

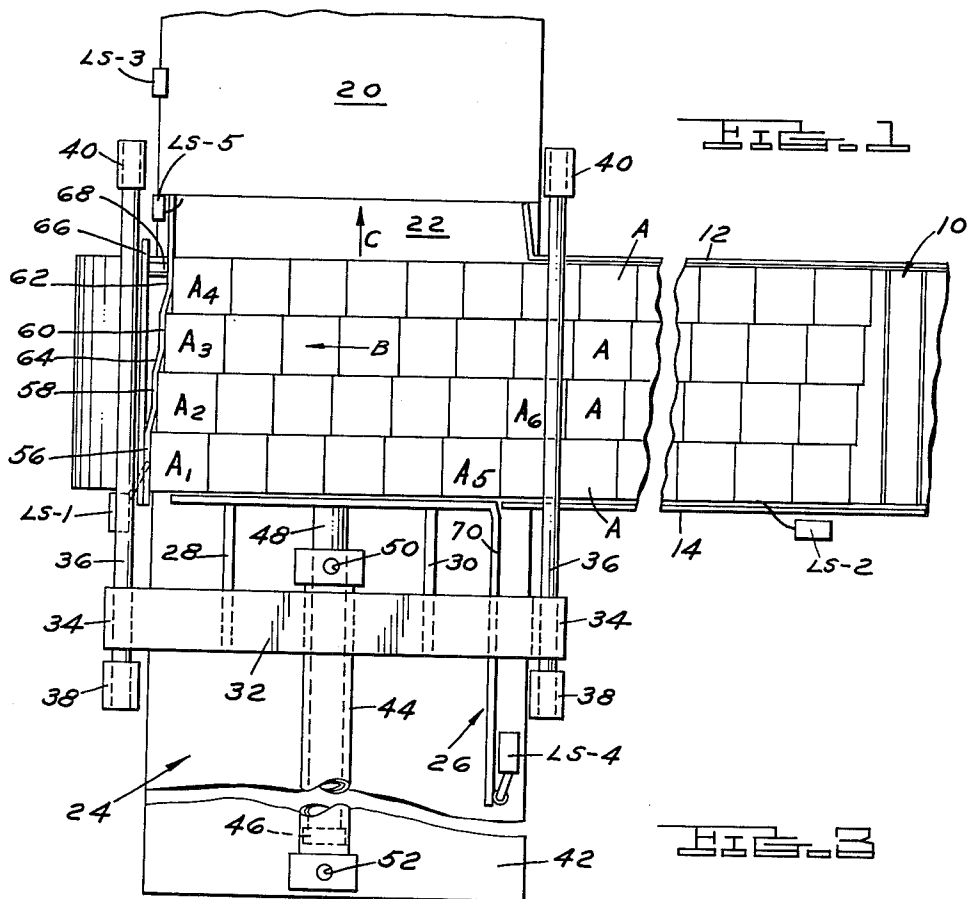
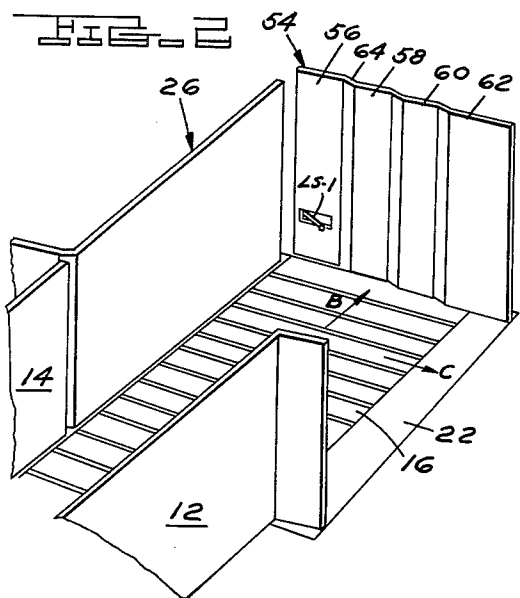
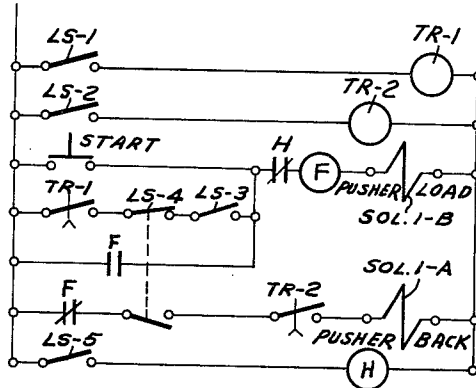
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APPARATUS FOR TRANSFERRING GROUPS OF CARTONS

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3,199,651 APPARATUS FOR TRANSFERRING GROUPS OF CARTONS

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This invention relates to article handling apparatus and more particularly to mechanism for transferring a plurality of rows of rectangular articles such as cartons employed for containing milk, cream, fruit juices and other liquids, into a casing machine operable to deposit the cartons in crates or cases. Such a machine is disclosed in U.S. Patent No. 2,957,287, assigned to the assignee of the instant application.

The type of carton or container handled by the mechanism embodying the invention is the so-called square type made out of paper or cardboard, usually coated with wax or plastic, for containing various dairy products. Many such cartons have been in general use having differently shaped tops, for example the flat-top, the cable-top and the like. The cartons are transported along a moving conveyor in front of a pusher operable to push cartons off the conveyor into the machine for depositing them in crates or cases.

Originally the cartons were brought in front of the pusher in a single line, and successive operations of the pusher marshalled a plurality of rows of the cartons into a caseload for deposit by the casing machine into an awaiting case. It was found with such an arrangement that the casing machine operated at only a fraction of its capability because of the time required for the pusher to operate through three or four cycles to marshal a caseload of cartons, during which time the casing machine was idle. In order to speed up the operation a plurality of lines or rows of cartons were transported along the conveyor in front of the pusher, cutting down the number of pushes required to marshal an entire caseload of cartons.

While appreciably increasing the efficiency of the entire operation, this innovation created another serious problem. With cartons in front of the pusher awaiting transfer to the casing machine, a backlog of cartons is maintained along the conveyor to insure the presence of the requisite cartons in front of the pusher. This backlog of cartons exerts pressure against the cartons toward the front of the rows, and as the pusher shifts at right angles to the direction of conveyor movement, frequently a corner of a carton being pushed will become caught against the corner of the next successive carton in an adjacent row. When this occurs, some of the cartons being pushed may become misaligned or cocked out of position, or even more serious, the corners of the cartons may become smashed, causing the cartons to leak. It is this problem that the instant invention is provided to overcome.

It is therefore a specific object to provide apparatus of the character above described for transferring a plurality of rows of such cartons from one station to another wherein there is provided novel stop means against which each row of cartons abuts, said stop means being arranged so that the rows of cartons are offset or staggered with respect to each other, obviating any possibility of the corners of cartons in adjacent rows becoming engaged as some cartons from each row are transferred by the pusher at right angles to the direction of conveyor movement.

Other objects, advantages and meritorious features will more fully appear from the following specification, claims and accompanying drawing, wherein:

FIG. 1 is a top plan view of apparatus embodying the invention;

FIG. 2 is a perspective schematic view of the apparatus shown in FIG. 1; and

FIG. 3 is a schematic wiring diagram of the electrical circuit of the apparatus shown in FIGS. 1 and 2.

The apparatus embodying the invention is designed to handle so-called square type cartons or containers shown at A in FIG. 1. Such cartons may be provided with flat tops, gable tops, or any other kind of top, many different types being in general use.

The cartons are filled with milk, fruit juice or other liquid products by a filling machine as is conventional practice.

The output of one or more filling machines 30 (not shown) is fed onto a continuous conveyor 10, usually called an infeed conveyor. Shown positioned on the conveyor 10 are a plurality of rows or lines of the cartons A, in this case four rows. It is to be understood that the conveyor 10 may be sized to accommodate any given number of rows of cartons, but that preferably the number will be equal to the rows accommodatable within a crate or case. For example, in the dairy industry the length and width dimensions of cartons holding a half-pint, pint or quart of liquid are generally identical, the various cartons differing only in height. The larger volume cartons, e.g., half-gallons, have length and width dimensions which are greater. The crates or cases are usually sized to accommodate four rows of half-pint, pint or quart cartons and/or only three rows of half-gallon cartons. Therefore the conveyor 10 is just wide enough to accommodate four rows of the carton sizes up through quarts, or three rows of half-gallons, enough to fill a conventional case.

The cartons A move along the conveyor 10 in the direction of the arrow B in FIG. 1, and are held in line on the conveyor by guide means which may be in the form of sheet metal walls 12 and 14 extending longitudinally on opposite sides of the conveyor. The downstream end of the conveyor comprises a carton-accumulating station 16 in which an entire caseload of cartons may be positioned awaiting transfer. As can be seen, the guide walls 12 and 14 terminate near the upstream end of the accumulating area 16.

Adjacent one side of the station 16 there is positioned a casing machine 20 operable to deposit an entire caseload of the cartons A in upright position in a crate or case (not shown). The machine 20 includes a carton-supporting station or table 22 onto which the cartons are pushed for transfer to an awaiting case. Machine 20 may be of the type disclosed in U.S. Patent No. 2,957,287, details of which may be obtained by reference to such patent. Briefly the machine has a carton carrier provided with means for engaging the tops of the cartons to lift them off the table, and the carrier is shiftable downwardly to deposit the cartons suspended therefrom in a crate or case positioned underneath table 22, which retracts out of the way to permit the carrier to descend.

Adjacent the opposite side of the accumulating station 16 is a transfer means 24 operable to sweep a caseload of cartons from the station 16 onto the casing machine table 22. The transfer means comprises a pusher plate 26 connected as by brackets 28 and 30 to a cross-support 32, the plate, brackets and support being secured together as by welding. Support 32 is provided at its opposite ends with bearings 34 within which are slidably received a pair of guide rods 36 rigidly supported at their opposite ends by the supports 38 and 40. Suitably mounted on a plate 42 is fluid pressure cylinder 44 having a piston 46 therein and a piston rod 48 connected at its forward end to the pusher plate 26. Cylinder 44 is provided with pressure fluid ports 50 and 52 adjacent opposite ends thereof consistent with conventional practice.

Positioned at the downstream end of conveyor 10 is a

carton stop fence or plate 54 against which the lead cartons in each row abut to accumulate a caseload of cartons A in the station 16 in front of pusher 26. Stop fence 54 comprises a plurality of carton-abutting portions 55, 58, 60 and 62 equal to the number of lines or rows of cartons A on the conveyor. Each of the portions 55, 58, 60 and 62 is aligned with a respective row of cartons and is positioned perpendicularly to the direction of carton movement along conveyor 10 so that the leading carton in each row abuts the fence squarely. These portions of the stop fence are offset or staggered as shown, with the portion 62 adjacent the carton-supporting table 22 positioned farthest upstream of conveyor movement, and portion 55 adjacent the transfer means 24 positioned farthest downstream. The abutment portions 55, 58, 60 and 62 are joined together by integral inclined portions 64. A rigid support member 66 is positioned in back of the stop fence 54, and the stop fence is removably secured thereto as by screws or the like, the fence portion 62 being held spaced from the support 66 by a suitable spacer member 68.

With the provision of stop fence 54, the corners of cartons A in adjacent rows are offset or staggered, and upon movement of the transfer means 24 to sweep a caseload of cartons from the conveyor 10 onto the supporting table 22, the corners of the cartons being transferred will not become caught against the corners of cartons on the conveyor awaiting transfer.

As conveyor 10 delivers cartons to the accumulating area 16, the leading carton A₁ of the row nearest the pusher 26 abuts fence 54 and actuates an electric switch, LS-1 electrically connected in series to a time delay relay TR-1 (see FIG. 3). The relay delays a short interval to insure that all the rows of cartons are properly positioned with the lead carton in each row against the stop fence, and then energizes, through closure of TR-1, a solenoid operated valve, solenoid 1-B, controlling admission to fluid pressure cylinder 44 through port 52, causing piston rod 43 to be extended moving pusher 26 across the conveyor belts to sweep the cartons onto the table 22 of casing machine 20. As pusher 26 reaches the outer limit of its travel, it strikes electric switch LS-5, closing the switch and energizing a relay H, serving to de-energize solenoid 1-B and close the valve admitting fluid pressure to cylinder port 52. As above referred to, table 22 under the carrier (not shown) of casing machine 20, is retractable to permit the carrier to descend, carrying a caseload of cartons to an awaiting case. Switch LS-3 is provided, which switch is held closed by table 22 when in extended position to receive a caseload of cartons. Switch LS-3 is connected in series with relay contacts TR-1 and solenoid 1-B, so that cartons cannot be pushed unless table 22 is positioned to receive them.

Switch LS-2 is termed a backlog switch, and is located upstream for accumulating area 16 a distance greater than the length of a caseload of cartons to insure that a full caseload of cartons is backed-up along the conveyor 10 before the pusher 26 is retracted. Switch LS-2 is normally open, and is electrically connected in series to a time delay relay TR-2, whereby the switch must be held closed a predetermined length of time before it is operative to cause retraction of the pusher. A carton passing the switch will close the switch only momentarily. Pusher 26 has a rearwardly extending portion 70, which blocks carton entry into area 16 when the pusher is extended, as above described, so incoming cartons abut the pusher portion 70 until a sufficient backlog of cartons, say a caseload plus two cartons, accumulates upstream of pusher portion 70 to hold switch LS-2 closed. Relay TR-2 will then energize, through close of TR-2, solenoid operated valve, solenoid 1-A, delivering pressure fluid to port 50 of cylinder 44, retracting the pusher to its starting position, as shown in FIG. 1. With the pusher retracted, cartons will again be delivered by conveyor 10 to area 16 in front of the pusher, and

upon actuation of LS-1, another caseload of cartons will be swept onto table 22.

As the pusher 26 begins its outward movement, the cartons being swept from conveyor 10 onto table 22 are positioned (see FIG. 1) with the lead cartons A₁, A₂, A₃ and A₄ abutting the respective portions 55, 58, 60 and 62 of stop fence 54, which staggers the rows of cartons as shown. As the entire caseload of cartons is pushed by the pusher, the cartons in all but the first row shift slightly upstream as they are moved toward table 22. As the following cartons on the conveyor are compacted against those being transferred, there would be a tendency for corners of adjacent cartons to catch if the rows were in perfect alignment. For example, as carton A₅ is pushed, its upper right-hand corner as viewed in FIG. 1, might well catch against the lower length-hand corner of the carton in the adjacent row shown at A₆. Because of the offset, or staggering of the rows of cartons by the provision of stop fence 54, this condition is effectively prevented.

What is claimed is:

1. In apparatus for transferring groups of articles for the purpose described, and infeed conveyor along which a plurality of rows of articles are delivered; stop means extending generally transversely across the downstream end of said conveyor for interrupting movement of said articles to provide a compacted accumulation of articles on the conveyor; transfer means positioned at one side of said conveyor and operable at right angles to the direction of conveyor movement to sweep a group of articles from said accumulation laterally off the conveyor; said stop means including portions aligned respectively with each of said rows of articles, said portions being offset from one another with the portions disposed progressively farther from the transfer means in the direction of transfer movement being disposed successively farther upstream along said conveyor.

2. In apparatus for transferring groups of filled cartons for the purpose described, a carton infeed conveyor along which a plurality of rows of cartons are delivered, transfer means adjacent one side of said conveyor, a carton-supporting station in carton-receiving relation on the opposite side of said conveyor in alignment with said transfer means, and carton stop means extending across the conveyor downstream of said transfer means and said station for interrupting carton movement to accumulate a compacted group of cartons on the conveyor, said stop means including an abutment portion for each row of cartons extending at right angles to the direction of conveyor movement, said abutment portions lying in laterally offset spaced relation to each other in the direction of conveyor movement with the portion adjacent said one side of the conveyor being disposed farthest downstream to provide staggered rows of cartons on the conveyor, said transfer means being operable at right angles to the direction of conveyor movement to sweep cartons from all of said rows off said conveyor and into said carton supporting station.

3. The invention as defined in claim 2 characterized in that carton guide means are provided at the upstream and downstream ends respectively of said carton-supporting station at the side thereof adjacent said conveyor, the distance between said guide means being equal to the length of each row of cartons transferred from the conveyor to said supporting station.

4. The invention as defined in claim 2 characterized in that said carton stop means is a single member having integral inclined portions joining said abutment portions together to facilitate sliding movement of said cartons along said stop means.

5. In apparatus for transferring groups of substantially rectangular cartons for the purpose described, a carton conveyor along which a plurality of rows of said cartons are delivered, a reciprocable pusher positioned adjacent one side of said conveyor adjacent the downstream end

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thereof operable to sweep cartons from all rows off said conveyor, a carton-supporting table positioned in article-receiving relation with said conveyor adjacent the opposite side thereof in aligned confrontation with said pusher, and a generally vertically disposed stop fence positioned 5 extending across the downstream end of said conveyor for interrupting movement of cartons therealong to assemble a compacted group of cartons in front of said pusher, said stop fence comprising a plurality of staggered parallel abutment portions each aligned with a respective 10 row of cartons on the conveyor, with a first portion nearest the table side of the conveyor disposed immediately downstream of said pusher and the remaining portions progressively nearer the pusher side of said conveyor being disposed successively farther downstream of carton movement along the conveyor, whereby the cartons in each of said rows are staggered with respect to

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cartons in adjacent rows for transfer from the conveyor by said pusher.

6. The invention as defined in claim 5 characterized in that said stop fence includes intermediate portions joining together adjacent abutment portions, said intermediate portions being inclined with respect to the abutment portions so that the corners of said cartons may slide thereacross during transfer movement.

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