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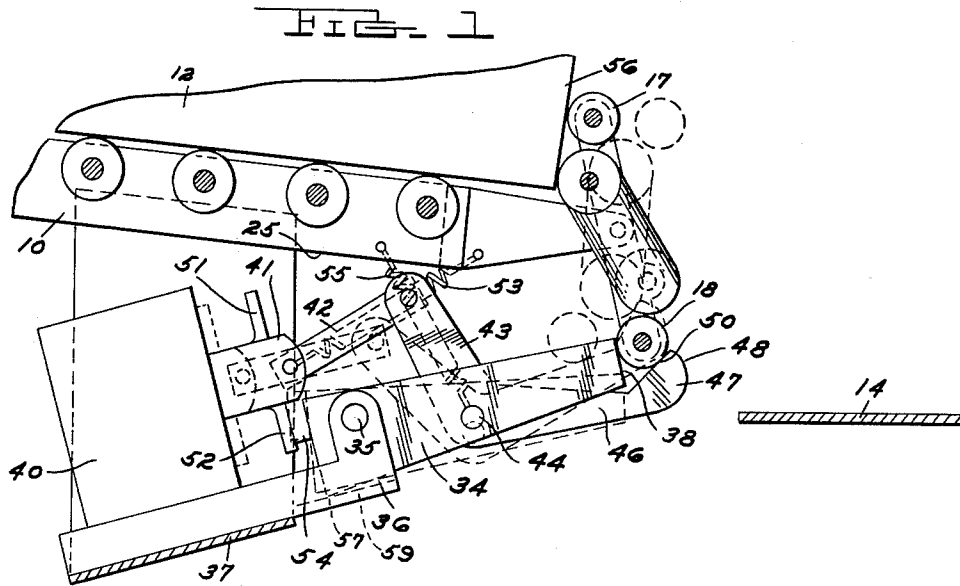
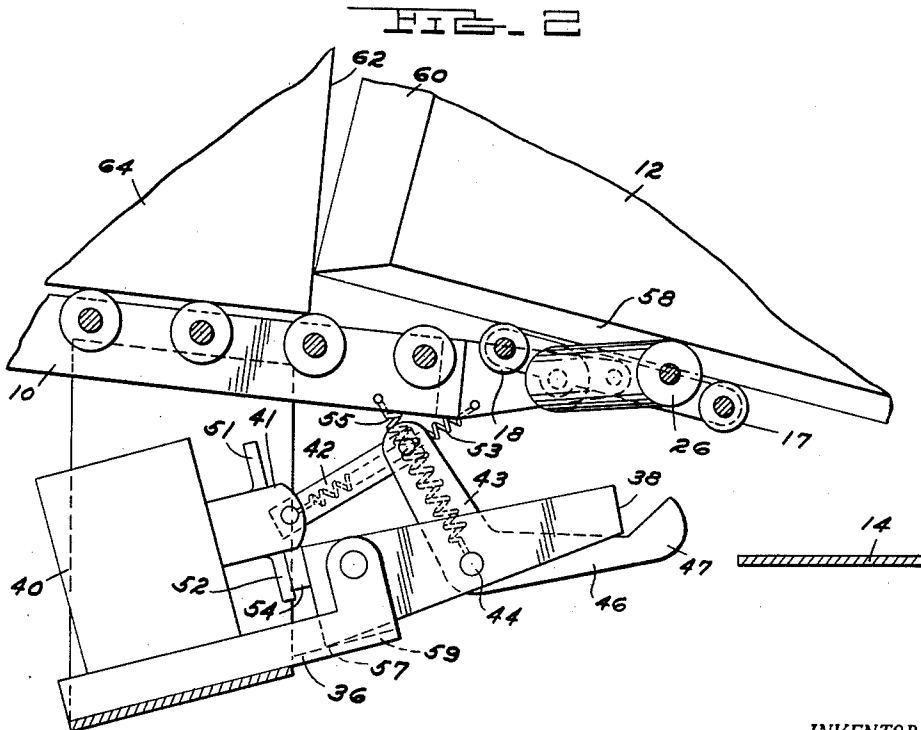
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ARTICLE RELEASING MECHANISM FOR INCLINED SUPPORTS

Filed July 18, 1960

2 Sheets-Sheet 1



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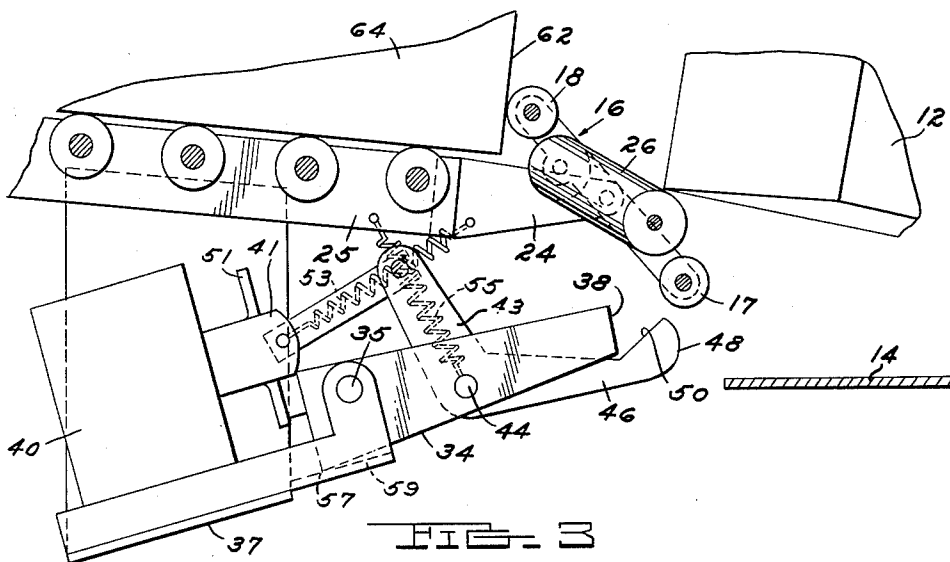
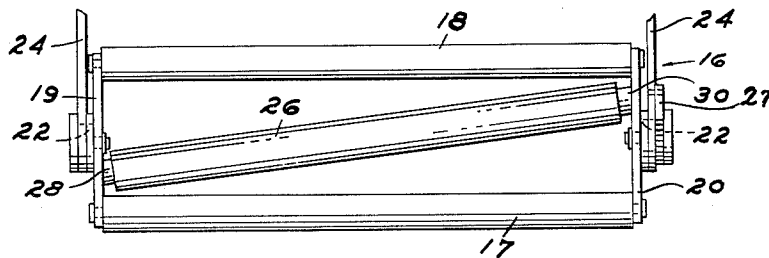
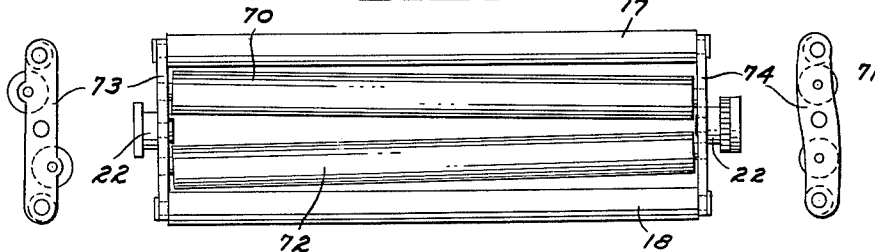


FIG. 6

FIG. 4

FIG. 7



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ARTICLE RELEASING MECHANISM FOR  
INCLINED SUPPORTS

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This invention relates to improvements in the construction of a releasing mechanism such as is employed to dispense articles singly from the discharge end of an inclined support such as a chute or rollerway. Particularly the invention pertains to improvements in the construction of a rotating type of release mechanism to insure improved operation thereof for dispensing only one article each time the release mechanism is actuated.

A rotating type of release conventionally consists of a frame which is rotatably mounted adjacent the discharge end of a support on which articles are stored in a row. A pair of article engaging members, usually rollers, are mounted in diametrically opposed relation to the axis of frame rotation and suitable means are employed for arresting frame rotation in a blocking position in which one of the article engaging members projects into the path of movement of an article on the support. Actuation of the release permits the frame to rotate in a normal or releasing direction in response to movement of the article being dispensed. As this frame rotation continues, the article advances over the frame which rotates through an article supporting position. Further advance of the article moves it off the frame and at the same time is supposed to cause the frame to rotate sufficiently to bring the other of its pair of article engaging members into a position for engagement by the leading face of an immediately following article. Frame rotation is arrested after 180 degrees of movement with the other article engaging member then occupying a blocking position.

Improvements of the present invention relate generally to means for controlling the rotation of this type of release mechanism. These improvements relate to the means employed for arresting frame rotation in the blocking positions thereof and actuating frame rotation from a blocking position, and also to an improved means for insuring that the frame will be rotated from one blocking position to a successive blocking position for engagement by an immediately following article.

Positive frame rotation into blocking relation with an immediately following article is accomplished in the present invention by the inclusion of at least one article engaging roller mounted in the rotating frame intermediate the pair of article engaging members or rollers thereof. This intermediate roller is mounted in non-parallel relation to the axis of frame rotation so that the line of contact between its surface and a passing article extends obliquely to the line of normal article movement defined by the support. This line of contact is located to the discharge side of the axis of frame rotation as the frame passes through the aforementioned article supporting position. In consequence, an article passing over the intermediate roller tends to be moved to a diverging path of travel and simultaneously a positive turning moment is imparted by the article to the rotating frame. This turning moment produces positive frame rotation to a point where the trailing article contacting member is moved into the path of travel of a following article before the article being dispensed has passed beyond the frame.

The improved means for arresting frame rotation in a blocking position and initiating releasing rotation therefrom includes a stop member which has an abutment surface and which is pivotally mounted so that this surface can be moved out of and into the path of frame

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rotation for engagement with a portion of the frame. An arm pivotally mounted on the stop member has a frame engaging surface disposed in generally opposite relation to the stop member abutment surface and spaced therefrom so that a portion of the frame is engaged and trapped between these two surfaces. This positively prevents the frame from rebounding from blocking position when it engages the stop member abutment surface. Releasing frame movement is initiated through a suitable actuating device such as a solenoid, which is connected to the arm so as to move the frame engaging surface thereof in a direction to impart an initial increment of releasing rotation to the frame. This arm movement is accomplished by simultaneous movement of the stop member to a non-engaging position.

Presently preferred embodiments of the invention are shown in the accompanying drawings which include the following views:

FIGURE 1, a sectional elevation showing the release mechanism mounted at the discharge end of a rollerway support, the mechanism being shown in full line in one of its blocking positions;

FIGURE 2, an elevation similar to FIGURE 1 showing the release passing through an article supporting position as the article is being dispensed;

FIGURE 3, an elevation similar to FIGURE 1 showing the article being dispensed about to pass beyond the release which in turn has been moved into a position blocking discharge of an immediately following article;

FIGURE 4, a plan view showing the frame construction of the release of FIGURES 1-3;

FIGURE 5, a plan view showing an alternate form of frame construction; and

FIGURES 6 and 7, elevations respectively of the left and right hand ends of the frame of FIGURE 5.

In FIGURES 1-3 an inclined rollerway 10 of conventional construction forms a support for a plurality of articles 12 which are mounted in a row thereon for normally urged movement toward the discharge end. A conveying means 14 such as a belt, is shown beyond and below the discharge end of the support. The releasing mechanism of the invention is intended to retain articles on the support in storage and release them singly upon each actuation, the article released or dispensed dropping on the conveyor belt.

This release mechanism consists of a frame generally designated 16 and best shown in FIGURES 3 and 4. The frame includes a pair of article engaging members in the form of rollers 17 and 18 which are mounted between suitable side members 19 and 20 with their axes in parallel spaced relation. A trunnion 22 is secured to each of the side members 19 and 20 thereby defining an axis of frame rotation which is located intermediate and parallel to the axes of the rollers 17 and 18 and preferably in a common plane therewith as shown in FIGURE 3. The frame is rotatably mounted adjacent the discharge end of the rollerway 10 between a suitable pair of brackets 24, each of which is secured to one of the rollerway side rails 25. Preferably, a ratchet 27 is interposed between one of the trunnions 22 and brackets 24 as shown in FIGURE 4 to confine frame rotation to a normal or releasing direction, which is clockwise in FIGURES 1-3. The frame further includes an intermediate roller 26 which is mounted between the side members 19 and 20 with its axis disposed obliquely to the axis of frame rotation and also to the axis of each of the pair of rollers 17 and 18. One end 28 of the roller 26 is located intermediate the frame axis and the axis of the roller 18 and to one side of the plane common to the roller axes 17 and 18. The other end 30 of the intermediate roller 26 is located equally and oppositely, that

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is, intermediate the frame axis and the axis of the other roller 17 and to the opposite side of the aforementioned common plane. The frame 16 is mounted in its supporting brackets 24 so that the displacement of the ends of the intermediate roller from the common plane is opposite with respect to the direction of normal or releasing frame rotation. This mounting of the intermediate roller will be further described in connection with the operation of the mechanism.

Normal or releasing rotation is imparted to the frame by the normally urged movement of an article resting on the inclined rollerway support 10 and an arresting mechanism is employed to positively locate the frame 16 in a position in which article movement is blocked. This mechanism includes a stop member 34 which is pivotally connected at 35 to a suitable clevis type bracket 36 which in turn is mounted upon a supporting member 37 suspended between the rollerway side rails 25. The stop member 34 is provided with an abutment surface 38 and is movable about its pivot 35 so that its abutment surface lies in the path of travel of one of the rollers 17 or 18 or out of this path of travel as indicated in phantom in FIGURE 1.

Pivotal movement of the stop member 34 is controlled by a suitable actuating device such as the solenoid 40 whose plunger 41 is connected through a link 42 to one arm 43 of a bell crank member which is pivotally connected at 44 to the stop member 34. The other bell crank arm 46 has an end portion 47 extending outwardly of the stop member so that this portion 47 of the arm lies in advance of the stop member abutment surface 38 with relation to the normal rotation of the frame 16. The portion 47 of the bell crank is provided with a rounded nose 48 and with a frame engaging surface 50 which is disposed generally oppositely and in converging relation with the abutment surface 38 and is adapted to engage one of the frame rollers 17 or 18 as shown in FIGURE 1.

The solenoid plunger 41 has a pair of laterally projecting portions 51 and 52 and is urged by a spring 53 to the return open position shown in FIGURE 1. In this position the projecting portion 52 of the plunger engages a stop 54 secured to the adjacent portion of the stop member 34. A spring 55 normally urges the stop member 34 to the frame arresting position shown, which is defined by engagement between the surface 57 at the inner edge of the member 34 and surface 59 on the base of the bracket 36.

Referring to FIGS. 1-3, the operation of the release mechanism is as follows: Upon actuation of the solenoid 40, movement of its plunger 41 to the left as the parts are shown in FIG. 1 results in a counterclockwise rotation of the bell crank, moving the bell crank arm 46 and its roller engaging surface 50 in the general direction of normal releasing rotation of the frame 16. This insures initial movement of the frame from the blocking position shown in full line and is accompanied by an opposite pivotal movement of the stop member 34 out of the path of frame rotation to the position shown in phantom in FIG. 1. Release of the frame 16 from blocking position permits normal gravity-urged movement of the article 12 off the discharge end of the rollerway 10, this movement being accompanied by releasing rotation of the frame 16 as the leading face 56 of the article 12 pushes the frame.

As the frame 16 rotates to a position approximately 90 degrees from its blocking position, it acts as a support for the article 12 whose bottom surface begins to ride over the intermediate frame roller 26. The manner in which this intermediate roller is placed in the frame 16 results in the roller surface defining a line of contact with the bottom surface 58 of the article 12 which extends obliquely to the path of travel defined by the rollerway 10 and which is inclined to gradually extend above a plane tangent to the surface of the rollers 17 and 18. Thus the article 12 in passing over the release is urged in a diverging direction of travel as shown in FIG. 2 and at the same

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time the weight of the article, which is gradually carried by the intermediate roller 26, causes a positive turning moment on the frame 16 in a releasing direction of rotation because contact between the article and intermediate roller takes place on the discharge side of the frame axis.

This change in the direction of movement of the passing article 12 breaks the surface to surface contact between its rear face 60 and the front face 62 of an immediately following article 64 making it much easier for the article 12 to tilt downwardly as its center of gravity passes beyond the axis of the release frame thereby assuring that the release frame will be rotated sufficiently to bring the next roller 17 up above the plane of the rollerway and into the path of travel of the immediately following article. The positive turning moment which is imparted to the release frame 16 through the intermediate roller further insures sufficient frame rotation to bring the other roller 17 into a position for engagement by the leading face of a following article.

As illustrated in FIG. 3, the turning moment imparted to the release frame 16 by the passing article 12 will be sufficient to cause 180 degrees rotation thereof without reliance upon movement of the following article 64 turning the frame by engagement of its leading face 62 with the roller 18 approaching a blocking position. As the frame 16 approaches 180 degrees of rotation, the leading roller 17 will contact the rounded nose 48 of the arm 46. The reaction accompanying this contact is transmitted to the stop member 34 causing a slight clockwise pivotal movement thereof and downward movement of the nose of the arm 46, thereby permitting the roller 17 to pass by the nose and to engage the abutment surface 38 at the end of the stop member 34. Reverse movement of the parts 34 and 46 caused by the return spring 55 results in the roller 17 being trapped between the abutment surface 38 and the oppositely disposed surface 50 on the arm 46. Rebounding or reverse rotation of the frame is thereby positively prevented and this insures that only one article will pass over the releasing mechanism upon each actuation thereof.

Another advantage results from the action of the intermediate roller 26. In most installations the belt conveyor 14 to which a released article is delivered is continuously moving. In such case the release frame will be installed so that the diverging direction of movement defined by the line of contact of the intermediate roller 26 extends toward the direction of movement of the belt conveyor. In other words, as the parts are shown in FIGS. 1-3, the belt conveyor would be moving toward the plane of the paper and it will be seen that the action of the intermediate roller diverts movement of the article 12 in this same general direction.

FIGS. 5-7 show one alternate construction for providing means carried by the rotatable release frame for engaging each passing article on a line of contact located on the discharge side of the axis of frame rotation and extending obliquely to the normal direction of article travel. A pair of rollers 70 and 72 are employed in this construction, and are mounted between the frame side members 73 and 74 on opposite sides of the axis of frame rotation defined by the trunnions 22, intermediate a pair of parallel article engaging rollers 17 and 18 which are mounted between the ends of the frame side members 73 and 74. The axis of each of the rollers 70 and 72 is positioned so that the line of contact between a passing article and the surface of either roller is oblique to the normal direction of article movement (which is perpendicular to the frame axis) and inclined to the normal plane of article movement. This inclination may also be expressed as a transverse inclination to the frame, in a direction opposite to the normal direction of frame rotation, which is clockwise as viewed in FIG. 6.

As best shown in FIG. 2, each passing article contacts the rotating release frame along at least two lines, one provided by the roller 26 on the outer or discharge side

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of the frame axis, and the other provided by the roller 17 on the inner or opposite side of the frame axis, with the outer line of contact diverging outwardly and upwardly of the inner line of contact. This same relationship applies to the frame construction of FIGS. 5-7 and obviously may also be obtained by other types of construction such as one employing a tapered roller or rollers.

While preferred embodiments have been described above in detail, it will be understood that numerous modifications might be resorted to without departing from the scope of the invention as defined in the following claims.

I claim:

1. A release mechanism of the type used at the discharge end of a support on which articles are placed in a row and normally urged toward such discharge end comprising a frame including a pair of rollers carried thereby in spaced parallel relation, means rotatably mounting said frame adjacent the discharge end of said support on an axis parallel to and intermediate the axes of said rollers, said frame axis extending substantially normal to the direction of article travel whereby said frame is rotatable in a normal direction in response to normally urged article movement from a blocking position in which one of said rollers projects above the plane of said support, through a supporting position in which both of said rollers form a continuation of said support to a second blocking position in which the other of said rollers projects above the plane of said support; means for arresting frame rotation in each of said blocking positions, said arresting means including a stop member having an abutment surface, means pivotally mounting said stop member below said support plane for movement between positions in which said abutment surface lies in and out of the path of a frame roller moving below said support plane in the normal direction of frame rotation, an arm pivotally carried by said stop member, said arm having a roller engaging surface disposed generally oppositely to said stop member abutment surface and in spaced relation therewith such that a roller can be trapped between said arm and stop member surfaces to positively locate said frame in a blocking position, means for releasing said frame from blocking position for normal rotation in response to article movement including an actuating device having a member movable between return and actuating positions, means connecting said actuating member to said arm for moving the roller engaging surface thereof in the direction of normal frame rotation and for simultaneously moving said stop member abutment surface out of the path of roller movement in response to movement of said member to actuating position, and means to insure normal rotation of said frame to a blocking position in engagement with an immediately following article comprising at least one roller carried by said frame intermediate said pair of rollers, said intermediate roller being positioned so as to contact a passing article on a line which extends oblique to the normal direction of article movement and which is inclined to extend above a plane tangent to said pair of rollers on the discharge side of said frame axis when said frame is in a supporting position.

2. A release mechanism of the type used at the discharge end of a support on which articles are placed in a row and normally urged toward such discharge end comprising a frame, means rotatably mounting said frame on an axis adjacent the discharge end of said support, a pair of rollers carried by said frame in diametrically opposed relation to said frame axis, stop means for holding said frame in a blocking position wherein one of said rollers projects into the path of article travel, means for releasing said stop means to permit normal rotation of said frame by article movement through a supporting position in which said pair of rollers are disposed with their article contacting surfaces substantially in the plane of article movement to a second blocking position in which the other of said rollers is projected into the path of article movement for engagement by the leading face of an

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immediately following article, and roller means mounted in said frame intermediate said pair of rollers and providing a line of article contact which in said frame supporting position extends obliquely to the direction of article travel and progressively from the plane of article movement to an elevation above such plane on the discharge side of said frame axis whereby one side of an article passing over said roller means is raised above the normal plane of movement exerting a turning moment on said frame and urging such passing article in a diverging direction of movement to reduce frictional contact between the trailing face of such article and the leading face of an immediately following article.

3. A device of the type described comprising a frame, a pair of article engaging rollers mounted thereon in spaced parallel relation; means mounting said frame for releasing rotation about an axis located intermediate said rollers, parallel to the axes thereof and in a common plane therewith; a third roller mounted on said frame with one end of its axis positioned intermediate said frame axis and one of said article engaging rollers and the other end of its axis positioned between said frame axis and the other of said article engaging rollers, the ends of said third roller being displaced equally and oppositely of said common plane in a direction opposite to the direction of releasing rotation; and means for arresting releasing rotation of said frame in 180° increments.

4. A device for releasing one article at a time from the discharge end of a support on which a row of articles is retained and normally urged toward the discharge end, comprising a frame, means mounting said frame for rotation on an axis adjacent and parallel to the discharge end of said support, said frame including a pair of article stop members carried on opposite sides of said axis and article engaging means carried by said frame for producing movement of said frame on said axis in response to engagement by an article being released, said article engaging means being mounted so as to be contacted by such article being released on a line which is located on the discharge side of said axis, which extends in a direction transversely oblique to the direction of article travel and which is inclined in the direction of article travel.

5. A releasing device according to claim 4 wherein said article engaging means comprises a roller mounted on said frame with at least a portion of said roller located intermediate said axis and one of said article stop members.

6. An article releasing device according to claim 4 wherein said article engaging means comprises a roller carried by said frame intermediate said article stop members, the axis of said roller extending obliquely across said frame from one side of the rotational axis to the other side thereof.

7. A device for holding one or more articles in a row on an inclined support and for releasing the lowermost of such articles comprising a pair of article contacting rollers, frame means mounting said rollers in spaced parallel relation, structure supporting said frame means for rotation on an axis located intermediate said rollers, said axis of frame rotation lying in a common plane with the axes of said pair of rollers, and means for insuring rotation of said frame in 180 degree increments on the discharge of each article comprising a third roller carried by said frame intermediate said pair of rollers, said third roller being mounted with its axis extending obliquely from one side of said plane to the other side of said plane to engage an article being released above said plane, and with its axis extending at an angle to the axes of the pair of rollers when viewed in said plane so as to tend to change the direction of movement of an article being released.

8. A release mechanism of the type used at the discharge end of a support on which articles are placed in a row and normally urged toward such discharge end comprising a frame including a pair of rollers carried thereby in spaced parallel relation, means rotatably mounting said

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frame adjacent the discharge end of said support on an axis parallel to and intermediate the axes of said rollers, said frame axis extending substantially normal to the direction of article travel whereby said frame is rotatable in a normal direction in response to normally urged article movement from a blocking position in which one of said rollers projects above the plane of said support, through a supporting position in which both of said rollers form a continuation of said support to a second blocking position in which the other of said rollers projects above the plane of said support; means for arresting frame rotation in each of said blocking positions, said arresting means including a stop member having an abutment surface, means pivotally mounting said stop member below said support plane for movement between positions in which said abutment surface lies in and out of the path of a frame roller moving below said support plane in the normal direction of frame rotation, an arm pivotally carried by said stop member, said arm having a roller engaging surface disposed generally oppositely to said stop member abutment surface and in spaced relation therewith such that a roller can be trapped between said arm and stop member surfaces to positively locate said frame in a blocking position, and means for releasing said frame from blocking position for normal rotation in response to article movement including an actuating device having a member movable between return and actuating positions, means connecting said actuating member to said arm for moving the roller engaging surface thereof in the direction of normal frame rotation and for simultaneously moving said stop member abutment surface out of the path of roller movement in response to movement of said member to actuating position.

9. In a rotating type of release for dispensing one article at a time from the discharge end of a support on which a row of articles is retained and normally urged toward such discharge end, said release including a frame

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rotatably mounted adjacent the discharge end of said support, means for controlling frame rotation in 180 degree increments comprising structure carried by said frame on diametrically opposite sides of the axis of frame rotation, a stop member having an abutment surface, means pivotally mounting said stop member below said support for movement between blocking and nonblocking positions in which said abutment surface lies in and out of the path of rotation of said frame structure, a bell crank arm pivotally carried by said stop member, one arm of said bell crank projecting into the path of rotation of said frame structure in advance of said stop member abutment surface, said projecting portion having a frame engaging surface spaced from and disposed generally oppositely to said stop member abutment surface so that said frame can be trapped between said arm and stop member surfaces, and means for releasing said frame for normal rotation including an actuating member movable between return and actuating positions, means connecting said actuating member to said arm for moving the frame engaging surface of the latter toward the abutment surface of said stop member in response to movement of said actuating member to actuating position, whereby said arm engages said frame to impart an initial increment of normal rotation thereto, said engagement being accompanied by a reaction upon said arm to cause pivotal movement of said stop member to a non-blocking position.

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