Nov. 17, 1925. 1,562,152

A. H. DU GRENIER

VENDING MACHINE

Filed June 10, 1924 3 Sheets-Sheet 1

Fig. 1.

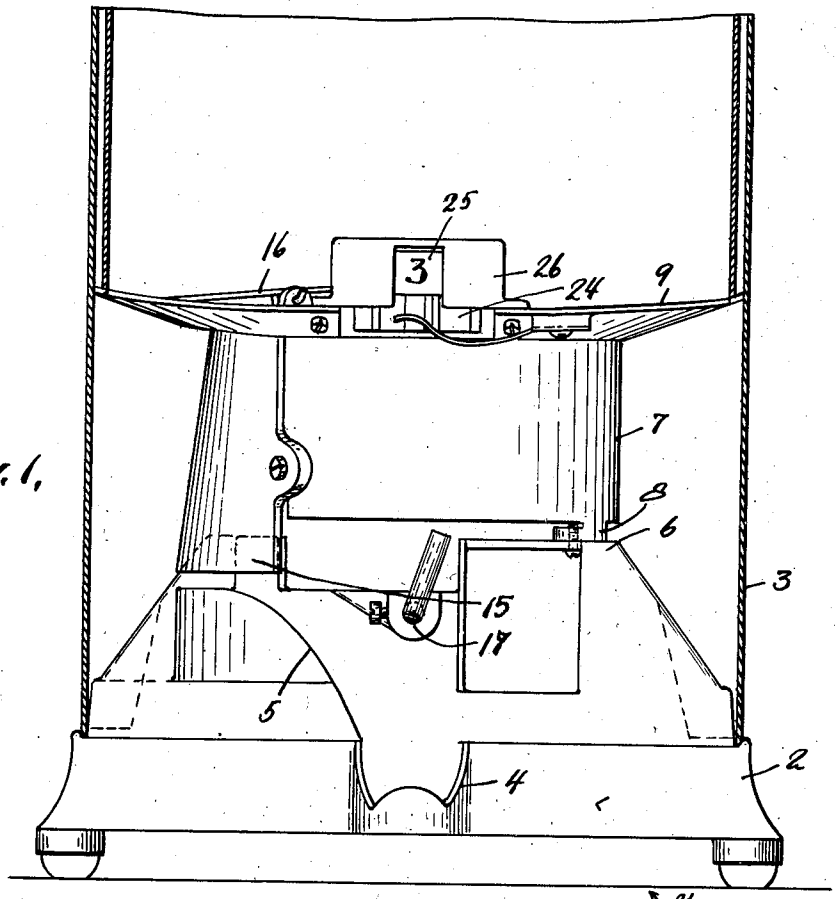
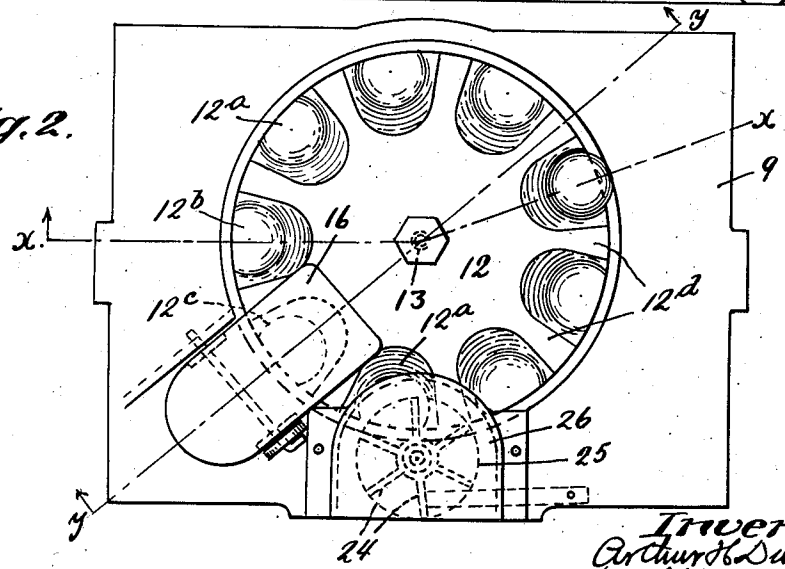


Fig. 2.



Inventor.
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atty.

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A. H. DU GRENIER

VENDING MACHINE

Filed June 10, 1924 3 Sheets-Sheet 2

Fig. 3.

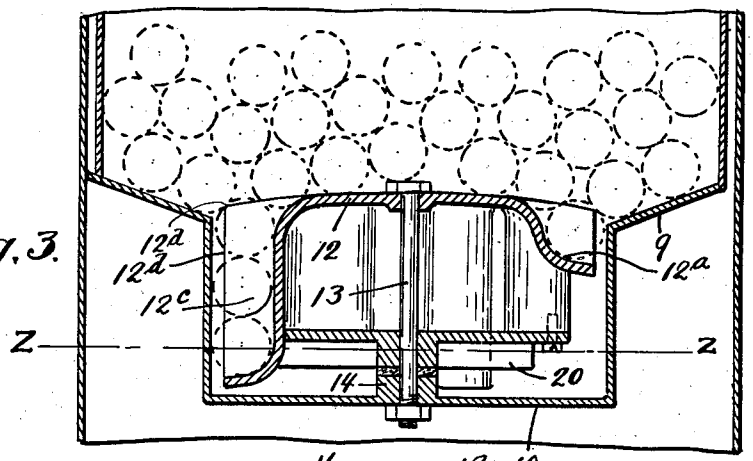


Fig. 4.

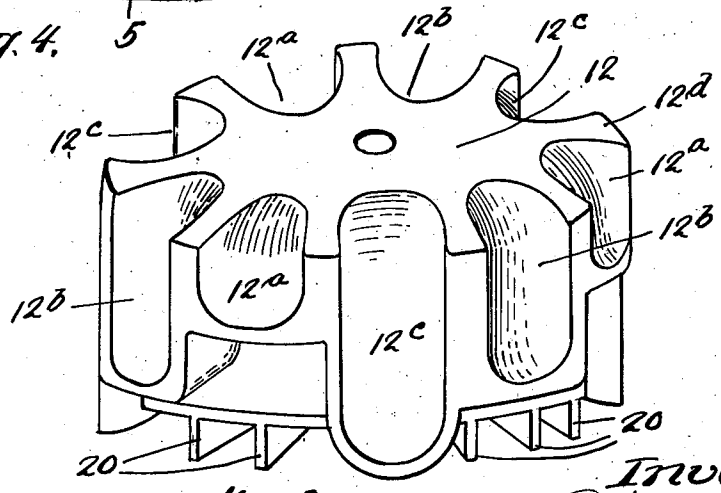


Fig. 5.

Inventor
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Atty

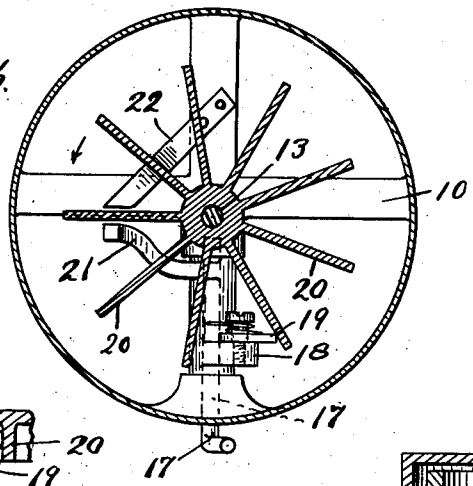
Nov. 17, 1925. 1,562,152

A. H. DU GRENIER

VENDING MACHINE

Filed June 10, 1924 3 Sheets-Sheet 3

Fig. 6.



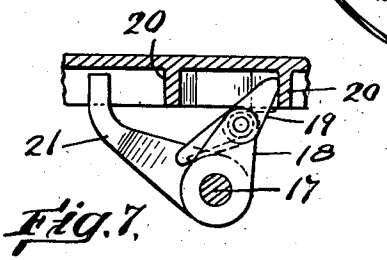
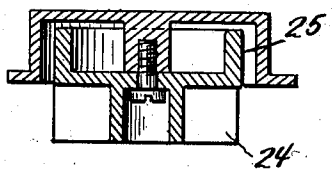


Fig. 7.

Fig. 8.



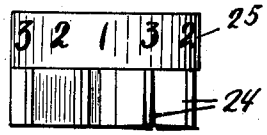
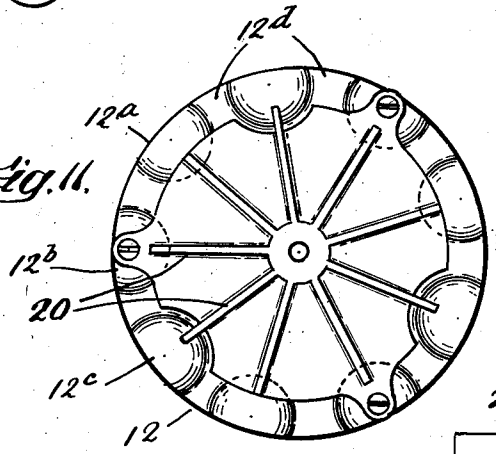


Fig. 9.

Fig. 11.



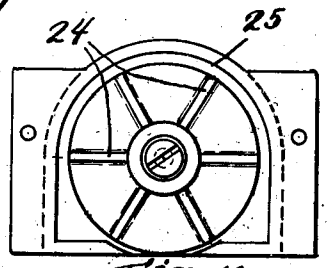


Fig. 10.

Inventor.

Arthur H. Du Grenier,

by L. H. Hamilton Atty.

Patented Nov. 17, 1925.

1,562,152

UNITED STATES PATENT OFFICE.

ARTHUR H. DU GRENIER, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HAROLD B. WOODS, OF HUDSON, MASSACHUSETTS.

VENDING MACHINE.

Application filed June 10, 1924. Serial No. 719,081.

To all whom it may concern:

Be it known that I, ARTHUR H. DU GRENIER, a citizen of the United States, and resident of Haverhill, county of Essex, and State of Massachusetts, have invented an Improvement in Vending Machines, of which the following is a specification.

This invention relates to vending machines of the type which are primarily designed to dispense spherical articles of uniform size, such as balls of candy coated gum, and, more particularly, to machines of this type which are adapted to dispense a different number of the articles vended at certain times, in a sequence of operations, than at other times, as for example, a machine such as disclosed in my prior Patent No. 1,490,365, in which a single ball is delivered on four successive operations, and either two or three balls are delivered on the fifth, according to the manner in which the machine is adjusted. In the practical operation of this machine, it has been discovered that when the machine has been adjusted to deliver two extra balls on every fifth or tenth operation, the machine sometimes fails to deliver the number intended, and that this is more likely to occur when the magazine is nearly full than at other times.

The reason for this failure has been found to be largely due to the fact that the chambers which deliver the extra balls are located within the circular series of chambers which deliver the single ball on each operation, so that these inner chambers usually take their supply from the portion of the magazine directly over the middle of the tray. Candy coated balls have a tendency to adhere to each other and to wedge together, and are liable to form an arch over the middle portion of the magazine bottom, so that the balls in the middle are supported by those at the sides. As a result, under these conditions, the extra ball chambers will exhaust the balls in the middle portion of the magazine which are resting directly on or close to the discharge tray portion, so that these chambers will not be supplied even though a quantity of balls are supported directly thereover.

The objects of my present invention are, primarily, to provide a vending machine of the type above referred to, which will successively deliver a single ball and a desired plurality of balls, according to the particular design of delivering tray with which the machine is fitted, and in which delivery to the desired quantity on each operation is assured, so long as any of the balls to be vended remain in the magazine.

I accomplish these, and other objects, by providing a magazine for the articles or balls, having a bottom portion which declines to a central opening, in connection with a cylindrically shaped delivery tray, which is mounted to rotate about a central vertical axis in said opening and has a convex upper end surface which declines to its periphery, and by arranging both the chambers which deliver the extra and the single balls at the periphery of the tray, so that all the balls are taken from the magazine at this point, said chambers being provided with declining bottoms located at different distances from the upper end of the tray which correspond to the diameter, or to multiples of the diameter of the balls, and means being provided independently of the tray for preventing lateral discharge of the balls from the chambers, except at a predetermined point. Also by providing the delivery tray with radially disposed projections which extend upwardly beyond said bottom portion adjacent thereto, and act to push the balls horizontally, when the tray is rotated, so that if the balls should tend to form into an arch over the tray, the arch will be broken out at its bottom.

For a more complete understanding of my invention, reference is made to the accompanying drawings in which:—

Fig. 1 is a front elevation of a vending machine embodying my invention, with a portion of the outer casing cutaway.

Fig. 2 is a plan view thereof.

Figs. 3 and 4 are vertical central sectional views at lines x—x and y—y respectively of Fig. 2.

Fig. 5 is a detail perspective view of the delivery tray.

Fig. 6 is a sectional view at line z—z of Fig. 3.

Fig. 7 is a detail view of the delivery plate driving mechanism.

Fig. 8 is a detail sectional view of the indicating mechanism which I employ.

Figs. 9 and 10 are detail side and bottom views of the indicating wheel thereof.

Fig. 11 is a bottom plan view of the delivery tray.

The embodiment of my invention shown is similar in a general way, to the apparatus shown in my said prior patent and comprises a base 2, and an outer casing 3, said base having a delivery cup 4 to which an inclined trough 5 leads. The base portion is extended upward and inward to form a table 6 for the delivery mechanism, and an upright circular casing, or partition 7 is mounted thereon and secured thereto by ears 8 which are connected to the table by screws. A bottom plate 9 is connected to or formed integrally with the upper edge of the partition 7, and extends outwardly and upwardly therefrom at a slight inclination to the inner surface of the casing 3 A horizontal shelf 10 closes the space enclosed by the partition 7 at the level of the lower edge of said partition, thereby forming with said partition a cylindrically shaped recess in which a cylindrically shaped delivery tray 12 is rotatably mounted on a vertical shaft 13, which is mounted in the shelf 10, in line with the axis of the tray, a boss 14 being provided on said shelf which forms a step-bearing for the tray The diameter of the delivery tray is slightly less than the internal diameter of the partition 7, so that the former may rotate freely therein. In the present instance, the form of delivery tray shown is designed to deliver first one, then two, and then three articles or balls, and to secure this particular result I find it preferable to provide three series of three chambers 12^a, 12^b, 12^c, which are formed by recessing the cylindrical side of the tray from the upper end down to varying distances equal to the diameter, or multiples of the diameter of the balls to be dispensed. In the present instance the vertical depth of the chambers 12^a, 12^b, and 12^c, correspond to one, two and three diameters respectively of the balls The bottoms of these chambers are inclined downward and outward and the inner sides blend with the bottoms in a gradual curve The upper surface of the tray is formed slightly convexly and the tray is supported in such a position that the partition portions 12^d, between each chamber, extend slightly above the level of the upper surface of the adjacent portion of the declining bottom plate 9, as shown in Figs. 3 and 4. The sides of the chambers extend divergently or radially from the axis of the tray and are rounded at their inner sides to correspond to the surfaces of the balls, so that the balls may pass freely into the chambers at the upper ends thereof and from their peripheral sides, the depth of the chambers horizontally from the periphery being slightly less than the diameter of the balls, so that when the balls are supported on the chambers by the bottoms thereof, they will protrude slightly beyond the periphery of the tray, as shown in Fig. 2.

As the radially extending sides of the chambers diverge slightly and said chambers are sufficiently wide to receive the balls within the periphery of the tray, the chambers are of somewhat greater width, at the periphery, than the diameter of the balls, and, when a chamber is filled, there will be a space between the ball therein (or upper ball, as the case may be) and each side of the upper portions of the partitions which form the sides of the chambers, as the ball projects only slightly beyond the end and top edges of the partitions. These spaces are of sufficient size to receive portions of other balls in the magazine, so that as the partitions 12^d project above the adjacent edge of the bottom plate 9, some of the balls which are supported on the plate will pass into the upper and outer portions of the chambers sufficiently to be in a position to be engaged by the partitions and pushed circularly and outwardly on the plate 9 when the tray is rotated. The partition 7 is provided with a vertical opening 7^a, from top to bottom, of the same width as the width of the chambers 12^a, 12^b, 12^c, and a semi-tubular guiding partition 15 is arranged in front of said opening and extends obliquely outward and downward from the underside of the bottom plate 9 to the outer side of the trough 5 at its upper end, so that when any one of the chambers of the tray containing one or more balls, is moved into register with the vertical opening 7^a, in the partition, the ball, or balls, as the case may be, will roll down from the bottom of the chamber and fall into the trough 5 and be delivered to the cup 4. While the purpose of the guiding partition 15 is primarily to direct the balls into the trough 5, it has a further function when operating in conjunction with a chamber which is discharging three balls, as it prevents either of the two upper balls from moving partly in front of the bottom ball, so as to cause a wedging action therewith and thus block the passage. By having the partition 15 inclined towards the upper end of the opening 7^a, in the parti-

tion 7, the upper balls are prevented from falling outward and are held thereby in approximately the relative positions in which they were held in the chamber, so that the lowermost ball will pass from the chamber bottom and fall into the trough and the others will follow in its path, as indicated in Fig. 4.

A guard plate 16 is pivotally mounted on the magazine bottom in position to extend over the chambers of the tray 12 at the point where the chambers are moved into register with the opening 7ª in the partition 7, so as to prevent any balls from passing into any one of said chambers while in this position. The plate 16 is adapted to rest at one end by its gravity, on the upper surface of the tray and its opposite portion extends beyond its pivot over the bottom 9 and acts as a stop to limit the extent to which said plate may be swung upward. The arrangement is, however, such that a limited up and down swinging movement of the plate 16 is permitted, for the following reasons:—The plate should normally be held in a position in which the balls which are supported on the bottoms of the chambers will pass close to its underside in order that other balls not in the magazine will not became wedged at this point. In case the balls should run a little over size, when three balls are piled one on the other, this enlargement will be correspondingly multiplied, so that the edge of the plate 16 might engage the top ball and crush it. This difficulty is, however, avoided by providing means permitting said plate to yield upwardly to a limited extent, as shown.

Various means by which the discharge tray is driven from station to station may be employed, a preferable means comprising a shaft 17 having an arm at its front end for oscillating it, which is adapted to be operated from without the machine when released by a coin controlled mechanism. An arm 18 is mounted on shaft 17 and has a pawl 19 thereon, which is adapted to engage any one of a series of radial flanges 20, which are centrally located on the underside of the tray 12. A stop arm 21 is also mounted on the shaft 17 and a leaf spring 22 is arranged to engage flanges 20 to prevent rearward rotation of the tray. The manner in which the tray is driven will be apparent. When the shaft 17 is rotated forward sufficiently, the pawl 19 will engage a flange 20 and cause the tray to be rotated forwardly and by the time it has been advanced one station, the finger 21 will have been raised into position to be engaged by another flange 20, as shown in Fig. 7 so that, before the tray can be advanced further, the shaft 17 must rotate rearwardly to the starting position.

I further provide means for indicating the number of articles or balls which will be delivered on the next operation of the machine, which comprises a star wheel 24 mounted to rotate about a vertical axis directly in front of the tray 12, the arms of said wheel projecting into the chambers of the tray, so that, when the tray is rotated, the partitions between said chambers successively engage the arms of the star wheel and cause it to rotate. A circular dial 25 is mounted on the upper side of the star wheel and has, in the present instance, three consecutively arranged sets of figures 1, 2 and 3 to be successively exhibited at an opening in a housing 26 which is secured to the frame thereover. The adjustment is such that a figure, 1, 2 or 3 will appear according to whether one, two or three balls will be delivered the next time the machine is operated.

With the above described device, when the magazine is filled with the balls to be vended, they will be partly supported by the declining bottom plate 9 about the tray 12 and partly by the top surface of the tray. Also, as all the chambers in the tray are open at their upper ends, except the one which is covered by the plate 16, they will all be filled, and each chamber will contain one, two or three balls, as the case may be, and these balls will be retained therein by the circular partition 7, as shown in Fig. 3. After one operation of the machine, these balls will be delivered on the successive operations as already described. As the chambers are of only slightly greater diameter than the diameter of the balls, there is no possibility of two balls becoming wedged therein, for where the chamber is designed to contain a plurality of balls, they will rest directly one on the other, as indicated in Fig. 3, and when such a chamber is moved into register with the side opening in the partition 7 the lowermost ball will immediately slip, or roll down the inclined bottom and the others will follow, so that they will successfully fall into the trough 5 and roll into the cup 4, as indicated in Fig. 4.

When the tray is rotated, the action of the upper outer end portions of the partitions 12ª in pushing the balls outwardly and upwardly on the bottom plate 9, as before described causes the balls which are thus pushed out to break out the bases of any arches which may be formed by the balls in the magazine over the tray or the entrances to the chambers therein. When the magazine is nearly empty, the loose balls will all tend to roll down the inclined bottom plate 9, from the sides and down the convex face of the upper end of the tray from the middle to the periphery of the tray, so that the last remaining balls will fall into the chambers. As a result, by the time a chamber has been

moved from the point when it passes from beneath the plate 16 to the point where it is about to pass beneath it again, it will be completely filled even though the magazine is nearly empty. As the walls of the magazine are transparent the purchaser can readily see whether the articles will be delivered if the machine is operated, and can ascertain from the dial how many will be delivered on the next operation, so that there will be no uncertainty as to what the purchaser will receive for his coin.

I claim:—

1. A vending machine comprising a magazine for the articles to be vended, a cylindrically shaped delivering tray mounted to rotate about a central vertical axis with its upper end forming a bottom portion of the magazine, and having a series of peripherally arranged article receiving chambers opening to the upper end of the tray and to the side thereof to permit the articles to pass from the magazine into said chambers and be laterally discharged therefrom, means carried by the tray, and disposed at the lower ends of said chambers, for supporting the articles therein, and means disposed adjacent the side of the tray to retain the articles in said chambers and to permit the same to be discharged laterally therefrom, successively, at a predetermined point.

2. A vending machine comprising an article-receiving magazine, a cylindrically shaped delivering tray mounted to rotate about a central vertical axis with its upper end forming a bottom portion of the magazine and having a series of peripherally arranged article receiving chambers opening to the upper end of the tray and to the side thereof to permit the articles to pass from the magazine into said chambers and to be laterally discharged therefrom, means carried by the tray and disposed at the lower ends of said chambers for supporting the articles therein, and a casing encircling said tray in position to retain the articles in said chambers and having an opening into register with which the side openings are moved successively to permit discharge of the chambers at a predetermined point.

3. A vending machine comprising an article-receiving magazine, a cylindrically shaped delivering tray mounted to rotate about a central vertical axis with its upper end forming a bottom portion of the magazine and having a series of peripherally arranged article receiving chambers opening to the upper end of the tray and to the side thereof to permit the articles to pass from the magazine into said chambers and to be laterally discharged therefrom, means formed with the tray and arranged to support the articles in said chambers and to facilitate gravity discharge of the articles laterally therefrom, and means disposed about said tray in position to prevent such discharge except at a predetermined point.

4. A machine for vending spherical articles of uniform diameter comprising a magazine for said articles, a cylindrically shaped tray mounted to rotate about a central vertical axis with its upper end forming a portion of the magazine bottom and having a series of peripherally arranged chambers of a diameter corresponding to that of said articles and open at their upper ends and outer sides, to permit free entrance of the articles thereto at the top and lateral discharge therefrom means carried by the tray for supporting the articles in said chambers arranged to conduce to said lateral discharge, and a stationary casing having a vertically disposed face encircling said tray in proximity thereto, to retain the articles in said chambers and having an opening to permit discharge therefrom at a predetermined point.

5. A machine for vending spherical articles of uniform diameter comprising a magazine for said articles, a cylindrically shaped tray mounted to rotate about a central vertical axis with its upper end forming a portion of the magazine bottom and having a series of peripherally arranged chambers adapted to receive said articles and corresponding in diameter thereto, said chambers being open at their upper ends and outer sides to permit free entrance of the articles thereto at the top and discharge therefrom at the side, and having bottoms formed with the tray for supporting the articles therein adapted to conduce to the discharge therefrom, said bottoms being arranged at different predetermined distances from the upper end of the tray corresponding to the diameter and to multiples of the diameter of the articles, and a casing independent of, and extending about said tray, for normally retaining the articles in said chambers and adapted to release them successively at a predetermined point in the travel of the tray.

6. A machine for vending spherical articles of uniform size comprising a magazine for said articles, a cylindrical discharge tray mounted to rotate about a central vertical axis with its upper end forming a portion of the magazine bottom, and having a series of circular, vertically disposed chambers arranged about its periphery and corresponding in diameter to the diameter of the articles, said chambers being open to their full size at their upper ends and outer sides and having outwardly and downwardly inclined bottoms formed with the tray disposed at distances from its upper end corresponding to said diameter, a circular casing enclosing said tray with its inner surface in proximity to the sides thereof, to retain the articles in said chambers and

having a discharge opening with which the open sides of said chambers are successively brought into register, and a discharge receptacle having a discharge passage leading thereto from said opening.

7. A machine for vending spherical articles of uniform size comprising a magazine for said articles, a cylindrical discharge tray mounted to rotate about a central vertical axis with its upper end forming a portion of the magazine bottom, and having a series of circular, vertically disposed chambers arranged about its periphery and corresponding in diameter to the diameter of the articles, said chambers being open to their full size at their upper ends and outer sides and having outwardly and downwardly inclined bottoms formed with the tray disposed at different distances from its upper end corresponding to said diameter and to multiples of said diameter, so that a plurality of said articles may be supported in a portion of said chambers one directly on the other, a circular casing enclosing said tray with its inner surface in proximity to the sides thereof, to retain the articles in said chambers, and having a discharge opening corresponding in dimensions to the side opening of the deepest of said chambers so arranged that the open sides of said chambers will be brought into register therewith successively, a discharge passage and a guiding plate extending obliquely outward from said casing opposite said opening to direct the articles held in said chambers to said passage in the order in which they were supported.

8. A machine for vending spherical articles of uniform size comprising a magazine for said articles, a cylindrical discharge tray mounted to rotate about a central vertical axis with its upper end forming a portion of the magazine bottom, and having a series of circular, vertically disposed chambers arranged about its periphery and corresponding in diameter to the diameter of the articles, said chambers being open to their full size at their upper ends and outer sides and having outwardly and downwardly inclined bottoms formed with the tray disposed at different distances from its upper end corresponding to said diameter and to multiples of said diameter, so that a plurality of said articles may be supported in a portion of said chambers one directly on the other, a circular casing enclosing said tray with its inner surface in proximity to the sides thereof, to retain the articles in said chambers, and having a discharge opening corresponding in dimensions to the side opening of the deepest of said chambers so arranged that the open sides of said chambers will be brought into register therewith successively, and a cut off plate arranged to extend over the upper end of each chamber when held in registering position in proximity to the upper end of said tray, said cut-off plate having means to permit upward yielding thereof as a chamber filled with said articles is passed therebeneath.

9. A machine for vending spherical articles of uniform diameter comprising a magazine for receiving said articles, a cylindrically shaped delivering tray mounted to rotate about a vertical axis with its upper end closing the magazine at its bottom, said tray having a series of peripherally arranged chambers of a diameter corresponding to the diameter of said articles, said chambers opening to the upper end of the tray to receive said articles from the magazine and to the side thereof to permit their discharge and being arranged in corresponding groups, the chambers of each group having outwardly declining bottoms formed with the tray and disposed at distances from the upper end of the tray corresponding to the diameter and multiples of the diameter of the articles in regular order, and means enclosing the tray arranged to permit discharge of the articles in each chamber in succession at a predetermined point and to prevent such discharge at all other points, whereby the tray will deliver different numbers of articles in a series of regular sequences as it is rotated.

10. A machine for vending spherical articles of uniform diameter, comprising a magazine, a cylindrically shaped discharge tray mounted to rotate about a central vertical axis with its upper end arranged to form a portion of the bottom of the magazine, said tray having a series of vertically and radially disposed partitions extending to the upper end and peripheral side thereof and providing a series of article receiving chambers therebetween, permitting entrance of the articles thereto at the top and side of the tray, the width of said chambers at the periphery being greater than the diameter of the articles, providing spaces between the end portions of the partitions and the articles when held in the chambers, and a magazine bottom portion having its upper surface declining to the end of the partitions below the level of the upper edges thereof, to permit articles on said bottom portion, at its inner edge, to be held in position to be engaged by the end portions of said partitions and moved circularly and outwardly thereon when the tray is rotated.

11. A machine for vending spherical articles of uniform size comprising a magazine for the articles, a cylindrical shaped discharge tray mounted to rotate about a central vertical axis with its top end forming a portion of the bottom of the magazine and having a series of peripherally arranged article receiving chambers extend-

ing from the top end and opening to the peripheral side thereof throughout the height of the chambers, to permit entrance of the articles to the chambers horizontally, the width of said chambers at the periphery being greater than the diameter of the articles to be vended, permitting partial entrance of the articles in the magazine to the chambers while other articles are contained thereby in position to be discharged therefrom, and a magazine bottom portion extending in proximity to the tray and having its upper surface declining thereto at points below the upper ends of the sides of the chambers, to permit articles partly received by the chambers to be partly supported on said shelf and actuated thereon by the tray when rotated.

12. A machine for vending spherical articles of uniform size comprising a magazine for said articles, a cylindrically shaped discharge tray mounted to rotate about a central vertical axis and forming a portion of the magazine bottom, said tray having its top surface declining to its periphery and having a series of peripherally arranged chambers, each opening to said surface and to the periphery of the tray from said surface to the bottom of the chamber, and the sides of each chamber extending radially and permitting free entrance of the articles thereto horizontally and a bottom plate for the magazine having its top surface declining to the peripheral side of the tray at a substantial distance below the upper ends of the sides of the chambers, to support the articles in position to extend into said chambers and to be engaged by the sides thereof and pushed outwardly on said plate when the tray is rotated.

13. A vending machine comprising a magazine having a bottom plate provided with a circular opening in the middle thereof and arranged to decline to said opening, a cylindrically shaped discharge tray, mounted to rotate about a central vertical axis with its side in proximity to the edge of said bottom plate to close said opening and having a series of regularly spaced article-receiving chambers provided with bottoms for closing their lower ends and opening to the upper end of the tray and to its sides, from said upper end to the bottoms thereof, to permit entrance of the articles in the magazine to said chambers and lateral discharge therefrom beneath said bottom plate, the sides of said chambers extending radially from the axis of the tray and extending vertically for a substantial distance above the level of the upper surface of said bottom plate, to engage the articles in the magazine and cause agitation thereof when the tray is rotated and a casing disposed beneath said bottom plate in position to retain the articles in said chambers and having an opening to permit their discharge at a predetermined point.

14. A machine for vending articles of uniform size comprising a magazine for the articles, a rotatable tray having a series of chambers, each chamber of the series being constructed and arranged to receive a predetermined number of the articles from the magazine which is different from that received by each of the others in that series and to deliver, on successive operative movements of the tray to a discharging position, a different number of the articles for each movement until each chamber of the series has been discharged and means whereby the number of articles to be next delivered will be indicated in advance of each operation.

In testimony whereof, I have signed my name to this specification.

ARTHUR H. DU GRENIER.