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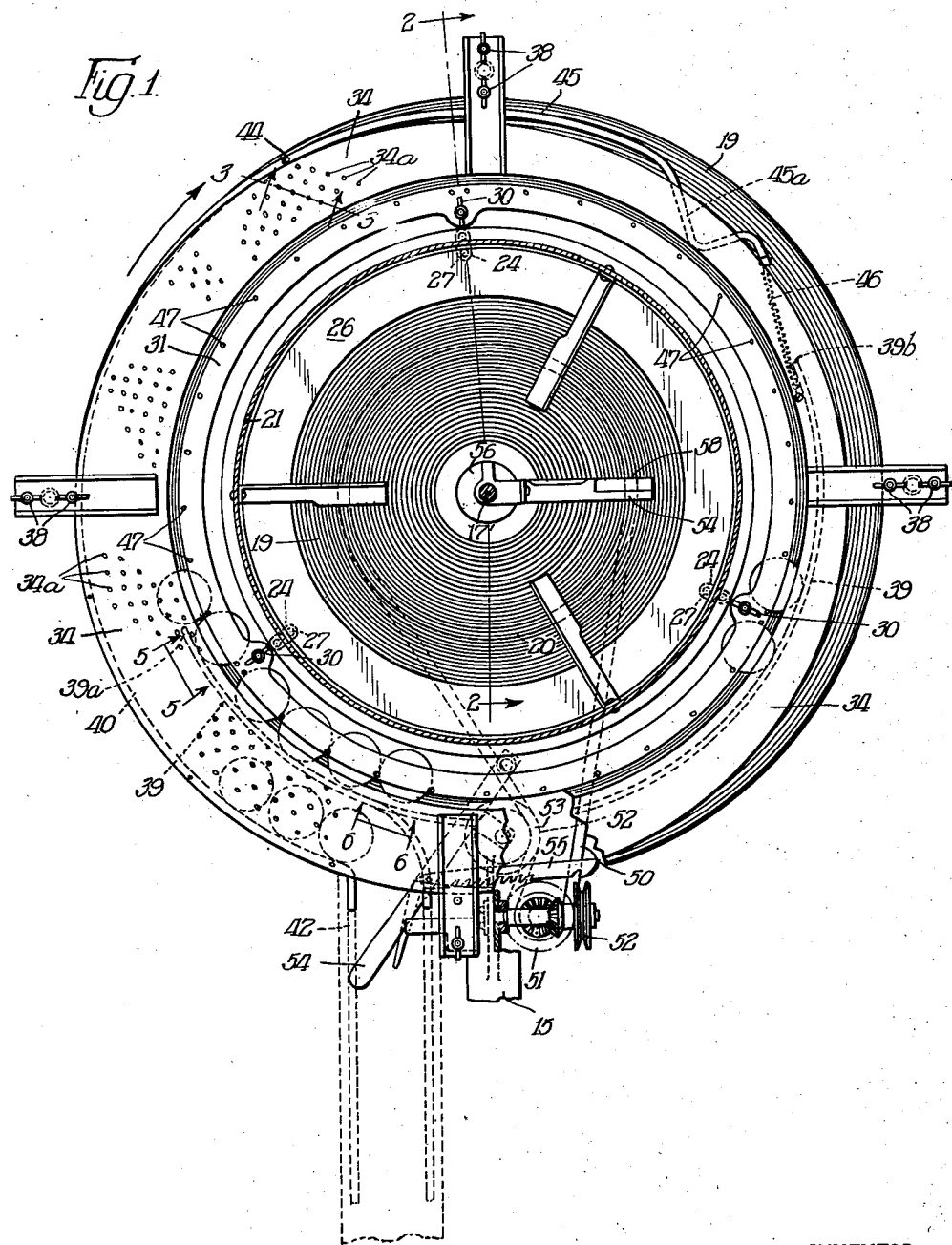
L. E. DAVIES

2,532,760

ARRANGING AND FEEDING APPARATUS

Filed July 10, 1944

3 Sheets-Sheet 1



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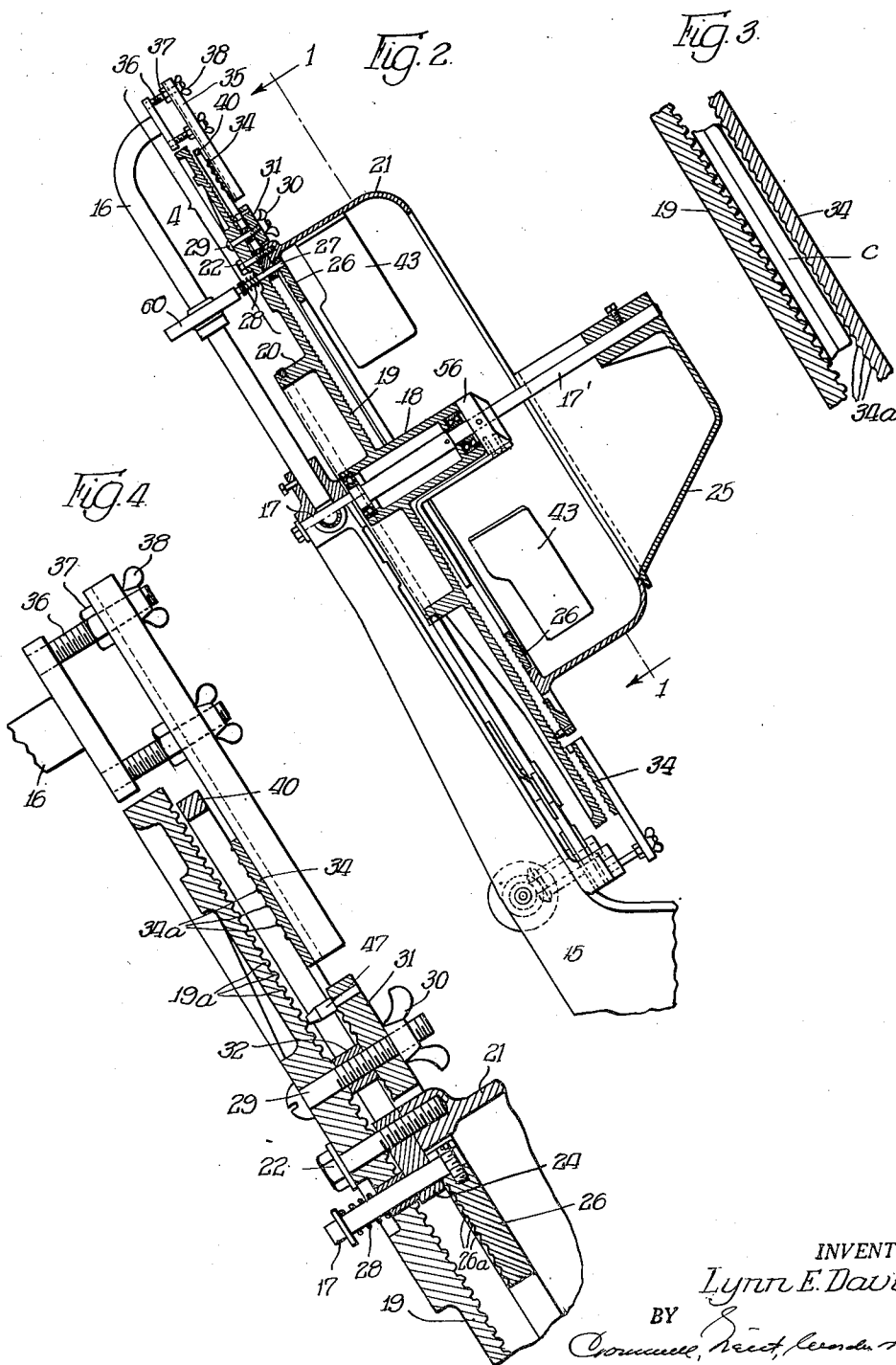
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ARRANGING AND FEEDING APPARATUS

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3 Sheets-Sheet 2



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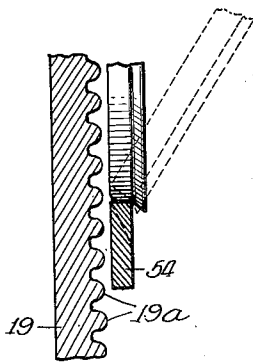
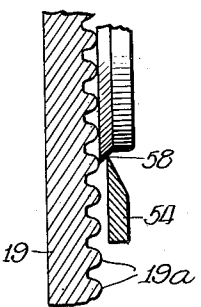
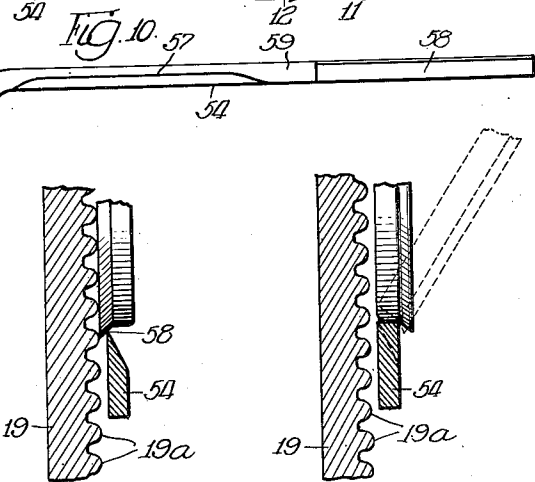
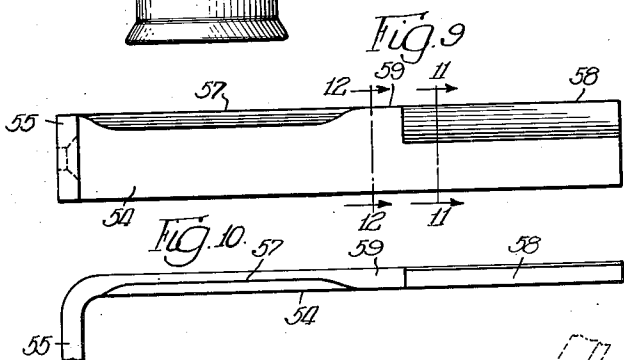
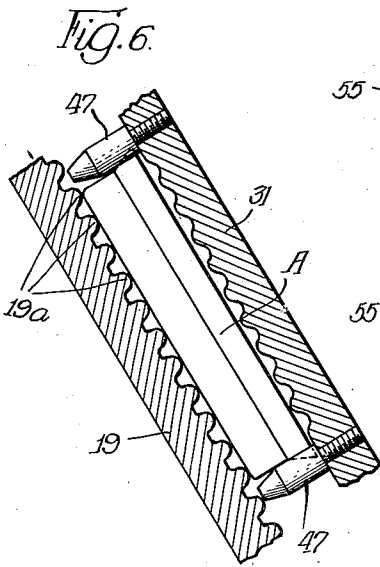
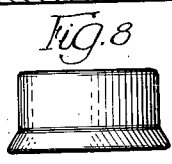
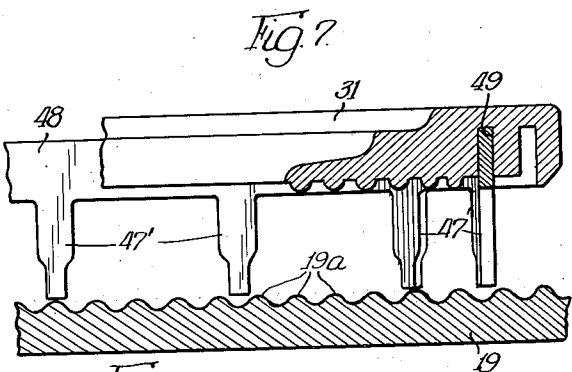
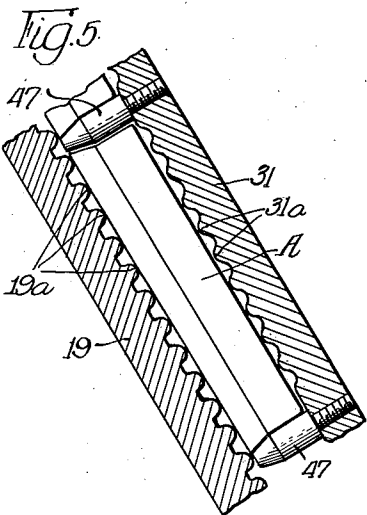
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ARRANGING AND FEEDING APPARATUS

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2,532,760

ARRANGING AND FEEDING APPARATUS

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14 Claims. (Cl. 209—72)

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This invention relates to apparatus for the sorting of identical articles from a random or promiscuous relationship and the positioning and feeding of them in a regular or uniform relationship wherein their attitudinal disposal is the same. More particularly, it pertains to apparatus which may be employed for the arranging and feeding of identical closure caps for receptacles or the like from a jumbled or indiscriminate association to a regular or uniform arrangement in which all are disposed with their tops presented in the same direction.

The general object of the invention is the provision of such apparatus which will accomplish such positioning and feeding of the articles very rapidly from a jumbled or indiscriminate relationship into a continuous, progressively-moving series automatically and very rapidly and with minimum handling or tumbling of the articles.

Another object is the provision of apparatus which will be effective to position and discharge articles very rapidly and continuously into a series wherein their attitudinal disposal is uniform, from a hopper wherein they are originally associated in indiscriminate and random relationship.

There are various types of hopper devices known in the art which are designed for the purpose of arranging closure caps in a uniform series from a random or jumbled relationship in the hopper. Most of these depend upon tumbling of the articles in the hopper until they attain a certain selected position wherein they may be discharged from the hopper. Because of the fact that attainment of the selected position is left pretty much to chance, the output of such machines is likely to be very slow in relation to the amount of tumbling to which the articles are subjected in the hopper. Such tumbling, particularly in the case of articles which are made of light metal and which may have protective coatings of lacquer and the like, is likely to result in defacement or injury to the articles if it is violent or prolonged. The present apparatus is designed to obtain rapid discharge and feeding of the articles from the hopper by facilitating their movement to the selected discharge position and their feeding movement and discharge therefrom.

Various other objects and advantages of the present invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon actual use of it.

In the accompanying drawings I show apparatus representing one form in which the invention

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may be embodied. It is to be understood that this and the following description of it are presented for purpose of illustration merely, and are not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings:

Fig. 1 represents a front or elevational view of a hopper device embodying the invention, certain parts being shown in section on line 1—1 of Fig. 2 and certain parts being broken away to show others which are behind them;

Fig. 2 is a side elevational section taken generally on the line 2—2 of Fig. 1;

Fig. 3 is a sectional detail on an enlarged scale such as might be seen on approximately line 3—3 of Fig. 1;

Fig. 4 is a sectional detail on an enlarged scale of the portion subtended within the brace 4 in Fig. 2;

Fig. 5 is a sectional detail on an enlarged scale such as might be seen at line 5—5 of Fig. 1, with a closure cap in selected discharge position;

Fig. 6 is a similar sectional detail such as might be seen at 6—6 in Fig. 1, with a cap in inverted position;

Fig. 7 is a sectional detail illustrating certain associated parts of the apparatus with an interchangeable selector ring;

Fig. 8 is a side elevational view of a bottle closure cap for which the selector ring illustrated in Fig. 7 is designed;

Fig. 9 is a front or face view of a directing member;

Fig. 10 is a top view of same;

Fig. 11 is a sectional detail view illustrating the cooperation of the directing member with an associated part of the apparatus and with a closure cap, the directing member being shown in section on approximately line 11—11 of Fig. 9; and

Fig. 12 is a similar detail showing the parts in association with a closure cap in an inverted position, the section through the directing member being taken on approximately line 12—12 of Fig. 9.

For the purpose of positioning articles, such as closure caps, uniformly for packaging or for supplying a cap-applying machine or the like, it is desirable that they be positioned uniformly as to attitude, for example, with their tops all presented in the same direction. In the following description of the illustrative apparatus shown in the drawings, I will refer to such attitude as

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the "right-side-up" position, regardless of or not the tops are actually presented upwardly or otherwise in the particular instance.

As indicated above, the present apparatus is designed to arrange articles in right-side-up position and to dispose them in series for feed to a desired location. The particular nature of the invention will be most quickly ascertained from a consideration of this illustrative embodiment in detail.

The hopper apparatus shown in Figs. 1 and 2 is designed to be mounted in association with a machine for applying closure caps to jars, bottles or the like. It comprises a supporting member or standard 15 upon which are fixed three spider arms 16 extending in radial directions from a hopper post 17. The standard is arranged to support these members in sloping positions inclined approximately as illustrated in Fig. 2. Upon the hopper post 17 is rotatably journaled a hub 18 which carries a circular hopper bottom plate 19 which extends normal to the post 17 and carries a belt sheave 20. A generally cylindrical hopper 21 is fixedly mounted on the hopper bottom plate concentrically with the post 17 and secured to said plate by screws 22, spacing blocks 24 being interposed between the bottom plate and the hopper at widely separated locations for the purpose of spacing the rearward rim of the hopper away from the plate 19. The front of the hopper 21 is open and over the lower portion of it is supported a funnel 25 which is mounted on an extension 17' of the post 17. Within the hopper and disposed concentrically with the post 17 is an annular gauge plate 26 which normally rests upon the spacer blocks 24. Lifter pins 27 pass through the hopper bottom plate 19 and the spacer blocks 24 and have their forward or upper ends fixedly secured in the gauge plate 26, said lifter pins being slidable through the plate 19 and blocks 24 to permit the gauge plate 26 to be lifted away from the plate 19, but the parts normally being constrained by springs 28 to hold the gauge plate 26 against the blocks 24.

Removably mounted on the plate 19 by means of bolts 29 and wing nuts 30 is a gauge ring 31' which encompasses the hopper 21 and upon the bolts 29 are spacing collars 32 which hold the gauge ring 31' spaced from the plate 19. By this arrangement of parts, there is provided a shallow selecting passageway leading outwardly from within the hopper, first underneath the gauge plate 26, then underneath the rim of the hopper and then underneath the gauge ring 31, said passageway being open and unobstructed throughout the circumference of the hopper, excepting at the locations where the narrow spacer blocks 24 are disposed. The surface of the hopper bottom plate 19 forms the rear or lower wall of this passageway.

Outwardly beyond the gauge ring 31 is disposed a cover plate 34 which is demountably and adjustably supported on the spider arms 16 by means of bracket arms 35 welded to and extending radially from the cover plate and received on screw posts 36. It is adjustable toward and from plate 19 by means of stop nuts 37 and wing nuts 38, and on its rearward side it carries guide strips 39 and 40 which extend into proximity with the surface of plate 19. The inner guide strip 39 forms an outer limit or boundary for part of the shallow annular gauge passage that is covered by plate 26, the rim of the hopper and ring 31, and it extends around the lower portion of the

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ring 31 from the points 39a to 39b. Above the end 39a, the arrangement affords a lateral discharge opening from said shallow passage, and above the points 39b a lateral escape passage.

The guide strip 40 is spaced outwardly from the strip 39 and cooperates with it to define the lateral limits of a shallow downward lead-off passage which follows generally the peripheral contour of the ring 31 from the discharge opening to a chute 42, and upwardly from the upper limit 39a the associated portions of plates 19 and 34 afford an overflow runway passage leading upwardly to a gate strip 45 which is pivoted at 44 to swing inwardly and outwardly between the bottom plate 19 and cover plate 34. The gate strip 45 constitutes a gate member which extends across a portion of the escape passage above the point 39b, and it is drawn inwardly by a long and comparatively light spring 46. A portion 45a of it adjacent its swinging end is deflected obliquely across the runway passage.

The gauge ring 31 carries a plurality of gauge elements or contour elements 47 spaced circumferentially about it, the relative spacing of said elements and their elevational contours being such as to permit passage of the intended articles between them when said articles are resting flat on bottom plate 19 in right-side-up position. Said contour elements may be in the nature of pins, as illustrated in Fig. 5, with portions beveled or reduced in width so as to accommodate flaring portions of the skirt of a closure cap A, as illustrated in said figure, and to prevent passage of an identical article when it is in up-side-down position, as illustrated in Fig. 6. Or said contour elements may be formed as integral portions of an annular strip or band 48, as illustrated in Fig. 7, which band is seated in an annular channel 49 of the gauge ring 31' so that the contour members, which are designated 47' in Fig. 7, extend into proximity with the surface of the hopper bottom plate 19. Where the arrangement illustrated in Fig. 7 is employed, the bands or selector rings 48 may be interchanged to adapt the apparatus to articles of different sizes or contours, the one illustrated in Fig. 7 being adapted for a closure cap of approximately the form illustrated in Fig. 8. Where the fixed pin form of contour elements, such as illustrated in Figs. 5 and 6, is employed, the machine may be adapted for the handling of articles of different sizes and contours due to interchangeability of ring 31, which may be quickly demounted after removal of the wing nuts 30.

Mounted on the hopper wall at spaced locations are radially extending flights 43, and the hopper is equipped to be driven in clockwise direction, as by means of a belt 50 entrained on the sheave 20 and on a pulley 51 which is rotated by a drive pulley 52 through a beveled gear connection. A belt tightening sheave 53 is mounted on a lever 54 by which it may be swung toward the belt so as to bind it in frictional driving cooperation with the sheaves 20 and 51, or may be withdrawn from the belt so as to permit it to slacken to the extent that it will not have sufficient driving friction. A ratchet member 55 is arranged to latch the lever 54 in the desired belt tightening position.

In operation of the device for the positioning and feeding of closure caps, the bottom plate 19 and hopper being rotated continuously in clockwise direction at constant speed, a quantity of the suitable caps is deposited in the hopper by being dumped into the funnel 25. Incident to the ro-

tation of the hopper, the caps are carried up by the flights 43 and discharged from the flights within the orbit of the gauge plate 26 so that they slide down the bottom plate 19. The normal spacing of the gauge plate 26 from the bottom plate 19, in the lower portion of the hopper, is such as to admit between them only such caps as are resting flat upon the plate 19. Such caps enter the selecting passage between the plates 19 and 26 and pass by gravity outwardly in such passage and under the gauge ring 31, which is rotating with the hopper and bottom plate, until such caps reach the zone of the contour elements 47. Such caps as are in the right-side-up position readily pass between adjacent contour elements and into engagement with the guide strip 39, which is held stationary because of its mounting on stationary cover plate 34. Such caps are propelled up the guide strip 39 until they reach the discharge passage above 39a, whereupon they roll outwardly into the lead-off passage between strips 39 and 40, and feed down said passage until they are discharged therefrom into the lead-off chute 42. Such caps as are in upside-down position in the selecting passage under ring 31 are restrained by contour elements 47 from passing outwardly between them, as illustrated in Fig. 6, at the location 6—6 in Fig. 1. Consequently, such caps are carried on upwardly past the point 39a and after being elevated to position above the horizontal diameter of the bottom plate 19, they slide inwardly through the shallow selecting passage and back into the hopper.

Such is a more or less conventional procedure for discharging articles in right-side-up position from the rotating hopper. An object of the present invention is to expedite the discharge of the contents of the hopper with minimum tumbling. Experience has shown that if half of the caps in a conventional hopper which reach the discharge point in the first rotation of the hopper are in the right-side-up position, the operation will show a very substantial decrease in the number of caps discharged with each succeeding rotation; and the decrease appears to proceed more nearly at a geometric than an arithmetical progression. Consequently, such machines involve a prolonged tumbling of the hopper charge in order to work all of it off. The present improvements obviate that difficulty by the conjoint action of various novel features which have not been specifically referred to hereinabove. One of these is the provision of a novel surface form on the hopper bottom plate 19, same comprising the provision thereon of a plurality of upstanding ribs or ridges 19a which, for facility of manufacture, may be of concentric arrangement. Figs. 5 and 6 show appropriate forms for such ridges or ribs. Likewise, a similar ridge or uneven surface formation 26a is provided on the under surfaces of the gauge plate 26 and the gauge ring 31 which face the ribbed surface of the bottom plate 19. While such ribbing is here shown as concentric, it is obvious that it may be of radial or diagonal arrangement. Likewise, an irregular surfacing is provided on the under surface of the cover plate 34 which, as illustrated in Figs. 1 and 3, may be in the nature of a plurality of spaced individual embossments 34a. In any of said locations it is desirable that the ribs or embossments have limited height, that their crowns be rounded and that the intervening spaces be of outwardly flaring form. Such surface formation facilitates the sliding movement of the articles in the shallow selecting spaces leading outwardly from the hopper and

likewise contributes to the mobility of the caps in the discharge passage and the lead-off runway, and in the hopper it contributes to the movement of the caps on the bottom plate to the locations where they may enter under the gauge plate 26.

It will be understood that in the operation of the apparatus, there may be a plurality of radially related tiers of caps in the shallow selecting passage below the horizontal diameter of the bottom plate; for example, the tier which is in engagement with the contour elements 47 may be backed up by another tier between them and the hopper, and those in turn may be backed up by a third tier or row under the plate 26. Consequently, when a cap in the outermost tier reaches the discharge opening at 39a, it may be subjected to considerable weight or pressure from those behind it, and if the lead-off passageway below the point 39a is gorged with caps, as may occur if the capping machine has been shut down momentarily, the caps which are in proper discharge position may be prevented from passing through the discharge opening and may be carried on upwardly merely to be thrown back into the hopper, thus losing their first chance to be discharged. It is for this reason that the overflow runway passage is provided, leading upwardly from the point 39a. When the lead-off passage is filled with caps, those reaching the discharge opening in proper discharge position may still be permitted to move outwardly from between the elements 47, which they are likely to do because of the pressure of weight of others behind them; and they and some of the excess ones ahead of them can find temporary accommodation in the overflow runway passage in which they subsequently can feed downwardly by gravity to the lead-off runway without having to go through the hopping and selecting procedure again. Those which reach the uppermost quadrant of the overflow passage, however, may pass between elements 47 and back into the hopper.

The escape passage above 39b and its gate 45 are provided as a safety factor to permit discharge of caps which do not escape from the overflow runway passage in the normal manner. In event the overflow runway passage becomes filled with caps to the oblique portion 45a of the gate, the pressure of the leading cap against the said oblique portion may cam the gate outwardly against the action of spring 46 and permit such cap to escape outwardly above 39b.

The ribbed formation of the plate 19 contributes to the inverting of caps in the hopper, and hence counteracts the normal tendency to increase the proportion of upside-down to right-side-up caps, which exists because of the continuous discharge of the latter.

In canning plants where closure applying apparatus is used, the air is usually warm and full of moisture from the cooking of the material which is being canned, and as a consequence, metal surfaces exposed in the place are likely to be filmed or beaded with moisture resulting from condensation. The ribbed or uneven form of the hopper bottom surface prevents adhesion of the closure caps to it, such as is prone to occur in apparatus where the caps are brought into contact with a flat metallic surface which is filmed or beaded with moisture. As a consequence, in the ribbed bottom hopper described above, the caps are not retarded by such adhesion against sliding freely downwardly along the bottom wall, and hence they reach a position where they can enter under the gauge plate 26 more promptly

after they have been discharged from the flights 43. Moreover, since the uneven bottom surface formation leaves upside-down caps free, rather than held by adhesion of moisture between their tops and bottom plate 19, such upside-down caps are tumbled more readily to the right-side-up position in the course of their movement in the hopper.

The uneven surfacing in the shallow selecting passage under plate 26, hopper rim and gauge ring 31 and in the discharge passage and runway passages, prevents adhesion of the caps to either the supporting or the covering surfaces therein, and thus contributes to rapid movement of the closure caps to the contour elements 47 and prompt passage through them, and hence expedites the ultimate discharge of caps from the apparatus. It likewise contributes to free and rapid return movement of the upside-down caps from the gauge passage to the hopper. Hence the ribbed or uneven formation of the cap-contacting surfaces greatly expedites the working-off of a hopperful of caps.

The spacing of the gauge plate 26 from the hopper bottom surface is such as to admit only caps which are resting flat against the latter, and hence one of the important factors in working off a charge of caps is the promptness with which they find their way to this shallow selecting passage. To increase the opportunity for entry of caps into the gauge passage, and to increase the circumferential extent of the portion of the passage where the caps will be disposed to enter it, a directing member is provided, which may be of the form illustrated in Figs. 9 and 10. It is a generally flat strip of metal comprising a blade portion 54 having an attaching shank 55 extending angularly from it and by which it is fixedly mounted on a collar 56 which is fixed to the shaft extension 17 in such fashion that the blade 54 is maintained in proximity with the upper surface of the hopper bottom plate 19 at a location where the blade is in approximately horizontal position and extends radially from the collar 56 toward the plate 26, but with the outer end of the blade spaced from the plate a distance approximating the diameter of a cap. The upper marginal portion of the blade toward which the hopper bottom rotates is beveled or thinned to provide a guiding edge 57 and a thinner guiding edge 58 spaced from each other by a relatively short but substantially wider displacing edge 59. The thinner guiding edge 58 is on the outer portion of the blade and the thicker guiding edge 57 on the inner portion. Some of the caps which are tumbled downwardly along the hopper bottom plate or which are carried around by it encounter the blade as they move downwardly in the hopper, and inasmuch as it presents a low barrier, it tends to promote the tumbling or inverting of them. Such of the caps as are resting flat against the hopper bottom during their downward sliding progress come directly into engagement with the edges 57 and 58. Caps which have flaring lower skirt margins and which come into contact with the narrow guiding edge 58 while in right-side-up position, as illustrated in Fig. 11, are retained by the blade with a certain amount of persistence, due to the slight entry of the flaring skirt portion between the narrow edge and the surface of the hopper bottom. As a consequence, such caps will be caused to roll along that guiding edge to the outer end of the blade and in rolling off of the latter will be directed toward the gauge passage between the plates 26 and 19 adjacent the

end of the blade. The blade thus contributes to such caps a lateral travel which induces their entry into the gauge passage at a higher point than would normally occur if their movement were solely under the direction of gravity. Consequently, the directing member has the effect of extending the cap-receiving range of the gauge passage in the circumferential direction of the hopper. Caps which reach the edge 58 while resting flat against the hopper bottom but in an inverted position, as illustrated in Fig. 12, are not retained with the same persistence as those which are right-side-up, and hence tend to topple off of that edge or swing away from it before they reach the outer end of the blade, as illustrated in a general way in Fig. 12. Caps in the right-side-up position which reach the thicker edge 57 are retentively engaged as first above described, and roll along that edge until they reach the edge 58 and thence are discharged outwardly from the end of the blade as above explained. Caps which reach the edge 57 in the upside-down position are disposed to roll along it toward the edge 58, but upon reaching the displacing edge 59 they are either displaced outwardly away from the hopper bottom or are caused to topple off as above described, without appropriating any of the space along the edge 58. Thus the inner edge portions of the blade tend to move the inverted caps away from the center while at the same time contributing to the inverting of them, but without permitting them to cumber the space along the edge 58 which can be used advantageously for the directing of right-side-up caps into the gauge passage. Thus, caps which enter the selecting passage off the end of the directing member 54 would almost invariably be in right-side-up position, and will find selecting spaces between the contour elements, where they will be supported with their outer rims against the guide strip 39 to be carried along to the lateral discharge opening at 39a.

It may occur at times that a cap will have its marginal portion caught under the entering or inner edge of gauge plate 26 when the cap is in a canted position due to having an opposite rim portion supported on another cap. Caps thus caught under the margin of plate 26 might become rather firmly wedged there if allowed to remain, and hence the entry space into the selecting passage might become blocked to a considerable extent. To prevent that sort of occurrence, the portion of the gauge plate 26 which is at the top of its orbit is lifted away from the back plate 19 periodically, this being accomplished when the respective pins 27 ride upon a roller 60 positioned below the bottom plate 19 near the top of the orbit of the hopper. When the pin rides up the roller, the pin is thrust upwardly against the pressure of its spring, thus lifting the gauge plate 26 at that location and freeing any caps which are wedged below the portions of it which are above the horizontal diameter of the hopper. It being observed in Fig. 1 that there are three of these pins, such lifting of the uppermost part of the gauge plate 26 will occur three times in each revolution of it. When past the roller, the pin and plate are restored to their normal positions by springs 28.

It is to be observed that the apparatus is adaptable to caps of different kinds by changing spacers 24 and 32 and adjusting brackets 35 on posts 36 by means of nuts 37 and 38. The apparatus is adaptable to articles of different contours by

virtue of the interchangeability of gauge ring 31 or, in the modified form shown in Fig. 7, by interchangeability of the selector rings 48.

Apparatus having the features described above and operating as explained are effective to work off batches of caps and the like very rapidly and hence with minimum tumbling of them. It will be understood that the improvements constituting the present invention may be utilized in many kinds of apparatus differing in numerous respects from that herein illustrated, and may be embodied in various different forms without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. Apparatus for arranging and feeding predetermined articles from a rotary tumbling hopper, comprising a plate disposed in an inclined plane to present an upper surface on which articles in the hopper may move downwardly and means associated with the plate to afford an outlet passage for the predetermined articles leading from the hopper along the upper surface of the lower portion of the plate, said plate having its upper surface of uneven contour such as to present spaced upstanding contact elements spaced from each other by but a small fraction of the largest dimension of each article for engaging articles in the hopper.

2. Apparatus as specified in claim 1 and wherein the contact elements are in the form of ribs formed on the plate with intervening recesses.

3. Apparatus as specified in claim 1 and wherein the said contact elements are in the form of upstanding ribs formed in concentric spaced relationship on the plate.

4. Apparatus as specified in claim 1 and including means for rotating the plate in its inclined plane.

5. Apparatus for selecting and feeding closure caps and the like comprising a hopper in which a quantity of the caps may be tumbled, a plate forming a bottom along which caps in the hopper may be moved, said hopper being associated with the plate to afford an outlet passage leading from the hopper along the upper surface of the plate, and the upper surface of the plate being formed with a multiplicity of upstanding contact elements spaced from each other by but a small fraction of the largest dimension of each cap for affording distributed points of support for caps lying in contact with the plate.

6. Apparatus for arranging and feeding closure caps and the like comprising a hopper in which a plurality of the caps may be tumbled, and means associated with the hopper to define a selecting passage leading outwardly from the hopper for discharge of caps therefrom, said means comprising oppositely disposed surfaces spaced from each other sufficiently to permit discharge of caps of predetermined height only when such caps are disposed flatwise relative to said surfaces, said surfaces being of uneven contour such as to present toward said passage a multiplicity of contact points spaced from each other by but a small fraction of the largest dimension of each cap for guiding cooperation with caps therein.

7. Apparatus for arranging and feeding closure caps and the like comprising a hopper in which a plurality of the caps may be tumbled, and means associated with the hopper to define a selecting passage leading outwardly from the hopper for discharge of caps therefrom, said means comprising a supporting surface arranged to support caps in said passage and a gauge surface co-

operating with the supporting surface to define the depth of the passage, said supporting surface being of uneven contour such as to present a multiplicity of contact points spaced from each other by but a small fraction of the largest diameter of each cap for supporting cooperation with caps in the passage.

8. Apparatus for arranging and feeding closure caps and the like comprising a hopper in which a plurality of the caps may be tumbled, and means associated with the hopper to define a selecting passage leading outwardly from the hopper for discharge of caps therefrom, said means comprising a supporting surface arranged to support caps in said passage and a gauge surface cooperating with the supporting surface to define the depth of the passage, said gauge surface being of uneven contour such as to present a multiplicity of spaced contact points toward the supporting surface.

9. Apparatus for arranging and feeding closure caps and like articles comprising a hopper in which a plurality of the caps may be tumbled and having a bottom wall disposed in an inclined plane, means affording a discharge passage leading laterally from the hopper for outlet of caps therefrom, means associated with the hopper to provide an overflow runway having lateral communication with the discharge passage and leading upwardly therefrom, said overflow runway leading to an escape passage, and a gate normally closing said escape passage but operable by caps in the overflow runway to permit escape of caps therefrom.

10. Apparatus for arranging and feeding closure caps or similar articles of predetermined size and form comprising, in combination, a circular wall disposed in a sloping position so that the intended articles may slide down it, means for rotating said wall about its center in the plane of its inclination, means for depositing articles on an upper portion of the wall for sliding movement down it, means associated with the downwardly moving side of the wall to provide a selecting passage for reception of caps from the wall, and a directing strip disposed close to the same side of the wall in the path of caps moving downwardly on it, said directing strip extending in a generally horizontal direction and being of less height than the caps.

11. Apparatus for arranging and feeding closure caps and similar articles of like size and form, comprising a circular wall disposed in a sloping position so that caps may slide down it, means for rotating said wall about its center in the plane of its inclination, selecting means disposed marginally of the downwardly moving side of the wall and adapted to pass caps passing therefrom in right-side-up position and to prevent passage of caps in other positions, means for depositing caps on the upper portion of the wall for sliding movement downwardly on the same, and a stationary directing member disposed adjacent the same side of the wall in the path of caps moving downwardly thereon.

12. Apparatus as specified in claim 11 and wherein the directing member is disposed to guide caps toward the selecting means.

13. Apparatus as specified in claim 11 and wherein the directing member is arranged to direct caps in right-side-up position toward said selecting means.

14. Apparatus for arranging and feeding predetermined articles of uniform size and form comprising, in combination, a bottom plate on

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which the articles may slide, a rotatable annular hopper for tumbling the articles, an annular gauge plate and a readily demountable gauge ring, all terminating short of and spaced entirely above the bottom plate to afford a selecting passage of limited depth leading radially outward from the hopper along the upper surface of the bottom plate and extending circumferentially of the hopper, the depth of said passage being such as to accommodate the predetermined articles when they are disposed flat against the bottom plate, and a plurality of narrow contour elements having a width which is but a small fraction of the distance between adjacent elements mounted in a series on the gauge ring and having lateral contours and relative spacing such as to pass between them predetermined articles which are in right-side-up position in the selecting passage,

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said gauge plate being located within the hopper, and said gauge ring being located outside of the hopper and being supported from the bottom plate independently of the hopper.

LYNN E. DAVIES.

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