March 17, 1936. J. A. JOHNSON 2,033,988

CLOSURE CAP FEEDING DEVICE

Filed Feb. 9, 1933 3 Sheets-Sheet 1

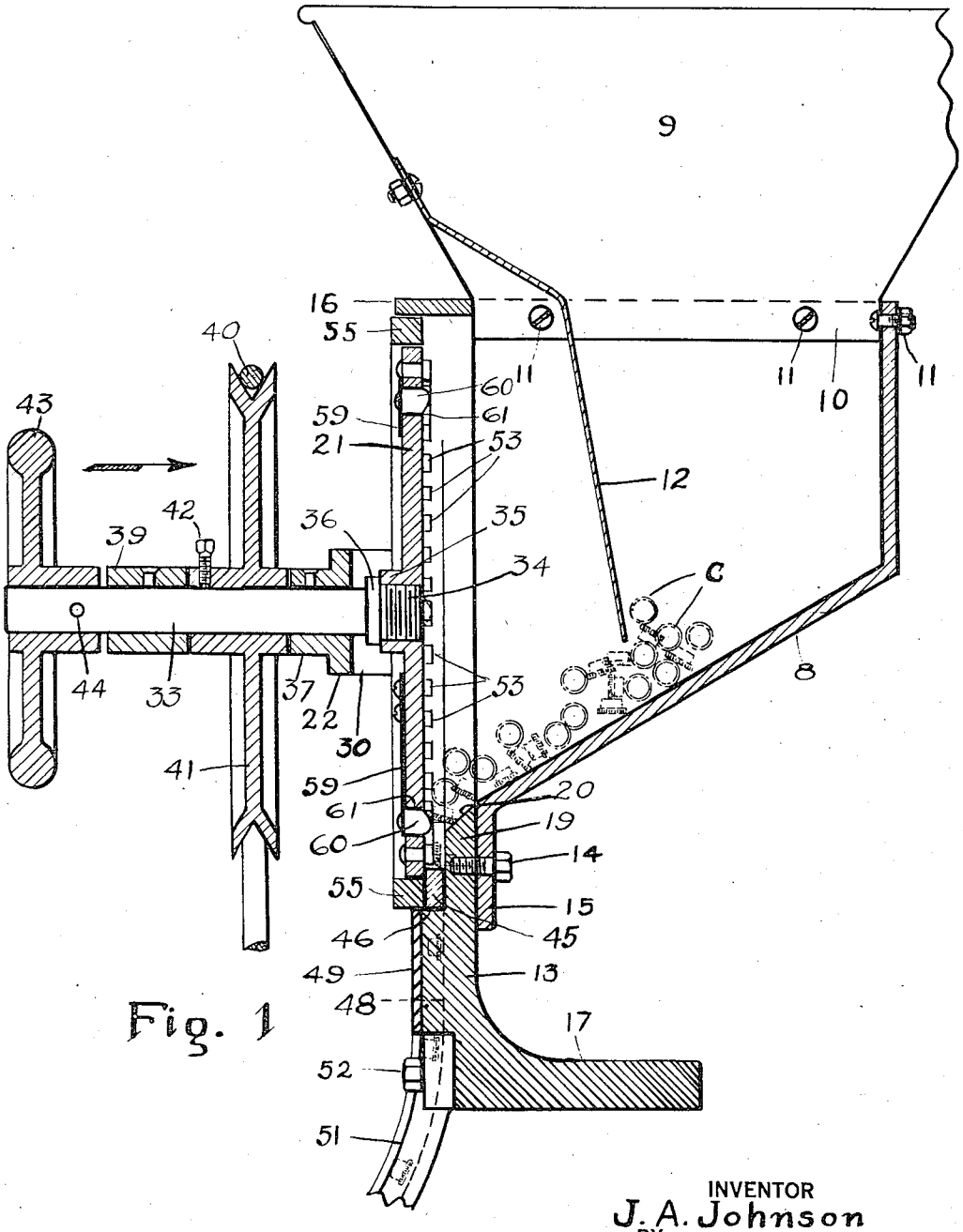


Fig. 1

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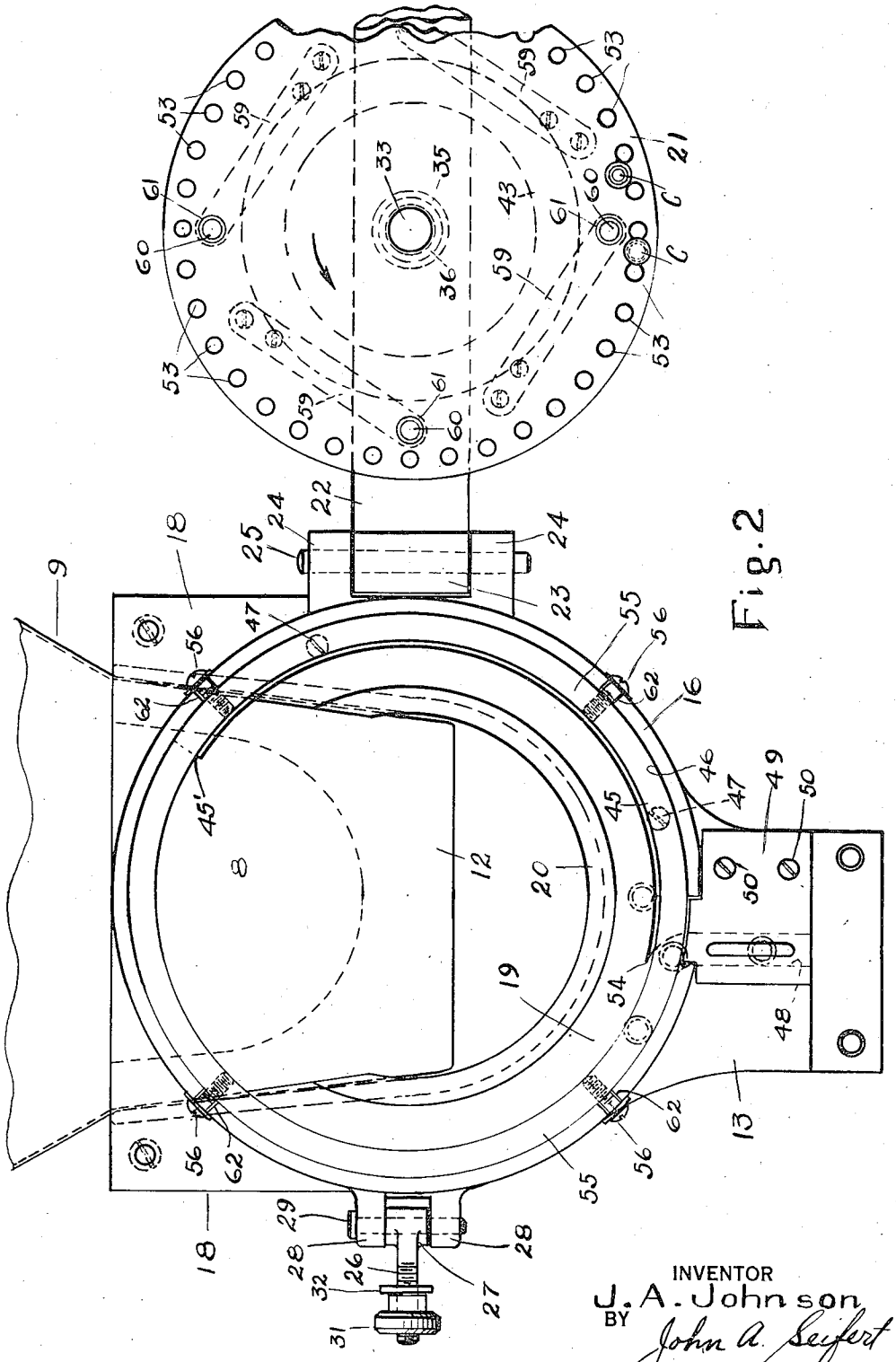


Fig. 2

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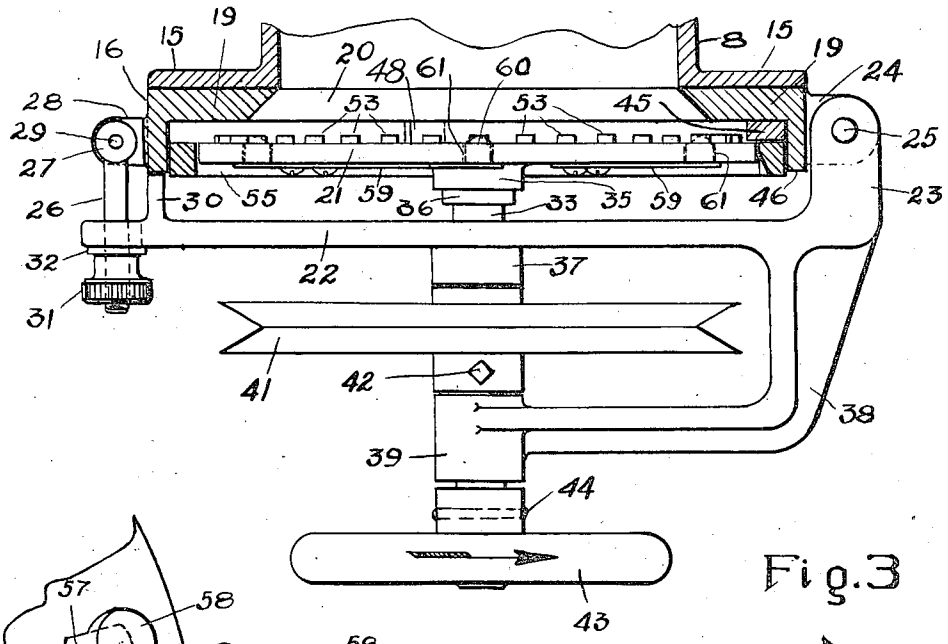


Fig. 3

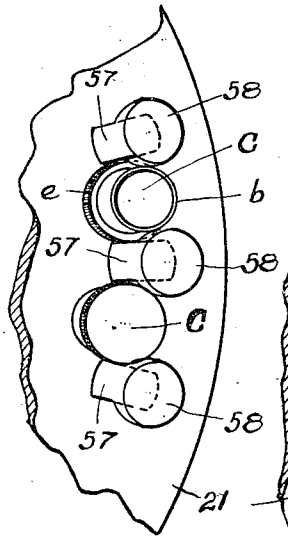


Fig. 6

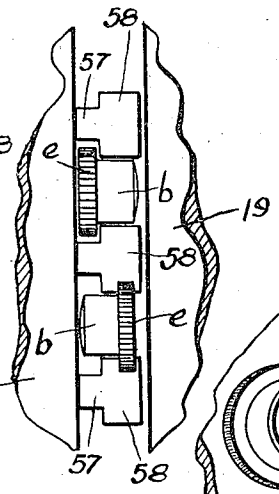


Fig. 7

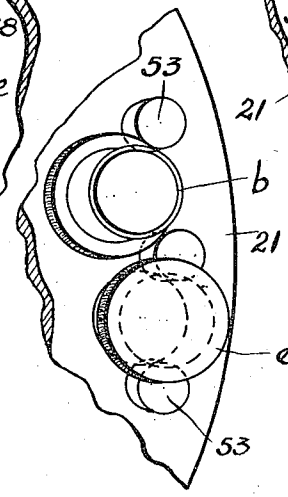


Fig. 4

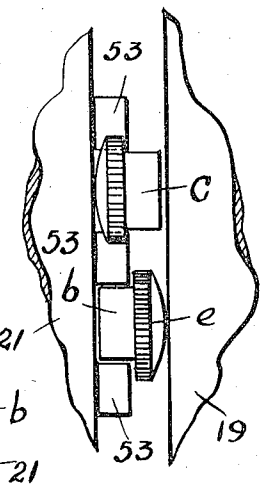


Fig. 5

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UNITED STATES PATENT OFFICE

2,033,988

CLOSURE CAP FEEDING DEVICE

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Application February 9, 1933, Serial No. 655,948

7 Claims. (Cl. 226—88.1)

This invention relates to devices for feeding closure caps prior to the delivery of the caps to apparatus for assembling liners in the caps or to machines for applying the closure caps to receptacles, whereby the caps are delivered to the designated apparatus in predetermined position, the devices embodied in the present invention being particularly adapted for feeding closure caps having an enlargement to facilitate applying the caps to a receptacle.

It is the principal object of the invention of this application to provide a device for this purpose which is simple and inexpensive in structure and efficient in use.

Another object of the invention is to provide a device whereby the operating parts thereof are readily interchangeable to accommodate the device for different size closure caps.

A further object of the invention is to provide a type of feeding means whereby the closure caps will be continuously delivered in predetermined positions.

A still further object of the invention is to movably mount the feeding means to permit of the ready dislodgment of closure caps that may become jammed in the device.

The embodiment of the invention comprises a hopper casing having an opening closed by an adjustable and rotatable disk arranged with pins equidistantly spaced about and projecting from a face of the disk adjacent the periphery thereof for the releasable engagement between the pins of a portion of the closure caps in the hopper casing, and transferring said engaged closure caps by the rotation of the disk relative to a guideway to the inlet of an outlet chute leading from the hopper casing adjacent the opening in said casing and the closure caps engaged between the disk pins dropping into the chute inlet.

In the drawings accompanying and forming a part of this application Figure 1 is a side elevational view in longitudinal section of the device, and showing the parts in operative position.

Figure 2 is a front elevational view of the device showing the closure and feeding disk in open position to permit access to the interior of the hopper casing through the opening therein.

Figure 3 is a fragmentary view looking at the feeding disk from the top of Figure 1 and showing the same in relation to the opening in the hopper casing and a portion of the hopper casing in cross section.

Figure 4 is a fragmentary view in perspective of a peripheral portion of the feeding disk showing a portion of a closure cap engaging between the disk pins in the method of feeding the caps.

Figure 5 is a fragmentary view of a pin carrying portion of the disk and showing the same relative to a wall of a cap guideway about the wall of the opening of the hopper casing and showing a cap engaged between and transferred by the disk pins relative to the guideway and another cap in position in which it cannot engage between and be transferred by the disk pins.

Figure 6 is a view similar to Figure 4 showing a modified form of the cap engaging disk pins to adapt the enlarged portion of the caps to engage between the disk pins to effect a sorting of the closure caps; and

Figure 7 is a view similar to Figure 5 showing the modified form of cap engaging pins shown in Figure 6, the position of the cap engaged by the pins being reversed to that shown in Figure 5.

In carrying out the invention illustrated in the accompanying drawings there is provided a casing 8 having openings in the top and front walls, and the side and bottom walls diverging from the rear wall toward the open front wall, with the bottom wall of arcuate or chute formation and the side walls converging toward said bottom wall, as shown in Figures 1 and 2. To facilitate the feeding of closure caps C to the casing 8 the open top, constituting the charging or inlet opening to the casing, is arranged with a hopper in the form of a rectangular funnel shaped member 9 having a flange 10 extending about the smaller end for the engagement of the inner faces of the side and rear walls at the opening in the top of the casing and secured therein by bolts, as shown at 11 in Figure 1. To maintain the major portion of the caps in the hopper casing and distribute the caps evenly over and from the bottom wall of the casing to a pin carrying closure disk a baffle and guide plate 12 is fixed at one end to a wall of the hopper 9 and extended downward in an oblique direction to a point adjacent the flange 10 of the hopper from which point the plate is extended at a lesser angle in a downward direction into the casing 8 terminating in spaced relation to the bottom wall thereof, as shown in Figures 1 and 2.

The casing 8 is supported and mounted upon a standard 13 by passing bolts 14 through a flange 15 extended from the walls of the casing at the open side thereof and threading the bolts into the standard with said open side of the casing in alinement with the opening in a ring portion or annulus 16 arranged at the upper end of the standard 13. The standard 13 is supported by a

laterally extending base portion 17 and by securing the ring portion 16 to a support (not shown) through the engagement of bolts in perforations in flanges 18 extended upwardly from the periphery of the ring portion, as shown in Figure 2. A section 19 corresponding to and equal to the width of the arcuate bottom wall of the casing is extended inwardly from the periphery of the opening in the ring portion 16 and has the edge beveled to form a surface extending as a continuation of the bottom casing wall, as at 20.

The opening through the ring portion 16 and the open side wall of the casing is closed by an adjustable door comprising a disk 21 rotatably carried by an arm 22 pivotally or hingedly mounted on the ring portion 16 by an end 23 of the arm extended at a right angle from the body of the arm and engaged between a pair of ears or knuckles 24 projecting laterally from a side of the ring portion 16, said arm end 23 being pivotally connected to the ears 24 by a tapered pintle 25 engaged in tapering and alined openings in the ears and arm end, as shown in Figure 2. The door is releasably retained in closed position by arranging a bifurcation in the end of the arm opposite to the angular end 23 for the engagement of a rod 26 having a perforated boss 27 at one end whereby it is pivotally mounted between a pair of ears 28 extended from the side of the ring portion 16 in opposed relation to the ears 24 by a headed pintle 29. The disk 21 is positioned in predetermined spaced relation to the peripheral extended portion 19 of the ring 16 within said ring by an abutment 30 fixed to and extended perpendicularly from the arm 22 adjacent the bifurcation in said arm to engage the outer side of the ring 16, and maintained in forcible engagement therewith by a knurled nut 31 threaded onto the free end of the rod 26 projecting from the outer side of the arm 22 with a washer 32 interposed between the nut and arm 22.

The disk 21 is rotatably carried by the arm 22 by a shaft 33 having an enlarged screw threaded end portion 34 releasably engaged in an internally screw threaded boss 35 arranged axially of the disk, the engagement of the shaft with the disk being limited by an annular shoulder 36 on the shaft at the inner side of the screw threaded end to abut the end of the boss 35. The shaft 33 is rotatably mounted in a bearing 37 integral with and midway of the ends of the arm 22, and to prevent canting movement of the shaft 33 there is extended from the end of the arm 22 in opposed relation to the extension 23 an angular bracket 38 having a leg portion extending parallelly of the arm 22 and arranged with a boss 39 at the end for the rotatable engagement of the shaft. The disk is continuously rotated from a suitable source of power, such as an electric motor, not shown, connected to the shaft 33 by a belt 40 passed around a peripherally grooved pulley 41 mounted on the shaft between the arm bearing 37 and bracket boss 39 and fixed to the shaft by a set-screw 42 threaded into the hub of the pulley to impinge the shaft, as shown in Figure 1. The particular mounting of the shaft 33 by the bearings 37, 39 will receive the full force of any stress or strain exerted upon the pulley by the belt without canting the shaft 33 or disk 21. The disk 21 may be manually adjusted by rotating the shaft 33 through a hand manipulating wheel 43 fixed on the end of the shaft extending beyond the bracket boss 39 by a pin engaged in alined perforations in the hub of said wheel and the shaft, as at 44 in Figure 3.

The caps C for which the device is specially adapted to feed and arrange in predetermined position comprise a hollow body *b* having a closed end arranged with an enlargement *e* having the edge serrated to facilitate the applying of the closure cap to and removing of the cap from a receptacle. The body of the cap at the open end thereof may be internally screw threaded for the releasable engagement thereof with a screw thread on the receptacle, or the caps may be of the slip-on type, and it is also to be understood that the enlargement *e* may be arranged at any desired portion of the cap body and having greater cross sectional width than the height of the entire cap.

The caps fed to the casing 8 will drop onto the bottom wall thereof and be directed over the beveled edge 20 of the peripheral portion 19 of standard 13 into a channel guideway or runway for the caps formed along the peripheral portion 19 by a semi-circular member or rib 45 mounted on a shoulder 46 formed in the ring 16 to extend laterally from and along the portion 19 with the member 45 secured to said portion 19 by screws, as shown at 47 in Figure 2, said member extending from a point in alinement with the juncture of a side wall with the rear wall of the casing, as shown at 45' in Figure 2, to the side wall of a vertical passage or channel 48 in the face of the standard 13 covered by the plate 49 retained in position on the standard by screws 50 to form the inlet to a discharge chute 51 mounted on a standard, as at 52 in Figure 1, the chute leading to a closure cap assembling or applying apparatus in the usual manner. The cross sectional thickness of the member 45 is substantially equal to the space between the disk 21 and peripheral portion 19 of the ring portion 16 when the disk is in closing position and the width of said member is such that a portion thereof will be juxtaposed to the peripheral portion of the disk, as clearly shown in Figures 1 and 3, the space thus formed between the disk 21 and ring 16 comprising the channel runway having a width substantially equal to the height of the cap but less than the cross sectional width of the cap enlargement *e* so that the caps can only engage the runway sidewise, as shown in Figures 1, 5 and 7.

In the embodiment of the invention illustrated in Figures 1 to 5, inclusive, the caps are delivered from the casing 8 to the cap assembling or applying apparatus with the enlarged closed end *e* of the caps lowermost, by only delivering to the chute 51 caps engaged in the channel runway with the enlarged ends *e* adjacent the peripheral portion 19. The caps positioned in this manner are transferred in the runway along the member 45 and delivered to the chute inlet 48 by pins 53 fixed in and projected laterally from the inner face of the disk 21 and arranged to extend about the periphery of the disk in equidistantly spaced relation to each other and travel in the channel runway as the disk is rotated. The spaces between the pins are slightly greater than the cross sectional width of the body *b* of the caps, and of a length less than the length of the cap body *b*, so that when the caps fall into the channel runway in the prescribed position the body portion will readily engage between the pins, as clearly shown in Figures 1, 2 and 5.

In all of the embodiments of the invention illustrated the disk is rotated in a clockwise direction looking at the outside of the disk in the

closed position thereof which makes it necessary that the runway forming member **45** be mounted on the right hand side of the opening in the ring portion **16**, looking at Figure 2, to assure a continuous transfer of caps by providing the positioning of a great quantity of caps to be readily engaged by the pins prior to the travel of said pins past the chute inlet **48**. The caps engaged between the pins are maintained in such position during the travel of the pins relative to the runway forming member **45** until they are conveyed past the chute inlet **48** by moving relative to an extension **54** of said member **45** projecting in overhanging relation to the chute inlet by extending the end of the member **45** in an upward arcuate direction from the lowermost edge which is in alinement with a side of the chute inlet **48**, to a point approximately in alinement with the opposite side of the chute inlet, so that the caps will be carried by the pins **53** beyond the chute inlet before they will drop from between the pins into second runway formed by an annulus or ring member **55** mounted within the ring portion **16** in spaced relation to the peripheral portion **19** by screws **56** passed through openings **62** in the ring portion **16** and threaded into the ring **55**, as clearly shown in Figure 2. The ring **55** is juxtaposed to the runway forming member **45** so that the runway formed within the ring portion **16** by the ring **55** will extend in alinement with but below the runway formed by the member **45**, as shown in Figure 3, whereby the caps will readily engage the first mentioned runway formed by ring **55** and will roll or slide down said runway into the chute inlet **48**, as clearly indicated by the caps shown in dotted lines in Figure 2. The disk pins **53** will prevent the entrance of caps into the second runway other than those which may be positioned to pass between the disk pins.

By mounting the ring member **55** within the ring portion **16** it is adapted to encircle the pin carrying disk **21**, the ring member **55** being of such width as to co-operate with the disk **21** to completely close the opening through the ring portion **16** and the outlet opening of the casing **8**. The device as hereinbefore described is adapted to feed different size caps by the removable mounting of pin carrying disks **21** of different sizes on the shaft **33** having cap engaging pins **53** spaced different distances apart corresponding to the size of the bodies of the closure caps to be sorted, and to completely close the opening in the ring portion **16** rings **55** of different widths are also substituted to co-operate with the different sized disks **21**.

To deliver the caps with the open ends thereof lowermost, only the caps positioned in the runway formed by the member **45** with their enlarged ends *e* juxtaposed to the disk **21** (Figures 6 and 7) are adapted to be engaged between and transferred by pins **57** fixed in and extended from the inner face of the disk **21** in spaced relation to each other, similarly to the pins **53**, except that the pins **57** have an enlarged portion **58** at the free ends thereof of a length substantially equal to the length of the body *b* of the closure caps with the pins **57** spaced apart a distance to form a space between them corresponding to the shape of the caps with the enlarged ends *e* of the caps juxtaposed to the disk **21**, as clearly shown in Figure 7.

It is to be understood that either form of the closure cap engaging pins disclosed may be used for the purpose of delivering caps in any desired predetermined position by changing the direction in which the chute **51** extends from the standard **13**. In the illustration of Figure 1, the caps may be delivered with the open end lowermost instead of the enlarged end *e* lowermost as in the arrangement shown in said Figure 1, by extending the chute in an arcuate direction to the right of said figure instead of to the left.

The caps positioned in the runway formed by the member **45** so that they cannot be engaged by the pins and transferred by the rotation of the disk **21**, are ejected from the runway into the casing **8** by continuously agitating said caps through the engagement of the caps with the pins carried by the disk continuously travelling along said runway and to maintain the runway formed by the member **45** filled with caps, the caps in the casing **8** are agitated into position to engage the runway by agitators comprising strips or bands **59** of resilient material fixed at one end to the outer face of the disk **21** and extended in tangential directions relative to the axis of the disk and in equidistantly spaced relation with each other, studs **60** carried at the free end and projecting laterally of the strips slidably engage equidistantly spaced openings **61** in the disk **21**, the free ends of the studs being rounded and normally extended beyond the inner face of the disk under the yielding force of the resilient strips **59**, whereby the rounded ends of the studs will engage the caps and should the studs meet with undue resistance by the interlocking and jamming of the caps into compact groups the studs will move into the disk against the inherent tension of the strips **59**, and thereby prevent breakage of parts.

While I have illustrated one embodiment of my invention it will be obvious that various modifications may be made in construction and arrangement of parts, and that portions of the invention may be used without others, and come within the scope of the invention.

Having thus described my invention, I claim:

1. In a closure cap feeding device, a casing having a hopper inlet and arranged with an opening in a side wall having a vertical wall extended about the opening, a rotatable closure releasably supported to close said opening, means removably mounted on the vertical wall to form a channel runway of regulatable width, between the vertical wall and said closure for the passage of different size caps, a chute leading vertically from said channel runway, and a circular row of pins carried by and extending from the closure into the runway arranged to co-operate with a wall of the runway to permit of a predetermined engagement of the closure caps between the pins in the channel runway and transfer of such caps to the chute inlet by the rotation of the closure.

2. In a closure cap feeding device, a casing having an inlet and arranged with an opening in angular relation to the inlet and said opening having an annular wall about the same, a disk rotatable centrally of and closing the casing opening, means to form a channel runway between the wall about the casing opening and the disk, a chute leading from the channel runway, and a circular row of equidistantly spaced pins fixed in a face of the disk adjacent the periphery thereof and extended therefrom into the channel runway and said pins being of a length less than the width of the runway and the spaces between the pins of a size slightly larger than the body of the closure caps to permit a predetermined engagement of the closure caps between

the pins and transfer of the caps along the runway and delivery to the chute inlet by the rotation of the disk.

3. In a closure cap feeding device, a casing having a hopper inlet and a circular opening arranged with a vertical wall extended from a peripheral portion thereof, a rotatable disk in spaced relation to said vertical wall portion and closing the circular opening, a chute leading from the space between the disk and the vertical wall portion, an arcuate member extended along a side of the circular opening and said vertical wall portion interposed between said wall portion and disk with an end of said member terminating adjacent the chute and forming a channel runway leading to said chute, and a circular row of equidistantly spaced pins fixed in and extended from a face of the disk to travel relative to said runway by the rotation of the disk and adapted for engagement between the pins of predetermined positioned caps in the runway to transfer the caps along the runway and deliver them to the chute inlet by the rotation of the disk.

4. A closure cap feeding device as claimed in claim 3, wherein the free ends of the pins are arranged with enlargements for the engagement of the caps between the pins with the body of the caps relative to said enlargements and in said position transferring the caps by the rotation of the disk to the chute inlet.

5. A closure cap feeding device as claimed in claim 3, wherein the rotatable disk is arranged with means to agitate the caps comprising strips of resilient material fixed at one end to the face of the disk opposite to the pins, and studs carried at the free ends of said strips slidably engaged in perforations in the disk with end portions of the studs normally projecting from the face of the disk from which the pins project.

6. In a closure cap feeding device, a casing having a hopper inlet and arranged with an opening having a vertical wall extending therefrom and the walls of the casing diverging toward said opening, a runway extended about a portion of the vertical wall with the ends of the runway terminating on opposite sides of the vertical axis of the casing opening for the reception of closure caps directed toward the opening by the diverging walls of the casing, a chute leading from the lower end of the runway, and a rotatable disk adapted to close the opening having equidistantly spaced pins projecting from adjacent the periphery into the runway for a predetermined engagement of the closure caps in the runway to transfer the caps in said position along the runway to the chute inlet by the rotation of the disk and deliver the engaged caps from the disk to the chute inlet by gravity.

7. In a closure cap feeding device as claimed in claim 3, wherein a ring member is releasably mounted within the casing opening to encircle the closure disk and in spaced relation to a portion of the vertical wall to form a second runway terminating at the side of the chute inlet and to which the caps are delivered from the first runway, and the disk pins adapted to prevent entrance of caps to said second runway unless predeterminedly positioned relative to said pins.

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