Sept. 18, 1962 E. S. GODLEWSKI 3,054,612

COLLATING DEVICE

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Fig. 1.

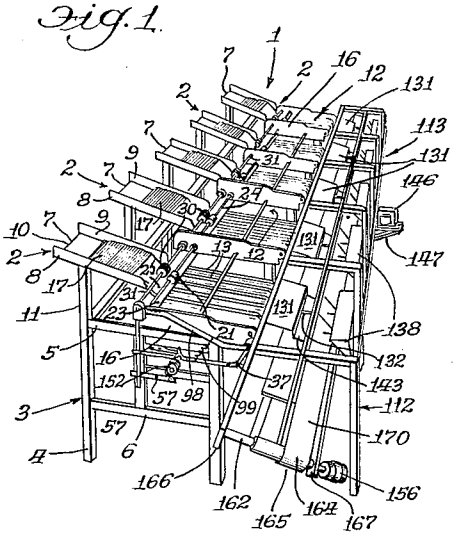


Fig. 4.

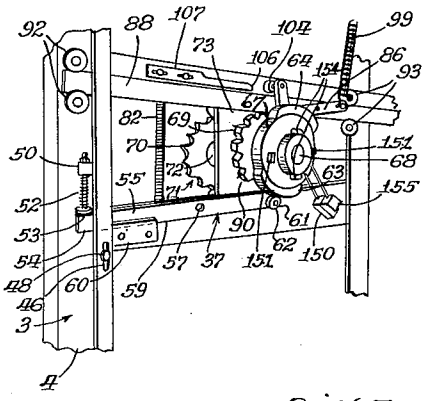


Fig. 5.

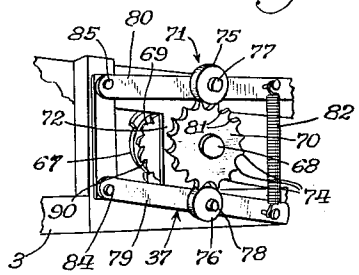


Fig. 6.

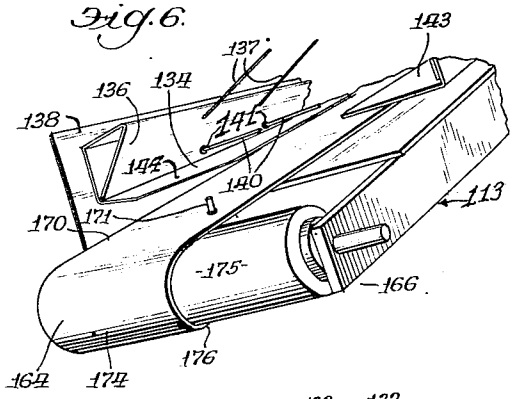


Fig. 7.

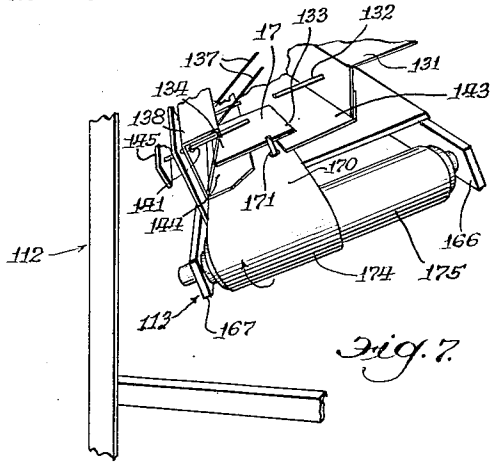
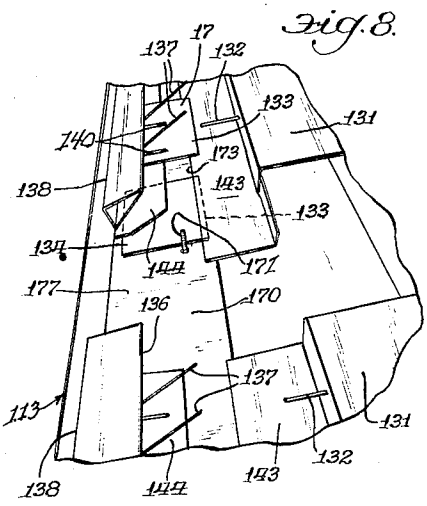


Fig. 8.



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COLLATING DEVICE

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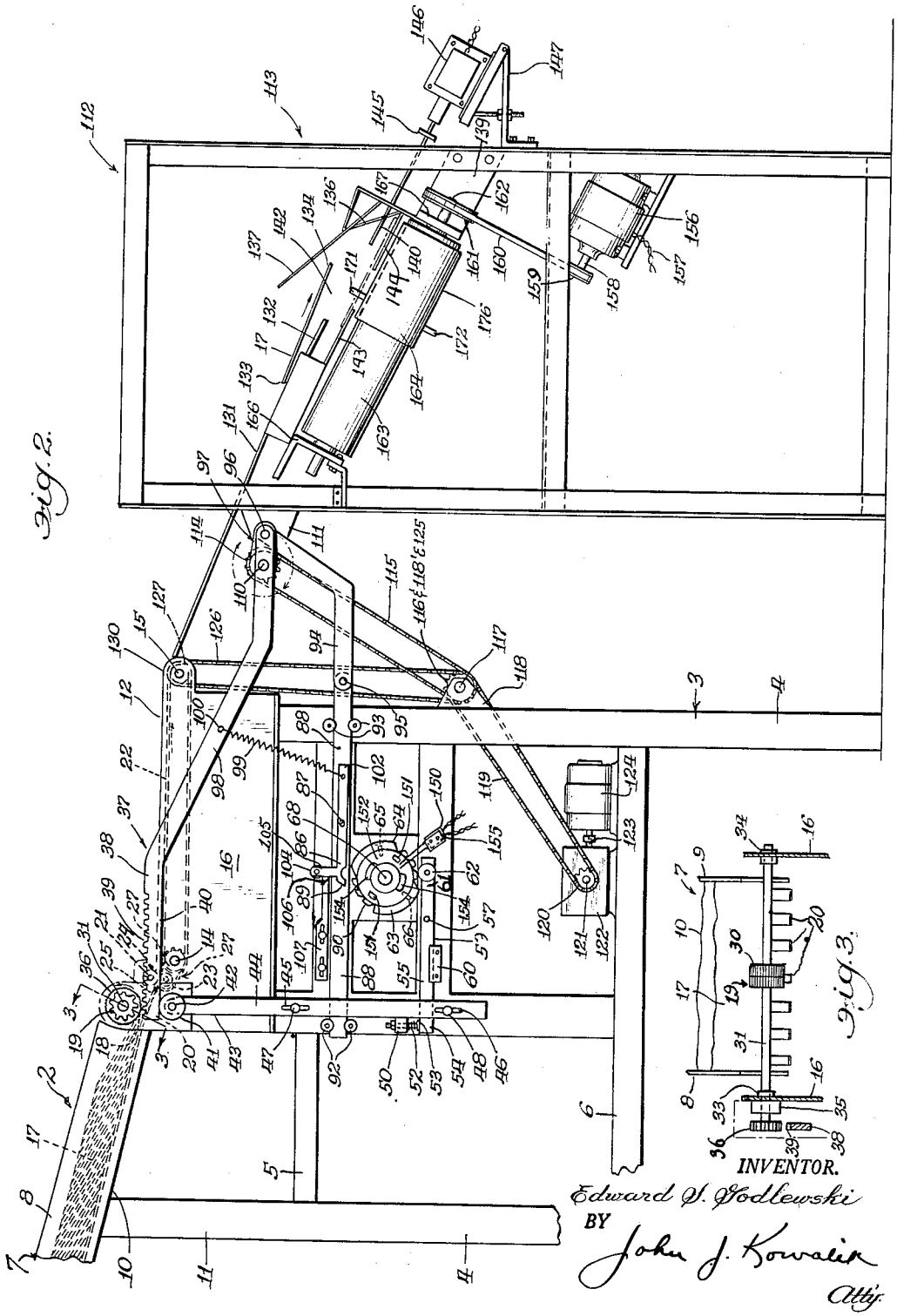


Fig. 2.

Fig. 3.

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COLLATING DEVICE

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This invention relates to a collating device and more specifically to a novel automatic mechanism for sorting and collecting a plurality of different items in a preset arrangement.

Present devices of this type are now only extremely complicated and expensive and require experienced maintenance and at best are poorly correlated, and with inexperienced help the problems of operation become complicated to such an extent that the equipment is not considered satisfactory for the average user.

A general object of the invention is to provide novel, simple and rugged equipment of this type which is easily operated and adjusted and so constructed that malfunctioning and individual attention is for all practical purposes eliminated.

A particular object is to provide a novel arrangement of feeders and drives therefor which obviates the difficulties normally considered inherent in such devices, the feeders being arranged to deliver to a gathering and conveying means which is arranged to accept items issued from the respective feeders and then after the feeding increment is completed to aggregate and carry it away while the next increment is being formed.

A more specific object of the invention is to provide a simple and efficient feeder mechanism and drive therefor which may be readily adjusted to feed different numbers of items.

The invention comprehends the provision of a bank of feeder mechanisms arranged to deliver items of different quantities to a collecting conveyor by way of intermediate depositories which function to periodically discharge onto trays positioned proximate to the conveyor and swept thereon by means in the nature of fingers carried by the conveyor.

These and other objects and advantages inherent in and encompassed by the invention will become more apparent from the specification and the drawings, wherein:

FIGURE 1 is a top perspective view of the novel collating device taken from the delivery end thereof;

FIGURE 2 is an enlarged end elevational view of the device;

FIGURE 3 is a reduced sectional view on line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary perspective view of the feed drive;

FIGURE 5 is a fragmentary perspective view of the feed drive taken from the side opposite that of FIGURE 4;

FIGURE 6 is a perspective view taken from the leading end of the device;

FIGURE 7 is a fragmentary perspective view taken from the leading end of the device at a higher elevational point than FIGURE 6 and from the outer side thereof, and

FIGURE 8 is a fragmentary top perspective view of the delivery stations.

Describing the invention in detail, there is shown in FIGURE 1 a collating device generally indicated 1 including a plurality of feeders 2, 2 each of which is substantially identical with the other. These feeders are arranged in side by side laterally aligned relationship and each comprises a frame 3 including support legs 4, with interconnecting upper and lower beams 5 and 6.

Each feeder proper includes a tray or chute or magazine 7 which has upstanding laterally spaced side flanges

8 and 9 and a bottom panel 10 which is mounted on extensions 11 of the legs 4 and is inclined toward a table 12 which is comprised of a power driven conveyor apron or draper belts 13 carried on rollers 14 and 15 suitably mounted on the side panels 16 of the support frame 3.

The tray or magazine 7 carries a stack of items which in the present instance are illustrated as cards such as Christmas or greeting cards 17 which are arranged shingle fashion and individually discharge into the intake nip 18 developed between an upper feeder, metering or pull out roller 19, and retarders 20 which are arranged in underposed relation to roller 19 and grasp each card 17 therewith in sequence and pursuant to rotation of the roller 19 in the direction indicated by the arrow in FIGURE 2 deliver to discharge rolls 21, 23 which are journalled on the sides 16 and draw each card therethrough and discharge the same onto the top run 22 of the conveyor belts 13.

The upper roller 21 has a cylindrical body mounted on a center shaft 24 (FIGURE 3) which is journalled for free rotation at its ends adjacent to the discharge end 25 of the magazine from suitable journal supports on the flanges 16. Roll 23 has a body on a center shaft mounted on panels 16, and has a sprocket and chain drive connection 27 to the shaft 14 of the conveyor 13.

The feeder roller 19 also has a cylindrical body 30 which is carried and driven by a center shaft 31 journalled adjacent to its ends as at 33 and 34 on the panels 16 which also form guides flanking the table or platform 12.

The shaft 31 mounts a one way drive clutch or means 35 which forms a one way driving connection from the spur gear 36 to the shaft 31. The gear 36 is intermittently driven by a novel drive mechanism generally indicated at 37 which comprises a rack 38 having a toothed upper edge 39 and a straight lower edge 40. The edge 39 as shown in FIGURE 2 is disengaged from gear 36 and is in a nondriving position. The lower edge 40 rides upon a roller 41 which is journalled as at 42 upon the upper end 43 of a vertical elongated push rod or actuator 44 which is slotted longitudinally at spaced areas as at 45 and 46 through which extend the guide bolts 47 and 48 which are threaded into an upright portion of the frame 3. The rod 44 is provided intermediate its ends with a lug 50 which mounts a yieldable adjustable spring loaded abutment 52 which engages the top edge 53 of one end 54 of an actuating lever 55 which is pivoted intermediate its ends as at 57 on a horizontal pin carried from frame 3. The lever 55 seats on its lower edge 59 in an area between the pivot 57 and end 54 on a stop 60 which limits downward movement of end 54 as well as of the standard or reciprocating rod 44.

The other end 61 of the lever 55 carries a roller 62 which is alternately engaged by the counting segments 63 and 64 which are of lengths such as desired, the segments being removably mounted as by screws 65 and 66 upon a mounting ring or wheel 67 which is keyed to shaft 68 which is also keyed to a driving ratchet wheel 69 and to a stop or control gear 70 of an escapement or retarder mechanism 71. The shaft 68 is journalled in a bearing 72 mounted on the support structure 73 of the frame 3.

The escapement gear 71 is provided with peripheral teeth 74 which are engaged by the rollers 75 and 76 which are of rubber or other elastomer material, the rollers 75 and 76 being rotatably mounted by pins 77 and 78 on levers 79 and 80 intermediate the ends thereof and yieldably urged against diametrically opposite sides of the gear 71 into the notches 81 between adjacent teeth by means of a biasing means in the form of a tension spring 82 connected to corresponding ends of the levers 79 and 80, the other ends of these levers being pivoted to frame 3 as by pins 84 and 85. The rollers 75 and 76 are of larger diameter than the spaces 81 between the teeth 74 so

that they ride thereover pursuant to actuation of the shaft 68 as it is driven by the pawl 86 which is pivotally mounted intermediate its ends at 87 upon the pitman 88 for engagement at its driving end 89 with the teeth 90 of ratchet 69 as the pitman which is guided between the spaced roller bearing assemblies 92 and 93 carried upon frame 3 is reciprocated by the driver 94 pivoted at 95 to the pitman 88, the driver being driven from the crank pin 96 of a crank 97. The pin 96 also journals and drives the arm extension 98 of the rack 38. The rack is yieldably held against the roller 41 by a spring 99 which is attached at one end as at 100 to the extension 98 and at the other end to the distal end 102 of the pawl 86 pivoting it about 87 into engagement of its driving end 89 with the teeth 90 and accommodating disengagement of the pawl as the roller 104 carried by the upstanding extension 105 on the pawl 86 rides over the ramp 106 of the lifting cam 107 which is adjustably mounted on the frame 3 and movable lengthwise of the pitman to govern the length of the stroke of the pawl.

The drive to the crank 97 is obtained from a shaft 110 which is journalled on pillow blocks 111 mounted on the frame 112 of the belt transfer conveyor or collecting mechanism 113. The shaft 110 is driven by a sprocket 114 which is driven by a chain 115 trained on a sprocket 116 mounted on a countershaft 117 which is journalled on pillow blocks 118 carried from the frame 3.

It will be noted that the countershaft extends the full length of the bank of feeders and delivers drive to the feed rollers of each unit as that in the unit shown in FIGURE 2. The countershaft 117 is also connected to a sprocket 118' which is driven by a chain 119 which is trained about sprocket 120 which is driven from the output shaft 121 of a gear box 122 carried by frame 3, the gear box having its input shaft 123 driven from a motor 124 also carried on frame 3.

The countershaft also drives a plurality of sprockets 125 one for each feeder, each sprocket 125 driving a chain 126 which drives a sprocket 127 of the roller and shaft assembly 115 at the discharge end 130 of the apron conveyor which discharges onto an inclined panel or slide 131 which angles downwardly away from the conveyor table 12 and at its lower extremity adjoins a downwardly offset ledge 132 forming a supporting for the trailing edges 133 of the cards as they slide off the inclined while the leading edges 134 of the cards 17 strike the diagonal stop wall 136 as the cards are guided by the fingers 137 which project diagonally upwardly from the backstop structure 138 which mounts on the brackets 139 carried from the frame 112. The cards are guided at their leading edges by the wall 136 to descend upon a plurality of fingers 140 which project through openings 141 in wall 136, the fingers providing a temporary support or intermediate station whereat the cards bridge the space 142 between the ledge 132 and the fingers 140 beneath which are positioned the ledges 143 and 144 which are disposed beneath the ledges 132 and fingers 140 respectively and provide a transfer station upon which the cards fall with their trailing edges riding off ledge 132 and the leading edge portions of the cards falling pursuant to withdrawal of the fingers 137 as the same are retracted by the bar 145 to which they are secured.

The bar 145 is actuated by a solenoid 146 mounted on a platform 147 carried by the frame 112. The solenoid is an exemplary form of actuating means, it being understood that any form of operating mechanism may be used such as mechanical linkage as is well known to those skilled in the art. In the present form of the invention the solenoid is actuated by a switch 150 which is mounted on the frame 3 and engages cams 151 on a drum or hub 152 which is connected to shaft 68 of one of the feeders, the cams 151 being so arranged that they actuate the solenoid to withdraw the fingers 140 when the feeder set to feed the most number of cards completes its run.

The drum 152 has other cam means 154 which are so positioned that immediately after the cards are dumped onto the transfer station they actuate a switch 155 and start the motor 156 through lines 157, the motor 156 having a shaft 158 driving a pulley 159 which drives a belt 160 trained about pulley 161 which is connected to shaft 162 which mounts a roller 163 carrying the transfer belt 164 at its discharge end 165 (FIGURE 1), the shaft 162 being journalled at opposite ends in longitudinal beams 166, 167 which extend along the lateral edges of the belt and from part of the frame 112. The belt extends the entire length of the bank of feeders and has a top run 170 which operates beneath the ledges 143 and 144. The belt is provided with a pair of sweeps or fingers 171 and 172 which are positioned to run through the slots 173 developed between the ledges 143 and 144 and to sweep the cards deposited on ledges or delivery station 143 and 144 onto the belt which carries the cards to the delivery end 165 of the conveyor. It will be seen that the belt 164 is carried at its pick-up end 174 on a roller assembly 175 journalled on the beams 166 and 167. The movement of the belt is controlled by the cam 154 and it will be seen that at each actuation the belt 164 runs only one half of its length, that is the top run moves from the pick-up end 174 to the delivery end 165 and the bottom run 176 moves from the delivery end to the pick-up end.

It will be noted that the paired ledges 143 and 144 of each feeder are spaced from those of the adjacent feeder lengthwise of the belt so that the cards fall onto the belt in the spaces indicated at 177.

It will be readily apparent that each station or feeder 2 is charged with different cards and that normally a different amount of each card is required to form a package. To vary the number of cards, different length cams 64 and 65 are mounted on the respective drums 67. The longer the cam the longer the driving period and the more cards issued. Each time the cam engages the end roller 62, the lever 55 is rotated clockwise (FIGURE 2) lifting member 44 upwardly and engaging rack 38 with the pinion 36. The sequence of operation commences with the feeding. Immediately after completion, the intermediate station is discharged, the cards dropping onto the transition station. The belt is then run half length sweeping the cards off the transition stations and moving them to the delivery end of the belt. While this is proceeding, the cycle is repeated.

I claim:

1. A collating device comprising a bank of feeders each including a magazine, cards therein, a feeding mechanism operatively associated with each magazine for individually feeding the cards therefrom, conveying and collecting means extending alongside said feeders and having an intermediate station adjacent to each feeder in receiving relation thereto and a transition station in receiving relation to the intermediate station, a conveyor belt in receiving relation to all of the transition stations and having means thereon sweeping the cards from the transition stations pursuant to movement of the belt, intermittent drive means for each feeding mechanism settable to drive the same to discharge a predetermined number of cards to respective intermediate stations and to periodically discontinue drive to the respective feeding mechanisms after the desired number of cards issue, and means for sequentially dumping said intermediate stations onto the transition stations after discontinuance of drive to said feeding mechanisms and then actuating said conveyor belt to sweep said transition stations.

2. The invention according to claim 1 and at least one of said intermittent drive means comprising a pinion having a one way driving connection to the respective feeding mechanism, a constantly driven rack underposed with respect to the pinion and movable between driving and disengaged positions with respect thereto, a constantly driven member having a plurality of sequentially arranged cams, a linkage operative between one of the cams and the rack

for positioning the latter into driving position to the pinion, said member having second and third cams operative respectively to actuate said dumping means and said belt conveyor.

3. The invention according to claim 1 and said intermediate station comprising a ledge at the delivery end of each feeding mechanism inclined downwardly and outwardly and a stop having a surface facing toward the related mechanism and spaced outwardly from the adjacent ledge, and fingers projecting from said stop in front of the surface and with the said ledge providing a support for the cards descending thereupon from the related mechanism, said fingers in dumping position withdrawing into the stop whereupon the cards thereon descend gravitationally onto the transition station attendant to sliding off the ledge.

4. The combination of a feeder comprising a magazine, feeding mechanism operatively associated therewith and comprising a roller, a pinion having a one way driving connection with the roller, a crank drive, a rack and a pitman operatively connected to the crank drive, shifting means supporting said rack adjacent to said pinion, ratchet wheel means supported adjacent to said pitman, a pawl pivoted on the pitman for engagement with the ratchet wheel means, cam means of selected lengths removably mounted on the ratchet wheel means and engageable with said shifting means for moving the same into engaging position of the rack with the pinion and disengageable from the shifting means for accommodating movement of the same to a position disengaging the rack from the pinion.

5. The invention according to claim 4 and common resilient means operative between the rack and the pawl and biasing the former into engaged position with the shifting means and the latter in driving relation to the ratchet wheel means.

6. A drive for a feeder element for a selected time interval to deliver a required number of items from an associated source, comprising a pinion having a driving connection with said element, a rack operative to move said pinion spaced vertically from the same in non-driving relation thereto, an actuator beneath the rack to drivingly position the same with respect to the pinion, driving means operatively connected to the rack for continuously reciprocating the same, and actuating means operatively connected to said driving means and having means driven by the driving means and operative to selectively move said actuator to lift the rack against the pinion for driving the same, said actuating means having a part slidably supporting said rock.

7. The invention according to claim 6 and said actuating means comprising a ratchet wheel, a pitman connected to the driving means and reciprocated thereby, pawl means mounted on the pitman in driving relation to the ratchet wheel, cam means connected to the ratchet wheel and movable thereby attendant to rotation of the ratchet wheel, and a lever engageable by the cam means disposed in moving relation to said actuator for moving it to said driving position thereof.

8. In a device of the class described, a generally horizontal feeding mechanism, a downwardly and outwardly inclined slide extending from the feeding mechanism, an intermediate station comprising first part including a ledge supported below the slide in receiving relation thereto and inclined downwardly and outwardly therefrom, and a second part spaced outwardly from the first part and comprising a stop facing the feeding mechanism, and at least one element movable through the stop to a position in front thereof and with said first part providing an article support, and a transition station beneath said intermediate station comprising a pair of generally coplanar sections disposed beneath respective parts, said element movable to a withdrawn article dumping position for depositing articles gravitationally upon the transition station.

9. In a collating device, a bank of feeders each arranged to discharge different articles, an intermediate station at each feeder receiving therefrom, a transition station beneath each intermediate station, a conveyor disposed in collecting relation to said transition stations, and means for sequentially operating said feeding means for delivery of articles to the transition stations, then terminating operation of the feeding means, then discharging the intermediate stations onto the transition stations, then actuating the conveyor to collect off the transition stations while simultaneously operating the feeding means to deliver articles to the intermediate stations.

10. In a device of the class described, a feeder, driving means therefor, an intermediate station receiving from the feeder, and a transition station beneath the intermediate station in accepting relation thereto, said transition station comprising a pair of laterally spaced portions defining a slot therebetween, a belt conveyor having a top run movable beneath the transition station and carrying a finger aligned to move through the slot for sweeping articles off the transition station pursuant to movement of the belt, and means discharging said transition station and actuating the belt at predetermined periods and timed and actuated by said driving means for the feeder.

11. A drive for a generally horizontal feeder roll of a collating device comprising a pinion, a one way driving connection between the roll and pinion, a reciprocating rack movable to and from driving relation with the pinion, shifting means for moving the rack between said positions thereof, and means for operating the shifting means comprising a rotary structure including cam means rotatable with said rotary structure to engaging position with the shifting means pursuant to rotation of said structure and to disengaged position with respect to said shifting means, means for incrementally rotating the structure, and escapement mechanism connected to the structure governing movement thereof to substantially uniform increments, and said escapement mechanism comprising a gear having peripheral teeth with spaces of predetermined width therebetween, and a lever-carried spring biased resilient roller of a diameter larger than the spaces entered partially into one of the spaces and in engagement with adjacent teeth, and another lever-mounted resiliently biased yieldable roller entered partially into another space diametrically opposite the one space.

12. In a collating device, the combination of a magazine, a feeding mechanism therefor including a drive shaft, means for intermittently driving the shaft comprising a pinion having a driving connection with the shaft, a rack beneath the pinion, means movably supporting the rack for raising and lowering the same between engaged and disengaged positions and comprising a vertical push rod, abutment means thereon a lever of the first class having one end supporting the rod through said abutment means, a rotatable structure having peripheral cams disposed to move in a path engaging the other end of the lever for pivoting the same and elevating the rod to raise the rack, a ratchet wheel connected to the rotatable structure, a reciprocal element, crank means drivingly connected to the rack and the element reciprocating the same, a pawl pivoted on the element and drivingly engaging the ratchet wheel, and cam means engageable with the pawl for elevating the same from the ratchet wheel to disengaged position with respect thereto.

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