

June 9, 1953

A. H. WEBSTER
CONVEYER SYSTEM

2,641,371

Filed June 12, 1950

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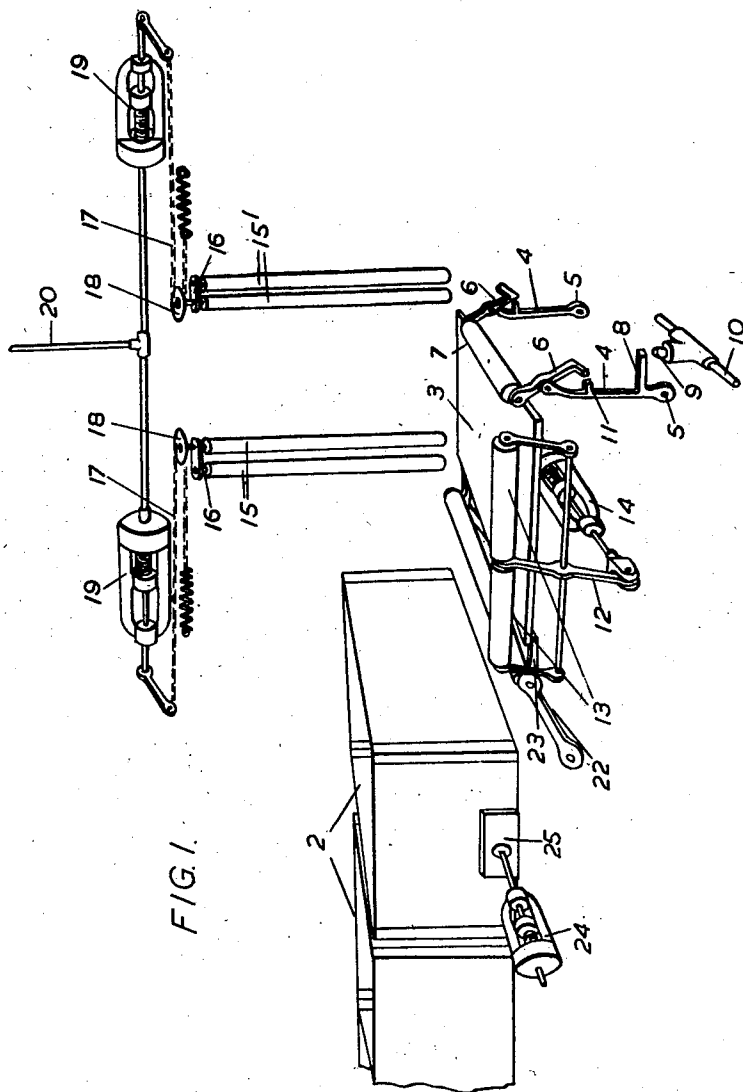


FIG. 1.

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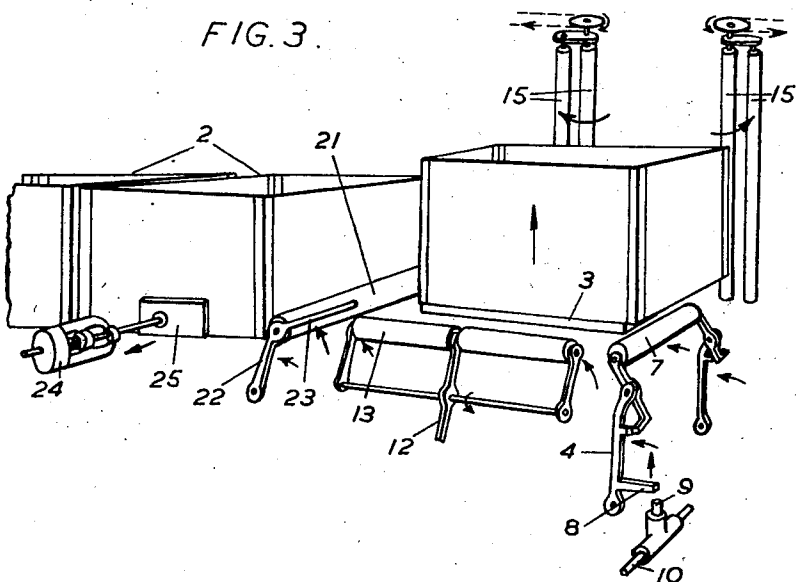
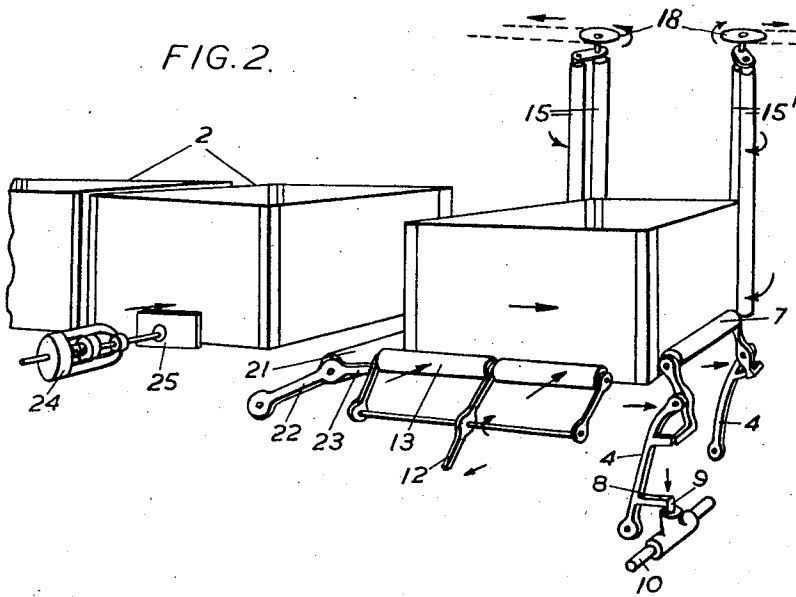
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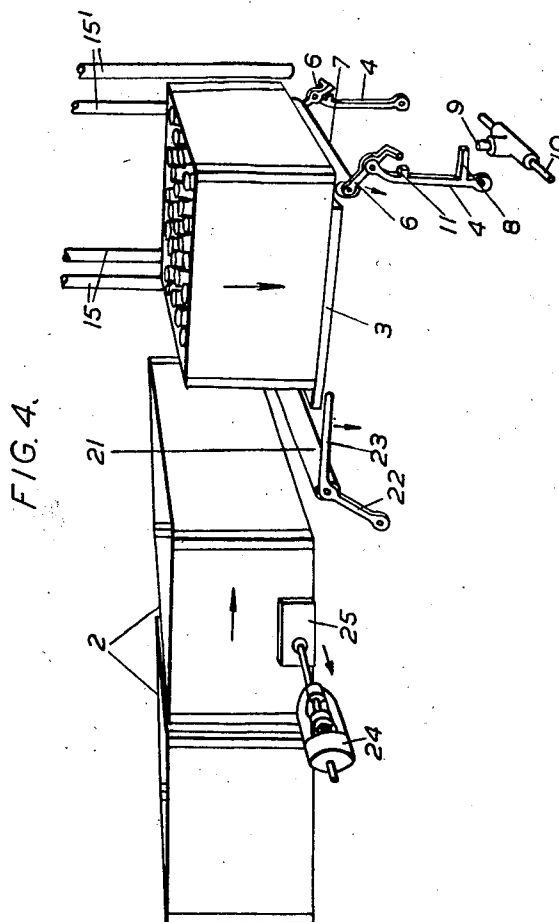
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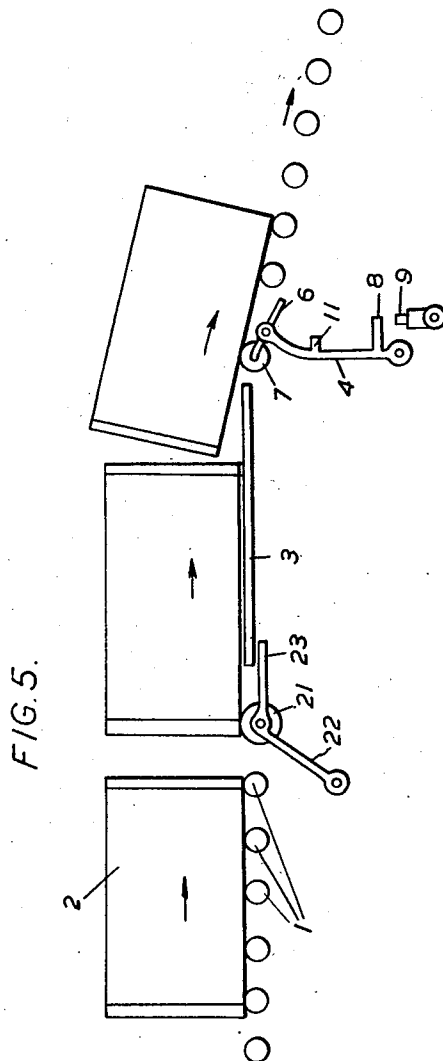
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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CONVEYER SYSTEM

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11 Claims. (Cl. 214—89)

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This invention relates to conveyor systems, and is concerned, more especially, with systems intended for the conveyance of cases or boxes, or similar packages in packing and like machines.

In such systems it is frequently desired to provide arrangements for arresting successive cases or packages in a precise predetermined position and attitude in order to carry out an operation therewith, e. g. filling empty cases with bottles. The present invention is directed to a conveyor system embodying such a feature.

The invention consists in a case or package conveyor system comprising means for advancing cases, one by one, to a predetermined point along the conveyor path and movable thrust means for orientating and/or positioning each case or package in a prearranged manner after it has been advanced to, and arrested at, the predetermined point aforesaid.

Preferably the arrangements are automatic in character whereby the intermittent advance and arresting of the line of cases or packages, and the precision-locating of the individual arrested cases or packages, proceed as a continuing intermittent operation. Thus the orientating and/or locating means are preferably brought into operation automatically by the actuation of means encountered by a case or package. The various elements may be operated by hydraulic or pneumatic means, e. g. a pressure-sensitive diaphragm-operated motor device, the pressure to which may be controlled by spring-loaded valves automatically actuated by levers or the like engaged by successive cases or packages in the advancing line.

The invention will be clearly understood from the following description of one form (given, however, merely by way of example) which it may assume, and this description will be more readily followed by reference to the accompanying drawings wherein:

Figures 1-4 inclusive represent, somewhat diagrammatically in perspective, a conveyer system, according to the present invention, in successive stages of operation; and

Figure 5 represents in side view the movement of a line of cases in relation to part of a conveyer system according to the invention.

In carrying the invention into effect in one convenient manner as shown in the accompanying drawings, there is provided a roller-conveyer path 1 (Figure 5) along which a line of empty cases 2 are advanced, e. g. under the action of gravitational forces. In a gap in the conveyer path, and level with the conveyer rollers 1, is a

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flat rectangular platform 3 adapted to be raised and lowered to a prearranged extent, in a manner to be described more fully below.

Beneath the platform 3 and adjacent to the advanced edge thereof (i. e. the edge, transverse of the conveyer path, remote from the advancing cases) is an inverted U-shaped lever system comprising two substantially vertical levers 4, each pivoted at its lower end 5 for movement about a horizontal axis parallel to the edge of the platform, and each pivotally supporting at its upper end a short L-shaped lever 6, the upper ends of these two L-shaped levers 6 being connected together by a roller 7, which is held thereby slightly above the level of the platform 3. An abutment 8 on one of the vertical levers 4 extends to the spring-loaded control valve 9 of a pipe 10 connected to a source of air under pressure (not shown), and springs (not shown) are provided to urge the U-shaped lever system 4, 5, 7 away from the air valve 9 (i. e. towards the platform 3), against a suitable stop (not shown), and to urge the short roller-carrying levers 6 out of engagement, by their ends remote from the roller 7, with abutments on the vertical levers 4, so that the roller 7 rests against the platform edge. The arrangement is such that an advancing case moving on to the platform 3 runs against the roller 7 and forces its L-shaped supporting levers 6, against their spring load, to a position in which the short limbs of the L-shaped levers 6 engage the abutments 11 of the vertical 4, so that further forward movement of the case forces the whole U-shaped lever assembly 4, 5, 7 about its pivots 5, against its spring load, until its abutment 8 engages and opens the air valve 9, whereby further automatic operations are initiated, as will hereinafter appear.

On one side of the platform 3 is provided a lever 12 pivoted at a mid-point for movement about a horizontal axis parallel to the side edge of the platform, and carrying at its upper end and horizontal rollers 13 which stand slightly above the level of the platform 3. The lever 12 is normally held, e. g. by springs (not shown) so that the rollers 13 are retracted a short distance from the platform 3, and at its lower end the lever 12 is linked to a suitable actuating device 14 whereby the lever may be rocked to move the rollers 13 towards the platform.

The actuating device 14 is preferably pneumatically or hydraulically operated, and may consist of a diaphragm motor comprising a rubber or other flexible diaphragm, supported by its periphery, as one wall of a closed chamber, against

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which is spring-pressed a suitably shaped rod or lever forming part of, or connected to, a linkage system whereby power is taken from the motor. Fluid pressure entering the closed chamber deforms the diaphragm and thus displaces the rod or lever pressed against it, to effect a desired movement of elements connected thereto. By this device the roller-carrying lever 12 may be rocked to move its rollers 13 towards the platform, and subsequently allowed to rock in reverse direction, under spring load, when the fluid pressure in the diaphragm motor is released.

Adjacent to the rear of the conveyer line, i. e. the side of the platform 3 opposite to the motor-actuated roller-carrying lever 12, are two pairs of rollers 15, 15' extending vertically upwards from the level of the platform adjacent to the corners thereof. The rollers of each pair are parallel to one another, being held together by short connecting links 16 between the ends of their two shafts, and each pair is mounted so that the axis of one roller is stationary, while the other roller can swing thereabout on the abovementioned links. Such movement may be effected by suitable connection (e. g. a chain 17 engaging a sprocket 18 on the fixed roller shaft) with diaphragm motors 19 as above described (one being provided for each pair of rollers), which may be actuated from a common source of fluid by pressure pipe 20, under the control of the case-actuated pressure foot 4, 6, 7, above described.

These rollers 15, 15' are arranged so that when the swinging rollers, one of each pair, are moved inwards by bodily pivotal movement about the axis of the stationary rollers they engage those leading and trailing walls of the case on the platform which extend laterally across the conveyer path, so that the vertical corners of the case are embraced each by one pair of these rollers. The rollers 15, 15' are somewhat spaced from the side of the platform so that the case must be shifted laterally for a short distance on the platform 3, out of line with the succeeding cases on the conveyer, before its corners can be thus engaged by the vertical rollers. The manner in which the rollers 15, 15' embrace the corners of a case will be appreciated by reference to Figure 2 of the drawings herewith.

Transversely of the conveyer path, adjacent and parallel to the edge of the platform over which cases are transferred on to the platform 3 is a stop roller 21 carried by levers 22 pivoted by their lower ends for movement about a horizontal axis located beneath, and transversely of, the conveyer path. A projection 23 from these levers 22 extends beneath and is engaged by the platform 3 in its lowermost position, to hold the levers 22 down against spring action so that the roller 21 does not normally interfere with advance of a case on to the platform 3.

Adjacent to the conveyer path, on one side of the position occupied by each case immediately before being moved on to the platform, is a diaphragm motor 24 adapted to actuate a pressure pad 25 in order to move it into frictional contact with the side of a case, and thus arrest movement thereof on to the platform. This diaphragm motor 24 is supplied with fluid pressure from the aforementioned source, and under control of the same valve 9, as the diaphragm motors 14 and 19 above referred to.

In operation of the above described system a line of cases is advanced along the conveyer path and the leading case, passing on to the plat-

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form 3 over the stop roller 21, engages the transverse roller 7 adjacent to the remote edge of the platform, forcing it, with its lever assembly, 6, 4, 8, against its spring loading, into a position in which it opens the fluid pressure control valve 9, and thus actuates the diaphragm motors, 14, 19, 24.

As soon as the fluid pressure control valve 9 is opened the pressure pad 25 is actuated to engage the next case in the line, and prevent further movement towards the platform 3. The horizontal rollers 13 on one side of the platform are also moved into engagement with the side of the case on the platform, and force it transversely of the platform which remains stationary at this juncture into contact with the stationary vertical rollers of the pairs 15, 15' adjacent to the opposite side of the platform. The pivotally movable vertical rollers of those pairs are swung into engagement with the leading and trailing walls of the case (Figure 2), locating the case accurately in a prearranged position over the platform 3, whereafter the platform 3 is raised by suitable means (e. g. a hydraulic cylinder forming part of a packing machine), to a position where the case can be dealt with as desired, e. g. filled with bottles.

As the platform is raised the stop roller 21 is allowed to rise under its spring load into engagement with the front of the leading case on the conveyer path. This is necessary since the upward movement of the platform 3 releases the roller 7, lever 6 and pressure foot 8 assembly holding open the fluid pressure control valve 9, and in consequence that valve 9 automatically closes and the fluid pressure in the diaphragm motors 14, 19, 24 is vented or released, so that all the rollers, except the stop roller 21, return to their inoperative positions, as will be seen from Figure 3 of the drawings herewith.

The diameters of the pipes through which the fluid pressure is fed to the various diaphragm motors may be so chosen that slight time differences occur between operation of the motors. Thus upon opening of the control valve 9 immediate operation of the motor 24 actuating the pressure pad is desirable in order at once to stop advance of the line of cases. At the same time, or immediately thereafter, the forward vertical swinging rollers of the pair 15' which limits advancing movement of the case on to the platform should be moved into operative position, and the horizontal pusher rollers 13 for sliding the case transversely of the platform should be operated, to move the case into contact with the stationary vertical rollers. Slightly later the vertical swinging roller (of pair 15) at the trailing end of the case may be moved against the case, to locate it accurately over the platform, leaving a slight gap between this case and the next case of the succeeding line (held arrested by the pressure pad 24).

A hydraulic cylinder (not shown) e. g. forming part of a packing machine, may be provided to lift the platform 3 to a desired height as soon as the case is properly located thereon, and the pressure supply valve feeding the hydraulic cylinder may conveniently be automatically opened by the final inward movement of the last mentioned vertical swinging roller 15 whereby the case is positioned on the platform.

The mechanism of the packing machine is arranged so that when the filling of the elevated case is completed, the action of the hydraulic cylinder is automatically reversed, and the plat-

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form 3 lowered to its normal position in line with the conveyor path. In reaching this position the platform again depresses the stop roller 21 (Figure 4), allowing the line of cases to advance. When being lowered the undersurface of the filled case on the platform 3 engages the roller 7 of the lever system 6, 4, 8, without actuating the pressure-control valve 9. The short pivot arms 6 whereby the roller 7 is secured to the lever system allow the roller to be depressed by the descending case which then rides over it from the platform on to the discharge section of the conveyor (Figure 5). This section of the conveyor is preferably downwardly inclined as shown so that the case, as it is pushed thereon by the advancing line of cases behind it, tips forward as soon as little more than half has moved thereon, whereby the rear portion of this case rises slightly, releasing the roller 7 of the pressure-controlling lever system, which thereupon springs up into the path of the next following case, to be actuated thereby and initiate another cycle of operations.

It should be understood that the invention is not limited solely to the constructional and operation details of the form described above, which may be modified in order to meet various conditions and requirements encountered, without departing in any way from the scope of the invention, as defined by the dependent claims.

What I claim is:

1. A case conveyor system comprising a conveyor for advancement of a case, stop means for arresting the case at a pre-arranged point along said conveyor, thrust means for transverse positioning and orientation of said case in pre-arranged manner on said conveyor while it is in said arrested position, and control means actuated by said stop means when the latter arrests a case for initiating operation of said thrust means.

2. A case conveyor system comprising a conveyor for advancement of a plurality of cases in line, stop means for arresting the leading case of the line at a pre-arranged point along said conveyor, line arresting means separate from said stop means for holding stationary the second and succeeding cases of the line, thrust means for transverse positioning and orientation of said leading case in pre-arranged manner on said conveyor while it is in said arrested position, and control means actuated by said stop means when the latter arrests said leading case for initiating operation of said thrust means and said line arresting means.

3. A case conveyor system according to claim 2 wherein said line arresting means comprise a friction pad and motive means for urging said pad against the foremost case of the line of cases to be held stationary.

4. A case conveyor system comprising a conveyor for advancement of a case, stop means for arresting the case at a pre-arranged point along said conveyor, thrust means for urging said arrested case transversely of said conveyor, buffer means adjacent to said case on the side opposite to said thrust means for limiting said transverse movement of said case under the influence of said thrust means, and control means actuated by said stop means when the latter arrests said case for initiating operation of said thrust means.

5. A case conveyor system according to claim 4 comprising two spaced buffer means located to engage the two vertical corner edges of said case on the side opposite to said thrust means.

6. A case conveyor system according to claim 4

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wherein said buffer means are movably mounted and connected to motive means whereby they are forced into engagement with said case and orientate and position said case in pre-arranged manner on said conveyor.

7. A case conveyor system according to claim 4 wherein said buffer means comprise two spaced vertical rollers, each mounted for rotation about its own axis, and each having connected thereto a parallel roller bodily movable about the said axis.

8. A case conveyor system comprising a conveyor for advancement of a line of cases, stop means located in the path of movement of said line of cases for arresting the front case of said line at a pre-arranged point along said conveyor, front case positioning means adapted to act upon said front case while it is arrested at said pre-arranged point and including thrust means for locating said front case in a pre-arranged position transversely of said conveyor, means for locating said front case in pre-arranged orientation in relation to said conveyor, means for performing a subsequent operation upon said front case, a source of power, and trip means actuated by said stop means for initiating transmission of power from said source to said front case positioning means and thereafter to said means for performing a subsequent operation on said front case.

9. A case conveyor system comprising a conveyor for advancement of a line of cases, a vertically movable platform in alignment with said conveyor, stop means located in the path of movement of said line of cases for arresting the front case of said line on said platform, front case positioning means adapted to act upon said front case while it is arrested on said platform and including thrust means for locating said front case in a pre-arranged position transversely of said platform, means for locating said front case in prearranged orientation in relation to said platform, means for lifting said platform with said front case thereon, a source of power, and trip means actuated by said stop means for initiating transmission of power from said source to said front case positioning means and thereafter to said platform lifting means.

10. A case conveyor system according to claim 9 comprising holding means brought into operation by said lifting movement of said platform to hold in arrested position the second and subsequent cases of said line during the time said platform is above the level of said path.

11. A case conveyor system according to claim 9 comprising fluid-operated motive means for actuating said thrust means and said platform lifting means.

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