Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

Filed Jan. 30, 1961 19 Sheets-Sheet 1

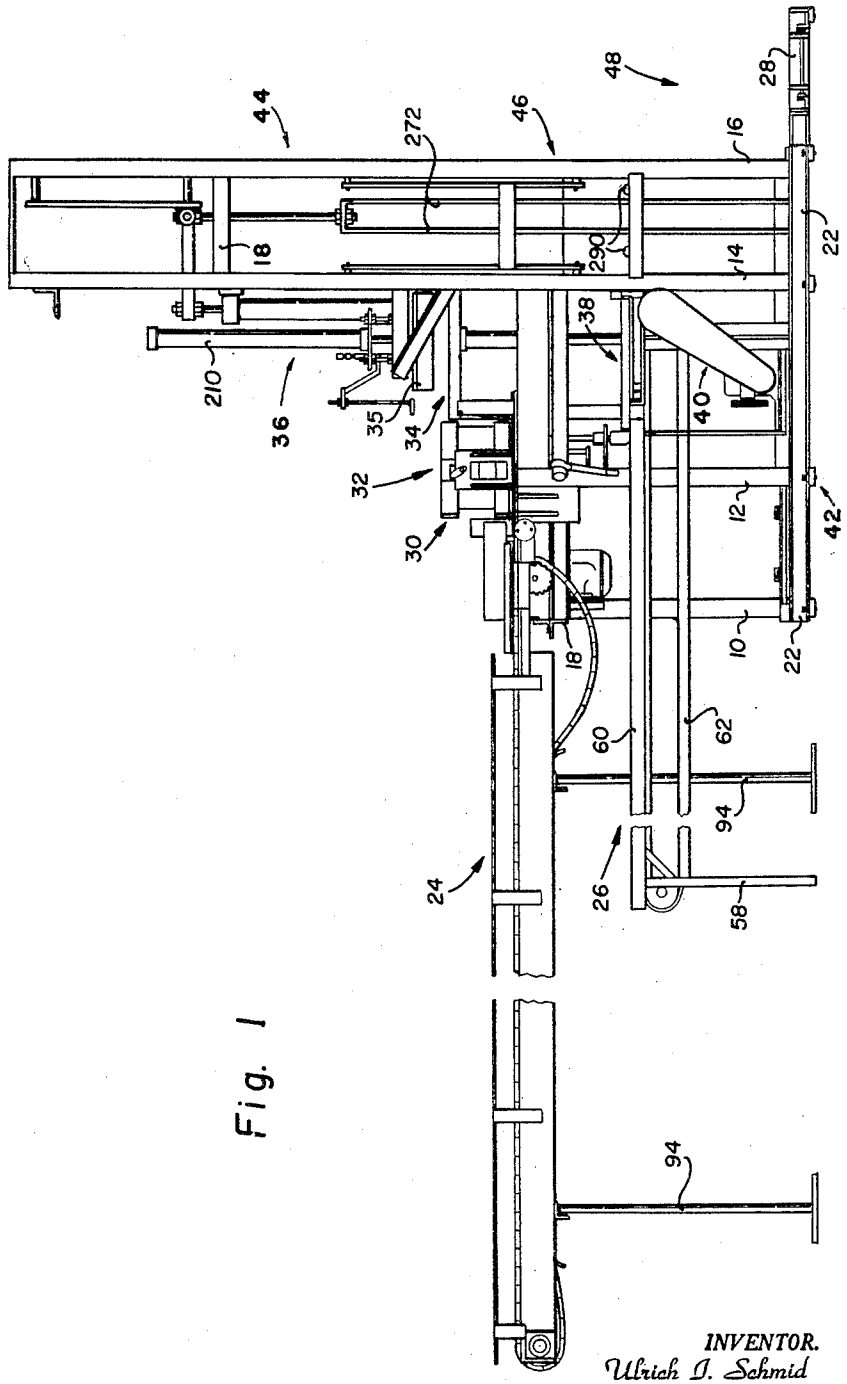


Fig. 1

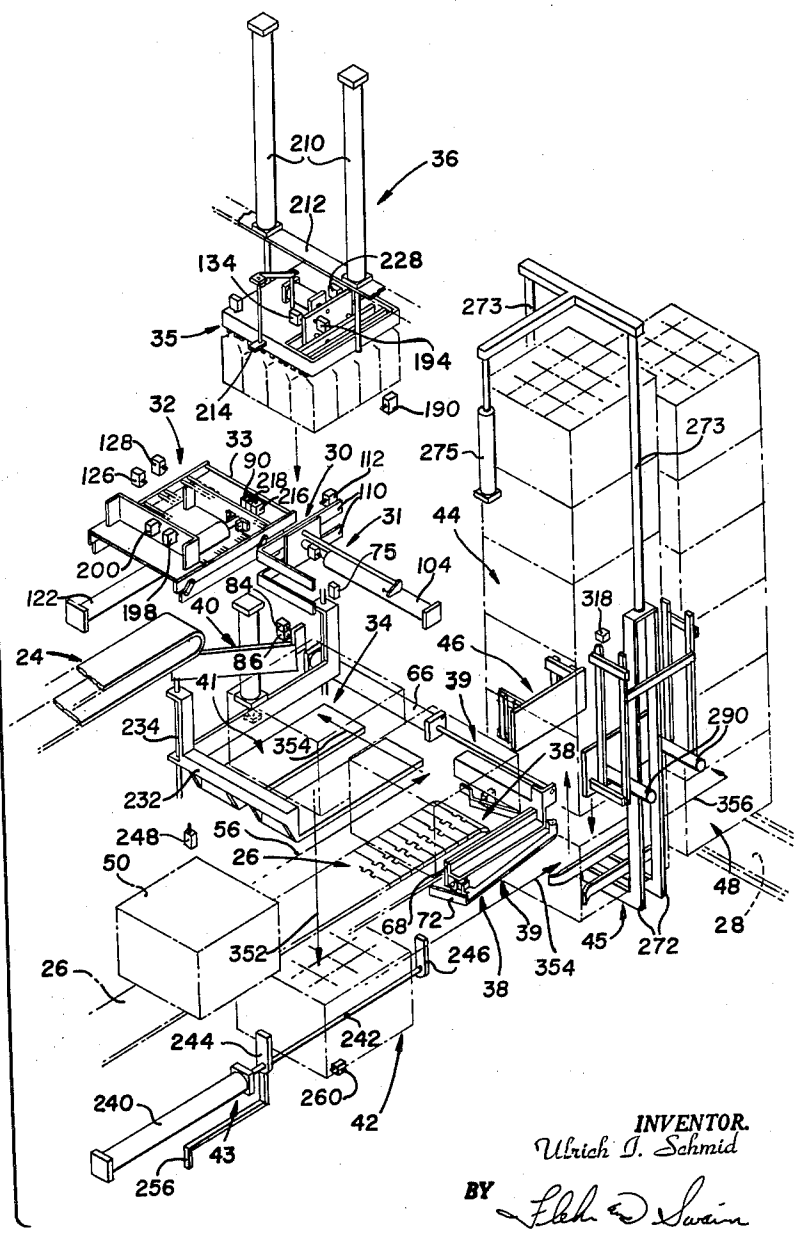
INVENTOR.
Ulrich J. Schmid
BY
Fleh & Swain
Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

Filed Jan. 30, 1961 19 Sheets-Sheet 2

Fig. 2



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BY Fleckner & Swain
Attorneys

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CASE FILLING AND STACKING MACHINE

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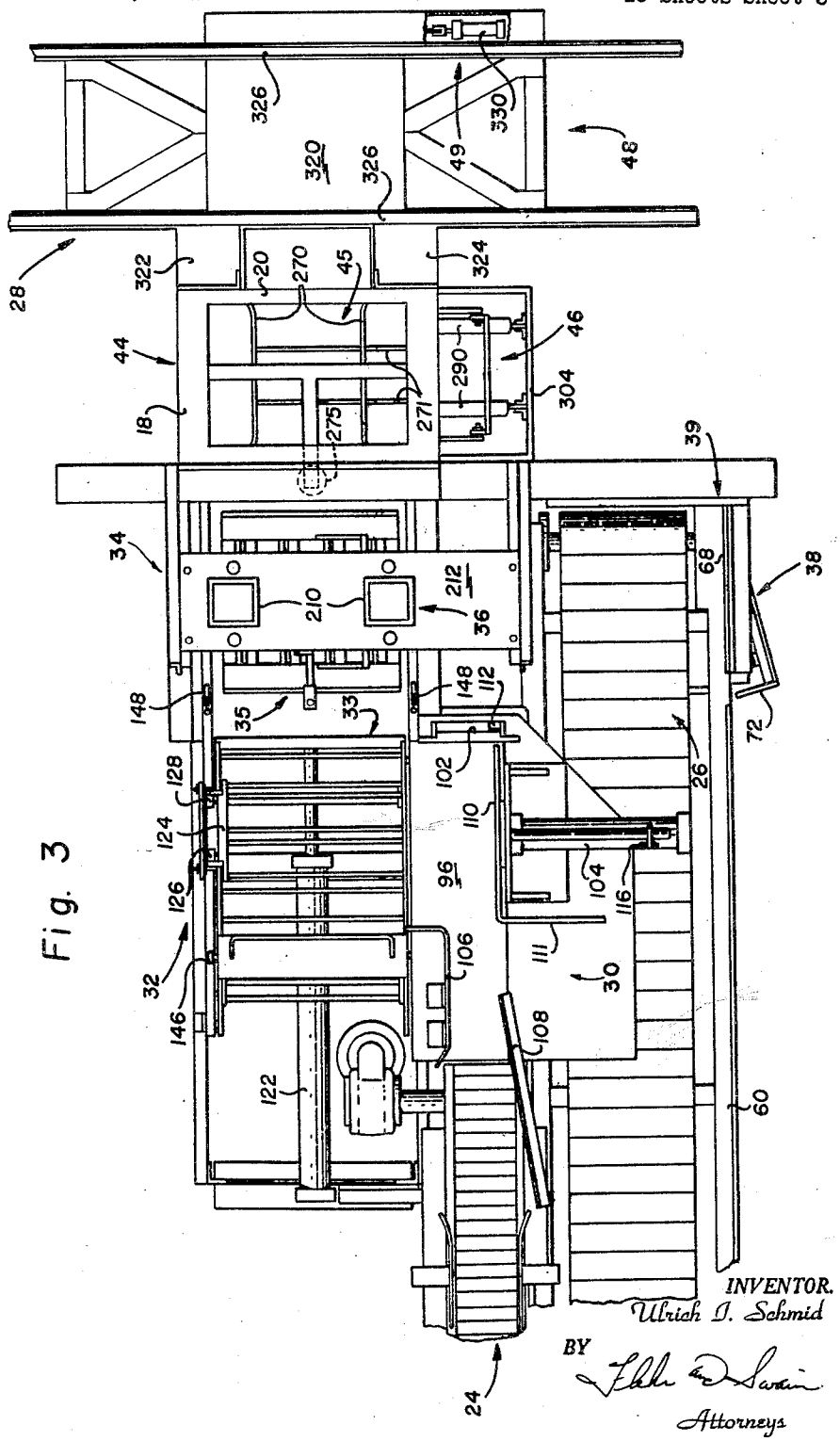


Fig. 3

INVENTOR.
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BY
Attorneys

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CASE FILLING AND STACKING MACHINE

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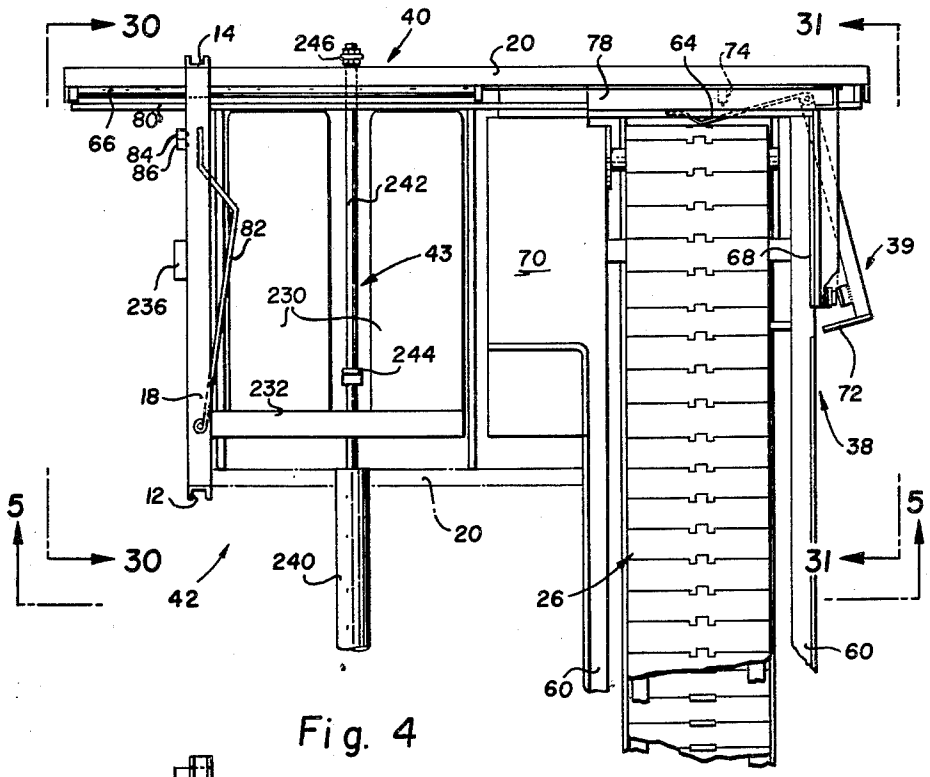


Fig. 4

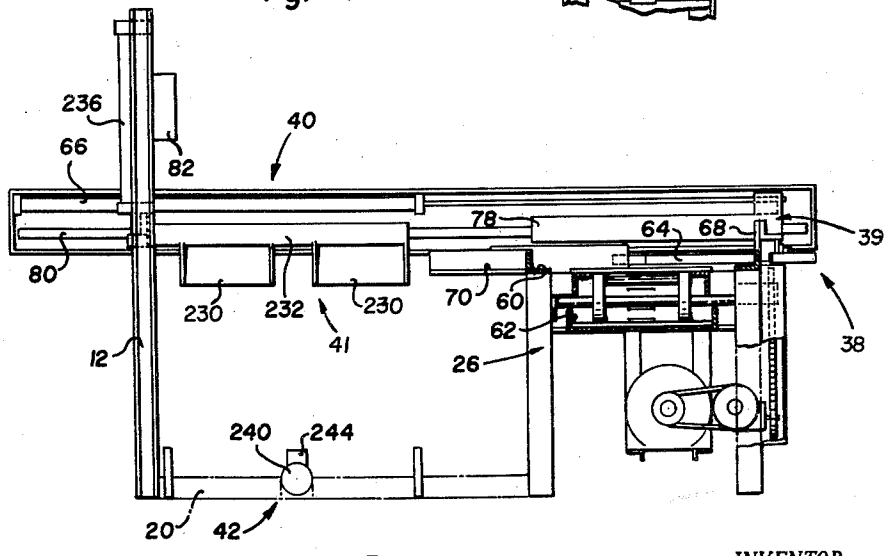


Fig. 5

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Ulrich J. Schmid
BY Fleit & Jacobson
Attorneys

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CASE FILLING AND STACKING MACHINE

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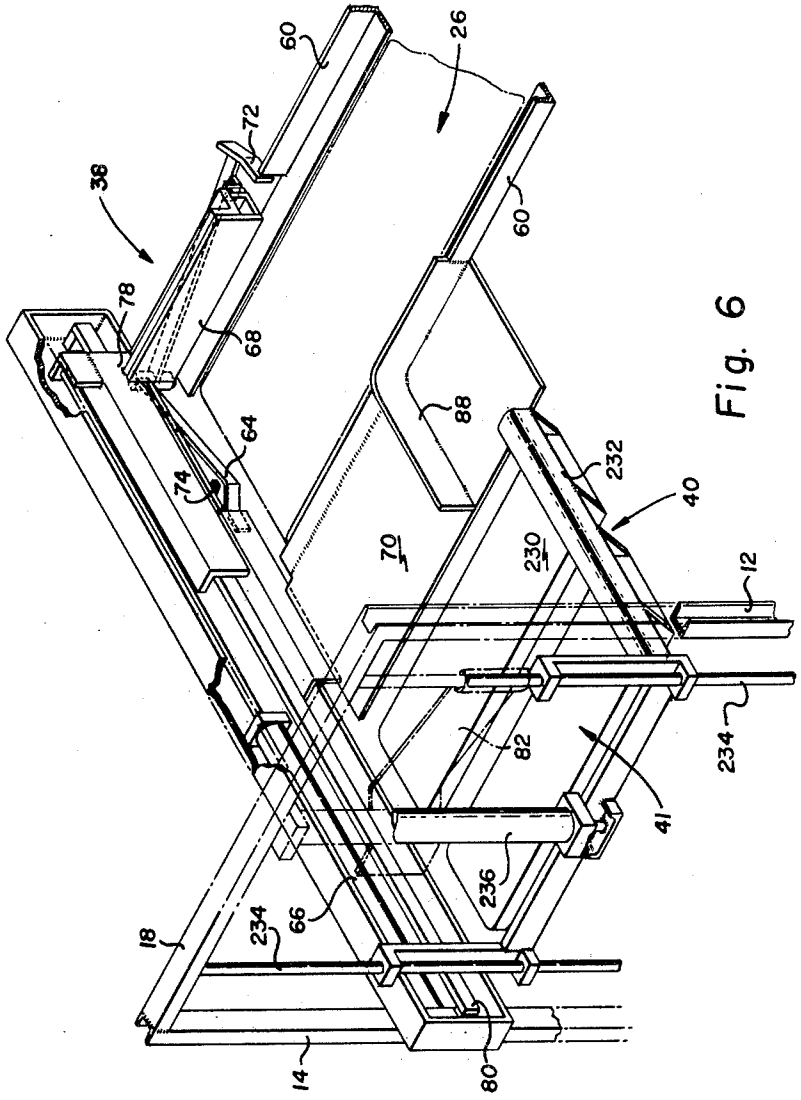


Fig. 6

INVENTOR.
Ulrich J. Schmid

BY Fleht & Swain

Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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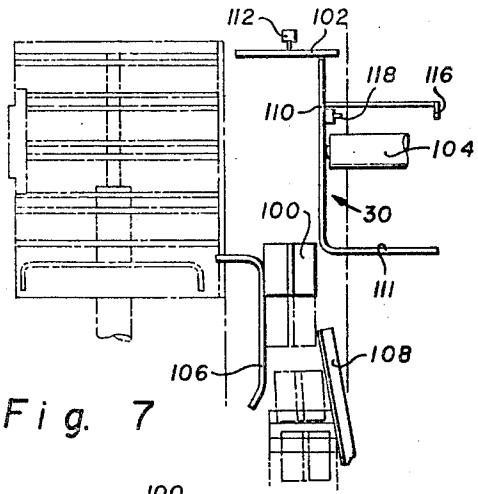


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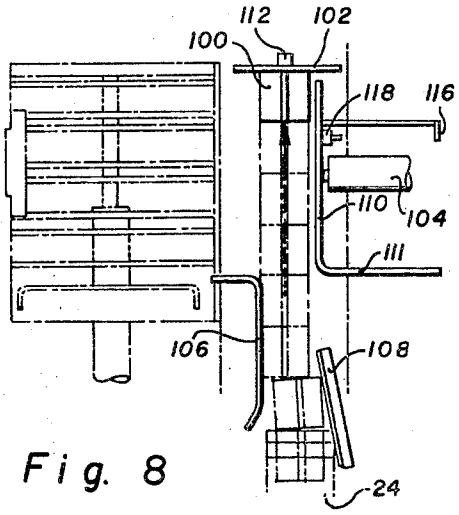


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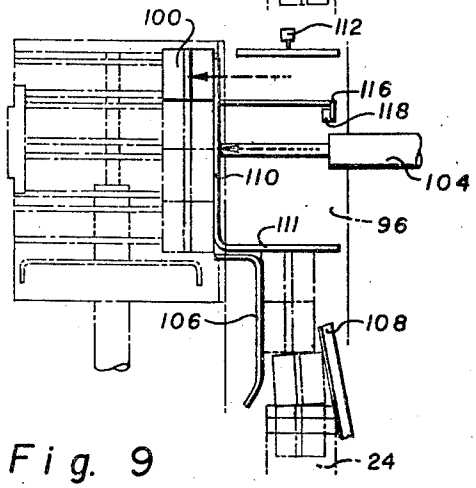


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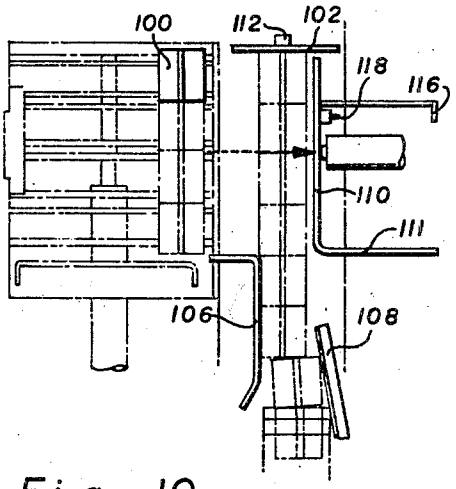


Fig. 10

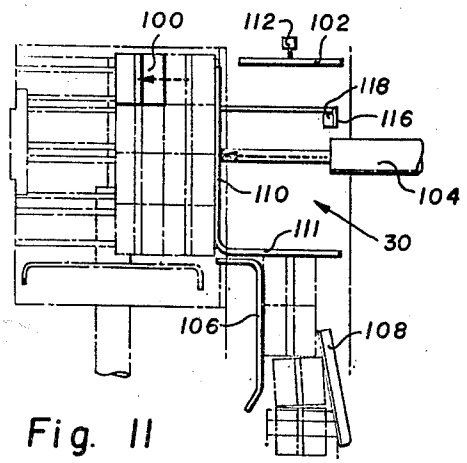


Fig. 11

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Ulrich J. Schmid
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Attorneys

CASE FILLING AND STACKING MACHINE

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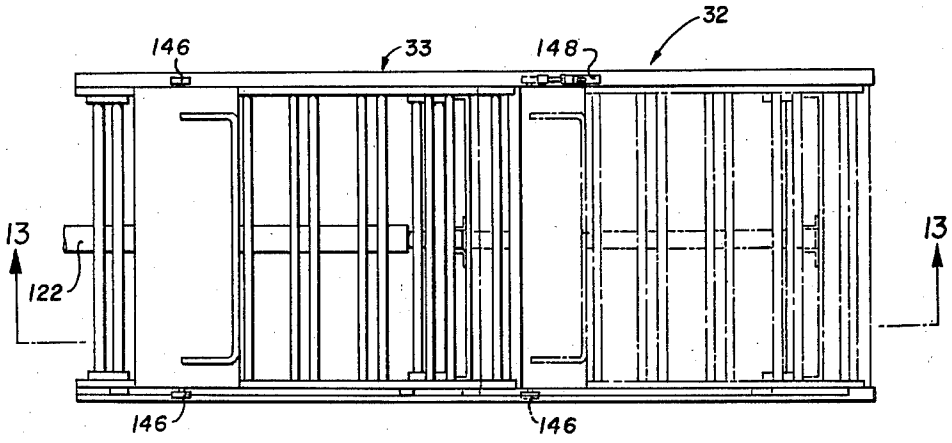


Fig. 12

Fig. 13

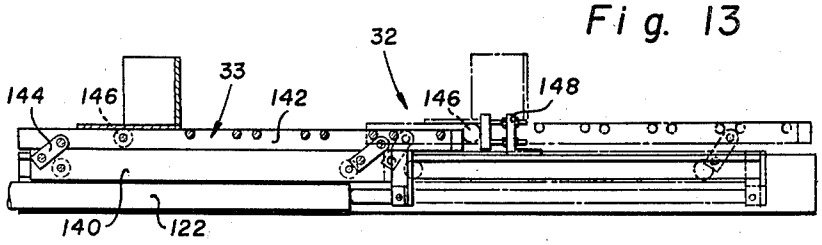
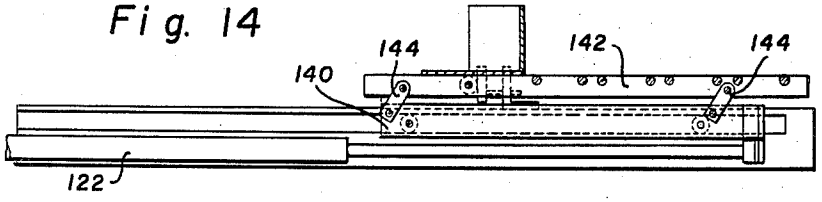


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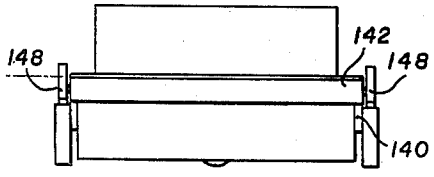


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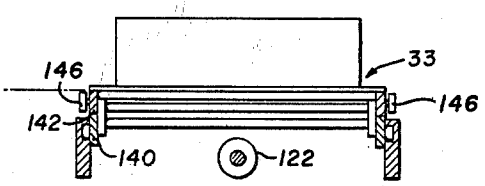


Fig. 16

INVENTOR.
Ulrich J. Schmid
BY Fleit & Swain
Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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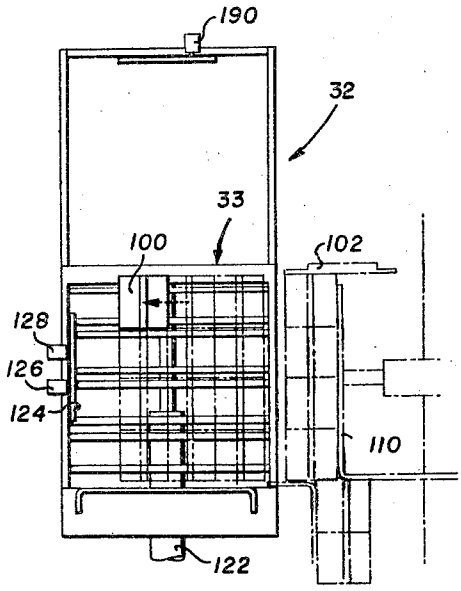


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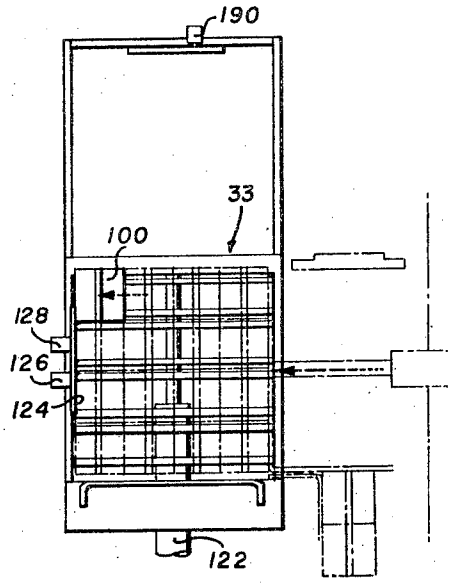


Fig. 18

Fig. 20

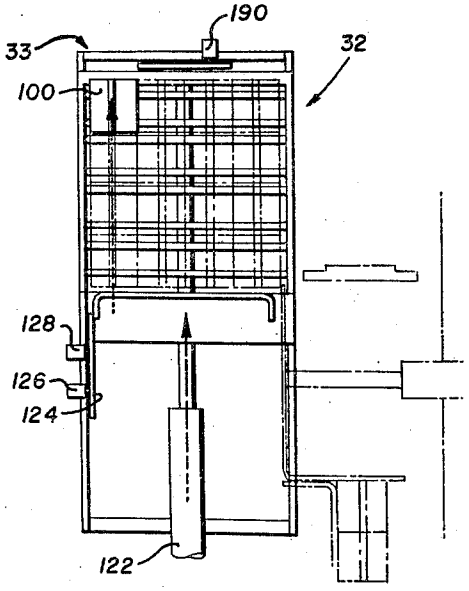
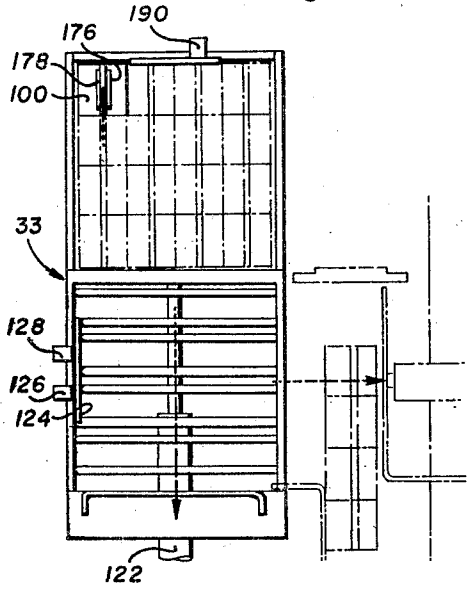


Fig. 19



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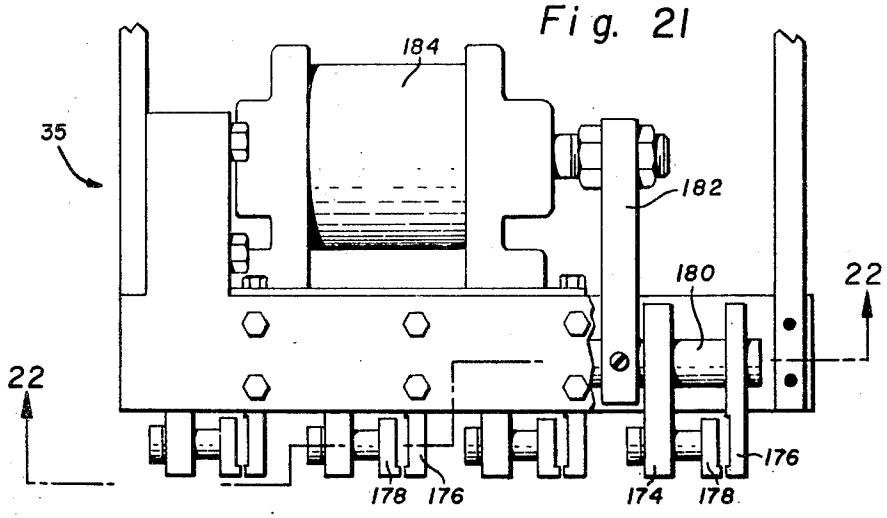
BY Fleh & Swain

Attorneys

CASE FILLING AND STACKING MACHINE

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Fig. 21



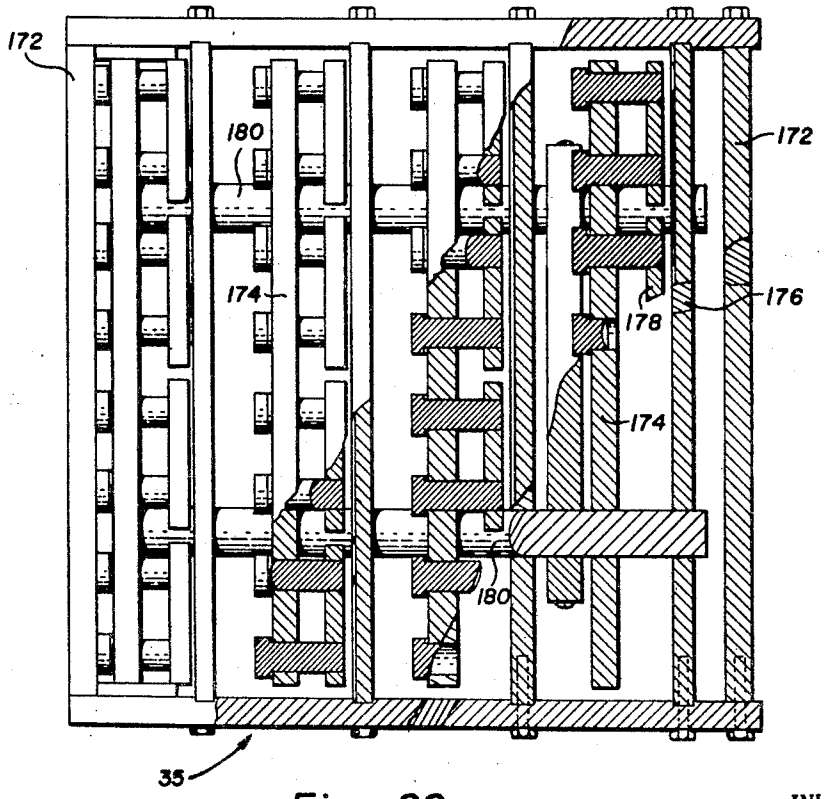


Fig. 22

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Attorneys

CASE FILLING AND STACKING MACHINE

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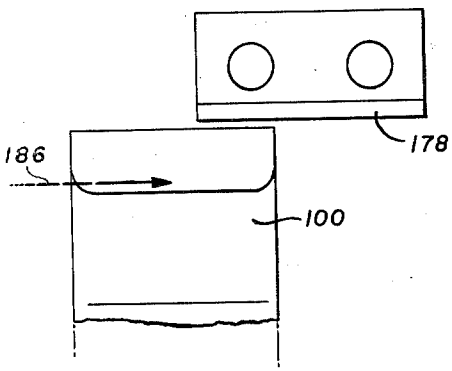


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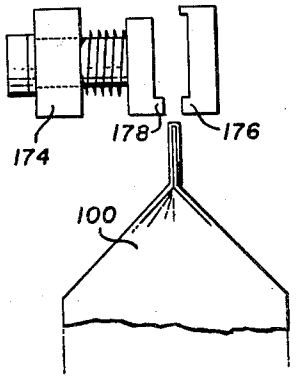


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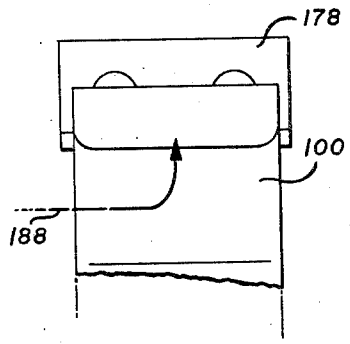


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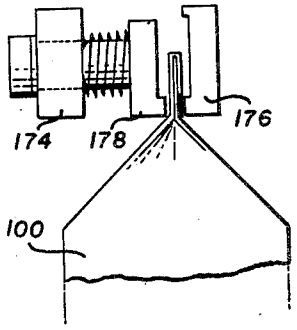


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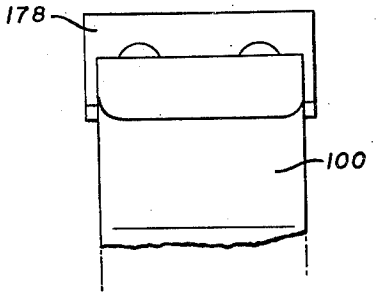


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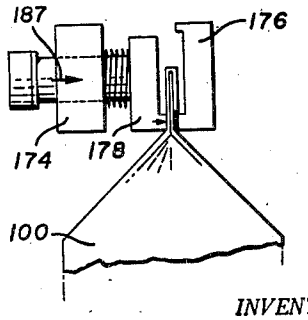


Fig. 28

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Ulrich J. Schmid
BY
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Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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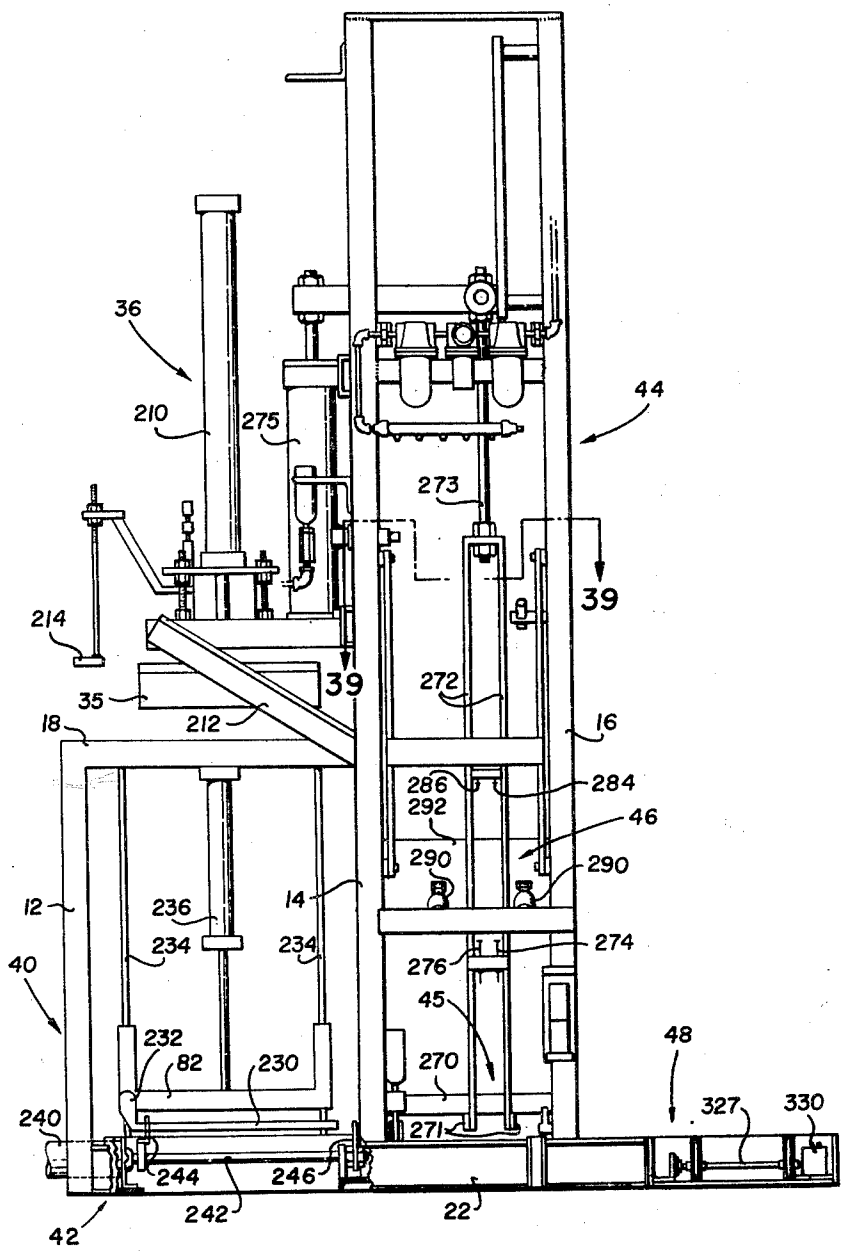


Fig. 29

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Ulrich J. Schmid
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Attorneys

CASE FILLING AND STACKING MACHINE

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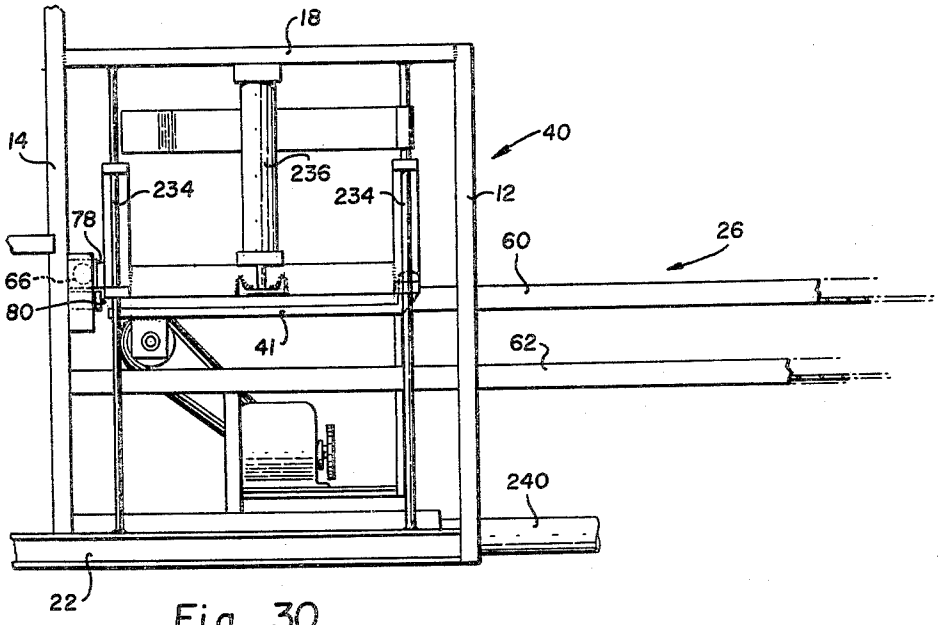


Fig. 30

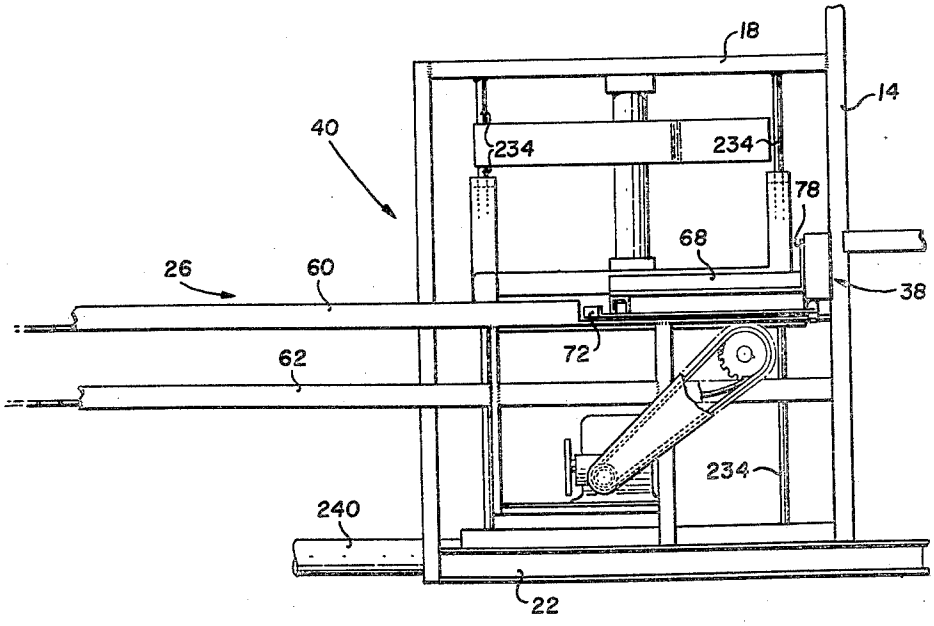


Fig. 31

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Attorneys

CASE FILLING AND STACKING MACHINE

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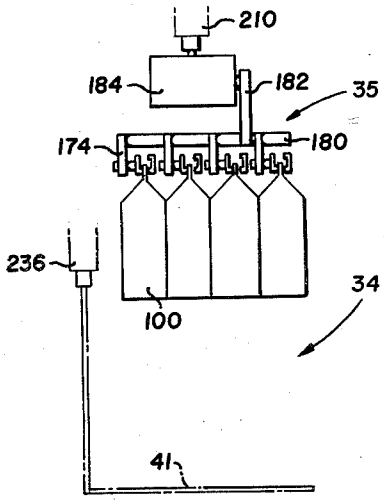


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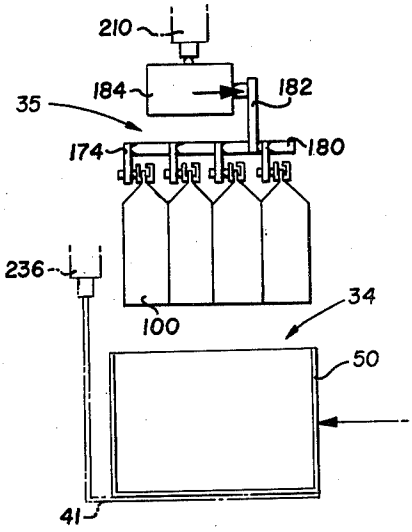


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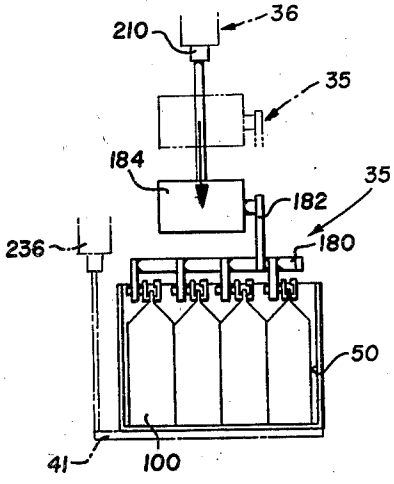


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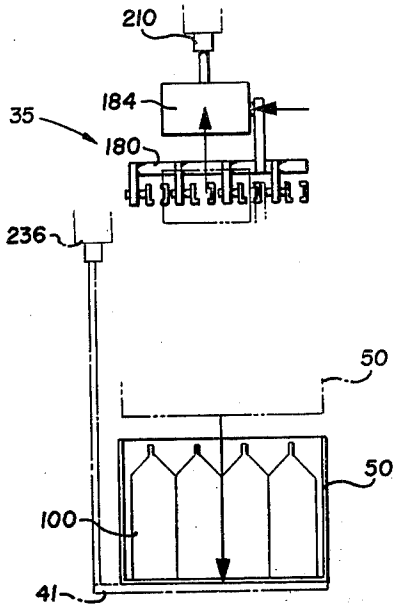


Fig. 35

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Ulrich J. Schmid
BY
Clarke & Swan
Attorneys

CASE FILLING AND STACKING MACHINE

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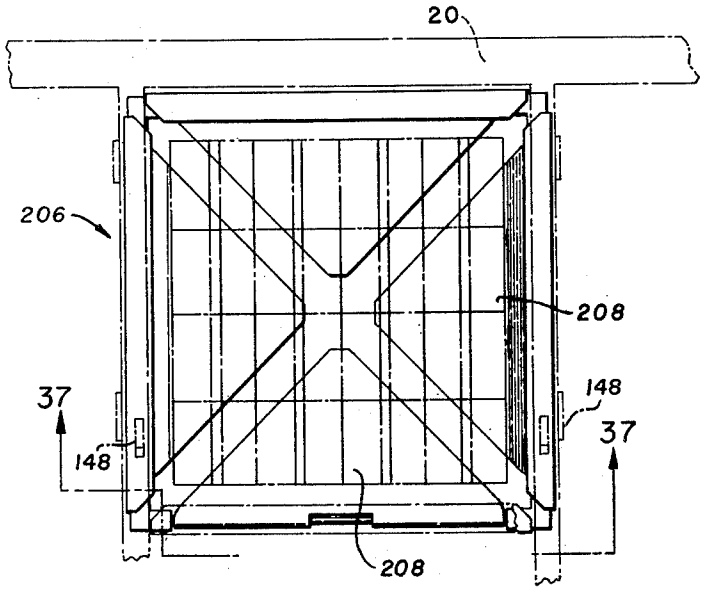


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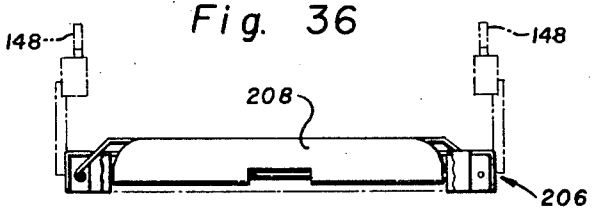


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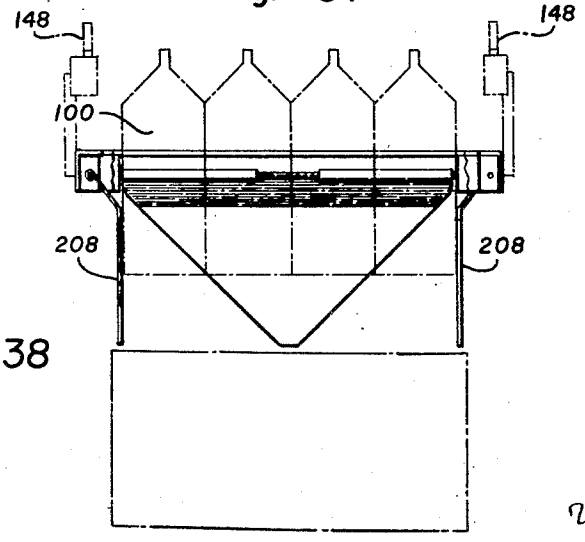


Fig. 38

INVENTOR.
Ulrich J. Schmid
BY Fleit & Swain
Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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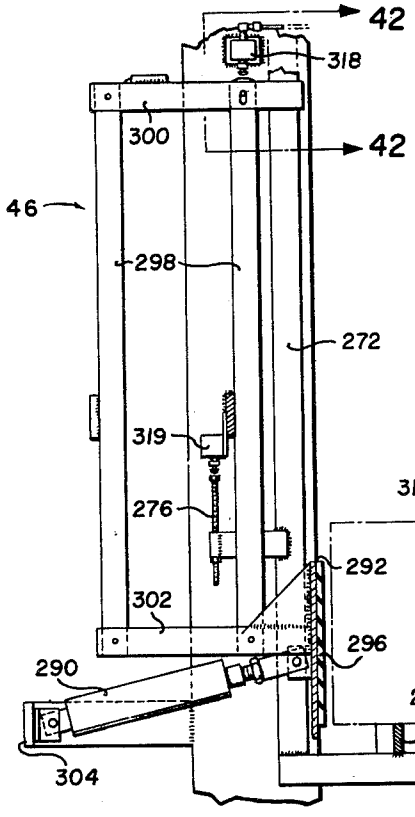


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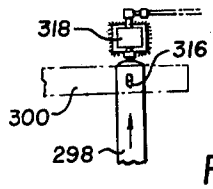
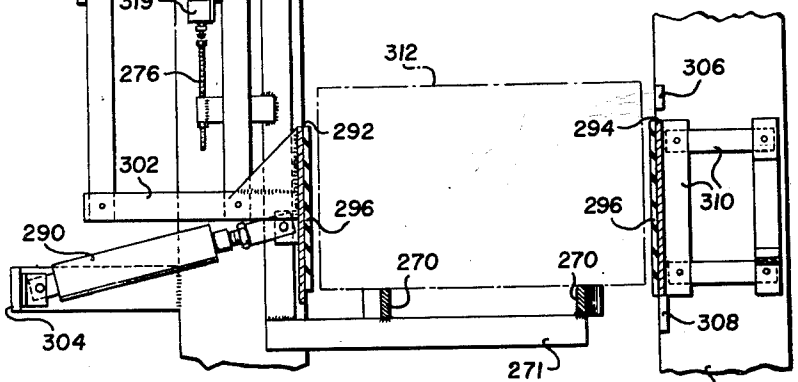


Fig. 42



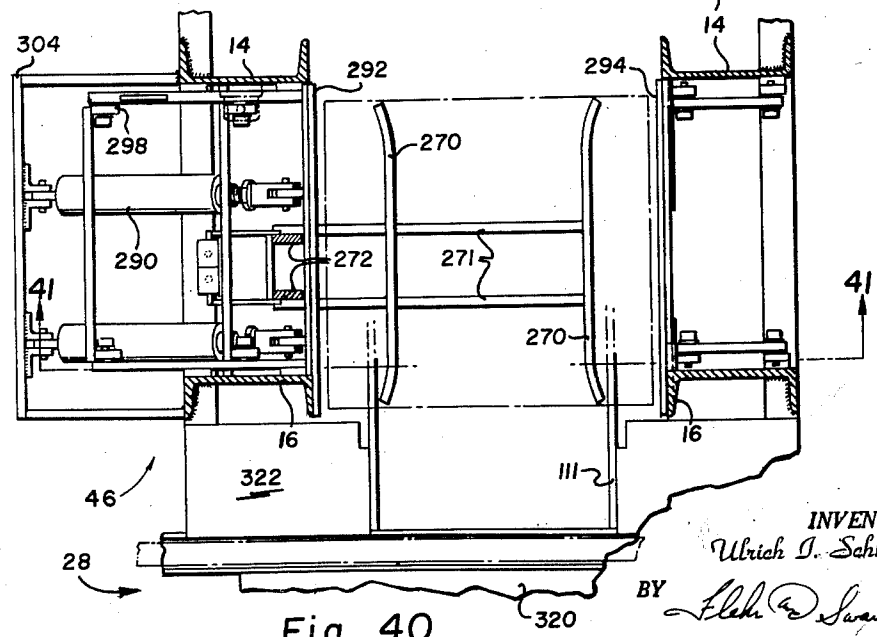


Fig. 40

INVENTOR.
Ulrich J. Schmid
BY Fleit & Jacobson
Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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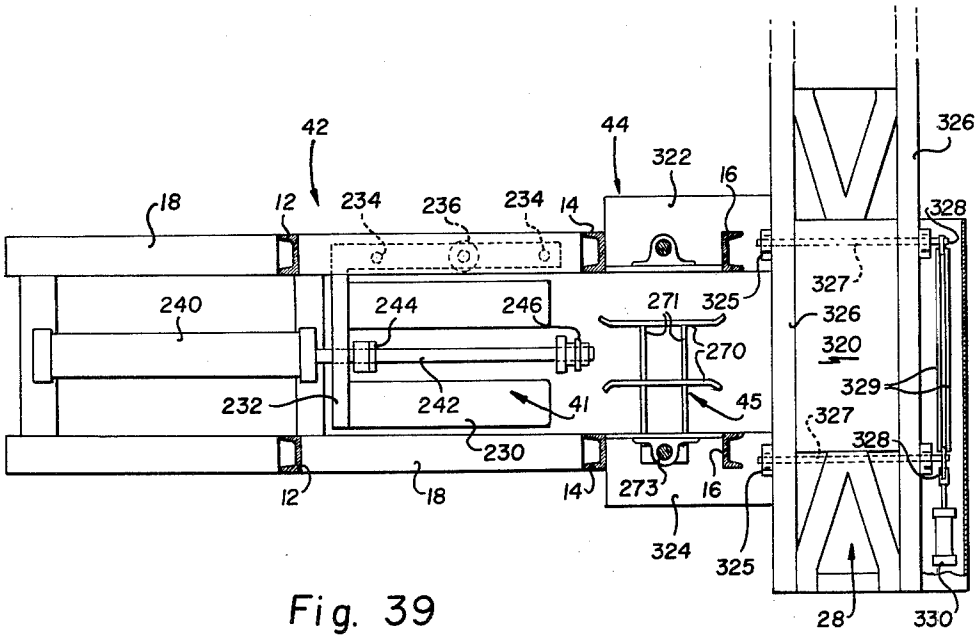


Fig. 39

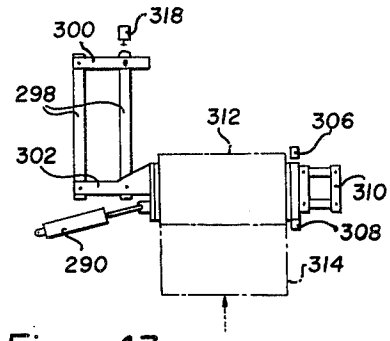


Fig. 43

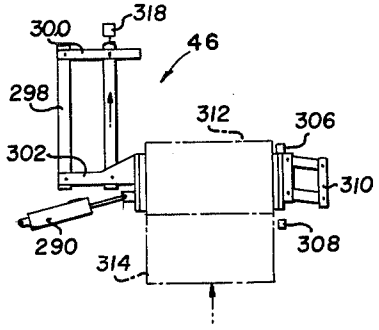


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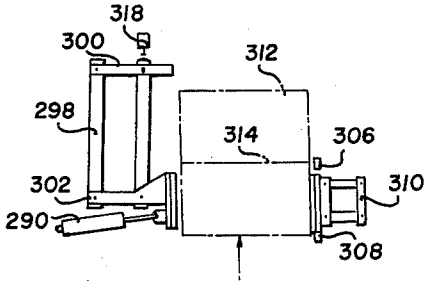


Fig. 45

INVENTOR.
Ulrich J. Schmid
BY Fleh & Swan.
Attorneys

Dec. 25, 1962 U. J. SCHMID 3,069,823

CASE FILLING AND STACKING MACHINE

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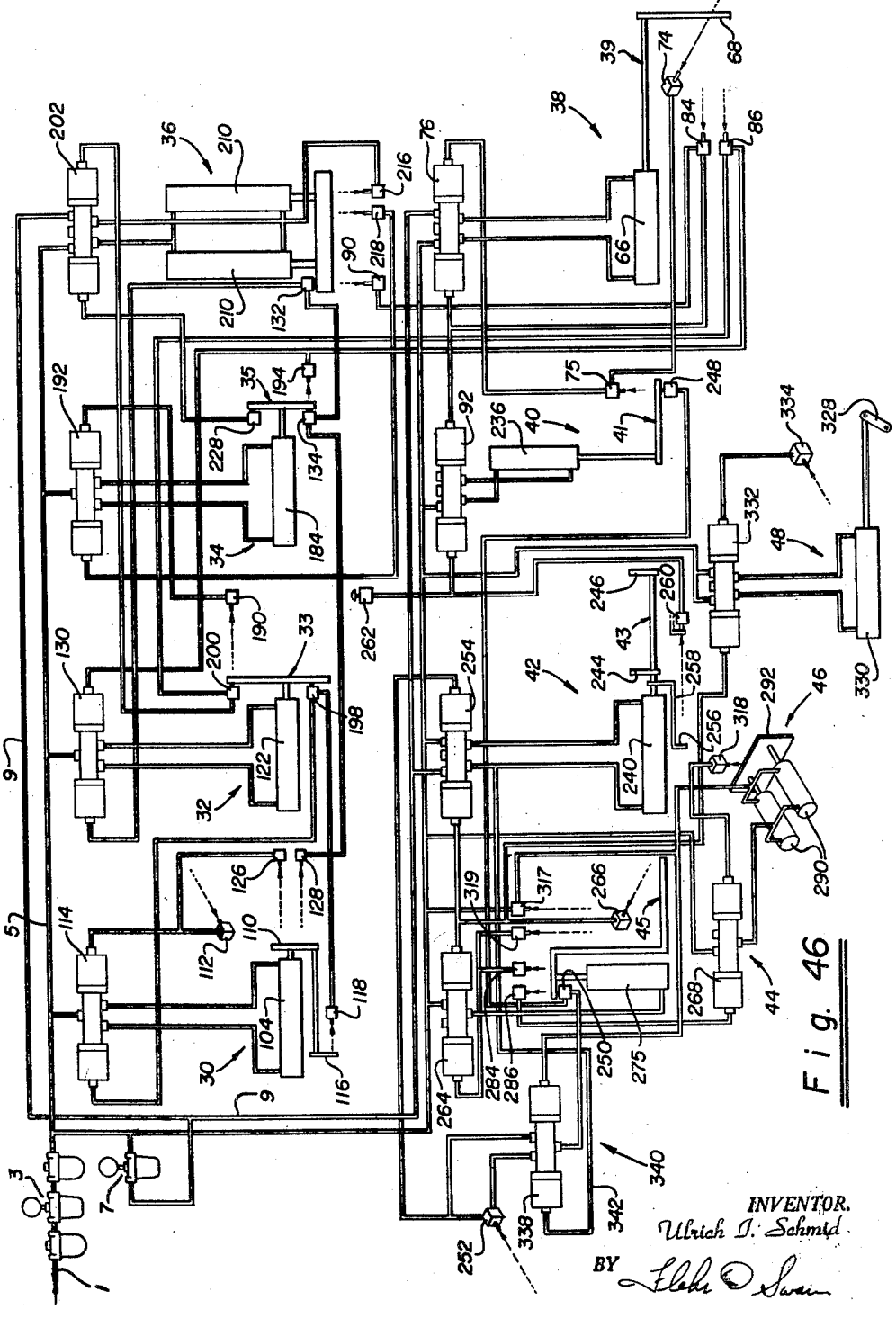


Fig. 46

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BY Fleit & Jacobson
Attorneys

CASE FILLING AND STACKING MACHINE

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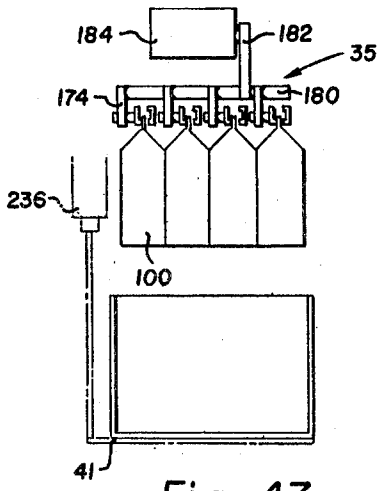


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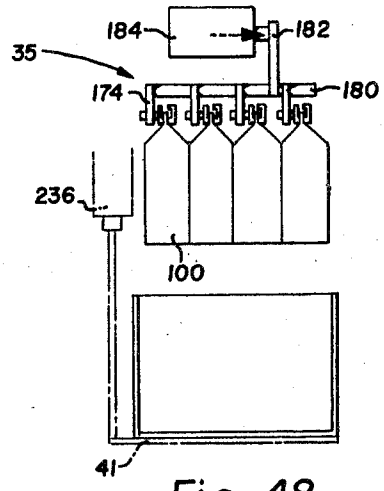


Fig. 48

Fig. 50

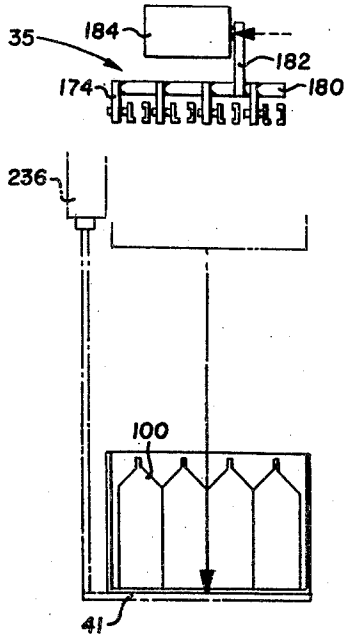
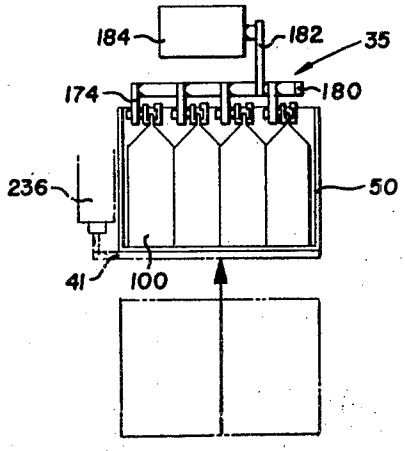


Fig. 49



INVENTOR.
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BY Fleh & Sarin
Attorneys

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CASE FILLING AND STACKING MACHINE

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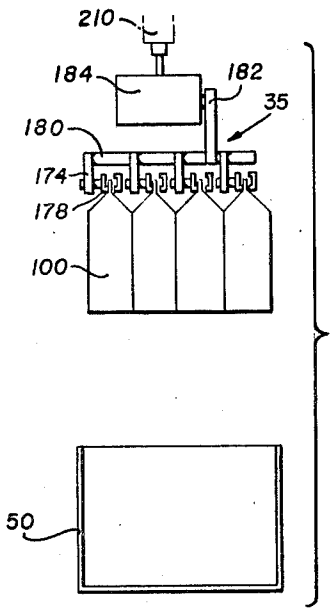


Fig. 51

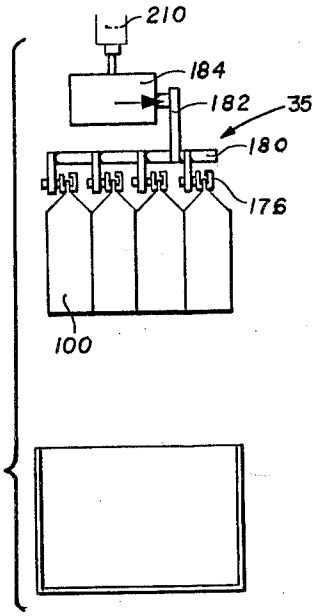


Fig. 52

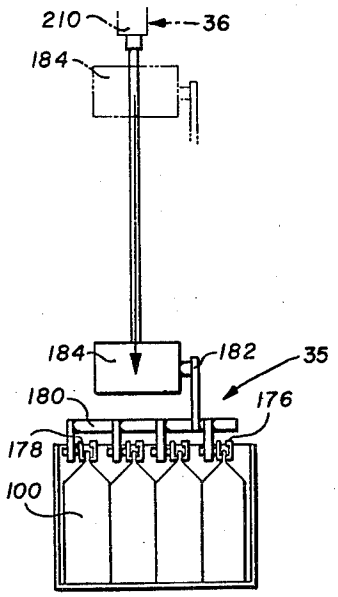


Fig. 53

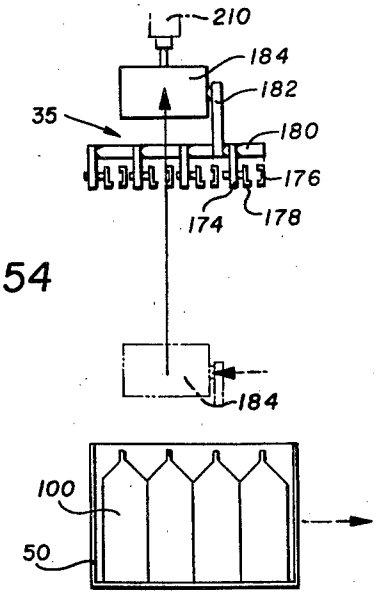


Fig. 54

INVENTOR.
Ulrich J. Schmid
BY Fleh & Swain
Attorneys

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CASE FILLING AND STACKING MACHINE

Ulrich J. Schmid, Dallas, Tex., assignor to Foremost Dairies, Inc., San Francisco, Calif., a corporation of New York

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28 Claims. (Cl. 53—26)

This invention relates to case filling and stacking machines and is particularly concerned with a combination machine of this character which is compact, light in weight and which requires a minimum of space.

Automatic or semi-automatic machinery is widely used in the dairy, citrus, bottling and related industries to facilitate the filling of cases with milk cartons, bottles or other containers. In conventional practice, the case filling operation is performed in a separate area, which preferably is close to the carton or bottle filling operation. In the most modern systems, the filled cases are also conveyed to stacking machinery which arranges the cases into vertical stacks for convenient handling during transport or storage.

Heretofore, separate machinery has been employed to perform the above described operations, requiring the use of extensive conveyor systems to move the bottles or cartons and the cases or stacks of cases to desired plant locations. These conveyer systems generally employ a plurality of segments to effect change in level within the plant, and to move the various units such as bottles or cases from one area to another. Effective placement of machinery and equipment is consequently a matter of considerable difficulty, particularly in view of the customary use of floor wells or pits to house various portions of the machinery, such as the hydraulic mechanisms for the casing and stacking elevators, conveyer mechanisms, and so on.

In general, it is an object of the present invention to provide a unitary case filling and stacking mechanism which efficiently receives a substantially continuous supply of individual containers and empty cases, loads the containers into the cases to fill the same, and thereafter arranges the filled cases in vertically stacked relation for discharge from the system.

It is another object of the invention to provide a machine of the above character which operates in continuous fashion, in a series of successive operating steps, to fill the empty cases with one or more layers of filled containers and to vertically stack the filled cases for discharge from the system, and which performs these steps quickly, easily and automatically.

It is a further object of the invention to provide a case filling, stacking and conveying mechanism of such character adapted to operations at or above floor level, that is simple in construction, light in weight, and which occupies a minimum of floor space.

Another object of the invention is to provide a mechanism of the above type which can be readily positioned in a plant operation to receive individual containers and empty cases from feeding lines at working heights, and which will deliver the stacked assemblies at floor or shipping levels for convenience in further conveyance or transport.

A still further object of the invention is to provide an automatic case filling and stacking mechanism of the above character which receives filled containers and empty cases, one by one, arranges the containers into layers or patterns corresponding to the interior of the cases, deposits the layers or patterns of containers within the cases, arranges the filled cases into vertically stacked assemblies, and delivers the stacked assemblies for further conveyance.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, as illustrated in the accompanying drawing, in which:

FIGURE 1 is a view in side elevation of a machine embodying the invention;

FIGURE 2 is a schematic view in perspective of the associated components of the machine of FIGURE 1, illustrating the operation thereof;

FIGURE 3 is a view in top plan, on an enlarged scale, of the machine of FIGURE 1;

FIGURE 4 is a fragmentary view, similar to FIGURE 3, with portions of the structure removed to show the case feeding mechanism;

FIGURE 5 is a view in vertical section along the line 5—5 of FIGURE 4;

FIGURE 6 is a view in perspective of the case feeding mechanism;

FIGURES 7 to 11 are schematic views related to FIGURE 3, illustrating the operation of the container feed mechanism and transfer station;

FIGURE 12 is an enlarged view of a container assembly station associated therewith;

FIGURE 13 is a view in section along the line 13—13 of FIGURE 12;

FIGURE 14 is a like view showing an extended position of a pattern table at the assembly station;

FIGURE 15 and 16 are views, respectively, in end elevation and section of the assembly station;

FIGURES 17 to 20 are schematic views likewise related to FIGURE 3, illustrating the operation of the assembly station;

FIGURE 21 is a view in front elevation of a gripper mechanism employed at a case filling station in the machine;

FIGURE 22 is a view in section along the line 22—22 of FIGURE 21;

FIGURES 23 to 25 are schematic views in side elevation illustrating the movement of a carton into a supported position within the gripper mechanism;

FIGURES 26 to 28 are views in front elevation, corresponding to FIGURES 23 to 25;

FIGURE 29 is a fragmentary view in section and elevation illustrating the positioning of the gripper head and case loading elevator relative to the stacking mechanism;

FIGURE 30 is a view along the line 30—30 of FIGURE 4, showing details of the case loading elevator;

FIGURE 31 is a like view along the lines 31—31 of FIGURE 4;

FIGURES 32 to 35 are schematic views illustrating the movements of the gripper mechanism and the loading elevator at the case filling station;

FIGURE 36 is a view in top plan of a guide assembly employed at the case filling station;

FIGURE 37 is a view in side elevation thereof along the line 37—37 of FIGURE 36;

FIGURE 38 is a view in section and elevation illustrating the operation of the guide assembly;

FIGURE 39 is a view in transverse section along the line 39—39 of FIGURE 29, illustrating the case transfer mechanism;

FIGURE 40 is an enlarged fragmentary view similar to FIGURE 39, illustrating details of the case stacking mechanism;

FIGURE 41 is a view in vertical section along the line 41—41 of FIGURE 40;

FIGURE 42 is a detail view showing the operation of switching means forming a part of the stacking mechanism;

FIGURES 43 to 45 are schematic views illustrating the operation of the case stacking mechanism;

FIGURE 46 is a schematic view illustrating a system of control for the machine of the invention;

FIGURES 47 to 50 are schematic views illustrating the case filling operations in a modified embodiment of the invention;

FIGURES 51 to 54 are like views, illustrating case filling operations in accordance with a further modification of the invention.

In general, the case filling and stacking machine of the instant invention operates in conjunction with a bottling or filling mechanism by which a supply of bottles, cartons or other containers is filled with merchandise and fed to the machine in substantially continuous fashion. It also operates in conjunction with a supply of empty cases. The machine performs the function of receiving the filled cartons and empty cases, forming the cartons into layers or patterns of a predetermined number of units, and effecting relative motion between each such layer or pattern of cartons and an empty case to thereby fill the case with the cartons. As successive cases are filled with the layers of cartons, they are automatically transferred to a stacking mechanism which elevates them into a stack, with each new case being successively positioned at the bottom of the stack being formed. When a desired number of cases has been arranged in a stack, the machine functions to discharge the stack as a unit onto a discharge conveyor. The machine thus performs the successive functions of loading or filling the cases with layers of individual containers, and thereafter forming the filled cases into stacks for discharge to further plant operations.

In one embodiment of the machine (FIGURES 1 to 46), the containers are delivered at a convenient working level above the empty cases, the patterns of cartons lowered into the cases, and the cases then lowered into position for stacking and discharge of the stacks at a convenient stack handling level (i.e., floor level). In another embodiment of the machine (FIGURES 47 to 50), each empty case is elevated or raised within the machine to receive the containers, and is thereafter lowered to the floor level for transfer into the stacking mechanism. In still another embodiment of the machine (FIGURES 51 to 54), the patterns of cartons are lowered into the empty cases at floor level, following which the cases are transferred into the stacking mechanism at that level.

The embodiments of the machine illustrated herein operate in conjunction with a pneumatic system employing compressed air or other gaseous fluid supplied by a power cylinder (not shown) to the main supply line 1 (FIGURE 46). This supply line delivers the air through various purifying apparatus 3 to a high pressure line 5. It also supplies air through suitable pressure reducing apparatus 7 to low pressure lines 9. In general, the line 5 supplies pressure to various valves, air locks, bleeding poppets, operating cylinders, and other units of the control system of the machine. The lines 9 supply air of reduced pressure to the valves and cylinders at the case filling and case transfer stations to insure a safe, low pressure handling of the cartons and cases during the operations at these stations.

If desired, the machine can also be designed to operate in conjunction with a hydraulic system in which oil, water, or other liquid can be employed as the hydraulic fluid.

General Description of the Machine

The illustrated machine generally comprises a frame including vertical side frames 10, 12, 14 and 16 suitably connected by cross bracing 18 and transverse supports 20, and which are all supported upon a bottom transverse frame including the side rails 22. The frame provides a support for various operating stations within the machine and is constructed to cooperate with a feed conveyer 24 for the filled containers, a feed conveyer 26 for the empty cases, and a discharge conveyer 28 for the stacks of filled

cases. The operating stations of the machine comprise a container transfer station 30 including a transfer mechanism 31 associated with the feed conveyer 24, a container assembly station 32 including a pattern table 33 and shift mechanism therefor, a case filling station 34 including a gripper mechanism 35 and a gripper elevator 36, a case feeding station 38 including a transfer mechanism 39 associated with the conveyer 26, a stepdown or case loading station 40 including a loading elevator 41, a case transfer station 42 including a pusher ram assembly 43, a stacker station 44 including a stacking elevator 45 and a stack holding mechanism 46, and a discharge station 48 including a discharge elevator 49 associated with the discharge conveyer 28.

In the specific operations described herein, the machine receives a supply of filled, waxed paperboard cartons of the type commonly employed by the dairy industry in the merchandising of milk and similar items, and a supply of empty cases of wood, wire, plastic or other suitable construction having dimensions to receive such cartons. Empty cases are delivered to the machine by the conveyer 26 (left to right in FIGURES 1 and 2) and are transferred laterally at the case feeding station 38 to a filling position on the elevator 41 at the loading station 40. Individual cartons are simultaneously fed into the machine by the conveyor 24 and are transferred laterally at the carton transfer station 30 to the assembly station 32. The cartons are moved in groups (four, in the illustrated apparatus) onto a shiftable pattern table 33 at the assembly station, which delivers a predetermined pattern of cartons to the gripper mechanism 35 at the case filling station 34. At station 34, the gripper elevator 36 functions to lower the pattern of cartons into an empty case on the loading elevator at station 40. The cartons are released within the case, and descend with the case on the loading elevator to a position in front of the pusher ram 43. The ram pushes the case onto the elevator 45 at the stacker station 44, which functions to receive successive cases from the loading elevator and to arrange the same into a stack. When a stack of a predetermined number of cases, or vertical dimension, is formed, it is lowered by the stacker elevator and pushed by the ram 43 onto the elevator 49 at the discharge station 48. The latter deposits the stack on the discharge conveyer 28 for conveyance to a shipping dock, or to other desired plant location.

Case Conveyer and Feed Station

The case conveyor 26 (FIGURES 1 and 6) functions to to deliver empty cases 50 one after the other in the direction of the arrow 56 (FIGURE 2), to the case feeding station 38. Such conveyer preferably operates substantially above floor level but below the level of the cartons delivered by the conveyer 24. A suitable framework can be provided for the case conveyer, such as the support columns 58, and side frame members 60, 62 for the upper and lower reaches of the conveyer belt.

The case feeding station 38 (FIGURES 2, and 4 to 6) includes a transfer mechanism 39 which cooperates with the case conveyer 26 to transfer one case at a time to the loading elevator 41. It also acts to prevent movement of additional cases into the machine until the entering case has been filled with cartons and delivered to the stacker mechanism 44. As best illustrated in FIGURES 4 and 6, the conveyer 26 causes each case entering the station 38 to contact an inwardly biased actuator 64 for the switch 74. The latter operates to retract the air cylinder 66, causing the pusher bar 68 to shift the entering case laterally across the dead plate 70 onto the loading elevator 41. The inward movement of the pusher bar also permits a case stop 72 to be biased inwardly into a position to prevent entry of additional cases into the station 38. The stop 72 remains in position until such time as the pusher bar 68 again returns to its original position, to effect transfer of a new case into filling position.

As illustrated in FIGURE 46, an interlock 75 is pro-

vided in the switching circuit for the cylinder 66 so that the switch 74 is inoperative unless the loading elevator 41 is in the up or case filling position. In the up position of the elevator, the switch 74 functions to shift the control valve 76 for the cylinder 66, causing it to pull a slide mount 78 for the pusher bar 68 inwardly on a support rail 80. At the end of its stroke, the pusher bar forces the entering case into engagement with an actuator plate 82 for the switches 84 and 86 (FIGURE 4). The switch 84 is an interlock in the control circuits for the pattern table 33 and the gripper elevator 36. The switch 86 is an interlock in the control circuits for the pusher bar 68 and the loading elevator 41. Both these interlocks remain open so long as a case is being held in filling position on the loading elevator 41 by the pusher bar 68.

Referring to FIGURE 6, a guide plate 88 is provided opposite the pusher bar and slide assembly to insure a positive alignment and positioning of the entering case on the loading elevator 41. During the subsequent case filling operation, the case is held in positive alignment with the gripper elevator 36 by the opposed pressure of the pusher bar 68 and the spring plate 82. As will appear, the case transfer mechanism is returned to its original or feed position by a switch 90, operated on the downstroke of the gripper elevator.

Carton Feed and Transfer Station

The carton conveyer 24 (FIGURES 1 to 3) functions to feed the individual cartons to the machine to initiate the case filling operation. As best illustrated in FIGURES 1 and 3, the carton conveyer 24 is positioned above the case conveyer and is laterally offset from the longitudinally line of the case conveyer. Any suitable means of support can be provided for the conveyer 24, for example the post supports 94 as shown in FIGURE 1.

The carton conveyer functions to deliver cartons one at a time onto a dead plate 96 at the transfer station 30 (FIGURES 7 to 11). As illustrated by the sequence positions of the lead carton 100, the cartons are advanced on the dead plate in single file until the lead carton engages an actuating plate 102 at the end of the dead plate. This causes the transfer cylinder 104 to shove a predetermined number of cartons sideways (FIGURE 9). This operation is repeated until ultimately the pattern table 33 at the assembly station is completely covered with a desired pattern of cartons (FIGURE 18).

Referring to FIGURES 7 to 10, the transfer station 30 includes inlet guide plates 106, 108 adapted to cooperate with the pusher bars 110 of the transfer cylinder to provide a uniform row of cartons on the dead plate. The actuating plate 102 is pivotally suspended in front of a poppet or switch 112 so that this switch is actuated upon movement of the lead carton across the dead plate. As represented in FIGURE 46, the switch 112 shifts the control valve 114 for the transfer cylinder to advance a single row of cartons onto the pattern table. During this operation, a rearward extension 111 of the pusher bar 110 prevents movement of any additional cartons onto the dead plate (FIGURE 9).

The support plate 113 for the pusher bar also mounts an actuator 116 which functions to engage a switch 118 as the transfer cylinder completes its stroke. Switch 118 functions to return the transfer cylinder to permit advance of a new row of cartons onto the dead plate 96. The operation at the station 30 thus repeats itself until the pattern table at the assembly station 32 receives a full pattern of cartons.

Carton Assembly Station

The assembly station 32 (FIGURES 3 and 12 to 20) includes a pattern table 33 adapted to receive a full pattern of cartons from the transfer station 30, and a shift or a transfer mechanism including air cylinder 122 to advance the pattern table into position beneath the gripper mechanism 35 at the case filling station 34.

Referring particularly to FIGURES 17 and 18, the formation of a full pattern of cartons on the transfer table 33 causes the first row represented by the cartons 100 to engage the actuator 124. The actuator 124 is similar to the actuator 102, but is of sufficient width to actuate two switches 126 and 128. Switch 126 functions to open the return line to the control valve 114 so that the switch 118 fails to return the transfer cylinder 104. The switch 128 acts to shift the control valve 130 for the transfer cylinder 122, causing the latter to advance the pattern table to the loading station. However, as indicated in FIGURE 46, the switch 128 will advance the pattern table only if the gripper elevator 36 is in position to actuate the switch 132 (raised position) and the gripper mechanism 35 is in position to actuate the switch 134 (open position). In other words, the assembly station 32 will not advance the pattern table unless the gripper elevator 36 is up and the grippers at the case filling station 34 are open to receive a pattern of cartons.

The pattern table 33 is preferably mounted within it assembly station so that it is raised or slightly elevated as the cartons are advanced into the gripper station 34. Such elevation facilitates return of the pattern table beneath the cartons without frictional drag.

As illustrated in FIGURES 12 to 16, the pattern table is constructed in two parts, a lower slide frame 140 and an upper table portion 142 supported for pivotal parallel movements relative to the slide frame by means of links 144. The table portion 142 mounts a pair of laterally extending rollers 146 which engage stops 148 mounted on the frame. This construction causes the table portion 142 to elevate above the slide portion 140 near the end of the stroke of the cylinder 122 (FIGURE 14) thereby producing an upward movement of the cartons within the gripper mechanism, as illustrated by the arrows 186 and 188 in FIGURES 23 to 28.

Case Filling Station

The case filling station 34 (FIGURES 1 to 3 and 29) includes a gripper mechanism 35 (FIGURES 21 to 29) adapted to operate in conjunction with the loading elevator 41. Essentially the gripper mechanism functions to remove a pattern of cartons from the pattern table 33, and to support the same during subsequent case filling operations involving the gripper and loading elevators (FIGURES 32 to 35).

The gripper mechanism 35 (FIGURES 21 and 22) includes a head or frame 172 suspended within the case filling station above a position of advance of the pattern table. This frame is provided with a series of cross supports 174 mounting a plurality of fixed gripper elements 176. The frame also supports a plurality of movable gripper elements 178 mounted on slide rods 180. The slide rods 180 are mounted for reciprocal movement in the cross supports 174 by means of a rigid connection 182 with the air cylinder 184. For convenience this air cylinder can be mounted directly on the gripper head.

As best seen in FIGURES 23 to 28, the gripper mechanism 35 is synchronized in its operation with respect to advance of the pattern table so that the gripper jaws 176 and 178 close at the instant the cartons are elevated between the jaws. This closing operation is effected by the pattern table 33 in FIGURE 28, at the end of its stroke, through engagement with the switch 190 (FIGURE 46). The switch 190 shifts the control valve 192 for the gripper elements causing them to close on the top flaps of the cartons. This latter operation is represented by the arrow 187 in FIGURE 28. In this fashion, each of the cartons becomes suspended from above, permitting the pattern table to be retracted.

Referring to FIGURE 46, the closing of the gripper jaws by the cylinder 184 serves to open a bleeder poppet or switch 134 in the return line for the pattern table cyl-

inder 22, causing the pattern table 33 to return to its initial or loading position. During this return movement the pattern table drops slightly, as explained previously, so that frictional contact tending to pull the cartons out of the jaws during the return movement is avoided. The return of the pattern table actuates a switch or poppet 198 to shift the valve 114 to also retract the transfer cylinder 104, thereby initiating operation of the transfer cylinder to form a new pattern of cartons at the assembly station 32. As will be explained, return of the pattern table also serves to bleed an interlock 200 in circuit with the switch 84 to reverse the control valve 202 for the gripper elevator 36. The switch 200 thus functions to initiate the case filling operation at station 34.

The Gripper Elevator

The gripper elevator 36 (FIGURES 1 to 3 and 29) generally functions to produce relative movement between the gripper mechanism 35, and a case supported by the loading elevator 41, to deposit a pattern of cartons within the case. In the embodiment of FIGURE 1, the elevator 36 operates to lower the gripper mechanism to position the cartons immediately above the bottom of the case, at which point the gripper mechanism releases the cartons for support within the case.

As best seen in FIGURES 1 and 3, the air cylinders 210 for the loading elevator are mounted on a cross support 212 of the main frame. The gripper mechanism 35 is supported for vertical movements below the cross support by the rods 214 of the air cylinders. The gripper mechanism is thus supported for free vertical movements relative to a case 50 on the loading elevator 41, as generally indicated in FIGURES 32 to 35. However, this lowering movement of the gripper elevator can only be accomplished if the gripper mechanism is closed to bleed the poppet 194, the pattern table 33 retracted to bleed the interlock or poppet 200 in the same line, and the case feed mechanism actuated to hold an empty case against the switch 86. As previously explained, the poppet 200 is actuated by return of the pattern table to shift the valve 202 to admit low pressure air from line 9 to the top of the gripper elevator cylinders 210. These cylinders lower the cartons gently into the case at the loading station 40 (FIGURE 34).

Referring to FIGURES 3 and 36, a guide mechanism 206 is supported by the main frame in the path of descent of the gripper elevator 36. The guide mechanism is composed of a quadrant of generally triangular plates 208 which are normally spring biased to a substantially horizontal position (FIGURE 37). The plates are spaced from one another so as to permit downward pivotal movement upon engagement with a pattern of cartons descending with the gripper elevator 36, although offering resistance to passage of the cartons due to the spring pressure. The guide mechanism 206 is vertically aligned within the station 34, and spaced with respect to a case on the elevator 41 so that the plates 208 positively guide the pattern of cartons into the case, as represented in FIGURE 38, without preventing subsequent return of the plates to the normal horizontal position.

As best illustrated in FIGURE 46, the downstroke of the loading elevator causes actuating devices carried by the gripper mechanism (e.g., 214 in FIGURES 1, 2) to engage the poppets and switches 216, 218 and 90. The switch 216 causes the selector valve 202 to admit low pressure air from the line 9 to the bottoms of the air cylinders 210 to stop the descent of the gripper elevator. The switch 218 simultaneously bleeds the line to the valve 192 to retract or open the gripper mechanism 35, thereby releasing the cartons. Opening of the grippers in turn causes the switch 228 to shift the selector valve 202 to admit high pressure air from line 50 to the bottoms of the cylinders 210, to return the gripper elevator 36 to the up position. The switch 90 performs the dual function of shifting the valve 76 to return the case feeding mechanism to its extended position, and the valve 92 to lower the case loading elevator 41 into position before the pusher ram assembly 43.

Case Loading Station

The case loading station 42 performs the function of lowering filled cases to a position for charging into the stacker mechanism and includes the loading or stepdown elevator 41 (FIGURES 2, 6, and 29 to 31).

In the illustrated apparatus, the loading elevator 41 comprises a pair of spaced apart platforms carried by a movable frame 232. The frame is mounted for vertical movements on slide rods 234 by means of an air cylinder 236. As illustrated in FIGURE 46, the air cylinder 236 is actuated by the control valve 92, upon a signal from the switch 90. The switch 90 is responsive to downward movement of the gripper elevator when a case on the loading elevator is in contact with the switch 86. In other words, the operation of the elevator 36 in filling an empty case on the loading elevator automatically sends the filled case down to a loading position in front of the air ram assembly 43.

It is to be noted that the descent of the loading elevator 41 opens the interlock 75, thereby rendering the switch 74 at the case feeding station 38 inoperative to admit a new case to the loading elevator until such elevator has been returned to its up position.

Case Transfer Station

The case transfer station 42 (FIGURES 2, 29 and 39) includes a pusher ram assembly which functions to transfer the filled cases from the loading elevator to the stacking elevator at station 44. As will appear, the ram assembly also functions to transfer the stacks of cases from the stacker station to the discharge conveyer 28.

The pusher ram assembly 43 includes an operating air cylinder 240 and a pusher rod 242 mounting a rear pusher bar 244 and a forward pusher plate 246. The pusher bar 244 is mounted above the rods 242 so as to pass lengthwise of the central channel of the loading elevator 41 when the latter is in lowered position. This construction permits the ram assembly to discharge a case from the loading elevator onto the elevator 45 at the stacking station 44. It also prevents any interference between the operation of the loading elevator and the pusher ram, which are free to operate independently.

The ram assembly 43 also functions to discharge a formed stack from the stacker station 44 onto the conveyer of the discharge station 48. This is accomplished by pressure of the pusher plate 246 against the bottom case of the stack to move it off the stacker elevator onto the discharge conveyer, as will be later described.

Referring to FIGURE 46, the ram assembly is actuated into its extended position by downward movement of the loading elevator 41 into contact with the switch 248. However, the switch 248 will not function to extend the ram unless the stacking elevator 45 is in the down position, closing the interlock 250, and the discharge conveyer is free of stacks of cases discharged from other units, as signified by an open position of the case guard switch 252. When this condition exists, the switch 248 will act to shift the control valve 254 for the air cylinder 240, extending the ram to perform its dual functions of feeding the case into the stacker station and discharging the stack onto the discharge conveyer.

The assembly 43 is additionally provided with an actuator 256, carried by the rearwardly extending rod 258, which is adapted to engage the switch 260 in a fully extended position of the ram. As shown in FIGURE 46, the switch 260 shifts the control valve 92 at the loading station to raise the elevator 41 to its original position. Manual switch 262 can also be provided to perform this latter operation independently of the automatic control system.

The Stacker Station

The stacker station 44 (FIGURES 1 to 3, 29 and 39) includes a stacking elevator 45 which elevates the cases in the formation of a stack, and case engaging means 46 for supporting the stack as it is progressively formed from below. The stacking station also includes switch means operable when a stack reaches a given height to release the case engaging means and to lower the elevator with a stack thereon into a position before the pusher ram assembly 43. The ram then operates to discharge the stack as a unit into the discharge station 48.

In general, the stacker station may be constructed as herein disclosed, or as disclosed in my copending application Serial No. 28,263, filed May 11, 1960.

As illustrated in FIGURES 40 and 41, the stacking elevator 45 comprises a unitary open frame platform including spaced apart rails 270 mounted on the transversely extending supports 271. The latter are rigidly secured to the vertically extending lift members 272, operated by the lift cylinder 275. As represented in FIGURE 46, the lift cylinder is actuated by the control valve 264 upon a signal from the switch 266. The latter is actuated by movement of a case onto the stacking elevator 45 through operation of the pusher ram. In short, the operation of placing the case on the stacking elevator 45 automatically causes it to be sent upward in a stack forming movement.

Referring to FIGURES 29 and 41, the lift member 272 carries a pair of adjustable actuators 274 and 276 which are adapted to engage stationary switches 284 and 286 in an uppermost position of the elevator. The switch 284 functions to reverse the operation of the control valve 264 to return the stacking elevator to the down position for receipt of the next case in a stacking operation. The switch 286 functions to energize clamping cylinders 290 to positively grip and hold a case in elevated position, as will be hereinafter explained.

Referring to FIGURE 41, the case engaging means 46 comprises a pair of gripper or pressure plates 292, 294, preferably faced with rubber or similar deformable resilient material 296. The plate 292 is mounted for lateral movement by pairs of swinging arms 298 suspended in parallel fashion on laterally extending arms 300 carried by the frame members 14 and 16. At their lower ends these swing arms are pivotally connected to support arms 302 for the pressure plate. Lateral movement of the swing arms and the pressure plate 292 is obtained by the air cylinders 290, which are pivotally connected between the pressure plates and the cross frame 304. The opposite pressure plate 294 is restrained from moving laterally, but is permitted to move vertically between the upper and lower stops 306 and 308. This movement is permitted by a simple parallelogram linkage between the plate 294 and the frame member 14, 16 provided by the pivot arms 310.

FIGURE 41 illustrates the first stage in the operation of the stacking mechanism, showing a filled case 312 being elevated to a position between the pressure plates, just prior to contact of the switches 284 and 286 by the actuators 274 and 276. Actuation of the switch 286 causes the air cylinders 290 to swing the arms 298 and pressure plate 292 inward into engagement with the case, forcing it against the opposite pressure plate 294, as schematically represented in FIGURE 43. The switch 284 simultaneously returns the stacking platform 270, 271 to the down position to receive the next case in the stacking operation. As the next filled case 314 is elevated into position it engages the lower surface of the case 312 (FIGURE 43) causing an upward movement of the first case 312 and also the pressure plates 292, 294 (FIGURE 44). The movement of the plate 292 is accommodated by means of slots 316 in the upper ends of the forward swing arms 298, permitting one of the latter to engage a switch 318, controlling operation of the air cylinders 290 (FIGURES 42 and 46). The switch 318 shifts the control valve 268 to reverse the operation of the cylinders 290, causing the pressure plate 292 to be retracted (FIGURE 45). The stacking elevator is thereby freed to elevate both cases 312 and case 314 until such time as the actuator 276 again engages switch 286, causing the cylinders 290 to actuate the pressure plates to grip the case 314. The stacking sequence is now complete with the new case 314 firmly clamped in stack supporting position.

The operations just described are repeated in succession with each new case being positioned at the bottom of the stack between the pressure plates 292 and 294. When a desired number of cases has been formed into a stack, the top case in the stack can be caused to contact a lever or other means to actuate switches 317 and 319. As illustrated in FIGURE 46, the switch 317 energizes the control valve 268 to cause positive retraction of the clamping cylinders 290 to free the stack. The switch 319 simultaneously shifts the control valve 264 to reverse the movement of the stacking elevator, to lower the stack into position before the pusher plate 246 of the ram assembly 43.

Discharge Station

The discharge station 48 (FIGURES 1, 3, 29 and 39) includes a discharge conveyor 28 and a discharge elevator 49 by which cases can be deposited on the discharge conveyer.

As particularly illustrated in FIGURE 39, a stack of cases is discharged from the stacker mechanism by the forward plate 246 of the ram assembly onto a stable discharge platform 320 positioned between the chains of the discharge conveyer 28. Additional smaller platforms, such as the platforms 322 and 324, can be positioned alongside the chains to increase the area of stable support.

The conveyer chains are mounted for limited vertical movements relative to the platform 320 by means of chain lifts or hoists 326. The latter are supported by cranks 325 linked to the hoists and rigidly secured to the cross shafts 327. The cross shafts are elevated to raise or lower the hoists through the action of the lever 328, connecting rods 329 and air cylinder 330. The chain hoists are thus freely movable to lower the conveyer during discharge of a stack from the stacker station, and thereafter to raise the conveyer for discharge of the stack from the machine.

As previously explained, the forward bar 246 of the ram assembly 43 operates to discharge the stack upon actuation of the switches 248 and 250 in the down positions of the loading elevator 41 and stacking elevator 45. When the discharge conveyer 28 is clear (i.e., switch 252 is open), the switches 248 and 250 bleed the line through the valve 338 and the switch 252 to shift the valve 254 at station 42. This causes the ram 43 to extend and discharge the stack onto the platform 320. During the first portion of this stroke, the discharged stack engages the switch 334, shifting the valve 332 so that the cylinder 330 lowers the chain hoist 326 (FIGURE 46). This permits a stack to be moved onto the surface of the platform 320, at a time when the discharge conveyer is depressed below the surface of this platform. Simultaneously, the rear pusher bar 244 moves a new case into the stacker and into engagement with the switch 266. However, the positioning of the switches 334 and 266 is such that the stack has completed its movement onto the platform 320 prior to actuation of switch 266. The switch 266 then acts to shift the valve 332 to raise the chain hoist 326 for the discharge conveyer 28, causing the conveyer to engage the stack and discharge it from the station 48.

Case Guard Circuit

In general, it is contemplated that the machine of the invention can be used in conjunction with additional machines of the same type, positioned at spaced locations along a single discharge conveyer. Such arrangement has been found to simplify large scale filling and stacking operations. In such a system the case guard circuit insures that a stack of cases is not discharged from one

machine at a time when a stack discharged by another machine is opposite the pusher ram assembly 43.

Referring to FIGURE 46, the case guard circuit comprises a switch 252 positioned adjacent the conveyer 28 on the infeed side of the discharge station 48. Upon formation of a stack of cases at station 44, the stack height control switch 317 functions to shift the control valve 338 in the case guard circuit 340 to bleed the line through switch 252. In this condition of the circuit, the downstroke of the stacking elevator actuates the bleeding poppets 248 and 250, shifting the valve 254 to extend the discharge ram. However, in the event a stack on the discharge conveyer is in contact with the switch 252, the control line to the discharge ram will be closed preventing discharge of the stack until such time as the case has passed and the switch 252 has reopened. Thereafter the stack can be discharged by the ram 43 in the manner previously described.

A control line 342 is also provided so that movement of the ram in discharging the stack will shift the control valve 338 to anticipate the next stacking sequence.

Operation

Reviewing briefly the operation of the machine, empty cases are fed to the machine at working level by the case conveyer 26. Merchandise to be loaded into the cases such as bottled goods, cans, cartons, etc., is simultaneously fed to the machine by the conveyer 24 at an elevation above the case conveyer (FIGURES 1 and 2). Operations are initiated by movement of an empty case into the case feeding station 38 (arrow 56, FIGURE 2) where it contacts the poppet 74 controlling the cylinder 66 (FIGURE 6). If the loading elevator 41 is in up position, as sensed by the poppet 75, the cylinder 66 retracts the pusher assembly 39 thereby transferring the case into a loading position on the elevator 41 (arrow 350, FIGURE 2). At the same time the stop 72 is biased inwardly to prevent additional cases from entering the machine. As the case moves onto the loading elevator, it actuates the interlocks 84 and 86 in the control circuits for the stations 32 through 40 (FIGURE 4).

The cartons fed by the conveyer 26 simultaneously move onto the dead plate 96, at station 30, where they are advanced in single file to actuate the switch 112 in the control circuit for the transfer mechanism 31. The latter includes the cylinder 104 and pusher bars 110 which shove a row of four cartons laterally onto the pattern table 33 at the assembly station 32 (FIGURES 7 to 9). This operation is repeated by the switch 118 (FIGURES 9 to 11) until the fourth or last row of cartons is moved onto the pattern table 33, at which time switches 126 and 128 are actuated (FIGURE 18). Switch 126 bleeds the valve 114 to hold the transfer cylinder 104 in extended position. Switch 128 shifts the valve 130 to advance the pattern table with the newly formed pattern of cartons (FIGURE 19). At the end of its stroke the pattern table elevates the cartons within the gripper mechanism 35 and simultaneously engages the switch 190 to close the gripper elements to supportingly grasp each of the cartons (FIGURES 20 to 28). The closing of the gripper jaws opens the bleeder poppet 134 to return the pattern table during which the pattern table drops slightly to prevent frictional contact against the bottom of the cartons. The return of the pattern table actuates the switch 198 to retract the cylinder 104 to permit assembly of a new pattern of cartons by repeat operations at the stations 30 and 32.

The return of the pattern table also bleeds an interlock 200 in the circuit for the gripper elevator 36, permitting the latter to lower the pattern of cartons at low pressure into the empty case on the loading elevator 41 (FIGURE 34). At the bottom of its stroke, the gripper elevator actuates the switches 90, 216 and 218 (FIGURE 46). Switch 216 admits low pressure air to the bottoms of the cylinders 210 stopping the movement of the gripper elevator. The switch 218 functions to open the gripper mechanism 35 to release the pattern of cartons within the case. This operation in turn causes switch 228 to raise the gripper elevator with high pressure air and to open an interlock 134 in the container transfer circuit. The pattern table is thus freed to advance with a new pattern of cartons. The switch 90 performs the dual function of lowering the filled case on the loading elevator 41 into position before the pusher ram assembly at station 42 (arrow 352, FIGURE 2), and returning the case feeding mechanism to its extended position to receive a new empty case. However, the switch 74 will be ineffective to feed a new case into the machine until the elevator 41 has returned to its up position to open interlock 75.

The downstroke of the elevator 41 bleeds the line to the pusher ram control circuit through the switches 248, 250, valve 338, and switch 252. Thus the pusher ram will extend to transfer the filled case into the stacking mechanism only if the stacking elevator 45 is also in down position (contacting switch 250), and the case guard switch 252 signals that the discharge conveyer is clear. When these conditions exist, the outstroke of the pusher ram performs the dual function of transferring the filled case from the loading elevator 41 onto the stacking elevator 45 (arrow 354, FIGURE 2), and a completed stack from the elevator 45 into the discharge station 48 (arrow 356, FIGURE 2). It also actuates switch 260 to return the loading elevator 41 to the up position.

The movement of the filled case onto the stacker elevator 45 causes the switch 266 to shift the control valve 254 to retract the pusher ram assembly and the valve 264 to initiate the case stacking sequence by sending the stacking elevator upward in a stack forming movement. At the top of its stroke, the stacking elevator actuates the switches 284 and 286. The switch 284 functions to reverse the direction of movement of the stacking elevator to return it to the down position. The switch 286 energizes the clamping cylinders 290 to positively grip and hold the case on the stacking elevator so that it remains in supported elevated position. At the end of its downstroke, the stacking elevator again bleeds the switch 250 to extend the pusher ram assembly causing a new case to be transferred from the loading elevator 41 into the stacker station. Switch 266 is again engaged by the entering case causing a repetition of the stacking sequence. As the new case moves upwardly on the stacking elevator, it engages the case held by the clamping mechanism 46, causing the clamping plate 292 to move upwardly to engage switch 318 (FIGURES 42 and 44). The latter functions to shift the control valve 268 opening the gripper plates and allowing the elevator to continue upward into contact with the switches 284 and 286. These switches repeat the previously described operations of sending the stacking elevator down, and shifting the valve 268 to again grasp the case on the stacking elevator (case 314 in FIGURE 45). The described operations are repeated in succession with each new case being positioned at the bottom of the stack in a position of support between the pressure plates 292 and 294. When the desired number of cases has been formed into a stack, the top case engages a lever or other means actuating the switches 317 and 319. The switch 319 acts to send the stacking elevator down with the stack, whereas the switch 317 simultaneously opens the clamping mechanism 46 to prevent any interference in the downward movement of the stack. The switch 317 also acts to shift the valve 338 in the case guard circuit to thereby activate the case guard switch 252 at the discharge station. At the bottom of its stroke, the stacker elevator again bleeds the switch 250 to extend the pusher ram assembly. However, if a stack from another machine is entering the discharge station, it will engage switch 252 preventing discharge of the formed stack from the stacker station. When the discharge conveyer is clear, the valve 254 shifts to extend the pusher ram to discharge the completed stack into the discharge station 48. The first portion of this movement causes the

stack to engage the switch 334 to lower the discharge conveyer so that the stack passes freely onto the support platform 320. At the end of its stroke, rear bar 244 of the pusher ram forces the new case into contact with switch 266, thereby raising the discharge conveyer into a position of discharge conveyance of the stack. This operation completes the full cycle of the machine.

In the operations of the machine so far described the cartons are first lowered to a case at working level by the gripper elevator 36 (FIGURE 34), and the filled case then lowered by the loading elevator 236 into position before the pusher ram (FIGURE 35). However, in some installations it is desirable to eliminate either the gripper elevator or the loading elevator. Thus FIGURES 47 to 50 illustrate an operating sequence in which the loading elevator first elevates the case to receive the cartons (FIGURE 49) and then lowers the filled case to a position at floor level before the pusher ram (FIGURE 50). This arrangement permits elimination of the gripper elevator 36.

FIGURES 51 to 54 illustrate an operating sequence in which the empty cases are fed to a "holding" station on a case feed conveyer passing through the machine. Such a holding station and associated mechanism are described in my copending application, "Case Filling Machine," Serial No. 85,547, filed January 30, 1961. A holding station as described therein could be positioned before the pusher ram assembly 43 and in vertical alignment with the gripper elevator 36. After the gripper elevator has deposited the cartons within the case (FIGURES 53 and 54), the pusher ram can be actuated to transfer the filled case into the stacker station in the manner described above.

Portions of the machine described herein are separately disclosed and claimed in my copending applications, "Case Stacking and Conveying Apparatus," Serial No. 28,263, filed May 11, 1960, and "Case Filling Machine," Serial No. 90,099, filed February 17, 1961. As these copending applications disclose additional or modified embodiments of the various stations of the machine, described above and claimed herein, the disclosures of these copending applications are incorporated by reference. It is to be understood that many additional changes in construction and widely differing embodiments and applications of the invention will suggest themselves to those skilled in the art to which this invention pertains. The disclosures and description herein are purely illustrative and are not intended to be limiting, except as in the appended claims.

I claim:

1. In a combination case filling and stacking machine, means receiving a plurality of individual containers including means to successively form the same into patterns of containers, means receiving a plurality of empty cases, case filling means including vertical movable means to deposit each pattern of containers within one of said cases, case stacking means, means to transfer cases filled with patterns of containers into said case stacking means, and means to discharge stacks of filled cases from said stacking means.

2. A machine as in claim 1 wherein said means receiving containers includes a pattern table and a shift mechanism for said pattern table adapted to transfer each pattern of containers to a filling position above an empty case.

3. A machine as in claim 2 wherein said means receiving containers includes a container transfer mechanism adapted to transfer groups of containers onto said pattern table.

4. A machine as in claim 1 wherein said case stacking means includes an elevator adapted to successively receiving and elevating filled cases in the formation of a stack.

5. A machine as in claim 1 wherein said means for transferring filled cases includes a pusher ram engageable with said cases.

6. A machine as in claim 1 wherein said discharge means also includes a pusher ram adapted to engage the lowermost case in the said stacks of cases.

7. In a combination case filling and stacking machine, means receiving a plurality of individual containers including means to successively form the same into patterns of containers, means receiving a plurality of empty cases, case filling means including means to support the patterns of cartons from above and vertical movable means to deposit each pattern of containers within one of said cases, case stacking means, means to transfer cases filled with patterns of containers into said case stacking means, and means to discharge stacks of filled cases from said stacking means.

8. A machine as in claim 7 wherein pusher ram means are provided to both transfer individual filled cases into said stacking means and to discharge stacks of filled cases therefrom.

9. In a combination case filling and stacking machine, a conveyor feeding individual containers into the machine, assembly means including a pattern table, means transferring individual containers onto said table to form a pattern of containers, case filling means including a gripper mechanism adapted to remove a pattern of cartons from said table, a case conveyer feeding empty cases to the machine, means transferring each empty case received on said case conveyer to a position beneath said case filling means, elevator means adapted to achieve relative movement between each case so received and said case filling means whereby a pattern of containers is deposited within each case, case stacking means, means transferring each filled case into said stacking means, said stacking means including a stacking elevator adapted to forming said filled cases into a stack, a discharge conveyer, and means transferring stacks of filled cases from said stacking means to said discharge conveyer.

10. A machine as in claim 9 wherein said assembly means includes a transfer mechanism adapted to shift said pattern table beneath said gripper mechanism.

11. A machine as in claim 9 wherein said means transferring filled cases into said stacking means includes a loading elevator adapted to lower said cases to a stack discharge height.

12. A machine as in claim 9 wherein said stacking means includes support means associated with said stacking elevator to successively receive and support cases in the formation of a stack, said support means being actuated into supporting position by upward movement of a case on said stacking elevator.

13. A machine as in claim 9 wherein said means transferring filled cases and discharging stacks of filled cases comprises a single pusher ram assembly.

14. A machine as in claim 9 wherein elevator means are associated with said discharge conveyer, said elevator means acting to produce relative movement between a discharged stack and said discharge conveyer.

15. A combination case filling and stacking machine comprising a container feed conveyer, a container assembly station associated with said feed conveyer and operating to assemble the cartons into patterns, a case filling station including a gripper mechanism adapted to remove patterns of cartons from said assembly station, a case feed conveyer, a case feeding station associated with said last named conveyer and adapted to position empty cases beneath said case filling station, elevator means cooperating with said case filling and case feeding stations whereby a pattern of cartons is deposited within each empty case, a stacker station, a case transfer station including means to transfer filled cases into said stacker station, said stacker station operating to form the filled cases into stacks, a discharge conveyer, and a discharge station including means to transfer stacks of filled cases from said stacker station onto said discharge conveyer.

16. A machine as in claim 15 wherein said container assembly station includes a pattern table and means to

shift said pattern table beneath the gripper mechanism at said case filling station.

17. A machine as in claim 15 wherein a loading elevator is provided, said loading elevator being operable to lower filled cases from said case feeding station to said case transfer station.

18. A machine as in claim 15 wherein said case transfer station includes a pusher ram assembly operable to move filled cases into said stacker station and stacks of filled cases to said discharge station.

19. A machine as in claim 15 wherein said stacker station includes a stacking elevator adapted to elevate individual cases in the formation of a stack, and a stack holding mechanism adapted to support said cases and stacks of cases within the stacker station.

20. A machine as in claim 15 wherein said discharge station includes a discharge elevator associated with the discharge conveyer.

21. A combination case filling and stacking machine comprising a container feed conveyer, a container transfer station including a transfer mechanism associated with the feed conveyer, a container assembly station including a pattern table and means to shift said pattern table, a case filling station including a gripper mechanism, a case feed conveyer, a case feeding station including a transfer mechanism associated with the case feed conveyer, a case loading station, elevator means associated with said case loading station and gripper mechanism whereby the latter is caused to deposit a pattern of containers within an empty case at said loading station, a case transfer station including a pusher ram assembly, a stacker station including a stacking elevator and stack holding mechanism, and a discharge conveyer, said pusher ram assembly serving to transfer individual filled cases into said stacker station and stacks of said cases from the stacker station onto said discharge conveyer.

22. A machine as in claim 21 wherein said means to shift the pattern table includes means to elevate the pattern table relative to the gripper mechanism.

23. A machine as in claim 21 wherein said case filling station includes a gripper elevator adapted to achieve vertical movements of said gripper mechanism relative to an empty case at said loading station.

24. A machine as in claim 21 wherein said loading station includes a loading elevator adapted to lower a case filled with containers into a transfer position adjacent said pusher ram assembly.

25. A machine as in claim 21 including a discharge station provided with a discharge elevator associated with the discharge conveyer.

26. In a method of successively filling cases with containers and thereafter stacking the filled cases to produce stacks of filled cases, the steps of feeding a plurality of containers to an assembly zone, assembling the containers into patterns at said assembly zone, gripping the patterns of containers so assembled to support the same in suspended relation, successively feeding empty cases one at a time to a case filling zone beneath the point of suspension of said patterns of containers, effecting relative movement between each of said cases and a pattern of containers to deposit at least one pattern of containers within each case, transferring each filled case to a stacking zone, elevating the filled cases in said stacking zone to form stacks of filled cases, said cases entering the stacking zone in such manner that the last case introduced acts to support the cases previously introduced as a stack, and discharging stacks of filled cases from said stacking zone.

27. A method as in claim 26 wherein said containers are assembled into patterns at a level above a level of feed of said empty cases.

28. A method as in claim 26 wherein said filled cases are lowered from the level of case feed to a level of stack discharge prior to transfer to said stacking zone.

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