United States Patent

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[54] **FEEDER**
19 Claims, 7 Drawing Figs.

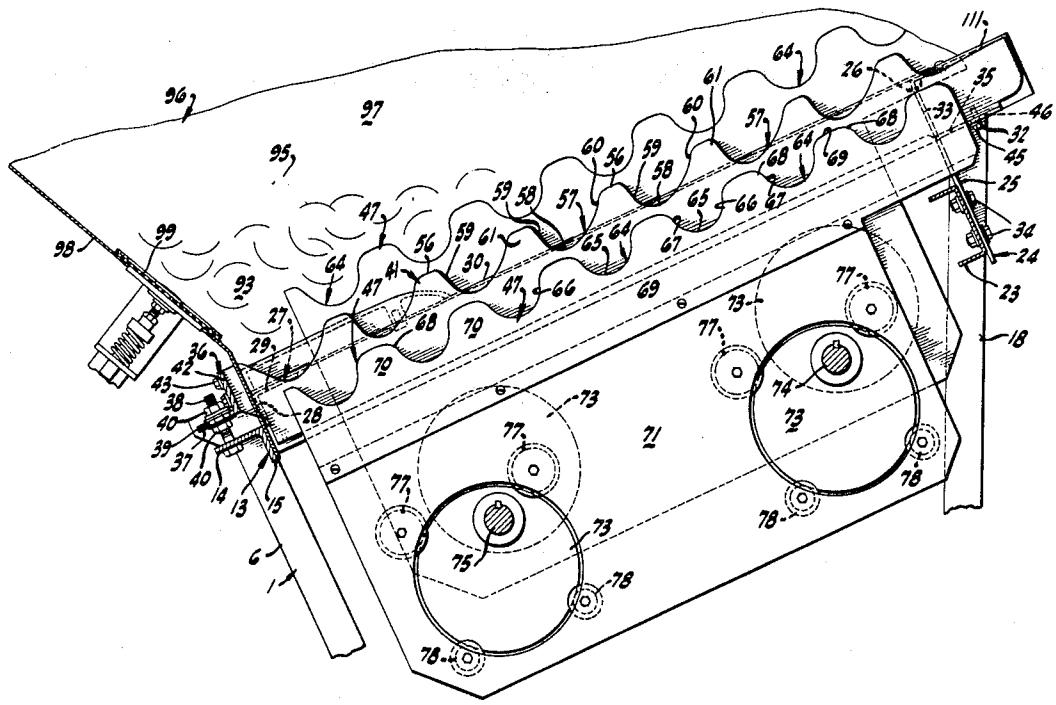
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[51] **Int. Cl.** **B65g 47/26;** B65a 25/02
[50] **Field of Search** 198/30, 32, 33R1, 45, 46, 219

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ABSTRACT: A step-by-step conveyor for picking up articles of similar size from a bulk mass thereof and moving them up an inclined path to a discharge point for discharging them at said discharge point, said conveyor including supports for carrying said articles equally spaced from each other in a row extending longitudinally of said path during said movement, and also providing means for relieving said supports from surplus articles to provide for discharge of a single article from each support at said discharge point at equally spaced intervals, without injury to said articles.



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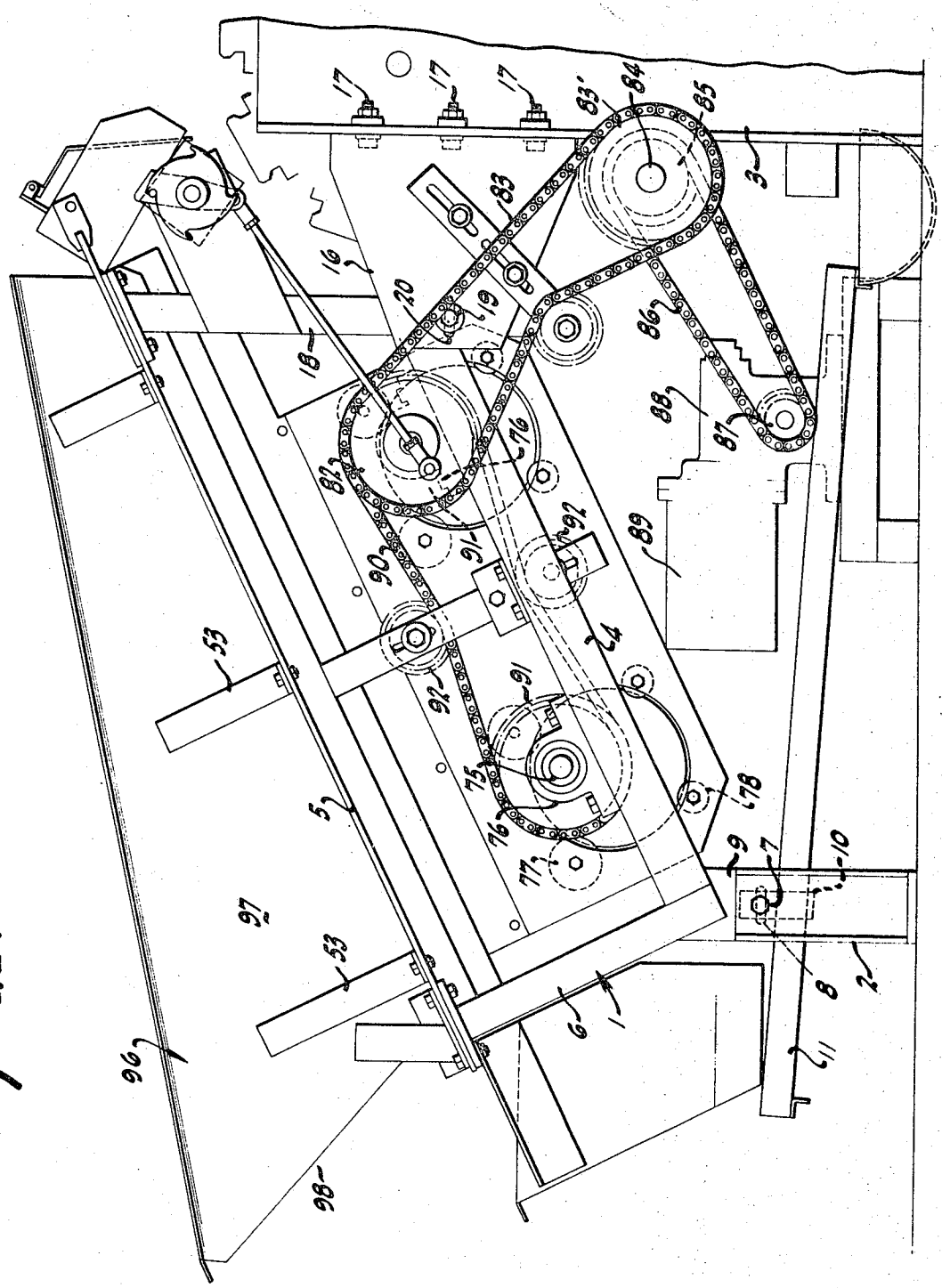


FIG. 1

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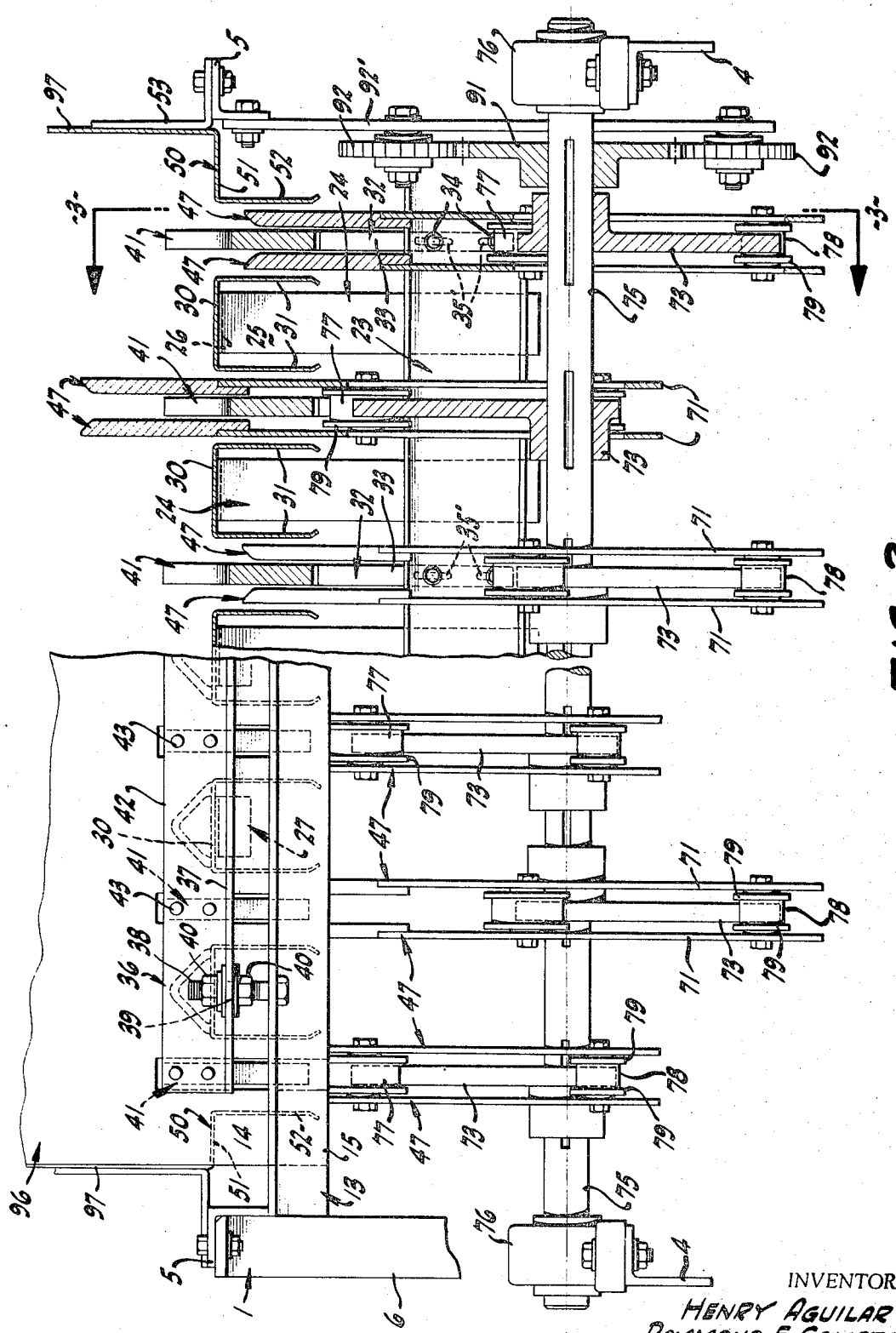


FIG-2

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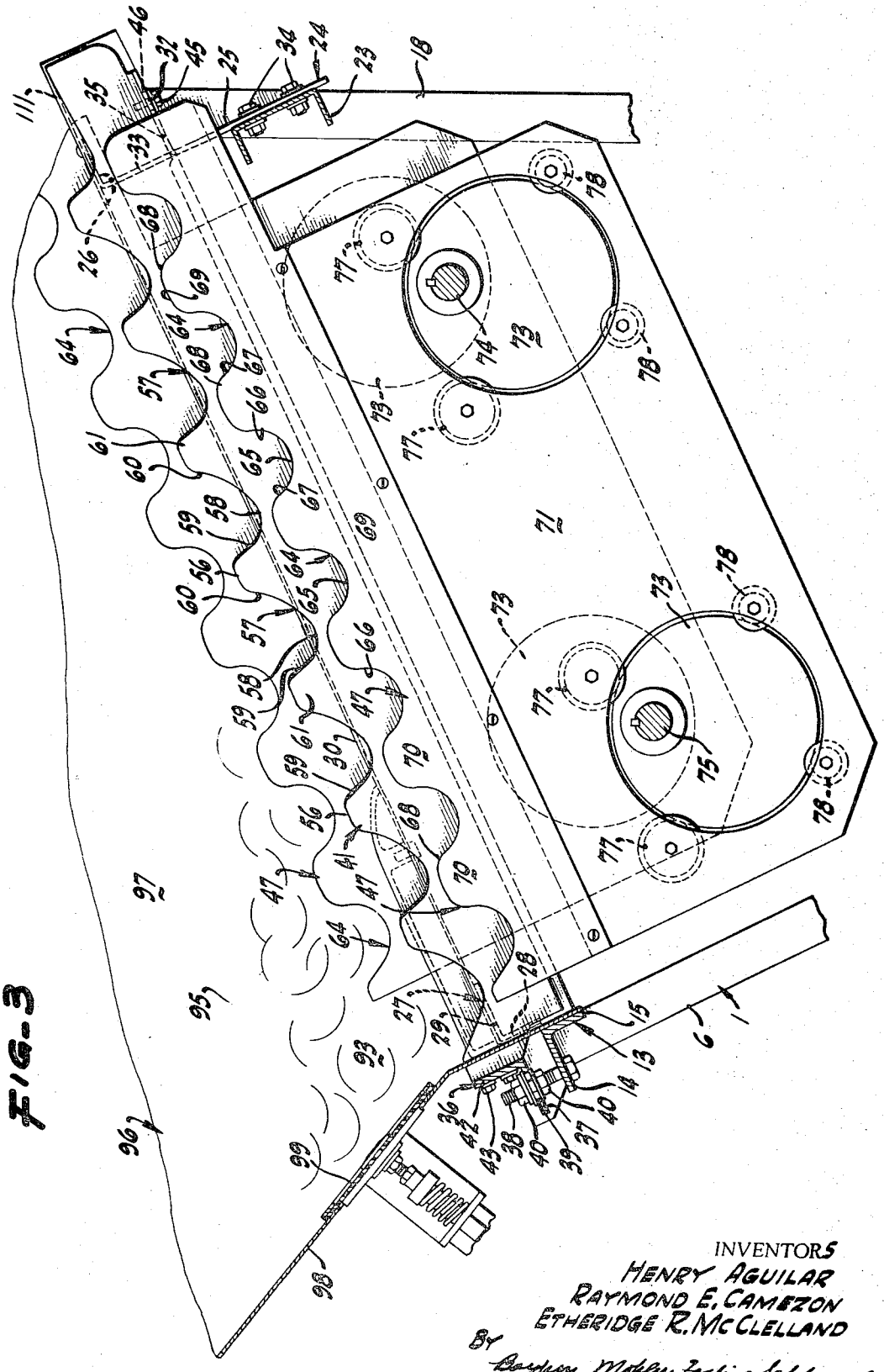


FIG. 3

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FIG-4

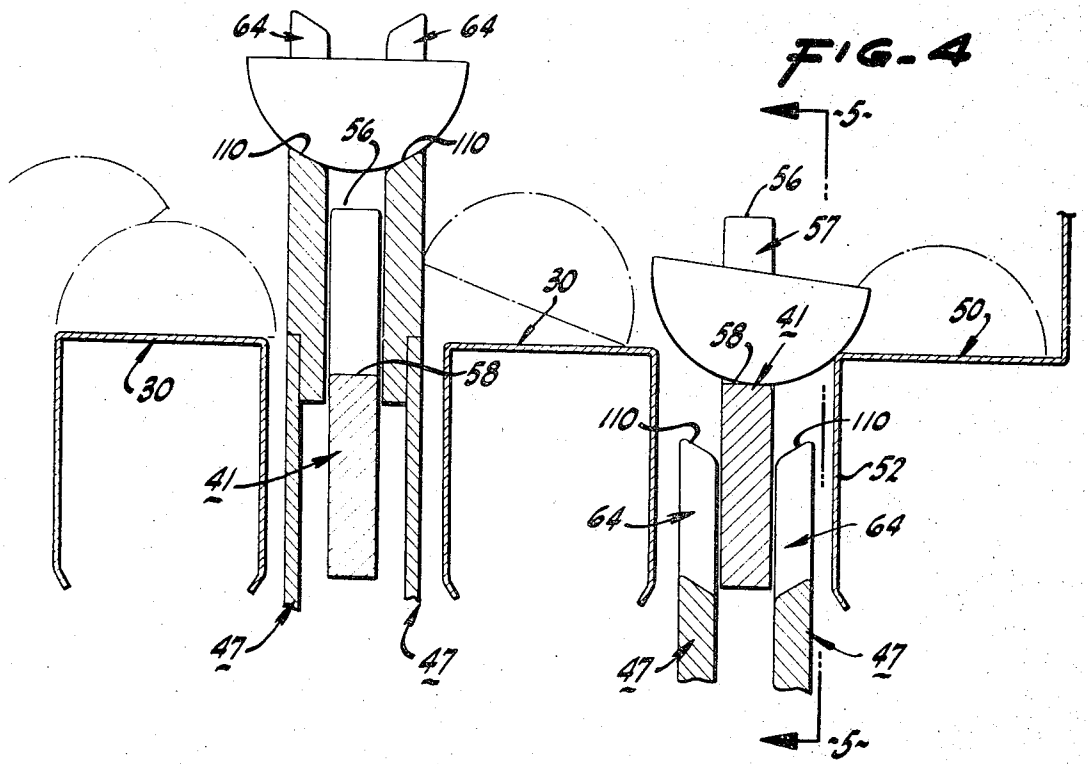
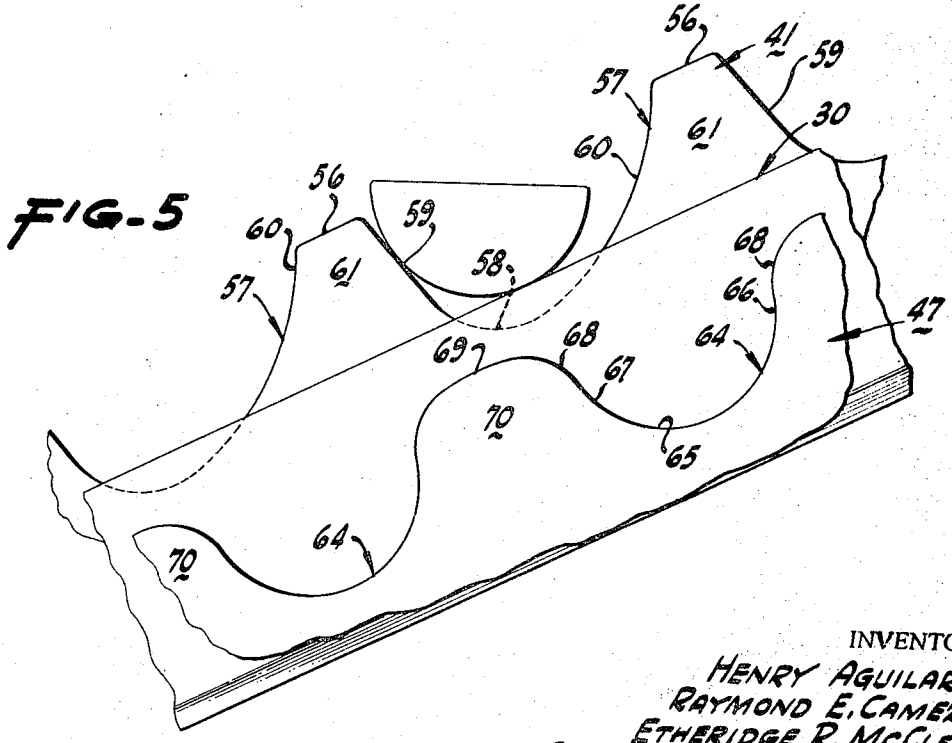


FIG-5



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FIG. 6

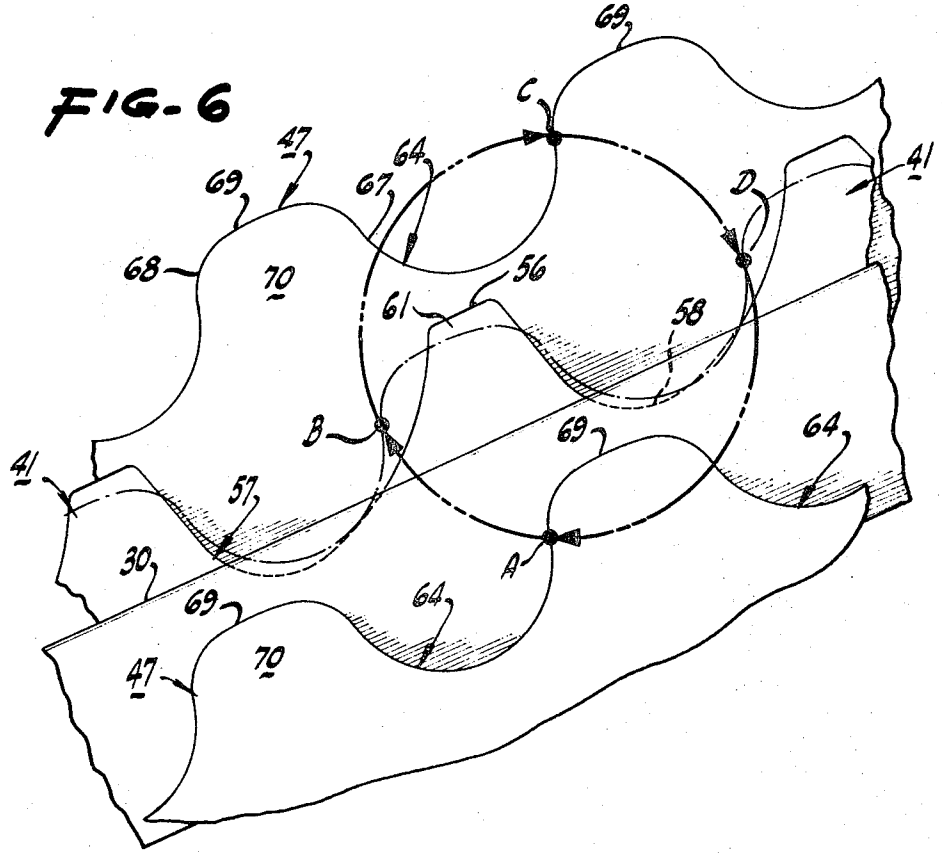
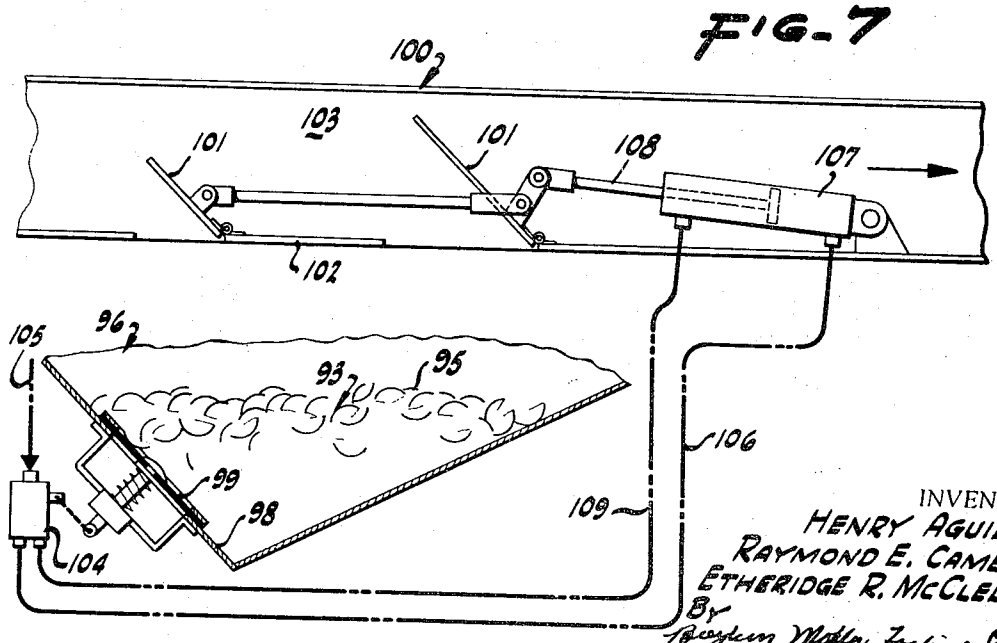


FIG. 7



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BRIEF SUMMARY OF THE INVENTION

One of the principal difficulties in step-by-step movement of a row of fruit halves, such as peach halves, longitudinally of said row for intermittent discharge of single halves only at one end of said row, is to prevent the simultaneous discharge of two or more halves or doubles, at the discharge end of the row. When the present invention is operated to its capacity, the discharge or feeding of doubles, or more, at the discharge end is reduced to a negligible degree, as compared to approximately 10 percent to approximately 20 percent in the case of prior shuffle-type feeders that have attempted to accomplish similar results, and one of the objects of this invention is the substantial elimination of simultaneous discharge of more than one-half at a time.

Another object of this invention is the provision of a method, and means for feeding single objects that may be symmetrical or nonsymmetrical, one at a time, at predetermined spaced intervals, in a system in which it is desirous that the articles or objects are so fed one at a time for further handling.

Another object is the provision of a bulk to single row feeder in which the articles so fed are not injured by displaced surplus objects or articles, and in which such surplus objects are automatically returned to a bulk mass of articles for repositioning to single rows and in spaced relation in said rows for feeding one at a time at uniform intervals.

Other objects and advantages will appear in the description and drawings.

DESCRIPTION OF DRAWINGS

FIG. 1 is a side elevational view of the feeder.

FIG. 2 is a part sectional and part elevational enlarged end view of the feeder of FIG. 1 as seen from the left end of the latter.

FIG. 3 is a fragmentary enlarged cross-sectional view taken along line 3–3 of FIG. 2.

FIG. 4 is a fragmentary, cross-sectional view of the structure shown in FIG. 2, with several drupe halves indicated in elevation and in dot-dash lines.

FIG. 5 is a semischematic fragmentary view taken along line 5–5 of FIG. 4, showing the control for the mass of objects to be fed.

FIG. 6 is a fragmentary view similar to FIG. 5, showing different corresponding points on an adjacent pair of drupe moving elements.

FIG. 7 is a semischematic view showing the means for feeding articles into the hopper of FIG. 3 and for maintaining the desired level of the load in the hopper.

DETAILED DESCRIPTION

The machine illustrated comprises a main frame, generally designated 1, adapted to be supported on a floor by rear legs 2 and front legs 3. Frame 1 is inclined upwardly from its rear to its forward or front end and includes correspondingly upwardly inclined lower, parallel, horizontally spaced side frame members 4 and upper side frame members 5 spaced above and parallel with said lower side frame members.

The words "forward, forwardly, rear," and "rearwardly," and words of similar meaning, are used with respect to the direction of movement of the articles that are fed, said articles being advanced from the lower end of the frame, forwardly, to the upper end of the latter.

The articles or objects fed will be designated "peach halves," with the understanding that it is not limited to such articles, but is successfully used in feeding peach halves, which are particularly difficult to feed, one at a time at uniformly spaced intervals of time.

Upwardly and rearwardly inclined extensions 6 (FIG. 1) are adjustably secured to legs 2 by bolts 7 that extend through horizontally extending slots 8 formed in plates 9 that are rigid with extensions 6 and that project downwardly from said extensions alongside legs 2. Bolts 7 also extend through angle

members 10 that support a pan 11 extending under the machine from end-to-end of the latter. Pan 11 may pivot about bolts 7 for draining forwardly to a suitable flume or drain outlet, any water falling into the pan, (FIG. 1).

The upper ends of the upward extensions 6 of legs 2 are connected by a cross frame member 13 which is an angle strip and has an upper flange 14 generally horizontally disposed and perpendicular to the extensions 6, and the other flange 15 depends from the forward edge of flange 14 and is parallel with extensions 6, (FIG. 3).

Brackets 16 are bolted at 17 to the upper end portions of the forward legs and project rearwardly therefrom, and which brackets are secured to upwardly-extending frame members 18 which, in turn, are secured to the forward ends of side frame members 4 and 5 by bolts 19 that extend through horizontal slots 20 in said brackets, (FIG. 1).

A channel strip 23 extends between and is secured at its ends to the frame members 18, one of the latter being at each of the opposite sides of the frame.

A plurality of vertically elongated angle pieces 24 are horizontally spaced between side frame members 18 at the forward end of the frame 1, each of which pieces has a relatively long, generally vertically extending leg 25 that may be welded or otherwise suitable secured to the cross frame channel strip 23, and a shorter leg 26 extends forwardly from the upper end of leg 25.

Referring to the rear end of the machine, a plurality of angle pieces 27 are in opposed relation to the angle pieces 24 that are at the forward end of the machine, and which pieces each have a depending leg 28 secured to frame 1 and a generally horizontally extending leg 29 extending forwardly therefrom. Legs 26 and 29 of the angle pieces 24, 27 are coplanar and at the same inclination relative to horizontal as the side frame members 5.

A plurality of parallel inverted channel strips 30 are secured at their ends to the aforesaid legs 26, 29 of angle pieces 24, 27, said legs extending between the sides 31 of said channel strips, with the sides of adjacent pairs of channel strips 30 being spaced from each other. As will later be described more in detail, the upper planar surfaces of the inverted channel strips 30 provide planar slide plates on which fruit is adapted to slide rearwardly and downwardly.

Equally spaced between the angle pieces 24 at the forward end of the machine, and also secured to the forward cross frame member 23, are angle members generally designated 32, each having a vertical leg 33 bolted by a pair of vertically spaced bolts 34 to said cross frame member 23, and a forwardly extending upper leg 35. Bolts 34 extend through vertically extending slots 35' in said legs 33 so that said angle pieces 32 are vertically adjustable to different levels.

At the rear end of the machine, an upper angle strip 36 extends transversely between, but spaced from, the upper ends of the extensions 6 of rear legs 2, and which angle strip has a rearwardly projecting upper flange 37 that is spaced above flange 14 of the rear cross frame member or angle strip 13. A bolt 38, rigid with the flange 14, adjacent each of the ends of flange 37, and between said ends, extends upwardly through a slot 39 (FIG. 3) formed in flange 37. Each slot 39 extends longitudinally of the machine thus enabling forward and rearward adjustment of the strip 36 Nuts 40 above and below flange 37 serve to lock the strip 36 in adjusted position.

Extending forwardly from angle strip 36 at substantially the same inclination as the side frame members 5 is a horizontally extending row of elongated rails 41, which rails are relatively thick strips of metal, transversely thereof, and of a substantially greater dimension vertically. These rails may be rectangular in cross-sectional contour, their ends at angle strip 36 being bolted against the vertically upstanding flange 42 by screws 43.

The upper forward ends of rails 41 extend over and each is bolted to the upper leg 35 of each angle member 32 by a screw 45 that extends through a slot 46 extending longitudinally of each leg 35 and into the rails 41, thereby enabling longitudinal

adjustment of rails 41 upon loosening screws 45, and nuts 40, and generally vertical adjustment of said rails is enabled upon loosening nuts 40 on bolts 38 and bolts 34 and resetting them. It is important that rails 41 have these two adjustments, as will later appear.

There may be any desired number of rails 41, and as the action of each is the same, a detailed description of one and the elements associated therewith will be adequate. It is to be understood that the invention is not to be necessarily limited to the dimensions given. Such dimensions as are given have been found to be satisfactory where the halves of peaches of different diameters are fed.

Slightly spaced at each of the opposite sides of each rail 41 is one of a pair of generally horizontally elongated, vertically disposed plates 47 in a parallel side-by-side relation to rail 41. These may be called outer plates, and they have substantially the same inclination relative to horizontal, as rails 41, which rails may be inclined at an angle of approximately 25° to 30° relative to horizontal, with their rear ends lowermost.

Said outer plates 47 may be thinner than the central rail 41 that is between them. In feeding peach halves, the thickness of each outer plate may be approximately 0.5 inches and that of the central rail approximately 0.8 inches to 1.0 inches, with the outer plates equally spaced from the inner rail, and approximately 1.0 inches to 1.25 inches apart. These dimensions may be varied to suit conditions and the objects to be fed.

The inverted channel strips 30 are each disposed between an adjacent pair of assemblies, each assembly being a rail 41 and the pair of plates 47 at opposite sides thereof. In the drawings, an even number of such assemblies are shown in a horizontal row in parallel side-by-side relation, and outwardly of each end assembly of the row is an angle strip 50 (FIG. 2) having an upper flange 51 having an upper surface that is coplanar with the horizontal upper surfaces of the inverted channel strips 30. Flange 52 faces the outer side plate 47 of the outer assembly of rails 41 and plates 47 and is of the same vertical width as the sidewalls 31 of the channel strips 30. Each strip 50 is rigidly secured to a bracket 53 that, in turn, is secured to a portion of the fixed frame 1.

Referring specifically to rails 41, the upper edge 56 of each rail is square in cross-sectional contour transversely of the rail, and said upper edge is formed with equally spaced recesses 57, of greater length, longitudinally of the rail, than of vertical depth, and the vertical depth of each recess may be slightly less than the maximum diameter of peaches to be moved.

The sides and bottoms of each recess 57 are of concave linear contour, with the rear end portion of each recess deeper than the forward portion and of substantially circular curvature 58 with a generally forwardly facing and vertically extending rear side 59 that meets the uppermost edge of the rail at almost a right angle, while the forward side 60 meets the uppermost edge 56 of the rail at a substantially oblique angle. The part 61 between adjacent recesses may be called a tooth, and the uppermost edge 56 of the rail defines the upper edge of each tooth. The width of each tooth longitudinally of the rail at edge 56 may be only approximately a fifth of the length of the open upper side of each recess.

The upwardly inclined uppermost surfaces of the inverted channel strips 30 and angle strips 50 (which are horizontal in cross-sectional contour transversely of the strips) are coplanar, and parallel with rails 41, at a level that is spaced slightly below the level of the lowermost portions 58 of recesses so that said strips 30, 50 will cooperate with the portion of each rail at each recess 57 to form two lateral opposite sides of a pocket with the rear and forward edges or sides 59, 60 forming the forward and rear sides of the pocket (FIGS. 3, 4).

The outer plates 47 at opposite sides of each rail are each formed with a row of corresponding, upwardly opening, equally spaced recesses 64 of the same number in each row as the number of recesses 57 in each rail 41. The open upper side of each recess 64 may be of approximately equal to the diameter of the maximum sized fruit, or peach half to be fed. The recesses 64 in the pair of plates 47 at opposite sides of each rail are in alignment at right angles to the plates and rail. The bottom edges 65 of recesses 64 have a concave linearly extending curvature approximately corresponding to the convex curvature of the outer surface of a peach, and the front side 66 and rear side 67 of each recess 64 extend divergently upwardly and tangentially of the curvature of the lower edge 65. The upper ends of the front and rear sides 66, 67 are convexly rounded as at 68 and the upper edge 69 extending between the rounded forward and rear side of adjacent pairs of said recesses is slightly convex, linearly of said edge and may slant slightly upwardly relative to the longitudinal axis of the plates 47. The portion 70 between adjacent recesses 64 is substantially longer than the width of each tooth 61 on rail 41.

The outer plates 47 have corresponding downward extensions 71 thereon and rigid therewith, providing a pair of such extensions for each assembly of a rail 41 and the plates 47 at opposite sides thereof. Insofar as the operation is concerned, these extensions 71 may be considered as integral with plates 47, but they are substantially thinner than plates 47, (FIG. 2).

Each pair of plates 47 at opposite sides of each rail 41 is carried on a pair of corresponding eccentrics 73. The eccentrics of each such pair are spaced longitudinally of the plates and are rigid on a pair of parallel shafts 74, 75 that, in turn, extend normal to the parallel planes of each pair of plates 47, with the axes of said shafts disposed on an inclined line parallel with the longitudinal axes of said plates. Bearings 76 on the lower side frame members 4 rotatably support said shafts at their ends, and shaft 74 is the upper of the two shafts.

Two sets of four flanged rollers respectively disposed between and carried by the pair of plates 47 of each assembly of a rail 41 and the plates 47 at opposite sides thereof support the plates 47 of each such assembly on a pair of said eccentrics 73 that are respectively on shafts 74, 75, (FIG. 1).

Each set of four rollers comprises an upper pair of rollers 77 and a lower pair of rollers 78, with the axes of rotation of the upper pair, and the lower pair being parallel with shafts 74, 75, said axes of the upper pairs of said sets and of said lower pairs, being in parallel vertically spaced planes parallel with the longitudinal axes of plates 47 and rails 41. The diameters of the rollers 77 are the same and preferably larger than the diameters of the lower pairs, and flanges 79 extend over opposite sides of the eccentrics therebetween.

The upper shaft 74 has a sprocket wheel 82 that, in turn, may be connected by a chain 83 with a sprocket wheel 83' on a shaft 84 supported on bearings carried by front legs 3 of the machine. A second sprocket wheel 85 on shaft 84 may be connected by a chain 86 with a sprocket wheel 87 on the output shaft of a gear box 88 connected with a motor 89. Shafts 74, 75 are connected for rotation by sprocket chain 90 that extends over sprocket wheels 91 of corresponding diameters on shafts 74, 75.

In the present invention, the chain 90 should be kept tight, and this is accomplished by a pair of sprocket wheels 92 (FIG. 1) respectively engaging the upper and lower runs of the chain 90 centrally between the sprocket wheels 91, said tightening wheels 92 being independently adjustable toward each other on the opposite end portions of a vertical bar 92' secured to the lower side frame member 4.

This arrangement of engaging both of the said chains by the chain-tightening sprockets and providing for independent adjustment of the chain-tightening sprockets maintain the desired balance of forces on the eccentrics 73.

By the foregoing arrangement, motor 89, when actuated, will effect bodily circular movement of plates 47 (clockwise as seen in FIG. 6) while said plates 47 are, at the same time, maintained parallel with the rails 41 during said movement.

In the machine illustrated, there is shown an even number of assemblies of rails 41 and plates 47 and the space between each adjacent pair of assemblies is preferably greater than the maximum diameter of the fruit or peach halves that are to be fed by the machine. Also, the width of the flange 51 of angle strips 50 outwardly of the end assemblies is preferably wider than the maximum diameter of a peach half.

The eccentrics 73 of alternate assemblies in the row thereof on shafts 74, 75 are oppositely offset to opposite sides of said shafts so that the pairs of plates 47 will counterbalance each other during rotation of shafts 74, 75 and the movement of said plates 47 in their circular paths.

Each pair of plates 47 is supported on a pair of said eccentrics 73 for movement in circular paths from lower position A (FIG. 6) in which their upper edges 69 are spaced below the lower edges 58 of rails 41, rearwardly and upwardly through dotted position B and forwardly through position C and then forwardly and downwardly through position D and finally downwardly and rearwardly to position A.

In moving from position A to B, each pair of plates move upwardly to a position in which peach halves seated in recesses 57 in each rail 41 will be lifted out of said recesses by plates 47 in a position in the recesses 64 in plates 47 and straddling the space between the plates 47 of said pair, and will be carried upwardly and over the teeth 61 that are forwardly of the recesses 57 from which the halves have been lifted when the plates 47 are at position B. When the plates are in position D, the peach halves or articles carried by the plates 47 will be deposited in the pocket hereinbefore mentioned, that is formed by the cooperation between the edges of the channel strips 30 and sides or edges of recesses 57 in rails 41. The peach halves in such pockets will not roll backward toward the lower ends of the rails although, as the recesses 64 in plates 47 move downwardly toward position A, halves that may be forwardly of the teeth 61 may fall forwardly, since the upper open sides of recesses 57 are considerably wider than the diameters of the fruit being fed.

A mass 93 of peach halves covers the lower end portions only of the rails 41 and plates 47 to approximately a level 95, the upper end of which level is approximately midway between the ends of the rails 41. This mass of peach halves is in a hopper generally designated 96 having vertical sides 97, and a rear wall 98 that extends slantingly rearwardly and upwardly from the lower end portions of rails 41. A flexible diaphragm 99 in rear wall 98 reacts to move rearwardly under the weight of the mass of halves 93.

One run of conventional merry-go-round conveyor 100 (FIG. 7) extends over the upper open side of the hopper 96, which conveyor is diagrammatically disposed vertical in FIG. 7, but actually is horizontal, and includes swinging gates 101 in the vertical fence 102 along one edge of the conveyor. These gates extend different distances across the feed portion 103 of conveyor 100 when open, and when swung to said open position they deflect peach halves on said conveyor 103 through openings in said fence normally closed by the latter. The peach halves so deflected fall into hopper 96 at its rear end, and when the level of the peach halves is approximately at level 95 the movement of the diaphragm 99 under the force of the mass 93 actuates an air valve 104 that is in an air pressure line 105 to conduct such air through a line 106 to one end of air cylinder 107 for moving a plunger in said cylinder outwardly. Piston rod 108 connected with said plunger is connected, in turn, with gates 101 to close the gates for shutting off the flow of peach halves into the hopper until the pressure of the peaches against said diaphragm enables the latter to move back toward normal, and to thereby actuate the valve 104 for switching the air from line 106 to a line 109 leading to the opposite end of cylinder 107, to thereby retract the piston rod 108 for opening gates 101, whereupon fruit will again be fed into the hopper.

The adjacent upper corners of the plates 47 of the pair of each assembly with a rail 41 therebetween are convexly rounded, as at 110 (FIG. 4). This contributes to centering the peach halves, or other objects, over the rail 41 so that the halves will remain in a line above each rail as they are advanced, step-by-step to the upper ends of the rails for discharge, one at a time at equally spaced intervals from said upper ends.

The regulation of the depth of the mass 93 of drupe halves over the lower ends of plates 47 prevents injury to the halves that are picked up or engaged by said plates during their movement in their circular paths, through engagement with other halves in said mass, and the slant of the rails 41 and plates 47 relative to the mass of halves is such that the halves that straddle the space between the plates of each pair, and that extend across the rail 41 between such plates, will not tend to be dislodged, and will quickly be advanced out of the mass 93.

If more than one half is picked up in the recesses 64 of plates 47 during upward movement of the plates, the least securely supported half will normally be dislodged, either by being overbalanced to one side or the other of the pair of plates or by engagement with other halves in mass 93 of halves.

As the halves are advanced out of the mass 93, at the end of each forward advance the halves in recesses 64 are deposited on the adjacent edges of the strips 30 or 50 that are at opposite outer sides of the plates 47, and surplus halves are dislodged at this point, due to the sudden cessation in downward movement of the halves and the fact that the halves in recesses 64, which may be supported by the rear and forward sides of said recesses, are no longer supported against the forward edge and may fall forwardly against the forward edge 60 of the recess 57 in the rail. The result is that only approximately 1.8 percent of the peach halves advanced in recesses 57 will be doubles, as distinguished from approximately 8 percent to approximately 20 percent in conventional feeders.

The surplus halves that are dislodged from recesses 64 will be deposited onto the strips 30 between the pairs of plates 47 of the respective assemblies or on strips 50 for sliding back to the mass 93 for again being picked up.

At the upper ends of the rails 47 beyond the uppermost recesses 57 therein the fruit halves are deposited on a transversely extending plate 111 disposed over and secured on the upper ends of rails 47, which plate may be slotted to pass the upper end portions of the plates 47 during their downward movement, and the halves so deposited are pushed forwardly off the plate by each forward movement of plates 47 and may fall into individual chutes or guides for successive movement to a conveyor or other apparatus for further processing.

The provision for the adjustment of rails 41 both longitudinally thereof and vertically, enables adjusting the relation between the recesses 57 and 64 of the rails 41 and plates 47 for feeding different articles. Also the relationship of the teeth 61 on the rail relative to the sides of the recesses 64 in plates 47 may be modified. These adjustments enable adapting the feeder to feeding articles of different kinds having different sizes and contours. However, where adjusted for peach halves, once the adjustment is made for average sized halves, the feeder satisfactorily delivers halves of maximum and minimum diameters.

I claim:

1. The method of feeding objects, one at a time, from one end of a row thereof that comprises the steps of:

a. engaging one of the correspondingly positioned sides of said articles at single points in a vertical plane and holding said articles at said points against movement in one direction longitudinally of said row;

b. intermittently advancing said objects longitudinally of said row in an opposite direction to said one direction, by simultaneously engaging said objects at a pair of points at opposite sides of said plane and lifting said objects in said opposite direction in a series of corresponding, upwardly arcuate paths of travel in end-to-end relation;

c. supporting said objects at the end of each of said arcuate paths between said advances at a pair of spaced points respectively at opposite sides of said plane and spaced outwardly of the points of said first-mentioned pair, and while said articles are held against movement in said one direction at said single points, whereby articles in said row will automatically center themselves in the latter relative to said plane and between said pairs of spaced points during and between said advances in said upwardly arcuate planes.

2. The method of feeding objects, one at a time, from a row thereof that comprises the steps of:

a. supporting a plurality of said objects in an upwardly inclined row in a vertical plane in spaced relation at uniformly spaced points and holding said objects in said plane against movement down the incline of said row;

b. intermittently advancing the objects in said row longitudinally thereof and up the incline of said row by simultaneously bodily lifting said objects in a series of upwardly arcuate, semicircular, paths that are in end-to-end relation and which paths are each of substantially the same length as the spacing between adjacent pairs of said objects;

c. bodily depositing each of said objects at the end of the advance of the latter in each of said semicircular paths in a stationary pocket for holding said objects between intermittent advances thereof;

d. laterally displacing from said row to the side of said vertical plane objects that may be held in said pockets in excess of a predetermined number during said intermittent advances; and

e. successively discharging said objects, one at a time, from the upper end of said row.

3. The method as defined in claim 2 that includes the step of: conducting the objects displaced laterally from said row, by gravity, back to the lower end of said row for repositioning in said row at the lower end of the latter.

4. The method as defined in claim 3 that includes the step of: supporting from below each object that is substantially centered in said plane at a pair of points at opposite sides of said plane during the advance of each object, and supporting each object, so centered, against movement down the incline of each row solely at a single point in said plane and at the side of each object that generally faces toward the lower end of said row, whereby objects projecting a substantially greater position to one side of said plane than the other will be displaced out of said row laterally thereof for said movement back to the lower end of said row.

5. In the method as defined in claim 2: the deposit of each of said objects at the end of the advance of each article in its semicircular path being in a stationary pocket and lifting of each object at the beginning of each advance thereof, being relatively abrupt whereby the influence of the force of gravity on any objects superposed on objects in said row will be augmented for displacing said objects, so superposed, from said plane and row.

6. The method of feeding substantially hemispherical drupe halves, each having a planar cut face at the side opposite its hemisphere convex surface, one at a time, from rows thereof, that includes the steps of:

a. substantially simultaneously separating from a bulk mass of indiscriminately arranged halves a plurality thereof disposed in parallel, upwardly inclined rows in side-by-side relation with said rows in vertical planes and with said halves positioned at points spaced-apart in each of said rows and held at said points against movement, by gravity, down the incline of each row, in the plane of the latter;

b. intermittently and simultaneously advancing the halves in each row up the incline thereof and outwardly of said mass in a series of upwardly arcuate, approximately semicircular, corresponding paths respectively in end-to-end relation in each row; and

c. laterally displacing into the space at opposite sides of each row halves that may be held at said points in excess of one, and conducting the halves so displaced directly back to said mass along straight paths of travel at the sides of said rows whereby a single half at each point will be delivered, one at a time, to the upper terminal ends of said rows for discharge therefrom.

7. In the method as defined in claim 6:

a. supporting said bulk mass of halves over the lower end portion only of said row; and

b. replenishing said mass of halves during advance of said halves therefrom to maintain a supply of said halves over said lower portion only of said row.

8. Apparatus for delivering objects, on at a time, from the upper end of an upwardly inclined row thereof, comprising:

a. stationary object-supporting means in an upwardly inclined row disposed in a vertical plane for supporting such objects at equally spaced points along said row in said plane;

b. object-moving means respectively adjacent to each of said object-supporting means supported for movement in annular paths in said plane for engagement with objects supported by said stationary object-supporting means and for bodily carrying such objects to and depositing them in the next higher stationary object-supporting means of said row during each complete revolution of said object-moving means in their annular paths;

c. actuating means connected with said object-moving means for simultaneously moving them in said annular paths in the same direction for movement toward the upper end of said row of stationary object-supporting means in the upper portions of said paths;

d. receiving and conveying means along opposite lateral sides of said row of stationary object-supporting means and adjacent to said object-moving means inclined similarly to said row for receiving and conveying to the lower end of said row, objects that may be discharged laterally from said row; and

e. said stationary object-supporting means and said object-moving means comprising elements defining the forward, rear and lower sides of recesses opening upwardly and laterally relative to said row for holding single objects approximately centered relative to said row against said rear sides for holding such objects against movement downwardly of said row, while permitting lateral discharge of objects in excess of one and objects substantially offset laterally relative to said row, to said receiving and conveying means.

9. In apparatus as defined in claim 8: feed means over said stationary object-supporting means at the lower end of said row thereof actuatable for feeding objects onto said stationary object-supporting means and said object-moving means at the lower end of said row to a predetermined vertical depth sufficient to cover the lower portion of said stationary object-supporting means and said object-moving means at said lower end of said row.

10. In apparatus as defined in claim 9: control means for actuating and discontinuing actuation of said feed means for so feeding objects operatively connected with said feed means and responsive for movement under the influence of objects so covering said lower portion of said stationary object-supporting means for so actuating and discontinuing actuation of said feed means.

11. In apparatus as defined in claim 8:

a. a stationary feed hopper having an open lower end disposed over said stationary object-supporting means and said object-moving means at the lower end of said row and a rear wall extending upwardly therefrom and transversely thereacross relative to said row for supporting thereagainst a mass of said objects positioned on said stationary object-supporting means and said object-moving means at the lower end of said row of stationary object-supporting means;

g. feed means actuatable for feeding objects into said hopper for support against said rear wall and on said stationary object-supporting means and object-moving means at said lower end of said row; and

c. control means on said rear wall at a predetermined level above the lower end of said stationary object-supporting means responsive for movement under a predetermined reduction in the pressure of said mass of objects thereagainst, and operatively connected with said feed means for actuating the latter to feed objects onto said

stationary object-supporting and object-moving means at the lower end of said row.

12. In apparatus as defined in claim 8: means for supporting said stationary object-supporting means at different positions longitudinally of said row thereof relative to said object-moving means for regulating the positional relationship between said stationary object-supporting means and said object-moving means longitudinally of the former.

13. In apparatus as defined in claim 8: means for supporting said stationary object-supporting means at different positions vertically relative to said object-moving means for regulating the generally vertical positional relationship between said stationary object-supporting means and said object-moving means.

14. In apparatus as defined in claim 8:

a. said receiving and conveying means being generally horizontally disposed members having smooth upper surfaces extending longitudinally of said row of stationary object-supporting means for sliding of objects discharged thereon to the lower end of said row;

b. the lower surfaces of the recesses in said stationary object-supporting means being at a level spaced below said upper surfaces of said members; and

c. said object-moving means being at opposite lateral sides of said object-supporting means and the recesses in said object-supporting means being substantially in alignment with the recesses in said object-supporting means, transversely of the latter, during movement of said object-moving means from the lower portions of their annular paths of travel to the upper portions thereof at intermediate positions between said upper and lower portions of said annular paths, and said object-moving means including the recesses therein being spaced below the recesses in said object-supporting means during movement in the lower portions of their annular paths, whereby said members along said opposite lateral sides of said object-moving means will cooperate with one of the sides of the recesses in said stationary object-supporting means to provide pockets for supporting objects deposited in the recesses in said object-supporting means during movement of said object-moving means in the lower portions of their paths.

15. In apparatus as defined in claim 8:

a. said object-moving means being at opposite sides of said stationary object-supporting means; and

b. means on said object-moving means for centering the objects in each recess relative to said stationary object-supporting means.

16. Apparatus for delivering objects, such as substantially hemispherical drupe halves, one at a time, from the upper end of an upwardly inclined row thereof, comprising:

a. a plurality of sets of parallel, elongated members in parallel, side-by-side relation inclined upwardly relative to horizontal, each set comprising a pair of outer members and an intermediate member between said pair of outer members;

b. upwardly and laterally opening recesses formed in the members of each set along their upper sides equally spaced-apart longitudinally of said members when said recesses are in alignment transversely of said members for holding a drupe half in the aligned recesses in each set substantially centered relative to the recess in said intermediate member against displacement down the incline of the members of each set;

c. means supporting the pair of outside members of each set for simultaneous movement in corresponding annular paths in vertical planes and for holding said members parallel and in their upwardly inclined positions between lower positions with the recesses therein spaced below the recesses in the intermediate member therebetween, upwardly past pickup positions in which the recesses in said outer and intermediate members are in alignment transversely of said members, and to upper positions in which said recesses are spaced above said members and forwardly in a direction generally toward the upper ends of the members of said sets and then downwardly past drupe depositing positions in which said recesses in the members of said set are in alignment transversely thereof to said lower positions, whereby halves in the recesses in said intermediate member will be successively carried in the recesses in said pair of members to the next higher recess in said intermediate member during each complete revolution of said pair of members in said annular path, and for discharge of said halves, one at a time, from the upper ends of the members of said sets;

d. moving means connected with said sets for simultaneously moving them in said annular paths, said sets being in a plurality of pairs thereof providing an equal number of said pairs supported for said movement at opposite points in their paths to counterbalance each other during said movement of said sets; and

e. drupe receiving and conducting means at opposite sides of each set of members and extending between adjacent pairs of said sets and parallel therewith for receiving drupe halves in said recesses overbalances laterally to one side or the other of said sets and drupes in excess of one in each recess for supporting such drupe halves for sliding to the lower ends of said sets for repositioning in said recesses.

17. In apparatus as defined in claim 16: the upper open ends of the recesses in the intermediate member of each set being wider in a direction longitudinally of said member than the open upper ends of the recesses in said pair of outside members, and said recesses in the members of each set having read edges nearest the lower ends of said members that are substantially in register transversely of said members when said recesses are in alignment transversely of said members whereby drupe halves in the recesses in the intermediate members of each set will be more loosely held than in the recesses in the members of the outer pair for centering themselves relative to said intermediate member upon being deposited in the recesses in the latter.

18. In apparatus as defined in claim 17:

a. said members of each set comprising elongated strips disposed in vertical planes having said recesses formed along the upper edges thereof; and

b. the adjacent surfaces of the recesses in the outer strips of each pair along the edges of said recesses being slanted inwardly and downwardly relative to the space between said recesses for centering drupe halves in engagement therewith relative to said space and the intermediate strip of each set thereof.

19. In apparatus as defined in claim 16: a horizontally extending stationary plate at the upper ends of said sets of members extending transversely thereof for receiving drupe halves delivered one at a time at the upper ends of said sets for supporting said drupe halves for movement thereacross for dropping one at a time from said plate at substantially the end of forward movement of the pair of outside members of each set, and means on the upper ends of the outside members of each set for engaging drupe halves deposited on said plate and for pushing them across the latter by such forward movement of said outside members.