United States Patent

[11] 3,613,861

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[45] Patented Oct. 19, 1971
[73] Assignee Smith Kline & French Laboratories
Philadelphia, Pa.

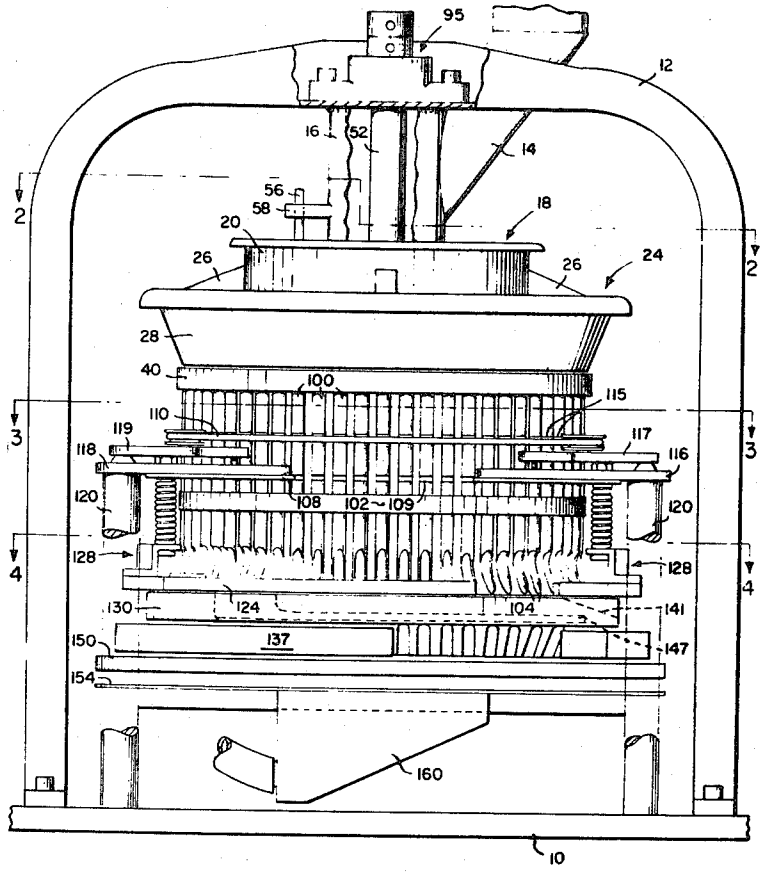
[54] CAPSULE ORIENTING MACHINE
10 Claims, 44 Drawing Figs.

[52] U.S. Cl. 198/33
[51] Int. Cl. B65g 47/24
[50] Field of Search ..... 198/30, 33 AA, 209; 221/169, 171–173

[56] References Cited
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Primary Examiner—Edward A. Sroka
Attorney—Smith, Harding, Earley & Follmer

ABSTRACT: A machine for orienting capsules of the conventional type comprised of a cylindrical interfitted cap and body in which the capsules are fed from a random supply through vertically extending tubes to a means for orienting the capsule in a desired position. The capsule orienting means includes means for forcing the capsule through a restricted passage so that the cap is held by a restriction while the body is turned to a desired oriented position after which the capsule is removed from the restricted passage and discharged.



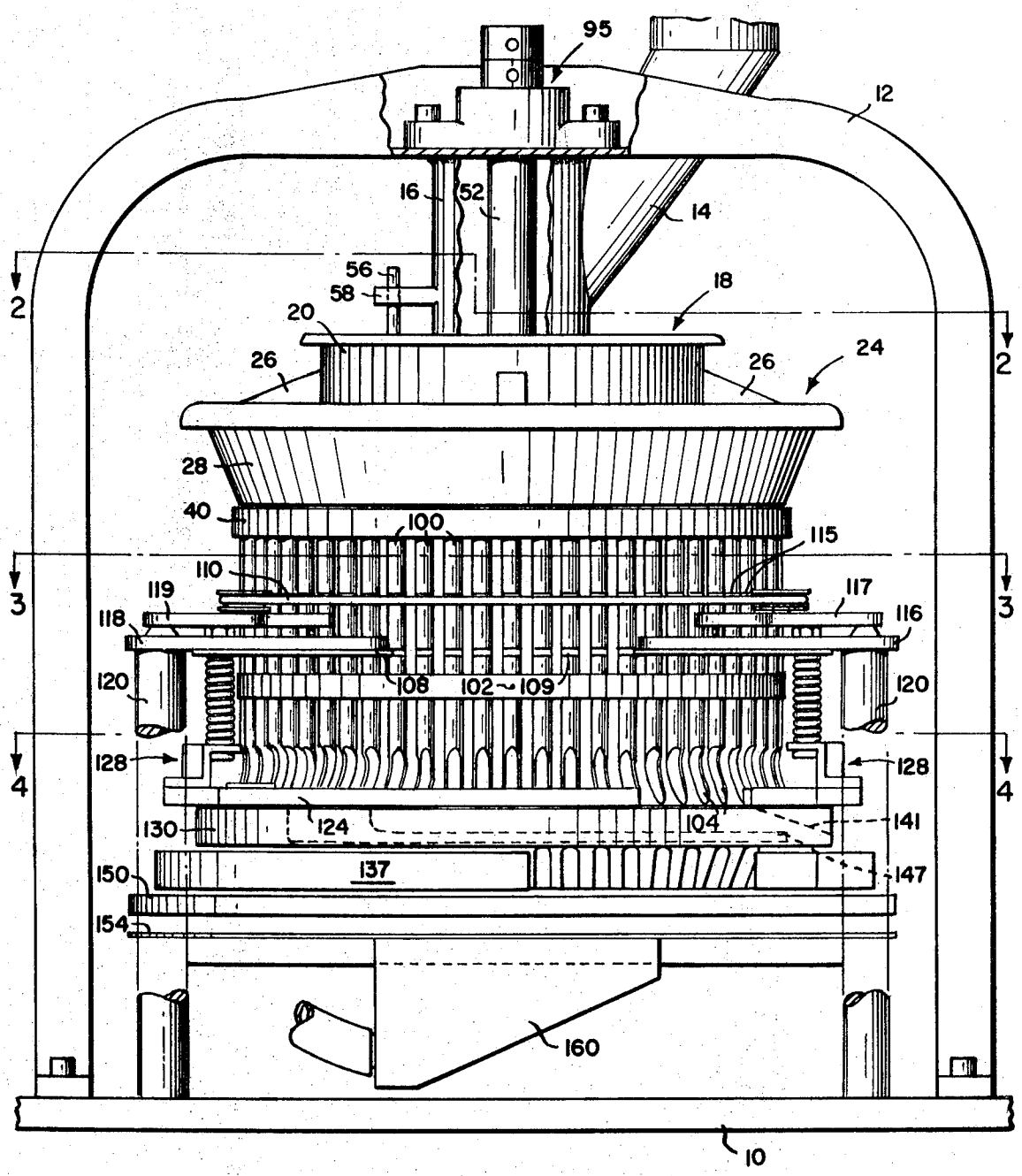


FIG. 1.

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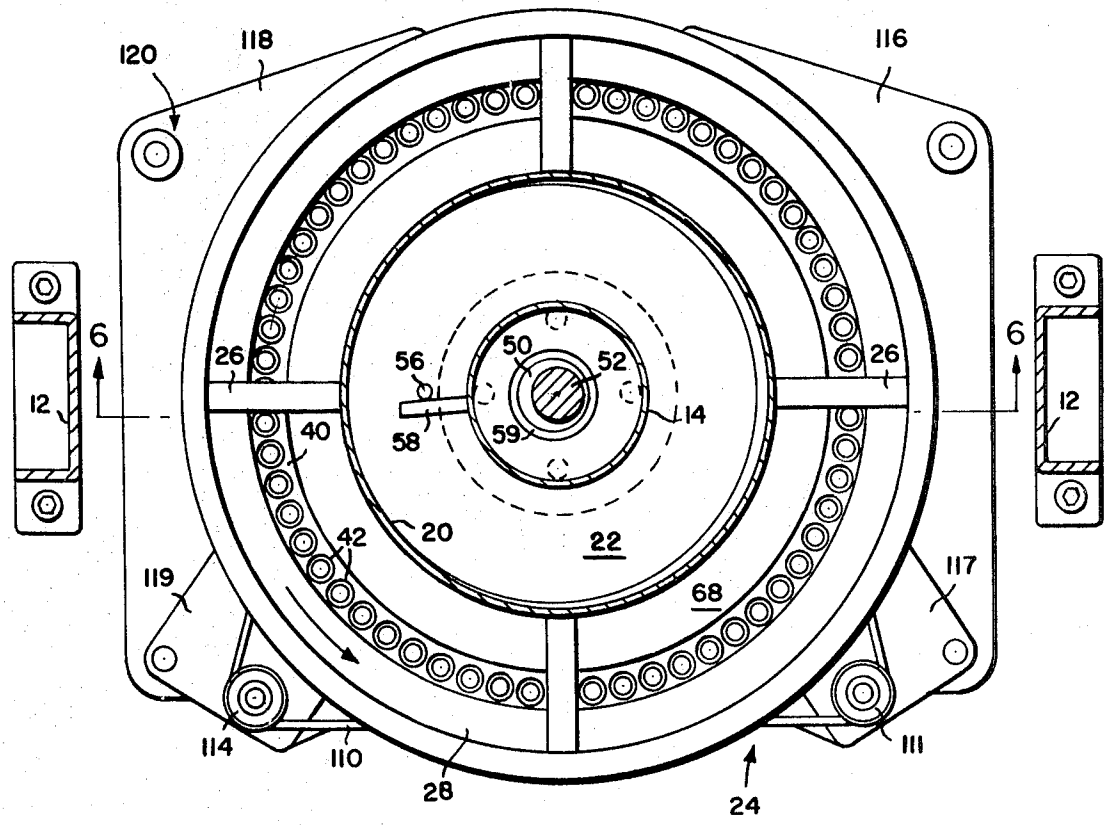


FIG. 2.

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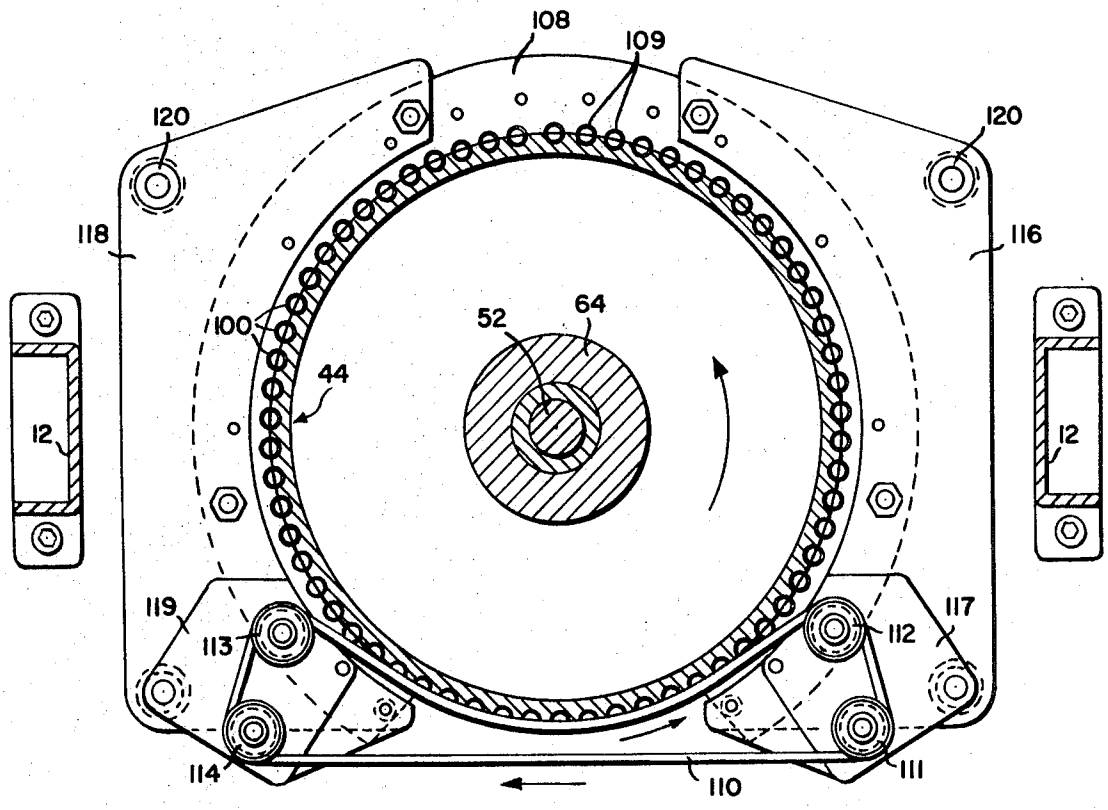


FIG. 3.

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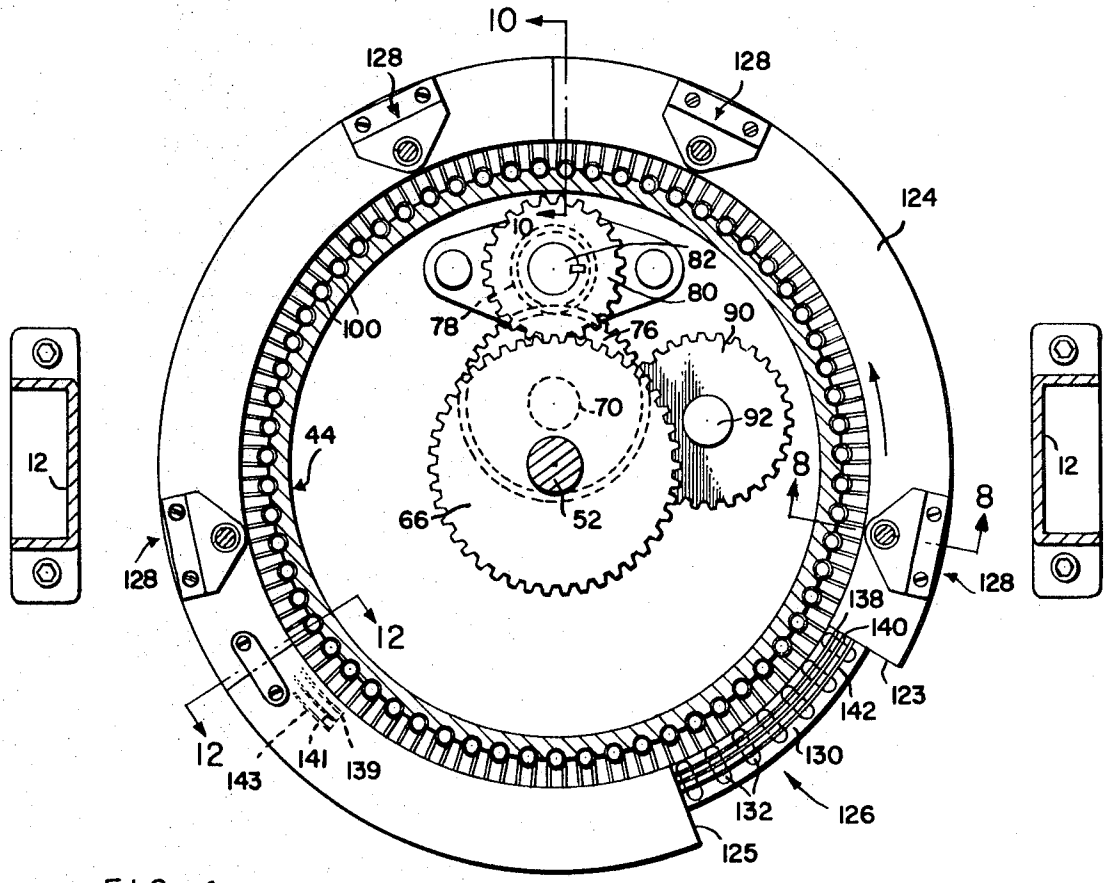


FIG. 4.

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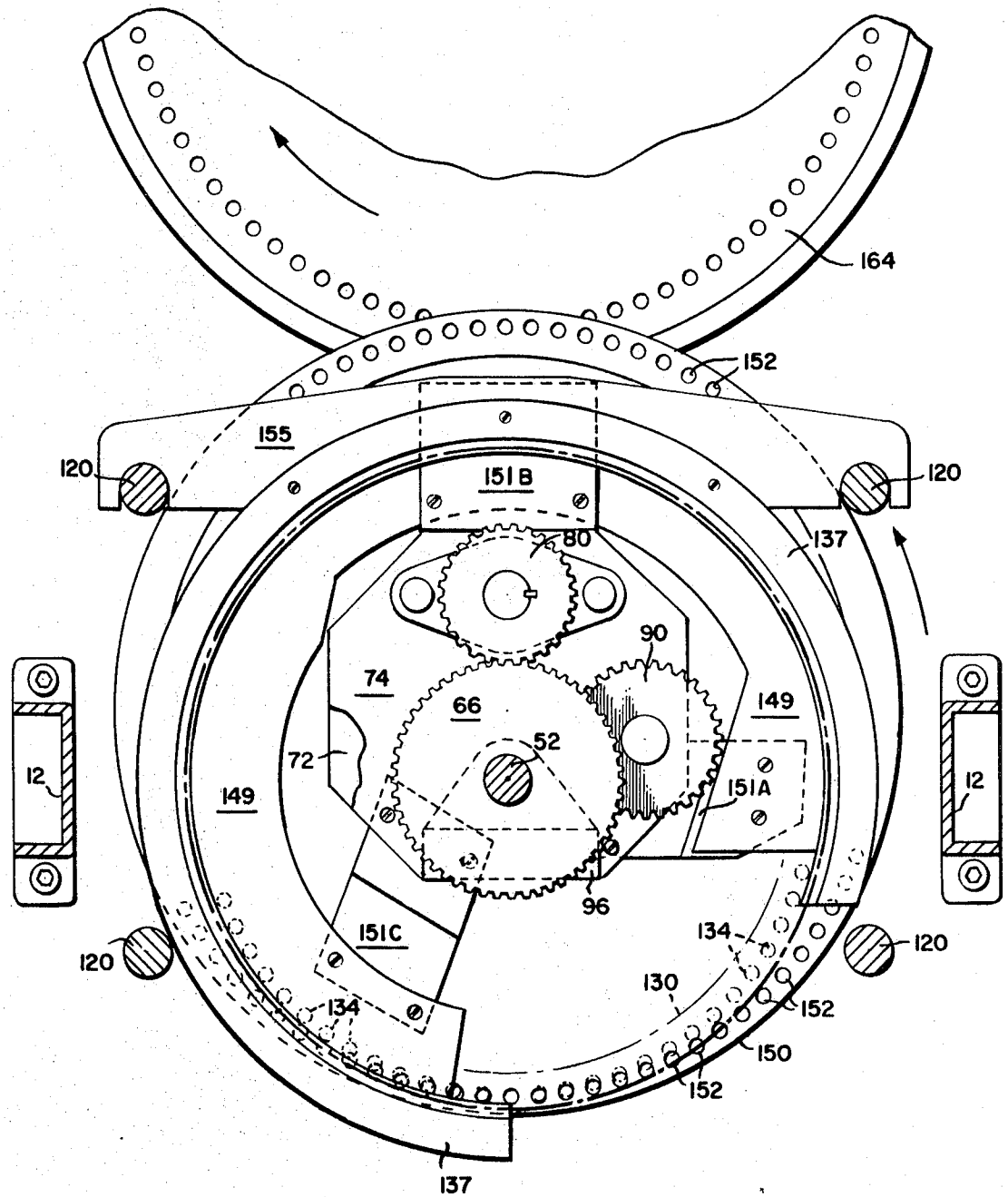


FIG. 5.

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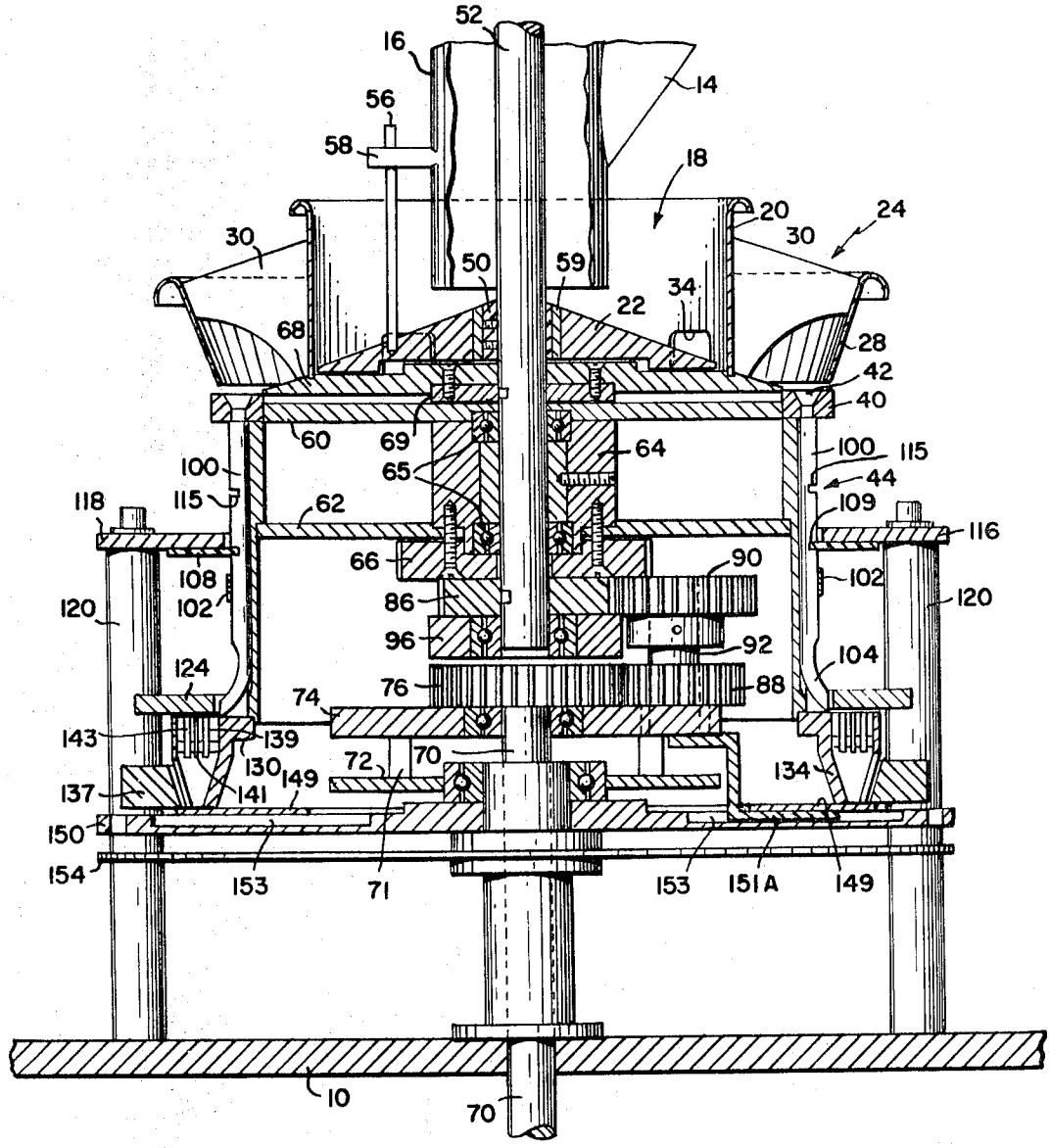


FIG. 6.

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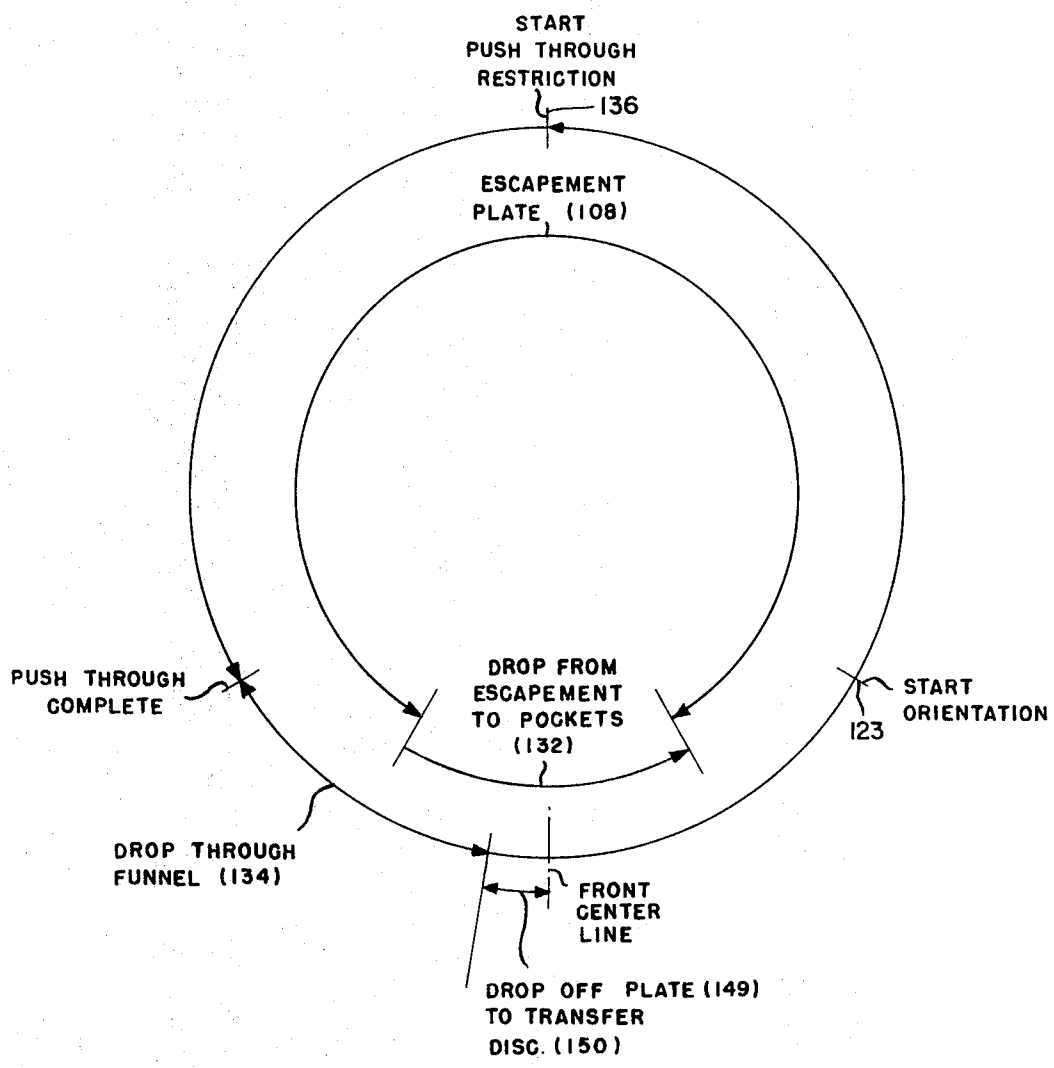


FIG. 7.

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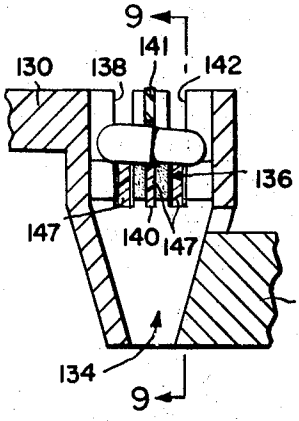


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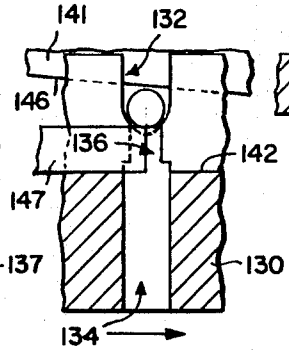


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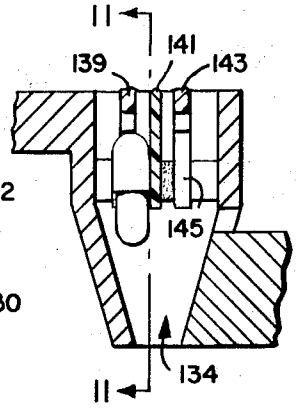


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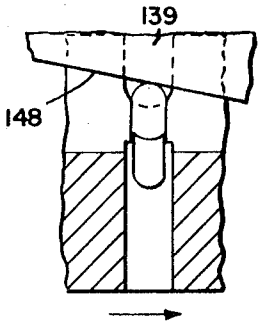


FIG. 11.

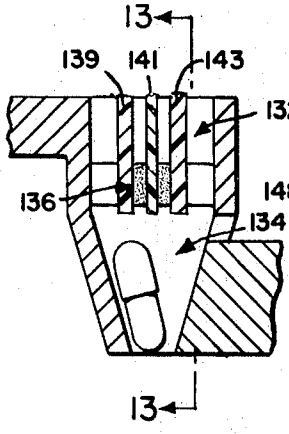


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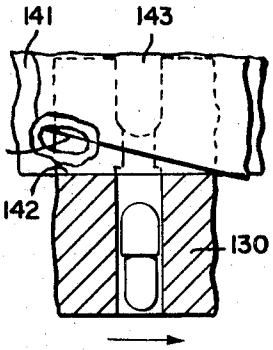


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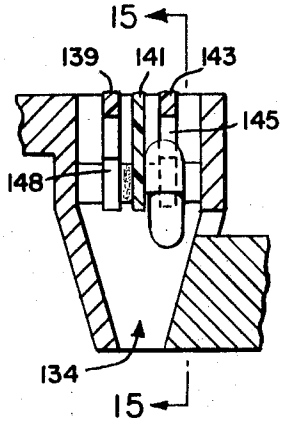


FIG. 14.

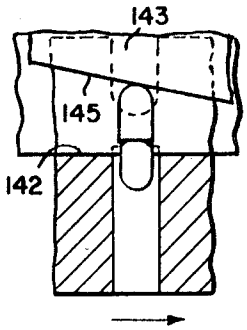


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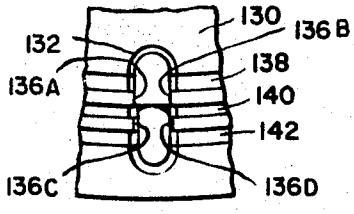


FIG. 16.

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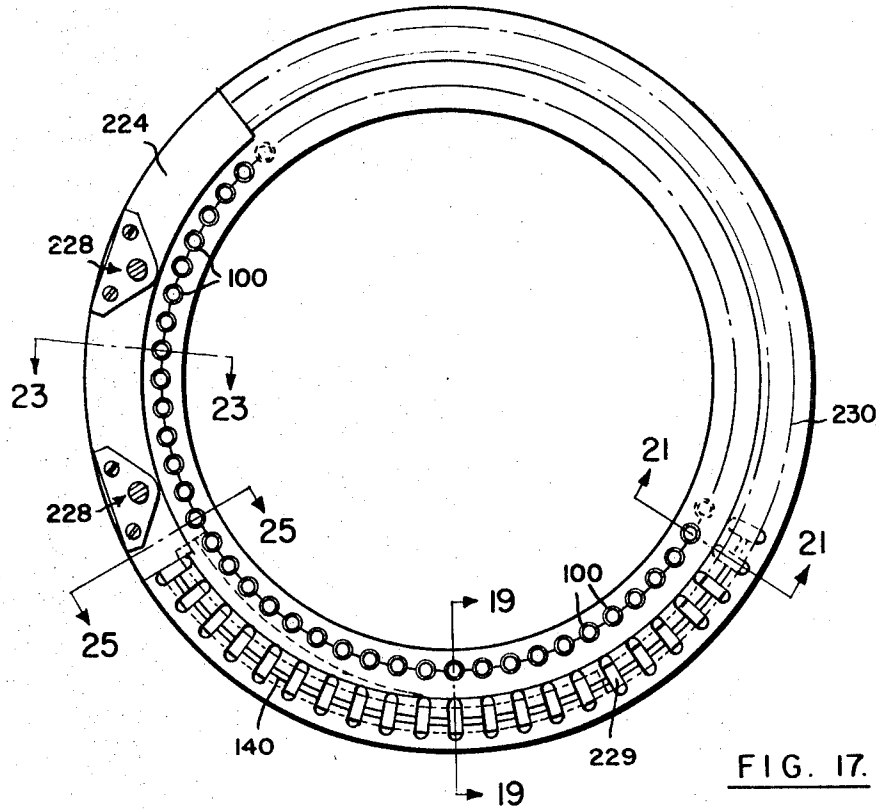


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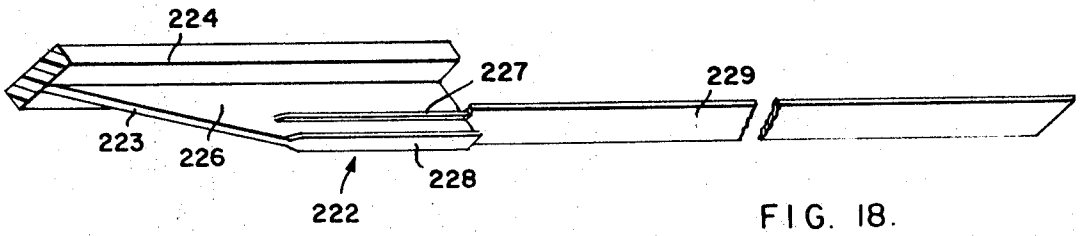


FIG. 18.

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FIG. 19.

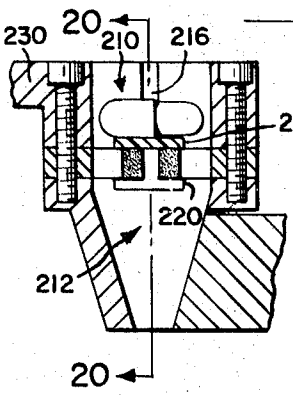


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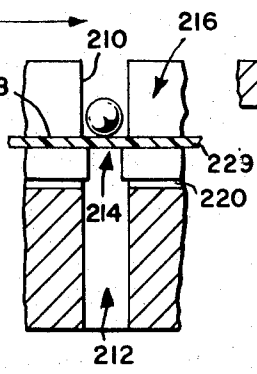


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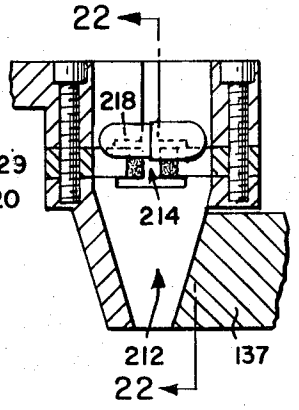


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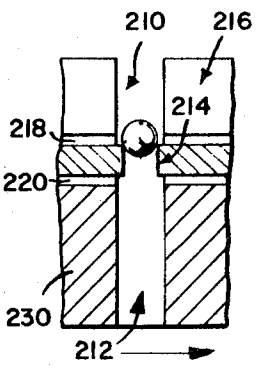


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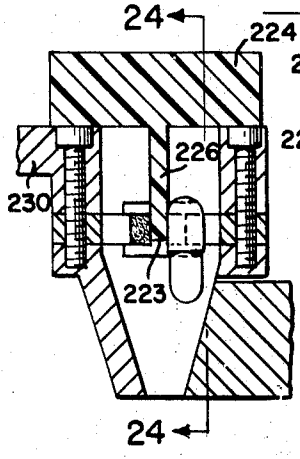


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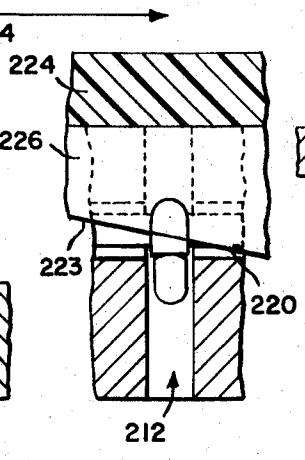


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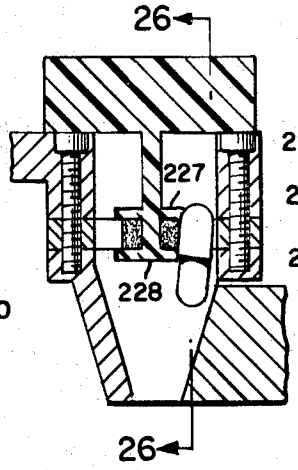


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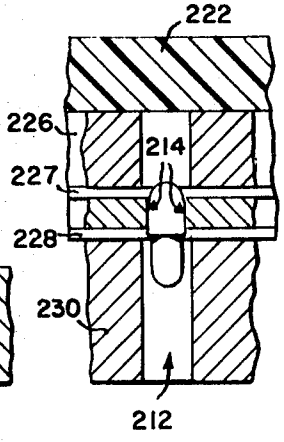


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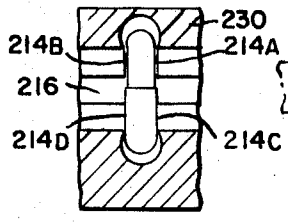
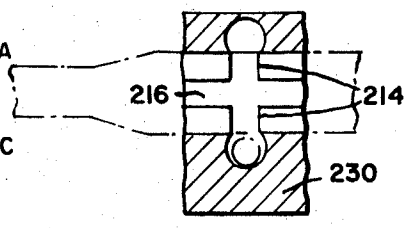


FIG. 28.



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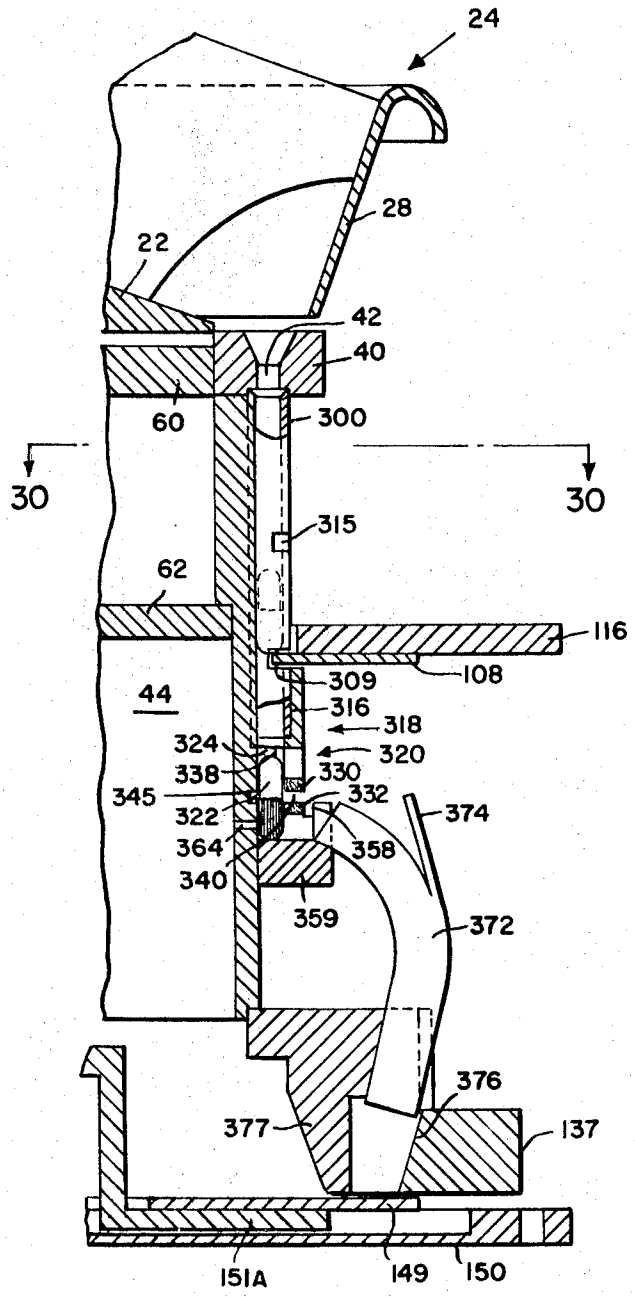


FIG. 29.

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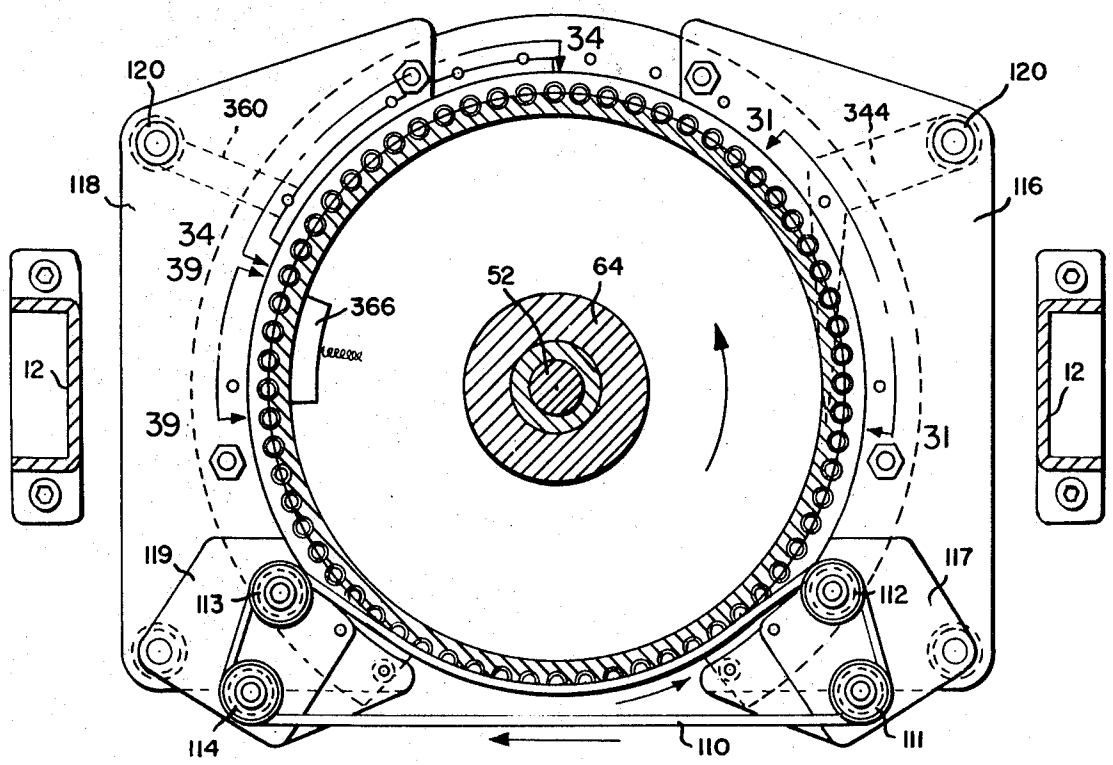


FIG. 30.

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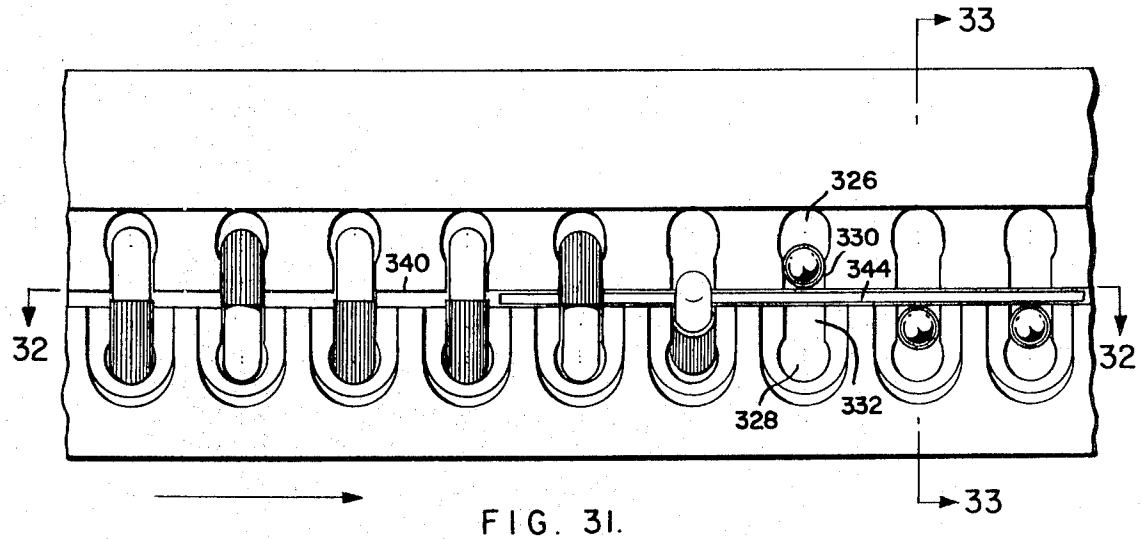


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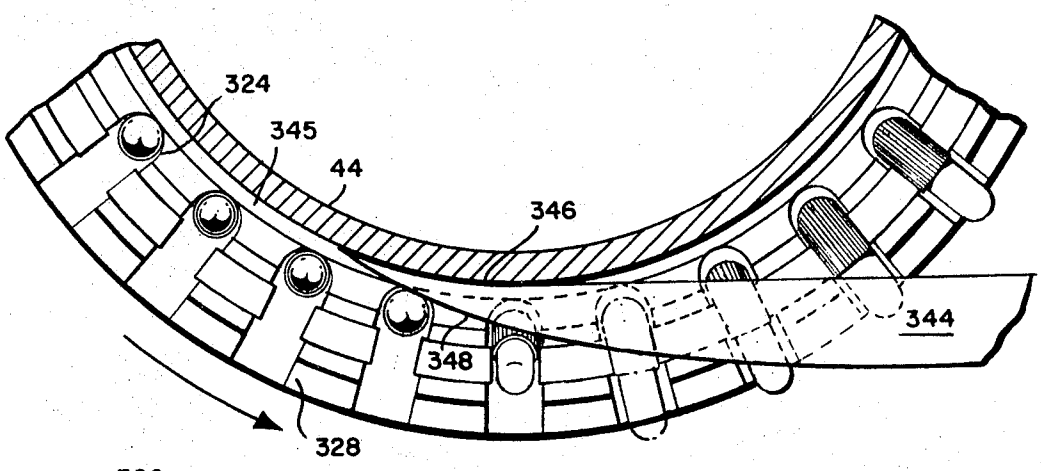


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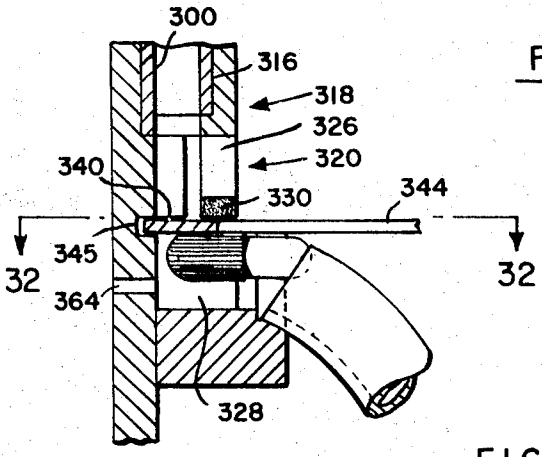


FIG. 33.

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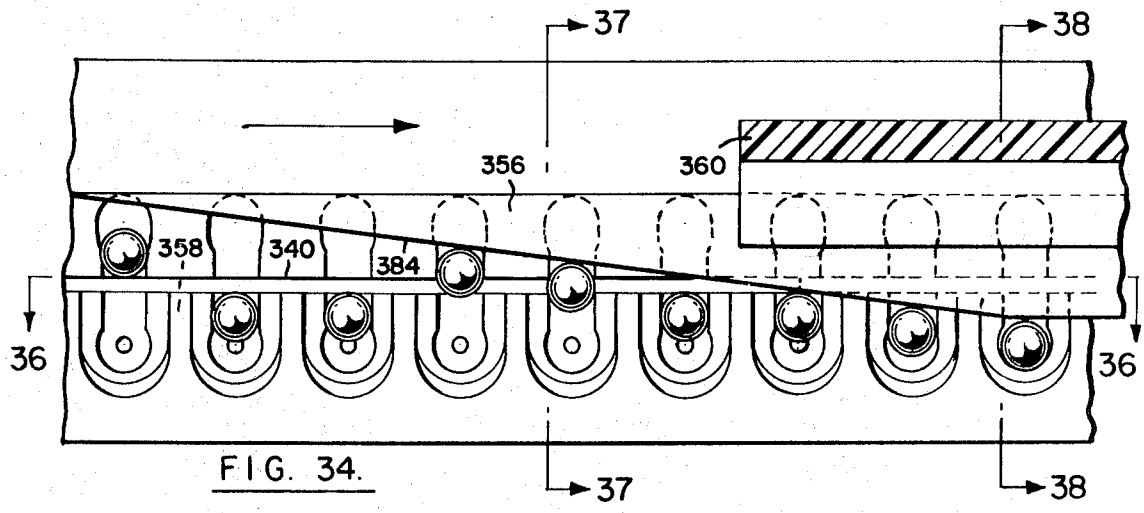


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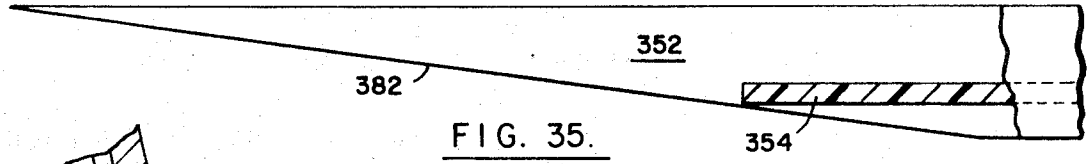


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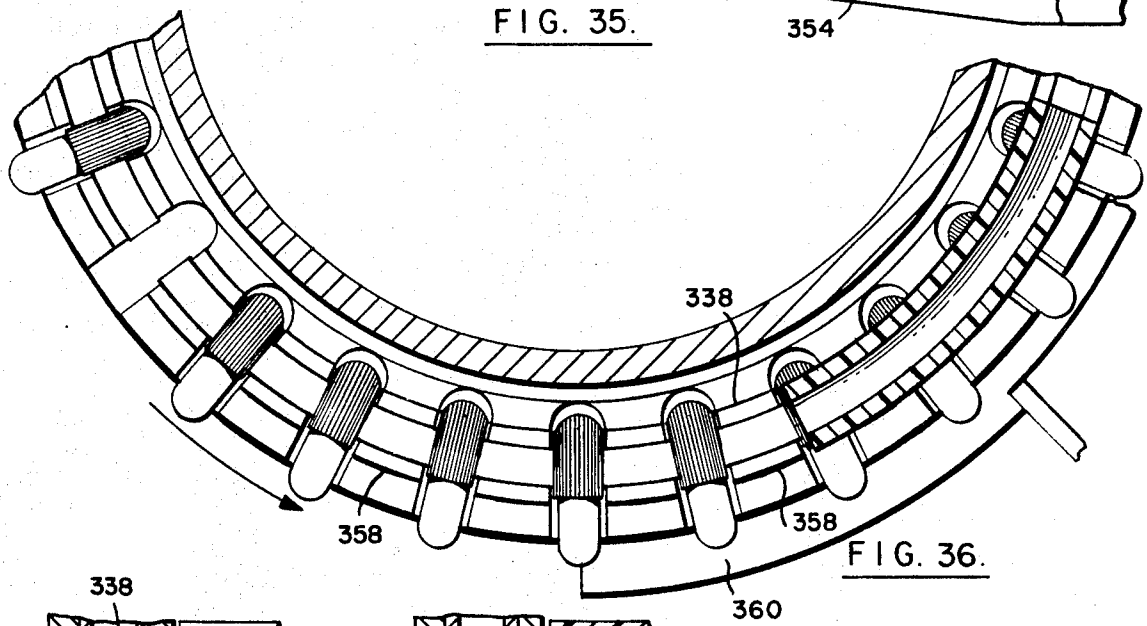


FIG. 36.

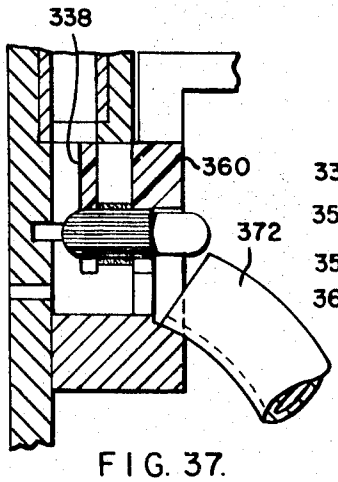


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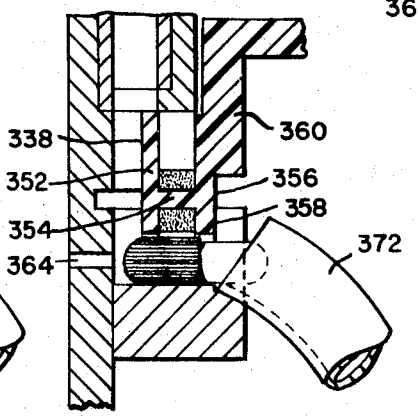


FIG. 38.

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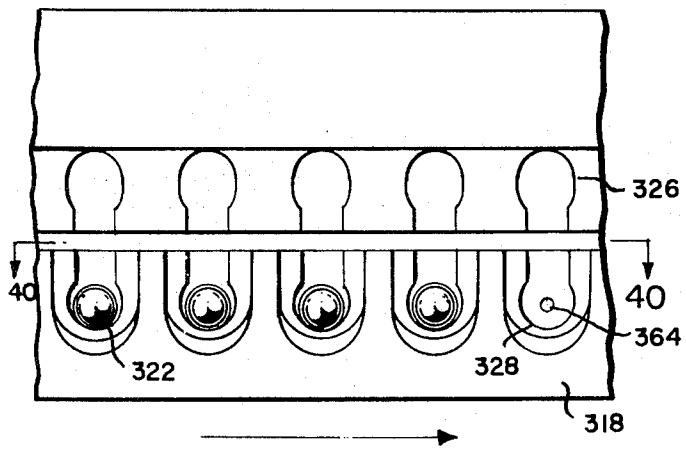


FIG. 39

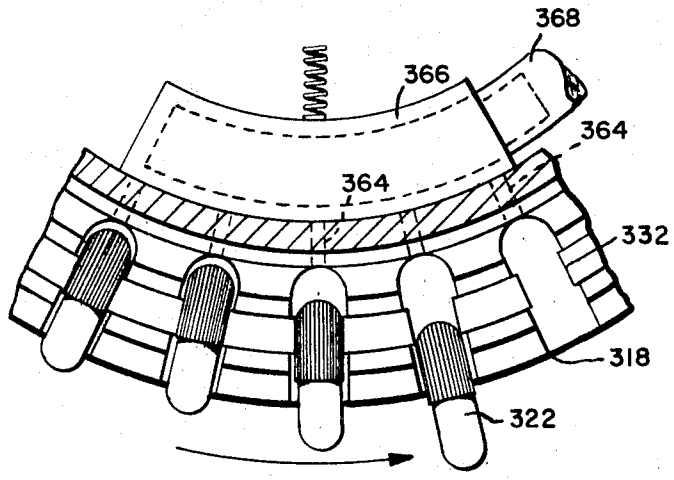


FIG. 40.

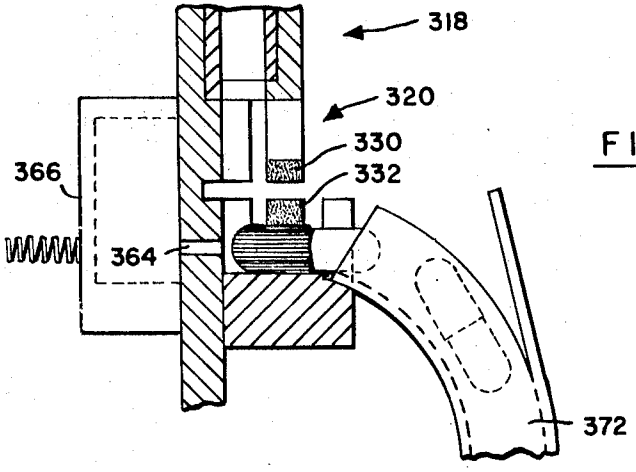


FIG. 41.

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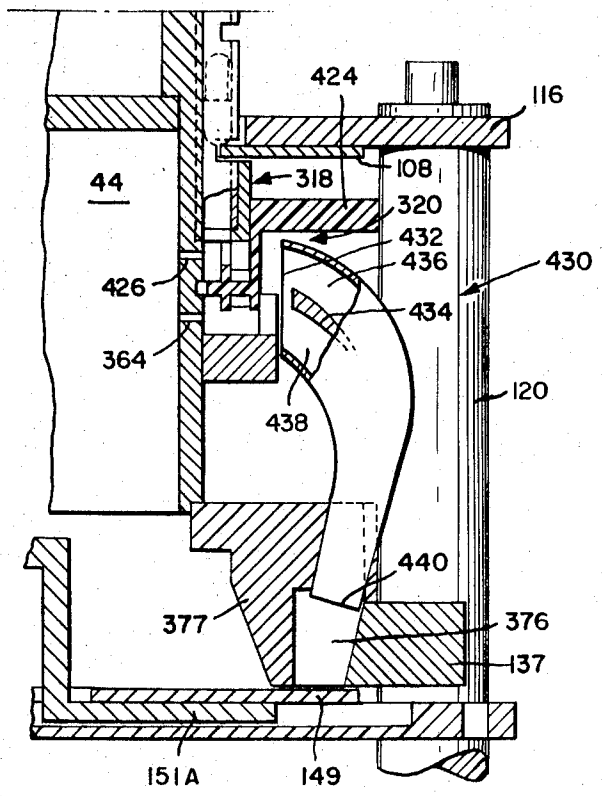


FIG. 42.

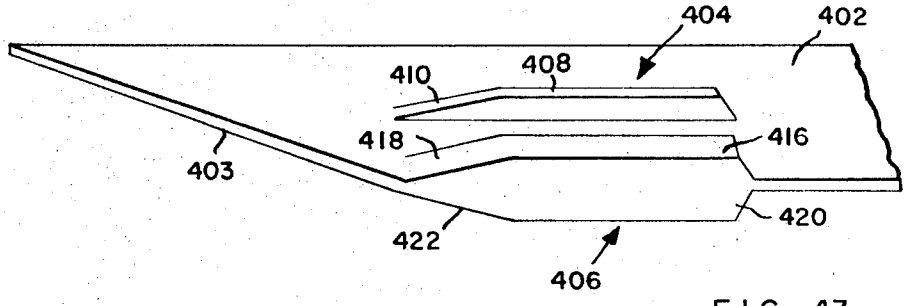


FIG. 43.

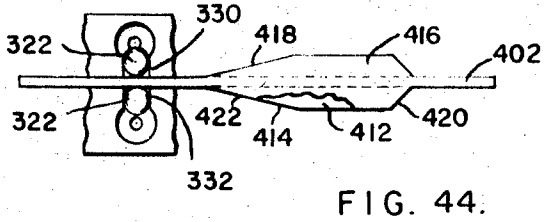


FIG. 44.

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CAPSULE ORIENTING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to capsule orienting means for capsules of the conventional type involving interfitted cylindrical cap and body portions.

There have been provided various types of capsule orienting machines. However, these prior art machines have been limited in their speed of operation. One problem typical of the prior art capsule orienting machines is that they employ some form of reciprocating mechanism in the capsule orienting portion of the machine. The reciprocating means involves problems in the timing of the machine and has served to inhibit the operation of these machines at high speeds.

SUMMARY OF THE INVENTION

The capsule orienting machine in accordance with the invention has been designed to achieve greater orienting speed in high-speed machinery. Also, the machine is designed without any reciprocating parts in the capsule orienting mechanism thereby eliminating the timing and other problems involved with reciprocating parts at high speeds.

Briefly stated, the machine in accordance with the invention involves capsule orienting means. The capsule orienting means includes a restricted passage sized to frictionally contact the cap portion of the capsule. A blade contacts the midportion of the capsule to force the same through the restricted passage during which movement the cap portion is held by the restricted passage and turned to a desired orientation. The midportion is the portion of the capsule which is closer to the point halfway between the ends of the capsule than it is to the said ends. Blade means remove the oriented capsule from the restricted passage.

Advantageously, means are also provided for supplying the capsules for the high-speed operation. Such means comprises a hopper having a conical central portion extending downwardly for directing the capsules to the periphery thereof. The capsules then pass outwardly to a peripheral area having a rotating disc therebeneath. The rotating disc contains capsule receiving holes which move in a path to deliver the capsules received to vertically extending tubes supplying the capsule orienting means. This capsule supply is very effective and can supply capsules at a rapid rate for a high-speed operating machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a capsule orienting machine in accordance with the invention;

FIG. 2 is a section taken generally on line 2—2 of FIG. 1;

FIG. 3 is a section taken generally on line 3—3 of FIG. 1;

FIG. 4 is a section taken generally on line 4—4 of FIG. 1;

FIG. 5 is a horizontal section, partially broken away, showing a portion of the drive and capsule transfer area;

FIG. 6 is a fragmentary sectional view taken generally on line 6—6 of FIG. 2;

FIG. 7 is a diagrammatic view illustrating the sequence of operation of the machine;

FIG. 8 is a fragmentary section taken generally on line 8—8 of FIG. 4;

FIG. 9 is a section taken on line 9—9 of FIG. 8;

FIG. 10 is a fragmentary section taken on line 10—10 of FIG. 4;

FIG. 11 is a section taken on line 11—11 of FIG. 10;

FIG. 12 is a fragmentary section taken on line 12—12 of FIG. 4;

FIG. 13 is a section taken on line 13—13 of FIG. 12;

FIG. 14 is a fragmentary section similar to FIG. 10 with the capsule shown in another position;

FIG. 15 is a section taken on line 15—15 of FIG. 14;

FIG. 16 is a fragmentary view illustrating a capsule in a pocket of the capsule orienting means;

FIG. 17 is a fragmentary sectional view of a second form of capsule orienting means adapted for use in the machine in accordance with the invention;

FIG. 18 is a perspective view of a development of arcuate blade means employed in the embodiment shown in FIG. 17;

FIG. 19 is a fragmentary section taken generally on line 19—19 of FIG. 17;

FIG. 20 is a section taken on line 20—20 of FIG. 19;

FIG. 21 is a fragmentary section taken generally on line 21—21 of FIG. 17;

FIG. 22 is a section taken on line 22—22 of FIG. 21;

FIG. 23 is a fragmentary section taken on line 23—23 of FIG. 17;

FIG. 24 is a section taken on line 24—24 of FIG. 23;

FIG. 25 is a fragmentary section taken generally on line 25—25 of FIG. 17;

FIG. 26 is a section taken on line 26—26 of FIG. 25; FIG. 27 is a fragmentary view illustrating a capsule in a pocket in the form of the invention shown in FIG. 17;

FIG. 28 is another view illustrating a capsule within a pocket of the form of the invention shown in FIG. 17;

FIG. 29 is a vertical section partially broken away taken on line 6—6 of FIG. 2 particularly showing a modified capsule tube, orienting means and discharge means;

FIG. 30 is a horizontal section taken on line 30—30 of FIG. 29;

FIG. 31 is an elevational view, partially broken away, taken on line 31—31 of FIG. 30;

FIG. 32 is a horizontal section, partially broken away, taken on line 32—32 of FIG. 33;

FIG. 33 is a vertical section, partially broken away, taken on line 33—33 of FIG. 31;

FIG. 34 is an elevational view, partially broken away, taken on line 34—34 of FIG. 30;

FIG. 35 is an elevational view, partially broken away, of a push-down blade;

FIG. 36 is a horizontal section, partially broken away, taken on line 36—36 of FIG. 34;

FIG. 37 is a vertical section, partially broken away, taken on line 37—37 of FIG. 34;

FIG. 38 is a vertical section, partially broken away, taken on line 38—38 of FIG. 34;

FIG. 39 is an elevational view, partially broken away, showing the fully oriented capsules as they are being discharged from the orienting device;

FIG. 40 is a horizontal section, partially broken away, taken on line 40—40 of FIG. 39;

FIG. 41 is a vertical section, partially broken away, through the orienting pocket when it is positioned opposite the air manifold;

FIG. 42 is a vertical section, partially broken away, showing a modified blade and discharge tube;

FIG. 43 is a top perspective view, partially broken away, of a development of the modified arcuate blade; and

FIG. 44 is a schematic view illustrating the action of the blade 42 in moving a capsule either upwardly or downwardly to its discharge position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the capsule orienting machine in accordance with the invention comprises a base 10 and a channel frame member 12 having a pair of vertically extending legs joined by a horizontal crosspiece. Mounted on the crosspiece at the upper end of the machine is a capsule supply chute 14 comprising a centrally located cylindrical portion 16 best shown in FIG. 1 and FIG. 6. The vertically extending portion 16 of the supply chute receives the capsules from a supply through an angularly extending chute portion and discharges them through an opening at the bottom portion thereof. The capsules discharged from the bottom of the supply chute portion 16 are received by a hopper 18 comprising a cylindrical wall portion 20 and a conical-shaped bottom 22 which is best shown in FIG. 6. A capsule discharging hopper 24 is mounted on the cylindrical wall 20 by means of radially extending members 26 (FIG. 2) and comprises a wall 28 concentric with wall 20 and inclined inwardly and downwardly as shown in FIG. 6.

The discharging hopper 24 thus provides an annular capsule containing portion outwardly of the capsule receiving hopper 18 with the lower edge of wall 28 spaced from conical-shaped bottom 22.

A plurality of supports 30 extend radially between the walls 20 and 28 and bridge over the capsule area. The wall 20 is provided with a plurality of openings 34 to provide communication between the interior of the capsule receiving hopper 18 and the exterior thereof.

Mounted for rotation beneath the capsule discharging hopper 24 is a rotating annular ring 40 having an array of capsule receiving holes 42 therein. The parts are arranged so that the array of holes 42 pass underneath the opening between conical disc 68 and wall 28. The annular ring 40 is mounted at the periphery of a cylindrical turret member 44 which is driven by gearing in the manner to be described more fully hereafter. The parts are arranged so that the annular member 40 rotates in a circular path with the capsule receiving openings 42 moving beneath the hopper 24 so that the capsules drop into these openings 42.

The bottom 22 of the hopper 18 is engaged with an eccentric cam 50 at its central location (FIG. 6). The cam 50 is secured to a vertically extending shaft 52 passing through the center of the machine. The bottom 22 is provided with a vertically extending pin 56 which engages a stop 58 on the supply chute portion 16. The bottom 22 is given an oscillating movement by rotation of the cam 50 within a bearing 59 carried by the bottom 22. The pin 56 cooperates with the stop 58 to prevent rotation of the bottom 22 and confine its movement to an oscillating type of movement.

The turret 44 is carried by a pair of discs 60 and 62 (FIG. 6) which are fixedly secured to a hollow cylindrical member 64 journaled by means of bearings 65 on the shaft 52, the connected parts being driven by a gear 66 operatively connected to the drive of the machine to be described hereafter.

The wall 20 of capsule supply hopper 18 and wall 28 of hopper 24 are mounted on a rotating disc 68. Disc 68 is secured by screws to a collar 69 keyed to the shaft 52 whereby disc 68 rotates with the shaft 52. Disc 68 fills in a portion of the opening between bottom 22 and wall 28 to form a partial floor for hopper 24.

The gearing of the drive is such that disc 68 and walls 20 and 28 rotate at a rate of about 20 percent to about 35 percent of the speed of annular ring 40 of the turret in the direction of the arrow shown in FIG. 2. By this arrangement, the entry of the capsules into openings 42 is facilitated.

The drive for disc 68 and for the turret 44 is shown in FIGS. 4, 5 and 6. The main drive shaft indicated at 70 extends vertically upwardly from the bottom of the machine, and is suitably journaled in plates indicated at 72 and 74 which are connected by pins 71. At its upper end, the drive shaft 70 carries a drive gear 76 which is drivingly connected by suitable gearing to the turret drive gear 66. The drive connection between gears 76 and 66 is best shown in FIG. 4 and comprises a pair of gears 78 and 80 keyed on a vertically supported shaft 82, gear 78 being driven by drive gear 76 and gear 80 being arranged to drive turret gear 66.

Drive gear 76 is also arranged by means of suitable gearing to drive a gear 86 keyed to shaft 52 for driving the same. The drive connection between gears 76 and 86 comprises a pair of gears 88 and 90 keyed on a vertically supported shaft 92 mounted for rotation on plate 74 (FIG. 6), gear 88 being driven by a drive gear 76 and gear 90 being arranged to drive the gear 86 keyed to the shaft 52.

It is noted that the shaft 52 is supported at its upper end on the crosspiece of the frame member 12 by a suitable collar type of support indicated generally at 95 (FIG. 1). The lower end of the shaft 52 is journaled in a bracket 96 which carries suitable bearing means as shown in FIG. 6 for rotatably mounting the lower end of the shaft 52. In this manner the shaft 52 is mounted for rotatable movement and to extend vertically.

Mounted on the exterior of the cylindrical wall 44 of the rotating turret are a plurality of vertically extending tubes 100 secured in position by a band 102 (FIGS. 1 and 6). The tubes 100 are positioned beneath each one of the capsule receiving holes 42 and of the ring 40. Accordingly, capsules are delivered from the holes 42, wherein they are positioned in a vertically extending position, downwardly into the vertically extending tubes 100. At their lower end, the tubes 100 are provided with a radially outwardly extending curved discharge portion 104 for delivering, in a generally horizontal condition the capsule to the capsule receiving pocket of the capsule orienting means, indicated generally at 106 (FIG. 8).

Means are provided for controlling the location and the time when capsules are discharged from the vertically extending tubes 100. Such means comprises an arcuate escapement plate 108 (FIG. 3) which extends within the vertical tubes 100 by way of slots 109 therein and serves to hold capsules in vertical end to end relation throughout the major circumferential extent of the turret (see FIG. 7). Referring to FIG. 3, it will be noted that the plate 108 extends around the turret about 300° and only provides an opening in the front portion of the turret. In this open region of the front part of the turret there is provided an endless belt 110 mounted on four pulleys 111, 112, 113 and 114 and arranged to extend through slots 115 (FIG. 1) in the vertically extending tubes 100 to frictionally contact the sides of capsules within the tubes at a location immediately above the lowermost capsules in the region above the plate 108. The endless belt 110 serves to hold all capsules except the lowermost ones within the tubes 100 as the tubes move in this front region whereby the lowermost capsule is released and allowed to drop through the tubes and be fed to the capsule orienting means.

The arcuate plate 108 and the endless belt 110 are supported by means of a pair of support plates 116 and 118 mounted on vertically extending legs 120 on the base 10. The arcuate plate 108 is secured to the support plates 116 and 118 by mounting screws as is best shown in FIG. 3. The pulleys for the endless belt 110 are mounted on a pair of supporting plates 117 and 119 also mounted on the support plates 116 and 118, respectively, by suitable means.

After the lowermost capsules in each tube 100 are released by the escapement plate 108 they drop vertically down through tubes 100 to the curved lower end 104 thereof and into pockets 132 in ring 130. As shown in FIG. 4, arcuate plate 124 extends circumferentially around the machine at the outer ends of the discharge tubes 100, is made up of a plurality of sections, and is provided with an opening in the region indicated at 126. The arcuate plate 124 is part of the capsule orienting means and is resiliently supported from the brackets 116 and 118 by supporting means indicated generally at 128 (FIG. 1).

The capsule orienting means also comprises an annular orienting ring 130 (FIG. 4) extending around the machine beneath the lower ends of the tubes 100. The ring 130 comprises a plurality of capsule receiving pockets and associated capsule discharge funnels. The capsule receiving pockets are indicated at 132 and the discharge funnels are indicated at 134 (FIG. 8). Between each pocket 132 and its associated funnel 134 there is provided a restriction indicated generally at 136. Each restriction 136 is composed of two pairs of opposed faces 136A and 136B and 136C and 136D (FIG. 16) spaced apart a distance less than the diameter of the cap end of the capsule and to allow the body to pass therethrough with little or no friction. Thus, as the capsules are forced downwardly through the restriction, the capsule pivots on the cap end which contacts the restriction with greater friction than the body end.

The ring 130 is provided with three concentric grooves 138, 140 and 142 (FIGS. 4 and 8) extending circumferentially thereabout and extending downwardly from the upper face of the ring 130 to the region below the restriction 136. Groove 138 may be termed the inner groove, groove 140 may be termed the middle groove, and groove 142 may be termed the

outer groove. The 138, 140 and 142 grooves are adapted to receive, respectively, blades 139, 141 and 143 (FIG. 10) which are secured to and project downwardly from the arcuate plate 124. As will be apparent hereafter, as the ring 130 rotates the blades which project within the grooves 138, 140 and 142 will contact capsules positioned within the pockets 132 and restrictions 136. Support runners 147, 147 and 147 which are suspended from plates 124 and ride in grooves 136, 138 and 140, respectively, aid in supporting capsules until they are to be urged through the restrictions (FIG. 8).

The funnels 134 are tapered as shown in FIG. 8 and are open at their outer peripheries. A fixed ring 137 (FIG. 1) mounted on posts 120 extends around the periphery of ring 130 adjacent the open part of the funnels 134 to close the outer periphery of the funnels.

The manner in which the capsule orienting is achieved will be described with particular reference to FIGS. 7 to 16. FIGS. 8 through 15 illustrate sequential positions of the capsule during orientation thereof, and FIG. 7 illustrates the sequence of operation of capsule orientation.

As the ring 130 moves in the direction of the arrows shown in the drawings to carry capsules toward the starting end 123 of the capsule orienting plate 124, the capsules are supported in a horizontal position within the pockets 132 as shown in FIG. 16 for example. Referring to FIG. 7, the initial phase of the orientation of the capsule occurs in the period of about 120° rotation from the end 123. During this orientating phase, the central blade 141 which extends within the central groove 140 and is inclined gradually downwardly at edge 146, engages the upper part of the capsule at a central location thereof by means of its inclined edge 146 (FIGS. 8 and 9) just as support runners 147, 147 terminate. As the ring 130 moves the capsule past the inclined edge 146 of blade 141, the capsule is pushed downwardly into the restriction 136 (FIGS. 10 and 11).

Assuming a capsule lies in the pocket 132 in the position shown in FIGS. 8 and 9 with the cap end positioned inwardly, the capsule will be moved to a position shown in FIGS. 10 and 11 as the ring 130 rotates from the position of the section of FIG. 8 to the position of the section of FIG. 10 shown in FIG. 4. This is achieved because the blade 141 pushes the capsule downwardly into the restriction 136 which causes the capsule to pivot on its cap end because of the frictional contact with the restriction whereby a capsule is positioned to extend vertically with the cap end above a body as shown in FIGS. 10 and 11.

The next step may be termed a "capsule push through" phase which occurs as the capsule is moved from the position of the section of FIG. 10 to the position of the section of FIG. 12. During this movement, the capsule is pushed through the restriction 136 and into the funnel 134 as shown in FIGS. 12 and 13. This is achieved by the inclined edge 148 of the blade 139 contacting the top of the cap of the capsule and gradually forcing it vertically downwardly through the restriction 136. The capsule is temporarily prevented from dropping out of funnel 134 by plate 149. From the funnel 134, the capsule drops vertically downwardly into a capsule receiving pocket in a disc 150 rotating beneath disc 130 as is best shown in FIG. 5. Referring to FIG. 7, this occurs in the region shown on this figure and designated "DROP OFF." Plate 149 is supported by brackets 151A, 151B and 151C (FIG. 5) which ride in circular cutout portion 153 (FIG. 6) in disc 150 and are secured to plate 74. Bracket 151B is connected to torque bar 155 which is secured to two posts 120, 120 to prevent plate 74 from rotating.

FIGS. 14 and 15 are fragmentary sectional views corresponding to FIGS. 10 and 11 and show the position of a capsule which was positioned in the pocket with the cap end radially outwardly. This position is the reverse of that shown in FIG. 8 and 9. In this case, the capsule again pivots about the cap end but this cap end is in engagement with the portions of the restriction radially outwardly of the central groove 140. Thus, the capsule pivots outwardly to a position shown in FIGS. 14 and 15. In this case, the "capsule push through" is achieved by the blade 143 which has an inclined lower edge 145 which contacts the top of the cap of the capsule to force the same vertically downwardly through the restriction 136 into the funnel therebeneath in the same oriented position with the cap above the body.

The operation of the capsule orienting means in accordance with the invention is now completed. From the funnels 134 the capsules drop into a conventional rotating transfer disc 150 which is located below the disc 130 and is arranged to move its capsule receiving passages 152 into alignment with the discharge openings in the bottom of the funnels 134 at the appropriate location during the cycle of operation. A fixed capsule supporting platform 154 (FIG. 1) is located below the disc 150 as is conventional. The manner in which the transfer disc holes 152 move into alignment with the funnel openings is shown in FIG. 5. This is achieved in a front part of the machine and at this location there is positioned a vacuum applicator 160 which applies a vacuum pressure underneath the transfer disc holes 152 so as to draw a capsule into the openings 152 and hold the same in this position for a short period of rotation. The transfer disc then transfers the capsules to a second disc indicated generally at 164. This disc 164 may be used as part of various types of machines, such as for example, in a capsule filling machine.

A modified form of capsule orienting means in accordance with the invention is shown in FIG. 17 through 28. In this form of the invention there is provided a ring 230 which is constructed and arranged similar to the ring 130 of the first embodiment. The embodiment shown in FIG. 17 is similar to that shown in FIG. 1, but differs in the form of the capsule receiving pockets and funnels formed in the ring 230 and in the form of blades which cooperate with the capsules received in the pockets.

As shown in FIG. 17, the capsule receiving pockets in ring 230 are adapted to receive capsules from the tubes 100 mounted on the rotating turret 44.

Referring to FIGS. 19 through 28, the ring 230 is provided with a plurality of circumferentially spaced capsule receiving pockets 210 and associated capsule discharge funnels 212. Between each pocket 210 and its associated funnel 212 there is provided a restriction indicated generally at 214. Each restriction 214 is composed of two pairs of opposed faces 214A and 214B and 214C and 214D (FIG. 27) spaced apart radially and located on either side of the center of the capsule receiving pocket, the spacing being similar to that of the previously described capsule orienting means. Thus, when a capsule is forced downwardly through the restriction 214, it pivots on the cap end which contacts the restriction with greater friction than the body end as was described previously.

The ring 230 is provided with a centrally located groove 216 extending circumferentially thereabout and downwardly from the upperface thereof to the region below the restriction 214. There is also provided two horizontal grooves 218, and 220 concentrically aligned with the groove 216 and extending circumferentially around ring 230 as illustrated in the drawings.

There is provided an arcuate member 224 which corresponds to the member 124 of the first embodiment. Member 224 carries a member 222 (FIG. 18) which cooperates with the grooves 216, 218, and 220 in ring 230. It will be apparent that FIG. 18 is merely illustrative and that the member 224 and the member 222 are arcuate in form, this figure being for clarity of illustration only. As shown in FIG. 17, the member 224 is mounted above the ring 230 and is supported by a pair of brackets, indicated generally at 228, which brackets are mounted on the machine in the same manner as the brackets 128 in the embodiment shown in FIG. 1.

The member 22 comprises a vertically extending blade 226 which is received within the vertical groove 216 and a pair of horizontal blades 227 and 228 which project outwardly from both sides of vertical portion 226 and are adapted to be received in the grooves 218 and 220, respectively. Extending from the trailing end of vertical blade 226 is a horizontal blade

229 which is adapted to be received in the upper horizontal groove 218.

It will be apparent that as the ring 230 rotates, the vertical and horizontal blades described above will contact capsules positioned within the pockets 210 and the associated restrictions 214.

FIGS. 19 and 20 illustrate a capsule which has just been delivered from a tube 100 into a capsule receiving pocket 210. It is noted that this capsule will be supported in a horizontal position on the horizontal blade 229 above the restriction 214. This is the condition at the section of line 19—19 in FIG. 17.

When this same capsule reaches the position of the section of line 21—21 in FIG. 17, the capsule will have dropped off the horizontal blade 229 and fallen into the restriction 214 where the capsule will be frictionally engaged by one of the opposed pairs of restriction faces. FIGS. 21 and 22 illustrate one condition of the capsule when its cap has been engaged by the outermost pair of restriction faces. Obviously, the capsule may take a variety of positions during this phase of the capsule orienting operation.

The next phase in the operation involves the contact of the capsule by an inclined edge 223 formed on the vertical blade 226. As the capsule is moved past the vertical inclined edge portion of the vertical blade, the edge contacts part of the capsule at a generally central location and pushes the capsule downwardly further into the restriction 214. Thus, the capsule, such as the one shown in FIGS. 21 and 22 will be engaged by the inclined blade edge 223 and moved into the position shown in FIGS. 23 and 24. As the blade pushes the capsule downwardly, into the restriction, it causes the capsule to pivot on its cap end because of the greater friction at this location to thereby position the capsule in a vertical position with the cap end above the body as shown in FIGS. 23 and 24.

The next phase in the orienting operation involves moving the capsules from their held position in the restriction 214. This is achieved by the two horizontal blades 227 and 228 which comes into contact with the sides of the capsule and push it in a radial direction to allow the capsule to be released from the restriction and drop vertically downwardly through the discharge funnel 212. In FIG. 25, a capsule is shown immediately after it has been pushed free of the restriction 214 in a radially outwardly direction and has freely dropped to the position shown in this figure.

It will be evident that the form of the invention shown in FIG. 17 to 28 employs the basic principles of that shown in FIGS. 1 to 16. Thus, there is provided a capsule receiving pocket, a restriction, means for contacting the capsule and orienting the same in the restricted area and means for removing the capsule from its oriented position in the restriction and allowing it to drop through the discharging funnel.

The most advantageous embodiment of the invention is the modification of the capsule orienting machine of FIGS. 1 through 16 which is shown in FIGS. 29 through 41. The embodiment shown in FIGS. 29 through 41 is the same as the embodiment of FIGS. 1 through 16 with the exception of having modified vertical tubes connected to opening 42 in ring 40, a modified orienting ring and associated orienting parts, and a modified capsule discharging means.

Referring first to FIG. 29 each opening 42 in ring 40 is in communication with a vertically extending tube 300 affixed to turret 44. Each tube 300 is provided with a slot 315 for the reception of an endless belt 110 and a slot 309 for the reception of escapement plate 108. Each tube 300 extends downwardly into a vertical bore 316 in a ring 318 fixedly secured to turret 44. Each bore 316 discharges into a pocket generally indicated at 320 which has a vertical depth in excess of the length of a capsule, such as, the capsule shown at 322. Pocket 320 has vertical extending portion 324 which freely receives a capsule from tube 300. Outward of the upper and lower portions of portion 324 are enlarged pocket portions 326 and 328 respectively (FIG. 33) which are large enough to permit the free passage of a capsule when disposed substantially horizontally. Immediately below portion 326 and immediately above portion 328 are restricted pocket portions 330 and 332 (FIG. 29) which are sized to frictionally engage the cap portion of a capsule and permit the body portion to pass with little or no friction (see FIGS. 29 and 31).

As shown in FIG. 29, ring 318 is slotted vertically as indicated at 338 and slotted horizontally as indicated at 340 to accommodate orienting blades. A blade 344 secured to post 120 (FIG. 30) rides in slot 340 and in a circumferential turret slot 345 and has an arcuate portion 346 adjacent turret 44 and an arcuate face 348 adapted to engage a capsule vertically seated in a pocket 320. A vertical blade 352 rides in slot 338 (FIG. 38) and is connected by a web 354 to a substantially parallel vertical blade 356 which rides in a slot 358 in ring 359. Blade 352, web 354 and blade 356 are integral with an arm 360 (FIG. 38) which is connected to post 120 (FIG. 30) to prevent these integral parts from rotating. Blade 352 and 356 act on a capsule after it has been acted on by blade 344.

Each pocket 320 communicates through an opening 364 with a manifold 366 (FIG. 40) supplied with air under pressure by a line 368 for blowing oriented capsules out of each pocket 320. Each pocket 320 has associated therewith a discharge tube 372 (FIG. 29) which has the upper portion 374 split open to provide ample room for the passage of the capsule about the bend in the upper portion of the tube and discharges at its lower end into a funnel-shaped opening 376 in ring 377 which is secured to the lower portion of turret 44 and performs the function of discharge funnel 134 in the first described embodiment above. Ring 377 cooperates with fixed ring 137.

In operation, a capsule 322 passes through tube 300 in the same manner that a capsules passes downwardly through the originally described tube 100 being controlled by belt 110 in slot 315 and escapement plate 108 in slot 309. A capsule after entering and being seated in a pocket 320 is vertically disposed as shown in FIG. 29. As thus disclosed, the capsule is engaged by horizontal blade 344 riding in slot 340 which gets in back of the capsule and urges it outwardly against the restricted portions 330 and 332 as illustrated in FIGS. 31 and 32. Assuming the cap of the capsule is oriented downwardly originally as illustrated in FIGS. 29, the cap will engage restricted portion 332 as it is being moved outwardly causing the capsule to be pivoted about the cap to place the body end of the capsule pointing outwardly with the capsule lying below blade 344 as illustrated in FIG. 33. If the capsule is originally oriented with the cap upwardly it will similarly be urged outwardly by the blade 344 and the cap will engage and be restricted by restriction 330 and be pivoted about the cap to position the body portion facing outwardly with the capsule lying above blade 344.

As the turret 44 continues to rotate ring 318, the capsule which has thus been oriented substantially horizontally is engaged by the lower sloping edges 382 and 384 of blade 352 and 356 respectively and urged downwardly into the bottom of pocket 320 as illustrated in FIGS. 34, 37 and 38. Further, rotation of rings 318 brings the pocket containing the capsule oriented and ready for discharge into the area where opening 364 communicates with manifold 366 causing air under pressure to move into pocket 320 behind the capsule and force it outwardly into tube 372 as illustrated in FIGS. 40 and 41. The capsule passes downwardly into pocket 376 and thence into disc 150.

By a slight modification of the embodiment of FIGS. 29 through 41, the capsule after it has been oriented to a horizontal position with the body end pointing outwardly can be moved upwardly for discharge if it is above the first orienting blade or downwardly for discharge if below the orienting blade. Referring to FIG. 43, a blade 402 which rides in slots 340 and 345 has a sloping edge 403. Blade 402 is integral with a pair of substantially vertical blades 404 and 406 which ride in slots 338 and 358 respectively. Blade 404 has a portion 408 which extends above blade 402 and is provided with a sloping face 410 to urge a capsule upwardly. This blade also has a portion 412 below blade 402 with a sloping face 414 to urge a

capsule downwardly. Similarly, blade **406** has a portion **416** extending above blade **402** and having a sloping face **418** to urge a capsule upwardly and has a portion **420** extending below blade **402** with a sloping face **422** to urge a capsule downwardly. Blade **402** is secured to post **120** by means of an arm indicated at **424** to prevent rotation. As shown in FIG. **42** an additional opening **426** in each pocket **320** is provided for communication with manifold **366** to provide for the ejection of a capsule when it is moved upwardly in pocket **320**.

A modified discharge tube **430** (FIG. **42**) is employed. Tube **430** has an enlarged open upper end **432** which is divided by a horizontal divider **434** to provide for an upper entrance portion **436** for a capsule discharge by air through opening **426** and a lower entrance portion **438** for a capsule discharge by air through opening **364**. The lower end **440** of tube **430** discharges into opening **376**. In operation leading edge **403** of blade **402** engages a capsule in pocket **320** and orients in the same manner as is accomplished by blade **344** in the immediately previously described embodiment. If the capsule is above the blade **402**, it will be engaged by sloping portions **410** and **418** and urged upwardly to be discharged by air passing through opening **426**. On the other hand, if the capsule is oriented below blade **402**, it will be pushed downwardly by sloping portions **414** and **422** into position to be discharged by air passing through opening **364**. This operation is illustrated in FIG. **44**.

I claim:

1. A machine for orienting elongated capsules having a cap and a body comprising:

a turret adapted to rotate continuously,

means mounted on said turret providing a restriction to the movement of the cap of a capsule,

means to position a capsule adjacent said restriction means,

first fixed blade means to engage the midportion of a capsule positioned adjacent said restriction means to advance the capsule into said restriction means to cause the pivoting of the capsule about the cap and place the capsule in a desired orientation, and

second fixed blade means to engage the oriented capsule and release it from said restriction means for discharge.

2. A machine in accordance with claim **1** in which the restriction means is spaced horizontally from a substantially vertical pocket and spaced vertically from a discharge passage and in which the first blade means is substantially horizontal, and in which the second blade means is substantially vertical.

3. A machine in accordance with claim **2** having air means to discharge a capsule from the discharge passage.

4. A machine in accordance with claim **1** in which a plurality of restriction means are mounted successively about the periphery of the turret.

5. A machine in accordance with claim **4** having feed means comprising:

a capsule hopper,

a tube connecting each restriction means with the capsule hopper, and

means to periodically release a capsule in each tube to each restriction means.

6. A machine in accordance with claim **5** in which the capsule hopper has a conical bottom for guiding the capsules in a radially outward direction and an outward annular hopper adapted to receive capsules moving outwardly from said central hopper, said outer hopper communicating with each tube.

7. A capsule orienting machine in accordance with claim **6** having means for rotating the outward annular hopper at a speed less than the speed of rotation of the tubes.

8. A machine in accordance with claim **6** having means for oscillating the conical bottom.

9. A machine in accordance with claim **1** in which the capsule positioning means places the capsules substantially horizontally above the restriction means and both blade means operate vertically.

10. A machine in accordance with claim **1** in which the restriction means lies between two substantially vertical passages for capsules, the positioning means positions a capsule in a substantially horizontal position above said restriction, the first blade means is substantially vertical and the second blade means is substantially horizontal.