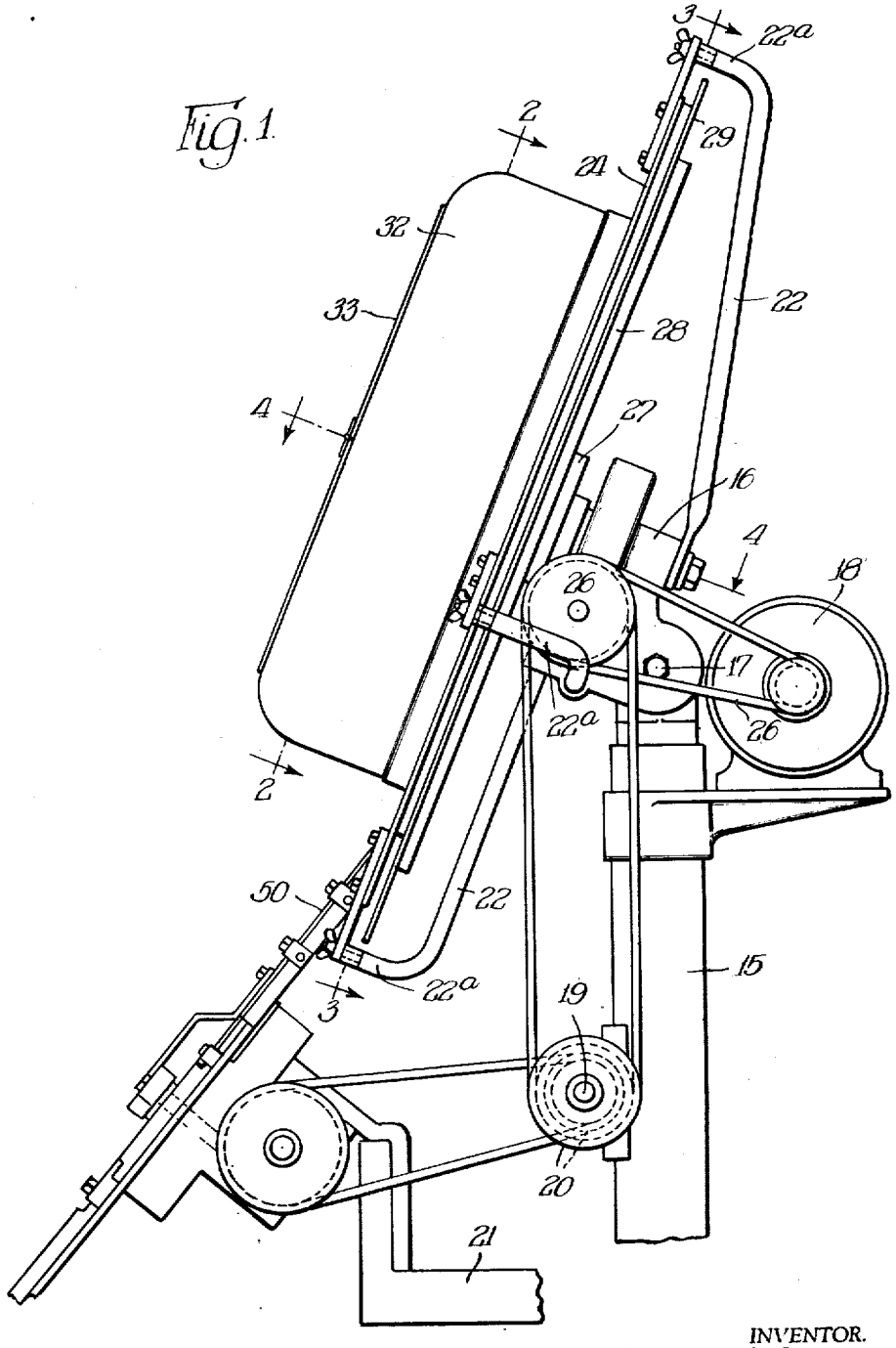
Nov. 7, 1944. E. A. KRUEGER 2,361,948

ASSORTING APPARATUS

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Fig. 1.



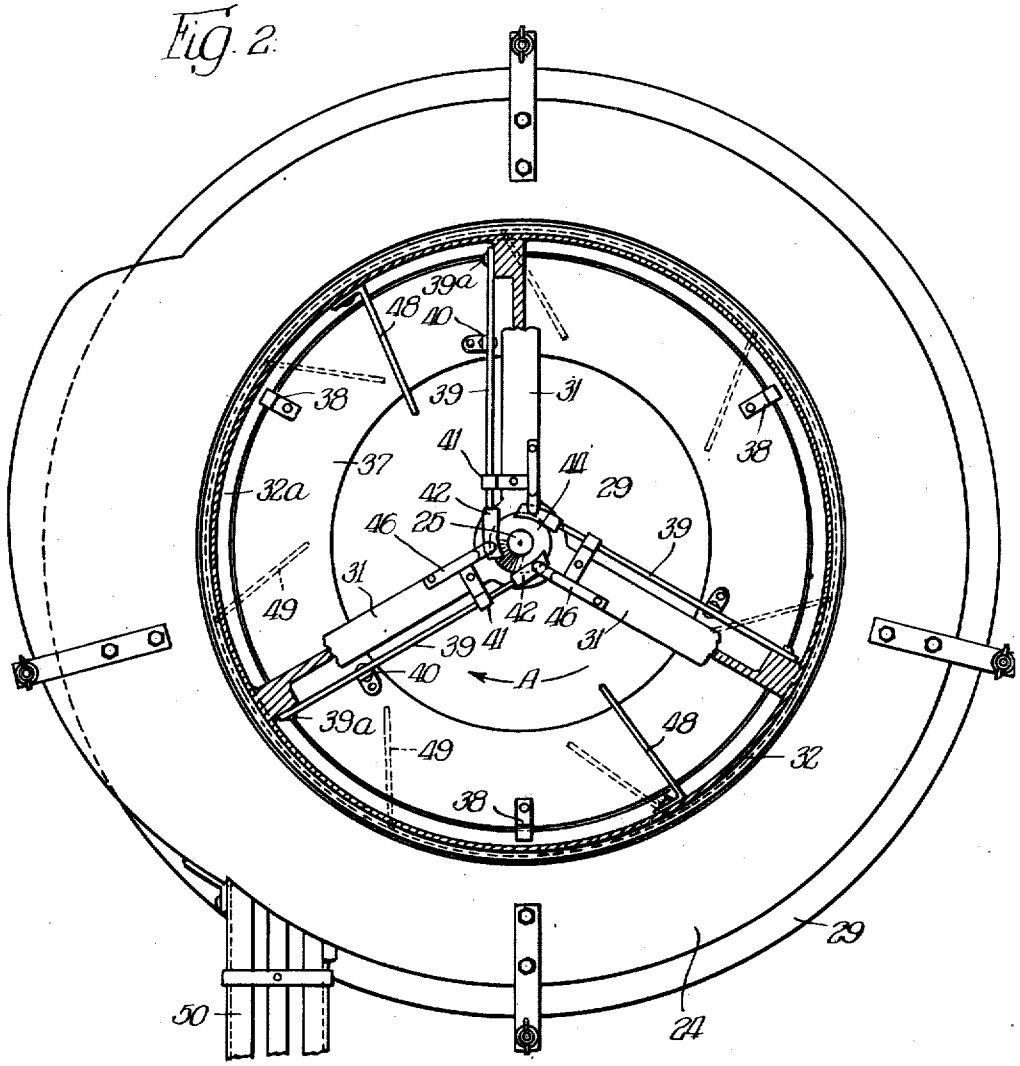
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ASSORTING APPARATUS

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Fig. 2.



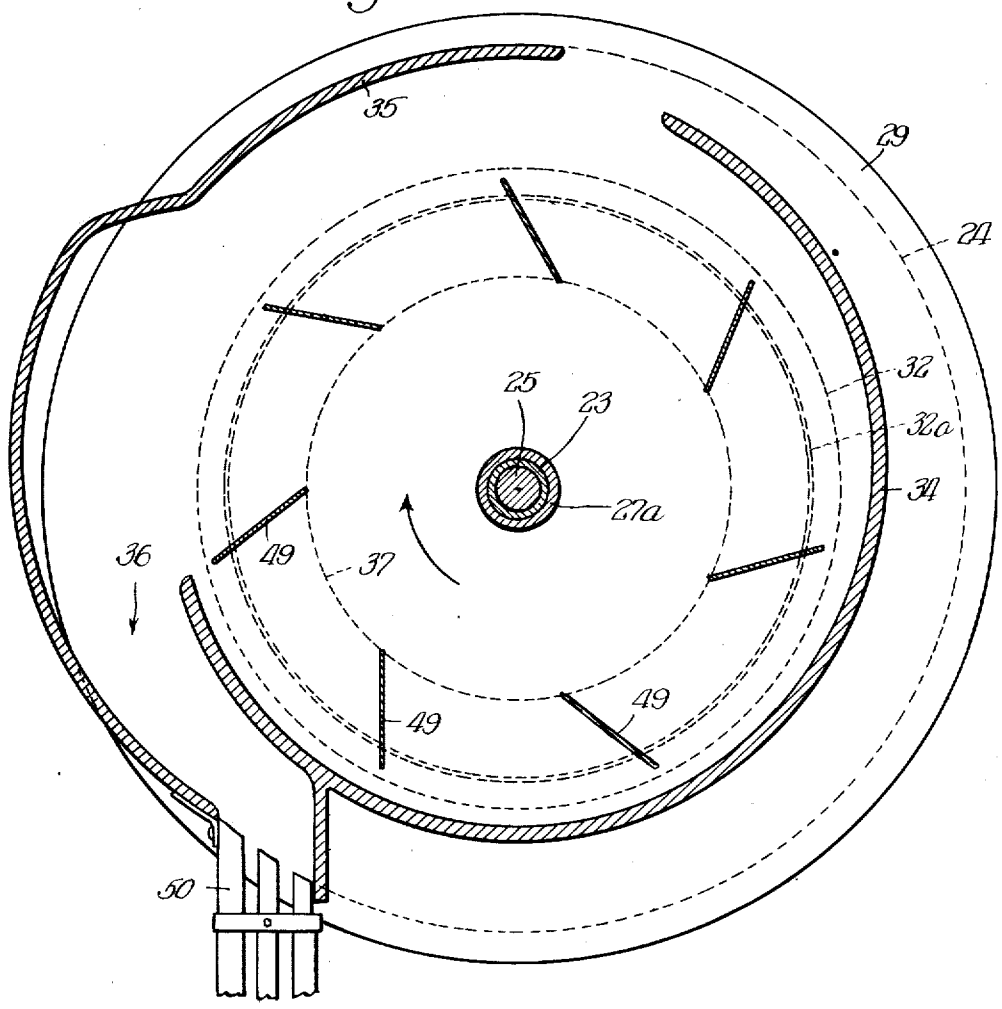
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Fig. 3.



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Fig. 4

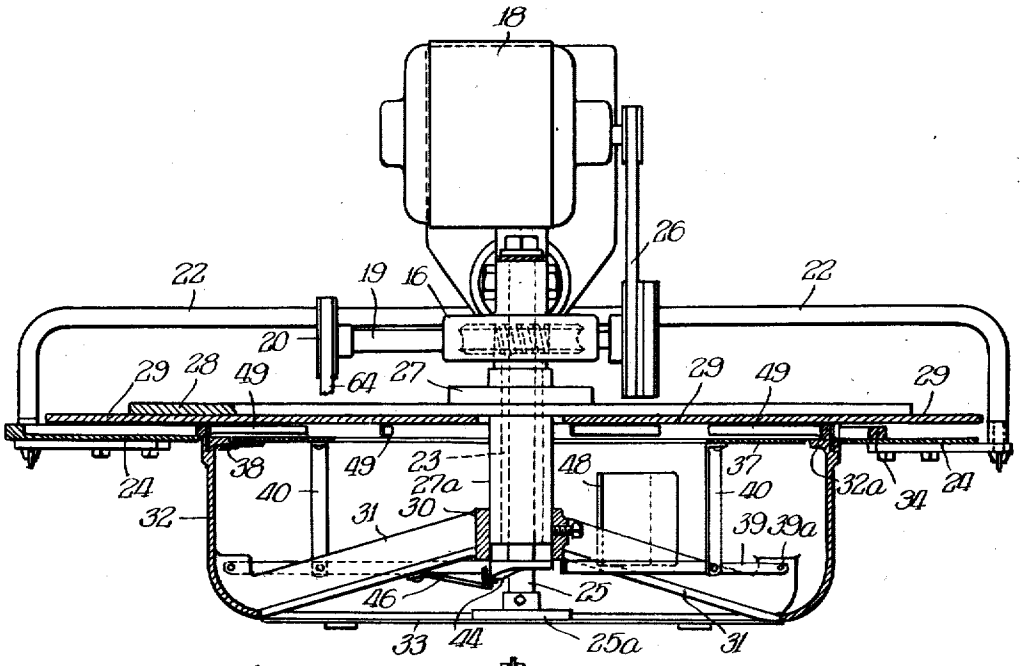


Fig. 5

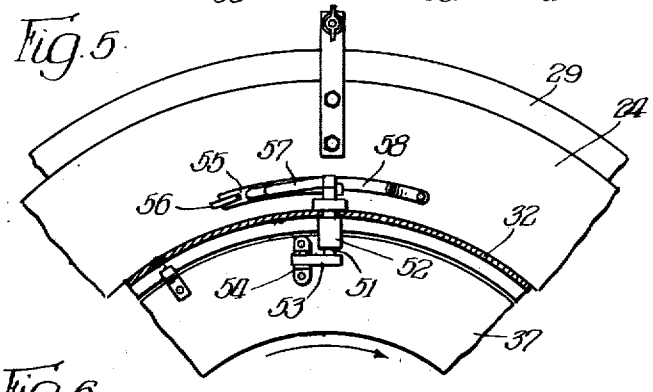
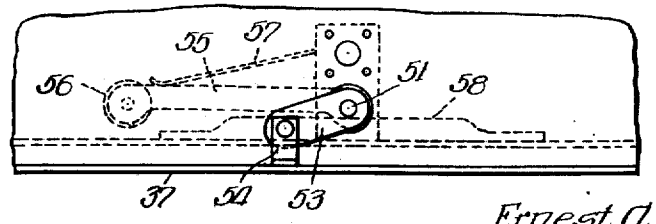


Fig. 6



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UNITED STATES PATENT OFFICE

2,361,948

ASSORTING APPARATUS

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Application February 24, 1941, Serial No. 380,188

10 Claims. (Cl. 226—88.1)

This invention relates to apparatus for assorting or arranging articles of like size and form which are associated with one another in a jumbled or random condition, and positioning them uniformly. One such use for which the present invention is adapted is the feeding and positioning of closure caps of kinds utilized for the closing or sealing of packing vessels such as jars, bottles, and the like. It is to be understood, however, that the invention is likewise adapted for handling articles of other specific kinds. For the purpose of explaining the invention, I show and describe it herein as embodied in an apparatus for handling closure caps.

A general object of the present invention is the provision of apparatus which will operate automatically to feed such articles as closure caps from a jumbled or random condition and position all of them accurately and uniformly in a desired relationship rapidly and in constant volume per unit of time and without marring or damaging them.

A particular object of the invention is the provision of such apparatus by which articles may be fed and discharged from a hopper or the like, into which they are charged in a jumbled relationship, very rapidly, thereby to maintain an uninterrupted feed or supply of the articles to the intended destination and also to minimize the amount of tumbling and abrasion to which they may be subjected in the hopper.

Another particular object is the provision of apparatus whereby jamming or cramping of the articles in the hopper is precluded and freedom of discharge from the hopper is maintained at all times.

Other purposes and advantages of the invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon an understanding of the present description of it or use of it in actual practice.

For the purpose of aiding in explanation of the invention, I show in the accompanying drawings forming a part of this specification, and hereinafter describe, certain embodiments of it in apparatus designed for the feeding and positioning of closure caps. It is to be understood, however, that these embodiments are here presented merely for purpose of illustration and that they may be modified in various particulars and for the handling of different kinds of articles, without departing from the scope or spirit of the invention.

In said drawings,

Fig. 1 is a side elevational view of such an apparatus embodying the invention;

Fig. 2 is a front view of the upper portion of Fig. 1, partly in section on the line 2—2;

Fig. 3 is a sectional view on approximately line 3—3 of Fig. 1;

Fig. 4 is a transverse sectional view on line 4—4 of Fig. 1;

Fig. 5 is a detail in the nature of a plan view of a modified form of release device; and

Fig. 6 is a side view of said modified form of release device on somewhat larger scale.

As indicated in the foregoing, the apparatus illustrated in the drawings is designed for the rapid feeding of closure caps to a desired point of disposal from a hopper in which they are associated in a jumbled or random relationship, and to accomplish the uniform positioning of the caps so that all will arrive at a point of disposal in desired relationship as to sequence. The apparatus operates automatically in the manner hereinafter described to discharge the caps rapidly from the hopper and to advance them progressively in a series and deliver them in proper position and relationship at the point of disposal. A complete understanding of the nature of the invention will be had most quickly from the following detail explanation of the apparatus shown.

Upon a suitable support 15 is mounted a housing or bracket 16 which is angularly adjustable in a vertical arc about its attaching member 17 and adapted to be fixedly secured at the desired adjustment by the latter or other suitable means. On the support 15 are mounted also a motor 18 for actuating the mechanism, a pulley shaft 19 carrying one or more drive sheaves 20, and a bracket 21. The bracket 16 carries radially extending arms 22 having laterally directed end portions 22a, upon which, by means of radial arms 24a, is fixedly mounted an annular cover plate 24. In the bracket 16 is fixedly mounted a stationary shaft 25 (see Fig. 4) and upon this shaft is rotatably mounted a sleeve 23 which is adapted to be rotated by suitable gearing housed in bracket 16 and driven by the motor through suitable transmission means 26. The sleeve 23 has affixed to it a hub 27 carrying a disk 28 upon which is fixed a circular back plate 29. Through the center of the plate extends the collar 27a of the hub and upon the collar 27a is mounted a spider 30 having radially extending arms 31 which support a cylindrical hopper 32.

Accordingly, when sleeve 23 is rotated, it carries with it back plate 29 and hopper 32, while cover

plate 24 remains stationary because of its mounting on stationary arms 22. Stationary shaft 25 carries at its outer end a flange 25a upon which is mounted a hinged cover 33 which may be swung open to permit the introduction of closure caps into the hopper. The under surface of plate 24 and the lower rim of hopper 32 are spaced from back plate 29 by a distance slightly exceeding the overall depth or thickness of the closure cap which is to be handled in the machine, and cover plate 24 has affixed to it, and extending from its rearward side, guide or ledge strips 34 and 35 which extend into close proximity with the surface of back plate 29. As seen in Fig. 3, guide strip 34 takes a somewhat involute course from its upper end and lies outside but adjacent the peripheral area of hopper 32, while guide strip 35 follows generally the outline of cover plate 24 and is spaced considerably farther from the periphery of hopper 32 than is guide strip 34. Slightly below the horizontal diameter of cover plate 24, the lower end portions of guide strips 34 and 35 overlap to form an upwardly flaring throat at 36 and affording a lateral discharge passage leading outwardly from the hopper in a centrifugal direction.

Referring to Figs. 2 and 4, it will be observed that hopper 32 has at its lowest margin an inwardly extending flange 32a, and that a gauging ring 37 is disposed within the compass of said flange 32a and supported thereon by cleats 38. The spacing of gauging ring 37 from back plate 29 is but slightly greater than the overall depth of the closure caps which the device is to handle, so that a closure cap which is resting flat against back plate 29 may pass between it and the gauge ring 37. Due to the steeply inclined position of back plate 29, closure caps which are lying flat upon it are disposed to slide downwardly by gravity into the space between the back plate and gauge ring 37 in the lower or downwardly presented portion of the hopper. Gauge ring lifting levers 39 extend along the respective spider arms 31, each pivoted at its outer end to the adjacent spider arm at 39a and connected to gauge ring 37 by a link 40 and held parallel with the adjacent arm 31 by a guide 41 in which the inner end of the lever may slide upwardly and downwardly. At its rearward end each lever carries a shoe 42 which rides on a cam 44 mounted on the stationary shaft 25, the shoe being held down on the profile of the cam by a leaf spring 46. The levers, of course, revolve with the spider and hopper around shaft 25 and cam 44, and the high point of the cam is located so that the inner ends of the respective levers will be raised or thrust outwardly longitudinally of shaft 25 when their outer ends approach the zenith of their orbital movement. Such outward movement of the inner end of the lever will swing the lever on its pivot 39a and, by virtue of the connection 40 between the lever and gauge ring 37, will lift the upper portion of said ring away from back plate 29.

This operation of gauge ring 37 is for the purpose of releasing any caps which may have become wedged between it and back plate 29, as in instances where caps are partially overlapped one on top of another with the margin of the overlying cap between ring 37 and back plate 29. After being released by such lifting of the upper portion of gauge ring 37, caps so wedged behind it slide down the back plate, thus leaving the space between gauge ring 37 and the back plate clear for proper entry of other caps in the lower portion of the hopper.

The hopper carries inwardly extending flights 48, the function of which is to carry upwardly the mass of caps in the hopper and then discharge them more or less gradually, as the flights approach the zenith of their orbital movement, so as to permit those which are released from the flights in the upper portion of the hopper to slide downwardly on back plate 29 and enter the space between the back plate and gauge ring 37 in the lower portion of the hopper. Caps which thus enter the space between the back plate and gauge ring 37 are prevented by guide strip 34 from sliding out, and are carried along on back plate 29 by impelling flights 49 which are affixed to the lower end of hopper 32 and travel in the space between gauge ring 37 and back plate 29. Caps thus carried along by the impelling flights 49 are discharged into throat 36 when they pass the end of guide strip 34, and they slide downwardly in said throat between back plate 29 and cover plate 24 by gravity to a chute 50. To obtain best output capacity, it is desirable that the flights 49 be spaced from each other a distance adequate to admit more than one cap at a time and to permit caps which are between adjacent flights to pass each other. This avoids any clogging of any of the delivery spaces between the flights by caps jamming in them, and insures delivery from those spaces into the delivery passage 36. As will be observed in Fig. 2, the distance between the ends of adjacent flights 49 exceeds twice the width of the passage of chute 50, and hence will admit simultaneously any two caps which are of size to pass through that chute. Thus the gauge space between gauge ring 37 and back plate 29 is cleared of caps excepting for such as may have been wedged between those members as above described, and such as are thus wedged are freed and allowed to slide down into the lower portion of the hopper by the lifting of the upper portion of the gauge ring from the back plate as above explained.

In Figs. 5 and 6 I illustrate a modified form of means for lifting the gauge ring at its upper portion. In said figures, the back plate is designated 29, the cover plate 24, the hopper 32 and the gauge ring 37, and all of said parts are associated as above described. Instead of the system of gauge ring lifting levers as above described, this modified construction comprises a short shaft 51 rotatably journaled in a bearing 52 fixed in the wall of the hopper 32, there being at least three of these mounted equidistantly from one another circumferentially of the hopper. Fixed to the inner end of shaft 51 is a short crank 53 which has its outer end pivotally connected to the gauge ring 37 by means of a shackle 54. On its outer end, which projects exteriorly of the hopper 32, shaft 51 has fixed to it a lever arm 55 which carries at its free end a roller 56 supported clear of the surface of the cover plate 24 under the pressure of a leaf spring 57. At the zenith of the hopper's orbit, an incline member 58 is mounted on cover plate 24 in the path of movement of roller 56. In the operation of this device, therefore, as one of the shafts 51 passes the zenith of its orbit, the roller will ride up on incline 58, thus swinging lever arm 55 and rotating shaft 51 in a direction such as to swing the crank 53 upwardly and lift the adjacent portion of gauge ring 37 away from back plate 29. This will have the effect of freeing caps which may have become wedged between the cap ring and back plate 29.

Throat 36 and chute 50 are so proportioned as to cause caps therein to follow one another in

single file. It will be appreciated, however, that some of these caps are right-side-up and others upside-down. Inasmuch as it is desired that all caps delivered to the point of disposal be in right-side-up position, I provide means for inverting those which are upside-down, in the course of their progressive movement to the point of disposal. Such means is designated generally by the reference character 60 and forms the subject matter of a copending continuing application.

As the purposes and operations of various parts of the apparatus have been explained in the course of the foregoing description, a general explanation of the operation will suffice at this point.

A suitable quantity of caps is placed in the hopper through the opening afforded by swinging the hinged cover 33 downwardly. The quantity of caps in the hopper at any one time should be limited to such as will permit them to have free movement within it. The hopper, together with the gauge ring 37 which it carries and the back plate 29, are rotated about shaft 25 in the direction indicated by the arrow A in Fig. 2. By such rotation, the caps in the hopper are carried upwardly by flights 48 and spill therefrom in the upper portion of the hopper against the back plate 29. They slide down the back plate by gravity, and such as are lying flat against that plate slide freely to positions between it and gauge ring 37 in the lower portion of the hopper. Some of these caps will be in upside-down position and others right-side-up, this permitting the rate of discharge from the hopper to be quite high. Caps thus received between the gauge ring and back plate are carried upwardly by flights 49 and discharged into throat 36, guide strip 34 preventing their discharge ahead of that point. Any caps which may have become wedged between gauge ring 37 and back plate 29, as by being partially overlapped, are freed in the upper portion of the hopper by the lifting of the upwardly presented portion of the gauge ring away from the back plate, as by operation of a lever 39 (Fig. 2) or 55 (Fig. 6). Caps discharged into throat 36 slide downwardly therein by gravity, meanwhile becoming arranged in single file, and are discharged into chute 50.

The apparatus described above attains distinct advantages in that it accomplishes the feeding and desired positioning of the caps very rapidly and continuously and minimizes the amount of tumbling to which they are subjected in the hopper. It will be understood that it may be adapted to handle caps of different sizes and sorts and also articles of other kinds.

What I claim is:

1. Apparatus for arranging closure caps or similar articles, comprising a hopper for containing the articles to be arranged and having a sloping back plate arranged to support articles in the hopper, said hopper having a lateral discharge passage leading in a centrifugal direction from its circumference, a gauge ring spaced from said back plate sufficiently to pass only such of said articles as are resting flat upon the back plate, means for tumbling articles in the hopper and elevating means arranged to carry articles which are between the gauge ring and back plate to said discharge passage, the elevating means which are adjacent each other being spaced sufficiently to permit articles between them to pass one another in said centrifugal direction.

2. Apparatus for arranging closure caps or similar articles, comprising a hopper having a sloping back plate for supporting articles which are to be arranged, said hopper having a lateral discharge passage, a gauge ring rotatable in an inclined position and spaced from the surfaces of said back plate sufficiently to pass between them only such of said articles as are positioned flat upon the back plate, means for moving articles in the hopper to upper portions of the back plate within the compass of the gauge ring, and means operated cyclically to increase the spacing of portions of the gauge ring from upper portions of the back plate.

3. Apparatus for arranging closure caps or similar articles, comprising a hopper having an inclined bottom for supporting the articles which are to be arranged, a gauge ring overlying and inclined with the hopper bottom and spaced from it sufficiently to pass between them only such of said articles as are disposed flat against said bottom, a lateral discharge passage being provided from the space between the gauge ring and hopper bottom, means for depositing articles on upper portions of the hopper bottom within the compass of the gauge ring, means for rotating the gauge ring, and means for lifting portions of the gauge ring away from the hopper bottom in the course of the ring's rotation.

4. Apparatus for arranging closure caps or similar articles, comprising a hopper having an inclined bottom for supporting the articles which are to be arranged, a gauge ring arranged generally parallel with the hopper bottom and spaced from its surface sufficiently to pass between them only such of said articles as are disposed flat against the latter, a lateral outlet from the space between the gauge ring and hopper bottom, means to rotate the hopper bottom and gauge ring, and means operable to lift portions of the gauge ring away from the hopper bottom at certain locations.

5. Apparatus for arranging closure caps or similar articles, comprising a hopper having a bottom portion for supporting the articles which are to be arranged, a gauge ring spaced above the surface of said bottom portion sufficiently to pass between them only such of said articles as are disposed flat upon the latter, a lateral outlet being provided from the space between the gauge ring and said bottom portion, means for rotating the hopper and gauge ring, and means for lifting portions of the gauge ring away from said bottom portion at a certain location in the course of said ring's rotation.

6. Apparatus for feeding and arranging closure caps or similar articles, comprising a hopper for containing the articles in jumbled relationship, a back plate forming a bottom for the hopper, a gauge ring within the hopper and spaced from the surface of the back plate a distance sufficient to pass between them only such of said articles as are disposed flat upon the back plate, means for rotating the hopper and the back plate and the gauge ring, a cover plate overlying portions of the back plate outside the area of the hopper, means on the cover plate and cooperating with it and the back plate to define a discharge passage from the clearance space between the back plate and gauge ring, and elevating means in said clearance space movable to impel articles therein to said discharge passage, said elevating means being arranged to permit caps within said clearance space to pass one another in outward radial directions.

7. In apparatus for arranging flat circular ar-

ticles of like size, a hopper having an inclined back plate for supporting therein the articles which are to be arranged, a gauge ring overlying and inclined with said back plate and spaced therefrom sufficiently to admit between them only such of said articles as are disposed flat against the back plate, the gauge ring and back plate being associated to provide between them a clearance space in which the articles may be moved, a discharge passage being provided leading from said clearance space in a direction away from the hopper, and flights for impelling articles in said clearance space upwardly to said discharge passage, said flights being spaced from one another sufficiently to permit articles between them to pass one another en route to the discharge passage.

8. In apparatus for arranging closure caps or similar articles, a hopper having an inclined back plate for supporting therein the articles which are to be arranged, a gauge ring overlying and inclined with the back plate and spaced therefrom sufficiently to pass between them only such of said articles as are disposed flat against the back plate, means for rotating the gauge ring, and means for periodically moving portions of the gauge ring away from the back plate in elevated locations.

9. In apparatus for arranging closure caps or similar articles, a hopper having a bottom portion for supporting the articles which are to be arranged, a gauge ring spaced from the surface of said bottom sufficiently to form a clearance space which will admit only such of said articles as are disposed flat upon the bottom, means for rotating the hopper to tumble articles therein, and means for moving portions of said gauge ring away from said bottom periodically in certain locations.

10. Apparatus as specified in claim 9 and wherein a lateral outlet from the clearance space is provided, and means are provided in the clearance space for guiding articles therefrom into said lateral outlet.

ERNEST A. KRUEGER.

CERTIFICATE OF CORRECTION.

Patent No. 2,361,948. November 7, 1944.

ERNEST A. KRUEGER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, lines 20 and 21, strike out the words "and in constant volume per unit of time" and insert the same after "rapidly" and before the comma, line 27, same page and column; page 2, first column, line 27, for "lowest" read --lower--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of February, A. D. 1945.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

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