

[54] **STACKER AND METHOD OF STACKING
FROZEN FOOD PATTIES**

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[58] **Field of Search**..... 198/35; 271/DIG. 7;
93/93 C, 93 DP; 214/6 D

[56] **References Cited**

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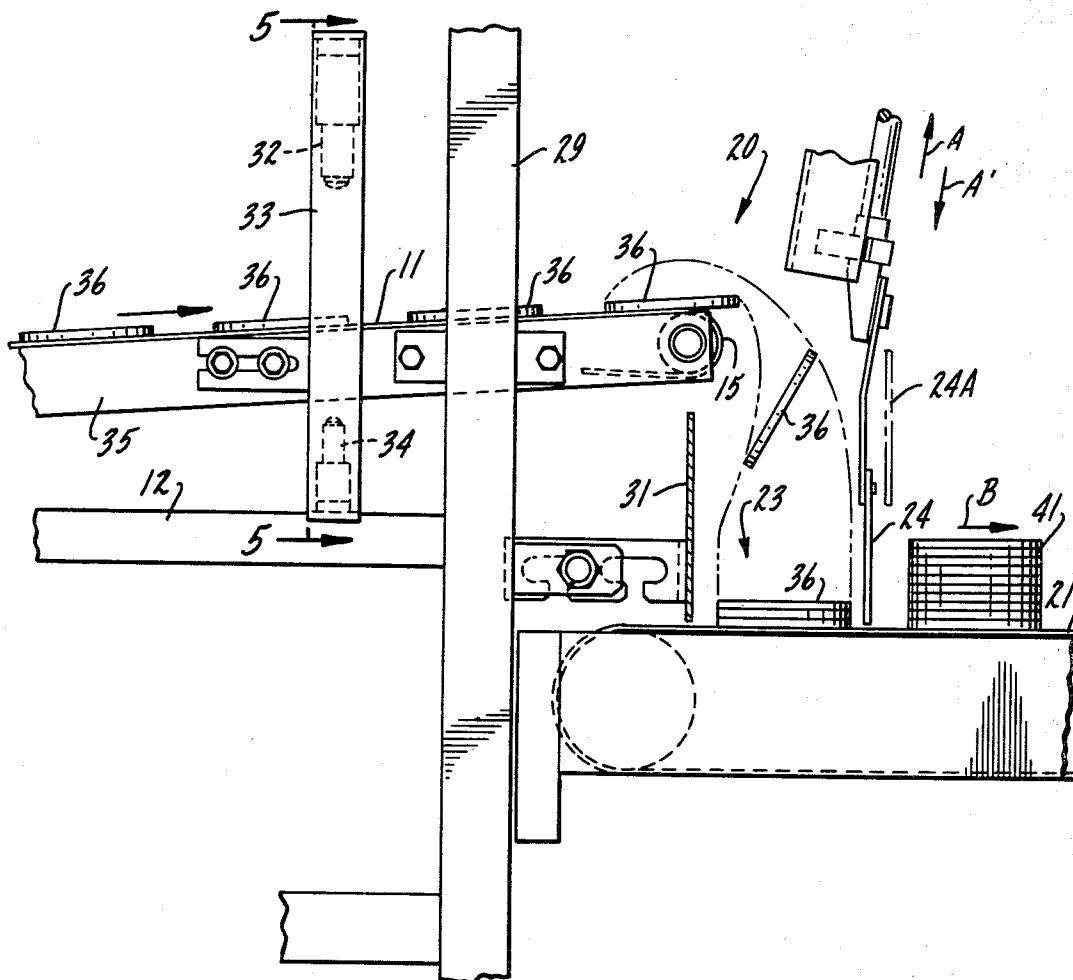
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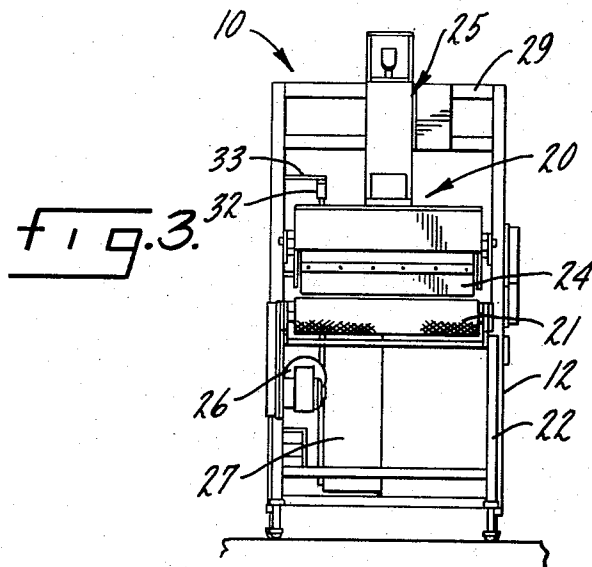
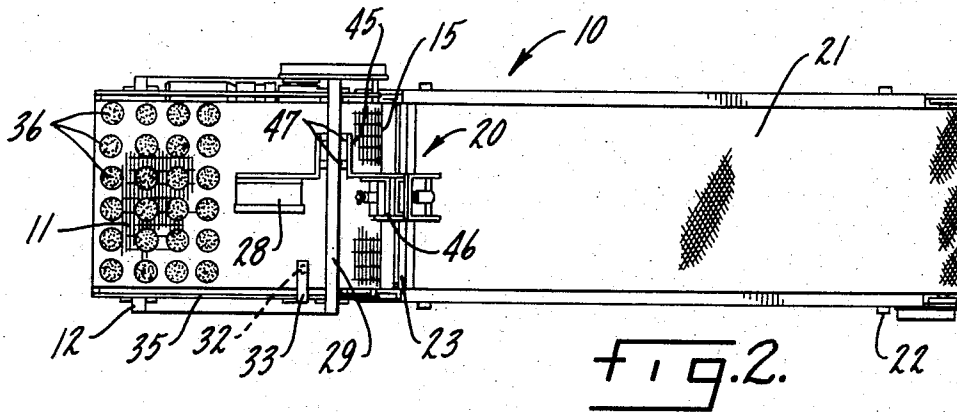
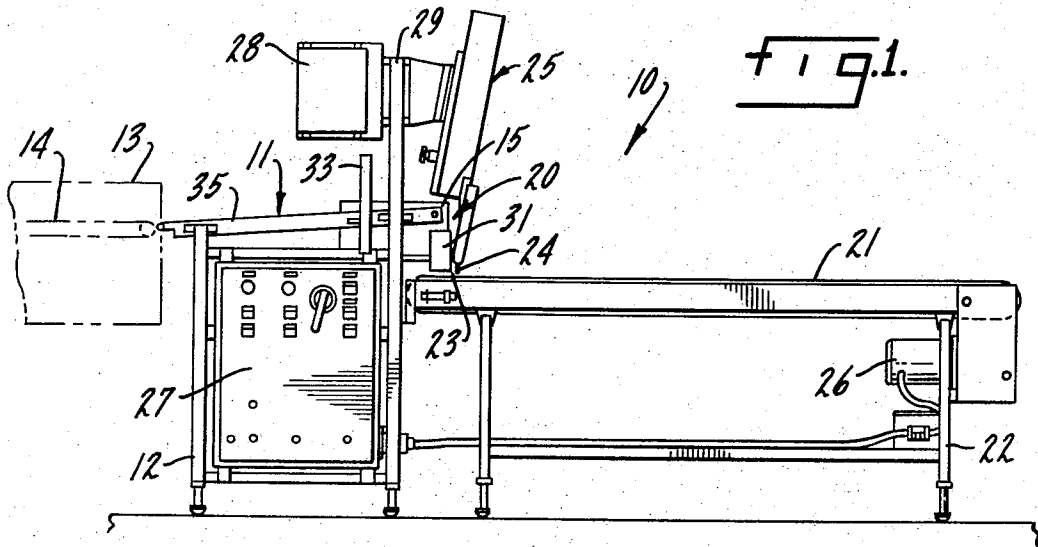
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[57] **ABSTRACT**

A stacking method and apparatus for frozen food patties and like disc-shaped articles; the patties are discharged in free fall and at predetermined speed over the terminal end of an input conveyor and are accumulated on a stationary stacking conveyor after rotation of about 180°, being guided into an orderly stack by a guide positioned outwardly of the terminal end of the input conveyor. The stack height is monitored, preferably by counting the patties; when a full stack is collected, the guide is lifted up and away from the stacking conveyor and the stacking conveyor is actuated to move the stack away from the stacking position. The guide is moved back to its original position and the stacking conveyor is stopped before the next patty falls onto the stacking conveyor.

10 Claims, 8 Drawing Figures





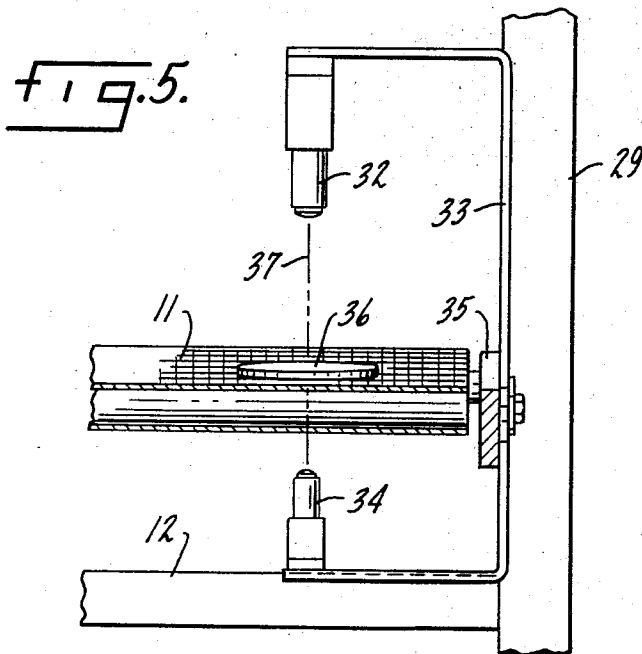
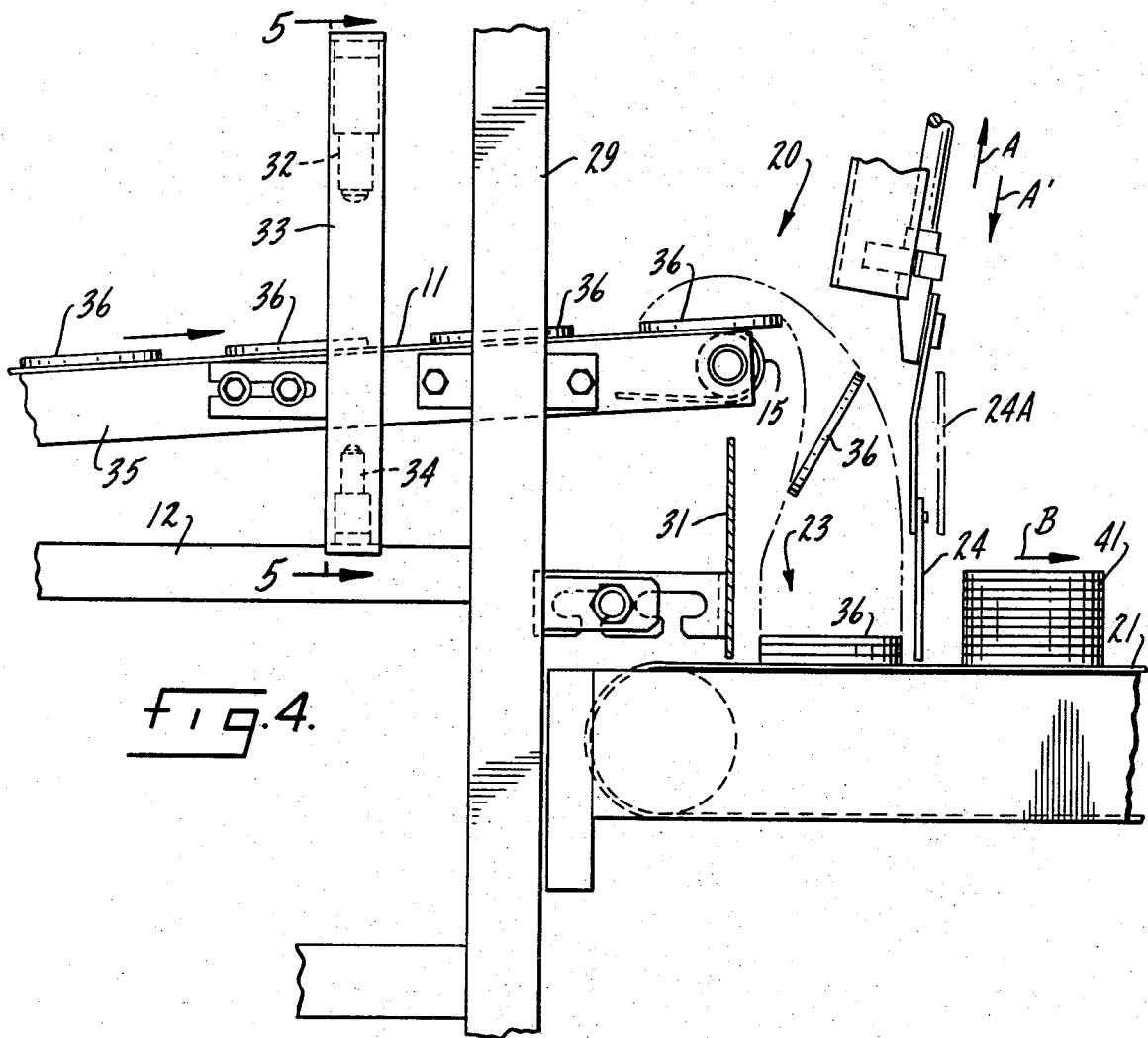


FIG. 6.

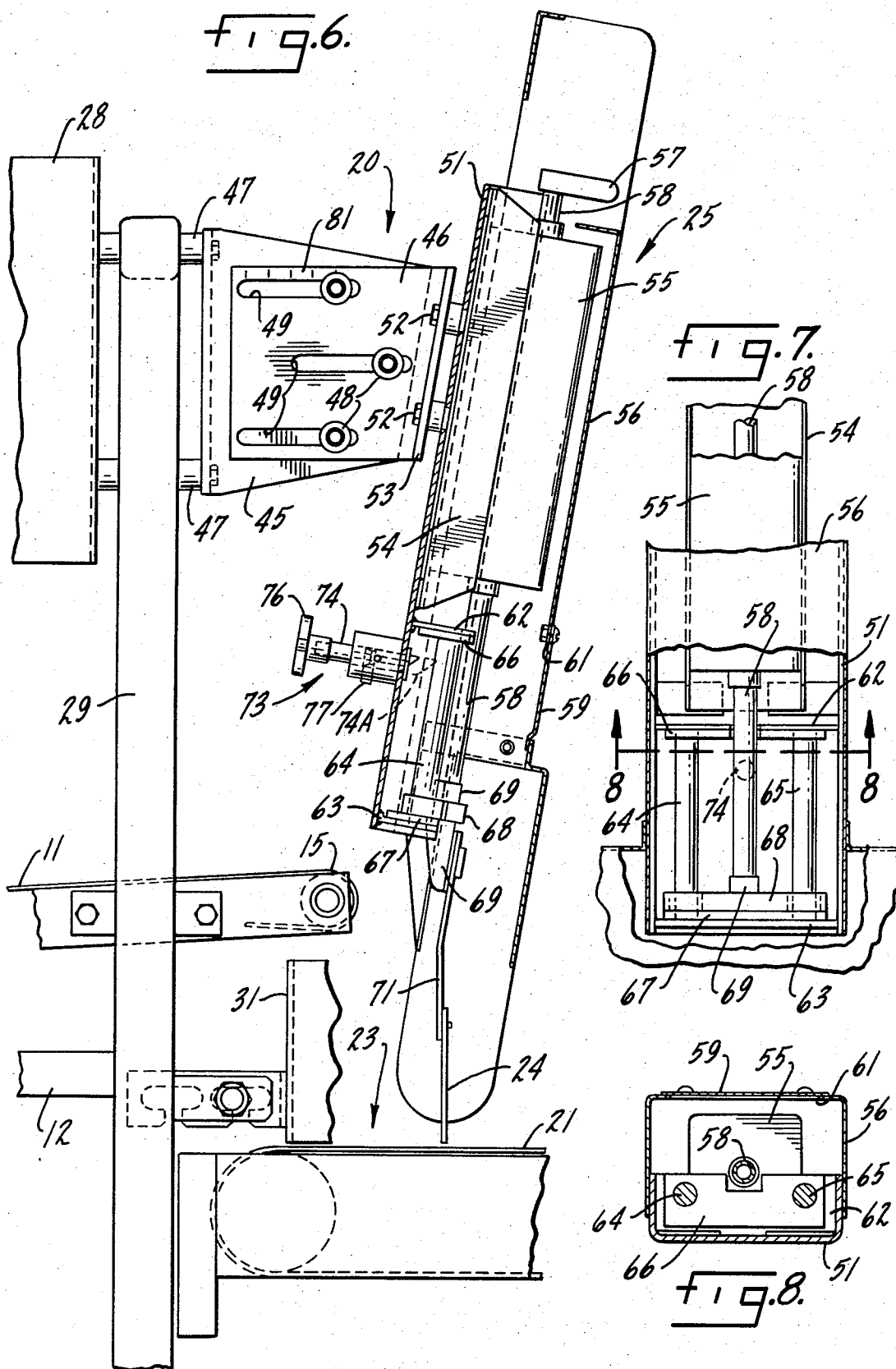
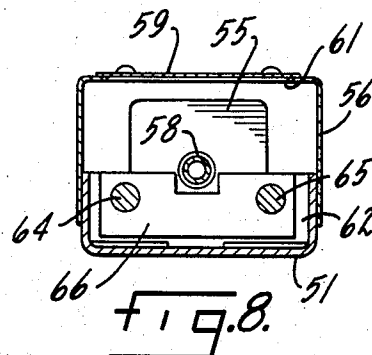
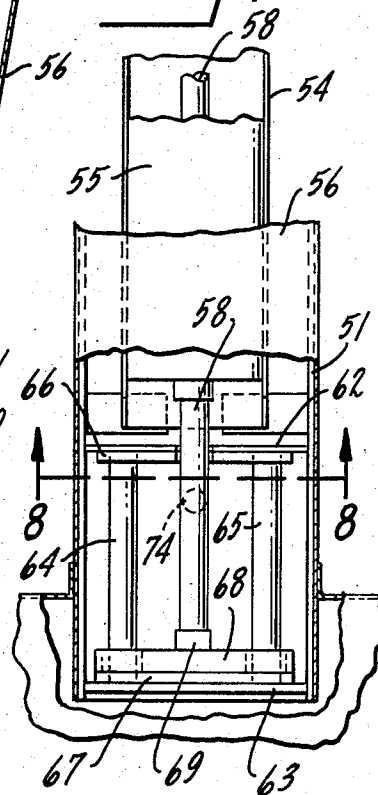


FIG. 7.



STACKER AND METHOD OF STACKING FROZEN FOOD PATTIES

BACKGROUND OF THE INVENTION

Pre-molded food patties, particularly hamburger patties, have found increasing popularity for both commercial and household use. A number of different high-speed high-volume devices have been developed for the manufacture of these food patties. To obtain the advantages of centralized production, increasingly larger percentages of hamburger patties and other food patties are being marketed in frozen form. In a typical installation, the patties are molded in a high speed molding machine, conveyed directly into and through a cryogenic freezing tunnel, and then packaged for distribution to commercial and retail outlets. The frozen patties are hard and brittle, as they emerge from the cryogenic freezing equipment, and must be maintained in frozen condition throughout any packaging or subsequent processing.

For the most part, hand stacking and packaging has been employed for frozen hamburgers and other food patties, even in high-volume production facilities. This often requires a substantial number of stacker employees, adding considerably to the expense of overall plant operation, particularly for a plant in which molding and freezing of the patties is a fully automated operation. Hand stacking is a rather unpleasant job, since the patties are frozen and difficult to handle. Any inaccuracy in the stacking operation may result in an economic loss to the plant operator, either from customer complaints or from delivery of excess goods to the customers. Substantial floor space may be required, in a high speed frozen food patty processing line, in order to afford adequate work room for the stackers. Any frozen patties that are dropped represent an economic loss, due to breakage and the loss of sanitary control.

In many installations, it is highly desirable to afford a complete in-line operation from the patty molding equipment through the relatively long cryogenic freezing tunnel and then through the packaging operation. Any deviation from a direct linear processing path may materially increase floor space requirements, particularly in installations in which more than one processing line is employed.

Several different forms of equipment have previously been proposed for stacking disc-shaped articles. For example, in the tortilla stacker shown in Mason patent No. 3,393,645 tortillas slide down a chute and are projected out along a horizontal extension of the chute, coming to rest in a stack that accumulates on a set of movable plates. The plates are retracted when the stack is complete, allowing the tortillas to fall onto an output conveyor. In another stacker, shown in Maulini U.S. Pat. No. 3,338,370, biscuits are discharged at relatively high speed from the bottom of a hopper, either in pairs or on an individual basis; a relatively complex multiple hopper arrangement is used to develop stacks containing a plurality of biscuits.

Another biscuit stacker is Morton U.S. Pat. No. 3,282,399 in which biscuits slide off of the end of a plate at high speed and fly outwardly into engagement with an anvil. From the anvil, the biscuits fall downwardly to accumulate on an output conveyor. In the Morton arrangement, the biscuits turn through a limited angle, less than 90°. Another stacker that utilizes

a turning motion of about 90° is shown in Monaco U.S. Pat. No. 2,519,419, in which the biscuits or like articles slide off of the end of an upwardly inclined conveyor and down a guide chute to accumulate in a vertically oriented stack.

An entirely different form of stacker is shown in Joa U.S. Pat. Nos. 3,324,930 and 3,391,777. In these mechanisms, the flat objects to be stacked are carried upwardly away from an input conveyor by a transfer conveyor that deposits the articles on an output conveyor. The transfer conveyor rotates the articles through an angle of 180°, in an operating cycle that maintains the transfer conveyor in contact with the articles throughout the stacking operation.

Each of these previously proposed stacking devices presents some disadvantage and difficulty when applied to the stacking of hard, brittle, disc-shaped articles such as frozen food patties. Some of the stackers require the use of relatively high conveyor speeds in the stacking operation, particularly where the stacked articles are maintained in the same angular orientation throughout the stacking operation. This high speed operation presents a substantial possibility of damage, when the movement of the articles is interrupted by an anvil or other blocking member. In several instances, the stacking equipment is relatively complex, unduly increasing the cost and presenting a maintenance problem in the rather difficult environment presented by a food processing plant. Hand stacking, on the other hand, is expensive, potentially inaccurate, and entails the use of excessive amounts of floor space.

SUMMARY OF THE INVENTION

It is a principal object of the present invention, therefore, to provide a new and improved stacker apparatus and stacking method, applicable to the stacking of frozen food patties and other similar disc-shaped articles in high-volume production facilities, that does not require the utilization of high speed conveyors and can be operated effectively at relatively low conveyor speeds.

A particular feature of the present invention is the provision of a high-volume stacking method and apparatus, operable with conveyors functioning at relatively low speeds, in which stacking is effected through free fall of the stacked articles through a relatively short distance, entailing a rotation of approximately 180° and continuous but limited guidance of the articles during the stacking process.

Another object of the invention is to provide a high speed operating mechanism for displacing a guide, in a free-fall stacker for frozen food patties and like disc-shaped articles, that removes the guide to permit the transport of a completed stack away from the stacking location and subsequently restores the guide to its normal guiding position before the first article for the next stack reaches the stacking location.

Another object of the invention is to provide a new and improved method and apparatus for monitoring the accumulation of frozen food patties or like disc-shaped articles in the course of stacking those articles for packaging at the output of a high volume production line.

A particular object of the invention is to provide a new and improved stacker for frozen food patties or like disc-shaped articles that is simple and economical in construction, requires a minimum of maintenance,

and is adapted to use in a straight-line production arrangement.

Accordingly, the invention relates to a stacker for stacking frozen food patties or like disc-shaped articles; the stacker comprises a substantially horizontal input conveyor, having a terminal end located at a stacking station, for conveying frozen food patties or like disc-shaped articles to the stacking station at a predetermined speed and with predetermined minimum spacing, the input conveyor discharging the articles in free fall over its terminal end. A normally stationary stacking conveyor extends outwardly of the stacking station from a stacking location below the terminal end of the input conveyor, the vertical distance from the terminal end of the input conveyor to the stacking conveyor being sufficient to allow each article to rotate through an angle of about 180° as it falls toward the stacking conveyor. A guide, movable between a stack guidance position adjacent the stacking conveyor and a stack release position displaced from the stacking conveyor, is employed to guide the articles to accumulate in an orderly stack on the portion of the stacking conveyor at the stacking location. Stacking conveyor actuating means are provided, actuating the stacking conveyor for a limited time interval, not substantially greater than the time interval between discharge of successive patties into the stacking station, to transport an accumulated stack of patties away from the stacking location. Further, guide actuating means are provided to actuate the guide from its stack guidance position to its release position and back again in timed relation to operation of the stacking conveyor actuating means, the guide returning to its back guidance position before more than one patty for the next stack reaches the stacking conveyor.

The invention further relates to a method of stacking frozen food patties and like disc-shaped articles. In the stacking method, a series of disc-shaped articles are conveyed in flat, spaced, longitudinal alignment at a predetermined speed along a given generally horizontal input path toward a terminal end of the path; the articles are discharged, successively, in free fall, from the terminal end of the input path and into a stacking station. The falling articles are collected in a stack on a normally stationary conveyor surface at the stacking station, below the terminal end of the input path, the vertical distance from the terminal end of the input path to the stacking conveyor surface being sufficient to allow each article to rotate through an angle of about 180° as it falls. The articles are guided into an orderly stack by normally maintaining a guide in a guidance position adjacent the stacking conveyor surface and spaced outwardly of the terminal end of the input path. The height of the stack of articles accumulating on the stacking conveyor surface is continuously monitored, and the guide is moved upwardly of the stacking conveyor surface and outwardly of the terminal end of the input path to a stack release position upon accumulation of a stack of given height. The stacking conveyor surface is moved to transport the stack away from the stacking location, substantially simultaneously with movement of the guide toward its release position. The guide is restored to its guidance position and movement of the stacking conveyor is stopped before the next article reaches the stacking conveyor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of a patty stacker constructed in accordance with one embodiment of the present invention and capable of carrying out the stacking method of the invention;

FIG. 2 is a plan view of the stacker of FIG. 1;

FIG. 3 is an end view, taken from the output end, of the stacker of FIGS. 1 and 2;

FIG. 4 is a partly schematic elevation view of the stacking station in the stacker of FIGS. 1-3, drawn to an enlarged scale and employed to explain the stacking operation;

FIG. 5 is a detail view, partly schematic, taken approximately along line 5-5 in FIG. 4, illustrating the monitoring apparatus for the stacker;

FIG. 6 is a side elevation view of the stacking station for the stacker of FIGS. 1-3, drawn to an enlarged scale, with the covers of a part of the apparatus removed to show details of the operating mechanism;

FIG. 7 is a detail end elevation view of the stacking mechanism of FIG. 6, with covers cut away to show the operating mechanism; and

FIG. 8 is a detail sectional view taken approximately along line 8-8 in FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The general construction of a stacker 10 for stacking frozen food patties or like disc-shaped articles, comprising one embodiment of the present invention, is shown in FIGS. 1-3. Stacker 10 includes an input conveyor 11 mounted on a frame 12 and located in alignment with the output end of production apparatus, such as a cryogenic freezing tunnel 13, in position to receive frozen food patties discharged from a conveyor 14 within the production equipment.

The input conveyor 11 is substantially horizontal in alignment, although some deviation from the horizontal can be permitted as indicated in FIG. 1. The terminal end 15 of conveyor 11 is located at a stacking station 20. A stacking conveyor 21, mounted upon a frame 22, is included in stacker 10. The stacking conveyor 21 extends outwardly of stacking station 20, away from a stacking location 23 below the terminal end 15 of input conveyor 11. Input conveyor 11 operates at a predetermined, constant speed and the stacking location 23 on output conveyor 21 is spaced below the terminal end 15 of input conveyor 11 by a vertical distance which is sufficient to allow each patty to rotate through an angle of 180° in free fall, as described in greater detail hereinafter.

Stacker 10 includes a guide 24 that is normally maintained in a stack guidance position, as shown in FIGS. 1 and 3, adjacent the surface of the stacking conveyor 21. Guide 24 is spaced outwardly a short distance from the terminal end 15 of input conveyor 11. Guide actuating means, generally identified by reference numeral 25, are provided for actuating guide 24 from its normal stack guidance position to a release position. This movement of guide 24 is in a direction upwardly from stacking conveyor 21 and somewhat outwardly with respect to the terminal end 15 of input conveyor 11.

Actuating means are also provided for the stacking conveyor 21, comprising a conveyor drive motor 26. Stacker 10 includes controls for controlling and synchronizing operation of both the guide actuating means

25 and the stacking conveyor actuating means 26. A main control unit 27 is mounted in the lower part of frame 12; a supplemental control unit 28 is mounted upon an upward extension 29 of frame 12 that also serves as a support for the guide actuating means 25. Stacker 10 may also include an auxiliary guide 31 located on the opposite side of the stacking station 20 from the movable guide 24. Guide 31 is a stationary guide, and may be omitted in some installations.

Stacker 10 further includes means for monitoring the stacking operation; this monitoring means comprises a light source 32 mounted above the input conveyor 11 on a bracket 33 affixed to a frame member 35, as generally illustrated in FIGS. 1-3 and shown in greater detail in FIGS. 4 and 5. A photocell 34 is positioned below conveyor 11 and is aligned with light source 32 (FIGS. 4 and 5). For this particular monitoring arrangement, a wire mesh belt is utilized for input conveyor 11 so that the passage of a patty 36 through the light beam 37 between source 32 and photocell 34 can be detected in the output from the photocell, enabling a part of the control system 27, 28 to obtain an accurate account of the patties as they are passed through the stacker.

In the method of the present invention, as carried out by patty stacker 10, a series of frozen hamburger patties or other similar disc-shaped articles 36 is conveyed along input conveyor 11 in flat, spaced, longitudinal alignment as shown in FIG. 2. Patties 36 are maintained in orderly rows on conveyor 11, as shown in FIG. 2, but the spacing between adjacent rows need not be constant. Input conveyor 11 is operated at a relatively constant speed and the path of the patties along the input conveyor is approximately horizontal. The input path along conveyor 11 terminates at the terminal end 15 of the conveyor, from which the patties are discharged in free fall into stacking station 20.

As each row of patties falls from input conveyor 11, the patties are collected in stacks on the surface of stacking conveyor 21 at the stacking location 23 below the terminal end 15 of the input path. As noted above, the vertical distance from the terminal end 15 of the input path to the surface of the stacking conveyor 21 is chosen to allow each patty 36 to rotate through an angle of approximately 180° as it falls toward the stacking conveyor (see FIG. 4). The bottom patty in each stack rotates through an angle somewhat greater than 180° and is re-aligned horizontally as it comes to rest on stacking conveyor 21. The top patty in each stack rotates through an angle somewhat less than 180° because its fall is interrupted before full rotation is achieved. The average rotation for all patties, however, is approximately 180° .

As the stack of patties accumulate in stacking station 20, the stacks are maintained in orderly alignment by the movable guide 24, which is held steady in the stack guidance position shown in FIGS. 1 and 3. Thus, any patty that tends to fall too far outwardly away from the terminal end 15 of the input path is constrained from moving beyond the desired stack alignment by guide 24. The stationary guide 31 may be utilized to prevent excessive movement of the falling patties in the opposite direction from that controlled by the movable guide 24, particularly by patties deflected by guide 24. In many instances, however, there is no tendency toward excessive movement of the patties in this latter

direction, so that the stationary guide 31 may be eliminated.

As the stacks of patties accumulate in stacking station 20, the number of patties is counted by the monitoring means comprising light source 32 and photocell 34. When a stack of desired height, such as the stack 41, has accumulated (FIG. 4), guide 24 is moved rapidly upwardly from the stacking conveyor surface and outwardly from the terminal end 15 of the input path, as indicated by the arrow A in FIG. 4. In this manner, guide 24 is shifted to a stack release position as indicated by the phantom outline 24A. At approximately the same time, the actuating means for the stacking conveyor 21 is activated, moving the upper surface of the stacking conveyor 21 in the direction of the arrow B to transport the stack away from the stacking location 23 to the position shown for stack 41.

As soon as the stack of patties has been moved out of the stacking location 23 to a position clear of the stacking guide 24, the guide is moved back downwardly and inwardly of the stacking station to its original guidance position, moving in the direction of the arrow A' in FIG. 4. At about the same time, the movement of the stacking conveyor 21 is interrupted and the stacking conveyor is subsequently held stationary for the accumulation of another stack of patties in stacking station 20. The complete cycle of operation of stacking guide 24 and stacking conveyor 21 should be accomplished before the next patty reaches the upper surface of the stacking conveyor 21, or at least very shortly thereafter, so that the first patty for the next stack will be properly positioned in the stacking location 23.

From the foregoing description, it will be apparent that stacker 10 affords an efficient and effective apparatus for stacking patties 36, on an essentially automatic basis, eliminating hand stacking completely. The spacing between adjacent rows of the patties 36 can vary to a substantial extent, as may occur with some interruption or minor delay in operation of the production equipment that feeds the patty stacker. Such an interruption or delay will not result in the preparation of stacks of non-uniform height, since the stack height is effectively controlled by the monitoring means comprising light source 32 and photocell 34.

Stacker 10 serves as an in line extension of the production equipment, such as the freezing tunnel 13, and requires a minimal amount of floor space. The input conveyor 11 can be operated at quite moderate speeds, even for a high volume production line, so that the frozen patties are not damaged or dropped when they fall from the input conveyor terminal end 15 to the stacking location 23 on the stacking conveyor 21. Consequently, breakage and loss of sanitary control are inherently minimized. This relatively low speed operation is made possible by permitting the patties to rotate through an angle of approximately 180° in the course of the stacking operation, as described above and as specifically illustrated in FIG. 4, in contrast with the high speed operations frequently required in stackers that maintain the patties in their initial orientation.

A preferred construction for the stacking station 20, and particularly the actuating means 25 for movable guide 24, is shown in FIGS. 6-8. As illustrated therein, the guide actuating means 25 is affixed to an adjustable L-shaped bracket 46 that is mounted upon a support 45; support 45 is affixed to the upper frame 29 of the stacker by a plurality of bolts or other suitable mount-

ing devices 47. A series of bolts 48 mounted in slots 49 constitute the mounting connection between bracket 46 and support 45, allowing horizontal adjustment of the position bracket 46 parallel to the path of movement of patties through the stacker.

A channel-shaped support member 51 is mounted on the front leg 53 of bracket 46 by suitable means such as a plurality of mounting bolts 52. The base 54 of an electrically-energized linear actuator 55, such as a linear motor or solenoid is centrally mounted within the channel-shaped support 51, as shown in each of FIGS. 6-8. In the illustrated construction, the base 54 of the linear actuator 55 is bolted to the channel-shaped support 51, but other mounting arrangements can be utilized if desired. Support 51 is disposed at an acute angle to the vertical to provide for movement of guide 24 both upwardly and away from stacking location 23, as described hereinafter. A sheet metal cover 56 is provided for the linear actuator 55 and other components of the operating mechanism for guide 24; the upper end of the sheet metal cover 56 extends well above the linear actuator but is open at the front to allow access to a manual operating handle 57 mounted on the actuator rod 58 of linear motor 55. A removable plate 59 covers an access opening 61 in the lower portion of the sheet metal housing 56.

A bracket 62 is mounted in the support channel 51 a short distance below the lower end of the linear actuator 55 and a similar bracket 63 is mounted in channel 51 adjacent the lower end of the channel. The brackets 62 and 63 can be welded to or otherwise suitably mounted within channel 51. Two guide rods 64 and 65 extend between and are supported by the bracket 62 and 63, in spaced parallel relation to actuator rod 58. A bumper 66 is mounted upon the lower surface of the bracket 62 and a second similar bumper 67 is mounted on the upper surface of the bracket 63. The two bumpers 66 and 67 are formed of rubber or other relatively soft resilient material.

The lower end of the actuator rod 58 of linear motor 55 carries a two-piece clamp 68 and a gate mounting bracket 69. Bracket 69 is affixed to rod 58 and extends downwardly; a gate plate 71 is mounted on the lower end of the bracket. Clamp 68 is affixed to bracket 69; bracket 69 includes lateral extensions that embrace the two guide rods 64 and 65. Guide 24 comprises a blade insert that is affixed to the lower end of blade 71.

A retaining device 73 is mounted upon the support channel 51 a short distance below bracket 62. The retaining device 73 comprises an axially movable retainer rod 74 that extends through the base portion of the channel in alignment with the actuator rod 58. Rod 74 is normally maintained in a retracted position, out of the path of movement of the actuator rod 58 and clamp 68, as shown in FIG. 6. A handle 76 on rod 74 may be employed to move the rod axially to a position in which it can engage clamp 68 and maintain the clamp and actuator rod 58 in an elevated position adjacent the upper bumper 66. A spring-biased plunger 77 normally retains rod 74 in its retracted position, but a forward thrust upon handle 76 moves rod 74 to its retaining position 74A when required.

During the accumulation of a stack of patties at stacking station 20, as described above in connection with FIGS. 1-5, the operating mechanism 25 for guide 24 remains de-energized and guide 24 is held in the position shown in FIG. 6. When the last patty of the stack

has been discharged over the terminal end 15 of input conveyor 11, and has fallen onto the stack, linear actuator 55 is energized through an electrical circuit controlled by the monitoring device comprising photocell 34 (FIGS. 4 and 5). Energization of linear actuator 55 pulls actuator rod 58 upwardly very rapidly. The upward movement of actuator rod 58 elevates gate mounting bracket 69 moving the clamp 68 along a guided path determined by the guide rods 64 and 65, which are parallel to the actuator rod. In this manner, because guide 24 is suspended from bracket 69, the guide is rapidly moved from its normal stack guidance position adjacent the upper surface of stacking conveyor 21 to its stack release position 24A (FIG. 4). The upward movement of actuator rod 58, bracket 69, clamp 68, and guide 24 is interrupted by engagement of clamp 68 with the resilient bumper 66, which serves as a stop for the mechanism and also functions as a shock absorber.

When the accumulated stack of patties has been moved clear of the stacking location 23 by a brief actuation of conveyor 21, as described above, linear actuator 55 is energized for movement of rod 58 in the reverse or downward direction. As a consequence clamp 68 and guide 24 are driven downwardly at high speed until clamp 68 engages the lower bumper 67. Bumper 67, like bumper 66, serves both as a stop and as a shock absorber for clamp 68 and the other components that are supported upon actuator rod 58.

In some circumstances, it may be necessary or desirable to operate a production line in which stacker 10 is incorporated without attempting to stack the articles produced by the line. For example, this may occur if the production line is changed over to the production of articles of some configuration not susceptible to stacking (e.g. meatballs). Under these circumstances, handle 57 is utilized to pull actuator rod 58 upwardly through linear motor until clamp 68 engages bumper 66. In addition, the retainer device 73 is actuated, by means of handle 76, to insert retainer rod 74 inwardly to its position 74A, where it engages clamp 68 to hold the clamp, actuator rod 58, and guide 24 in the elevated stack release position. This arrangement also makes it possible to continue utilization of the production line in the event of a failure or malfunction of linear motor 55 or of any of the control equipment for the linear motor.

The guide actuating means 25, in the form illustrated in FIGS. 6-8, affords efficient and highly effective operation for the stacking station 20 of stacker 10. Linear motor 55 allows for rapid movement of guide 24 upwardly from its normal guidance position to its release position and back from the release position to the guidance position. The high speed movement is essential to complete the cyclic movement of guide 24 during a very short period determined by the time interval between the discharge of two consecutive patties over the terminal end 15 of the input conveyor path. The stop arrangement incorporated in the actuating mechanism 25, comprising bumpers 66 and 67, effectively allows for the requisite rapid operation without damage to the actuating mechanism. The linear motor operating mechanism is substantially more reliable and effective than virtually any arrangement utilizing a conventional rotary motor. A double-acting hydraulic or pneumatic piston could be employed, but the electrical linear actuator is preferable from the standpoint of low inertia,

high acceleration, and relatively low noise level. The angled movement of guide 24, horizontally away from stacking location 23 as well as upwardly from conveyor 21, makes it possible to start the stacking conveyor before the guide completes its movement to release position, shortening the stack-completed operating cycle without having the stack bump against guide 24.

In many plants, particularly those producing hamburger patties, a single production line may be employed to produce patties of several different sizes. A changeover in patty size is readily accomplished, in stacker 10, by adjusting the position of bracket 46 on support 45, thereby re-positioning guide 24 for the new patty dimension. The mount for actuating means 25 may be calibrated for various standard sizes, with a scale 81 on bracket 46.

For changes in thickness, the controls actuated by monitor photocell 34 can readily be adjusted to trigger actuation of conveyor 21 and guide 24 for a patty count commensurate with the desired stack height. Some adjustment of the positions of light source 32 and photocell 34 may be necessary to accommodate changes in the number of patties in each row; on the other hand, it is usually possible to position the monitor to function for any of the standard row arrangements of the production line, since the monitor can operate as long as the light beam 37 is interrupted by some part of a patty in each row.

We claim:

1. A stacker for stacking frozen food patties or like disc-shaped articles, comprising:

a substantially horizontal input conveyor, having a terminal end located at a stacking station for conveying frozen food patties or like disc-shaped articles to the stacking station at a predetermined speed and with predetermined minimum spacing, the input conveyor discharging the articles, in free fall, over its terminal end;

a normally stationary stacking conveyor, extending outwardly of the stacking station from a stacking location at a point directly below the terminal end of the input conveyor, the vertical distance from the terminal end of the input conveyor to the stacking conveyor being sufficient to allow each article to rotate through an angle of about 180° as it falls toward the stacking conveyor;

a guide, movable between a stack guidance position adjacent the stacking conveyor and a stack release position displaced upwardly from the stacking conveyor and outwardly from the stack guidance position, for guiding the articles to accumulate in an orderly stack on the portion of the stacking conveyor at the stacking location;

stacking conveyor actuating means for actuating the stacking conveyor for a limited time interval, not substantially greater than the time interval between discharge of successive articles into the stacking station, to transport an accumulated stack of articles away from the stacking location;

guide actuating means for actuating the guide from stack guidance position to release position and back again in timed relation to operation of the stacking conveyor actuating means, the guide returning to stack guidance position before more than one article for the next stack reaches the stacking conveyor;

and means to monitor article accumulation at the stacking location and to energize both of said actuating means when a desired accumulation has been attained.

2. A stacker according to claim 1, in which the guide actuating means comprises a linearly movable actuator member connected to the guide and extending upwardly from the stacking location at an acute angle to the vertical, away from the stacking location, so that movement of the guide to its release position displaces the guide outwardly of the stacking station and allows actuation of the stacking conveyor before the guide reaches its release position.

3. A stacking conveyor according to claim 2, in which the actuator member is the actuator rod of an electrically energized linear actuator.

4. A stacker according to claim 2, in which the guide actuating means includes upper and lower stop members defining the release and stack guidance positions of the guide, each stop member including a bumper of resilient material positioned at one end of the path of the guide movement to cushion the interruption of the guide movement.

5. A stacker according to claim 1 wherein the monitoring means for counting articles moving along the input conveyor and for initiating operation of the guide actuating means is and the stacking conveyor actuating means upon a given count.

6. A stacker according to claim 5, in which the input conveyor is a wire mesh conveyor and the monitoring means includes a light source and a photocell aligned with each other, one above and the other below the input conveyor.

7. A stacker according to claim 1, including a horizontally adjustable mount for the guide and guide actuating means, allowing adjustment of the horizontal position of the guide, toward and away from the stacking location, to accommodate articles of varying dimensions.

8. A stacker according to claim 1, and further comprising a supplemental stationary guide, positioned at the opposite side of the stacking location from the movable guide.

9. A method of stacking frozen food patties and like disc-shaped articles, comprising:

conveying a series of disc-shaped articles, in flat, spaced, longitudinal alignment at a predetermined speed along a given generally horizontal input path toward a terminal end of the path;

discharging the articles, successively, in free fall, from the terminal end of the input path and into a stacking station;

collecting the falling articles in a stack on a normally stationary conveyor surface at the stacking station, at a point directly below the terminal end of the input path, the vertical distance from the terminal end of the input path to the stacking conveyor surface being sufficient to allow each article to rotate through an angle of about 180° as it falls;

guiding the articles into an orderly stack by normally maintaining a guide in a guidance position adjacent the stacking conveyor surface and spaced outwardly of the terminal end of the input path;

continuously monitoring the height of the stack of articles accumulating on the stacking conveyor surface by counting the articles traversing the input path;

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moving the guide upwardly of the stacking conveyor surface and outwardly of the terminal end of the input path to a stack release position upon accumulation of a stack of given height;
moving the stacking conveyor surface to transport the stack away from the stacking location, substantially simultaneously with movement of the guide toward its release position and in response to monitoring a predetermined height of articles on the stacking conveyor;

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and restoring the guide to guidance position and stopping movement of the stacking conveyor before the next article reaches the stacking conveyor.

10. A method of stacking according to claim 9 in which the path of movement of the guide is inclined at an acute angle to the vertical, away from the stacking station, and in which movement of the stacking conveyor surface is initiated before the guide reaches its release position.

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