Dec. 27, 1955 A. E. WHITECAR 2,728,442

TABLET COUNTER

Filed Sept. 22, 1950 4 Sheets-Sheet 1

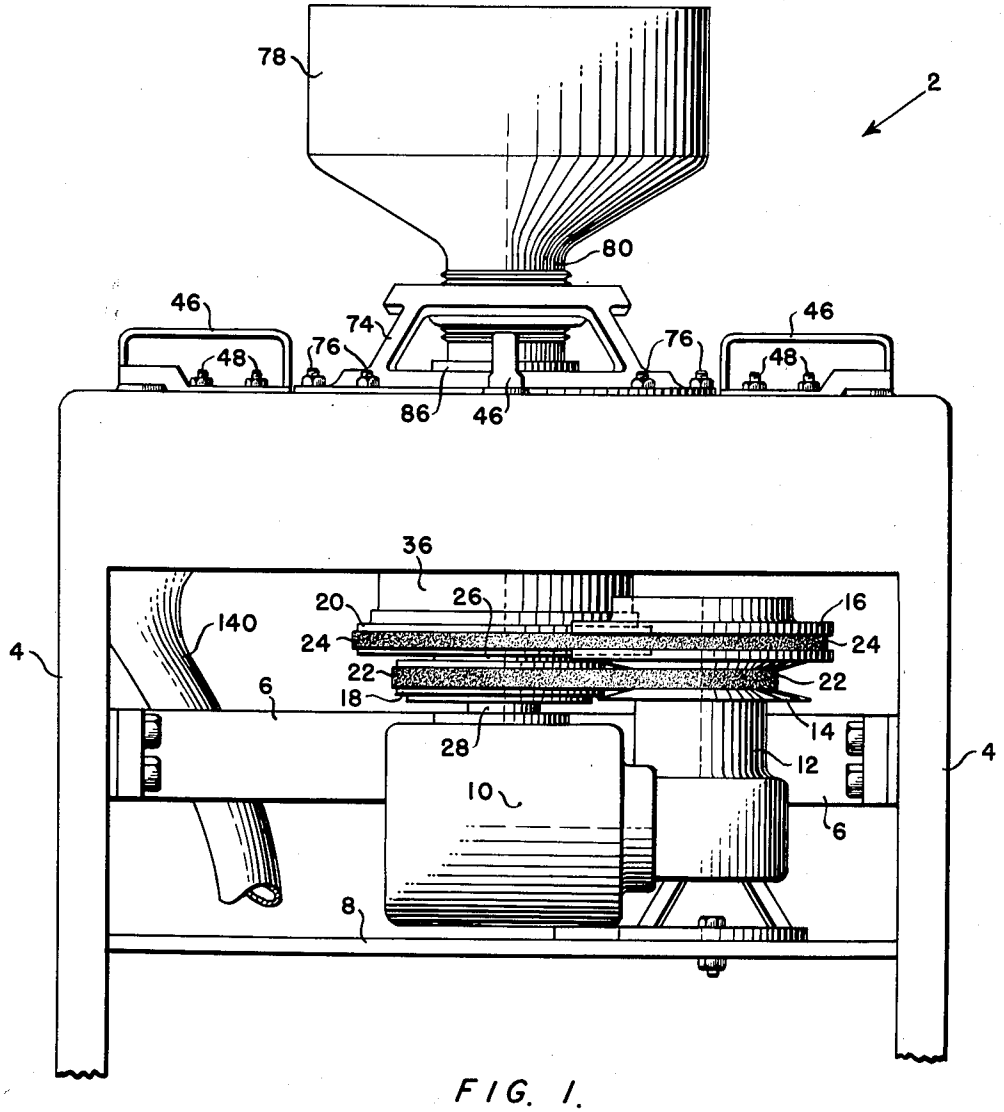


FIG. 1.

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TABLET COUNTER

Filed Sept. 22, 1950 4 Sheets-Sheet 2

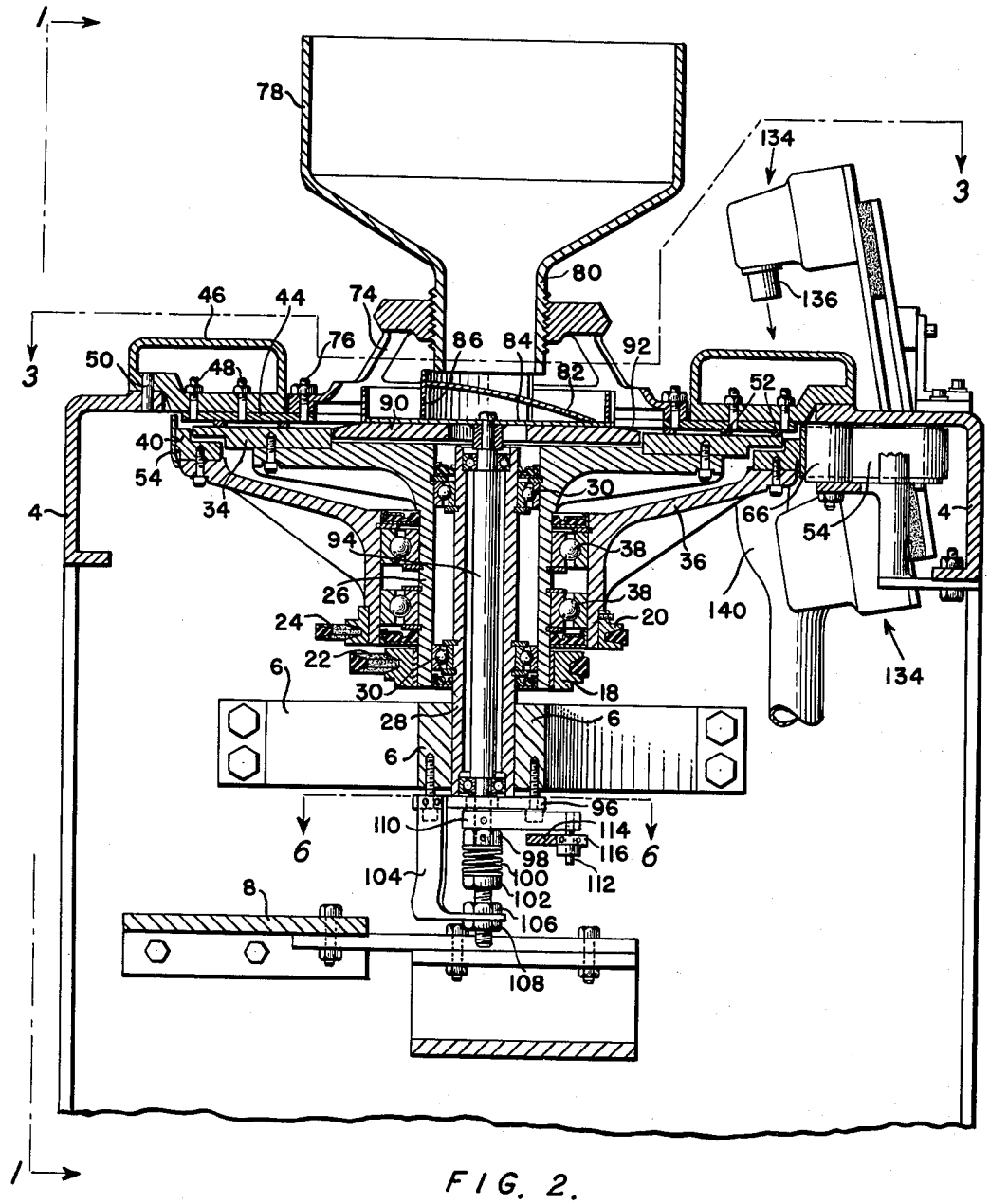


FIG. 2.

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TABLET COUNTER

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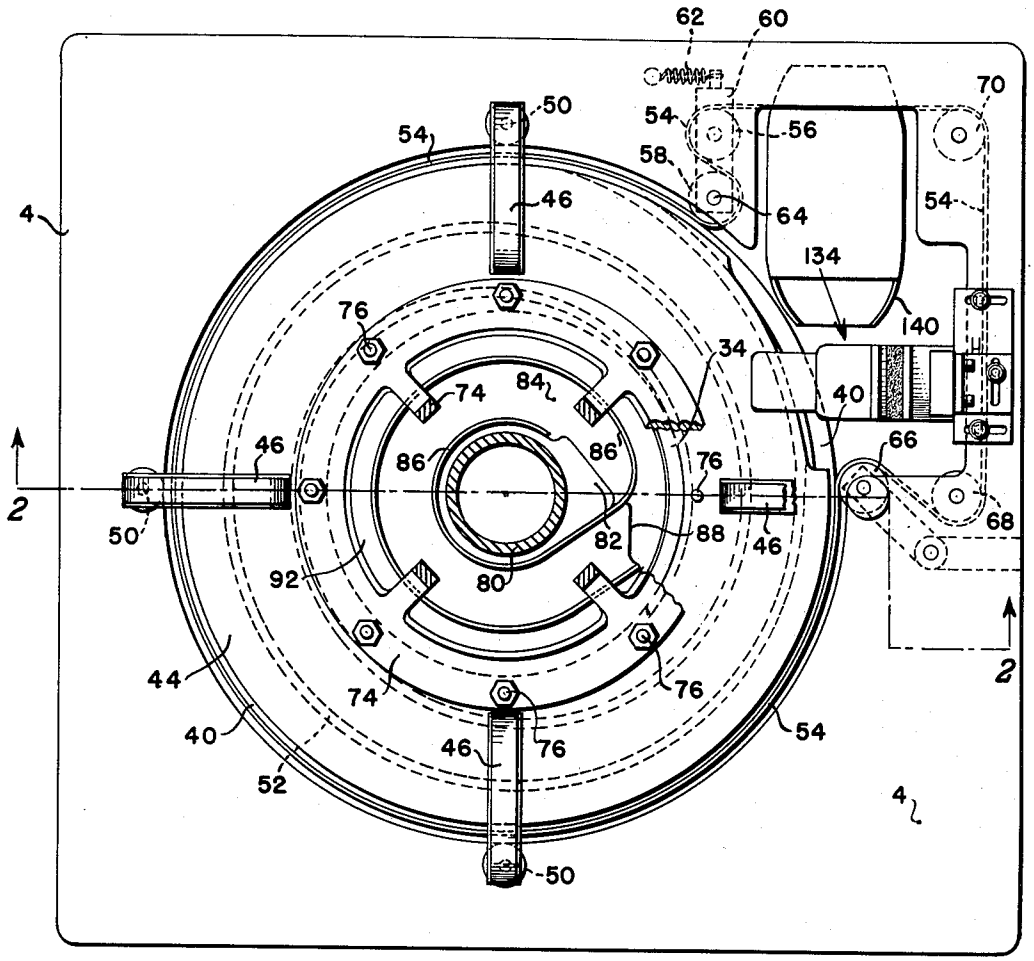


FIG. 3.

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Filed Sept. 22, 1950 4 Sheets-Sheet 4

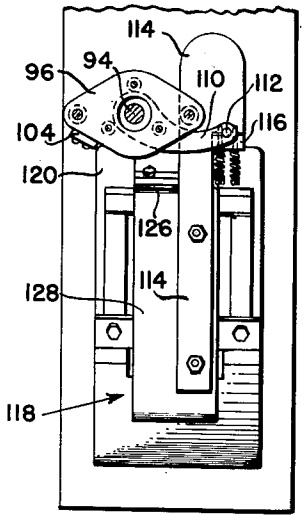


FIG. 6.

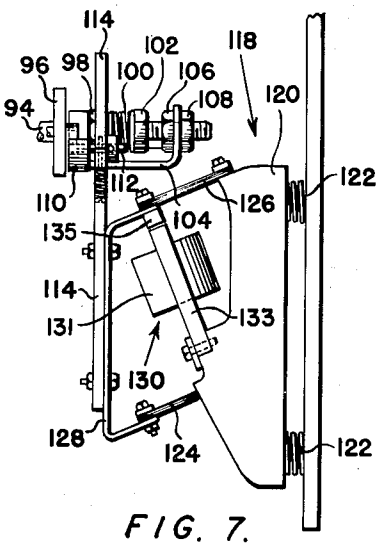


FIG. 7.

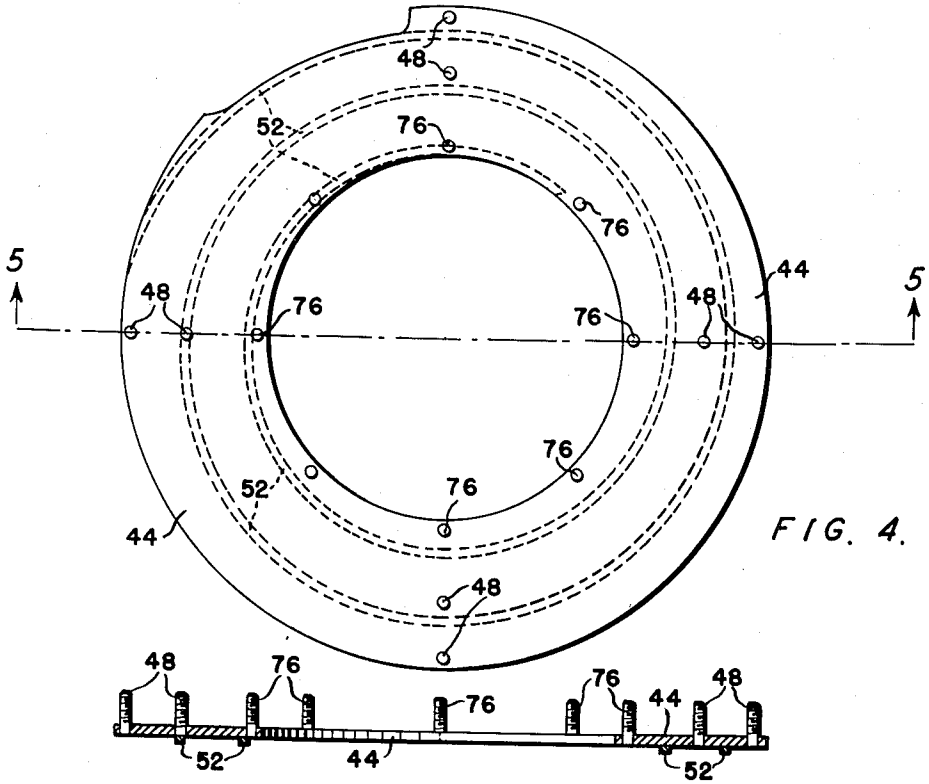


FIG. 4.

FIG. 5.

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2,728,442

TABLET COUNTER

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Application September 22, 1950, Serial No. 186,167

4 Claims. (Cl. 198—30)

This invention relates to a tablet counter, and more particularly, relates to a tablet counter which utilizes an electronic beam through which tablets are passed to effect a counting.

It is well known to count tablets and similar items by passing them through an electronic beam and thus interrupting the flow of the beam to a photoelectric cell and associated counting mechanism. The accuracy of such counting devices has heretofore been impaired by two or more of the tablets to be counted passing through the beam along side each other rather than in single file and also by the erratic movement of the tablets which results in knocking some of them out of the path passing through the counting beam.

The broad object of this invention is, therefore, to provide a mechanism which will insure that all of the tablets which are to be counted will pass through the electronic counting device beam in well-spaced, single file alignment.

This and other objects of this invention will become apparent on reading the description in conjunction with the following drawings in which:

Figure 1 is a side elevation of a machine in accordance with this invention.

Figure 2 is a vertical section of the machine of Figure 1 looking towards the rear of the machine and taken on the planes indicated by the line 2—2 of Figure 3.

Figure 3 is a view taken on the plane indicated by the line 3—3 in Figure 2.

Figure 4 is a top plan view of the top plate shown in Figure 3.

Figure 5 is a vertical section taken on the plane indicated by the line 5—5 in Figure 4.

Figure 6 is a view taken on the plane indicated by the line 6—6 in Figure 2 and showing, particularly, the vibrating mechanism.

Figure 7 is a side elevation of the vibrating mechanism of Figure 6.

As shown particularly in Figure 1, a tablet counting machine 2 in accordance with this invention has a supporting stand 4 which is braced by cross beams 6 and 8. A motor 10 is connected to a gear box 12 which drives pulleys 14 and 16 on a common shaft (not shown). The driving pulleys 14 and 16 are connected to driven pulleys 18 and 20, respectively, by means of belts 22 and 24.

As will be seen more clearly in Figure 2, pulley 18 is secured to and drives mounting 26 which is mounted for rotation on hollow column 28 by means of bearings 30. An inner ring 34 is mounted on the upper end of mounting 26.

Pulley 20 is fixedly secured to and drives mounting 36 which is mounted for independent rotation exterior of mounting 26 by bearings 38. An outer ring 40 is mounted on the upper end of mounting 36. The upper surface of ring 40 is adjacent but slightly lower than the upper surface of ring 34.

Referring again to Figure 1, it will be observed that,

due to the ratios of the driven to the driving pulleys, pulley 18 is driven at a lower R. P. M. than pulley 20. So long as pulley 18 is driven at a lower R. P. M. than pulley 20, the difference between their speeds can vary widely. However, it has been found that it is highly satisfactory to have a ratio of 1:1 between pulleys 14 and 18 and a ratio of 5:4 between pulleys 16 and 20. Thus, it will be apparent that the outer ring 40 is driven at a faster rate than the inner ring 24.

A top plate 44 has handles 46 secured thereto by studs 48. Handles 46 are secured to stand 4 by pins 50. As shown in Figures 2, 3, 4 and 5, the top plate 44 is provided with a spiral guide 52 which extends from the inner edge of plate 44 to the outer periphery of plate 44. Thus, guide 52 runs from a point adjacent the inner edge of inner ring 34 to a point adjacent the outer periphery of outer ring 40.

Referring now particularly to Figures 2 and 3, a guide about the exterior perimeter of the outer ring 40 is provided by a vertical continuous belt 54. Belt 54 passes around pulleys 56 and 58 of a slack take-up device 60 which is actuated by a spring 62 and pivoted at 64.

Belt 54 then passes tightly about outer ring 40 to guide pulleys 66, 68 and 70 and thence back to pulley 56. Belt 54 is carried by outer ring 40 and moves at the same linear rate as its outer periphery.

A spider 74 is secured to top plate 44 by means of studs 76. A tablet storage hopper 78 has a neck 80 which is threadably secured to the top of spider 74. Directly below the neck 80 and adapted to receive tablets flowing therefrom is a sloping plate 82 whose lower end rests on a plate 84. A curved upstanding plate 86 forms a barrier about all of plate 82 except its lower end and further forms a substantially circular pathway from the lower end of plate 82 to the terminus of plate 84 at 88.

Plate 84 has secured thereto vibrating disc 90 (Figure 2) which, as shown at 92, slopes downwardly at the edges. Plate 84 is bolted to a shaft 94 which passes downwardly through hollow column 28. Shaft 94 is mounted for rotation and vertical sliding within column 28 and passes downwardly through a collar 96 which is bolted to beams 6 and hollow column 28.

A nut 98 is secured to the lower end of shaft 94. Nut 98 is soldered to a coil spring 100 which, in turn, has its opposite end soldered to a bolt 102 which is secured to bracket 104 by nuts 106 and 108. The bracket 104 is secured to collar 96. Coil spring 100 acts to return shaft 94 to a neutral position when it is moved in a vertical direction or rotated.

Oscillating movement is imparted to shaft 94 in both the vertical direction and in the rotational direction by a conventional vibrating mechanism such as is well known to the art.

Referring now to Figures 2, 6 and 7, a lever 110 is fixedly secured to shaft 94 at one end and at the other end carries a downwardly extending pin 112. Pin 112 is secured to a lever arm 114 by conventional spring biased block 116 which provides takeup to compensate for wear.

Arm 114 is secured to a conventional vibrator 118. The vibrator 118 comprises a base 120 mounted on coil springs 122. Leaf springs 124 and 126 extend upwardly and rearwardly from the base and have secured thereto a strap member 128 which is also secured to lever arm 114.

A conventional electric vibrator shown at 130 has a coil 131 mounted on a core 133 and an armature 135 mounted on leaf spring 126. Core 133 is mounted on base 120. It will be apparent that the vibration imparted to spring 126 will cause the strap 128 to be moved with both a horizontal and a vertical component of motion, which motion is transmitted through the above described linkage to oscillate shaft 94 in a rotational direction and also in a vertical direction.

As shown particularly in Figure 2, the tablet counting machine **2** in accordance with this invention is provided with an electronic counting mechanism **134** which is of the interrupted beam type. This type of counting mechanism is so well known that a detailed description is unnecessary. As shown, the counting mechanism **134** projects a beam downwardly from the point shown at **136**, the beam passing down to a sensitive cell except as it is interrupted by the passage of tablets leaving the outer ring **40** and passing into receiving chute **140**.

This invention will be further clarified by a description of the operation of the illustrative machine **2** when using irregularly shaped tablets. Tablets from hopper **78** flow downwardly onto plate **82** and thence around plate **84** to the sloping edge **92** on vibrating disc **90**. The force of gravity together with the vibration or oscillation of plates **84** and **82** and vibrating disc **90** transmitted from the vibrating mechanism **118** causes the tablets to flow freely.

As the tablets flow off vibrating disc **90**, they pass onto inner rotating ring **34** which is being driven in a counterclockwise direction as observed from the top of the machine. As the tablets are carried by inner ring **34** along guide **52**, they are rolled and due to their irregular shape hop away from the guide **52**. The tablets are then returned by centrifugal force to a more advanced portion of the guide. In this manner, the tablets follow an erratic path as they are gradually moved outwardly towards the periphery of inner ring **34**. This erratic motion varies directly with the irregularity of the shape of the tablet, i. e., the more irregularly shaped the tablet, the more irregular the motion of the tablet as it is carried by inner ring **34**.

This erratic motion of the tablets is highly undesirable in that it causes a side-by-side pyramiding of the tablets which, if permitted to persist, would result in two or more tablets passing side-by-side through the beam of the counting mechanism **134** and hence the counting of two or more tablets as only one tablet. Further, the erratic movement of these tablets, if not corrected, invariably causes some tablets to miss the counting beam entirely due to being thrown out of line incident to collisions with other tablets. The principal benefit resulting from this invention is that these conditions are eliminated by the use of a second and outer ring **40** in a manner which will now be described.

To continue then, with the operation of the machine **2**, the tablets pass to the outer periphery of inner ring **34** in the vicinity of the outer terminus of guide **52**. Since outer ring **40** is being driven counterclockwise as observed from the top of the machine at a greater number of R. P. M.'s than inner ring **34**, the passage of the tablets onto the faster moving ring **40** acts to space the tablets further apart and break up the accumulated inertia of the tablets. This is desirable from the counting point of view, particularly since it tends to eliminate the disposition of tablets in a side-by-side relationship. Further, the passage of each tablet onto the faster rotating outer ring tends to cause the rotation of the tablets imparted by the spiral guide to reverse, thus helping to stabilize the movement of the tablet.

As previously described, the outer ring is slightly lower than the inner ring. This tends to prevent the tablets from moving from the outer ring back onto the inner ring. The outer ring being comparatively narrow, the tablets are confined to the space which will insure that they will pass through the electronic counting beam.

The moving belt **54** is used to form the outer barrier for ring **40** since it does not impart any rotational effect to the tablets.

As the tablets are carried around on outer ring **40**, they tend to be forced outwardly against belt **54** by centrifugal force. Therefore, when the belt moves away from the outer ring by going around pulley **66**, the tablets fly off the outer ring through the beam of the electronic counter and into chute **140**.

It will be obvious that the above described machine is merely for purposes of illustration, there being numerous possible modifications within the scope of this invention. Applicant, therefore, does not desire to be limited except as set forth in the claims.

What is claimed is:

1. A tablet delivery machine adapted to deliver tablets in spaced single file alignment comprising an inner ring mounted for rotation, means to rotate said ring, centrally located tablet supply means having a discharge edge adjacent the iner edge of said inner ring, an outer ring adjacent to and concentric with said inner ring and mounted for rotation, means to rotate said outer ring in the same direction as said inner ring and faster than said inner ring, a spiral guide mounted over said rings and a barrier adjacent a portion of the outer periphery of said outer ring and extending from the outer terminus of said spiral.

2. A tablet delivery machine adapted to deliver tablets in spaced single file alignment comprising an inner ring mounted for rotation, means to rotate said ring, an outer ring adjacent to and concentric with said inner ring and mounted for rotation, means to rotate said outer ring in the same direction as said inner ring and faster than said inner ring, a spiral guide mounted over said rings and starting adjacent the inner edge of said inner ring and terminating adjacent the outer periphery of said outer ring, centrally located tablet supply means having a discharge edge adjacent the inner edge of said inner ring and adjacent the inner end of said spiral guide and a barrier adjacent a portion of the outer periphery of said outer ring and extending from the outer terminus of said spiral.

3. A tablet delivery machine adapted to deliver tablets in spaced single file alignment comprising an inner ring mounted for rotation, means to rotate said ring, an outer ring adjacent to and concentric with said inner ring and mounted for rotation, means to rotate said outer ring in the same direction as said inner ring and faster than said inner ring, the top of said outer ring being lower than the top of the inner ring, a spiral guide mounted over said rings and starting adjacent the inner edge of said inner ring and terminating adjacent the outer periphery of said outer ring, means to introduce tablets to said inner ring adjacent the inner end of said spiral guide and a barrier adjacent a portion of the outer periphery of said outer ring and extending from the outer terminus of said spiral.

4. A tablet delivery machine adapted to deliver tablets in spaced single file alignment comprising an inner ring mounted for rotation, means to rotate said ring, an outer ring adjacent to and concentric with said inner ring and mounted for rotation, means to rotate said outer ring in the same direction as said inner ring and faster than said inner ring, the top of said outer ring being lower than the top of the inner ring, a spiral guide mounted over said rings and starting adjacent the inner edge of said inner ring and terminating adjacent the outer periphery of said outer ring, means to introduce tablets to said inner ring adjacent the inner end of said spiral guide and a barrier adjacent a portion of the outer periphery of said outer ring and extending from the outer terminus of said spiral, said barrier comprising an endless belt which is carried along by the outer ring and means to guide the belt when it is not adjacent said outer ring.

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