

Aug. 23, 1960

A. E. WHITECAR
AMPULE FEEDING DEVICE

2,949,998

Filed Feb. 12, 1958

5 Sheets-Sheet 1

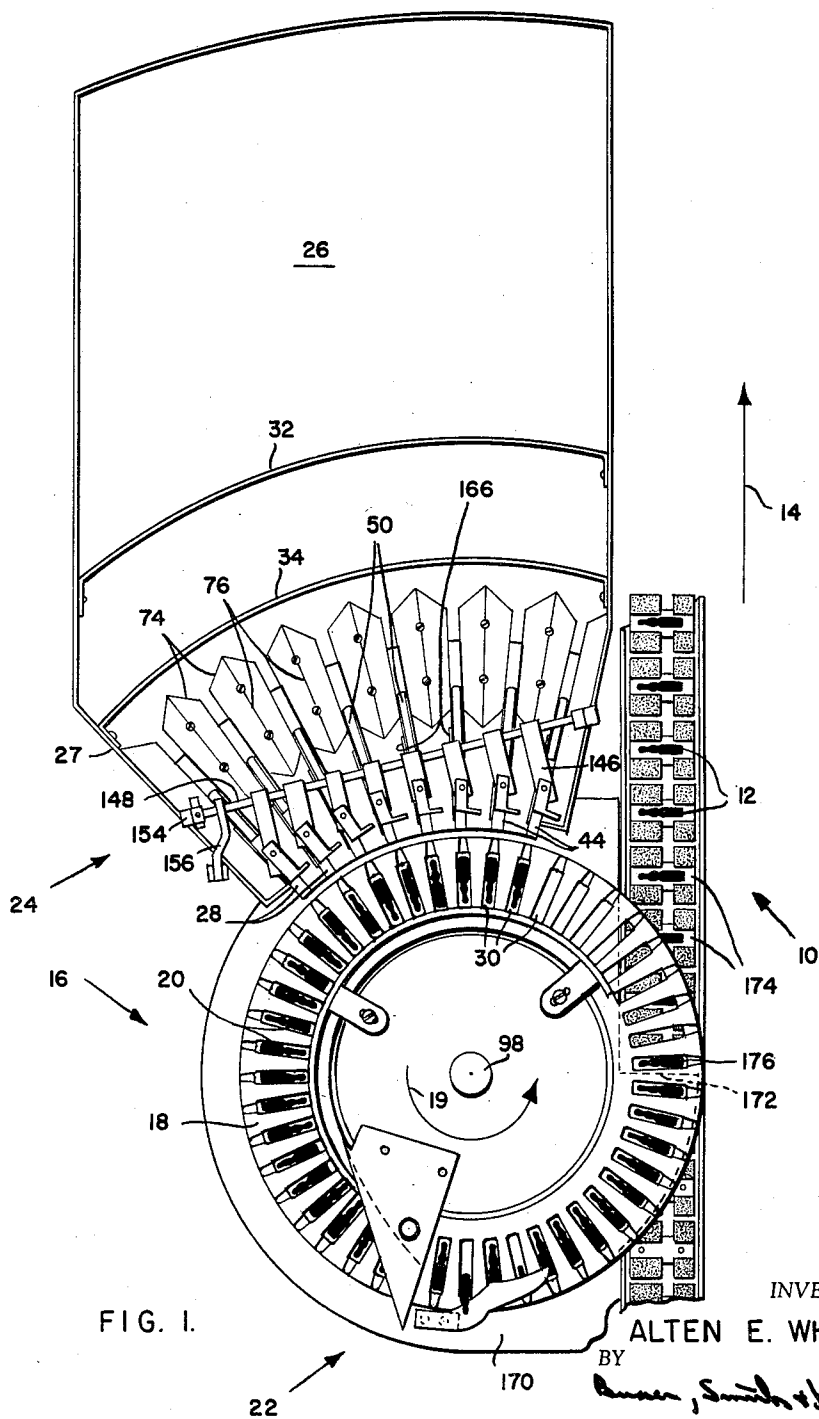


FIG. I.

INVENTOR.

ALTEN E. WHITECAR

BY

Allen, Smith & Harding
ATTORNEYS

Aug. 23, 1960

A. E. WHITECAR
 AMPULE FEEDING DEVICE

2,949,998

Filed Feb. 12, 1958

5 Sheets-Sheet 2

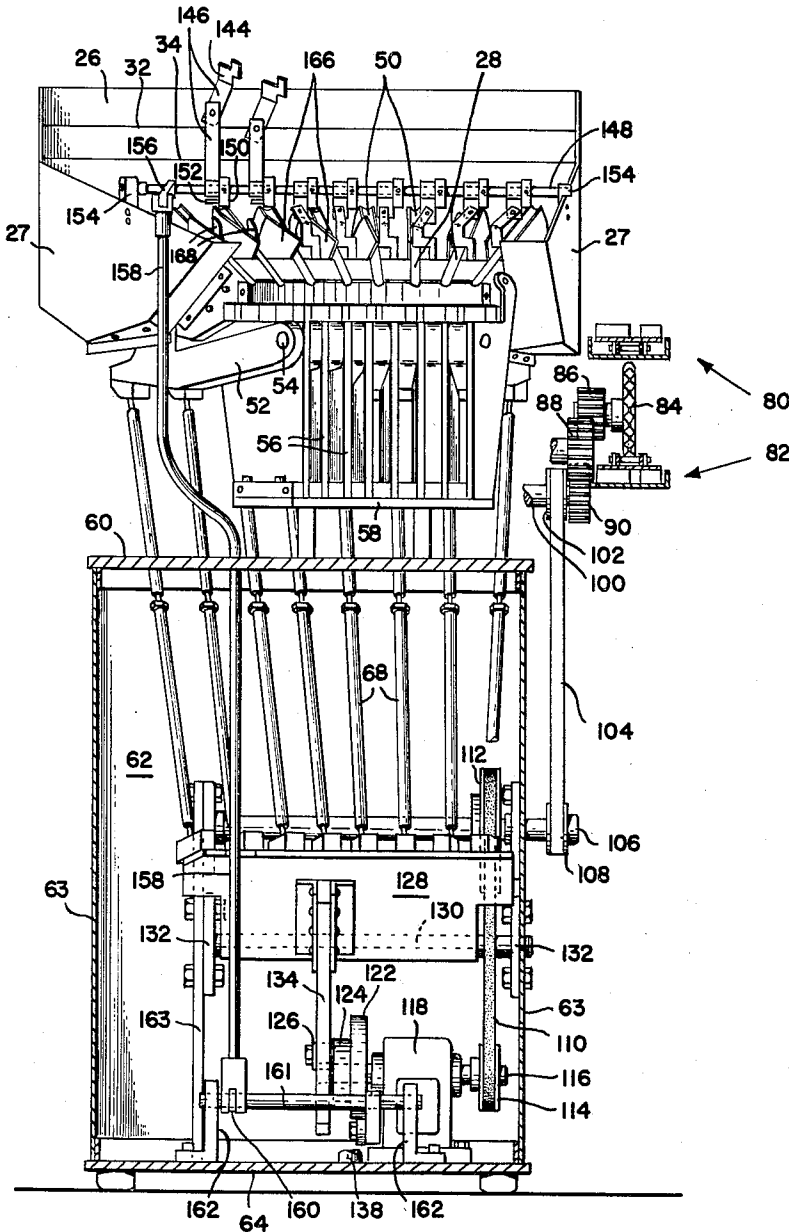


FIG. 2.

INVENTOR.

ALTEN E. WHITECAR

BY

Lawrence, Smith & Harding

ATTORNEYS

Aug. 23, 1960

A. E. WHITECAR
AMPULE FEEDING DEVICE

2,949,998

Filed Feb. 12, 1958

5 Sheets-Sheet 3

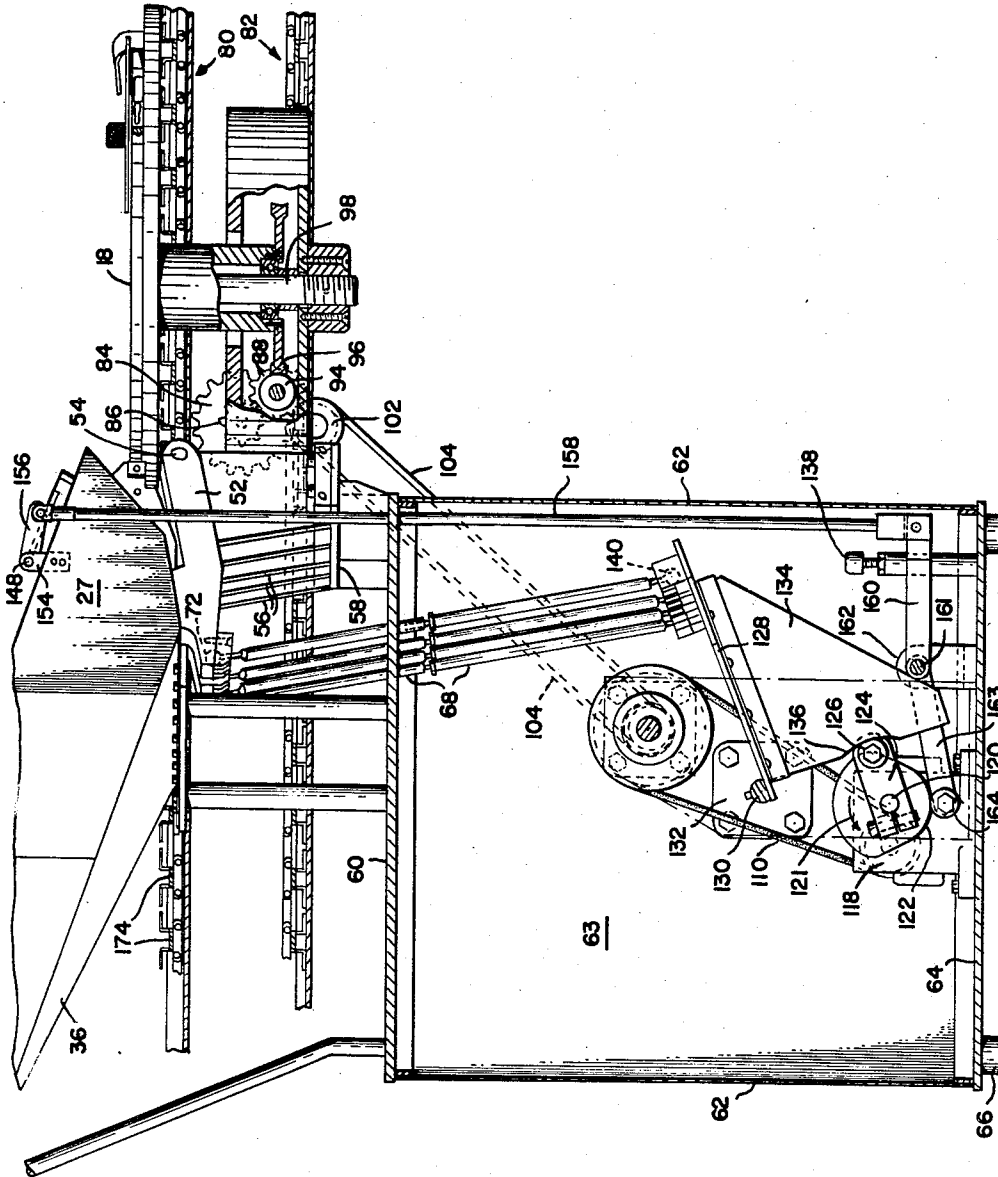


FIG. 3.

INVENTOR.

ALTEN E. WHITECAR

BY

Bauer, Smith & Harding

ATTORNEYS

Aug. 23, 1960

A. E. WHITECAR
AMPULE FEEDING DEVICE

2,949,998

Filed Feb. 12, 1958

5 Sheets-Sheet 4

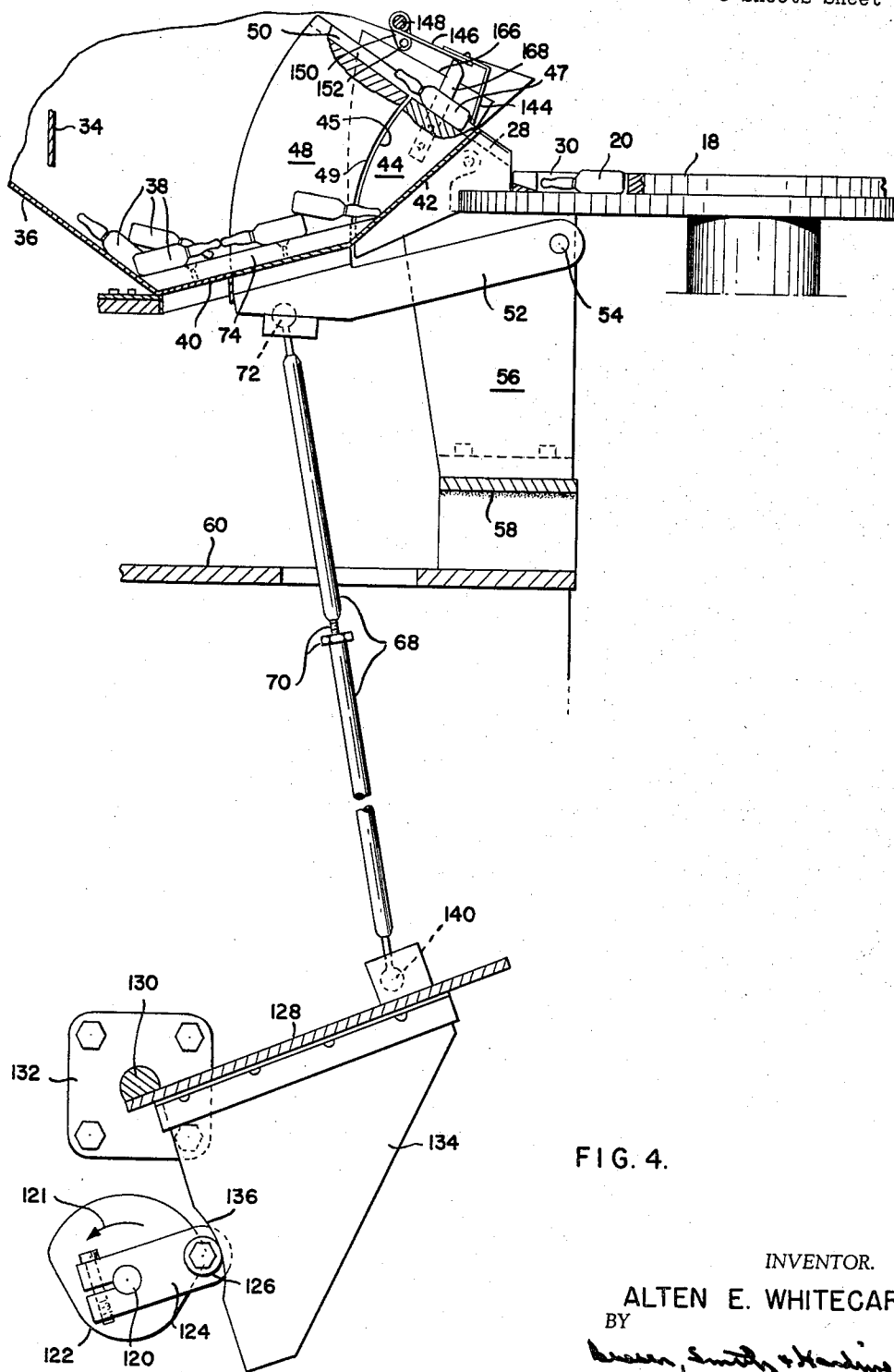


FIG. 4.

INVENTOR.

ALTEN E. WHITECAR

BY

Green, Smith & Harding

ATTORNEYS

Aug. 23, 1960

A. E. WHITECAR
AMPULE FEEDING DEVICE

2,949,998

Filed Feb. 12, 1958

5 Sheets-Sheet 5

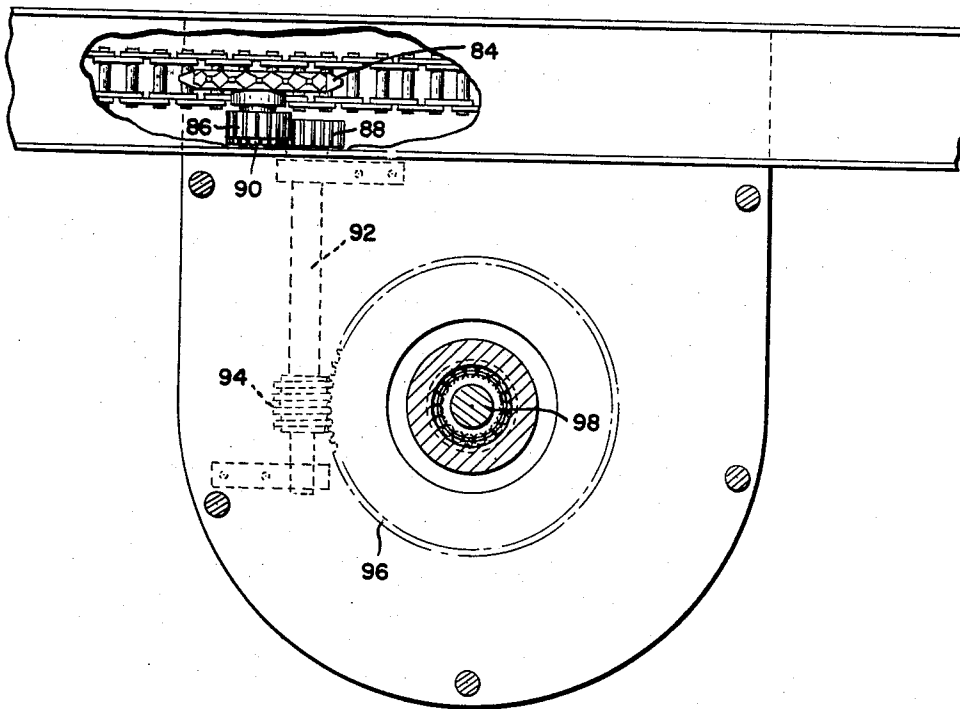


FIG. 5.

INVENTOR.

ALTEN E. WHITECAR

BY

James, Smith & Harding
ATTORNEYS

1

2,949,998

AMPULE FEEDING DEVICE

Alten E. Whitecar, Westville, N.J., assignor to Smith Kline & French Laboratories, Philadelphia, Pa., a corporation of Pennsylvania

Filed Feb. 12, 1958, Ser. No. 714,825

5 Claims. (Cl. 198—33)

This invention relates to a device for feeding ampules from a random supply thereof and, more particularly, for delivering the ampules one at a time in succession from each of a plurality of radially arranged chutes adapted to deliver ampules to radially arranged slots in a rotating disc.

In my copending application Serial No. 679,556, filed August 22, 1957, now Patent No. 2,857,039, there is disclosed a rotary ampule orienting device by means of which ampules positioned in radially extending slots in a rotating disc are oriented to have their necks all extending in the same radial direction preparatory to transfer of the ampules to a conveyor which carries the ampules to packaging apparatus. The present invention provides an automatic feed of ampules from a random supply thereof to the rotating disc described in my above-noted copending application.

These and other objects of the invention relating particularly to the structure thereof will become evident from the following description when read in conjunction with the accompanying drawings in which:

Figure 1 is a plan view of apparatus embodying the invention.

Figure 2 is a front elevation, partly in section, of the apparatus shown in Figure 1;

Figure 3 is an elevation, partly in section, of the apparatus shown in Figures 1 and 2 as viewed from the left-hand sides thereof;

Figure 4 is an enlarged vertical section showing fragmentary portions of the apparatus shown in Figures 1-3; and

Figure 5 is a fragmentary transverse section through the apparatus.

In Figure 1 there is indicated generally at 10 a conveyor carrying ampules 12 in the direction indicated by the arrow 14. The necks of the ampules 12 are all extending in the same direction and are so arranged by rotating apparatus indicated generally at 16 including a disc 18 rotating in the direction indicated by the arrow 19 and carrying ampules 20 in radially arranged openings 30 therein. The ampules indicated by the numeral 20 are not uniformly arranged and uniformity of arrangement is provided by apparatus indicated generally at 22. At 24 there is indicated generally apparatus for receiving a bulk feed of ampules in random arrangement from a hopper 26 and for delivering successive single ampules down each of a plurality of chutes 28 radially arranged in alignment with openings 30 in the disc 18. This apparatus will now be described in greater detail.

The hopper 26 is provided with a pair of adjacent transversely extending plates 32 and 34 which are spaced from the bottom 36 of the hopper as shown fragmentarily in Figure 4. This arrangement limits the depth of ampules which may accumulate at the lowermost or right-hand end of the bottom 36 of the hopper as viewed in Figure 4. The ampules 38 shown in Figure 4 indicate the random array thereof. It will be evident that this random array will exist to a greater depth when the

2

ampules are being fed under the lowermost edge of the plate 34. However, in Figure 4 only a limited number of ampules is shown in order not to obstruct the structural elements of the apparatus shown in Figure 4.

As viewed in Figure 4, the right-hand side of the bottom plate 36 of the hopper is formed with an upwardly inclined plate 40 which terminates in a more sharply upwardly inclined plate 42. The plate 42 is provided with a plurality of adjacent slots within which are mounted stationary blocks 44 in the form of vertically extending webs having formed in their uppermost edges the grooves 28. The grooves 28 are adapted to receive a succession of ampules such as that indicated at 47 in Figure 4. As will be evident from viewing Figures 1 and 2 the array of blocks 44 are positioned on radial planes extending through the center of rotation of the disc 18. The right-hand edges of the blocks 44, as viewed in Figure 4, terminate closely adjacent to the disc 18 and the spacing between the blocks 44 at the periphery of the disc 18 is such as to be equal to the spacings between the openings 30 in the disc, thus, ampules passing downwardly in the grooves 28 in the blocks 44 can slide onto the disc 18 and drop into openings 30 therein.

As best shown in Figure 4 arcuately formed blocks 48 are positioned with arcuate edges 49 behind or to the left of arcuate edges 45 of the blocks 44. The blocks 48 are provided on their upper edges with grooves 50 in alignment with the grooves 28 in the blocks 44. The blocks 48 lie in planes coincident with the plane of their adjacent blocks 44.

The lower ends of the blocks 48 are provided with arms 52 extending below their adjacent blocks 44 and having their innermost ends pivoted as indicated at 54 in Figure 4 to plates 56. One plate 56 is provided for mounting each of the arms 52 and the plates 56 are positioned in arcuate array on a plate 58 which is in turn supported above a plate 60 forming a top plate covering vertically extending side plates 62 and 63 mounted on a base plate 64 which is positioned above a supporting surface by means of pads 66. The arcs of curvature of the two side edges of the blocks 48 are drawn from the pivot centers 54. The edges of blocks 44 adjacent to the blocks 48 are similarly arcuately formed. Thus, upon movement of each of the blocks 48 around its pivots 54 constant clearance is maintained with its slot in the plate 40 through which it passes and with its adjacent block 44.

The lower edge of each of the blocks 48 is affixed to the upper end of a rod 68 through a ball and socket connection 72. Each of the rods 68 is provided with threaded length adjusting means 70. The arms 52 are moved about their pivots 54 and positioned by the rods 68 as will be hereinafter described. In Figure 4 the block 48 is shown in an uppermost position. When each of the blocks is in a lowermost position, as will be hereinafter described, the edges of the grooves 50 thereof lie substantially flush with the plate 40. Mounted above the plate 40 between each of the blocks 48 are inverted V-shaped plates 74 having the ridge 76 of the V positioned approximately mid-way between adjacent plates 48. The plates 74 serve to cause the ampules to roll onto the grooved upper edges of the blocks 48 when the blocks are in their lowermost positions with the edges of their grooves substantially flush with the plate 40. When the blocks 48 are raised the ampules carried upwardly thereby slide downwardly to the right as viewed in Figure 4 into the grooves 28 of the adjacent blocks 44 and from these grooves the ampules pass onto the disc 18 and into the openings 30 therein.

As previously noted, the ampules are discharged from the apparatus shown in Figure 1 by means of a conveyor

indicated generally at 10. In Figures 2 and 3 the upper and lower reaches of this conveyor are indicated generally at 80 and 82, respectively. A sprocket 84 is driven by the lower reach of the conveyor and drives a gear 86 which is in mesh with a gear 88 which is in turn in mesh with a gear 90.

As is best shown in Figure 5 the gear 88 is mounted on and drives a shaft 92 on which is mounted a worm 94. The worm 94 drives a worm gear 96 affixed to a vertically extending shaft 98 which mounts and drives the disc 18.

The gear 90 drives a shaft 100 on which there is mounted a pulley 102 which drives a belt 104. The belt 104 drives a shaft 106 through a pulley 108. A belt 110 is driven by a pulley 112 affixed to the shaft 106 and in turn drives a pulley 114 mounted on a shaft 116 driving a speed reducer 118. The output shaft of the speed reducer 118 is indicated at 120 in Figure 3 and mounts a cam 122 and an arm 124 in adjacent positions as best shown in Figure 2. The arm 124 mounts a roller 126. The shaft 120 rotates in the direction indicated by the arrow 121 in Figure 3.

A plate 128 is affixed to a rod 130 extending transversely between one sidewall 63 and a vertically extending plate 163 affixed to the base plate 64. The ends of the rod 130 are pivotally mounted in bearing brackets 132 mounted on the plates 63 and 163. A vertically extending plate 134 has its uppermost edge affixed to the underside of the plate 128 and has a curved recess 136 formed in a generally vertically extending edge thereof. The plate 134 is in alignment with the roller 126 which is adapted to engage the recessed surface 136 and the edge of the plate adjacent thereto to raise the plate 134 to a maximum elevation in counterclockwise rotation around the rod 130 as shown in Figure 3. The surface 136 is formed on a radius drawn around the center of the shaft 120 with the parts in the positions shown in Figure 3 in order that the plate 128 will remain stationary in its uppermost position during rotation of the shaft 120 during the interval in which the roller 126 is passing over the surface 136. An adjustable stop 138 is positioned to be engaged by the plate 128 when the roller 126 has rotated sufficiently from the position shown in Figure 3 and, thus, clockwise rotation of the plate 134 is restricted in accordance with the setting of the stop 138.

The lowermost ends of the rods 68 are pivotally connected to the plate 128 by means of ball and socket arrangements 140.

From the foregoing it will be evident that the pivoted blocks 48, best shown in Figure 4, are radially arranged as shown in Figure 1 and, thus, the ball and socket connections of the upper ends of the rods 68 are also in radial arrangement. The rod 130 provides a linear axis of rotation of the plate 128, thus, the ball and socket connection 72 at the upper end of the rod 78 and a ball and socket connection 140 at the lower ends of the rod 78 are necessary in order to provide suitable translation of motion between the plate 128 and each of the pivoted radially arranged blocks 48.

The distances of each of the ball and socket connections 72 from its associated pivot 54 and the distances of each of the ball and socket arrangements 140 from the axis of the pivot shaft 130 are selected so that the blocks 48 each rise and fall with identical degrees of motion. The upper levels are adjusted by adjusting the lengths of rods 68 to position the grooves 50 of the blocks 48 in alignment with the grooves 28 as shown in Figure 4, and the lower levels are adjusted by means of the adjustable stop 138 to position the edges of the grooves 50 of the blocks 48 level with the plate 40.

Reviewing briefly the operation of the apparatus thus far described, ampules contained in the hopper 26 pass downwardly over the inclined bottom plate 36 of the hopper under the plates 32 and 34 and come to rest

in the vicinity of the blocks 48. Driving power from the conveyor 82 causes the blocks 48 to periodically rise and fall. When the blocks 48 are in their lowermost positions the top surface of each of the blocks is substantially flush with the plate 40 of the hopper extending therebetween. The inverted V-shaped plates 74 positioned between the blocks 48 cause the ampules to move downwardly from the surfaces of the V-shaped plates 74 and come to rest in the grooves 50 extending along the upper edges of the plates 48. The plates are then lifted by the action of the cam roller 126 against the plate 134 to positions as shown in Figure 4. In these positions the grooves 50 on the upper edges of the blocks 48 are in alignment with grooves 28 in the upper edges of the adjacent blocks 44 and ampules such as the ampule 47 shown in Figure 4 carried upwardly by the block 48 slide downwardly through the grooves 28 and come to rest on top of the rotating disc 18 which is also driven from the conveyor 82.

In view of the fact that it is desired that ampules moving down the grooves 50 and 28 come to rest in openings 30 in the disc 18 control means is provided to time the discharge of the ampules. This control means is in the form of stop fingers 144 extending substantially vertically upwardly from the blocks 44 as shown in Figure 4. Each of the fingers 144 is affixed to an arm 146 pivotally mounted to a shaft 148. Affixed to the shaft 148 adjacent to each of the arms 146 is a small plate 150 mounting a pin 152 extending beneath the arm 146. Rotation of the rod 148 in a counterclockwise direction as viewed in Figure 4 raises the pins 152 which in turn raise arms 146 and fingers 144 permitting ampules to slide down the grooves 28 in the blocks 44. The two left-hand fingers in Figure 2 are shown in an upward position in order to more clearly show the structure involved. It will be evident that in normal operation these two fingers will be positioned as are the other fingers shown in the figure.

The rod 148 is mounted on brackets 154 affixed to the side walls 27 of the hopper as best shown in Figure 2. One end of a link 156 is affixed to the left-hand end of the rod 148 as viewed in Figure 2 and pivotally connected to the other end of the link is the upper end of a vertically extending rod 158 the lowermost end of which is pivoted to one end of a bar 160. The other end of the bar 160 is affixed to a rod 161 which is rotatably mounted in blocks 162 affixed to the base plate 64. One end of a bar 163 is affixed to the rod 161 and the other end of the bar 163 mounts a cam follower roller 164 which is positioned to engage the surface of the cam 122 and be actuated thereby to rotate the bar 148, raise the pins 152 and raise the fingers 144.

As previously noted, upward movement of the blocks 48 carries ampules upwardly for discharge into the grooves 28 in the blocks 44. When the blocks 48 are in their uppermost positions as viewed in Figure 4 the stop fingers 144 are in their lowermost positions preventing travel of ampules onto the disc 18. However, ampules are discharged from the blocks 48 to the blocks 44. Thereupon the blocks 48 are moved downwardly and thereafter the fingers 144 are raised. As will be evident from Figure 4 the length of the block 44 behind the fingers 144 is such as to provide support for only a single ampule, thus, when the stop fingers 144 are raised with the blocks 48 in a lowered position only a single ampule will slide down each of the grooves 28 onto the disc 18. The spacings between the blocks 44 are equal to the spacings between the outer ends of the openings 30 in the disc 18 and the apparatus is so timed that the stop fingers 144 are raised prior to the time when openings 30 are positioned in alignment with the blocks 44, so that one ampule sliding down the groove in each of the blocks 44 will enter an aligning opening 30 in the disc 18.

The eight blocks 44 discharge eight ampules and then the fingers 144 move downwardly as the blocks 48 are

5

again moved upwardly. The time cycle of upward movement and downward movement of blocks 48 is such that the fingers 144 are raised once with the passage of eight openings 30 of the disc 18, thus, each time the fingers 144 are raised eight empty openings of the disc 18 are presented at the base of the grooves 28 for the reception of ampules.

Thin guide plates 166 positioned against the left sides of the blocks 44 and 48 as viewed in Figures 1 and 2 and rising above the blocks as best shown in Figure 4 are provided to turn ampules lying crossways to grooves 50 into the paths of these grooves and to prevent interference from overflow ampules from adjacent grooves 50.

Additionally, there is provided adjacent to each of the blocks 44 a finger 168 having its uppermost edge deflected or bent to partially overlie the top of the block 44. Occasionally as a block 48 is raised two ampules will be lifted with the block and the adjacent plate 166 will serve to support the uppermost of the two ampules. The deformed upper end of the finger 168 serves to displace the upper of the two ampules causing it to drop off the top of the block 44 and down into the reservoir of ampules in random array. Thus, only a single ampule such as that shown at 47 in Figure 4 is delivered to the groove in the block 44 when the retaining fingers 144 are raised.

After ampules have been delivered to the openings 30 in the rotating disc 18 rotation of the disc carries the ampules past turnover apparatus indicated at 22 and described in detail in my above-noted copending application. Continued rotation of the disc 18 carries the ampules to the right-handmost portion thereof as viewed in Figure 1 in which the ampules pass beyond an underlying plate 170 which has up to this time prevented the ampules from falling through the openings 30 in the disc 18. The plate 170 is cut away on a radial line as indicated at 172 and, thus, after the ampules are positioned over the conveyor indicated generally at 10 the ampules drop from the disc. Recesses 174 in the conveyor and the openings 30 in the disc 18 are synchronized in their advance so that ampules falling from the openings 30 as indicated at 176 in Figure 1 drop into the receiving recesses therefor in the conveyor as indicated at 174 in Figure 1.

From the foregoing it will be evident that the apparatus provides for feeding a plurality of ampules from a random array thereof in a discharge hopper to radially arranged openings in a rotating conveyor member. It will also be evident that various details of the embodiment of the invention disclosed herein may be modified without departing from the scope of the invention as set forth in the following claims.

What is claimed is:

1. Ampule feeding apparatus comprising means for retaining a plurality of ampules in random array, a plurality of means in spaced array extending radially of

6

a common center for lifting ampules from said retaining means, and means for receiving ampules raised by each of said lifting means and in radial alignment therewith for simultaneously discharging the received ampules to a circular conveyor rotating around said center.

2. Ampule feeding apparatus comprising means for retaining a plurality of ampules in random array, a plurality of substantially vertically moving means in spaced array extending radially of a common center for lifting ampules from said retaining means, gravity chute means for receiving ampules raised by each of said lifting means and in radial alignment therewith, gate means to hold ampules on said chutes and for simultaneously discharging the received ampules to a circular conveyor rotating around said center, radially arranged ampule receiving means in said conveyor positioned adjacent to and adapted to be in alignment with said chute means and means to actuate said gate means to discharge ampules when conveyor ampule receiving means are in alignment with said chute means.

3. Apparatus in accordance with claim 2 in which each gravity chute is of a length between its input end and said gate means to accommodate only one ampule.

4. Apparatus in accordance with claim 2 in which each gravity chute is of a length between its input end and said gate means to accommodate only one ampule and is provided with an overlying finger adjacent the input end of the chute which prevents a second ampule from seating on an ampule in the chute means.

5. Ampule feeding apparatus comprising means for retaining a plurality of ampules in random array, a plurality of substantially vertically moving means in spaced array extending radially of a common center for lifting ampules from said retaining means, gravity chute means for receiving ampules raised by each of said lifting means, gate means to hold ampules on said chutes and for simultaneously discharging the received ampules, a circular conveyor rotatable around said center, radially arranged ampule receiving means in said conveyor positioned adjacent to and adapted to be in alignment with said receiving and discharging means, means to operate said gate means to discharge ampules when the conveyor ampule receiving means are in alignment with said chute means, means actuating said lifting means to lift ampules when said chute means are not discharging.

References Cited in the file of this patent

UNITED STATES PATENTS

1,220,801	Varga	Mar. 27, 1917
1,609,994	Ellis	Dec. 7, 1926
2,714,832	Seed	Aug. 9, 1955
2,791,314	Meier	May 7, 1957

FOREIGN PATENTS

501,576	Germany	July 3, 1930
---------	---------	--------------