Feb. 20, 1923. 1,446,024

J. E. TORNQUIST ET AL

APPARATUS FOR AGITATING, SEPARATING, POSITIONING, AND DISTRIBUTING CONTAINER CAPS AND OTHER ARTICLES

Filed June 14, 1920 4 sheets-sheet 1

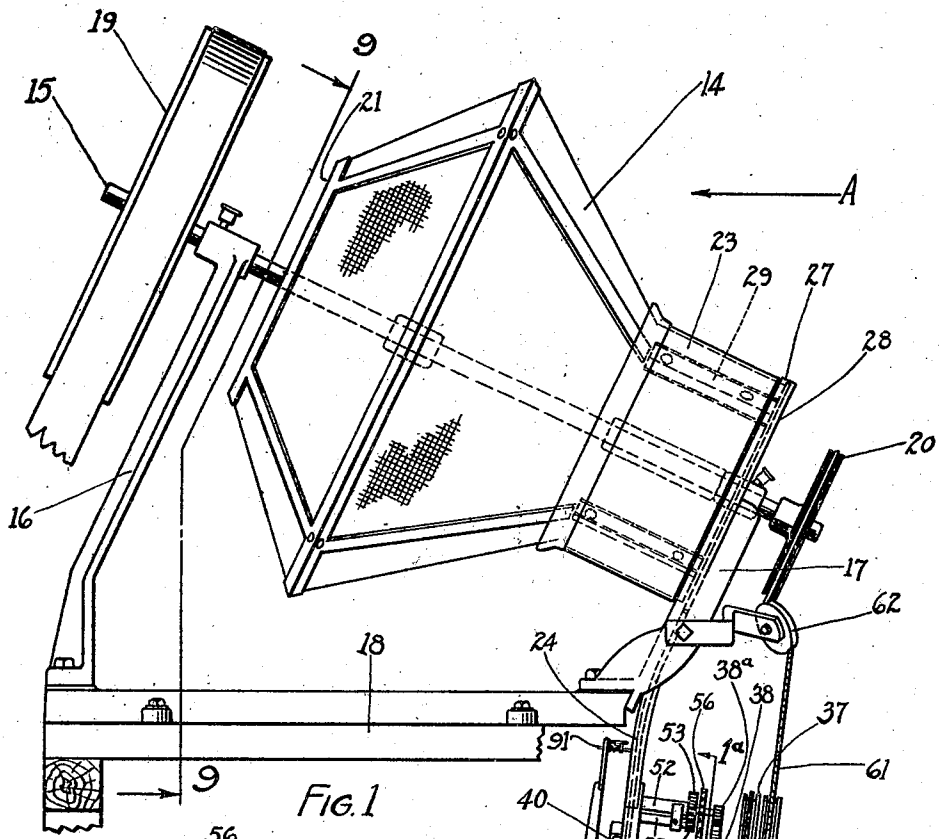


FIG. 1

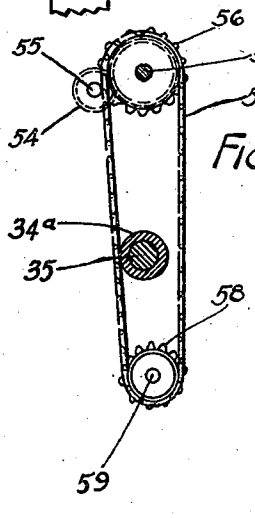


FIG. 1a

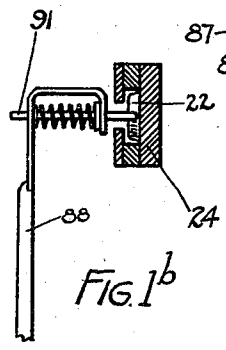


FIG. 1b

INVENTORS
Jonas E. Tornquist
William J. Towle
BY Paul & Paul
THEIR ATTORNEYS

Feb. 20, 1923. 1,446,024

J. E. TORNQUIST ET AL

APPARATUS FOR AGITATING, SEPARATING, POSITIONING, AND DISTRIBUTING CONTAINER CAPS AND OTHER ARTICLES

Filed June 14, 1920 4 sheets-sheet 2

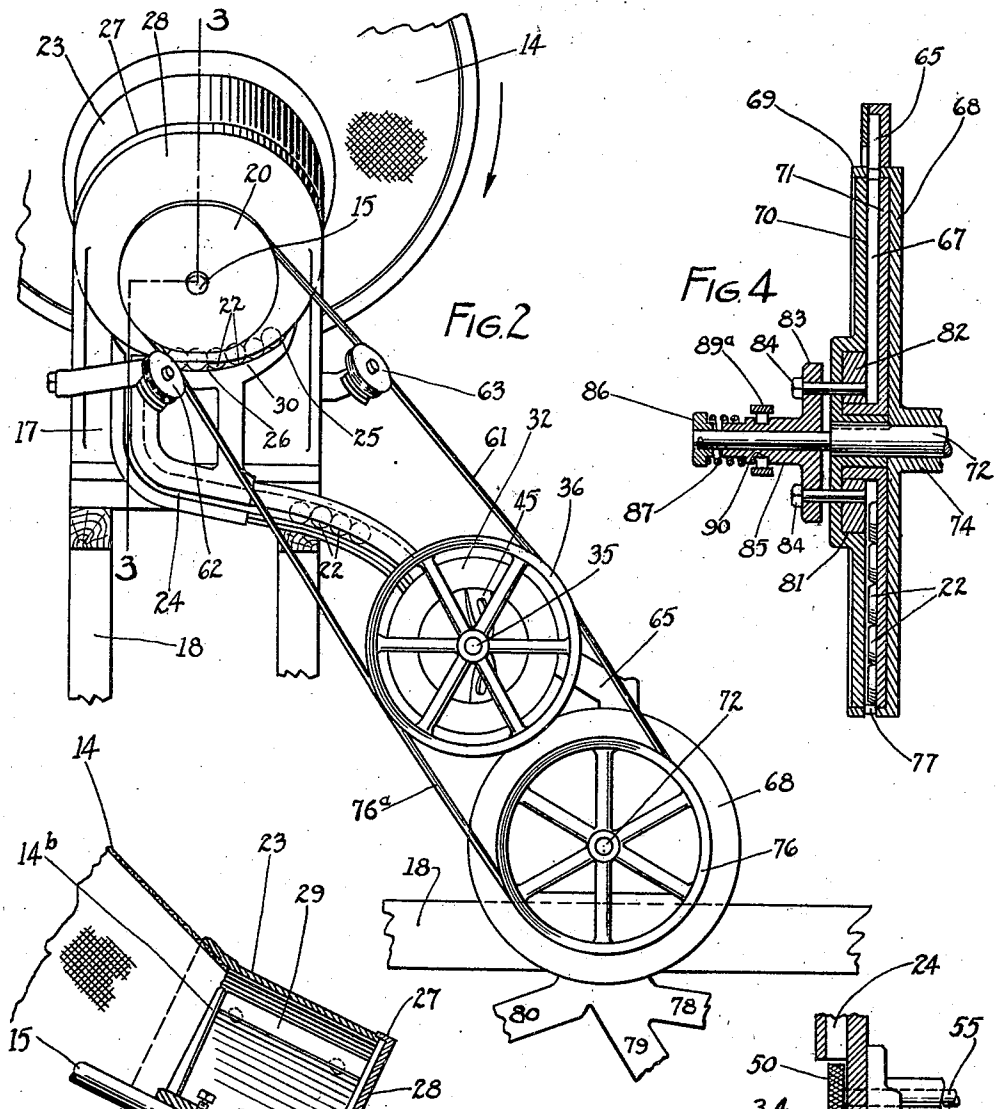


FIG. 2

FIG. 4

FIG. 3

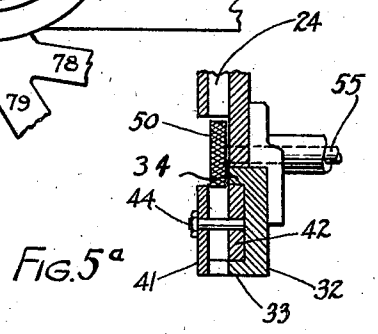


FIG. 5a

INVENTORS
Jonas E. Tornquist
William J. Towle
BY Pouls & Pouls
THEIR ATTORNEYS

Feb. 20, 1923. 1,446,024

J. E. TORNQUIST ET AL.

APPARATUS FOR AGITATING, SEPARATING, POSITIONING, AND DISTRIBUTING CONTAINER CAPS AND OTHER ARTICLES

Filed June 14, 1920 4 sheets-sheet 3

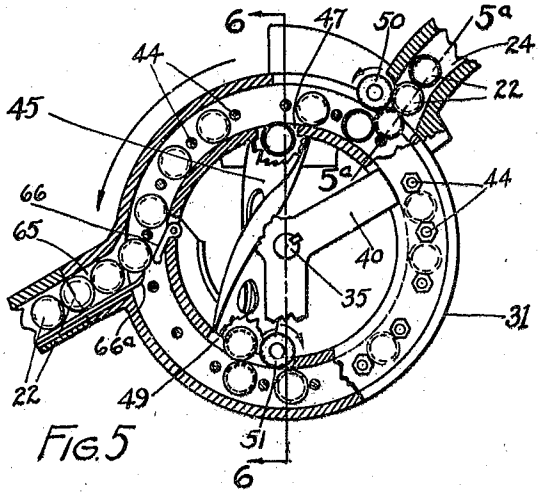


FIG. 5

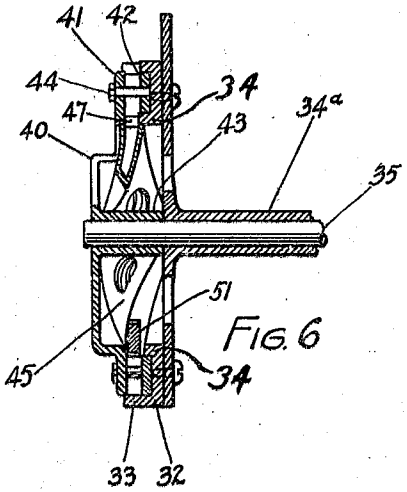


FIG. 6

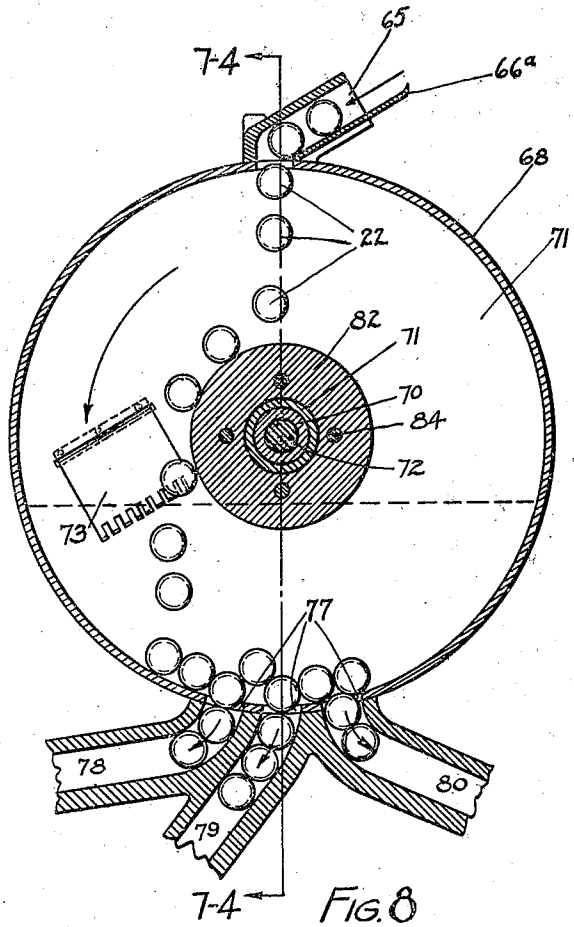


FIG. 8

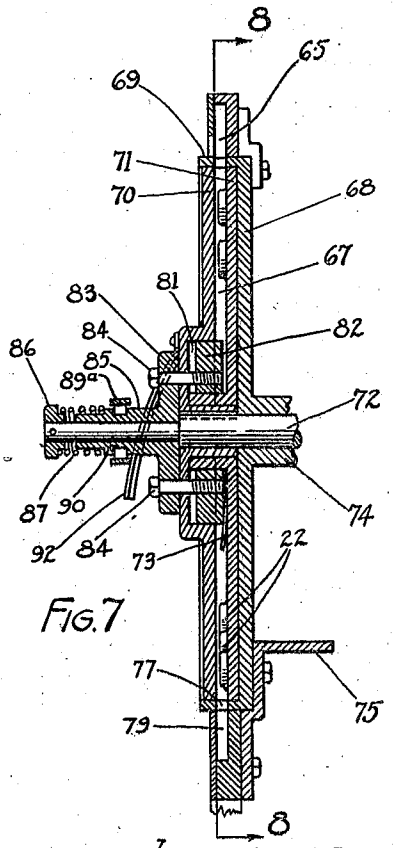


FIG. 7

INVENTORS
Jonas E. Tornquist
William J. Towle
BY Paul & Paul
THEIR ATTORNEYS

Feb. 20, 1923. 1,446,024

J. E. TORNQUIST ET AL

APPARATUS FOR AGITATING, SEPARATING, POSITIONING, AND DISTRIBUTING CONTAINER CAPS AND OTHER ARTICLES

Filed June 14, 1920 4 sheets-sheet 4

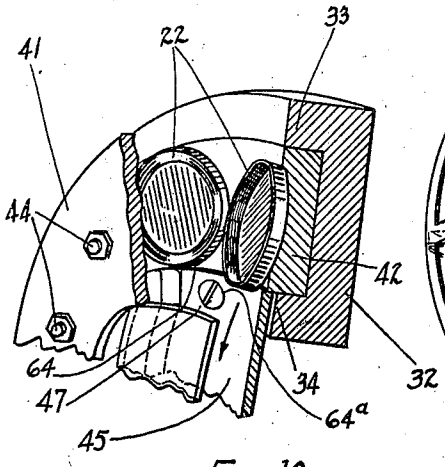


FIG. 10

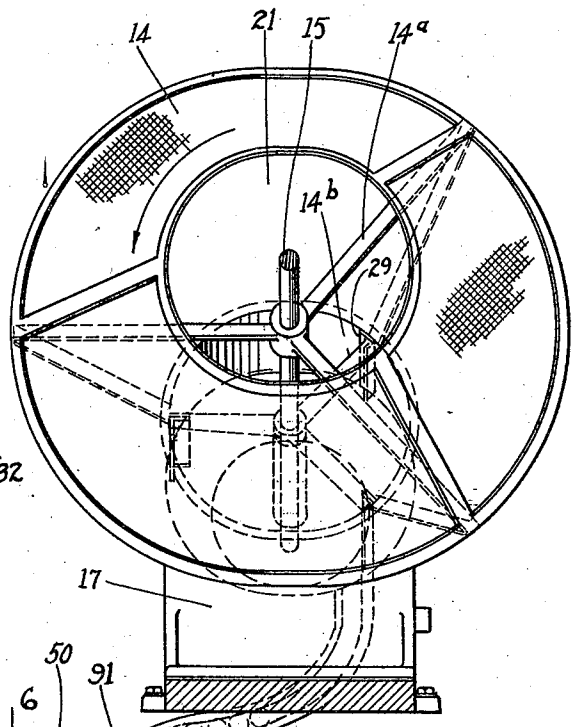


FIG. 9

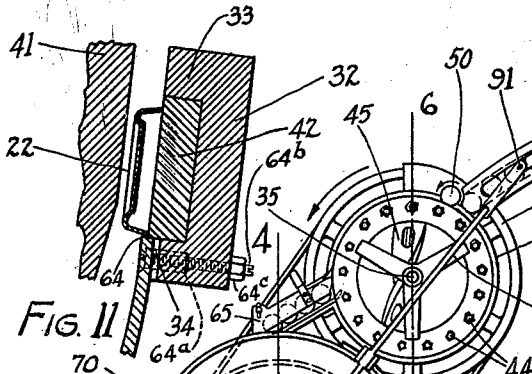


FIG. 11

FIG. 12

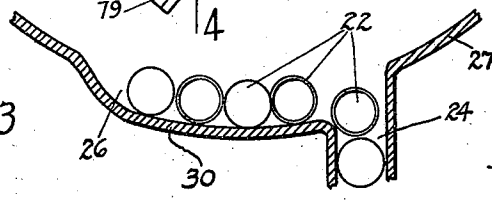


FIG. 13

INVENTORS
Jonas E. Tornquist
William I. Towle
BY Paul & Paul
THEIR ATTORNEYS

Patented Feb. 20, 1923. 1,446,024

UNITED STATES PATENT OFFICE.

JONAS E. TORNQUIST AND WILLIAM J. TOWLE, OF ST. PAUL, MINNESOTA; SAID TORNQUIST ASSIGNOR TO SAID TOWLE.

APPARATUS FOR AGITATING, SEPARATING, POSITIONING, AND DISTRIBUTING CONTAINER CAPS AND OTHER ARTICLES.

Application filed June 14, 1920. Serial No. 388,934.

To all whom it may concern:

Be it known that we, JONAS E. TORNQUIST and WILLIAM J. TOWLE, citizens of the United States, residents of St. Paul, county of Ramsey, State of Minnesota, have invented certain new and useful Improvements in Apparatus for Agitating, Separating, Positioning, and Distributing Container Caps and Other Articles, of which the following is a specification.

Our invention relates in general to apparatus for closing or sealing various forms of containers used for the preservation of foodstuffs, liquids and other substances by means of suitable caps or covers usually formed of metal.

The object of the invention is to provide means for automatically cleaning, feeding and correctly positioning such previously formed caps in chutes or conductors preparatory to the distribution thereof and delivery to the containers.

Our invention consists in certain constructions and combinations, hereinafter described and particularly pointed out in the claims with reference also to the accompanying drawings forming a part of the specification.

In the drawings,

Figure 1 is a side elevation of an apparatus, constructed according to our invention,

Figure 1[a] is a detail of an anti-clogging device,

Figure 1[b] is a detail of the feed control mechanism,

Figure 2 is a rear elevation of the apparatus looking in the direction of the arrow A of Figure 1.

Figure 3 is a sectional view on the line 3—3 of Figure 2 illustrating the primary feeding device for the caps.

Figure 4 is a sectional view through the distributing and feed controlling device the section being taken on the lines 4—4 of Figures 8 and 9 illustrating the feed control.

Figure 5 is a sectional view of the positioning mechanism.

Figure 5[a] is a detail section on line 5[a]—5[a] of Figure 5.

Figure 6 is a section on the lines 6—6 of Figure 5,

Figure 7 is a sectional view similar to Figure 4 showing some of the parts in a different position.

Figure 8 is a section on the line 8—8 of Figure 7.

Figure 9 is an end elevation of the apparatus partly in section on the line 9—9 of Figure 1.

Figures 10, 11 and 12 are detail views of the positioning device illustrating the positioning of the caps before they reach the distributing chutes to present them in the same relative position in the chutes.

Figure 13 is a detail view of the primary feed hopper.

In the drawings referring to Figure 1, 2, 3 and 9, 14 represents a rotary screen hopper or drum having spiders 14[a] and 14[b] mounted on an inclined shaft 15 supported in bearing brackets 16 and 17 arranged upon a suitable frame 18. The shaft 15 is provided with a driving pulley 19 and a pulley 20. A circular feed opening 21, through which the caps 22 are fed to the interior of the hopper, is provided in its front end and the screened hopper terminates in a rotating cylindrical feed hopper 23. The caps 22 are fed from this hopper into a narrow chute 24, the caps entering the chute edgewise at 25 through a suitable elongated recess 26 in the peripheral flange 27 of a stationary head 28 forming the rear end of the feed hopper 23. The screen hopper 14 is rotated slowly in the direction of the arrows in Figures 2 and 9 and the caps 22 being agitated in the hopper 23 by suitable strips 29 are thrown about and, entering the narrow extended slot 26 in the flange 27, are conducted to the mouth of the chute 24, rolling on the depressed ledge 30 formed by the recess as shown clearly in Figure 13. The agitation of the caps in the screen hopper 14 removes any adhering particles of grit, dust or other foreign material from the surface of the caps, the said material passing out through the screen and the caps being delivered to the chute 24 in a perfectly clean and sanitary condition. The caps 22 being formed with an annular flange 22[a] will enter this chute edgewise with the flange on one side or the other of the caps as they may happen to lie in the chute and the caps are then delivered in this condi-

tion to the positioning or adjusting device, 31. (See Figures 5, 6 and 9 to 12.) As it is desirable to deliver the caps to the containers with their flanges always on the same side, means are provided in this adjusting device 31 to position the caps and turn or invert them when necessary. The adjusting device consists of a stationary head plate 32 having an outer flange 33 and an inner flange 34 and also provided with a bearing 34[a] for the shaft 35. This shaft has a driving pulley 36, a pulley 37, a gear 38, and a cap positioning annular head 40 as shown most clearly in Figure 1. The head 40 is formed of two rings 41 and 42, secured to the shaft 35 by a spidered hub 43. The rings are spaced apart and connected to each other by a series of pins 44 the space between said pins forming a series of cap-receiving pockets. A vertical chute 45 having a spiral twist of 180 degrees is secured to the inner annular stationary flange 34 of the head plate 32 and a slot 47, the length of which substantially corresponds to the diameter of the caps 22, is cut away in the upper part of the flange 34. A similar slot is provided in the flange below at 49 and any of the caps that may drop into the chute 45 through the upper slot 47 will, in their passage through the chute, be turned around 180 degrees or inverted and emerge from the chute 45 into the space between the pins 44 in a reversed position. A rotating serrated disc 50 (Figures 5 and 5[a]) is arranged adjacent the discharge end of the chute 24 into the positioning head 40, and a similar disc 51 is mounted at the outlet from the vertical twisted chute 45. These discs, rotating in the direction of the arrows in Figure 5, against the incoming caps, serve to keep the caps agitated and prevent their clogging or jamming as they drop between the pins 44. The discs are driven at comparatively high speed from the shaft 35 (see Figures 1 and 1[a]) by means of the gear 38, meshing with a pinion 38[a] on an idler shaft 52, a gear 53 on said shaft in mesh with a pinion 54 on the upper disc shaft 55, and a sprocket wheel 56 on the idler shaft 52 having chain connection 57 with a sprocket wheel 58 on the lower disc shaft 59.

The shaft 35 is driven by means of a belt 61 running over idler pulleys 62 and 63 and around the pulley 36 on the shaft 35 and the pulley 20 on the main shaft 15. The positioning device and its shafts are preferably inclined, but at a less degree than the feeding drum and shaft 15 as shown in Figure 1. Referring now to Figures 5 and 10 to 12, as the caps 22 drop between the pins 44 resting on the flanges 34 they are carried over the flange until they come to the slot 47. A protruding, adjustable, sharp ledge or attachment 64 is provided at one side of the slot formed by the upper end of the twisted chute 45. The ledge 64 is preferably formed by the upper edge of one wall of the chute (see Figures 10, 11 and 12). I prefer to provide suitable adjusting screws 64[a] and 64[b] by means of which this upper end of the chute may be adjusted towards or from the plate 32 to increase or decrease the width of the ledge at the top of the chute. As here shown the screws 64[a] secure the upper end of the chute to the plate 32, and the screws 64[b] pass through the plate 32 and bear against the back surface of the upper end of the chute 45. The screws 64[b] are preferably provided with lock nuts 64[c], so that when said screws are adjusted to the desired position, the lock nuts may be turned against the face of the plate 32 to lock said screws in position.

The flange 22[a] of the cap 22 has a rounded edge 22[b] where it joins the top of the cap and a sharply defined lower or outer edge 22[c]. (See Figure 12.) When a cap with its rounded edge 22[b] turned towards the ledge 64 is carried over the slot 47 it will be deflected and will slide off the edge 64 and into the chute 45, as indicated in Figure 12. If a cap is turned with the outer sharp edge 22[c] of the flange toward the ledge 64, it will remain on the ledge 64, as indicated in Figure 11, and will be carried past the slot 47 and into the discharge chute 65 as shown in Figure 5. The inclination of the flanges of caps towards the ledge 64 materially aids in keeping the caps on the ledge, and carrying them past the slot 47 when they are in the correct position. The caps dropping into the chute 45 will be turned around or reversed by the spiral formation of the chute and emerging from the lower end of the chute will be carried around by the pins 44, upwards past the chute 24 and over the ledge 64 with the sharp edge of the flange turned toward the ledge and past the slot 47 to the discharge chute 65. A deflector 66 (see Figure 5) is arranged adjacent the mouth of the chute 65 to direct the caps 22 and prevent them from being carried past the mouth of the chute, and a projecting upturned end 66[a] of the chute facilitates the entrance of the caps to the chute 65 which conducts them to the container, all in the required or corresponding position for capping.

When it is necessary or desirable to send the caps to more than one place or station a distributer is provided to deliver the caps to the various stations. In connection with this distributer we also prefer to provide a regulator to adjust the feed and distribution of the caps in proportion to the capacity required. In order to insure a positive continuous supply of caps, the capacity of the feeding and positioning devices heretofore

described is greater than is usually required for the supply of containers and means are provided for automatically and temporarily stopping the feed when a certain quantity of caps has been delivered to the distributing device.

Referring to Figures 1, 2, 7 and 8, the caps 22 are delivered from the chute 65 into a narrow distributing chamber or device 67, formed by a frame plate 68 having an annular flange 69 and the discs 70, and 71, suitably spaced apart, fitting the flange 69. The discs 70 and 71 are both mounted on and secured to a driving shaft 72 and an agitating plate 73 is fastened to the disc 71 in the chamber 67.

The shaft 72 is journaled in bearings 74 connected to the plate 68 and secured to a suitable frame 75. A pulley 76 is secured to the shaft 72 and is driven by a belt 76ª from the pulley 37 on the shaft 35. The space between the disc 70 and the disc 71 is adjusted to the height of the caps 22 with allowance for proper clearance and as the caps enter the chamber 67, they descend by gravity in the proper position towards the outlet slots 77 provided in the bottom of the chamber 67. Distributing chutes 78, 79 and 80 connect with these slots and convey the caps to the desired stations, the caps rolling by gravity to their proper destination. The agitating plate 73 attached to the rotating disc 71 stirs up the caps collecting in the bottom of the chamber, facilitates their delivery to the distribution chutes and prevents clogging or jamming of the caps at the entrance to the chutes. As the number of caps received in the chamber 67 is normally greater than the number discharged from it, the caps will accumulate in the bottom of the chamber and when the level of the caps in the chamber is raised to a certain point as indicated by the dotted line in Figure 8, the feed is automatically interrupted until enough caps have been discharged to lower the level.

To this end an interior socket 81 is provided in the plate 70 in which is suitably arranged a ring 82 connected with an exterior plate 83 by means of sliding pins 84. The plate 83 is provided with a hub 85 slidably mounted on the shaft 72 and a collar 86 is carried by this shaft against which and the hub 85 a coil spring 87 bears tending to force the ring 82 towards the rotating disc 71.

A lever 88 is pivoted at 89 to the frame plate 68 and has forked connections 89ª with a groove 90 in the hub 85 of the plate 83. The lever extends diagonally upwards to the chute 24 as shown in Figure 9 and its upper end is provided with a spring tensioned pin 91 adapted to enter between the caps 22 in the chute when the lever is depressed and arrest the downward rolling of caps. A cam 92 is connected to the plate 70 in a position to periodically engage the lever 88 when it is rotated and move the plate 83 and interior ring 82 outwardly against the tension of the springs 87, at the same time depressing the upper end of the lever and forcing the pin 91 between or against the caps in the chute 24, the spring tension of the pin compensating when striking the caps. Normally the pin will immediately be removed from contact with the caps as soon as the cam 92 has passed the lever engagement and the caps will be permitted to continually roll downwards. When, however, the caps 22 in the distribution chamber 67 accumulate and reach a certain level as indicated by the dotted line in Figure 8, the ring 82 moving outwardly to the position shown in Figure 4, at every revolution of the shaft 72 will allow the caps 22 to enter the space between the ring 82 and disc 71 and prevent the return of the ring 82, and, through the plate 83 and the lever 88, the return of the pin 91 from contact with the caps 22 in the chute 24. The caps above the pin 91 will then be prevented from rolling to the positioning and distributing chambers until the pin 91 is withdrawn. The outward movement of the ring 82 is slightly greater than the thickness or height of the caps 22 and the tension of the ring 82 against the caps is temporarily relieved at every rotation of the cam 92 and as soon therefore, as the level of the caps in the distributing chamber falls below the ring 82, the caps blocking the return of the ring to normal will drop below the ring, permitting the ring to return and withdrawing the pin 91 from blocking contact with the caps in the chute 24, when the feeding operation will be resumed.

It will be seen from the foregoing that the caps are first agitated and thoroughly cleaned and foreign material separated from them in the rotating screen drum 14, and next that they are fed edgewise to the chute 24. Some caps will face one way and some the other. In passing through the positioning device the caps facing one way are adjusted a one-half turn. The caps all facing the same way are conducted to the distributing chamber, from whence they may be distributed in correct position to any number of stations for attachment to the desired container. The passage of the caps through the apparatus is automatically controlled independently of the number or capacity of the capping machines.

We have illustrated this machine in the drawings and described it in the foregoing specification as we have used it in connection with the application of metal caps or covers, to cans for containing syrup. It is obvious, however, that the machine may be employed, without departing from our invention, for handling caps or covers of other materials and designed for closing other

types of containers. It may also, obviously, in many instances, be employed for positioning and distributing articles other than caps or covers for containers. We, therefore, do not limit ourselves to the use of this mechanism herein shown and described in connection with the specific articles herein illustrated and described.

Various modifications may be made on the construction and details of the apparatus without departing from the scope or principle of the invention and we do not, therefore, limit ourselves to the details of the construction as shown and described.

We claim as our invention:

1. The combination, with a feed hopper arranged at an incline and mounted to rotate and adapted to receive a quantity of container caps, of a stationary head at one end of said hopper provided with an elongated narrow slot to receive the caps singly, one in front of the other, a depressed ledge adjacent said slot to receive the caps therefrom, and a chute arranged to receive the caps from said ledge.

2. The combination, with a rotating feed hopper mounted at an incline and adapted to receive a quantity of container caps, of a head normally stationary against which the caps are directed by the rotation of said hopper, said head having a flange thereon provided with a narrow elongated slot and a ledge over which the caps roll from said slot and a feed chute to which the caps are delivered singly from said ledge.

3. The combination, with a rotating feed hopper adapted to receive a quantity of container caps, of a head normally stationary against which the caps are directed by the rotation of said hopper, said head having an annular flange provided with a circumferential recess for receiving and aligning the caps and a feed chute arranged to receive the aligned caps from said slot.

4. The combination, with an agitating drum, of a feed hopper mounted to receive container caps from said drum and having a stationary head provided with a peripheral flange having an elongated recess therein for receiving, aligning and directing the caps from said hopper, and a discharge chute leading from one end of said recess.

5. A cap positioning device comprising feed and discharge chutes, means arranged to receive the properly positioned caps from said feed chute and deliver them to said discharge chute, a ledge on which the caps roll between said chutes, the straight edge of the properly positioned caps following said ledge and the rounded edge of the improperly positioned caps sliding off said ledge, means for receiving said improperly positioned caps, reversing them and returning them to said delivering means to pass again over said ledge to said delivery chute.

6. A cap positioning device comprising feed and discharge chutes, means arranged to receive the properly positioned caps from said feed chute and deliver them to said discharge chute, a ledge on which the caps roll during such passage, the straight edge of the properly positioned caps following said ledge and the rounded edge of said improperly positioned caps sliding off said ledge, a spout arranged to receive the improperly positioned caps from said ledge and reverse them and return them to said delivering means to be again rolled over said ledge and said delivery chute.

7. A positioning device for container caps comprising a feed chute adapted to receive the caps in opposite or reverse relative positions, and a spout twisted on its longitudinal axis for receiving and inverting the caps during their passage therethrough.

8. A positioning device for container caps comprising a revolving head adapted to receive and carry said caps, means arranged to support caps having their flanges extending in one direction and to deflect by gravity the caps having their flanges extending in the opposite direction, means for receiving and inverting such gravity deflected caps and returning them to said revolving head, and a discharge chute into which the caps are discharged with their flanges all extending in the same direction.

9. A positioning device for container caps comprising a revolving head adapted to receive caps in reversely arranged relative positions, a supporting ledge arranged in proximity to said head and adapted to support caps having their flanges extending in one direction and to deflect by gravity caps having their flanges extending in the opposite direction and inverting such gravity deflected caps and returning them to said revolving head to be again engaged by said ledge, and a suitable discharge whereto the caps are delivered after they pass over said ledge.

10. A positioning device for container caps comprising a revolving head having a plurality of pockets therein adapted to receive container caps which may be received and lie in said pockets with their flanges extending in either direction, a chute encircled by said head and spirally formed to reverse the caps delivered thereto, and means for deflecting into said chute for reversal therein certain of the caps carried by said revolving head, said chute being arranged to redeliver the reversed caps to said revolving head, and a discharge chute whereto the caps carried past the entrance to said chute are delivered.

11. The combination, with a positioning device for container caps comprising means for arranging the caps in the same relative position, a chute for receiving the caps

so arranged, a distributing device and means actuated by the undue accumulation of caps in said distributing device for temporarily checking the supply of caps to said positioning device.

12. The combination, with a feed chute, of a cap distributing device having chutes leading therefrom to one or more stations, and mechanism actuated through the accumulation of the caps in said distributing device for obstructing said feed throughout and checking the supply of caps to said distributing device.

13. The combination, with a feed chute, of a cap distributing device to which said caps are fed from said chute, a lever, a pin mounted thereon to be projected across said chute, and mechanism actuated by the accumulation of caps in said distributing device above a predetermined level for operating said lever and pin to temporarily check the feed of caps.

14. The combination, with a feed chute, of a cap distributing device comprising discs having a narrow gap or space between them to receive the caps edgewise, the lower walls of said distributing device having discharge openings, of a plate mounted to project into the space between said discs, means for moving said plate to close or open the space between it and the opposite disc, means connected with said plate for checking the feed of caps in said chute and said checking means becoming operative when said plate is locked by the accumulation of caps between it and the opposite disc.

15. The combination with means for reversing or positioning container caps in the same relative position, of a distributing device having a chute communicating with said positioning means, said distributing device having discharge openings and chutes therefore leading to one or more stations, and means in connection with said distributing device for temporarily checking the feed of caps through the chute leading to the positioning device when the caps in said distributing device have accumulated above a predetermined level.

16. Mechanism for agitating, separating, positioning and distributing container caps comprising in combination means for agitating said caps, means for feeding said caps singly to a chute through which they travel edgewise, means for separating the improperly arranged caps by gravity and positioning said caps with their flanges extending in the same direction, and means for delivering said caps at the desired stations.

17. Mechanism for separating, positioning and distributing container caps comprising in combination means for delivering said caps singly to a chute through which they travel edgewise, means for separating the improperly positioned caps by gravity and positioning them with their flanges extending in the same direction and means for delivering said caps at the desired stations.

18. A cap positioning device comprising an annular head composed of two rings spaced apart to form an annular passage between them, means for delivering the caps irregularly arranged to said passage, a twisted spout encircled by said rings and having its ends communicating with the upper and lower sides of said passage, means at the entrance of said spout for separating the improperly positioned caps from the others and delivering them to said spout, and means for rotating said rings to return the now properly positioned caps to mingle with the others, and a discharge chute communicating with said annular passage.

19. A cap positioning device comprising a rotating member having an annular passage therein adapted to receive the caps on edge, means encircled by said member and communicating at its ends with said passage for receiving and inverting the improperly positioned caps, means at the entrance of said inverting means for directing the improperly positioned caps therein, said rotating member returning the inverted caps to pass again the entrance of said inverting means and a discharge chute communicating with said annular passage.

20. A cap positioning device comprising a rotating member having an annular passage therein, means for delivering the aligned and irregularly positioned caps to said passage, a spout device encircled by said member and communicating at its ends with said passage, a ledge provided at the receiving end of said spout over which the aligned caps roll, the improperly positioned caps sliding by gravity off said ledge into said spout, means for adjusting said ledge to increase or decrease its cap engaging surface, the caps delivered to said spout being inverted and returned to said passage and the receiving end of said spout and a discharge chute communicating with said passage.

21. A cap positioning device comprising an annular rotating member having a passage therein adapted to receive caps on edge, and means for separating each cap from the adjacent caps, a cap inverting device arranged to receive the improperly positioned caps on the upper side of said passage and return them when inverted to the lower side of said passage, means at the receiving end of said inverting device for engaging the improperly positioned caps and directing them to said inverting device, and a discharge chute communicating with said passage.

22. A cap positioning device comprising a rotating member having an annular passage therein and means for delivering the

aligned irregularly arranged caps to said passage, a spout having its receiving end communicating with the upper side of said passage and its discharge end with the lower side of said passage and adapted to receive and invert the improperly positioned caps delivered thereto and return them to said passage.

23. A cap positioning device comprising a rotating member having an annular passage therein and means for delivering the aligned irregularly arranged caps to said passage, a spout having its receiving end communicating with the upper side of said passage and its discharge end with the lower side of said passage and adapted to receive and invert the improperly positioned caps delivered thereto and return them to said passage, a wall of said spout forming a ledge on which the caps roll, the properly positioned caps following said ledge past said spout and the improperly positioned caps sliding off said ledge by gravity into said spout.

24. A cap positioning device comprising a rotating member having an annular passage therein and means for delivering the aligned irregularly arranged caps to said passage, a spout having its receiving end communicating with the upper side of said passage and its discharge end with the lower side of said passage and adapted to receive and invert the improperly positioned caps delivered thereto and return them to said passage, a wall of said spout forming a ledge on which the caps roll, the properly positioned caps following said ledge past said spout and the improperly positioned caps sliding off said ledge by gravity into said spout, and means for adjusting said spout wall to vary the cap-engaging area of said ledge.

25. The combination, with a feed chute, of a cap distributing device comprising a frame plate and discs fitting thereon to form a shallow distributing chamber, in which the caps may slide edgewise toward or from the center of said discs, one of said discs having an agitating means and mounted for rotation in said chamber and the lower side of said distributing device having a plurality of discharge chutes for conducting the caps to different stations.

26. The combination, with a distributing device having a shallow chamber to which the caps are delivered, and in which the caps may slide edgewise radially with respect to said discs and means for agitating the caps in said chamber, of a plurality of distributing chutes leading from said distributing device for conducting the caps to different stations.

In witness whereof, we have hereunto set our hands this 15th day of May, 1920.

JONAS E. TORNQUIST.
WILLIAM J. TOWLE.

Witnesses:
JOHN A. BAUTHILET,
ASA A. ELDREDGE.