

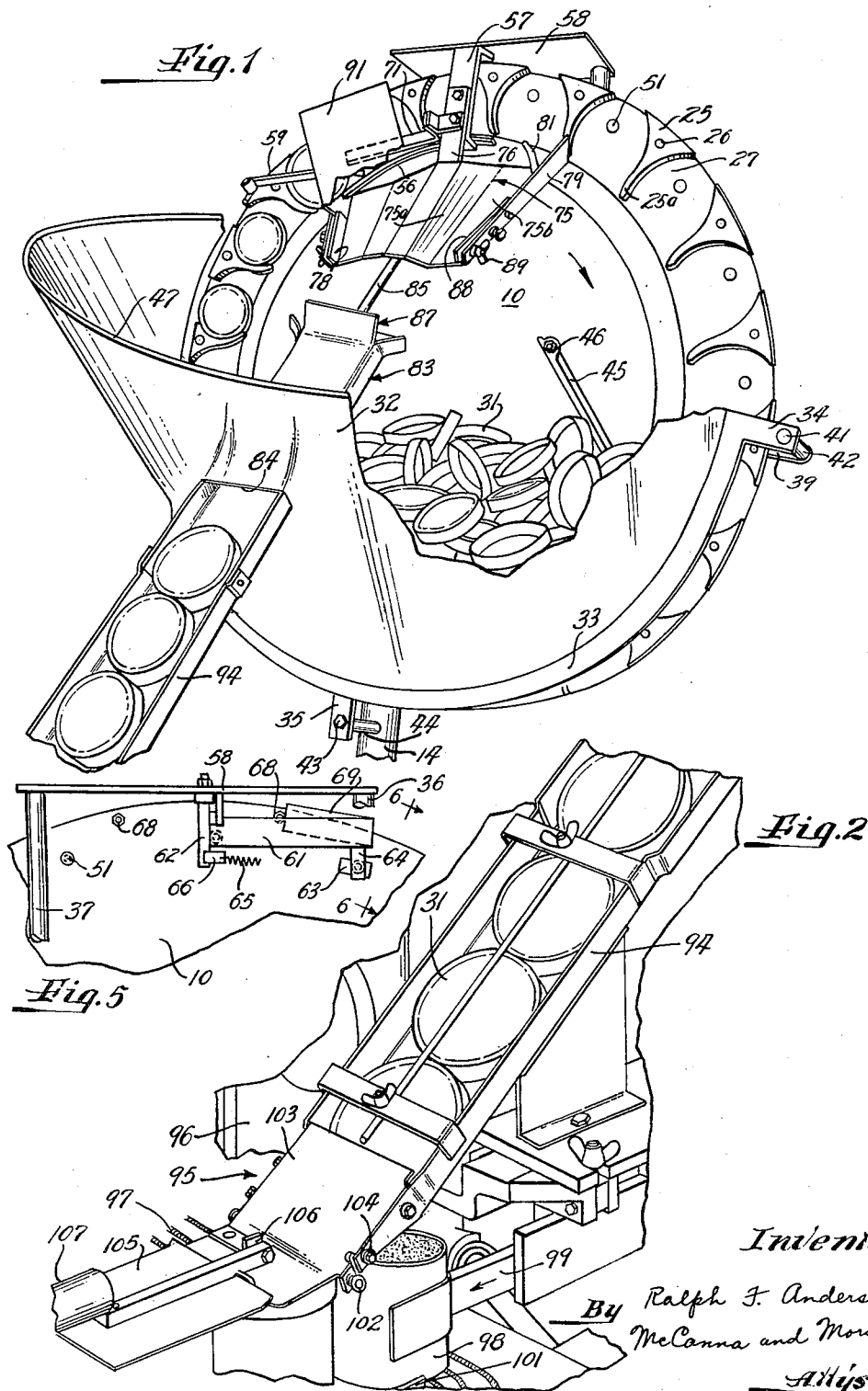
Jan. 26, 1960

R. F. ANDERSON
CAP SORTING APPARATUS

2,922,548

Filed Dec. 9, 1955

2 Sheets-Sheet 1



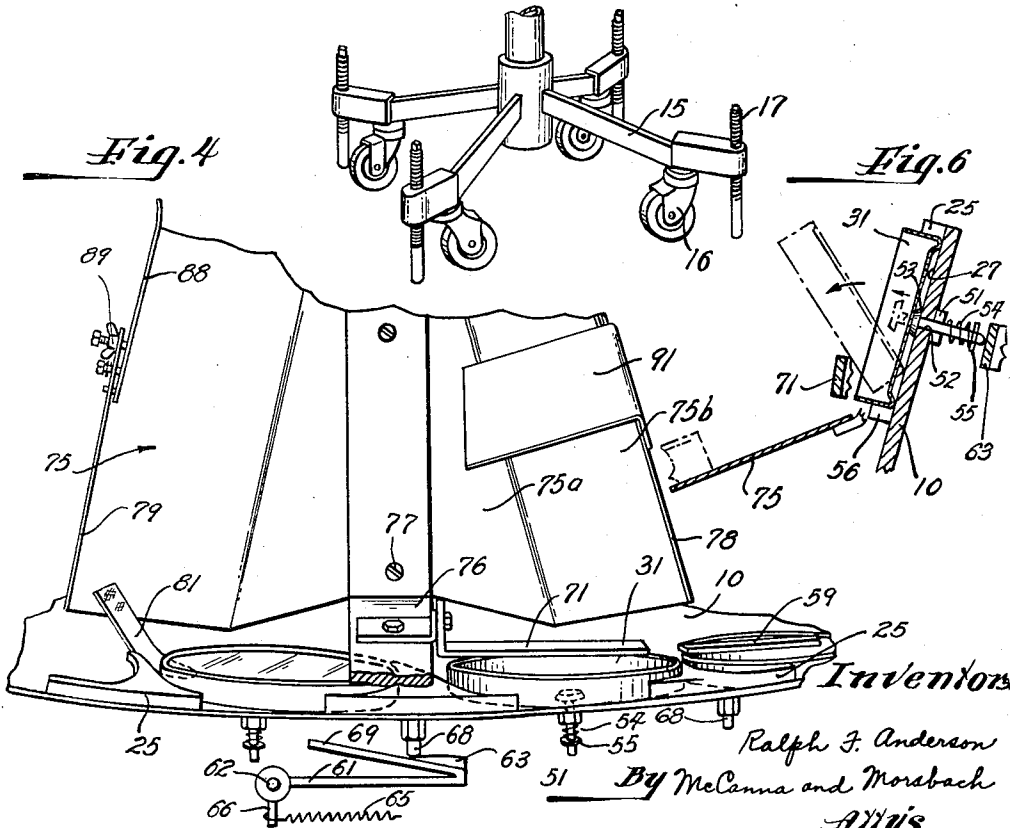
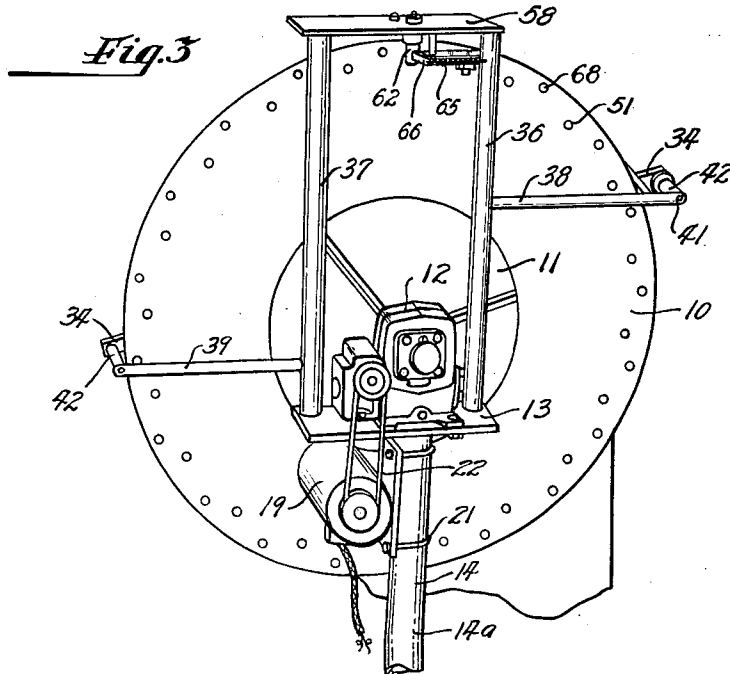
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CAP SORTING APPARATUS

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Application December 9, 1955, Serial No. 552,122

6 Claims. (Cl. 221—156)

This invention relates to article handling devices and more particularly to an apparatus for sorting and feeding cup-shaped articles.

An important object of this invention is the provision of an apparatus for storing a relatively large quantity of unsorted cup-shaped articles and which is arranged to select individual articles from the unsorted articles, orient the selected articles in proper position and convey the sorted articles to a dispensing station.

Another object of this invention is to provide an apparatus for sorting cup-shaped articles including an article carrier arranged to withdraw individual articles from an unsorted quantity of articles and having an improved apparatus for discharging articles from the carrier and for simultaneously inverting any of the articles which do not lie in a preselected position on the carrier.

A further object of this invention is to provide an apparatus in accordance with the foregoing objects which is of simple construction, and which is self-supported on a wheeled frame to enable the apparatus to be manipulated into and out of position with respect to the device for utilizing the sorted articles.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following description when taken in connection with the accompanying drawings wherein:

Figure 1 is a fragmentary perspective view of the sorting apparatus;

Fig. 2 is a fragmentary perspective view of the chute and cap applying apparatus shown applied to a filling machine;

Fig. 3 is a rear elevational view of a sorting apparatus;

Fig. 4 is a fragmentary top plan view of the sorting apparatus;

Fig. 5 is a fragmentary enlarged rear elevational view of the sorting apparatus showing the mechanism for discharging and inverting the cup-shaped articles from the pockets in the carriers; and

Fig. 6 is a fragmentary sectional view taken on the plane 6—6 of Fig. 5.

The apparatus of the present invention is arranged to sort and dispense cup-shaped articles and is particularly designed for use in sorting annular flanged covers of the type used to cover containers for comestibles such as ice cream and the like. The sorting apparatus comprises a circular disk-shaped carrier 10 having a hub 11 on the rear side thereof for rotatably mounting the disk. The hub 11 is rotatably supported in a speed reduction mechanism 12 which is mounted on a base 13 and which base is, in turn, carried by an upstanding support post 14. As best shown in Fig. 3, the post 14 is supported at its lower end by legs 15 having casters 16 mounted thereon to enable the sorting apparatus to be easily maneuvered into and out of operative position with respect to the device which utilizes the sorted articles. A plurality of leveling rods 17 are carried by the legs 15, as by

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threaded connection thereto and arranged to be adjusted into engagement with the supporting surface to enable the vertical position of the sorting apparatus to be readily adjusted and to support the latter off of the casters 16 to prevent shifting of the device while in use.

In accordance with the present invention, the carrier disk 10 is inclined to the vertical and mounted for rotation about an axis prepending thereto and for this purpose the supporting post 14 is bent at 14a intermediate the ends thereof so that the base 13 and the speed reduction 12 carried thereby are inclined to the horizontal. A motor 19 is mounted on the post 14 as by brackets 21 and coupled to the speed reduction unit as by a belt 22 to rotate the disk about an axis inclined to the horizontal and at a relatively low rate of speed.

A plurality of wedge-shaped inserts 25 are affixed to the front face of the disk 10 by fasteners 26 and are annularly spaced apart to define pockets 27 therebetween for receiving cup-shaped articles. Each of the pockets is open at the side opposite the disk and also open at the radially inner end thereof to permit articles to move into the pockets. The inner ends 25a of the wedge-shaped inserts 25 are skewed, in the direction of rotation of the disk, to aid in retaining the articles in the pockets. A means is provided at the front side of the disk 10 for retaining a relatively large quantity of articles 31 such as flanged caps or covers in contact with the front face of the disk. In accordance with the present invention, an arcuate hopper wall 32 is disposed at the front side of the disk and has an outwardly extending peripheral flange 33 formed on one edge thereof, which flange extends into closely spaced adjacency to the pockets on the carrier disk 10. A plurality of radially extending ears 34 and 35 are formed on the flange 33 and extend outwardly therefrom beyond the periphery of the disk 10. Spaced uprights 36 and 37 are attached to the base 13 at the rear side of the disk and arms 38 and 39 are attached to these uprights and extend outwardly therefrom to a point beyond the periphery of the disk. The ends of the arms 38 and 39 are affixed to the ears 34 on the wall 32 by fasteners 41 and are spaced therefrom by means of spacer blocks 42, to maintain the hopper wall 32 in proper spaced relation to the pockets on the disk. The ear 35 adjacent the bottom of the hopper is attached by a fastener 43 to the standard 14 and is spaced therefrom by a spacer block 44. In order to prevent dislodgement of the articles which fall into the pockets 27, by reason of engagement with other articles 31 disposed between the wall 32 and the disk 10, the flanged edge 33 of the wall is positioned to partially overlie the open side of the pockets 27 along the leading edge and bottom of the hopper, as is best shown in Fig. 1. Agitator bars 45 are attached to the front face of the disk 10, by fasteners 46 and arranged for engagement with the articles 31 in the hopper to agitate the latter as the disk 10 is rotated. The wall 32 extends upwardly and outwardly from the disk 10 and terminates with the upper edge 47 thereof spaced below the top of the disk. As the carrier disk 10 is rotated, articles 31 disposed in the hopper defined by the wall 32 and the disk 10, fall into the pockets 27 and are carried thereby to the top of the carrier disk.

Provision is made for discharging the articles from the carrier, as the pockets move past the top and for inverting those articles which do not face in a preselected direction. For this purpose there are provided a plurality of plungers 51 each mounted for reciprocation in a bore 52 in the disk 10 and each associated with one of the pockets 27 on the disk. A head 53 is provided on each of the plungers and arranged for engagement with the cup-shaped article in the respective pocket, when the article is oriented in the pocket with the concave side thereof

facing away from the disk. A spring 54 is interposed between the disk and a stop 55 on the plunger to normally urge the latter to its retracted position out of engagement with the article in the pocket. The plunger is preferably arranged so that it does not engage the article in the pocket, when the plunger is moved inwardly, if the article has the concave face thereof directed toward the disk.

The cup-shaped articles are retained against movement through the open radially inner end of the pockets, as the pockets approach the top of the carrier, by means of an arcuate guide bar 56 which underlies the radially inner ends of the pockets, as best shown in Fig. 1. The guide bar 56 is mounted on a U-shaped bracket 57 carried by a stop plate 58 which is affixed to the upper ends of the uprights 36 and 37 at the rear side of the disk. An article retaining bar 59 is attached to the outer end of the arm 38 and extends across the open side of the pockets as they move thereby to prevent accidental dislodgement of the articles from the pockets.

As best shown in Fig. 6, the articles 31 are supported in the pockets 27 at the top of the carrier in a rearwardly inclined position so as to be normally maintained by gravity in the pocket. Means is provided for striking a blow to the plungers 51 as the pockets move by the top of the apparatus to thereby discharge and invert those articles which do not face in a preselected direction. As best shown in Figs. 3, 4 and 5, an arm 61 is mounted on a stub shaft 62 attached to the top plate 58 for swinging movement in a path disposed transversely of the carrier disk 10. A hammer member 63 is attached to a laterally extending finger 64 adjacent the free end of the arm, which hammer member is arranged for movement into and out of engagement with the rear ends of the plungers 51 as they move past the hammer member. A spring 65 has one end thereof attached to an arm 66 also rigidly affixed to the shaft 62 and the other end thereof attached to the upright 36 to normally urge the hammer member into engagement with the plungers. A plurality of pins 68 are mounted at the rear side of the carrier disk 10 and each associated with one of the plungers 51. The pins 68 are arranged in a circular pattern and spaced radially on the disk from the plungers 51. A cam member 69 is attached to the free end of the arm 61 and slants, in the direction of rotation of the carrier disk 10, toward the latter into the path of movement of the pins 68. As the carrier disk 10 is rotated, the pins 68 engage the cam member 69 and swing the arm 61 in a clockwise direction as viewed in Fig. 4 to move the hammer member 63 away from the disk and from the plungers 51. As the pin 68 rides over the end of the cam member, the latter is released whereby the spring 65 is operative to rapidly move the hammer member into engagement with one of the plungers 51 to strike a blow to the latter. As is apparent from Fig. 5, the angular spacing between the plungers 51 and the respective pins 68 is such that the hammer member 63 overlies one of the plungers when the cam member 69 rides off of the associated pin 68.

If the article 31 has the concave side thereof facing away from the disk, the head 53 on the plunger will engage the article and push the latter out of the respective pocket 27, as shown in dotted lines in Fig. 6. In order to insure inversion of the article as it is ejected from the pocket by the plunger 51, a bar 71 is attached to the bracket 57 and arranged to extend across the open front face of the pocket 27 when the latter is adjacent the hammer 63. This bar is located adjacent the radially inner end of the pocket so as to engage only the lower edge of the article.

A chute is provided for receiving the articles as they are discharged from the pockets 27 and, as best shown in Figs. 1 and 4, the chute has a flared upper end portion 75 which extends into closely spaced adjacency of the front face of the carrier disk 10, adjacent the radially inner ends of the pockets 27 and which chute is inclined downwardly

and outwardly from the carrier disk. The upper end portion 75 of the chute is attached to an angulated bracket 76 carried by the U-shaped bracket 57 and is secured thereto by fasteners 77. For reasons set forth more fully hereinafter, the chute is formed with upstanding flanges 78 and 79 along opposite side edges thereof, which flanges converge toward each other and the bottom wall of the upper portion of the chute has panels 75a which slope downwardly, in a direction transversely of the chute and merge with panels 75b. The guide bar 56 extends only part way across the upper portion of the chute and is so arranged as to be spaced from the flange 79 on the chute a distance at least equal to the width of one of the pockets 27. Thus, those articles in the pockets which have the concave face thereof registering with the carrier disk and which were not discharged from the pockets by the plunger 51, are carried in the pockets until the latter move across the end of the guide bar 56. The articles are then free to pass through the open radially inner end of the pockets into the chute 75 and a resilient scraper finger 81 is attached to the chute 75 and extends into wiping contact with the carrier disk adjacent the open ends of the pockets to assist in removing the caps from the pockets.

A lower chute portion 83 in the form of a channel preferably having a closed top, is mounted in alignment with the upper chute portion 75 to normally receive the caps therefrom and is spaced from the upper chute portion a distance greater than the diameter of the articles being sorted to permit the articles to fall back into the hopper when the lower chute portion is full of caps. As best shown in Fig. 1, the lower chute portion is conveniently arranged to extend through an opening 84 in the hopper wall 32 and is supported thereby, a bar 85 being provided to attach the adjacent ends of the upper chute portion 75 to the lower chute portion 83 and to assure proper alignment therebetween. The end of the lower chute portion 83 which registers with the upper chute portion is preferably flared outwardly as shown at 87 to facilitate guiding the caps into the lower chute portion. Adjustable vanes 88 are mounted along the upstanding flanges 78 and 79 on the upper portion of the chute 75 and arranged for adjustment by means of a thumb screw 89 to facilitate guiding of the articles into the lower chute portion. A baffle plate 91 is affixed to the chute 75 and is arranged to prevent caps which are ejected from the pockets by the plunger 51 from flying out of the chute.

The articles as they pass through the lower chute portion 83 are thus oriented in the same direction. These articles may conveniently be conveyed by means of a chute 94 to a capping mechanism generally indicated by the numeral 95 such as is disclosed and claimed in my copending application for capping apparatus, Serial No. 572,466, filed March 19, 1956 and now issued as Patent No. 2,805,532. As shown in Fig. 2, the capping mechanism is applied to a filling machine 96 which includes a conveyer 97 operative to sequentially move the cups 98 past a filling station to the capping station. A pusher bar 99 is provided on the capping mechanism and arranged for operation in timed relation to the vanes of the containers on the conveyer to move the containers crosswise of the conveyer onto a loading platform 101. The caps 31 in the chute 94 are normally retained in the chute 94 by resilient fingers 102 which extend inwardly of the chute, adjacent the lower end thereof and which are yieldable to permit passage of the cap thereby. An angulated guide plate 103 is attached to the lower end of the chute 94, as by fasteners 104, and a presser plate 105 is hingedly connected at 106 to the guide plate and arranged for vertical pivotal movement. A suitable weight or other means 107 is provided for urging the presser plate against the caps to press the latter onto the containers as they move thereby.

In operation, a quantity of unsorted caps 31 is deposited in the hopper defined by the arcuate wall 32

and the front face of the carrier disk 10. As the disk is rotated by the motor 19 through the gear reducing mechanism 12, the pockets 27 at the periphery of the disk move downwardly into the articles in the hopper. The articles 31 are agitated by the agitator bars 45 and the articles eventually pass into the pockets on the conveyor. Since the carrier disk is tilted rearwardly, the articles tend to move towards the face of the carrier disk. However, in order to catch any articles which may fall from the pockets as the disk is rotated, the wall 32 is arranged to extend relatively higher at the trailing side of the disk than at the leading side thereof. The carrier thus selects individual articles from the unsorted articles in the hopper and raises the articles to a position adjacent the top thereof. As the plungers 51 in the respective pockets move past the hammer 63, the latter is actuated to strike a blow to the article in the pocket. Those articles which face with the concave side thereof away from the disk 10 are struck by the plunger 51 and are discharged from the pockets. The articles strike the bar 71 adjacent the lower edge thereof and are thereby inverted as they fall into the chute 75, as best shown in Fig. 6. The articles as they enter the chute have some tangential velocity due to the rotation of the disk. A previously described formation of the upper portion 75 of the chute is arranged to prevent movement of the articles crosswise of the chute and to guide the articles downwardly in the chute portion 75 and across the gap into the lower chute portion 83.

Those articles which are not discharged by engagement with the plunger 51 remain on the carrier until the pockets register with the opening formed between the guide bar 56 and the flange 79 on the upper portion of the chute 75. These articles face with the concave side thereof registering with the disk 10 and are removed by the resilient finger 81. The articles are also guided by the chute 75 downwardly into the lower portion of the chute 83. When the latter becomes filled, succeeding articles strike the articles in the lower portion of the chute and fall back into the hopper.

When used in conjunction with a capping mechanism such as 95, the articles 31 are caps and these caps pass downwardly from the chute 83 into the chute 94 to the capping mechanism 95. The caps are releasably retained by the resilient fingers 102 until a container 98 is moved into engagement with the lowermost edge of the cap in the chute. Further movement of the container by the push bar 99 withdraws the cap from the chute and positions it loosely on the upper end of the container. As the container is advanced during a subsequent capping operation by engagement with a subsequent container, the cap is pressed firmly onto the container by the presser plate 105 as the container passes therebelow.

I claim:

1. An apparatus for sorting cup shaped articles comprising a circular carrier having the front face thereof inclined to the vertical and mounted for rotation about an axis perpendicular thereto, said carrier having a plurality of annularly spaced pockets disposed at the front face thereof for receiving cup-shaped articles, means for retaining a plurality of unsorted articles at the front side of the carrier, a plunger individual to each of said pockets and mounted on said carrier for reciprocation in a direction transverse to the front face thereof, means yieldably urging said plungers to a retracted position, stop means limiting extension of said plungers whereby the plungers are movable into engagement with a cup-shaped article in the associated pocket only when the article faces in one direction, a hammer located at an article inverting station adjacent the upper edge of said carrier and mounted for movement in a direction transverse to said front face of said carrier into and out of engagement with the plungers, means on said carrier for operating said hammer each time one of the plungers on the

carrier is advanced to said inverting station to thereby strike a blow to the article in the respective pocket if the article faces in said one direction and discharge the article from the pocket, and means located adjacent said article inverting station and overlying the face of said pockets adjacent the radially inner edge thereof for engaging the articles adjacent their radially inner edge as they are discharged by said hammer from said pockets to invert the articles.

2. An apparatus for sorting cup-shaped articles comprising a circular carrier having the front face thereof inclined to the vertical and mounted for rotation about an axis perpendicular thereto, said carrier having a plurality of annularly spaced pockets each open at the side thereof opposite the carrier and also opening radially inwardly to receive articles, means defining a hopper for retaining a quantity of unsorted articles at the front face of said carrier, a stationary chute inclined to the front face of said carrier and merging therewith at a point located radially inwardly of said pockets adjacent the top of the carrier, guide means extending partially across the upper end of said chute and underlying the radially inner ends of said pockets to retain the articles therein and defining an article inverting station, means at said article inverting station overlying the front face of said pockets adjacent the radially inner edge thereof for engaging the inner edge of the article, a plunger individual to each of said pockets and mounted on said carrier for reciprocation in a direction transverse to the front face thereof, means yieldably urging said plungers to a retracted position, stop means limiting extension of the plungers whereby the plungers are movable into engagement with a cup-shaped article only when the article faces in one direction, a hammer located at the article inverting station and mounted for movement in a direction transverse to the front face of said carrier into and out of engagement with the plungers, means on said carrier for operating said hammer each time one of the plungers on the carrier moves past the hammer to thereby strike a blow to the article in the respective pocket if the article faces in said one direction to discharge the article from the pocket and invert the same as it falls into said chute, said chute communicating with said pockets at the trailing end of said guide means to receive the articles which face in the other direction and which pass through the open radially inner ends of the pockets into the chute.

3. An apparatus for sorting cup-shaped articles comprising a circular carrier having the front face thereof inclined to the vertical and mounted for rotation about an axis perpendicular thereto, said carrier having a plurality of annularly spaced pockets disposed at the front face thereof for receiving cup-shaped articles, means for retaining a plurality of unsorted articles at the front side of the carrier, a plunger individual to each of said pockets and mounted on said carrier for reciprocation in a direction transverse to the front face thereof, means yieldably urging said plungers to a retracted position, stop means limiting extension of said plungers whereby the plungers are movable into engagement with a cup-shaped article in the associated pocket only when the article faces in one direction, a hammer located at an article inverting station adjacent the upper edge of said carrier and mounted for movement in a direction transverse to said front face of said carrier into and out of engagement with the plungers, spring means yieldably urging said hammer into engagement with said plungers as they move past the hammer, a plurality of pins on said carrier each associated with one of said plungers, cam means on said carrier adapted for engagement with each of said pins to move the hammer away from the associated plunger and to rapidly release the hammer as the cam means rides over the pin whereby the spring means moves the hammer against the respective plunger and strikes a

blow to the article in the respective pocket when the article faces in said one direction to discharge the article from the pocket, and means at said article inverting station overlying the face of said pockets adjacent the radially inner edge thereof for engaging the articles adjacent their radially inner edge as they are discharged from the pockets by the hammer to thereby invert the articles.

4. An apparatus for sorting caps comprising a support, a circular carrier disk having the front face thereof inclined to the vertical and mounted on the support for rotation in one direction about an axis perpendicular to said front face, said disk having a plurality of annularly spaced pockets at the front side thereof open at the front face thereof and also at the radially inner ends thereof to receive articles, a hopper for storing unsorted articles at the front side of the carrier disk comprising an arcuate wall having a flange along one side edge thereof extending into closely spaced adjacency to the front side of said disk at the bottom thereof and partially overlying the open front side of said pockets to retain articles in the pockets and minimize interference between the articles in the hopper and those in the pockets on the carrier, means including a plurality of arms on said support at the rear side of said disk and attached to said one edge of said wall at spaced points therearound for supporting the wall at the front side of said disk, said wall extending upwardly and outwardly from the lower portion of said disk and terminating in an open top spaced below the upper edge of the disk to define a hopper for retaining a plurality of unsorted articles at the front face of the disk, means on the support for rotating the disk, and means located adjacent the upper edge of the disk for discharging the articles from the pockets and for inverting all articles which do not face in a preselected direction.

5. The combination of claim 4 wherein said last mentioned means includes a plunger individual to each of said pockets and mounted for reciprocation on the disk to engage an article in the pocket only when the article does not face in a preselected direction, a hammer mounted on said support at an inverting station adjacent the top of the disk for movement in a plane transverse to said disk into and out of engagement with the plungers as they move past the inverting station, and means on the disk for operating the hammer each time one of the plungers moves past the hammer to strike a blow to the article in the respective pocket if the article does not face in said preselected direction, and means overlying the front face of the pockets at the inverting station adjacent the radially inner edge thereof for engaging the inner edge of the articles as they are discharged from the pockets to invert the same, and means at an article

discharge station adjacent the top of the disk for discharging those articles which face in said preselected direction as the pockets move past the discharge station.

6. An apparatus for sorting cup-shaped articles comprising a circular carrier having the front face thereof inclined to the vertical and mounted for rotation about an axis perpendicular thereto, said carrier having a plurality of annularly spaced pockets each open at the side thereof opposite the carrier and also open at the radially inner end thereof to receive articles, means defining a hopper at the front face of said carrier, a stationary chute for conveying articles from the carrier including a flared upper chute portion arranged to underlie the radially inner ends of a plurality of pockets adjacent the top of the carrier, said upper chute portion extending downwardly and outwardly from the carrier and having upstanding side edges converging toward each other, guide means extending from one side edge of the upper chute portion and part way across the upper end thereof to underlie the radially inner end of at least one of the pockets thereat and define an article inverting station, said guide means terminating in spaced relation to the other side edge of the upper chute portion to define an article discharge station, means at said inverting station for discharging articles from said pockets when they face in one direction and to invert the same as they fall into the chute adjacent said one side edge thereof, the articles in said pockets which face in the other direction passing into said chute at said discharge station, said chute including a lower portion aligned with the upper chute portion to normally receive articles therefrom, said lower chute portion being spaced from the upper chute portion to define an opening therebetween for the passage of articles, said upper chute portion including panels which slope downwardly from the center of the upper chute portion in a direction crosswise thereof to prevent the articles from sliding crosswise in the upper chute portion and to guide the same into the lower chute portion, and means for rotating said carrier in a direction to sequentially move the pockets thereon across said guide means and across the opening between the guide means and said other side edge of the chute.

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