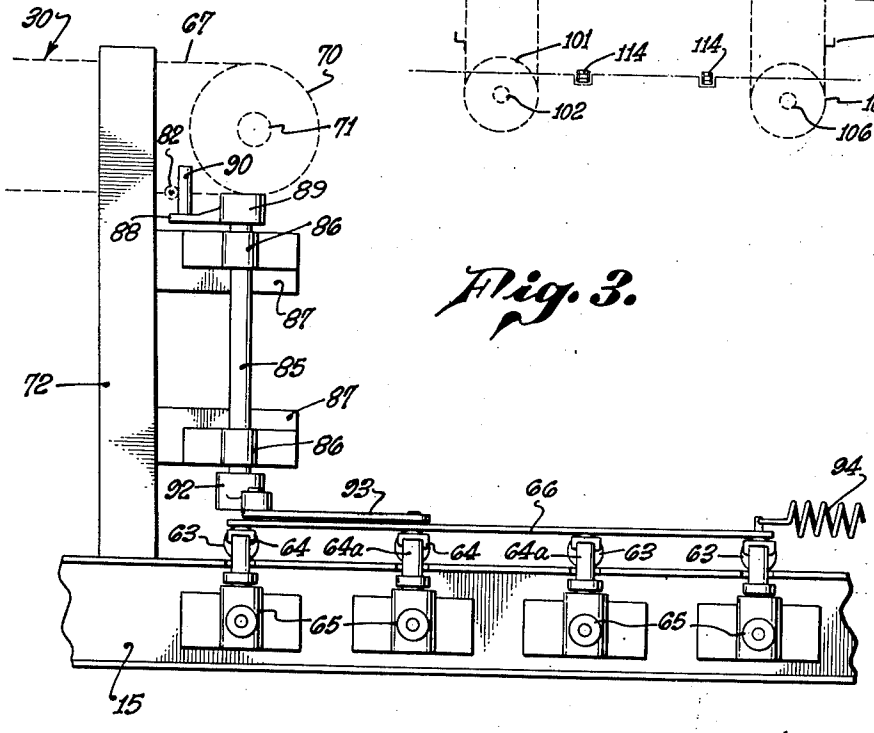


Fig. 3.



ALVIN LENHERT ESHELMAN,
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BY

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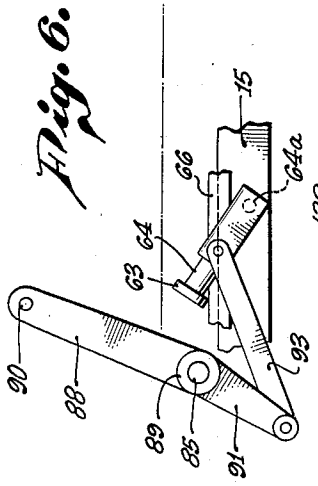


Fig. 6.

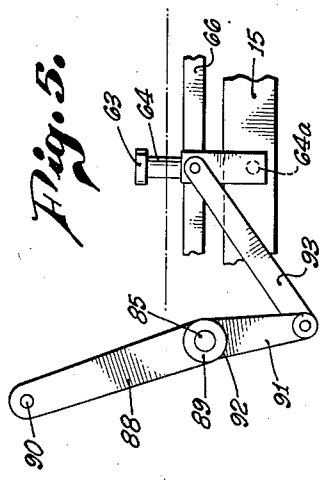


Fig. 5.

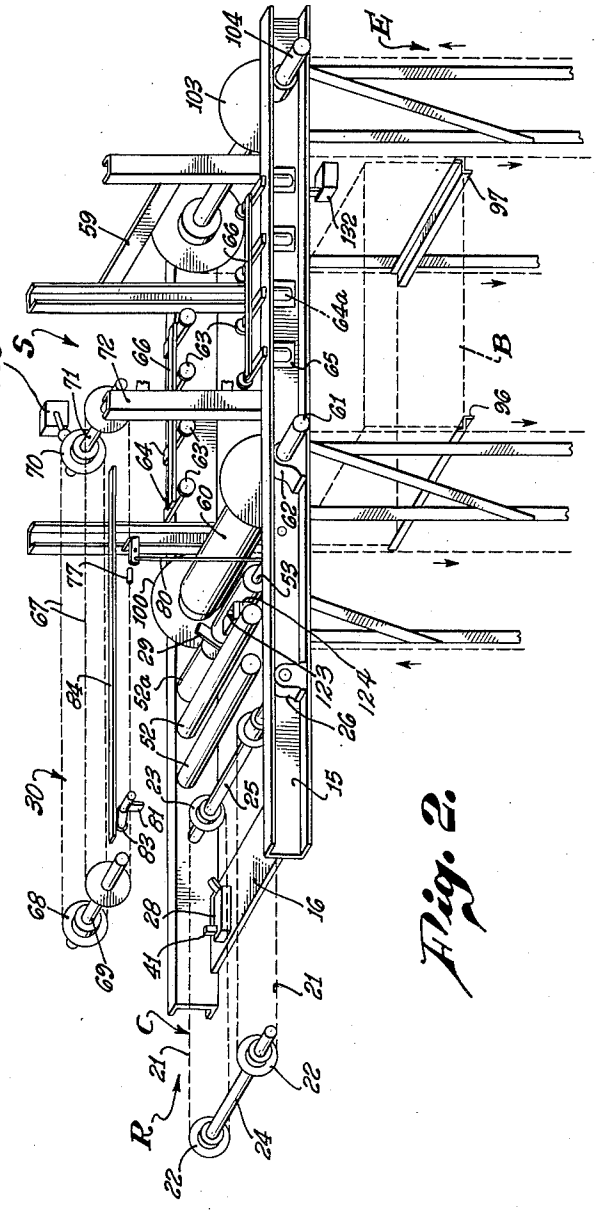


Fig. 2.

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Fig. 7.

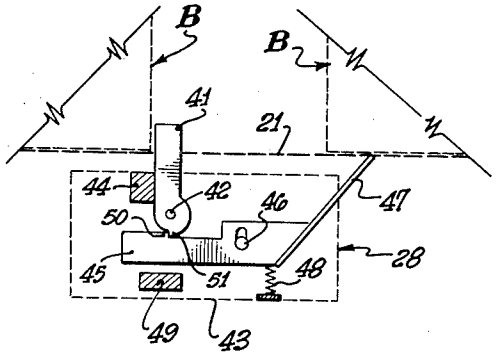
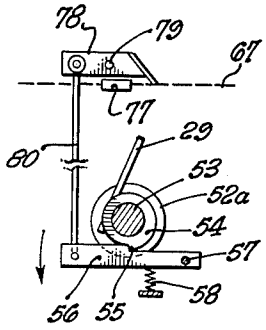


Fig. 8.



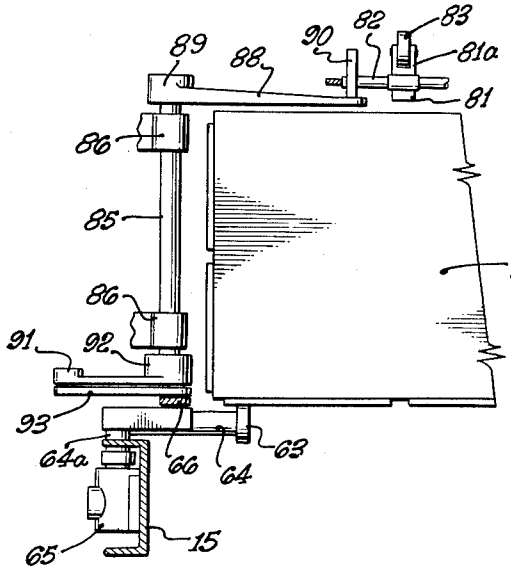


Fig. 4.

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ARTICLE STACKING APPARATUS

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Fig. 9.

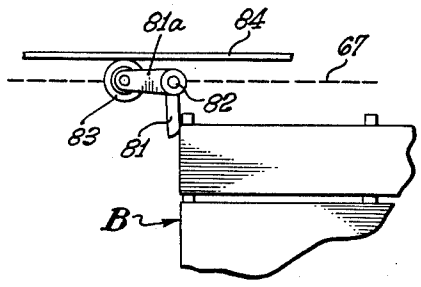


Fig. 10.

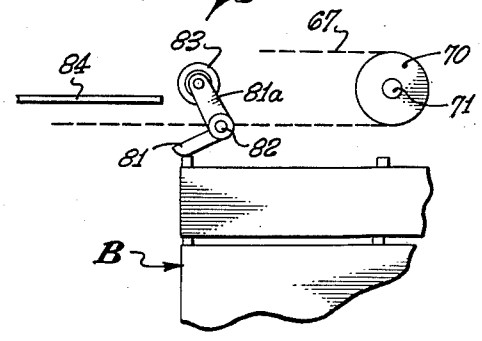
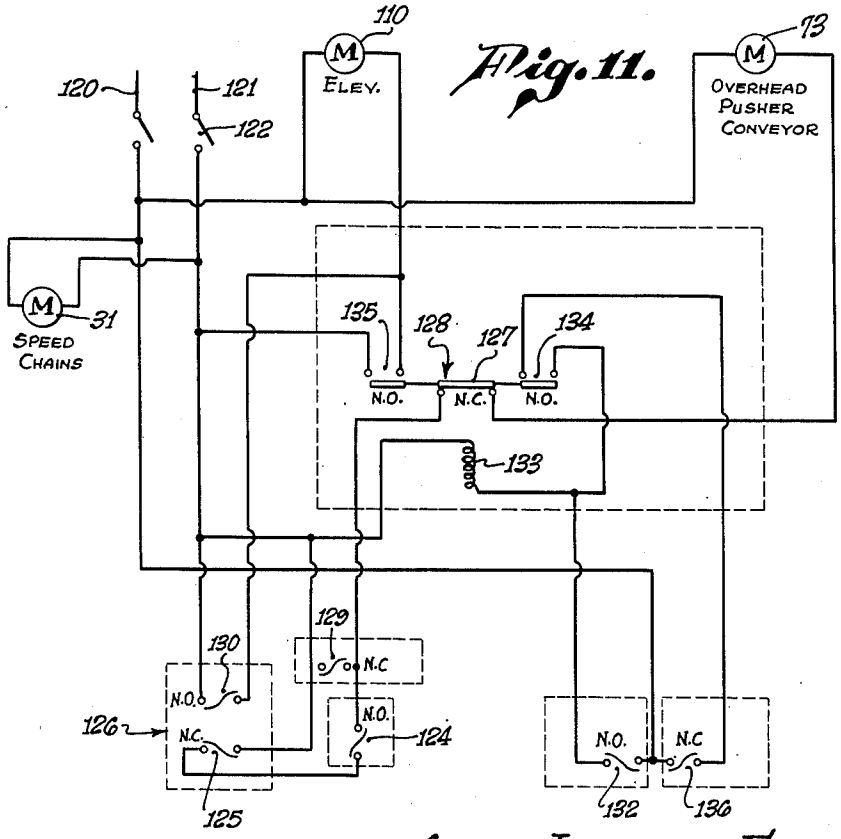


Fig. 11.



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BY C. A. Wiebe

ATTORNEY.

Patented May 5, 1953

2,637,450

UNITED STATES PATENT OFFICE

2,637,450

ARTICLE STACKING APPARATUS

Alvin Lenhert Eshelman, Upland, Calif.

Application October 14, 1949, Serial No. 121,242

8 Claims. (Cl. 214—6)

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This invention relates to article stacking apparatus. More particularly it relates to apparatus designed for receiving a series of articles, such as boxes, which are advanced in single file, and for positioning them, one upon another, to form a vertical stack of a desired number of boxes.

The invention has particular practical application in the handling and storing of boxes, lugs or crates in which fruit or vegetables, for example, are commonly contained incidental to the various processing operations which such commodities may undergo in a packing house preparatory to shipment to market. Numerous types of box stackers, as apparatus of the type disclosed herein is generally called, have been devised and have received wide acceptance in the fruit and vegetable packing industry. The purpose, of course, of thus stacking the boxes is to conserve floor space in the packing house and the mechanical stackers permit the stacking of the boxes to a greater height than could conveniently be done by hand, stacks as high or higher than ten feet being quite common.

In many of the prior stackers the boxes to be stacked are fed into the stacker at floor level and are lifted by the stacker to build up, from below, a tier of the desired number of boxes. Such stackers, however, unavoidably use up a large amount of floor space in the packing house, because of the necessity of floor feed conveyors of some form, which space could otherwise be put to use for other processing equipment or for storage. In another form, boxes are fed into the stacker from considerably above floor level by elevated or overhead conveyer means and the boxes are then lowered, one upon the other, by the stacker to develop a tier of the boxes.

It is with this second type of stacker that the present invention is more especially concerned and it is a purpose to provide a stacker which is mechanically simple and more efficient than previous ones of the generally related type. One of the chief advantages of the stacker here disclosed is that it is well adapted to receive boxes fed to it by overhead conveyers in a packing house, thus permitting the space below such conveyers to be used for other purposes. This arrangement is especially desirable in lemon packing houses, for example. In preparing lemons for shipment to market, the general practice employed by the packing house operators is to wash the lemons as they are received from the field, after which they are sorted according to color. Several distinct color grades of lemons are recognized by the trade and only those of a particular color are shipped to market. Normally many of the lemons as picked are quite green and are not suited for immediate shipment but must first be stored under particular temperature conditions and frequently in special atmospheres to bring out the desired color. Customarily, therefore, the lemons, after being washed, are spread out on grading tables where operators select them according to color and place them in wooden boxes so that each box contains lemons of only one color grade. All the boxes are then placed upon conveyers which carry them to the stackers. In a typical system employed in many of the packing houses, the number of stackers employed is equivalent to the number of color grades into which the lemons are divided, and as a box of a particular color grade of lemon is advanced by a conveyor, means are provided for diverting that box to a particular stacking unit so that the stack formed by that stacker will consist of boxes of lemons of the same color grade. Similarly boxes containing lemons of a different color grade will be diverted from the main conveyer to different stacking units and will be collected at respective points. The stacks formed at each of the respective stacking units are then collected and sent to storage, all of the boxes of one color grade being stored together and separated from those of other color grades. The lemons then remain in storage varying lengths of time, depending upon their initial color grade, until they acquire a color which is deemed desirable for shipment to market. Since in some instances, storage periods of a considerable length of time are required, it is apparent that a large amount of storage space is often required. The provision of a stacking system, therefore, which is adapted to be "hung" overhead in a packing house is especially advantageous for lemon packing operations. For example, this arrangement permits the stacking system to be placed above the wash room equipment, thus making use of space which would not otherwise be occupied.

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In furtherance of this same purpose the stacking mechanism of the invention also incorporates a box releasing or stacking mechanism which is of extremely simple construction and which permits further conservation of space in the packing house.

Other objects and improvements provided by the stacker disclosed herein will become apparent from the description of a typical practical unit illustrated in the following drawings in which

Fig. 1 is a view in side elevation of a typical stacking unit;

Fig. 2 is a view in perspective showing in

greater detail certain parts illustrated in Fig. 1;

Fig. 3 is a partial view in side elevation of box trap actuating means;

Fig. 4 is a partial view in end elevation of parts shown in Fig. 3;

Figs. 5 and 6 are enlarged fragmentary views showing details of the box trap mechanism in different positions;

Figs. 7 and 8 are diagrammatic views of box stop mechanisms used in controlling the delivery of boxes to the stacker;

Figs. 9 and 10 are diagrammatic views showing in greater detail portions of box feeding mechanism; and

Fig. 11 is a schematic of the electrical control circuit for the stacking mechanism.

The typical stacker installation illustrated in Figs. 1 and 2 is of the type, mentioned above, which is particularly adapted to be placed above other processing apparatus in the packing house, although it will be obvious that it may also be placed directly upon the floor of the packing house if so desired. The stacking unit, regardless of the particular manner in which it is supported, comprises, generally, conveyer means and accompanying supporting framework which define a runway R along which individual boxes B of fruit are advanced seriatim to the head or top of a stacking station S at the end of runway R. At this point, boxes B rest upon retractable roller supports which, when withdrawn from their box-supporting position, deposit the box upon a stack-forming elevator E directly beneath station S. Elevator E moves down with the delivery of each box so as to make room for a succeeding box until a vertical stack of a desired number of boxes has been formed in the elevator. Thereafter, the stack is lowered by the elevator to a point of delivery, such as the floor level of a storage room, where the stack is then removed from the elevator by a powered conveyer which is pushed beneath the stack into the box passageway of the elevator.

The supporting frame upon which various elements of the stacker unit are mounted comprises a pair of spaced, horizontal channel members 15 forming the sides of runway R, and cross braces 16 extending transversely between and secured to these channels. Vertical leg members 17, 18 and 19 are also provided which support the unit above the mounting platform upon which the present unit is designed to rest.

Boxes filled with fruit are delivered by a conventional conveyer C to a short transfer conveyer 20 at the rear or start of box runway R; i. e., to the left in Figs. 1 and 2. Conveyer 20 consists in this instance of a pair of endless chains 21 constrained for travel between paired sprockets 22 and 23 adjacent opposite sides of the box run, the upper runs of chains 21 serving to support and advance the box or boxes resting upon them. Sprockets 22 are carried upon a transverse shaft 24 which is supported in bearings (not here shown) mounted on frame members. Sprockets 23 are keyed to a driving shaft 25 journaled in bearings 26 on channel members 15. Boxes delivered by conveyer C are advanced in sequence by chains 21 from left to right (Figs. 1 and 2) towards stacking station S at the opposite end of the runway. Advancement of each box in turn and in timed relation with the preceding box is effected by cooperating box stop controls 28 and 29 located just prior, in point of travel of the boxes, to station S, and by an overhead pusher conveyer 30. Conveyer 20 operates continuously to advance boxes toward the stacking station and driving power for this conveyer is obtained from motor 31 through a chain and sprocket connection. This connection comprises a sprocket 32 keyed to motor shaft 33, a chain 34 driving sprocket 35, the latter being keyed to shaft 36 to which a sprocket 37 is also made fast. A chain 38 passes around sprocket 37 to a second sprocket 39, the latter sprocket being journaled in bearings (not shown) adjacent driving shaft 25 of conveyer 20. A sprocket 40 keyed to shaft 25 engages roller chain 38 intermediate its travel between sprockets 37 and 39 to transmit power to roller chains 21. The driving connection between motor 31 and conveyer 20 just described is arranged to effect a linear speed of chains 21 which is substantially higher than that of conveyer C feeding transfer conveyer 20, so that boxes on conveyer C, even though in end-to-end abutment, will be spaced apart on conveyer 20 by the momentary acceleration imparted to them by chains 21.

In order to correlate the various stacking operations, boxes B must be fed to station S in properly timed sequence. To this end a box advancing on conveyer 20 first encounters an upstanding bar 41 of box stop 28. As shown diagrammatically in Fig. 7, bar 41 is pivotally mounted upon a pin 42 which is journaled in opposite sides of housing 43 enclosing the stop mechanism. Bar 41 is spring biased so as to be normally retained in upstanding position against an abutment 44, thereby causing it to project between chains 21 and into the path of an advancing box. Stop 28 also includes a trigger member 45 supported within housing 43 upon a pin 46 passing through an elongated slot in the trigger to provide a lost motion connection. Trigger 45 has secured to it a rearwardly slanting contact shoe 47 which projects through the rear of housing 43 and into the path of the overhead boxes. A compression spring 48 positioned between trigger 45 and housing 43 causes the trigger to be pivoted in a counterclockwise manner about pin 46 against a stop 49 whenever there is no box in contact with shoe 47. Trigger 45 is also provided on its upper face with a substantially vertically-faced projection 50. Bar 41, in turn, is provided at its lower end with a projecting tooth 51 which, whenever shoe 47 is depressed by a previously advanced box, is engaged by projection 50 so as to prevent the clockwise pivotal movement of bar 41 about pin 42. In this latter condition, therefore, bar 41 acts as a positive stop for an advancing box and causes the box to be retained at that point. Chains 21 of transfer conveyer 20 then merely skid beneath the box supported by them. When, however, there is no box resting upon shoe 47, trigger 45 is permitted to pivot against stop 49, in which position it no longer engages stop bar 41, and the latter may be swung forwardly and downwardly against its spring bias out of the way of the advancing box to allow the box to pass freely thereover.

Upon passing stop 28, a box continues to ride upon endless chains 21 of transfer conveyer 20 until a portion of the box passes off the forward end of this conveyer (i. e. to the right in Figs. 1 and 2) and rests upon a series of idler rolls 52 which are suitably journaled in bearings, not shown, secured to frame members 15. At this point the advancing box engages the second stop member 29, in which position the box is then partially supported upon the forward end of con-

veyer 20 as well as upon idler rolls 52. The operation of stop 29 is diagrammatically illustrated in greater detail in Fig. 8, from which it will be seen that the stop is mounted between sections 52a of a split idler roller upon a shaft 53 also journaled for rotation transversely of frame members 15, whereby the stop may be caused to project into and to be rotated out of the path of boxes advancing along the runway. Here again, stop 29 is normally urged by spring means into a position in which it projects into the path of the boxes. Shaft 53 to which stop bar 29 is secured is provided with a ratchet 54 having a tooth 55 normally engaged by a pawl 56. Pawl 56 is pivoted upon a pin 57 and is urged into engagement with tooth 55 of ratchet 54 by a compression spring 58. In such position bar 29 is thus restrained from clockwise rotation and prevents the advance of a box resting against it. This again causes chains 21 to skid beneath that portion of the box still resting thereon. By means presently to be described pawl 56 is depressed at the proper time to release ratchet 54, thus permitting stop 29 to be rotated against its spring bias and out of the way by the advancing box. Upon passage of that box, stop 29 is immediately free to be returned to its projecting position by its spring. Stop means are also provided for preventing counterclockwise rotation of stop 29 beyond its upright position.

From a position adjacent stop 29, a box is next advanced, when the stop is withdrawn, to stacking station S at which point it comes to rest against a stop 59 disposed across the end of runway R. In thus advancing to station S, the box passes over an idler roll 60 loosely journaled upon shaft 61 which latter is carried in bearings 62 on frame members 15. The box is transferred from roller 60 onto two rows of skate wheels 63 which are positioned along opposite sides of the box runway at station S. Skate wheels 63 are mounted upon horizontally projecting arms 64 each having a vertical stub shaft 64a journaled at opposite sides of the station in bearings 65 on the webs of channels 15. Arms 64 in each series, four in the example here illustrated, are connected together by a tie-bar 66 by which they are adapted to be pivoted simultaneously in a horizontal plane from a position in which the arms project inwardly towards each other substantially perpendicular to channel members 15, in which position skate wheels 63 are spaced apart a distance less than the width of a box so that the box may be supported thereon, and a retracted position in which the arms lie substantially adjacent the respective longitudinal members 15, in which position the skate wheels of opposite sets are spaced apart a distance greater than the width of a box and are thus incapable of supporting the box while in such position. Boxes are delivered one at a time to station S while arms 64 are in their extended position as shown in Fig. 5. Thereafter arms 64 are swung horizontally to the position shown in Fig. 6 so as to withdraw skate wheels 63 by rolling them arcuately from beneath the box, whereupon the box is released and drops vertically.

As mentioned previously, movement of a box to its position against stop 59 at station S is initiated by the fact that the rear of the box is still resting upon speed chains 21. Thereafter the advance of such box is accomplished by means of overhead conveyer 30 which comprises a set of parallel, spaced endless chains 67 each disposed for travel between a sprocket 68 secured to shaft 69 at the rear and a sprocket 70 journaled upon a shaft 71 at the front of the conveyer. Shafts 69 and 71 are each carried in bearings supported from uprights 17 and 72, respectively. Conveyer 30 is driven by a motor 73 through a chain and sprocket connection consisting of a sprocket 74 keyed to the shaft of motor 73, an endless chain 75 and a sprocket 76 keyed to shaft 69. One of the endless chains 67 is provided with a horizontally projecting lug 77. Upon actuation of conveyer 30 from a predetermined starting position to which it is arranged to return as described hereinafter, this lug contacts a rocker 78. Rocker 78 is pivoted upon a pin 79 mounted in a suitable frame member adjacent the lower run of chain 67. The rocker is also connected to pawl 56 of stop 29 by a push rod 80 (Fig. 8) so that contact of lug 77 against rocker 78 serves to depress pawl 56 thus permitting stop 29 to rotate out of the path of a box resting against it. With further movement of chains 67 a box-engaging bracket 81, pivotally suspended upon an extended roller pin 82 passing between oppositely disposed roller links of chains 67, comes into contact with the upper rear edge of a box and thereafter pushes that box with advance of conveyer chains 67 so as to move the box into position against stop 59 at station S. In the box-engaging position of bracket 81 as shown in Fig. 9, the bracket is prevented from clockwise pivotal movement about pin 82 by engagement of a roller 83 mounted upon its trailing leg 81a with the underside of a track 84 suspended between and extending substantially the full length of the lower run of chains 67. Thus, the bracket is enabled to exert a forward thrust to a box during the time that roller 83 remains in contact with track 84. Track 84 terminates just short of the forward end of conveyer 30 so that when roller 83 passes beyond this point the bracket is no longer prevented from rotational movement about pin 82 and accordingly pivots backwardly allowing it to pass over the upper edge of the box with which it is then in contact. The terminal point of track 84 is designed to permit the release of bracket 81 at the point in the latter's travel where the box comes up against stop 59 at station S. During further travel of bracket 81 around shaft 71 and throughout its return run, it merely swings freely about its pivot to prevent interference with other parts of the stacking mechanism.

Upon delivery of a box to station S in the manner just described, actuation of arms 64 to withdraw the supporting skate wheels is accomplished by mechanical linkage with overhead conveyer 30. In the stacking unit illustrated in the drawings, actuation of each set of skate wheels is accomplished independently. Since the manner in which this is done is identical for each set, however, detailed description will be made of only one set of skate wheel actuating means. As shown in Figs. 3 and 4, a vertically disposed shaft 85 is journaled in bearings 86 mounted on brackets 87 secured to upright 72. At the upper end of shaft 85 a crank arm 88 having a hub 89 is secured by key or set screw engagement with the shaft within hub 89. An upstanding post 90 is secured to the outer end of crank arm 88, and the crank is so mounted on its shaft as to cause post 90 to be engaged by the extended roller chain pin 82 of conveyer 30 during the final portion of the lower run of chains 67. Shaft 85 is also provided with a sec-

ond crank arm 91 having a collar 92 securing the crank arm to the lower end of the shaft by set-screw or key means. A link 93 pivotally connects the outer end of crank 91 to tie-bar 66 and as post 90 is contacted by extended chain pin 82 during travel of the latter, shaft 85 is turned, with the result that skate wheels 63 are arcuately withdrawn from beneath the box then resting thereon. The position of shaft 85 coincides approximately with the forward end of overhead conveyer 30, and the horizontal travel of extended link 82 while in contact with post 90 is accordingly of only short duration since pin 82 in passing upwardly around sprockets 70 at the forward end of conveyer 30 slides off of the post and the mechanism is thereafter free to return to its original position. Such return is accomplished by means of an extension spring 94 connected between the forward end of tie-bar 66 and an upright member 95 of the supporting frame, the spring being put under tension whenever the skate wheels are swung out of their box supporting position.

A box, upon release at station S by actuation of the trap mechanism just described, drops vertically a short distance until coming in contact with a pair of oppositely disposed supporting brackets 96 and 97 carried by stack elevator E. Since the supporting skate wheels 63 are withdrawn from beneath the overlying box by movement in a horizontal arc, the distance which such box must fall need not substantially exceed the diameter of skate wheels 63. This reduces the shock imparted to the boxes in stacking them and it also serves to reduce the overall height of the stacking mechanism. Elevator E is composed of opposed pairs of endless chains 98 and 99, chains 98 being disposed for travel about sprockets 100 on shaft 61 at the head of the elevator and sprockets 101 on shaft 102 at the foot thereof. Chains 99, in turn, are disposed to travel between sprockets 103 on shaft 104 at the head of the elevator and sprockets 105 on shaft 106 at the foot. Brackets 96 are carried between chains 98 while brackets 97 are carried between chains 99, movement of chains 98 and 99 being so coordinated as to maintain brackets 96 and 97 horizontally opposite each other throughout the adjacent runs of chains 98 and 99, respectively. In order to accomplish this, a sprocket 107 is keyed to the outer end of shaft 61 and a sprocket 108 is similarly keyed to the outer end of shaft 104. Sprockets 107 and 108 are connected together for simultaneous movement by an endless chain 109. A driving motor 110 mounted on the frame supplies power through a sprocket 111 to chain 109. Moving in a counterclockwise direction from a starting point on sprocket 111, chain 109 passes around sprocket 108 from below, over the top of this sprocket to an idler sprocket 112 mounted on a shaft 113 journaled on upright 72, and down around the lower right-hand periphery of sprocket 107 to return to driving sprocket 111. In this manner sprockets 107 and 108 are caused to rotate mutually so that chains 98 and 99 in their adjacent runs move downwardly at the same relative speed. At the start of the stack forming operation, a set of brackets 96, 97, is adapted to be positioned just below the level of skate wheels 63 so that upon withdrawal of the latter, the box resting thereon is dropped upon the brackets. Elevator E moves brackets 96, 97, downwardly a distance corresponding to the height of a box, and the succeeding box, when released by the trap mechanism, drops into position upon the upper edge of the first box and the elevator is again lowered. This operation continues until the desired number of boxes has been accumulated in a stack, whereupon the elevator then lowers the stack to the level at which such stack is to be removed. In apparatus of the present type, the stacks when formed may be removed at a series of different levels since elevator chains 98 and 99 may pass downwardly through a shaftway extending through several floors in the packing house. In such an arrangement, therefore, a section of conveyer may be slid into position at any floor level so as to lie between brackets 96 and 97 and to receive a stack carried by such brackets and remove it laterally from between chains 98 and 99. At the lowest level, of course, permanent conveyer means may be installed to remove stacks, such means comprising reversible floor chains 114 in the present instance. With continued travel of conveyer chains 98 and 99, brackets 96 and 97 pass downwardly and then outwardly around sprockets 101 and 105 respectively to return to their initial positions at the head of the stacker.

Synchronization of the various steps of operation from the delivery of individual boxes to the removal of completed stacks is accomplished by means of a system of electrical controls for driving motors 31, 73 and 110 as follows: Assuming a starting condition in which no boxes are present at any point in the stacking unit, motor 31 runs continuously to drive speed chains 21 of conveyer 20 and for this purpose electrical power is supplied directly from power mains 120 and 121 whenever the main power switch 122 is closed. Upon delivery of a box by conveyer C to speed chains 21, such box is then progressed along the runway through stop 28, as previously described, until it comes to a halt against stop 29. At this point the box contacts a roller 123 which actuates switch 124 to move the switch from its normally open position into a circuit-closing position. Closing of switch 124 serves to complete the circuit to motor 73 for overhead conveyer 30 from power main 121 through points 125 of switch 126 (located on upright 95 at the forward end of station S) and through points 127 of a magnetic controller 128. Switch points 125 are spring biased to a normally closed position but are adapted to be opened by contact of a box against a switch operating arm 139 pivoted to upright 95 at the end of the runway. A parallel circuit to motor 73 bypassing switches 124 and 125 is also provided through a switch 129 located above sprockets 70 of conveyer 30. Switch 129 is adapted to be actuated by contact of bracket 81 in passing between the sprockets. The points of this switch are normally closed but at the starting position above assumed they are held open by contact of bracket 81 with the switch-actuating arm. Upon completion of the circuit to motor 73 through the first-named path, overhead conveyer 30 begins to operate. Initial movement of this conveyer causes bracket 81 to move out from under switch 129, allowing the latter to close, thus bypassing a portion of the initial circuit to motor 73. Further travel of conveyer 30 causes lug 77 to contact rocket 78 effecting release of stop 29 in the manner described hereinabove. Immediately thereafter, pusher bracket 81 comes into contact with the rear upper edge of the box and pushes the box over idler rollers 52, 52a, 60, and then onto skate wheels 63. Arrival of a box at station S causes

switch 126 to be moved into its alternate position by contact of the box with arm 139. Such action then opens contacts 125, but the circuit to motor 73 remains closed by virtue of switch 129 being closed. Movement of switch 126 also closes a second set of switch points 130 which complete the circuit from main 121 to elevator motor 110, and thus cause elevator E to begin operation. Conveyer 30 is meanwhile still in operation and extended chain pin 82 contacts post 90 of crank arm 88 to effect withdrawal of skate wheels 63 in the manner previously described. At this point brackets 96 and 97 of elevator E have been brought into position just below the skate wheels for reception of the box released thereby and the elevator continues to lower the box deposited thereon until the upper edge of the box passes beneath the lower end of switch arm 139. When this occurs, switch 126 returns to its original position, opening contact points 130 and closing contact points 125. With the opening of contact points 130, operation of the elevator is interrupted. Meanwhile bracket 81 again comes in contact with the operating arm of switch 129, whereupon overhead conveyer 30 ceases operation; that is, provided there is then no box depressing switch 124 adjacent stop 29. Where a succeeding box has arrived at switch 124, conveyer 30 of course continues operation without interruption.

In any event, when the next box in the series is delivered by speed chains 21, switch 124 is again closed and the same sequence of operations is repeated. With delivery of successive boxes, elevator E continues to move downwardly as the stack is formed. In order to limit the number of boxes in a stack, a contact lug 131 is positioned on chain 99 and is adapted to come in contact with the operating arm of a switch 132 when the top box in the stack has been delivered. Switch 132 completes a circuit from power main 120 through the operating solenoid 133 of magnetic controller 128. Thereupon switch contacts 127 are opened while contacts 134 and 135 are closed. Closing of contacts 134 completes an alternate or "holding" circuit for solenoid 133 so that even after lug 131 has passed beyond switch 132 and the latter has returned to its normally open position, the magnetic controller will be held in its last-mentioned position. In this position, the circuit to motor 73 for overhead conveyer 30 is broken at contact points 127. At the same time an alternate circuit to elevator motor 110 is completed by contact points 135 so that the elevator continues to move downwardly even after the top box has passed below operating arm 139 of switch 126. The holding circuit for magnetic controller 128 also includes a normally closed switch 136 which is in series with contact points 134. Switch 136 is positioned adjacent the outer or return run of elevator chains 99 and one of the latter is provided with a projecting lug 137 secured thereto. As the bottom of the stack carried upon brackets 96 and 97 is deposited upon floor chains 114 (or reaches such other level at which the stack is to be discharged) this lug contacts the operating arm of switch 136 thus interrupting the circuit to solenoid 133 of the magnetic controller, and the armature of the controller is returned by spring action to its first position. This breaks the circuit through points 135 of the controller and stops the downward travel of elevator E. No boxes, of course, can be delivered to station S during this last mentioned cycle of operation since the circuit to the driving motor for overhead conveyer 30 has been interrupted by opening of contact points 127 and the boxes are then held up by stops 28 and 29. However, upon return of the magnetic controller to its initial position, the normal cycle of operations above described can then take place again. Meanwhile floor chains 114 are actuated to remove the stack thus deposited upon them from between elevator chains 98 and 99, from which point the stack is then transferred to the coloring rooms or other point of storage.

It will be apparent that the relative positioning of switch 132 along the return run of elevator chains 99 will determine the number of boxes in a stack formed at station S, and that the desired number of boxes in a stack may therefore be readily controlled by proper placement of this switch. Similarly the level at which the stacks are removed from the elevator can be controlled by the positioning of switch 136. In some instances also, the operating lugs for switches 132 and 136 may be an additional set or sets of box supporting brackets carried by the elevator chains.

Modifications of the specific apparatus here illustrated will be apparent to those skilled in the art and the invention is accordingly not limited to the specific illustration here given.

What is claimed is:

1. In an apparatus for stacking articles which includes an elevator, an article delivery station at the head of said elevator including trap mechanism for receiving an article and releasing it onto said elevator to form a stack of superimposed articles, and feed conveyor means including an overhead conveyor for advancing articles seriatim into said station: the improved trap mechanism which comprises members mounted at opposite sides of said station and adapted and arranged for horizontal pivotal movement about vertical axes between an extended position in which they project inwardly from opposite sides of said station, in which position they are capable of supporting an article delivered to said station, and a retracted position disposed closely adjacent the sides of said station, in which position they are incapable of supporting such article; an article stop in front of said station, said stop being biased so as normally to project into the path of articles advancing on said feed conveyor, means for supporting said stop for rotational movement whereby it may be rotated out of the path of advancing articles by such articles themselves, ratchet and pawl mechanism associated with said stop supporting means for engaging the latter and holding it against rotation, spring means urging said pawl against said ratchet to retain said box stop in article-intercepting position, an arm pivotally connected at one of its ends to said pawl, a rocker disposed in the path of said overhead conveyor to which the opposite end of said arm is connected, and a member carried by said overhead conveyor for contacting said rocker to effect release of said ratchet whereby said box stop is permitted to be rotated out of the path of an advancing box.

2. In an apparatus for stacking articles which includes an elevator, an article delivery station at the head of said elevator including trap mechanism for receiving an article and releasing it onto said elevator to form a stack of superimposed articles, and feed conveyor means for advancing articles into said station, the combination of: a trap means including members pivotally mounted at opposite sides of said station for movement in

a horizontal plane into and out of article supporting position; spring means operably connected to said members for normally biasing said members into article supporting position; lever means connected to said members and adapted to be actuated by said feed conveyor means for retracting said members out of article supporting position; and means for feeding said articles in spaced relation into said station and including stop means pivotally mounted in front of said station and normally biased into article stop position; means operably connected to said stop means for releasably holding said stop means in said stop position, said releasable means including a member extending into proximity with said feed conveyor means; and an element carried by said conveyor means adapted to contact said last mentioned member for releasing said stop means.

3. In an apparatus for stacking articles including an elevator, an article delivery station at the head of the elevator, and means for delivering articles to said station including a conveyor, the combination of: a trap means within said station comprising opposed sets of inwardly extending horizontal members; anti-friction means carried on said members for supporting engagement with articles to be stacked; said members being pivoted about vertical axes for movement in a horizontal plane into and out of article holding position; spring means biasing said members into article holding position; lever means connected to said members; and means carried by said lever means for cooperable engagement with said conveyor for moving said members out of article holding position.

4. A trap mechanism for an article receiving station disposed at the head of an elevator stacking means and a conveyor means comprising: roller means pivotally mounted for movement in a horizontal plane at opposite sides of said station and normally spring biased into trap closing position for supporting an article; and means for retracting said roller means simultaneously into trap open relation for releasing an article into the elevator stacking means; said retracting means at each side of said station including a lever means connected to said roller means, a crank means operably connected to said lever means, and means carried by said crank means adapted to be intermittently contacted by said conveyor means for retraction of said roller means.

5. In an apparatus for stacking articles including an elevator and an article delivery station at the head of the elevator, the provision of: feed conveyor means for advancing articles in predetermined spaced relation into said station comprising a driven transfer conveyor portion, an idle conveyor portion between the transfer portion and the station, and an overhead conveyor portion above said transfer and idle portions and said station; a first article stop means positioned in the transfer conveyor portion and including a member to be engaged by an article which has passed said stop means to maintain said stop means in article stop position; a second stop means positioned in the idle conveyor portion and normally spring-biased into stop position; said member of the first stop means being released upon advancement of an article from between said first and second stop means; release means for said second stop means including a member on said overhead conveyor portion adapted to actuate said second stop means into released position; trap members at said delivery station normally spring-biased into trap closing position; lever release means for said trap means; and means carried by said overhead conveyor portion engageable with said lever means for actuating said trap members into trap release position.

6. In an apparatus for stacking articles including an elevator and an article delivery station at the head of the elevator the provision of: feed conveyor means for advancing articles in predetermined spaced relation into said station comprising an article supporting portion and an overhead conveyor portion above said supporting portion and the station; article stop means disposed in said supporting portion; trap members in said station pivotally mounted for movement into and out of article supporting position; lever means connected to said trap members; release means for said stop means including an element carried by the overhead conveyor portion and a cooperable member connected to said stop means; and means carried by said overhead conveyor including an article engaging member for advancing an article into the station and a projecting element cooperable with said lever means for moving said trap members into article release position.

7. In apparatus for stacking articles which includes an elevator, an article delivery station at the head of said elevator including trap mechanism for receiving an article and releasing it onto said elevator to form a stack of superimposed articles, and feed conveyor means including an overhead conveyor for advancing articles seriatim into said station: the improved trap mechanism which comprises members mounted at opposite sides of said station and adapted and arranged for horizontal pivotal movement about vertical axes between an extended position in which they project inwardly from opposite sides of said station, in which position they are capable of supporting an article delivered to said station, and a retracted position disposed closely adjacent the sides of said station, in which position they are incapable of supporting such article, resilient means urging said members into article-supporting position, and lever means operated by engagement with said overhead conveyor for effecting intermittent pivotal movement of said members simultaneously to their retracted positions upon delivery of an article to said station.

8. Article stacking apparatus as defined in claim 7 in which said lever means for effecting pivotal movement of said box-supporting members comprises a lever interconnecting said supporting members for effecting simultaneous pivotal movement thereof, a crank connected at one of its ends to said lever means and provided at its opposite end with a projecting pin, and spaced means carried by the conveyor means for intermittent contact with said pin during travel in said overhead conveyor.

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