May 19, 1942. B. C. SKINNER ET AL 2,283,615

FEEDING APPARATUS

Filed July 20, 1940 2 Sheets-Sheet 1

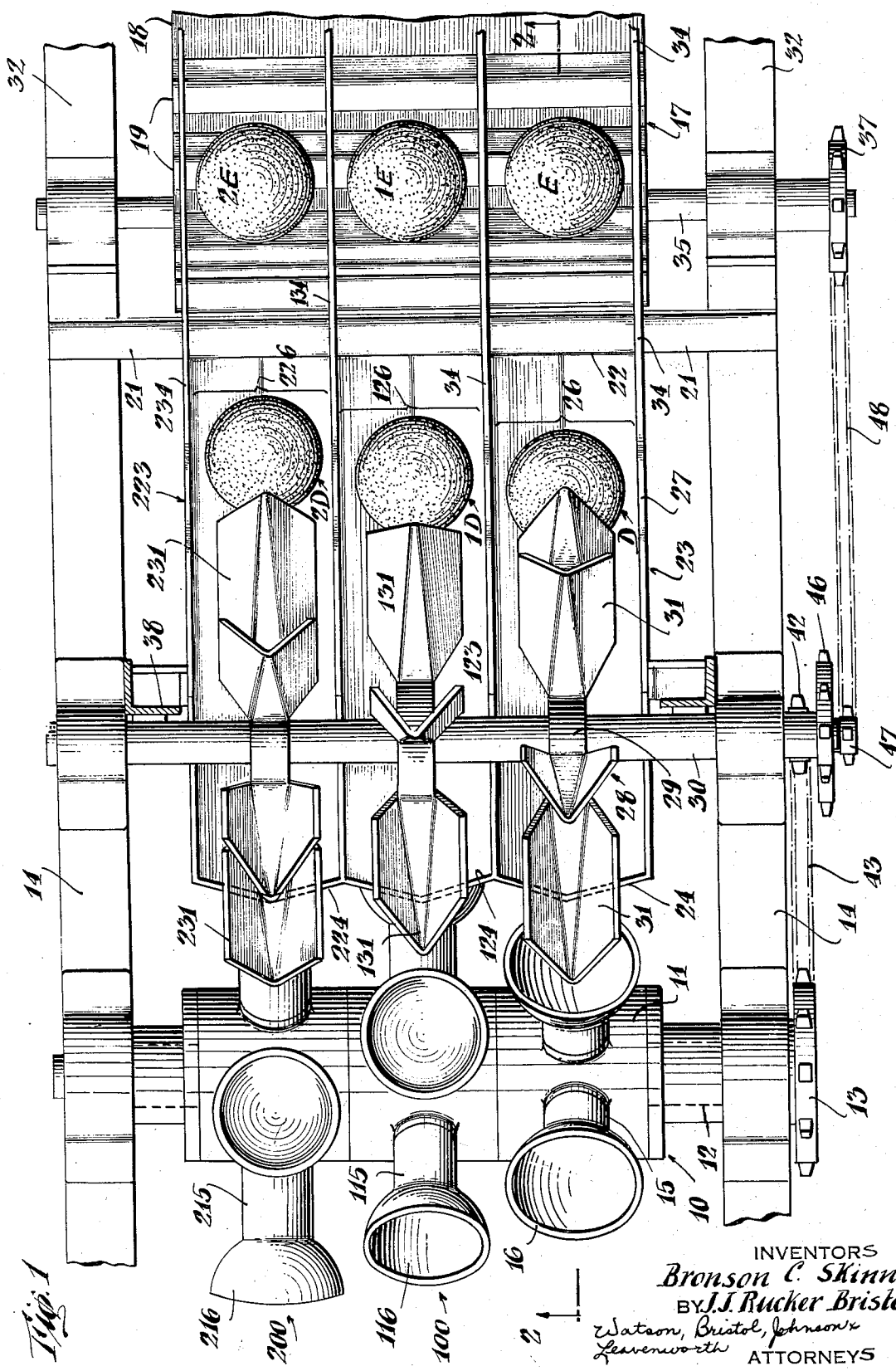


Fig. 1

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FEEDING APPARATUS

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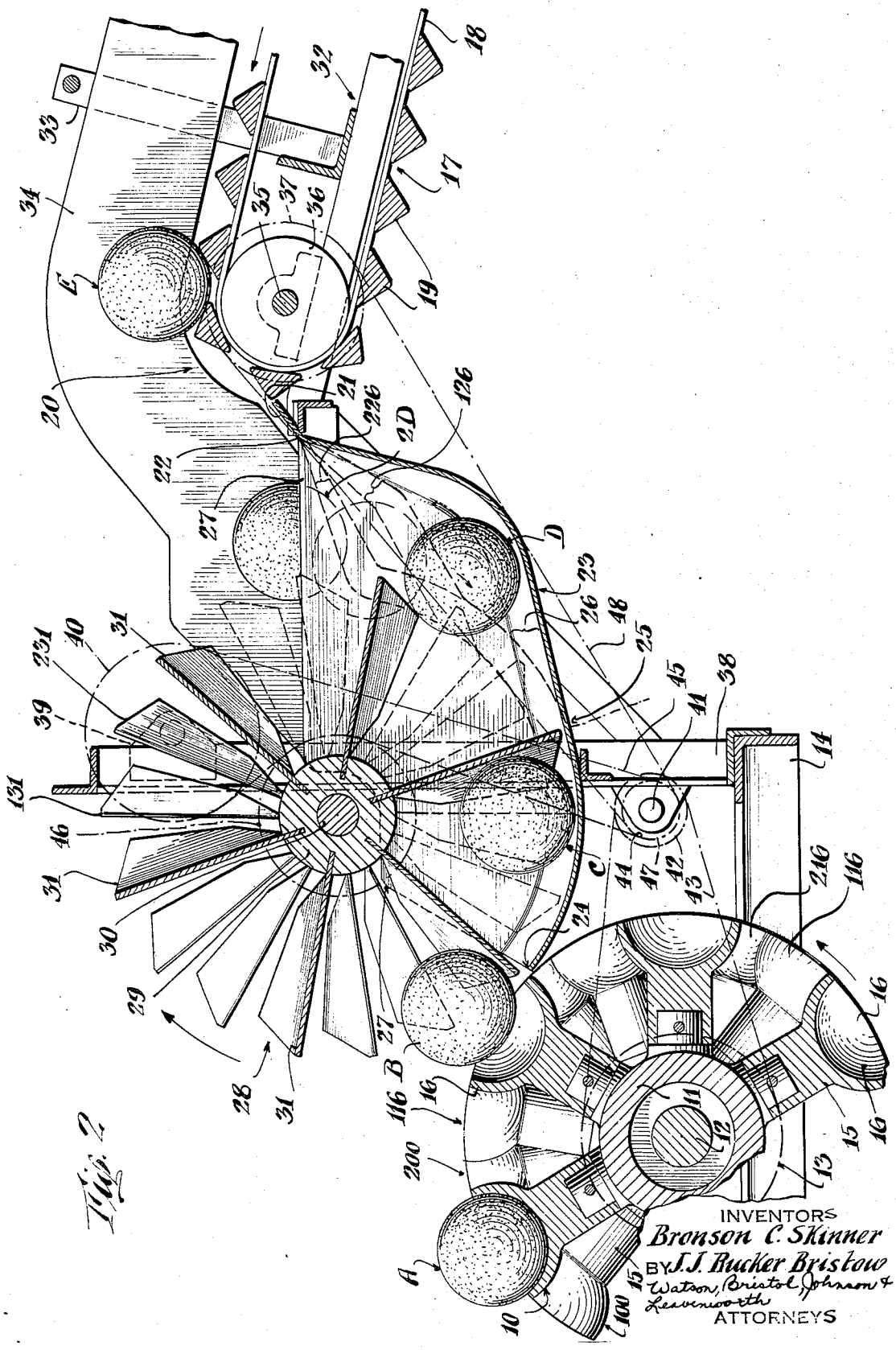


Fig. 2

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2,283,615

FEEDING APPARATUS

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Application July 20, 1940, Serial No. 346,512

7 Claims. (Cl. 198—25)

The present invention relates to feeding apparatus and, more particularly, to such apparatus adapted periodically to feed objects to receiving means moving past a receiving or feeding point.

A general object of the invention is the provision of such a device which is of simple construction and readily operable in an efficient manner effectively to deliver one object, such as for example a rollable or globular object, at a time to a receiving unit approximately at the time the latter is moving past a receiving or feeding point so that the object will be properly received and carried away in a secure manner; and which may be adapted for receiving a plurality of such objects from a supply substantially simultaneously and efficiently delivering them separately at different times in such manner to different locations or separate receiving means at the receiving or feeding point.

A more specific object of the invention is the provision of such feeding apparatus which may be efficiently associated with a receiver having receiving means adapted periodically to be moved past a receiving point and which is characterized by means effectively to engage one object at a time and move it to the receiving point at approximately the same rate of travel as the receiving means at approximately the time the latter moves past the receiving point and at that time to tip the object onto the receiver so that the object will be properly or accurately received and carried away in a secure manner without undue bouncing or displacement.

Another object of the invention is the provision of such feeding apparatus characterized by means effectively to receive from a supply at a desired speed or in a desired manner a plurality of objects approximately simultaneously and to move them to a common delivery or receiving point at approximately the same rate of travel as a plurality of staggered receiving means move therepast at different times and efficiently to deliver each of the objects to one of the receiving means as it is moving past the delivery point.

A further object is the provision in such an apparatus of a plurality of differently shaped ways each adapted to receive an object approximately at the same time as do the other ways to cause the objects each to be delivered to a position where it is engaged by a feeding means and then moved along thereby to a common delivery point at approximately the same time and same rate of travel as a receiving unit of a receiver moves past the delivery point, each of the ways being so shaped as to permit one object at a time to travel without aid down to the engaging position in advance of the arrival at that position of the feeding means which for the different ways may be staggered with respect to each other so that the objects may be delivered from different ways at different times.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view with parts in section and broken away of feeding apparatus of the present invention shown by way of example associated with a certain type of receiving means; and

Fig. 2 is a sectional elevational view taken on line 2—2 of Fig. 1 showing the relative positions of objects being fed by the apparatus at a particular stage of operation.

In accordance with the present invention supplying means are provided periodically to supply objects, such as rollable or globular objects, e. g., citrus fruits. These are to be transferred mechanically to a moving receiving means such as a rotating receiver, or a plurality thereof, which (or each of which) has one or more receiving units, such as recesses or cups, adapted periodically to be moved past a receiving point where one of the objects is delivered to each receiving unit at the time it moves past that point. When rollable or globular objects are fed onto moving receivers or into moving recesses, cups or the like, there may be tendency for the objects to be insecurely seated or to bounce out of the receiving means if inadequate precautions are taken. Such difficulties among others are avoided by the operation of the apparatus of the present invention which includes one or more ways along which the objects are caused to travel to the receiving or delivery point at a rate of travel approximately the same as the speed at which each receiving unit passes that point. The way is preferably so shaped that it approaches that point with at least a slight upward incline to assure that feeding means pushing each object along the way will remain in contact with the

object until it reaches the receiving or delivery point and is there delivered at the aforementioned speed.

The feeding means may comprise any suitable type of engaging devices each adapted to engage an object in the way and to push it therealong to the delivery end at the desired rate of travel. Preferably, it comprises a blade-wheel, the end of each blade of which may engage behind an object in the way and travel therealong at approximately the speed of and in the indicated timed relation with respect to the moving receiving unit.

When a plurality of receivers having receiving units of one staggered with respect to those of other receivers are to be fed from a simultaneously supplied source provision is made for delivering the objects in properly timed relation to the staggered receiving units as each passes the receiving or delivery point. This may be accomplished in accordance with the present invention by feeding the receivers from an equal number of ways associated therewith by an equal number of feeding means, each way being adapted to feed to only one of the receivers. Feeding means associated with one of the ways has the object engaging means thereof staggered with respect to those of other feeding means in the same relation as are the receiving units. Thus the feeding means may all be operated at a common speed to deliver objects to the various receivers at different times or, that is, in different timed relation.

When the feeding means, preferably provided with spaced apart engaging devices such as blades, are to deliver objects one at a time in different timed relation to the receivers from a substantially simultaneously supplied source the object in each way must be brought to engaging position in advance of the arrival of the engaging device which thereafter pushes it along the way to the receiving or delivery point. In order to accomplish this when the feeding means are traveling at a common speed, preferably operated by a common source of power such as is the case with a plurality of blade wheels mounted upon a common shaft with the blades of one wheel staggered with respect to those of other wheels, the ways are shaped differently. This may best be understood by referring to the ways as having delivery ends at the delivery or receiving point, feed sections extending from the point at which the feeding means may engage a supplied object and cooperate with the way to deliver it to the receiver, an entrance end for reception of supplied objects and an entrance section extending from the entrance end to the feed section. The way for the receiver in which the receiving units are in the most advanced position is provided with the longest feed section and the shortest entrance section with feed sections of ways for other receivers of decreasingly lesser length with the entrance sections thereof of increasingly greater length in a relation similar to the staggering of the receiving units of each of the receivers with respect to those of other receivers.

For a fuller understanding of the invention reference should be had to the drawings wherein like numerals refer to like parts throughout. A receiver **10** may comprise a hub **11** rotated on an axle **12** by a sprocket **13** with the axle **12** suitably supported by a framework **14**. The hub **11** is provided with a plurality of (such as, by way of example, six) radial spokes **15—15**, terminating in socket or cup members **16—16** substantially equally spaced about the circumference of the receiver as shown. Each cup member **16** is adapted to have seated therein an object A such as a citrus fruit, e. g. an orange. This receiver cooperates with suitable mechanisms for halving the fruits and squeezing the juice therefrom which are not shown since they constitute no part of the present invention.

The objects, oranges, may be supplied from a suitable source which may include a sizer belt over which the fruit is run to and under a sizer roll, then down a sloping way wherein it is arranged in single file. Such devices are not shown as being unnecessary to an understanding of the present invention.

The fruit arranged in single file in the aforementioned way may then be picked up by a slat elevator **17** comprising a continuous belt **18** on which is transversely arranged a plurality of slats **19—19** which carry each fruit to the position indicated at **20** where the fruit is permitted to roll from the elevator across an apron **21** into an entrance end **22** of a way **23**.

The way **23** has a delivery end **24** terminating at a receiving or delivery point where each of the cups **16—16** receives a fruit tipped from the end of the way by suitable feeding means.

The way **23** is provided with a feed section terminating at the delivery end **24** and extending from an engaging locality where the feeding means engages each supplied fruit, which is approximately indicated at **25** in Fig. 2. The feed section of the way preferably slopes at least slightly upward as is indicated in Fig. 2 so that the feeding means pushing it therealong will remain substantially in contact with and impart to the object a predetermined rate of travel. An entrance section of the way extends from the preferably elevated entrance end **22** to the feed section and is so shaped as to permit the fruit to travel therealong without aid to the engaging locality.

In the preferred form the way consists of a bottom section **26** in the form of a V-shaped trough and side sections formed by vertical plates **27, 27**. Such a shaped way will assure that the fruit will not be misplaced with respect to the feeding means and a predetermined line of travel for the same.

The feeding means preferably comprises a blade-wheel **28** consisting of a hub **29** suitably rotated on a shaft **30** with substantially radially arranged blades **31—31** mounted on the hub and preferably spaced at equal radial angles from each other. These blades **31—31** preferably are equal in number to the number of receiving cups **16—16** and the ends of the blades preferably lie on the circumference of a circle approximately equal in diameter to the outside diameter of the receiver **10** so that when both are rotated approximately at the same R. P. M. they will have approximately the same peripheral speeds.

When such feeding means are used the feed section of the way **23** is preferably curved along the path of the ends of the blades **31—31** so that the latter will approach the feed section of the way at the engaging locality and sweep along the feed section to the delivery end **24**, each to carry thereahead a fruit to the receiving or delivery point, indicated by the fruit B shown in Fig. 2 to be dropped into one of the cups **16—16**. Further the length of the feed section and the entrance section of the way **23** are so related as to permit a fruit when it is dumped from the

elevator 17 at the point 20 on to the apron 21 to roll down to the engaging locality between two succeeding blades.

Each blade 31 of the blade-wheel may comprise a paddle-like member scoop-shaped if desired as shown, or a pair of spoke members axially spaced apart and extending from the hub in the same radial plane may be used to function as and in the manner of a blade. Either form will, in cooperation with the V-shape of the bottom section 26 of the way 23, assure that the fruit will travel along a predetermined line without misplacement.

Upon a supporting frame 32 for the slat elevator 17 is mounted a bracket 33 supporting vertical guide plates 34, 34 which are substantially in line with side plates 27, 27 of the way 23 to form continuations thereof so that fruit moved by the elevator to the apron 21 at the entrance of the way 23 will be properly supplied to the way in single file.

On the elevator frame 32 is also mounted an axle 35 carrying a driving roll 36 of the elevator and upon the axle 35 is mounted a driving sprocket 37.

An upright bracket 38 on the frame 14 supports blade-wheel axle 30 and carries an adjustable take-up bracket 39 on which is rotatably mounted an idle sprocket 40.

A power driven shaft 41 carries a sprocket 42 to drive by means of a chain 43 the receiver sprocket 13, a sprocket 44 to drive the blade-wheel 28 by means of a chain 45 engaged over idle sprocket 40 and against a sprocket 46 on the blade-wheel shaft 30, and a sprocket 47 to drive by means of a chain 48 the elevator sprocket 37.

With the pitch diameters of the various sprockets properly related the receiver 10 will be driven at approximately the same peripheral speed as is the blade-wheel 28 and the elevator 17 will be driven in timed relation thereto so that each fruit supplied by the elevator will be permitted to roll down the way 23 intermediate adjacent blades 31, 31 to a position within the engaging locality somewhere near the point 25, thereafter to be picked up by the blade approaching the engaging locality which position is indicated by the fruit at C. Thereafter the fruit will be rolled along the feed section of the way 23 to the delivery end 24 to arrive at the receiving or delivery point indicated by the fruit at B at the same rate of travel as the receiving cup 16 arrives at that point so that the fruit will accurately and gently fall into the cup and thereafter be carried away in a secure manner as indicated by the fruit at A.

A plurality of receivers may be mounted on the shaft 12 each having the receiving cups thereof staggered with respect to those of the other receivers so that at the juice extracting station only one half fruit will be operated on at a time as may be desired. For example, receivers 100 and 200 may be mounted alongside receiver 10 with the receiving cups of each staggered with respect to those of the other receivers as shown. Each of cups 216—216 of receiver 200 are in advance of each of cups 116—116 by about 20° and each of cups 116—116 are in advance of each of cups 16—16 by about 20°. This relationship requires that the cups of the receivers be fed objects such as oranges at the receiving or delivery point from different ways at different times and when all of the ways are substantially simultaneously supplied from a common slat elevator as is indicated in Fig. 2 the ways must be so shaped with respect to staggered blades on separate blade-wheels as to permit such feeding.

The blades 231—231 of the third blade-wheel feeding the receiver 200 are staggered with respect to blades 131—131 in the same relation as are the cups 216—216 staggered with respect to cups 116—116. The blades 131—131 of the second blade-wheel are also staggered with respect to blades 31—31 of the first blade-wheel in a similar manner. Accordingly a fruit in each way must be supplied between blades of the respective blade-wheels at different engaging positions around the circumference of the circle described by the ends of the blades while travelling. This is accomplished by having the feed section of the way 123 longer than the feed section of way 23 and the feed section 223 longer than the feed section of the way 123 so that the points at which the fruits are fed to the blade-wheels bear an angular relationship to each other similar to that of the blade-wheels and receivers. The shaping of the ways to accomplish this purpose is indicated in Fig. 2.

With the apparatus last described the slat elevator picks up a row of fruits from the way delivering them from the sizer and carries each of them up between guide plates 34, 34; 34, 134; and 134, 234 to the position indicated by the fruits at E, 1E and 2E in properly timed relation to the operations of the receivers and blade wheels. The fruits are then moved forward to the points 20 where they are permitted to roll across the apron 21 into and down the respective ways 23, 123 and 223 as is indicated by the fruits at D, 1D and 2D, to the respective engaging localities where they arrive between successive blades of the respective blade-wheels. Fruits are then carried along the feed sections by the blade-wheels to the receiving or delivery point there to be tipped into the respective receiving cups at different times, viz. the time at which a cup of each receiver arrives at that point.

It will accordingly be seen that the objects set forth above and those indicated thereinafter are efficiently obtained by the apparatus of the present invention and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. A device for feeding rollable objects to a row of receiving units spaced at substantially equal radial angles and adapted to be moved past a receiving point at a certain rate of travel, comprising in combination, a way having an elevated entrance end and a feeding end terminating at the receiving point adapted to feed said row of receiving units; a blade-wheel associated with said way and having radiating blades disposed substantially at equal radial angles from each other and equal in number to the receiving units in the row being fed thereby in

cooperation with the associated way; means to supply rollable objects in timed relation to the elevated entrance end of said way; said way comprising a feed section and an entrance section with the former curved along the path of the outer ends of said blades whereby each blade in operation is adapted to engage and roll an object therealong at a rate of travel approximately equal to the rate of travel of the receiving units past the receiving point and to tip the object from the delivery end of the way on to a receiving unit as it passes the receiving point, said entrance section extending from the entrance end to the feed section of said way and down which the objects are adapted to roll without aid, said feed section merging with said entrance section at a point along the path of the ends of said blades so related to the speed of said blades and the timed feeding of the elevated entrance end of said way that an object will roll down the entrance section to arrive at that merging point intermediate of successive blades.

2. A feeding device comprising, in combination, a plurality of receiving means adapted to be moved past a receiving point there to receive objects at different times and carry them away in a secure manner; a plurality of gravity feeding ways each adapted to deliver an object to only one of said receiving means at the receiving point; means to supply objects to all of said ways approximately simultaneously; and a plurality of feeding means each associated with only one of said ways and all operated together each adapted to engage one object at a time in the way associated therewith, push it along the way to the receiving point at approximately the time the latter moves past the receiving point and at such time tip it onto the receiving means; said ways being provided with elevated entrance ends and being so constructed as to permit objects substantially simultaneously supplied to all of said ways each to move by gravity in one of the ways at a speed differing from that of objects in all of the other ways and to permit said feeding means associated with the ways to engage the objects therein in different positions and to deliver them to the receiving point at different times.

3. A feeding device comprising, in combination, a plurality of receiving means adapted to be moved past a receiving point there to receive objects at different times and carry them away in a secure manner; a plurality of ways each adapted to deliver an object to only one of said receiving means at the receiving point, each of said ways comprising a delivery end at the receiving point, a feed section adapted to cooperate with a feeding means so that the latter may push an object therealong to the receiving point at approximately the same rate of travel as the receiving means at approximately the time the latter moves past the receiving point and at such time tip it from said delivery end onto the receiving means, an elevated entrance end adapted to receive an object from a supply approximately at the same time as the other ways are each supplied with an object, and an entrance section extending between said entrance end and said feed section so shaped as to permit a supplied object to move by gravity to said feed section in time previous to arrival thereat of feeding means so that the latter may pick up the object and push it along the feed section; and a plurality of feeding means each associated with only one of said ways to move one behind another while all are operated together so as to arrive at their respective way feed sections at approximately the same time and to push objects in the ways at the same speed to the receiving point at different times.

4. A feeding device comprising, in combination, a plurality of receiving means arranged in staggered relation adapted to be moved past a receiving point at approximately the same speed there to receive objects at different times and carry them away in a secure manner; means to supply objects approximately simultaneously; a plurality of ways each adapted to receive an object from said supplying means and to deliver it to only one of said receiving means; and a plurality of feeding means operable together each associated with one of said ways and all arranged in staggered relation to move objects along said ways to the receiving point at approximately the same rate of travel as said receiving means whereby each object arrives at that point at approximately the time the receiving means being fed therewith moves past that point; each of said ways comprising a delivery end at the receiving point, a feed section along which one of said feeding means pushes one of the objects, an entrance end adapted to receive an object from the supplying means, and an entrance section between said entrance end and said feed section down which the objects will travel without aid, the feed section of the way for the most advanced receiving means being the longest and the entrance section associated therewith being the shortest with the feed sections of ways for succeeding receiving means of decreasingly lesser length and the entrance sections thereof of increasingly greater length so that objects will be supplied to all of said feed sections previous to arrival thereat of the associated staggered feeding means.

5. A feeding device comprising, in combination, a plurality of receiving units arranged in rows with the units in each row staggered with respect to the units in all of the other rows and all units being adapted to be moved past a receiving point at approximately the same speed there to receive objects at different times and carry them away in a secure manner; means to supply objects approximately simultaneously; a plurality of ways each adapted to receive objects from said supplying means and to deliver them only to one row of said receiving units, each of said ways comprising a delivery end at the receiving point, a feed section adapted to cooperate with feeding means so that the latter may push an object therealong to the receiving point at approximately the same rate of travel as the receiving units at approximately the time one of the receiving units moves past the receiving point and at such time tip the object from the delivery end onto the receiving unit, an elevated entrance end adapted to receive an object from the supplying means approximately at the same time as the other ways are each supplied with an object, and an entrance section extending between said entrance end and said feed section down which the objects will travel without aid; and feeding means comprising a plurality of blade-wheels operable together each associated with only one of said ways and having the same number of blades as there are receiving units in the row to be fed thereby, each blade of one wheel being adapted to engage an object supplied to the feed section of the associated way and to deliver it in timed relation to a re-

ceiving unit and the blades of each wheel being staggered with respect to the blades of all the other wheels similarly to the staggering of the receiving units; the feed section of the way for the row of receiving units which are in the most advanced position with respect to the receiving units in any other row being the longest and the entrance section of that way being the shortest with the feed sections of ways for succeeding rows of receiving units of decreasingly lesser length and the entrance sections thereof of increasingly greater length so that objects will be supplied to all of said feed sections intermediate blades of said blade-wheels.

6. A device for feeding rollable objects to a plurality of rows of receiving units with the units in each row staggered with respect to the units in other rows and all units being adapted to be moved past a receiving point at approximately the same rate of travel, comprising in combination, a plurality of ways terminating at the receiving point each adapted to feed one row of receiving units; an equal number of blade wheels operable together each associated with one of said ways, each wheel having radiating blades disposed substantially at equal radial angles from each other and equal in number to the receiving units in the row being fed thereby in cooperation with the associated way, said blades of each wheel being staggered with respect to the blades in other wheels in the same relation as are the receiving units in one row with respect to those in other rows; means to supply objects approximately simultaneously to elevated entrance ends of said ways; said ways each comprising a feed section and an entrance section with the former curved along the path of the outer ends of the blades whereby each blade in operation is adapted to engage and roll an object therealong at a rate of travel approximately equal to the rate of travel of the receiving units past the receiving point and to tip the object from the delivery end of the way onto a receiving unit as it passes the receiving point, said entrance sections extending from the entrance ends to the feed sections of said ways and down which the objects are adapted to roll without aid, said feed sections being longer than others so that an object will roll down to each feed section intermediate blades of said blade-wheels in advance of the blade adapted to roll each object to the receiving point at the proper time.

7. A device for receiving a plurality of objects from a supply substantially simultaneously and delivering them separately to different locations at a feeding point at different times and at a predetermined rate of travel comprising, in combination, a plurality of ways each having an elevated entrance end adapted for reception of an object from the supply, a delivery end terminating at the feeding point, an arcuate shaped feed section along which an object is to be pushed to the feeding point, and an entrance section extending from the entrance end to the feed section and down which objects are adapted to travel without aid; a plurality of blade-wheels operable together with one associated with each way so that the blades thereof will engage objects in the feed sections and impel them therealong, the blades of each wheel radiating at substantially equal radial angles from each other and being staggered with respect to the blades of other of said blade-wheels whereby objects will be delivered from ways at different times; said feed sections being of different lengths and the entrance sections merging therewith at points along the paths of the ends of said blades with such points of successive ways having substantially the same radial angular relationship with respect to each other as do the blades of the successive blade-wheels.

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