Aug. 3, 1965 R. G. HUNT ETAL 3,198,402

DISPENSING ARRANGEMENT

Filed March 9, 1964 4 Sheets-Sheet 1

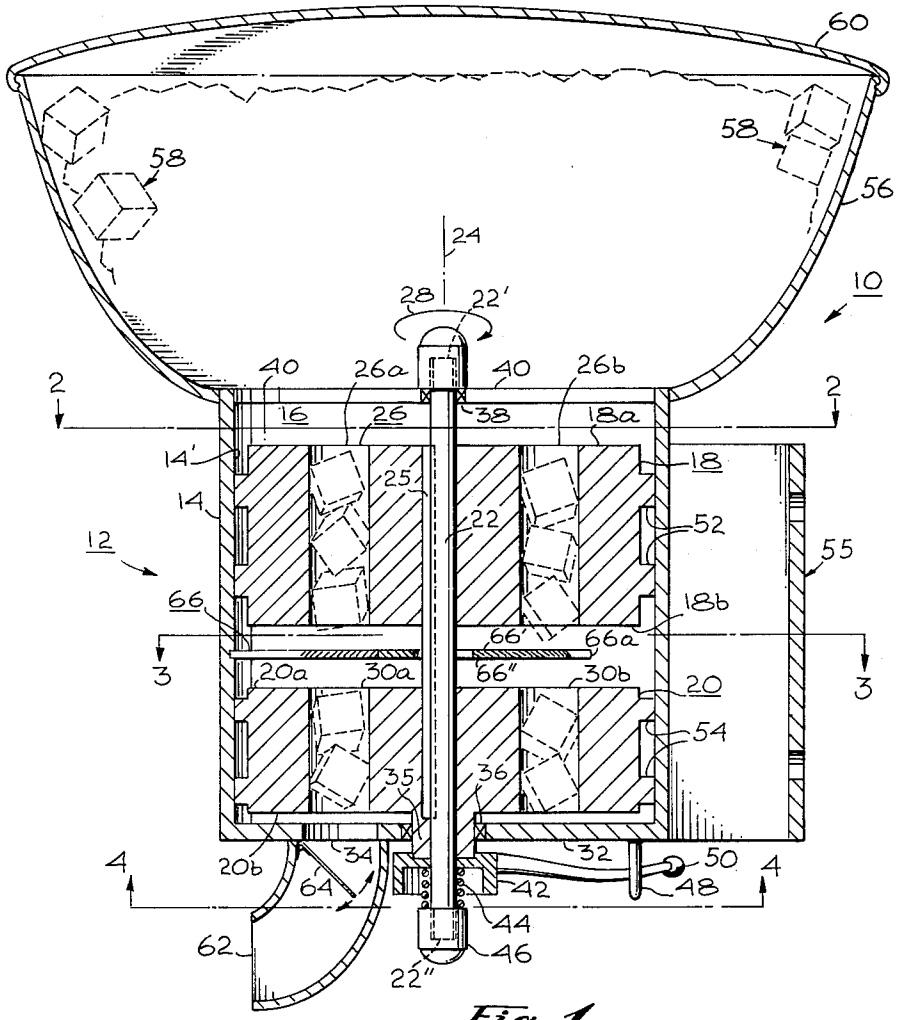


Fig. 1

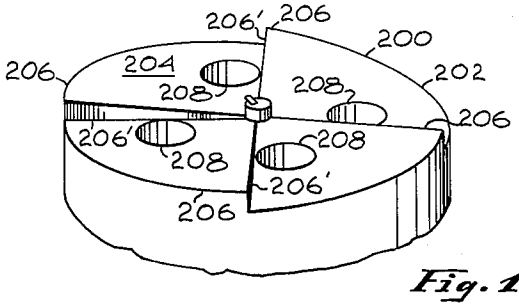


Fig. 10

INVENTORS
MILTON FABRE
RUSSELL G. HUNT
BY Don Finkelstein
ATTORNEY

Aug. 3, 1965 R. G. HUNT ETAL 3,198,402

DISPENSING ARRANGEMENT

Filed March 9, 1964 4 Sheets-Sheet 2

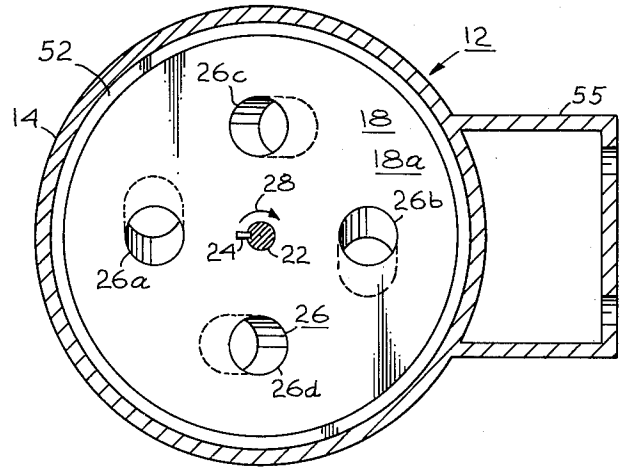


Fig. 2

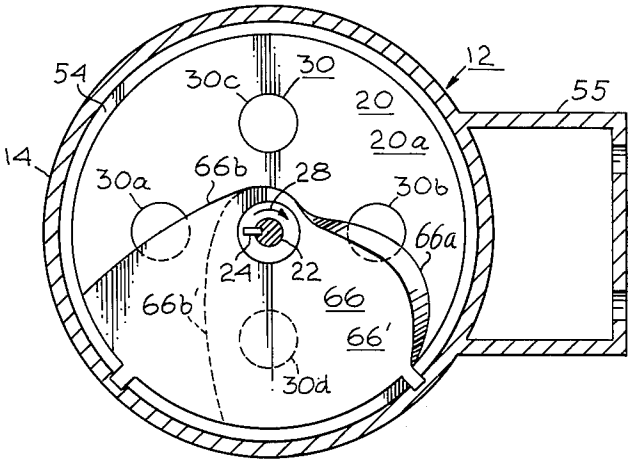


Fig. 3

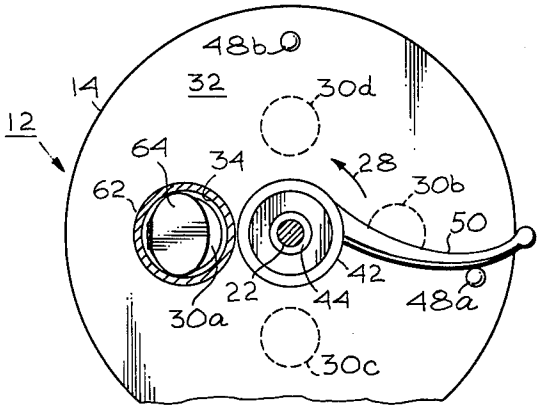


Fig. 4

INVENTORS
MILTON FABRE
RUSSELL G. HUNT
BY Don Finkelstein
ATTORNEY

Aug. 3, 1965 R. G. HUNT ETAL 3,198,402

DISPENSING ARRANGEMENT

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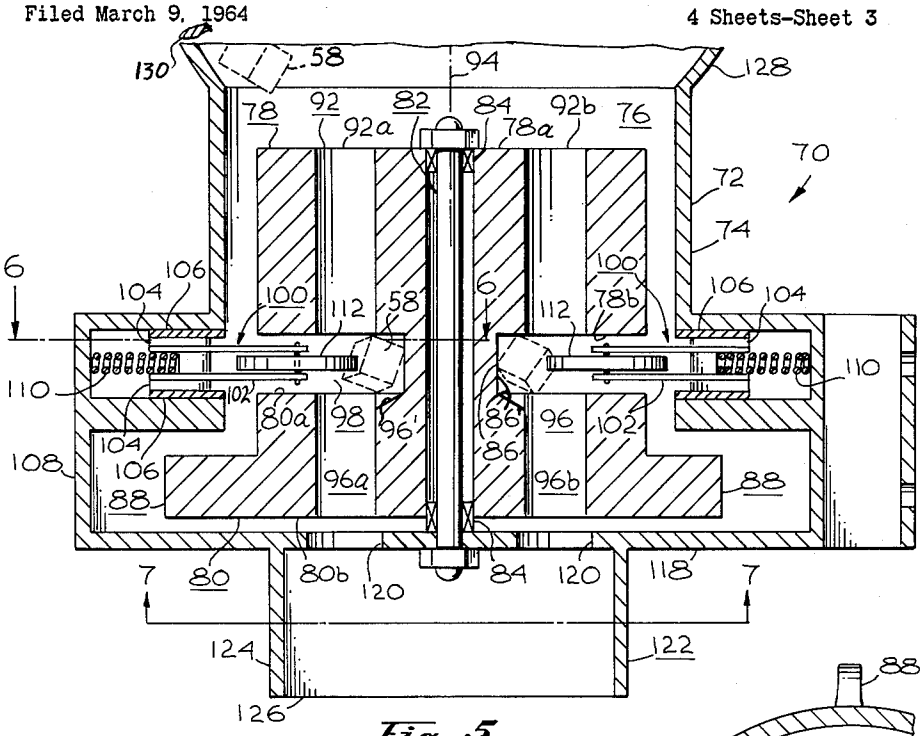


Fig. 5

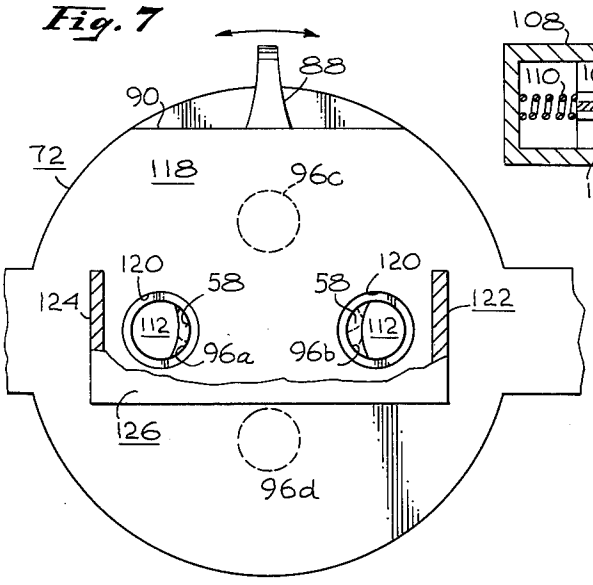


Fig. 7

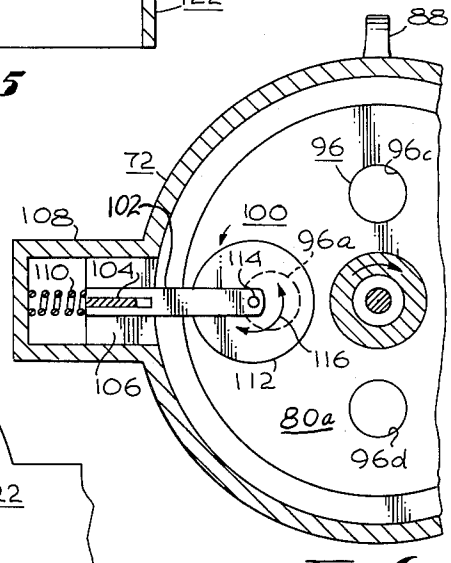


Fig. 6

INVENTORS
MILTON FABRE
RUSSELL G. HUNT
BY Don Finkelstein
ATTORNEY

Aug. 3, 1965 R. G. HUNT ETAL 3,198,402

DISPENSING ARRANGEMENT

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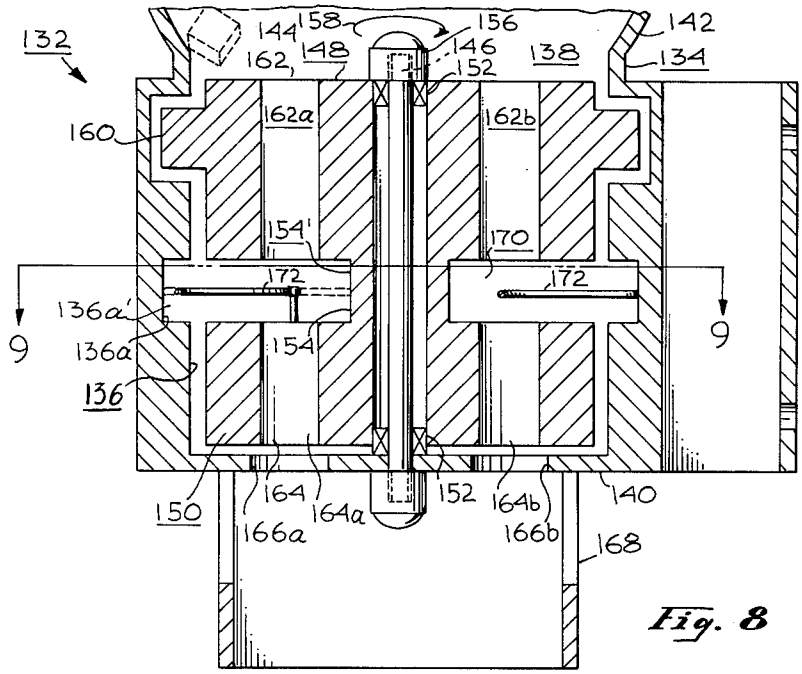


Fig. 8

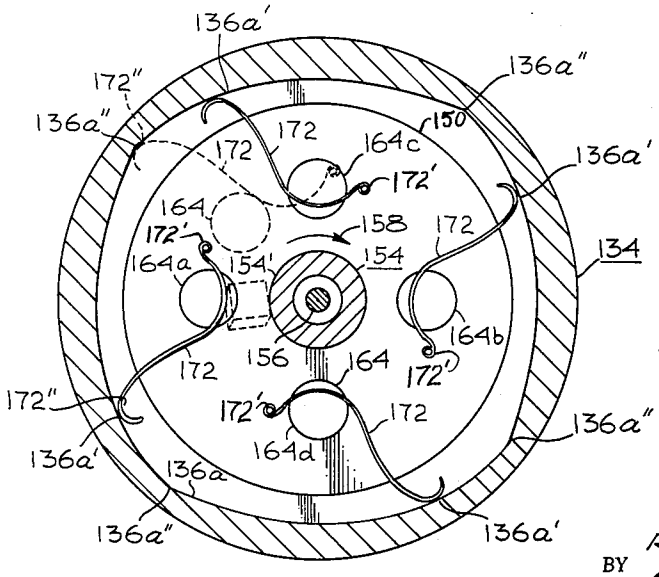


Fig. 9

INVENTORS
MILTON FABRE
RUSSELL G. HUNT
BY Don Finkelstein
ATTORNEY

United States Patent Office 3,198,402 Patented Aug. 3, 1965

3,198,402

DISPENSING ARRANGEMENT

Russell G. Hunt, 1308 Shelley St., Santa Ana, Calif., and Milton Fabre, 1352 Garlingford St., Costa Mesa, Calif.

Filed Mar. 9, 1964, Ser. No. 350,286
8 Claims. (Cl. 222—251)

This invention relates to the dispensing art and more particularly to an improved arrangement for dispensing a preselected number of solid objects.

In many applications there now exists a need for a mechanical device that automatically dispenses upon demand a preselected number of small, solid objects. This is particularly true in the food merchandising field wherein automatic vending machines for dispensing various food items are being utilized with increased frequency. For sanitary reasons, of course, an arrangement for dispensing food products must be inherently sanitary and provide protection for the objects to be dispensed from contamination with dirt or foreign matter.

Thus, for example, it is desirable to so dispense objects such as bouillon cubes, sugar cubes, dried cream or cream substitute pellets, and the like. As the nature of these and similar objects is generally such that they preferably dissolve freely in water, or other liquids, they are usually rather fragile and subject to crumbling or breaking. Therefore, a machine for dispensing such objects must not only allow the dispensing of a preselected number of such objects, but also must prevent or limit the breakage of such objects during the dispensing operation. The mechanism of such a dispensing arrangement must also be rugged enough to withstand substantially continuous operation for extended periods of time without requiring servicing and therefore must operate satisfactorily in the presence of powders or small particles that result from such breakage of the objects as may be inherently unavoidable. The dispensing arrangement must also, of course, be comparatively easy to disassemble and clean when necessary so that proper sanitary conditions for the dispensing may be maintained.

Prior dispensing arrangements for dispensing solid objects have not always proven to be completely satisfactory for dispensing such food products as described above. For example, such dispensing arrangements, to the best of applicants' knowledge, have generally been limited to handling substantially spherical objects, such as the familiar chewing gum balls, or the like. These arrangements handle the products comparatively roughly which would tend to crumble or destroy comparatively fragile solid objects, and are usually unsuited to dispensing other than spherical objects.

Accordingly, it is an object of applicants' invention herein to provide an improved dispensing arrangement.

It is another object of applicants' invention to provide a dispensing arrangement capable of dispensing solid objects independently of their size or shape.

It is yet another object of applicants' invention to provide a dispensing arrangement that dispenses comparatively fragile or crumbly solid objects without undue breakage or destruction thereof.

The above, and other objects, are achieved, according to one aspect of applicants' invention, by providing a bin or hopper in which a plurality of the objects to be dispensed which, for example, may be sugar cubes, may be contained in a completely random orientation. A body member having walls defining a rotor receiving cavity is coupled to the outlet of the bin member and the rotor receiving cavity is in communication with the supply of objects to be dispensed in the bin.

A pair of spaced apart rotors are contained in the rotor receiving cavity and each of the rotors has a plurality of apertures therethrough. The apertures in the first rotor, which is adjacent the supply of objects to be dispensed in the bin, are in registrable alignment with the apertures in the second rotor. The two rotors are mounted for rotational movement together and means are coupled thereto to rotate the rotors about a common axis.

A separator means, which generally may consist of a flat plate-like member, is positioned intermediate the first rotor and the second rotor and blocks the passage of objects to be dispensed from the apertures in the first rotor to the apertures in the second rotor during a first portion of each revolution of the rotors. During a second portion of each revolution of the rotors the objects to be dispensed are free to pass from the apertures in the first rotor to the apertures in the second rotor.

A base plate is coupled to the body member and placed adjacent the outlet of the apertures in the second rotor in those areas corresponding to the second portion of each revolution of the rotors to hold the objects to be dispensed within the apertures in the second rotor. However, an aperture or passageway is provided in the base plate in registrable alignment with the apertures in the second rotor when they are in the first portion of each revolution so that during the first portion of each revolution, that is, while passage of objects to be dispensed between the rotors is being blocked, the objects to be dispensed may flow from the apertures in the second rotor. A spout means may be provided to conduct the objects to be dispensed away from the body member where they may be utilized as appropriate.

It will be appreciated that, while applicants utilize in the descriptions presented herein of their invention a sugar cube as an example of an object that may be dispensed by their improved dispensing arrangement, applicants' invention is not to be so limited to dispensing sugar cubes or similar such items. Rather, the sugar cube has been selected for example because of the inherent characteristics in the sugar cube that make dispensing by other arrangements virtually impossible to the best of applicants' knowledge. Applicants' invention, however, may be utilized in the dispensing of any type of solid object.

The improved dispensing arrangement of applicants' invention is more completely described in the following detailed description taken together with the accompanying drawing wherein similar reference characters refer to similiar elements throughout and in which:

FIGURES 1, 2, 3 and 4 illustrate one embodiment of applicants' invention;

FIGURES 5, 6 and 7 illustrate another embodiment of applicants' invention;

FIGURES 8 and 9 illustrate another embodiment of applicants' invention; and

FIGURE 10 illustrates another aspect of applicants' invention useful in the practice of all embodiments thereof.

Referring now to FIGURE 1, there is shown the structure of one embodiment of an improved dispensing arrangement according to applicants' invention herein. The dispensing arrangement illustrated in FIGURES 1, 2, 3 and 4 is adaptable for utilization to dispense solid objects of any external configuration, that is, spherical, oblate, cubic, etc. Further, the manner of dispensing these objects is such that comparatively fragile or crumbly type of objects may be readily dispensed in preselected numbers therefrom. As utilized herein, the term "solid objects" refers to objects different from gaseous or liquid objects and as such may be solid or hollow, as long as at least a solid shell is provided.

As shown on FIGURES 1, 2, 3 and 4 a dispensing arrangement, generally designated **10**, is comprised of a body member **12** having cylindrical wall portions **14** defining a rotor receiving cavity **16**. A pair of rotors **18**

and 20 comprising a first or selector rotor 18 and a second or dispensing rotor 20 are positioned within the rotor receiving cavity 16 and are mounted for rotational movement therein on shaft means 22 by key 25. Thus, rotors 18 and 20, which are cylindrical in cross-section, rotate with shaft 22 about the common axis 24.

The selector rotor 18 is provided with a plurality of apertures 26*a*, 26*b*, 26*c*, 26*d* therethrough in a generally axial direction. For reasons discussed below, applicants prefer that the apertures 26*a*, *b*, *c* and *d* be inclined from the first or upper end 18*a* of rotor 18 where the apertures 26*a*, *b*, *c* and *d* have their inlets, forwardly in the direction of rotation, as indicated by arrows 28, to the second or bottom end 18*b* of rotor 18, where the apertures 26*a*, *b*, *c* and *d* have their discharge.

However, applicants have found that in many applications such forward slanting of the apertures 26*a*, *b*, *c* and *d* is not necessary and the apertures 26*a*, *b*, *c* and *d* may be aligned completely parallel to the axis 24.

The second or dispensing rotor 20 is provided with a plurality of substantially axially oriented apertures 30*a*, 30*b*, 30*c* and 30*d*, and the apertures 30*a*, *b*, *c* and *d* are registerably aligned with the apertures 26*a*, *b*, *c* and *d* of the first selector rotor 18. Thus, the apertures 30*a*, *b*, *c* and *d* are positioned to receive, at the inlets thereof along a first or upper end 20*a* of rotor 20, objects to be dispensed that flow from the outlet of apertures 26*a*, *b*, *c* and *d*.

The apertures 30*a*, *b*, *c* and *d* have a discharge at a second or bottom end 20*b* of rotor 20.

A base plate 32 is coupled to the cylindrical wall portions 14 of body member 12 and is adjacent the bottom edge 20*b* of rotor 20. The base plate 32 has an aperture 34 therethrough in registrable alignment with the apertures 30*a*, *b*, *c* and *d*, at a particular portion of each revolution thereof, as is more fully described below. A boss 35 of the rotor 20 is suitably journalled in the base plate 32 as, for example, by bearings 36, and the upper end 22′ of the shaft 20 is supported by suitable journalling in, for example, a bearing 38 supported on arms 40 coupled to the top of the cylindrical wall portions 14 of body member 12.

The shaft 22 and rotors 18 and 20 are rotated in the direction of the arrows 28 by means of the ratchet drive 42 bearing against the bottom edge of the boss 35 and urged thereto by spring means 44 which abuts against castle nut 46 coupled to the bottom edge 22″ of the shaft 22. The ratchet type drive utilized and as shown on FIGURE 1 is only one type of engagement of the handle 50 with the shaft 22 that will selectively rotate the shaft 22 and the rotors 18 and 20. When the ratchet type drive is utilized, there are matching teeth on the boss 35 and the ratchet drive 42 that, in the well known arrangement of ratchet drives, allows driving rotation of the shaft 22 in the direction indicated by the arrow 28 and allows the handle 50 to be rotated backwardly in a direction opposite to the arrow 28 without driving the shaft 22. However, as noted above, any desired type of drive arrangement between the handle 50 and the shaft 22 may be utilized. Suitable stops, such as stops 48, may be provided to adjust the stroke of the handle 50 of the ratchet drive 42 so that each operation thereof rotates the rotors 18 and 20 a preselected number of degrees.

The rotors 18 and 20 may be provided, if desired, with rims 52 and 54, respectively, which bear against the inside 14′ of the wall portions 14 of body member 12 and aid in supporting the rotors 18 and 20 in the rotor receiving cavity 16. A mounting bracket 55 may be coupled to the body member 12 to allow mounting of the dispensnig arrangement 10 on a suitable wall or other surface (not shown).

A hollow bin or hopper member 56 is coupled to the top of the wall portions 14 of body member 12 adjacent the upper end 18*a* of the first or selector rotor 18. The bin or hopper member 56 contains a plurality of objects to be dispensed, such as a plurality of randomly oriented sugar cubes 58. A suitable cover 60 may be provided over the top of the bin member 56 for obvious sanitary reasons.

A spout means 62 is coupled to the base plate 32 adjacent the aperture 34 therethrough to conduct the objects to be dispensed away from the body member 12 so that they may be utilized as desired. In some applications, for sanitary or other reasons, it may be desired to provide a spring loaded door means 64 adjacent the aperture 34 in base member 32 to prevent the intrusion of foreign matter into the rotor receiving cavity 16.

A plate-like separator means 66 is fixedly coupled to the wall portions 14 of the body member 12 and positioned intermediate the first or selector rotor 18 and the second or dispensing rotor 20. The leading edge 66*a* of the selector means 66 is generally tapered, for reasons to be described below in connection with the description of the operation of this embodiment of applicants' invention.

As shown in FIGURE 3 the plate-like separator means 66 is fixedly coupled to the body member 12 and does not rotate with the shaft 22 and rotors 18 and 20. As shown in FIGURE 3 the separator means 66, in this embodiment of applicants' invention, blocks the free passage of objects to be dispensed, such as sugar cubes 58, from the apertures 26*a*, *b* and *d* into the apertures 30*a*, *b* and *d* when the rotors 18 and 20 are aligned as shown in FIGURES 1, 2, 3 and 4. Thus, there is free flow of the sugar cubes 58 from the apertures in the first rotor 18 into the apertures in the second rotor 20 only from aperture 26*c* into aperture 30*c*, respectively, for the position illustrated.

In operation of the embodiment shown in FIGURES 1, 2, 3 and 4, the objects to be dispensed, such as sugar cubes 58, flow from the bin or hopper member 56 into the inlet of the apertures 26*a*, *b*, *c* and *d* at the upper end 18*a* of the first or selector rotor 18. The axial length of the apertures 26*a*, *b*, *c* and *d* may be selected to provide any desired number of sugar cubes 58 stored therein between the upper end 18*a* and the top side 66′ of the plate-like separator means 66.

As noted above, there is free passage of the sugar cubes 58 from the apertures 26 in the first or selector rotor 18 to the apertures 30 in the second or dispensing rotor 20 only when the apertures are rotated free of the plate-like separator means 66. That is, when the apertures are between the trailing edge 66*b* and the leading edge 66*a* in the direction indicated by arrow 28. During this portion of each rotation of the rotors 18 and 20 the sugar cubes 58 flow freely from the apertures 26 in rotor 18 to the apertures 30 in rotor 20.

The diameter of the apertures 26 and 30 may, if desired, be selected to provide a preferred orientation of the sugar cubes 58 therein. However, applicants have found that this is not necessary for successful operation of this embodiment of applicants' invention, since even somewhat random orientation of the objects to be dispensed within the apertures 26 and 30 does not interfere with proper operation of the dispensing arrangement 10.

The spacing of the top side 66′ of the selector means 66 from the bottom end 18*b* of the first or selector rotor 18, the spacing of the bottom edge 66″ of the selector means 66 from the upper end 20*a* of the second or selector rotor 20 as well as the spacing of the bottom end 18*b* of the rotor 18 from the upper end 20*a* of the rotor 20 are selected from considerations of the size and shape of the objects to be dispensed, such as sugar cubes 58, so that such objects cannot be trapped between the rotors 18 and 20 or between the rotors 18 and 20 and the selector 66.

As the rotors 18 and 20 are rotated by operation of ratchet drive 42, and the aperture 26*c* and the aperture 30*c* approach the position shown by apertures 26*b* and 30*b*, sugar cube or sugar cubes that are between the bottom end 18*b* of the rotor 18 and the upper end 20*a* of the rotor 20 slidingly engage the leading edge 66*a* of

the selector 66 which, as noted above, is tapered. This forces the sugar cubes 58 upwardly in the aperture 26 and such sugar cubes slide along the top side 66' of the separator 66 from the leading edge 66*a* to the trailing edge 66*b*. As noted above, as each of the apertures moves past the trailing edge 66*b* of the separator 66, flow from the apertures 26 into the apertures 30 again takes place. However, during that portion of each rotation of the rotors 18 and 20 from the position shown by apertures 26*b* and 30*b* to the position shown by apertures 26*a* and 30*a* in rotors 18 and 20, respectively, flow of the sugar cubes 58 therebetween is blocked by the plate-like separator means 66.

The sugar cubes 58 are restrained in the apertures 30*a*, *b*, *c* and *d* of rotor 20 by the base plate 32, except when the apertures are in the position indicated by the aperture 30*a* as they achieve registrable alignment with the aperture 34 in the base plate 32. In this position, the sugar cubes 58 flow from the aperture 30 in the second or dispensing rotor 20 through the aperture 34 in base plate 32 and out the spout means 66, the spring loaded door 64 moving downwardly to allow free passage of the sugar cubes 58.

It will be appreciated that the aperture 34 could be placed anywhere in registrable alignment with the path of the apertures 30 during each revolution between the leading edge 66*a* and the trailing edge 66*b* of the separator 66. Thus, for example, it could have been placed in alignment with the position of the aperture 30*b*, or 30*d*, or any position therebetween. However, to facilitate description and illustration of this embodiment of applicants' invention, the aperture 34 has been shown in the position of registrable alignment with the aperture 30*a*.

Applicants have found that the separator means 66 need not extend to cover that position shown by aperture 30*a* to block passage of sugar cubes 58 from aperture 26*a* to aperture 30*a* but may, if desired, be terminated as illustrated by the dotted line 66*b*'. If the trailing edge is positioned as shown at 66*b*', then the aperture 34 in the base plate 32 must be positioned in registrable alignment, for example, with the position indicated by the aperture 30*d*.

It is only necessary that the separator 66 prevent flow from the apertures 26 in the first or selector rotor 18 to the apertures 30 in the second or dispensing rotor 20 for a time sufficient so that, at the desired rotational rate of the rotors 18 and 20, there is sufficient time for the preselected number of objects to be dispensed contained within the apertures 30 to flow through the aperture 34 in the base plate 32.

The forward slanting of the aperture 26 in the first or selector rotor 18 has been found by applicants to aid materially in the upward movement of the suger cubes 58 in the apertures 26 as they engage the tapered leading edge 66*a* of the separator means 66. The tapered ramp-like leading edge 66*a* urges the sugar cubes upwardly in the apertures 26 without breaking or otherwise generally damaging the sugar cubes 58.

It will be appreciated that the ratchet drive arrangement 42 illustrated in FIGURES 1 and 4 is only one of many arrangements for rotating rotors 18 and 20 and may be replaced by any other desired arrangement. Thus, for example, a simple handle means (not shown) coupled to the shaft 22 to allow easy rotation thereof would suffice. It is desirable to have a certain amount of torque advantage and thus the handle 50 of the ratchet drive 42 has been provided.

As noted above, the dispensing arrangement 10 illustrated in FIGURES 1, 2, 3 and 4 may be utilized to dispense solid objects having any external configuration and virtually any degree of fragility. As shown on FIGURES 1, 2, 3 and 4 the sugar cubes 58 are dispensed from the apertures 30 in the second or dispensing rotor 20 only once during each revolution, that is, when the apertures 30 pass the position indicated by the aperture 30*a*. It will be appreciated, however, that the number of apertures 26 in the first or selector rotor 18, the number of apertures 30 in the second or dispensing rotor 20, and the number of apertures 34 in base plate 32, may be increased beyond the number illustrated, and more than one separator means 66 may be provided, so that there is a dispensing of sugar cubes 58 more than once in each revolution of the rotors 18 and 20.

In dispensing some types of solid objects, weight or friction considerations may make the upward movement of the objects to be dispensed in the apertures 26 of the first or selector rotor 18 as they engage the tapered leading edge 66*a* of the separator 66 impractical. Applicants' invention herein also comprises an arrangement where no such upward movement is required. The structure illustrating this arrangement of applicants' improved dispenser is illustrated in FIGURES 5, 6 and 7.

As shown thereon, there is a dispenser arrangement, generally designated 70, that is adapted to dispense a preselected number of solid objects. There is provided a body member 72 having cylindrical wall portions 74 defining a rotor receiving cavity 76. A pair of rotors 78 and 80 are mounted for rotational movement on a shaft 82 by suitable journalling or bearings 84 in the rotor cavity 76. In this arrangement, the pair of rotors 78 and 80 are of unitary construction being joined together by a portion 86. The pair of rotors 78 and 80 are rotated about the shaft 82 by movement of the handles 88 coupled to the second or dispensing rotor 80 which project from the front 90 of the body member 72. The rotors 78 and 80 may be rotated in either a clockwise or a counterclockwise direction and still provide satisfactory operation.

A plurality of apertures 92 are provided in the first or selector rotor 78 and these apertures 92 are substantially parallel to the axis of revolution 94. The second or dispensing rotor 80 is also provided with a plurality of apertures 96 in registrable alignment with the apertures 92 in the first rotor 78 and adapted to receive objects to be dispensed which, for example, may be sugar cubes 58, therefrom.

In the annular space 98 between the bottom end 78*b* of the first rotor 78 and the upper end 80*a* of the second rotor 80 there is provided a pair of separator means 100. It will be appreciated that any number of such separator means 100 could be provided in the dispenser 70, the two separator means 100 having been selected for purposes of illustration herein. Each separator means 100 is comprised of a bracket 102 having guide portions 104 engaging track means 106 in portion 108 of the body member 72. Spring means 110 engages the portion 108 of body member 72 and the bracket means 102 to yieldingly urge the bracket means 102 inwardly towards the axis of rotation 94. A separator disc means 112 is pivotally coupled to the bracket means 102 by means of pivot pin 114 and the separator disc means 112 is free to rotate about the pivot pin means 114 in either a clockwise or counterclockwise direction as indicated by arrow 116.

A base plate 118 is coupled to the body member 72 and positioned adjacent the discharge end of the apertures 96 in the rotor 80 at the bottom end 80*b* thereof. A pair of apertures 120 are positioned through the base plate 118 in object receiving relationship to the apertures 96 when the apertures 96 are in the position illustrated by the apertures 96*a* and 96*b*.

For the apertures 96 in positions other than the positions illustrated by apertures 96*a* and 96*b* objects to be dispensed that are contained within the apertures 96 are restrained therein by the base plate 118.

A spout means 122 is coupled to the base plate 118 and is adapted to direct the objects that are dispensed after passing through the apertures 120 to regions external the body member 72. The spout means 122 comprises a pair of support plates 124 and a back plate 126 that is slanted forwardly toward the front edge 90 of the body mem-

ber 72. Objects to be dispensed falling from the apertures 120 engage the back plate 126 and slide forwardly thereon.

A bin means 128 is coupled to the top of the wall portions 74 of the body member 72 adjacent the upper end 78a of the first or selector rotor 78 and is adapted to contain a plurality of objects to be dispensed, such as sugar cubes 58, in a random orientation. A cover means 130 may be provided, as described above, for sanitary reasons.

In the operation of the dispenser arrangement 70 the bin means 128 is filled with the objects to be dispensed, such as sugar cubes 58, which flow downwardly into the apertures 92 in the first or selector rotor 78. For the position of the apertures 92 in rotor 78 and 96 in rotor 80 other than that indicated by the positions of the apertures 96a and 92a and 96b and 92b, respectively, the objects to be dispensed flow through the apertures 92, past the annular space 98 and into the apertures 96 and are restrained therein by the base plate 118. As the apertures approach the separator means 100, objects to be dispensed that are in the space 98 between the apertures 92 and the apertures 96 engage disc-like member 112. When the objects to be dispensed are cubes, such as sugar cubes 58, applicants have found that they readily orient themselves so that one of the faces thereof is in engagement with the disc-like member 112. The disc-like member 112 urges the object to be dispensed that it engages against the wall 86' of the portion 86 in frictional engagement therewith and restrains the object from further downward motion into the aperture 96a. Further, the disc-like member 112 also blocks passage between the apertures 92 and the apertures 96 to prevent further flow of objects to be dispensed therebetween in the positions illustrated by the apertures 96a and 96b. Since the disc-like members 112 are free to rotate in either clockwise or counterclockwise direction, as the rotor 78 and the rotor 80 are rotated about the axis 94 and the disc-like member 112 frictionally engages an object to be dispensed, the disc-like member 112 rotates about the pivot pin 114 and as the apertures move away from the position illustrated, for example, by the apertures 92a and 96a, the object to be dispensed is released from its frictional engagement with the wall portion 86' of the portion 86 and is free to flow downwardly into the now empty aperture 96. Applicant has found it advantageous to chamfer the edges 96' of the apertures 96 to insure that the object to be dispensed formerly held in frictional engagement as described above flows into the aperture 96.

During the portions of each revolution of the rotors 78 and 80 when the apertures 92 and 96 therein are aligned with the separator means 100 there is no flow of objects to be dispensed from the apertures 92 in the rotor 78 to the apertures 96 in the rotor 80. However, there is flow from the apertures 96 out through the apertures 120 in the base plate 118 for utilization as desired. During other portions of each rotation of the rotors 78 and 80 objects are free to flow from the apertures 92 in the rotor 78 to the apertures 96 in the rotor 80 but are restrained from flowing therefrom by the base plate means 118 as described above. Thus, for the arrangement illustrated in FIGURES 5, 6 and 7 objects are dispensed from the apertures 96 in the second or dispensing rotor 80 twice during each revolution of the rotors 78 and 80. More than two selector means 100 may be provided so that the number of times at which objects are dispensed from the apertures 96 is increased to more than two.

In the two embodiments of applicants' invention described above, it will be noted that there is relative motion between the separator means, such as the disc means 112 shown on FIGURES 5 and 6, and the plate-like separator means 66 illustrated in FIGURES 1 through 4, and the objects to be dispensed. As such, there will always be some degree of frictional sliding motion between the objects to be dispensed and the separating means. For very fragile objects that must be dispensed which may crumble or disintegrate under even comparatively mild frictional engagement, applicants' invention herein also comprises a dispensing arrangement in which there is no frictional sliding between the object to be dispensed and the separator means. The structure illustrating this embodiment of applicants' invention is shown on FIGURES 8 and 9.

As shown thereon there is a dispensing arrangement generally designated 132, having a body member 134 with interior wall portions 136 defining a generally cylindrical rotor receiving cavity 138. A base plate 140 is coupled to one end of the body member 134 and a bin or hopper member 142 is coupled to an upper end of the body member 134, and the bin member 142 is adapted to contain a plurality of objects to be dispensed 144.

A shaft means 146 is coupled to the base plate means 140 and extends into the rotor receiving cavity 138. A pair of rotors 148 and 150 are mounted for rotational movement on the shaft 146 by suitable journalling as by bearings 152. In this embodiment, the two rotors 148 and 150 are also of unitary construction joined together by portion 154. However, it will be appreciated that two separate rotors, appropriately spaced apart and supported on shaft 146, could be utilized similar to the arrangement illustrated in FIGURE 1.

The pair of rotors 148 and 150 rotate about their common axis 156 in the directions indicated by the arrows 158. Rotation may be achieved by any suitable means operatively connected to the pair of rotors 148 and 150, such as the handle tabs 160 coupled to the first or selector rotor 148 in a manner similar to the handles 88 on rotor 80 in FIGURE 5.

The first or selector rotor 148 is provided with a plurality of axially oriented apertures 162 and as shown on FIGURES 8 and 9 four such apertures, 162a, b, c and d, are provided spaced approximately 90° apart.

A plurality of apertures 164 are also provided in the second or dispensing rotor 150. The apertures 164 are axially oriented and in registrable alignment with the apertures 162 in the first or selector rotor 148 and in receivable relation thereto to receive objects to be dispensed 144 as they flow through the apertures 162 into the apertures 164 as more fully described below.

The base plate 140 is provided with four apertures 166, two of which, 166a and 166b, are shown in FIGURE 8 and the apertures 166 in base plate means 140 are in registrable alignment with the apertures 164 in the second or dispensing rotor 150 when they are in the positions indicated on FIGURES 8 and 9. Thus, in these four positions indicated by the positions of apertures 164a, b, c and d objects to be dispensed, such as object 144, may flow from the apertures 164 in the second or dispensing rotor 150 through the apertures 166 in the base plate means 140 and be directed to regions external the body member 134 by spout means 168 which, for example, may be similar to the spout means 122 illustrated on FIGURE 5.

As noted above, the first or selector rotor 148 is spaced apart from the second or dispensing rotor 150 by space 170. A plurality of spring-like members 172 are positioned within the space 170 and have a first end 172' coupled to the second or dispensing rotor 150 and a second end 172'' frictionally engaging contoured wall portion 136a of the body member 134. The contoured wall portion 136a has four portions 136a' spaced a first preselected distance from the axis 156. This preselected distance between the axis 156 and the portions 136a' is selected so that the spring-like member 172 blocks passage of objects to be dispensed from the apertures 162 in the first or selector rotor 148 to the apertures 164 in the second or dispensing rotor 150 and also forces the spring-like member 172 into object to be dispensed engaging relationship with the wall portion 154' of the portion 154. Thus, in each of the four positions illustrated in FIGURE

9 of the apertures **164** the spring-like member **172** both blocks passage of objects to be dispensed from the apertures **162** to the apertures **164** as well as frictionally engages and holds an object to be dispensed in the space **170**, clamping said object between the spring-like member **172** and the wall portion **154'**. Since the spring-like members **172** are coupled to the second or dispensing rotor **150** at end **172'**, there is no relative motion between the objects to be dispensed and the wall portion **154'** or the spring-like member **172**.

As noted above, in each of the positions illustrated for the apertures **164** in FIGURE 9 objects to be dispensed may flow therefrom through the apertures **166** in the base plate means **140'** to be free of the dispenser **132** and for ultimate utilization as desired. Thus, during those portions of each revolution of the rotors **148** and **150** as they are in the positions illustrated in FIGURE 9, there is no flow of objects to be dispensed from the apertures **162** to the apertures **164**, but there is flow of objects to be dispensed out of the apertures **164**.

The contoured wall portion **136***a* also has portions **136***a''* intermediate each of the portions **136***a'* and the portions **136***a''* are spaced a second preselected distance greater than the first preselected distance from the axis **156**. The spacing of the portions **136***a''* from the axis **156** is selected so that the spring-like member **172** may swing out of blocking relationship between the apertures **162** and **164**. Such a position is illustrated by the dotted lines on FIGURE 9 of one of the springs **172** and apertures **164**, as they would occupy a position 45° advanced from the position shown for the aperture **164***a*. As shown the end **172''** of the spring member **172** in this position is engaging the wall portion **136***a''* and therefore allows the spring-like member **172** to swing away from a position over the aperture **164** and objects may freely flow from the apertures **162** in the first or selector rotor **148** to the apertures **164** in the second or dispensing rotor **150** during those portions of each revolution of the rotors **148** and **150** when the spring-like members **172** engage the portions **136***a''* of contoured wall **136***a*. Since there are no apertures through the base plate means **140** in positions other than those described above, the base plate **140** restrains the objects to be dispensed within the apertures **164** in the second or dispensing rotor **150** in all other positions during each rotation of the rotors **148** and **150**.

For the arrangement illustrated in FIGURE 9 four objects to be dispensed are so dispensed with each quarter turn of the rotors **148** and **150**. Thus, in a complete rotation 16 objects are dispensed from the dispensing arrangement **132**. It will be appreciated, of course, that any number of apertures **162** and **166** may be provided to dispense as many objects as is desired for each revolution thereof. Similarly, the number of apertures **166** in the base plate means **140** may be reduced to less than the same number of apertures **164** in the second or dispensing rotor **150** to control the number of objects dispensed with each revolution, as may also the contour of the contoured wall **136***a* by increasing or decreasing the number of radially inwardly spaced portions **136***a'* and radially outwardly spaced portions **136***a''*.

Applicants have found that when the objects to be dispensed are flat faced and have a comparatively high frictional engagement coefficient one with the other, there is some problem associated with "bridging" of the objects at the bottom of the bin or storage member adjacent the top of the first or selector rotor. Sugar cubes are an example of objects that have a tendency to so bridge. When the objects so bridge, they do not flow freely into the apertures in the first or selector rotor. Therefore, applicants have found it advantageous to contour the top of the first or selector rotor to break up any such bridging condition.

As illustrated in FIGURE 10, there is shown a fragmentary portion of the top end **200** of a first or selector rotor **202** that may be utilized in any embodiment of this invention. The first or selector rotor **202** illustrated in

FIGURE 10 may be utilized as the first or selector rotor **18** of the embodiment illustrated in FIGURE 1, as the first or selector rotor **78** of the embodiment illustrated in FIGURE 5, or as the first or selector rotor **148** of the embodiment illustrated in FIGURE 8. As shown in FIGURE 10, the top surface **204** of the rotor **200** is contoured by providing a plurality of ramps or ridges **206** so that the top surface **204** is similar to a ratchet face. The ridges **206** taper downwardly to the base **206'** of the adjacent ridge and the apertures **208** are preferably positioned adjacent the beginning of each ridge **206**. When a rotor, such as the rotor **202**, is utilized in applicants' invention herein, the ridges **206** tend to break up any bridging that might occur in the objects to be dispensed and allow the objects to flow from the bin member into the apertures **208**.

This concludes the description of applicants' invention of their improved dispensing arrangement. From the many embodiments illustrated herein it is apparent that many modifications and adaptations may be made by those skilled in the art. Therefore, the appended claims are intended to cover all such variations and modifications falling within the true scope and spirit of applicants' invention.

We claim:

1. In combination:

a body member having walls defining a rotor receiving cavity;

first rotor means having a plurality of objects receiving apertures therethrough mounted for rotational movement in said cavity;

second rotor means spaced apart from said first rotor means and having a plurality of apertures therethrough in object receiving relationship with said plurality of apertures in said first rotor means;

disc means slidingly mounted on said body member for reciprocating motion between said first rotor and said second rotor to sequentially block the flow of objects to be dispensed from the apertures in said first rotor to the apertures in said second rotor during a first portion of each rotation of said rotors;

spring means coupled to said body member and said disc means for yieldingly urging said disc means intermediate said first rotor and said second rotor; and

plate means coupled to said body member adjacent said second rotor and having an aperture therethrough sequentially registrably alignable with said plurality of apertures in said second rotor during said first portion of each revolution of said rotors to allow the passage of objects to be dispensed from said second rotor.

2. A dispensing arrangement comprising, in combination:

a body member having walls defining a rotor receiving cavity;

a selector rotor having a plurality of apertures therethrough mounted for rotational movement in said rotor receiving cavity;

a dispensing rotor spaced apart from said selector rotor and mounted for rotational motion therewith in said rotor cavity, said dispensing rotor having a plurality of apertures therethrough in registrable alignment with said plurality of apertures in said selector rotor;

bracket means coupled to said body member and mounted for reciprocating motion thereon;

a disc-like separator means pivotally mounted on said bracket means intermediate said selector rotor and said dispensing rotor for sequentially blocking the flow of objects to be dispensed from said plurality of apertures in said selector rotors to said plurality of apertures in said dispensing rotor during a first portion of each rotation of said rotors;

spring means coupled to said body member and said bracket member for yieldingly urging said disc-like

separator means intermediate said selector rotor and said dispensing rotor;

a base plate means coupled to said body member adjacent said dispensing rotor, said base plate means having an aperture therethrough in sequential registrable alignment with said plurality of apertures in said dispensing rotor during said first portion of each rotation of said rotors, said base plate means restraining objects to be dispensed in said plurality of apertures in said dispensing rotor during a second portion of each rotation of said dispensing rotor;

means operatively connected to said selector rotor and said dispensing rotor for rotating said rotors about a preselected axis; and

means for storing a plurality of objects to be dispensed adjacent said selector rotor whereby said objects to be dispensed flow into said apertures in said selector rotor and sequentially flow therefrom into said plurality of apertures in said dispensing rotor during said second portion of each revolution of said rotors.

3. A body member having walls defining a rotor receiving aperture therein;

a cylindrical selector rotor having a plurality of apertures therethrough in a direction substantially parallel to the axis thereof and said apertures having an inlet at a first end of said selector rotor and an outlet at a second end thereof, and said selector rotor adapted to rotate about said axis;

a cylindrical dispensing rotor spaced apart from said selector rotor and mounted for coaxial rotational movement therewith and having a plurality of apertures therethrough in a direction substantially parallel to said axis and said apertures having an inlet at a first end of said dispensing rotor and an outlet at a second end of said dispensing rotor, and said plurality of apertures in said dispensing rotor registrably aligned with said plurality of apertures in said selector rotor, and said plurality of apertures in said selector rotor having a first preselected length and said plurality of apertures in said dispensing rotor having a second preselected length less than said first preselected length;

bracket means mounted on said body member for reciprocating motion thereon;

disc means pivotally mounted on said bracket means intermediate said second end of said selector rotor and said first end of said dispensing rotor to sequentially block the passage of objects from said plurality of apertures in said selector rotor to said plurality of apertures in said dispensing rotor during a first portion of each rotation of said rotors;

spring means coupled to said body member and said bracket member for yieldingly urging said disc member intermediate said selector rotor and said dispensing rotor;

means operatively connected to said selector rotor and said dispensing rotor for unitarily rotating said rotors about said axis;

bin means coupled to said body member adjacent said first end of said selector rotor for containing a plurality of objects to be dispensed whereby said objects to be dispensed flow into said inlets to said plurality of apertures in said selector rotor and flow from said outlet of said plurality of apertures in said selector rotor into the inlet of said plurality of apertures in said dispensing rotor during second portions of each rotation of said rotors; and

base plate means coupled to said body member adjacent said second end of said dispensing rotor, said base plate having an aperture therethrough in registrable alignment with said plurality of apertures in said dispensing rotor during said first portion of each rotation of said rotors, and said base plate restraining objects to be dispensed in said plurality of apertures in said dispensing rotor during said second portion of each rotation of said rotors.

4. In combination:

a selector rotor having a plurality of apertures therethrough;

a dispensing rotor spaced apart from said selector rotor and adapted to rotate therewith and having a plurality of apertures therethrough in registrable alignment with said plurality of apertures in said selector rotor;

separator means mounted for reciprocating motion intermediate said selector rotor and said dispensing rotor for sequentially blocking the flow of objects to be dispensed from each of said plurality of apertures in said selector rotor to said plurality of apertures in said dispensing rotor during a first portion of each rotation of said rotors;

means operatively connected to said selector rotor and said dispensing rotor for rotating said rotors about a preselected axis;

means for storing a plurality of objects to be dispensed adjacent said selector rotor whereby said objects flow into said apertures in said selector rotor and sequentially flow therefrom into said apertures in said dispensing rotor during a second portion of each rotation of said rotors;

means for sequentially restraining said objects to be dispensed in said apertures in said dispensing rotor during said second portion of each rotation of said rotors; and

means for allowing a preselected number of said objects to be dispensed to flow from said apertures in said dispensing rotor during said first portion of each rotation of said rotors.

5. In combination:

a first rotor means having at least one aperture therethrough;

a second rotor means having at least one aperture therethrough, said at least one aperture in said second rotor means in registrable alignment with said at least one aperture in said first rotor means;

separator means intermediate said first and said second rotor means and mounted said second rotor for pivotal motion adjacent said at least one aperture, and said selector means adapted to rotate with said first rotor means and said second rotor means;

first means for restraining said selector means intermediate said at least one aperture in said first rotor means and said at least one aperture in said second rotor means to block the flow of objects to be dispensed therebetween during a first portion of each rotation of said rotors; and

second means for restraining objects to be dispensed in said at least one aperture in said second rotor during second portions of each rotation of said rotors.

6. A dispensing arrangement comprising, in combination:

a body member having walls defining a rotor receiving cavity;

a selector rotor mounted for rotational movement in said rotor receiving cavity and having a plurality of apertures therethrough;

a dispensing rotor mounted in said rotor receiving cavity for rotational movement with said selector rotor, and said dispensing rotor having a plurality of apertures therethrough, each of said apertures in registrable alignment with one of said plurality of apertures in said selector rotor;

spring-like separator means intermediate said selector rotor and said dispensing rotor and having a first end pivotally mounted thereon adjacent said at least one aperture, and said spring-like separator means adapted to rotate with said selector rotor and said dispensing rotor;

track means coupled to said walls of said body member

for slidingly engaging a second end of said separator means, said track means having first portions positioned to yieldingly urge said separator means into object blocking relationship between said at least one aperture in said selector rotor and said at least one aperture in said dispensing rotor during a first portion of each rotation of said selector rotor and said dispensing rotor, and said track means having second portions spaced radially outward from said first portion for allowing said separator means to pivot away from blocking relationship during a second portion of each rotation of said selector rotor and said dispensing rotor; and

means for selectively restraining objects to be dispensed in said at least one aperture in said dispensing rotor during said second portion of each rotation.

7. In combination:

a cylindrical selector rotor having a plurality of apertures therethrough in a direction substantially parallel to the axis thereof and said apertures having an inlet at a first end of said selector rotor and an outlet at a second end of said selector rotor and said selector rotor adapted to rotate about said axis;

a cylindrical dispensing rotor spaced apart from said selector rotor and mounted for coaxial rotational movement therewith and having a plurality of apertures therethrough in a direction substantially parallel to said axis and registrably aligned with said plurality of apertures in said selector rotor, and said plurality of apertures in said cylindrical dispensing rotor having an inlet at a first end of said dispensing rotor and an outlet at a second end of said dispensing rotor;

a body member having walls defining a rotor receiving cavity, and said selector rotor and said dispensing rotor mounted in said rotor receiving cavity for rotational movement therein;

a plurality of spring-like separator means pivotally mounted on said dispensing rotor and adapted to rotate therewith, each of said plurality of separator means adjacent one of said plurality of apertures in said dispensing rotor;

track means coupled to said body member for slidingly engaging each of said separator means, said track means having a first portion for yieldingly urging said separators in object blocking relationship between each of said plurality of apertures in said selector rotor and each of said plurality of apertures in said dispensing rotor during a first portion of each rotation thereof, and having a second portion for yieldingly allowing pivotal motion of each of said separators away from said blocking relationship during a second portion of each rotation of said rotors, whereby objects to be dispensed flow from the outlet of said selector rotor to the inlet of said dispensing rotor during said second portion of each rotation of said rotors;

means operatively connected to said selector rotor and said dispensing rotor for unitarily rotating said rotors about said axis;

bin means coupled to said body member adjacent said inlet end of said selector rotor for storing a plurality of objects to be dispensed, whereby said objects to be dispensed flow from said bin means into said plurality of apertures in said selector rotor; and

means coupled to said body member adjacent said outlet end of said dispensing rotor for sequentially restraining said objects to be dispensed in said apertures of said dispensing rotor during said second portion of each revolution of said rotors.

8. In combination:

a pair of spaced apart rotors adapted to rotate about a preselected axis and each of said rotors having a plurality of registrably aligned axially disposed apertures therethrough;

a plurality of separator means pivotally coupled to said pair of rotors and mounted therebetween, one of said plurality of separator means adjacent each of said plurality of apertures in said pair of rotors;

means for sequentially urging each of said separator means to block each of said apertures during a first portion of each revolution of said pair of rotors; and

means for allowing each of said separator means to sequentially pivotally move away from said blocking relationship during a second portion of each revolution of said rotors.

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RAPHAEL M. LUPO, *Primary Examiner.*