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APPARATUS FOR FEEDING RECEPTACLE CLOSURE CAPS

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2 Sheets-Sheet 1

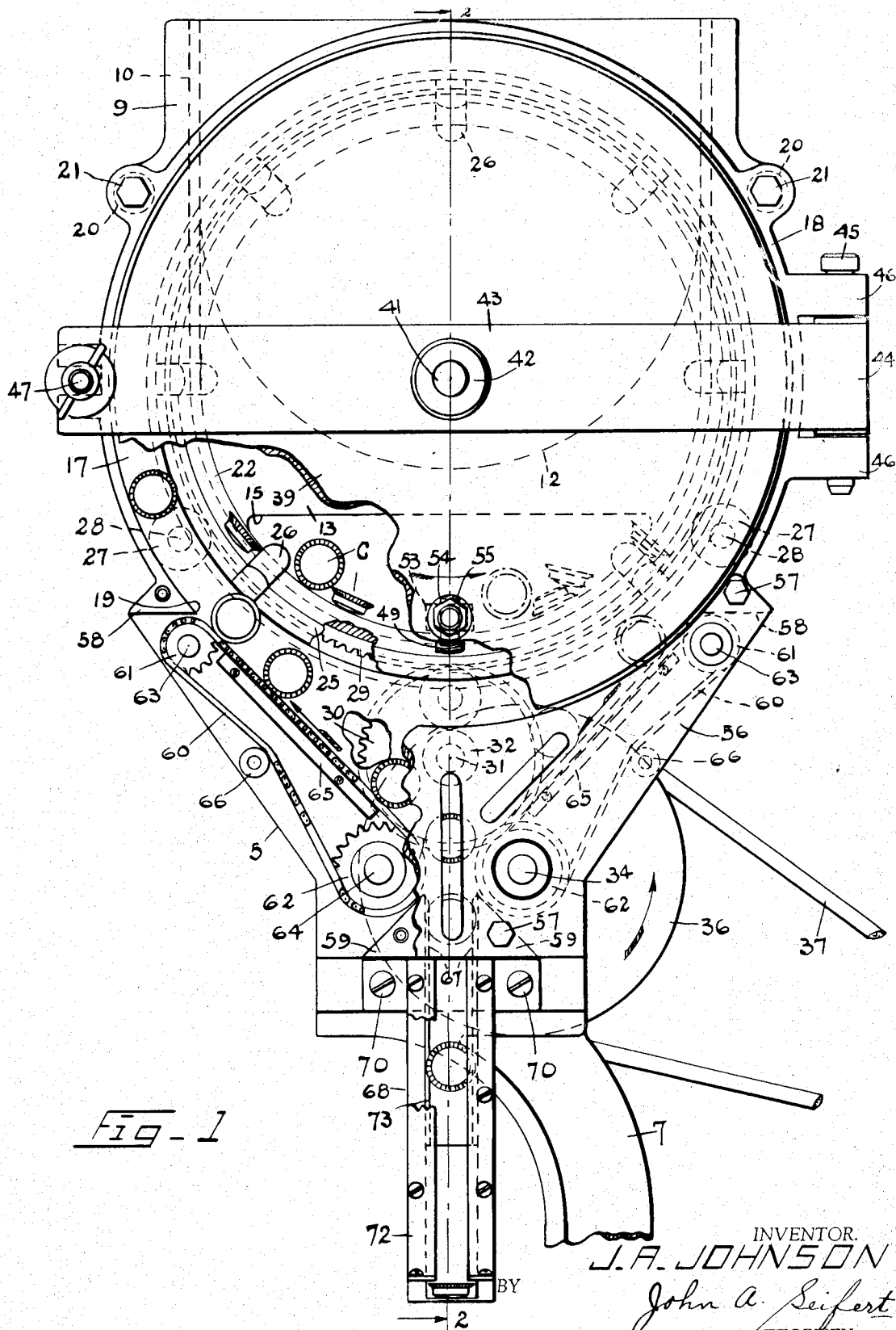


FIG. 1

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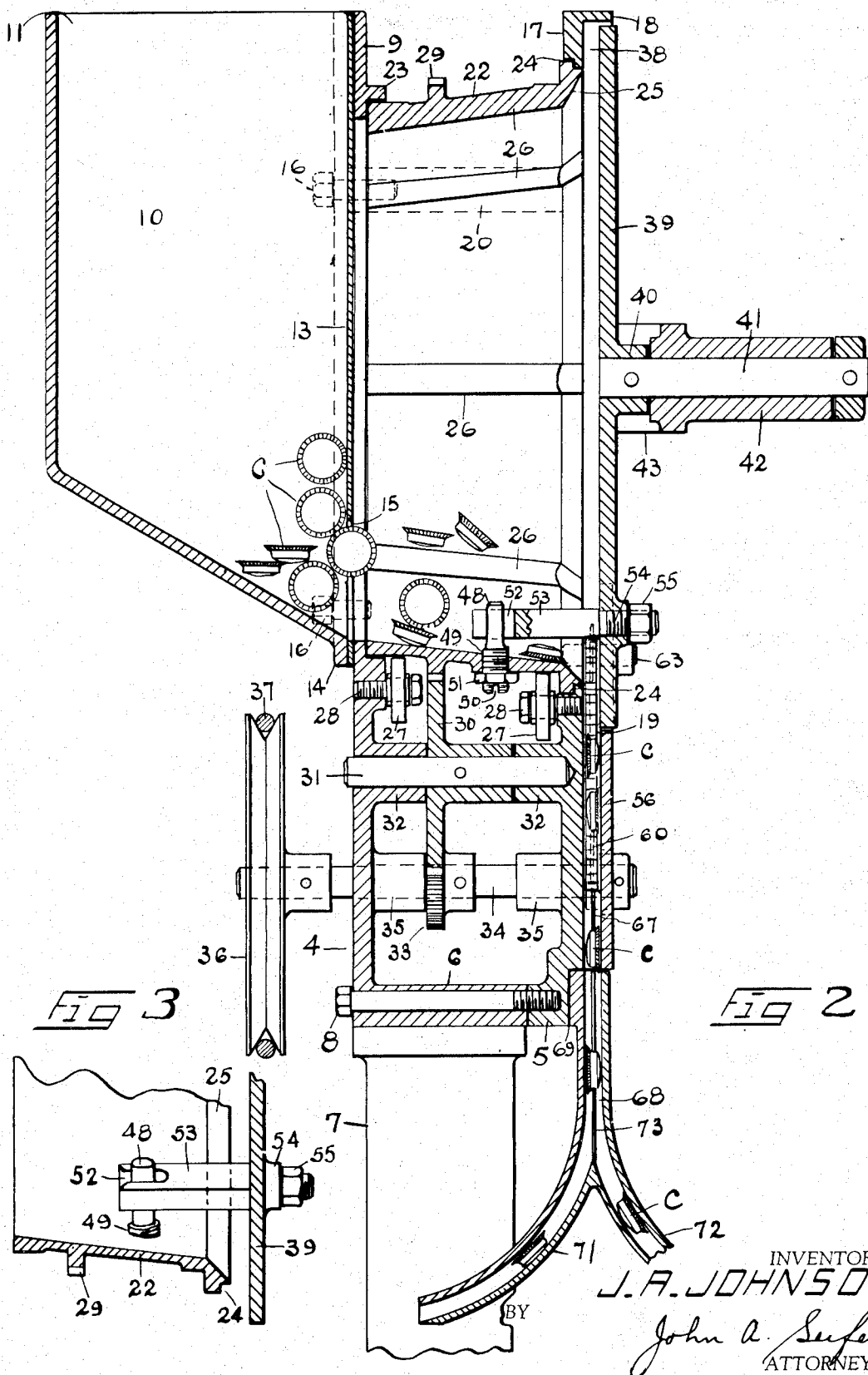
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UNITED STATES PATENT OFFICE

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APPARATUS FOR FEEDING RECEPTACLE
CLOSURE CAPS

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19 Claims. (Cl. 113—114)

This invention relates to apparatus for feeding closure caps in predetermined position to apparatus for assembling liners or sealing pads in the closure caps or to apparatus for applying the closure caps to receptacles, and particularly to apparatus for feeding closure caps having flared corrugations about the margin of the skirt to yieldingly engage an annular enlargement at the mouth of the receptacle and which closure caps are commonly termed "crown caps."

It is the principal object of the invention to materially increase the number of closure caps that are fed in a predetermined period of time by the present type of apparatus now in commercial use by providing endless conveyers to continuously transfer closure caps from a discharge passage of the apparatus to a chute.

In this type of apparatus the closure caps are tumbled about in a drum rotatably supported by a shaft rotatably mounted at a distance from the drum and connected to a source of power so that the weight of the drum will tend to tilt the shaft and bind the same in its mounting which will increase the load on the source of power and thereby increase the cost of power in operating the apparatus.

It is another object of the present invention to overcome the disadvantage of the present method of supporting the drum by supporting the drum about its periphery and connecting the source of power to the periphery of the drum.

It is a further object of the invention to provide novel and inexpensive means for operatively connecting the drum to a rotatable disk forming an outlet passage with the drum.

It is still another object of the invention to provide a closure cap discharge chute adapted to deliver predeterminedly positioned closure caps simultaneously to different apparatus for either assembling sealing pads therein or applying the closure caps to receptacles.

It is still a further object of the invention to actuate all of the operating parts of the apparatus from the same source of power.

The embodiment of the invention comprises a hopper casing having a discharge opening for supplying closure caps to a drum rotatably supported at the periphery with one end in communication with the discharge opening and the opposite end closed by a disk rotatably and pivotally supported in spaced relation with the drum by an annular member encircling the drum and disk and forming with the disk an annular channel for receiving sidewardly extending closure caps from the drum having a dis-

charge opening communicating with a vertical channel leading to a discharge chute and having an endless conveyer at the opposite sides thereof extending in a converging path from the discharge opening of the annular channel to the inlet of the chute. The periphery of the drum is operatively connected to a source of power which is also connected to the endless conveyers whereby the drum and conveyers are simultaneously actuated by the same source of power, and the drum and disk are arranged with co-operating means which will connect the disk to the drum when the disk is pivoted in position adjacent to and in spaced relation with the drum and transmit rotation of the drum to the disk. The source of power is connected to the conveyers in such a manner to actuate one conveyer in a direction away from the discharge opening of the annular channel to urge the closure caps toward the inlet of the chute and actuate the other conveyer in a direction toward the discharge opening of the annular channel to retard the travel of closure caps toward the chute inlet and prevent jamming of the closure caps at said chute inlet. The chute is arranged with a central ridge in the opposite sides thereof to engage the flared skirts of the closure caps and direct predeterminedly positioned closure caps to predetermined diverging outlet portions of the chute to deliver the closure caps to different apparatus for either assembling sealing pads in the closure caps or applying the closure caps to receptacles.

In the drawings accompanying and forming a part of this application, Figure 1 is a front elevational view of the apparatus forming the embodiment of the invention.

Figure 2 is a longitudinal sectional view of the apparatus taken on the line 2—2 of Figure 1 looking in the direction of the arrows; and

Figure 3 is a fragmentary view of the drum, disk and the co-operating means for connecting the disk to the drum.

In carrying out the invention illustrated in the accompanying drawings, there is provided a pair of standards 4, 5, the standard 4 having a horizontal base portion 6 adapted to be mounted on a pedestal 7 with the forward edge abutting the inner opposed face of the standard 5, and the standards are secured to each other by bolts 8 engaged in the base portion 6 and the standard 5, as shown in Figure 2. The standard 4 is arranged at the upper end with an annular portion or member 9 adapted to support a hopper casing 10 having an opening 11 at the upper

portion thereof through which closure caps C are delivered to the hopper and an arcuate bottom, as indicated at 12 in Figure 1, declining toward a front wall in the form of a plate 13 interposed between a lateral flange 14 of the hopper casing and the annular portion 9, and having a semi-circular opening 15 at the bottom thereof to permit the discharge of closure caps from the hopper casing in an evenly distributed condition. The hopper casing 10 and front wall 13 are secured to the annular portion 9 by bolts engaged in the flange 14, front wall 13 and the annular portion 9, as at 16 in Figure 2, with the arcuate portion of the opening 15 in line with the circumference of the opening in the annular portion 9.

The upper end of the standard 5 is arranged with an annular portion or member 17 extending in parallel spaced relation with the annular portion 9 with the opening in the portion 17 of greater diameter than the opening in the portion 9 and said portion 17 having a lateral flange 18 extending from the periphery at a right angle to the outer face thereof and about the upper portion of the periphery for approximately 260 degrees with the opposite ends equidistantly spaced from the vertical axis of the annular portion to form a discharge opening 19 in said annular portion 17. The annular portions 9 and 17 are maintained in spaced relation with each other by spacer members 20 secured at one end to ear portions of the annular portion 17 by bolts, as at 21 in Figure 1, and the opposite ends secured to similar ear portions of the annular portion 9 by the hopper casing securing bolts 16.

The closure caps C leaving the hopper casing 10 through the opening 15 will enter a tapering drum 22 rotatably supported between the annular portions 9, 17 by the smaller end of the drum rotatably engaging an annular flange 23 extending laterally from the inner face of the annular portion 9 adjacent to the central opening of said annular portion to position said smaller end of the drum in registry with said central opening of the annular portion 9 and the arcuate portion of the opening 15, and the larger end of the drum being arranged with a lateral flange having an angular recess slidably engaging a corresponding angular recess in the central opening of the annular portion 17, as at 24 in Figure 2. The inner wall of the drum at the larger end thereof is flared toward the outer face of the annular portion 17, as at 25, to have the closure caps leave the drum at an acute angle to said end of the drum, and the closure caps are agitated in the drum by a series of equidistantly spaced ribs 26 extending from the inner wall and longitudinally from one end to the opposite end of the drum. To prevent the drum binding at the ends thereof in the bearing surfaces 23, 24 of the annular portions 9, 17, respectively, the lower peripheral portion of the drum is adapted to engage a series of rollers 27 rotatably mounted on studs 28 fixed in and projecting laterally from the inner faces of the annular portions 9, 17 below the bearing surfaces 23, 24.

The closure caps are tumbled about in the drum by the ribs 26 striking the closure caps through the rotation of the drum from a source of power, such as an electric motor, not shown, which is connected to a peripheral portion of the drum to cause the rotation of the drum without setting up torsional stresses in the structure of the drum or in the bearing surfaces 23, 24. This purpose is accomplished by arranging an annu-

lar series of gear teeth 29 around the peripheral portion of the drum intermediate the ends thereof adapted to mesh with a gear 30 fixed to a stud shaft 31 having the opposite ends rotatably mounted in bearing bosses 32 integral with and extending laterally from the opposed inner faces of the standards 4, 5 below the annular portions 9, 17 and in vertical alignment with the axis of rotation of the drum, said gear 30 meshing with a pinion 33 fixed on a shaft 34 rotatably mounted in bearing bosses 35 integral with and extending from the opposed inner faces of the standards 4, 5 below the bosses 32 and to one side of the vertical axis of the drum, as shown in Figure 1, with the end of the shaft 34 supported in the bearing 35 of the standard 4 extending from the outer face of said standard for the mounting of a pulley 36 on said shaft 34 adapted to be engaged by a belt 37 engaged on a pulley fixed to the shaft of the electric motor.

The closure caps leaving the drum due to the taper and rotation thereof at an angle over the flared portion 25 are positioned to extend sideways in an annular passage 38 (Figure 2) formed by the outer face of the annular portion 17, the flange 18 and a disk 39 having a central hub portion 40 fixedly engaged on an end portion of a shaft 41 rotatably supported in an elongated boss 42 integral with and extending centrally of an arm 43 having right angle end portions extended laterally of the center portion of the arm in a direction opposite to the elongated boss 42 with one of said end portions terminating in a boss 44 adapted to be engaged by a headed pin 45 mounted in spaced ear portions 46 integral with and extending laterally from the flange 18 of the annular portion 17 and the outer leg of the opposite right angle end portion of the arm being bifurcated for the engagement of a hasp pivotally mounted on a portion of the flange 18 diametrically opposite the ear portions and releasably retained in engagement with the bifurcation of the arm by a wing nut, as shown at 47 in Figure 1, whereby the disk 39 may be positioned out of the annular portion 17 to permit inspection and removal of closure caps from the drum 22 and passage 38. The right angle end portions of the arm 43 are extended from the central portion thereof a distance to abut the outer edge of the flange 18 of the annular portion 17 and position the disk 39 in spaced relation with the flared end of the drum 22 when the bifurcated end of the arm is engaged by the hasp, as shown in Figure 2. The space between the disk 39 and the outer face of the annular portion 17 and the drum is slightly greater than the height of the closure caps to accommodate said closure caps in vertical position, and the diameter of the disk is slightly less than the diameter of the annular portion 17 to permit the positioning of the disk within the flange 18 to form the passage 38 with the outlet 19 at the lower portion thereof, as shown in Figure 2.

Rotation of the drum 22 is imparted to the disk 39 by releasable coupling means comprising a vertical projection in the drum in the form of a pin 48 having screw threads at one end to engage a screw threaded opening in the wall of the drum intermediate the ends thereof, as at 49 in Figure 2, to adapt the opposite end of the pin to be adjustably positioned in the drum by engaging a manipulating tool in a transverse slot 50 in said screw threaded end of the pin, and said pin is retained in adjusted position by a locking nut 51 engaged on the portion of the screw

threaded end extending exteriorly of the drum. The pin 48 is engaged by a bifurcated end 52 of a rectangular member 53 having the opposite end of cylindrical form screw threaded to engage a screw threaded boss in the disk 39 adjacent the periphery thereof, as at 54, and fixedly retained in the disk by a nut 55 engaged on the portion of said screw threaded end projecting from the outer face of the disk to permit engagement of the bifurcated end 52 with the pin 48 when the disk is positioned within the flange 18 in spaced relation with the drum. The pin 48 and member 53 will be in alignment with each other at all times as the disk 39 will only be positioned from the drum and out of the flange 18 when the drum and disk are idle and the drum will be held stationary by the gear 30 and pinion 33.

The closure caps engaged in the annular passage 38 will pass through the discharge opening 19 by the rotation of the drum and disk and the force of gravity to a vertical passage or channel formed by the outer face of the standard 5 and a plate 56 of Y shape having the upper portion of arcuate shape to conform to the contour of the periphery of the disk 39 and mounted in spaced relation with the face of the standard 5 on the annular portion 17 and standard 5 by bolts 57 engaged in the plate and triangular portions 58 at the opposite ends of the flange 18 and spaced triangular bosses 59 on the standard 5 to position the inner face of the plate in alignment with the inner face of the disk 39 and have the vertical channel of the same width as the annular channel 38, as shown in Figure 2. There will be a large quantity of closure caps entering this vertical channel from the annular channel 38 due to the relatively large opening 19 and to permit the closure caps in said vertical channel to pass between the opposing vertical sides of the spaced bosses 59 without jamming, there is provided conveyor means constituting the side walls of the vertical channel and comprising a pair of endless sprocket chains 60 engaged around and supported by pairs of sprocket wheels 61, 62, the wheels 61 being rotatably supported by studs mounted in bearing-bosses in the standard 5 and plate 56, as at 63, adjacent to the portions 58 and the annular channel 38. One of the wheels 62 is fixed on the shaft 34 which is located adjacent to one of the bosses 59 and the other wheel 62 is supported on a shaft 64 mounted in bearing bosses of the standards 4, 5 and the plate 56 adjacent to the other boss 59, so that the upper stretches of the chains extend in planes tangent to the annular passage 38, and in converging paths from said passage 38 to adjacent the space between the bosses 59. The upper stretches of the chains are supported by rails 65 mounted on the outer face of the standards 5 to engage the inner faces of the chains, and the chains are maintained in taut condition by rollers 66 rotatably supported by the standard 5 to engage the outer faces of the lower stretches of the chains, as shown in Figure 1. The shaft 34 is rotated from the source of power in a clockwise direction to impart rotation to the drum 22 and disk 39 in an anti-clockwise direction and move the sprocket chain 60 engaged on the sprocket wheel 62 fixed to the shaft 34 in an anti-clockwise direction so that the upper stretch thereof will travel in a direction from the annular channel 38 toward the bosses 59 and urge the closure caps engaged by said upper stretch toward the space between the bosses 59. The upper stretch of the other sprocket chain 60 is actuated to travel in an upward direction from the bosses

59 toward the annular channel 38 to retard the closure caps engaged thereby travelling toward the space between the bosses 59 and prevent the jamming of closure caps at said space. The actuation of said other chain 60 is accomplished by a pinion fixed on the shaft 64 meshing with the gear 30 on the side of the stud shaft 31 opposite to the side on which the pinion 33 is located.

The space between the bosses 59 will constitute the discharge outlet of the vertical channel of the apparatus of a width slightly greater than the diameter of the closure caps to permit the discharge of closure caps in a single column and the side walls thereof or the opposed edges of the bosses 59 are arranged with ridges 67 extending centrally and longitudinally thereof for engaging the flared skirt portions of the closure caps and prevent the canting and the jamming of the closure caps in said discharge outlet.

The closure caps entering the discharge outlet of the vertical channel of the apparatus are delivered from said apparatus to apparatus for either assembling sealing pads in the closure caps or applying the closure caps to receptacles, by a chute having a single channel 68 at the upper end fixed in a recessed portion 69 of the standard 5 (Figure 2) by screws engaged in laterally extending ears of the chute, as at 70 in Figure 1, to position the channel 68 in line with the discharge outlet of the vertical channel of the apparatus. The lower end of the chute is arranged with a pair of discharge portions 71, 72 diverging from the chute channel 68 in outward arcuate directions and adapted to co-operate with ridges 73 extending centrally from the opposite side walls of the chute channel 68 in line with the ridges 67 and from the inlet of the chute to the juncture of the diverging discharge portions, so that closure caps having the flared skirt portions on the left hand side of the ridges 67, 73, looking at Figure 2, will be directed into the discharge chute portion 71, and the closure caps having the flared skirt portions on the right hand side of the ridges 67, 73 will be directed into the discharge chute portion 72. It should be understood that a chute of this character is used when it is desirable to feed closure caps to two different or separate apparatus for assembling sealing pads in the closure caps, and that when it is desirable to feed closure caps to a single apparatus for either assembling sealing pads in the closure caps or applying the closure caps to receptacles, a chute having a single discharge portion is used.

Having thus described my invention, I claim:

1. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably supported at the periphery thereof having one end in communication with the discharge opening of the hopper casing to receive closure caps therefrom, a fixed annular member disposed about the opposite end of the drum, means pivotally mounted on the annular member to have movement toward and away from the end of the drum opposite the hopper casing, a disk rotatably carried by the pivotally mounted means to be positioned in parallel spaced relation to the end of the drum opposite the hopper casing, means carried by the drum and disk adapted to engage each other and connect the drum and disk when the disk is positioned in parallel spaced relation to the end of the drum by the pivotally mounted means, and motive means connected to the drum to impart rotation to the drum and disk when the disk is connected to the drum and position side-

wardly extending closure caps in the space between the drum and disk.

2. Closure cap feeding means as claimed in claim 1, wherein the inner wall of the drum is arranged with a series of rib portions extending longitudinally thereof to agitate closure caps in the drum.

3. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably supported at the periphery thereof having one end in communication with the discharge opening of the hopper casing and arranged with gear teeth extending around the periphery thereof, a fixed annular member disposed about the end of the drum opposite the end in communication with the discharge opening, a disk rotatably supported by the annular member and normally positioned in parallel spaced relation with the end of the drum in the annular member, means to releasably connect the disk to the drum and impart rotation of the drum to the disk, a gear meshing with the gear teeth of the drum, and motive means operatively connected to the gear to impart rotation to the drum and agitate closure caps in the drum and urge closure caps into the space between the drum and disk.

4. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably supported at the periphery thereof with one end in communication with the discharge opening of the hopper casing, a fixed annular member disposed about the end of the drum opposite the end in communication with the discharge opening, an arm pivotally mounted on the annular member to have movement toward and away from the drum, a disk rotatably carried by the arm to be positioned in parallel spaced relation with the end of the drum in the annular member, motive means connected to and adapted to rotate the drum, a projection extending inwardly from the inner wall of the drum, and a member fixed in and projecting from the inner face of the disk and having a bifurcated portion to engage the drum projection when the disk is positioned in parallel spaced relation with the drum to connect the disk to the drum and impart rotation of the drum to the disk.

5. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably supported with one end in communication with the discharge opening of the hopper casing to receive closure caps therefrom, a fixed annular member encircling the end of the drum opposite the end in communication with the discharge opening and having a portion cut away centrally below the axis of rotation of the drum, a disk rotatably mounted in parallel spaced relation with the end of the drum in the annular member, conveyer means mounted adjacent to and on one side of the vertical axis of the cut away portion of the annular member and extending in line with the space between the drum and disk, and means to rotate the drum and actuate the conveyer means in a direction opposite to the direction of rotation of the drum.

6. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably mounted with one end in communication with the discharge opening to receive closure caps from the hopper casing, a disk rotatably mounted in parallel spaced relation with the end of the drum opposite to the end in communication with the discharge opening, a chute mounted in vertical alignment with the space between the drum and disk and spaced from the peripheries of the drum

and disk, and a pair of endless chains extending in a converging direction from the space between the drum and disk to the chute.

7. In closure cap feeding means as claimed in claim 6, a source of power operatively connected to the drum and the endless chains to rotate the drum and actuate the upper stretch of one chain in a direction away from the space between the drum and disk and actuate the upper stretch of the other chain in a direction toward said space.

8. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably mounted with one end in communication with the discharge opening to receive closure caps from the hopper casing, a fixed annular member disposed about the end of the drum opposite the end in communication with the discharge opening and having an opening in a peripheral portion thereof below the axis of rotation of the drum, a disk rotatably mounted in the annular member in parallel spaced relation with the drum to form an annular passage with the annular member to receive sidewardly extending closure caps from the drum, a chute mounted in line with and spaced from the peripheral opening in the annular member, and a conveyor extending from a portion of said annular passage at one end of the peripheral opening in the annular member to the chute to deliver closure caps from the passage to the chute.

9. Closure cap feeding means as claimed in claim 8, wherein the conveyor comprises an endless conveyor chain having the upper stretch extending in a plane tangentially of the annular passage.

10. In closure cap feeding means, a hopper casing having a discharge opening for closure caps, a drum rotatably mounted with one end in communication with the discharge opening to receive closure caps from the hopper casing, a standard having an annular portion at the upper end encircling the end of the drum opposite the end in communication with the discharge opening and having an opening in the periphery thereof adjacent the body portion of the standard, the standard being arranged to support the hopper casing, a disk rotatably mounted in the annular portion in spaced relation with the end of the drum in the annular portion, a chute mounted on the standard with the inlet of the chute in alignment with and spaced from the peripheral opening in the annular portion, a plate mounted in spaced relation to a face of the standard and extending in the plane of the disk from said disk to the chute, and a conveyor mounted on the standard in the space between the standard and plate and extending from the space between the drum and disk at one end of the peripheral opening in the annular portion to the inlet of the chute to transfer closure caps from said space between the drum and disk to the chute.

11. Closure cap feeding means as claimed in claim 10, wherein the conveyor comprises an endless chain having the upper stretch extending from one end of the peripheral opening in the annular portion to a side of the chute inlet.

12. Closure cap feeding means as claimed in claim 10, wherein the chute is arranged with diverging outlet portions and ridges at the opposite sides extending from the inlet of the chute to said outlet portions to guide closure caps to predetermined outlet portions.

13. In closure cap feeding means as claimed in claim 10, wherein the drum is arranged with

an annular series of gear teeth extending around the periphery thereof, and the conveyor comprises a pair of sprocket wheels and an endless sprocket chain engaged around the sprocket wheels, a source of power, a pinion connected to the source of power and a sprocket wheel of the pair of sprocket wheels, a gear meshing with the gear teeth of the drum and the pinion.

14. In closure cap feeding means, a pair of annular members mounted in parallel spaced relation to each other, a hopper casing having a discharge opening and mounted on the outer face of one of said annular members with the discharge opening in communication with the opening in said annular member, a drum rotatably supported at the opposite ends by the annular members and adapted to receive closure caps from the hopper casing, a disk rotatably supported in the annular member spaced from the hopper casing in spaced relation with the end of the drum to form a channel with said annular member to receive closure caps from the drum, power means operatively connected to the drum to rotate the same, and means to connect the disk to the drum and impart rotation of the drum to disk.

15. In closure cap feeding means as claimed in claim 14, gear teeth arranged on the exterior of the drum between the opposite ends thereof, and a gear rotatably supported by the annular members meshing with the gear teeth on the drum and operatively connected to the power means.

16. In closure cap feeding means as claimed in claim 14, a series of rollers rotatably mounted on the inner faces of the annular members and extending around the periphery of the drum.

17. In closure cap feeding means, a hopper casing having a discharge opening, a drum rotatably mounted with one end in communication with the discharge opening to receive closure caps from the hopper casing, a disk rotatably mounted in spaced relation with the end of the drum opposite to the end communicating with the discharge opening, an annular member of angular shape in cross section mounted with one angle portion encircling the drum and the other angle portion having an opening therein below the axis of rotation of the drum and disk and the remaining section thereof encircling the disk to form a channel therewith for sidewardly extending closure caps received from the drum, a vertical channel extending from the opening in the angle portion of the annular member, a chute in communication with the lower portion of the vertical channel, and a pair of endless chains mounted along the opposite sides of the vertical channel and extending from the opposite ends of the opening in the angle portion of the annular member to the inlet of the chute, one chain transferring closure caps from the channel formed by the annular member and disk through the vertical channel to the chute, and the other chain retarding the movement of the closure caps toward the chute.

18. In closure cap feeding means as claimed in claim 17, means to simultaneously rotate the drum and actuate the chains.

19. In closure cap feeding means as claimed in claim 17, means to connect the drum and disk, and a source of power operatively connected to the drum and the chains.

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