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MEANS FOR SELECTING AND FEEDING RECEPTACLE CLOSURE CAPS

Filed Jan. 10, 1935 3 Sheets-Sheet 1

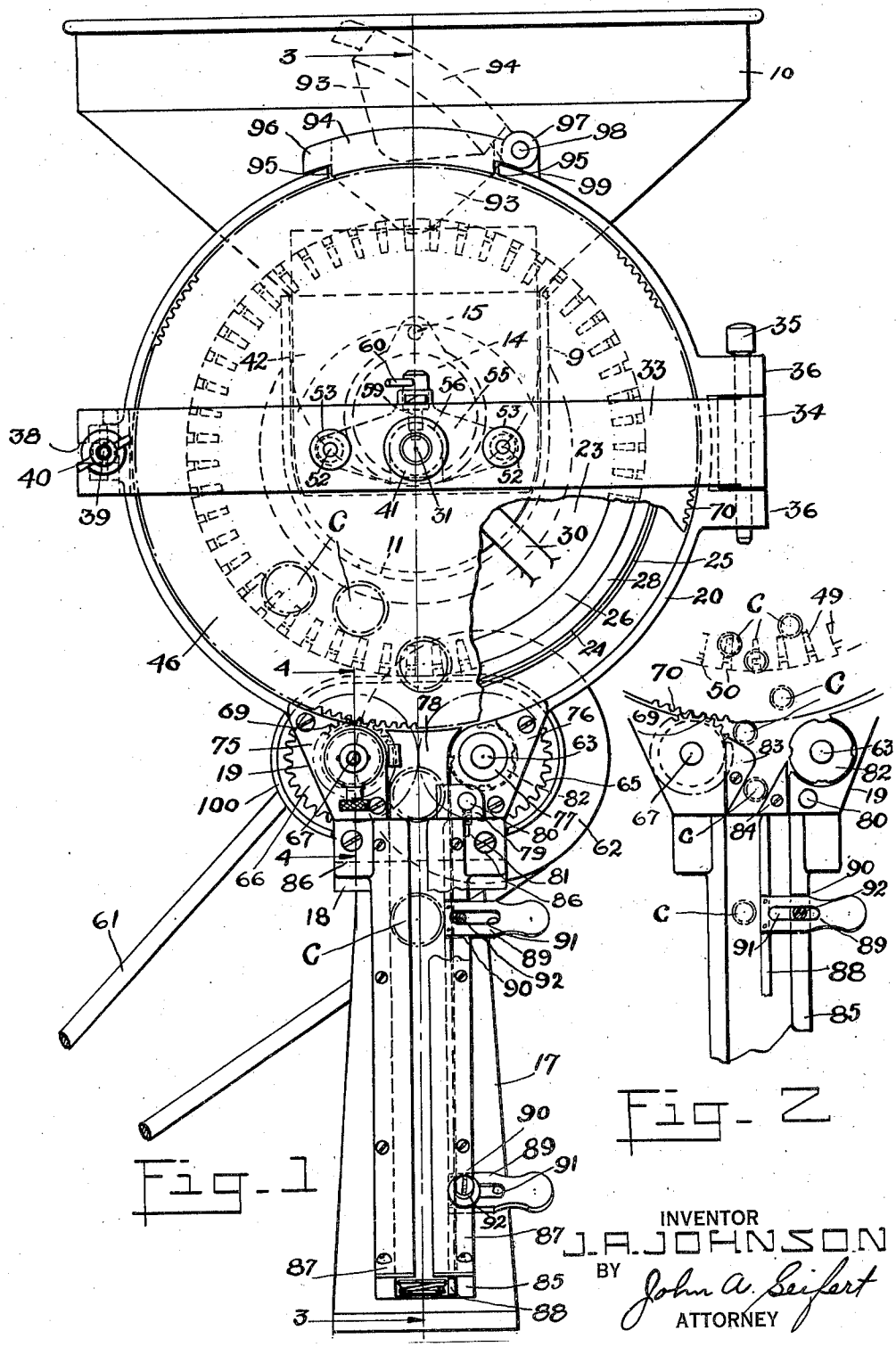


Fig. 1

Fig. 2

INVENTOR
J. A. JOHNSON
BY John A. Seifert
ATTORNEY

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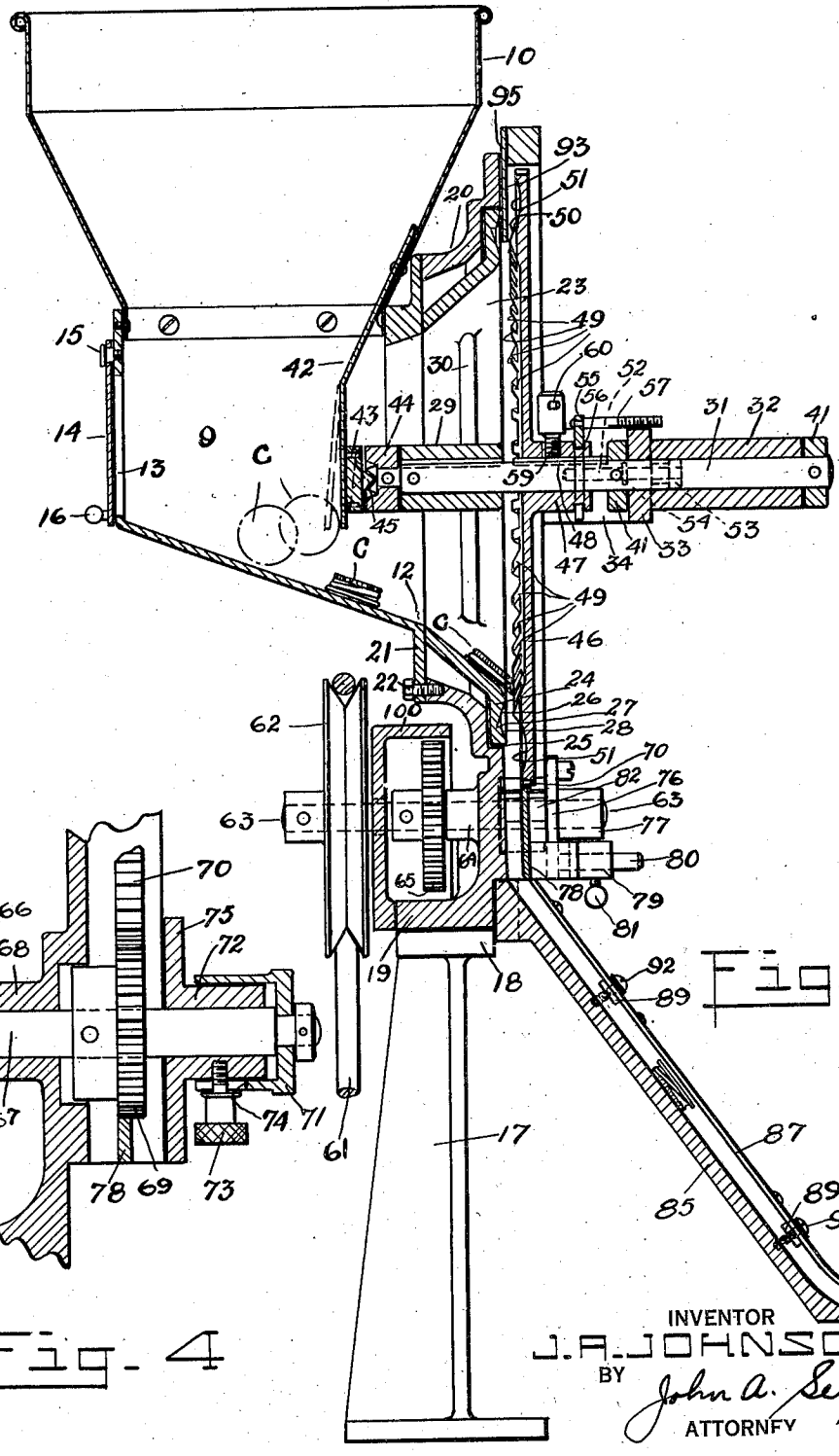


Fig. 3

Fig. 4

INVENTOR
J. A. JOHNSON
BY John A. Seifert
ATTORNEY

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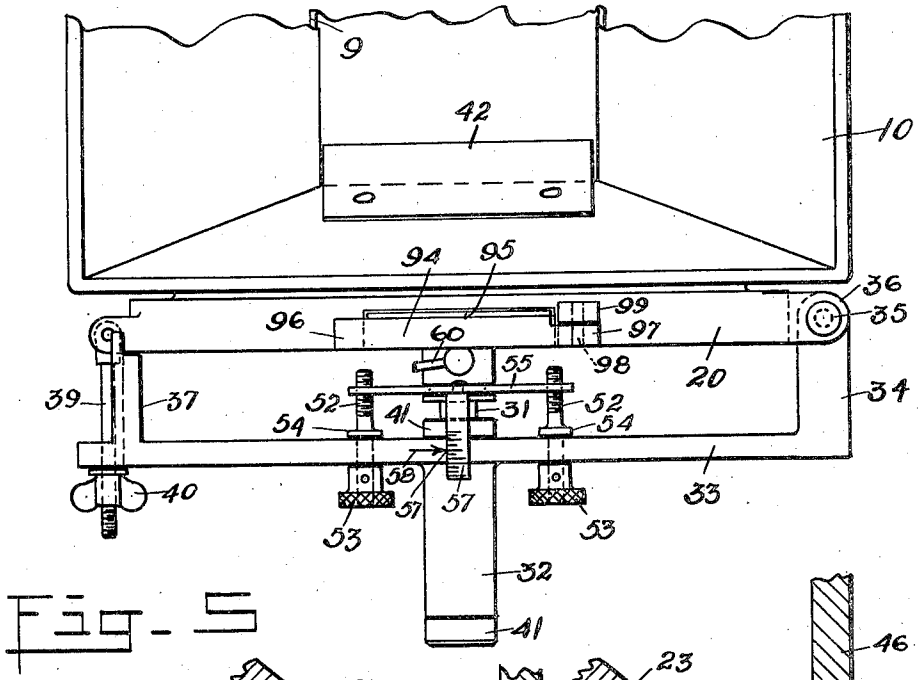


Fig. 5

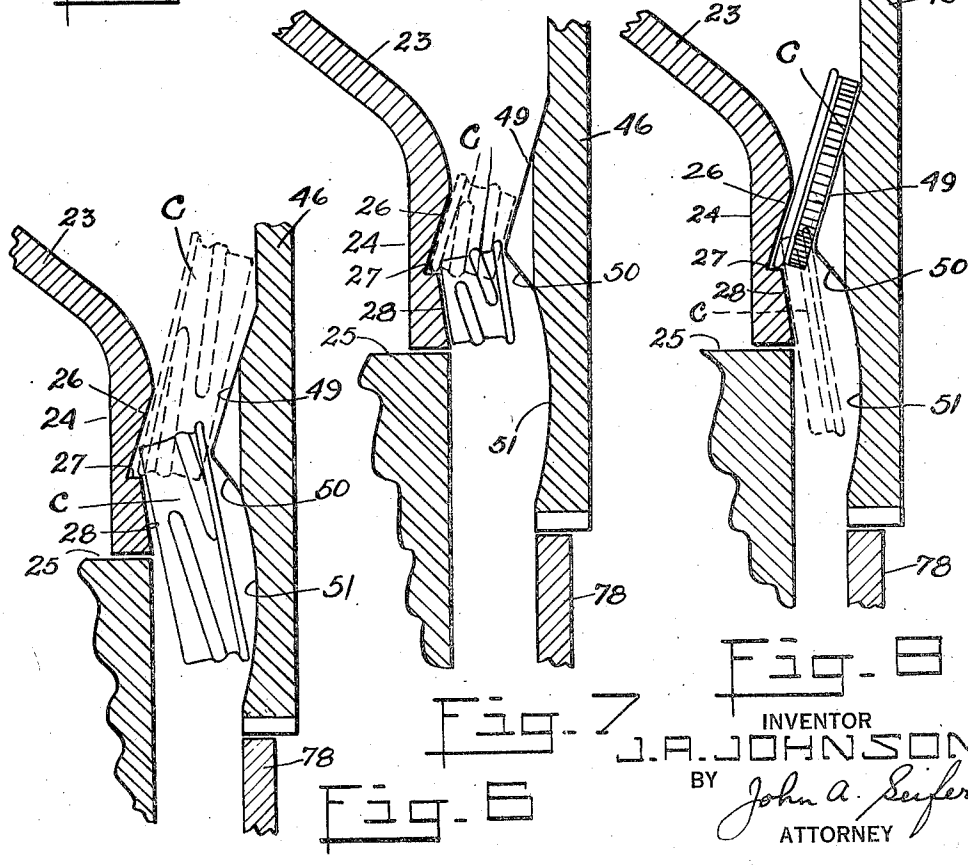


Fig. 8

Fig. 7

Fig. 6

INVENTOR
J. A. JOHNSON
BY John A. Seifert
ATTORNEY

Patented Mar. 29, 1938

2,112,291

UNITED STATES PATENT OFFICE

2,112,291

MEANS FOR SELECTING AND FEEDING RECEPTACLE CLOSURE CAPS

John A. Johnson, Woodhaven, N. Y.

Application January 10, 1935, Serial No. 1,119

11 Claims. (Cl. 113—114)

This invention relates to means for selecting predeterminedly positioned receptacle closure caps and feeding the selected receptacle closure caps to apparatus for assembling liners in the closure caps or to apparatus for applying the closure caps to receptacles, and particularly for selecting and feeding closure caps having the skirt portions thereof screw threaded for interlocking engagement with corresponding screw threads about the mouths of the receptacles.

It is the principal object of the invention to provide means to select and feed receptacle closure caps readily adjustable to permit the selecting and feeding of closure caps of different lengths or depths and diameters without the attachment of additional parts to said means.

Another object of the invention is to provide means that will prevent jamming of the closure caps in the selecting and feeding means.

Other objects and advantages will hereinafter appear.

In the embodiment of the invention there is provided a hopper casing having a bottom declining to an open end thereof with a rotatable drum at said open end having an annular flange at the outer end arranged with a groove therein in opposed relation to a circular series of equidistantly spaced angular protuberances on the face of a disk mounted to rotate with the drum and have axial movement to position the protuberances in variable spaced relations with the groove in the annular flange to permit passage between said annular flange and disk of edgewisely extending closure caps of different depths or lengths having the open ends thereof facing the protuberances. The distances between the protuberances are such as will prevent passage between said protuberances of closure caps of the smallest diameter that may be handled by the hopper casing and cause all the closure caps to extend edgewisely between the drum flange and disk protuberances. The drum and disk are rotated simultaneously by driving means connected to the disk and adjustably mounted to be correspondingly positioned in alinement with the disk in the adjusted position thereof. The closure caps having the open ends thereof facing the protuberances on the disk will enter a channel having a wall in alinement with the disk and mounted to be adjustable with the adjustment of the disk and the width of the channel being variable to guide closure caps of different widths and correspond with the adjustable width of a chute arranged with a slidable wall to vary the width of the chute with one end of the chute walls extending from the lower ends of the channel walls. A plate is pivotally mounted to extend between the groove in the annular flange of the drum and the protuberances of the disk diametrically opposite to the channel to disengage closure caps from between the groove and protuberances to maintain said space free for closure caps passing therethrough to the channel and chute.

In the drawings accompanying and forming a part of this application Figure 1 is a front elevational view of the means constituting the embodiment of the invention partly broken away to show the flanged end of the drum.

Figure 2 is a view of the channel and chute showing the delivery of closure caps of the smallest diameter from the selecting means.

Figure 3 is a longitudinal sectional view taken on the line 3—3 of Figure 1 looking in the direction of the arrows.

Figure 4 is a sectional view, on an enlarged scale, taken on the line 4—4 of Figure 1 looking in the direction of the arrows to show the adjustable mounting of the driving means for the drum and disk.

Figure 5 is a view looking at the top of Figure 1 with the rear portion of the hopper casing broken away and showing means to adjust the disk toward or away from the drum arranged with calibrations to indicate the amount of space between the drum flange and the disk protuberances.

Figure 6 is a fragmentary view in section and full size of the lower center portions of the drum flange and disk showing closure caps of maximum length and diameter passing between said drum and disk, and being prevented from passing.

Figure 7 is a view similar to Figure 6 showing closure caps of minimum diameter and maximum length; and

Figure 8 is a view similar to Figures 6 and 7 showing the disk adjusted for selecting and feeding closure caps of minimum length and maximum diameter.

In carrying out the invention illustrated in the accompanying drawings there is provided a hopper casing 9 having an opening in the top thereof arranged with a funnel shaped member 10 through which the closure caps are fed to the hopper and the bottom of the hopper being of arcuate formation in cross section, as shown in dotted lines at 11 in Figure 1, declining toward an open end 12, as clearly shown in Figure 3. The end wall of the casing opposite to the open end 12 has an opening 13 therein for the in-

spection of the interior of the casing and permit access to the closure caps within the casing and said opening 13 is adjustably closed to prevent the expelling of the closure caps from the casing through the opening by a closure plate 14 pivotally mounted on a headed stud 15 fixed in the rear wall of the casing, the closure plate being arranged with a manipulating knob 16 to facilitate the actuation of said plate.

The hopper casing is supported in elevated position relative to the apparatus (not shown) to which the caps are to be delivered by a pedestal or standard 17 adapted to be mounted at the lower end on or adjacent to said apparatus to which the closure caps are to be delivered and arranged at the upper end with a platform 18 for supporting the base of a bracket 19 having at the upper end an annulus or ring member 20 arranged with a diameter tapering inwardly with the inner end of smaller diameter connected to an annular flange 21 extending from the casing open end 12 by bolts, as at 22 in Figure 3.

Closure caps C having the skirt portion screw threaded are supplied to the hopper casing from the funnel shaped member 10 and by the formation of the bottom of the casing 9 they move by gravity toward the open end 12 and the annulus 20 where they are tumbled about to place them in sidewise position by a drum 23 tapering at a greater angle of inclination than the bottom of the casing 9 with the diameter at the smaller end coinciding with the open end 12 and having at the larger end a lateral flange 24 to extend into an annular recess 25 in the face of the bracket 19 adjacent the larger end of the annulus 20 and the outer face of the flange being arranged with an annular groove or channel having an inner side 26 extending from the inner periphery of the flange at an acute angle to the other or outer side 27 of the groove which outer side is substantially perpendicular to the plane of the flange and approximately one sixth (⅙) the length of side 26, as clearly shown in Figures 6, 7 and 8. The peripheral portion of the outer face of the flange 24 extends at an angle from the groove side 27 to the peripheral edge of the flange to form a flare, as at 28, for a purpose to be hereinafter described. The drum is rotatably mounted within the annulus 20 of the bracket 19 with the tapered end in registry with the casing open end 12 by a hub 29 supported centrally of the drum by a series of spokes 30 and fixed on an end portion of a shaft 31 rotatably supported at the opposite end in an elongated sleeve 32 arranged in the median portion of an arm 33 having an angular end portion 34 pivotally mounted on a pin 35 between a pair of spaced ears 36 projecting laterally from the annulus 20 with the opposite end of the arm arranged with a spacing portion 37 to abut the annulus 20 and position the arm parallelly of the drum and a slot 38 extending inwardly from said end for the engagement of a hasp 39 pivotally mounted on the annulus 20 diametrically opposite the ears 36 and having a wing nut 40 screw threaded on the free end thereof to engage the outer face of the arm and releasably retain the spacing portion 37 in abutting relation with the annulus 20. The shaft 31 is retained in the sleeve 32 against longitudinal movement by collars 41 fixed on the shaft to abut the inner face of the arm 33 and the outer end of the sleeve, as clearly shown in Figure 3.

To assure a steady supply of closure caps from the hopper casing to the rotary drum 23 there is provided agitating means adjacent the open end 12 in the form of a vibrating plate 42 of resilient material having an end portion secured to and extended as a continuation of the front wall of the funnel 10 with the opposite end portion bent to extend in parallel spaced relation to the open end 12 and arranged with a block 43 secured thereto having a transverse rib on the exposed face of triangular shape in cross section to engage a groove in a head 44 corresponding to the shape of the rib, as at 45 in Figure 3, with the head 44 fixedly mounted on the end of the shaft 31 projecting from the hub 29, so that the rotation of the shaft will intermittently engage the groove with the rib and vibrate the resilient plate 42 to the dotted line position shown in Figure 3.

The closure caps that are being tumbled about the drum 23 are positioned to extend edgewisely and predeterminate positioned closure caps are permitted to leave the drum. This positioning and selecting of the closure caps is accomplished by a disk or circular plate 46 having an elongated hub 47 extended from a face of the disk and arranged with a longitudinal groove to slidingly engage a key on the periphery of the shaft 31, as at 48 in Figure 3, whereby the disk will rotate with the shaft and have longitudinal movement thereon toward and away from the flange 24 of the drum 23 to permit passage of predeterminate positioned closure caps of different heights or lengths. The face of the disk opposite to the face arranged with the hub 47 has a circular series of equidistantly spaced protuberances in opposed relation to the annular groove in the drum flange 24 having an angular face with an inner angle portion 49 of greater length than the other or outer angle portion 50, and said angle portion 49 being substantially parallel with the side 26 of the groove in the drum flange 24, so that edgewisely positioned closure caps having the closed ends thereof facing or engaging the angle portion 49 will be positioned to engage the lower edges thereof with the straight portion 27 of the annular groove in the drum flange 24 thereby preventing the passage of said closure caps past the protuberances on the disk 46, as shown in dotted lines in Figures 6 and 7, and in full lines in Figure 8, while the edgewisely positioned closure caps with the open ends facing the protuberances will pass over the protuberances and between the drum flange 24 and disk 46, as shown in full lines in Figures 6 and 7, and in dotted lines in Figure 8. The peripheral portion of the disk extends beyond the periphery of the drum flange and the face extending from the protuberance is concave, as at 51, to provide space for the closure caps that are passing the protuberances and are directed at an angle toward the disk by the flared portion 28 of the drum flange, as clearly shown in Figures 6 and 8. The protuberances are of tapered formation along the longitudinal axis thereof and the spaces between the protuberances are less than the diameter of the smallest closure cap the hopper casing is capable of handling to prevent the closure caps from passing between the protuberances and direct all edgewisely extending closure caps over the protuberances and between the protuberances and the drum flange, as shown in Figures 1 and 2. By this arrangement of protuberances the closure caps of smallest diameters will pass over a single protuberance whereas the closure caps of larger diameters will pass over a pair of adjoining protuberances. The closure caps engaged by the straight portion 27 of the annular groove of the drum flange 24 will be dis-

lodged from said position by the rotation of the drum and disk and be eventually positioned with the open ends thereof facing the protuberances 49, 50 to pass between the drum and disk.

The closure cap selecting disk 46 is adjusted longitudinally of the shaft 31 to position the protuberances on the disk in predetermined spaced relation to the drum flange 24 to feed closure caps of different heights or lengths, as illustrated in Figures 6 to 8, inclusive, by a pair of lead screws 52 rotatably mounted in the arm 33 on opposite sides of the elongated sleeve 32 having attached thereon manipulating knobs 53 juxtaposed to the outer face of the arm 33 and shoulder portions 54 abutting the inner face of the arm to prevent longitudinal movement of the screws with the free ends screw threaded to adjustably engage screw threaded openings in the opposite end portions of a plate 55 having a central recess therein engaged in an annular groove in the elongated hub 47 of the disk 46, as at 56, whereby the turning of the lead screws by the manipulating knobs thereof will move the disk 46 along the shaft 31. To indicate the amount of space between the groove in the drum flange 24 and the protuberances on the disk 46 there is provided a bar 57 having graduations thereon to co-operate with an arrow on the upper edge of the arm 33, as at 58 in Figure 5. The disk 46 is releasably retained in adjusted position by a set screw 59 adjustably mounted in the elongated hub 47 of the disk to abut the key 48 of the shaft 31 and having an enlarged head arranged with a laterally extending projection, as at 60, to facilitate the actuation of the set screw.

The drum 23 and disk 46 are simultaneously and continuously rotated from a suitable source of power, such as an electric motor, not shown, through a belt 61 engaged on a pulley fixed to the shaft of the electric motor and a grooved pulley 62 fixedly mounted on a shaft 63 rotatably supported in a bearing 64 arranged on the bracket 19 having a gear 65 fixedly mounted on the shaft 63 intermediate the ends thereof to mesh with a gear 66 mounted on a shaft 67 rotatable in a bearing 68 on the bracket 19 and having a pinion 69 fixed thereon meshing with a circular series of gear teeth 70 arranged on the periphery of the disk 46. To provide a driving connection between the drum gear 70 and the pinion 69 in all the adjusted positions of the disk 46 the pinion is axially adjustable by permitting the shaft 67 to have sliding movement in the bearing 68 by securing the outer end of the shaft 67 in a cup member 71 slidably mounted on an elongated bearing 72 in which the shaft 67 is rotatable and the cup member is releasably retained in adjusted position by a set screw 73 engaging a slot 74 in the cup member and screw threaded in the bearing 72, as shown in Figure 4. The bearing 72 is arranged in the outer face of a plate 75 mounted on the outer peripheral face of annulus 20 in spaced relation to the bracket 19 and in lateral spaced relation with a plate 76 also mounted on the annulus 20 and arranged with a bearing 77 supporting the outer end of the shaft 63, as shown in Figure 1.

The closure caps after they pass the protuberances on the disk 46 enter a channel in axial alinement with the shaft 31 and formed by the outer face of the bracket 19 and the peripheral portion 51 of the disk 46, and a plate 78 extending as a continuation of portion 51 in spaced relation to the bracket 19 and between the plates 75, 76, adjustably mounted by a boss 79 fixed to and extending laterally of the plate 78 slidably mounted on a stud 80 fixed in and projecting from the plate 76, and the plate 78 is retained in adjusted position in alinement with the disk 46 by a set-screw 81 screw threaded into the boss to engage the stud. The sides of the channel are formed by portions of the bracket 19, the pinion 69, the hub of said pinion and a serrated wheel 82 mounted on the shaft 63 within a circular recess in the bracket 19 with a peripheral portion of said wheel extending into the path of the closure caps to agitate and urge the closure caps into and through the channel, as shown in Figure 2. The width of the channel will permit the passage of closure caps of the largest diameter the hopper is capable of handling and to properly guide closure caps of smaller diameter the width of the channel is varied by a pair of triangular blocks 83, 84 releasably mounted in the channel in spaced relation to each other by screws threaded in the bracket 19. The block 83 has a curved angle portion to direct the closure caps into the space between the blocks and said space extends in an oblique direction substantially at a tangent to the wheel 82 to facilitate the feeding of the closure caps into said space, as shown in Figure 2. It is to be understood that the space between the blocks 83, 84 is varied for closure caps of different widths by using different size blocks.

The channel in the bracket 19 directs the closure caps into a chute extending to the apparatus for assembling lining material in the closure caps or applying the closure caps to receptacles, or to a suitable depository. The chute comprises a channel shape member 85 secured at one end to the bracket 19, as at 86 in Figure 1, to decline therefrom with the opposite end curved toward the horizontal. The closure caps are retained in the channel member by guide rails 87 mounted on the upper free edges of the vertical walls of the channel member to extend inwardly toward each other in parallel spaced relation to the bottom portion of the channel member. The width of the chute is varied to correspond with the width of the channel in the bracket 19, as shown in Figures 1 and 2, by a strip 88 of suitable material formed to constitute a side wall of the channel member 85 and adjustably mounted to be moved toward or away from the opposite side wall of the channel member by arms 89 fixed at one end to the strip 88 slidable in recesses 90 in the adjacent side wall of the channel member and having elongated openings 91 therein engaged on set screws 92 screw threaded in said side wall in the center of the recesses 90 whereby the strip 88 is retained in adjusted position. The arms 89 are arranged with manipulating portions to facilitate the adjustment of the strip 88.

The closure caps may become jammed between the protuberances on the disk 46 and the groove in the drum flange 24 and to maintain the space between the drum flange and disk free of such jammed closure caps there is provided means to disengage said closure caps comprising a plate having a triangular portion 93 to extend between the protuberances and the groove and an arcuate portion 94 to be engaged in a cut out portion 95 in the annulus 20 and having ears 96, 97 at the opposite ends, the ear 97 being engaged by a pin 98 mounted in a boss 99 extended from the annulus to pivotally support the plate and the opposite ear 96 being adapted to engage the annulus adjacent the cut out portion 95 to act as a stop to position the triangular portion between

the drum flange 24 and the disk 46 and constitute a manipulating portion to facilitate the moving of the plate about the pin 98 and out of the space between the drum flange and disk to the dotted line position shown in Figure 1.

To prevent injury to the operator and an accumulation of dirt, the gears 65, 66 are enclosed by a housing 100 supported by the bracket 19, as shown in Figures 1 and 3.

Having thus described my invention, I claim:

1. In closure cap selecting and feeding means, a hopper casing having a discharge opening therein, a drum rotatable in said casing opening having a lateral flange at the outer end arranged with an annular groove in the outer surface having a wall extending at an acute angle to the other wall of the groove and said other wall extending perpendicularly to the flange, and a disk rotatably mounted in spaced relation to the outer end of the drum and arranged with an annular series of angular protuberances of uniform dimensions and in opposed relation to the annular groove having a side of each protuberance extending substantially parallel to the acute angle wall of the groove to permit passage between the drum flange and disk of only sidewardly extending closure caps having the open ends facing the protuberances, the perpendicular wall of the groove engaging and preventing the passage of closure caps having the closed ends facing the protuberances.

2. Closure cap selecting and feeding means as claimed in claim 1, wherein the peripheral force portion of the disk encircling the protuberances is arcuately concave to permit passage of the properly positioned closure caps between the drum flange and disk.

3. In closure cap selecting and feeding means, a hopper casing having a discharge opening, a drum rotatably mounted with one end in communication with the discharge opening and having an annular groove at the opposite end, and a disk rotatable in spaced relation to the end of the drum having the annular groove and arranged with an annular series of angular protuberances having the angle portions thereof extending at an acute angle to the face of the disk and said protuberances extending from the face of the disk equal distances and equidistantly spaced about the periphery of the disk in opposed relation to the annular groove with the spaces between the protuberances of a proportion less than the diameter of the smallest closure cap the hopper casing is capable of discharging to assure the passing of the closure caps over the protuberances and into the space between the protuberances and the grooved end of the drum.

4. In closure cap feeding means, a casing having an open end, a drum rotatably mounted in communication with the open end of the casing and arranged with a lateral flange, a disk mounted separately from the drum to rotate with the drum and have adjustment toward and away from the flange of the drum to permit the passage between the drum flange and disk of caps of different lengths, a series of gear teeth arranged about the peripheral edge of the disk, and a power driven pinion mounted to mesh with the gear teeth of the disk and have adjustment along the axis thereof corresponding with the adjustment of the disk toward or away from the drum flange.

5. In closure cap feeding means, a casing having an open end, a shaft rotatably mounted centrally of the open end, a drum fixedly mounted on the shaft with one end in communication with the open end of the casing, a disk mounted on the shaft to rotate therewith and have sliding movement thereon toward and away from the end of the drum opposite to the end having communication with the open end of the casing to permit passage of closure caps of different lengths between the drum and disk, and calibrated means carried by the disk and shaft to indicate the position of the disk relative to the drum.

6. In closure cap feeding means, a casing having an open end, a shaft rotatably mounted centrally of the open end, a drum fixedly mounted on the shaft with one end in communication with the open end of the casing, a disk mounted on the shaft to rotate therewith and have sliding movement thereon to permit adjustment of the disk toward and away from the end of the drum opposite to the end in communication with the casing and the edgewise passage of closure caps of different lengths between the drum and disk, and means actuated from the exterior of the casing to impart movement to the disk in opposite directions toward and away from the drum.

7. In closure cap feeding means, a casing having an open end, a drum rotatable in the open end of the casing, a disk mounted to rotate with the drum and have movement toward and away from the drum to permit passage between the drum and disk of edgewisely extending closure caps of different lengths, a continuous series of gear teeth arranged about the peripheral edge of the disk, a driven shaft rotatably and slidably mounted to extend transversely of the peripheries of the drum and disk, a pinion fixedly carried by the shaft meshing with the gear teeth of the drum, and means to longitudinally adjust the shaft to position the pinion in meshing engagement with the gear teeth in the adjusted positions of the disk to actuate the drum and disk.

8. In closure cap feeding means as claimed in claim 7, wherein the shaft adjusting means comprises a cup member fixedly connected to the shaft and slidably mounted to have movement longitudinally of the shaft, and means to engage and retain the cup member in adjusted positions.

9. In closure cap feeding means, a casing having an open end, an arm supported to extend transversely of and in spaced relation to the open end of the casing, a shaft rotatably mounted in the arm to project into the casing, a drum fixedly mounted on the shaft to receive closure caps from the casing, a disk mounted on the shaft to rotate therewith and have sliding movement thereon in a direction toward and away from the drum to permit the passage of closure caps of different lengths between the drum and disk, a plate carried by the disk, and lead screws rotatably mounted in the arm and screw threaded in the plate to adjustably position the disk relative to the drum to vary the distance between said disk and drum.

10. In closure cap feeding means, a casing having an open end, a drum rotatable with one end in communication with the open end of the casing, a disk rotatably mounted in spaced relation to the end of the drum opposite to the end in communication with the casing to permit passage of closure caps in edgewise position between the drum and disk, a channel below and in alinement with the space between the drum and disk to receive the closure caps in edgewise position, means removably mounted in the channel to vary the width thereof to adapt the channel for guiding therethrough closure caps of different diameters, and a chute mounted in communication

with the channel to receive closure caps from the channel and having a side movable toward and away from the opposite side to adjust the width of the chute to correspond with the width of the channel.

11. In closure cap feeding means, a casing having an open end, a drum rotatable with one end in communication with the open end of the casing, a disk rotatably mounted in spaced relation to the end of the drum opposite to the end in communication with the casing to permit passage of closure caps in edgewise position between the drum and disk, a channel below and in alinement with the space between the drum and disk to receive the closure caps in edgewise position, a wheel rotatably mounted with a peripheral portion extending into the channel to engage and urge the closure caps into said channel, and means removably mounted in the channel to vary the width thereof to adapt the channel for guiding therethrough closure caps of different diameters and arranged to form a channel extending tangentially of the wheel.

JOHN A. JOHNSON.