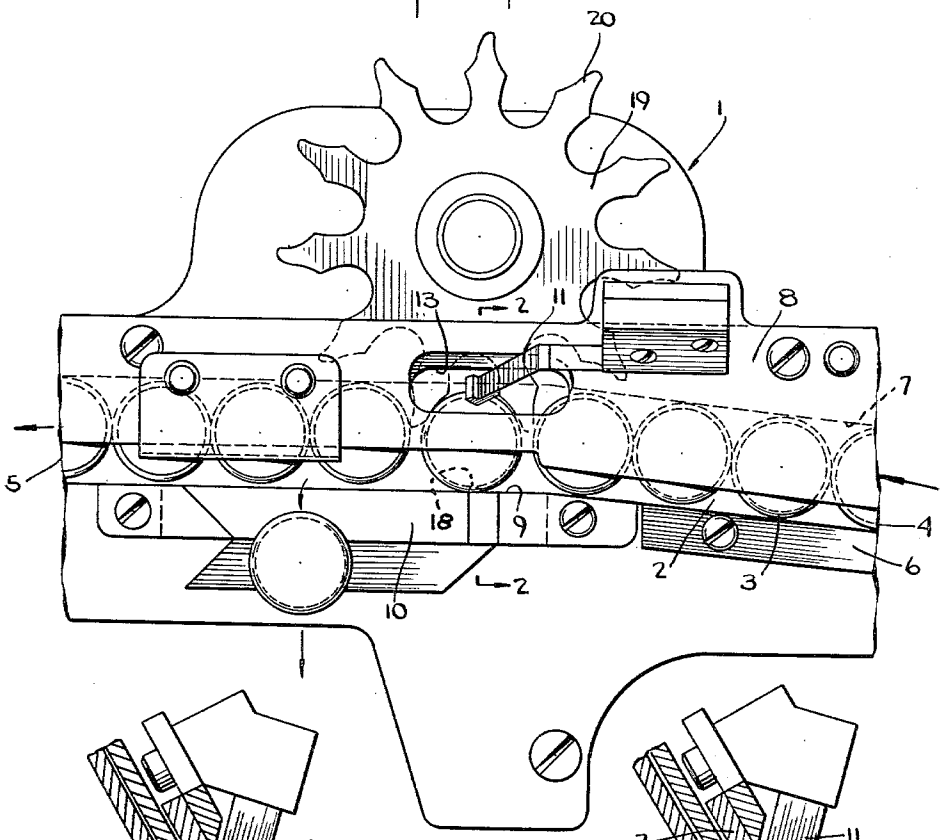
July 20, 1965 C. S. OCHS ETAL 3,195,705

AUTOMATIC CLOSURE CAP SELECTOR

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Fig. 1.



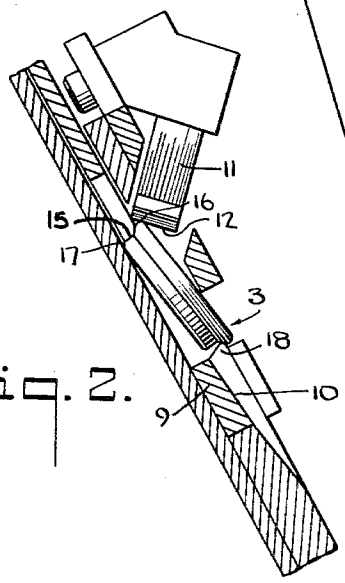


Fig. 2.

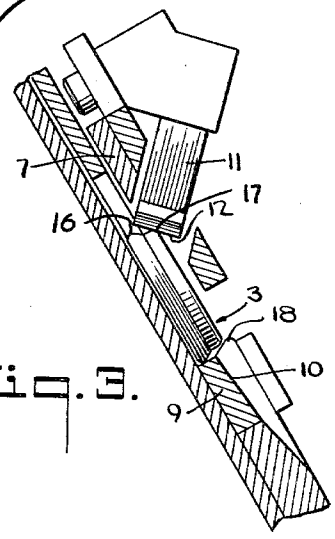


Fig. 3.

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AUTOMATIC CLOSURE CAP SELECTOR

Filed Sept. 18, 1962 2 Sheets-Sheet 2

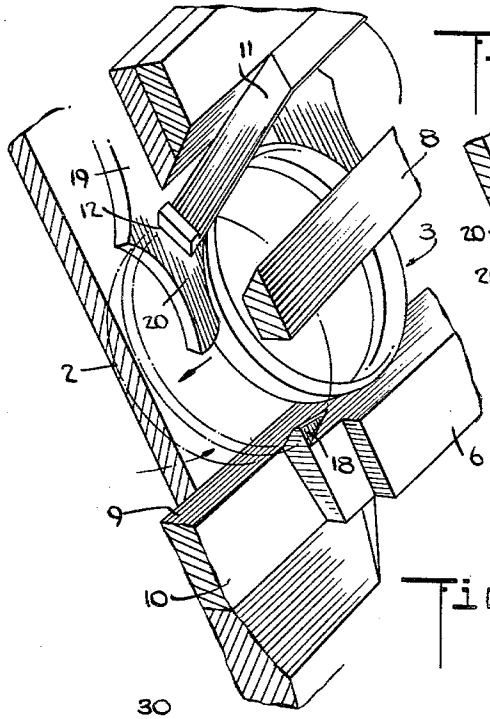


Fig. 4.

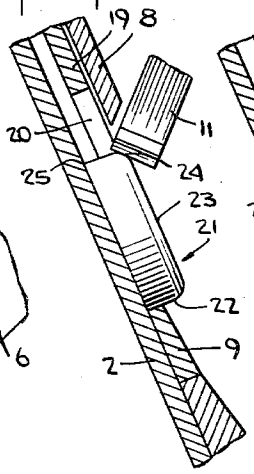


Fig. 5.

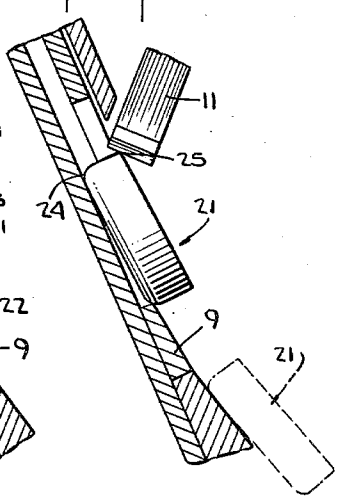


Fig. 6.

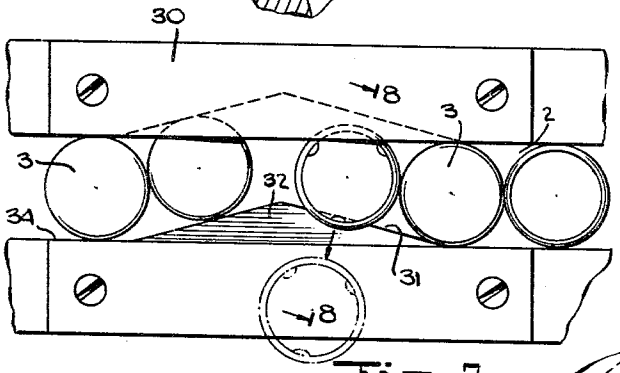


Fig. 7.

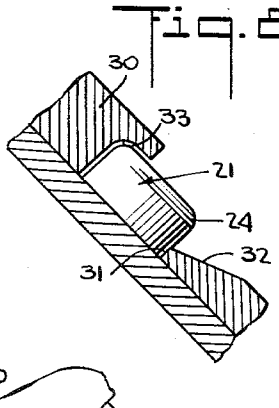


Fig. 8.

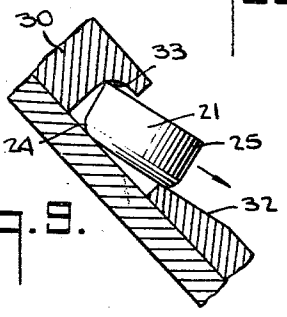


Fig. 9.

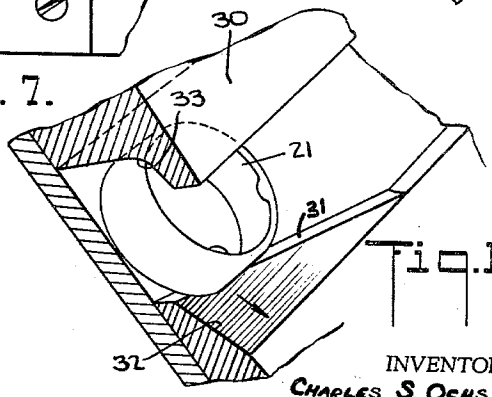


Fig. 10.

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3,195,705

AUTOMATIC CLOSURE CAP SELECTOR

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Filed Sept. 18, 1962, Ser. No. 224,410
12 Claims. (Cl. 193—43)

The present invention relates to an improved cap selector and more particularly to a high speed cap selector for use with caps or similar articles having rounded top corners or having flared, flanged or curved skirts.

A cap selector receives randomly oriented caps from a cap feeding hopper or other supplier and selects and passes on only correctly oriented caps having their tops all facing in the same direction. A cap selector, for example, is used to feed caps with all the tops facing in the same direction to a sealing machine where the caps are passed from a feed chute to a cap applicator which applies the caps to containers. The applicator may be designed to receive the caps with their tops uppermost or may be designed to operate with the caps being received in an inverted position.

The cap selector of the present invention is an improvement upon prior selectors of this general type due to its relatively simple operation and its small number of parts. These features permit the selector to be readily adjusted for handling changes in cap size and also permit the easy replacement of one cap selector for another where the change in cap shape or size requires such a substitution. The relative simplicity of the selector permits a variety of interchangeable parts for different caps or a number of cap selectors to be kept on hand for different cap sizes with only a relatively small investment. The simplicity of design and operation also permits the selector to run at high speeds and to run for long periods without adjustment or repair since the elimination of numerous moving parts and complex guiding and camming surfaces minimizes selector wear during operation and permits continuous high speed operation over long periods. The uncluttered and open form of the selector also facilitates its cleaning and provides for the continual maintenance of a clean unit by eliminating possible dirt accumulating or retaining elements and by exposing its main elements for easy cleaning, inspection and adjustment. The cap selector of the present invention also is capable of being produced for a wide range of cap sizes in compact form so that it may be readily fitted into a variety of cap feeding set-ups including use between all types of cap feeding hoppers and cap applying devices. This makes the improved selector useful on existing sealing equipment as well as on new container sealing or other similar article handling machinery.

Accordingly, an object of the present invention is to provide an improved cap selector.

Another object of the present invention is to provide a high speed cap selector characterized by extreme simplicity and reliability.

Another object of the present invention is to provide a cap selector useful with widely varying sizes of caps.

Another object of the present invention is to provide a cap selector readily adapted for changes in cap height and diameter.

Another object of the present invention is to provide a cap selector effective on caps having relatively straight skirts and rounded top corners.

Another object of the present invention is to provide a cap selector effective on caps having a flanged, flared or offset skirt where a portion of the skirt has a larger diameter than the remainder.

Other and further objects of the present invention

will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a side elevational view of a preferred embodiment of the cap selector;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1 illustrating the rejection of an improperly oriented cap;

FIG. 3 is a sectional view similar to FIG. 2 illustrating the passage of a properly oriented cap;

FIG. 4 is an enlarged perspective view illustrating the operation of the cap selector of FIG. 1;

FIGS. 5 and 6 are sectional views of another embodiment of the cap selector being used with caps having straight skirts with a rounded corner between the cap skirt and top;

FIG. 7 is a side elevational view of another embodiment of the cap selector;

FIG. 8 is a sectional view of the cap selector taken along line 8—8 of FIG. 7;

FIG. 9 is a sectional view corresponding to FIG. 8 showing selector operation for an incorrectly oriented cap; and

FIG. 10 is a fragmentary perspective view of the cap selector of FIG. 7.

As illustrated in FIG. 1, the cap selector 1 has a cap chute or channel 2 which carries a line of caps 3 through the selector for the sensing and selecting operation. The inlet end 4 of the chute 2 is connected by a suitable chute to a cap feeding hopper or other cap supply means (not shown) and the outlet end 5 of the selector 1 is connected by a suitable channel directly to a container sealing machine or to any other article handling or storing device (not shown) for the correctly oriented caps 3.

The cap selector is used where the caps 3 which are being fed through the channel 2 are randomly oriented so that the caps may be facing one way or the other in the chute 2. The function of the selector is to sense all caps which face in one particular direction and to remove these caps from the chute 2 so that they may be returned to the feed hopper. All caps passing through the outlet end 5 of the chute 2 will be positioned in the same way which, in the embodiment described herein, is with the cap tops uppermost in the position shown for the cap 3 in FIG. 3.

Since the caps 3 are normally fed from hoppers and into chutes such as the chute 2 under pressure, this feed pressure acts to continually move the caps 3 through the chute 2 past the selector means.

The selector 1 illustrated in FIGS. 1–4 operates in the following manner. As illustrated in the sectional view of FIGS. 2 and 3, the cap chute 2 is tilted in a transverse sense so that a cross-section makes a relatively steep angle with the horizontal. In the preferred embodiment, this angle is about 40-60 degrees, however, it is not critical. Each of the caps 3 passing through the selector 1 is initially guided by the spaced selector guide rails 6 and 7 and a top plate 8. At the sensing portion, the lower guide rail 6 is succeeded by a tapered selecting rail 9 having a reduced height at the chute 2 and a sloping cap guiding surface 10 extending outwardly therefrom. On the upper side of the chute and opposite the initial portion of the selecting rail 9, a pressure member 11 is mounted so that its end 12 extends through an aperture 13 in the chute cover 8 and

so that the end 12 resiliently engages the outermost portion of the edge of each cap 3 passing through the chute 2. The function of the pressure member 11 in combination with the selecting rail 9 is illustrated in FIG. 2 for an improperly oriented cap and in FIG. 3 for a properly oriented cap.

The cap 3 shown in these figures is a flanged cap with the lower portion of the skirt 15 flared outwardly as illustrated. As seen in FIG. 2, the pressure member 11 engages the improperly oriented cap at the uppermost edge 16 of its skirt and applies a cap turning or tilting force due to the engagement of the pressure member 11 against the edge 16 radially outwardly of the top radius 17 of the cap 3 which rests against the chute 2. This force causes the cap 3 to tilt on the chute as illustrated so that its edge 16 rides up onto the selecting rail 9 from where the cap 3 slips out of chute 2 under the force of the pressure member 11 and of gravity. In the preferred embodiment, a tapered cam 18 is mounted on the selecting rail 9. This cam 18 facilitates the selection by lifting the edge 16 of the cap 3 onto the continuing sloping surface 10 of the cap selecting rail 9 to insure that the cap edge 16 is carried over the edge of the cap selecting rail 9 allowing the cap 3 to slide back into the cap feeding hopper or downwardly into a suitable container or onto a conveyor for return to the cap feeding hopper.

FIG. 3 illustrates a correctly oriented cap 3 passing the pressure member 11 and the cam 18. In this case, the pressure member 11 contacts the top radius 17 of the cap radially inwardly of the skirt edge 16. This force acts to turn or hold the cap 3 against the bottom of the chute 2 so that the cap 3 remains against the bottom of the chute 2 as it passes the cam 18 and the selecting rail 9. This correctly oriented cap 3 will therefore pass the resilient member 11 without being tilted away from the chute 2 and will remain within the confines of the cap guide rails 6, 7 and 9 and the chute cover 8 so that it passes out of the discharge end 5 of the chute 2.

In order to space the caps 3 from one another during the time that they are acted upon by the pressure member 11, a free running star wheel 19 is preferably mounted on the selector 1. The star wheel 19 is rotated by the moving caps and its arms 20 pass between the caps 3 to isolate the particular cap beneath the pressure member 11 from the other caps to prevent back pressure on this cap from interfering with the selecting operation.

For changes in cap size, the guide rails 6, 7 and 9 and the cap chute cover 8 may be adjusted by the mounting screws. When necessary, the detachable selecting rail 9 may be replaced as where the cam 18 is not being used. The relative simplicity of the selector also permits a series of interchangeable selectors to be provided to handle a range of conventional cap sizes and shapes used in any particular operation.

FIGS. 5 and 6 illustrate the operation of the above described cap selector without cam 18 and for caps 21 having a generally straight skirt 22 which joins the cap cover 23 at a top radius 24. As seen in FIG. 5, the properly oriented caps 21 engage the pressure member 11 at a portion of the top radius 24 positioned radially inwardly from the skirt edge 25. This inwardly positioned force tends to hold the cap 21 flat against the cap chute 2 to prevent the caps tilting and sliding out of the chute over selector rail 9. On the other hand, in FIG. 6, the improperly oriented cap 21 is engaged on the skirt edge 25 by pressure member 11 and the cap 21 is rocked or tilted away from chute 2 on top radius 24 so that force of pressure member 11 and of gravity causes the cap 21 to slide downwardly over the selector rail 9 and out of chute 2.

The pressure member 11 may be a resilient leaf spring or any other member havings its edge 12 resiliently mounted to apply a spring-like force on the caps in the direction of the chute bottom.

FIGS. 7–10 illustrate another embodiment of the cap selector wherein the tilting means takes the form of a shaped cam 30. In this embodiment, a lower selector rail 31 of reduced height is used having a sloped cap guiding surface 32. On the upper side of the chute 2 opposite the lower rail 31, the sensing cam 30 is provided for tilting improperly oriented caps so that they slide downwardly over the guiding surface 32.

The operation for properly oriented caps 21 is illustrated in FIG. 8. The cap 21 passes the cam 30 with its top radius 24 in sliding engagement with a complemenatrily shaped surface 33 on the cam 30. No tilting force is applied in this case to the cap 21. The cap passes along the guide rail 31 without tilting so that it passes out of the discharge end 34 of the chute 2.

As illustrated in FIG. 9, an improperly oriented cap 21 strikes the rounded surface 33 of the cam 30 with its skirt edge 25 so that it is forced downwardly and tilted outwardly from the chute 2. This causes its top radius 24 to ride over the edge of the guiding surface 32 and causes the cap 21 to fall out of the chute 2 under the force of the cam 30 and of gravity.

Caps 21 such as those illustrated in FIGS. 5–10 having relatively straight skirt portions are selected efficiently even though in contact with the other caps of the line so that the star wheel 19 need not be used in selectors which are being only used for this type of caps.

It will be seen that an improved high speed cap selector has been provided for use with a wide variety of cap sizes and shapes. The cap selector of the present invention is relatively simple and adapted for use with presently used cap applicators and cap feeding hoppers. The selector is capable of operating at extremely high speeds so that it may be used with high speed cap feed hoppers and sealing machines. The cap selector also has a minimum number of parts and particularly a minimum number of moving parts so that set-up, maintenance, repair and cleaning are simplified and so that the cap selector has an extremely long life which minimizes replacement costs.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A selector for articles having spaced circular edges with one edge having a greater diameter than the other comprising the combination of a channel for guiding a moving line of said articles and being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said channel for engaging and supporting the sides of articles moving through said channel, and a pressure means on the uppermost edge of said channel positioned to engage the uppermost circular edge of each article on the inclined channel whereby those articles having their greater diameter uppermost are tilted with respect to said channel and pass out of the channel over said guide rail under the force of gravity.

2. The selector as claimed in claim 1 which further comprises a spacer for spacing the articles at said pressure means from the remaining articles in the moving line.

3. The selector as claimed in claim 1 which further comprises a star wheel adjacent said pressure means and having its arms positioned to pass between adjacent articles at said pressure means for spacing the articles at said pressure means from the remaining articles in the moving line.

4. A selector for articles having spaced circular edges at the article sidewalls with one edge having a greater diameter than the other comprising the combination of a channel for guiding a moving line of said articles and

being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said channel for engaging and supporting the sides of articles moving through said channel, a pressure means adjacent the uppermost edge of said channel positioned to engage the uppermost circular edge of each article on the inclined channel whereby those articles having their greater diameter uppermost are tilted on said channel and pass over said guide rail under the force of gravity, and a cam on said guide rail opposite said pressure means for engaging the sidewalls of said those articles to cooperate in the tilting.

5. A selector for cup-like articles having spaced circular edges with one edge having a greater diameter than the other comprising the combination of a channel for guiding a moving line of said articles and being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said channel for engaging and supporting the sides of articles moving through said channel, a recess in said guide rail, and a pressure means adjacent the uppermost edge of said channel opposite said recessed portion positioned to engage the uppermost circular edge of each article on the channel whereby those articles having their greater diameter uppermost are tilted on said channel and pass over said guide rail at the recessed portion under the force of gravity.

6. The selector as claimed in claim 5 which further comprises a spacer for spacing the article at said pressure means from the remaining articles in the moving line.

7. The selector as claimed in claim 5 which further comprises a star wheel adjacent said pressure means and having its arms positioned to pass between adjacent articles at said pressure means for spacing the article at said pressure means from the remaining articles in the moving line.

8. A selector for closure caps having generally straight skirts depending generally perpendicularly from the cap tops and with rounded corners between the skirts and the cap tops comprising the combination of a chute for guiding a moving line of said caps and being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said chute for engaging and supporting the skirts of caps moving through said chute, a cam adjacent the uppermost edge of said chute positioned to engage caps moving therethrough and having a sensing surface shaped to freely pass the uppermost edge of caps having said rounded corners uppermost and to slidably engage the uppermost edge of the skirt of caps having said rounded corners at said chute to thereby tilt the latter named caps with respect to said chute whereby they pass out of said chute under the combined forces of said cam and gravity.

9. A selector for closure caps having generally straight skirts depending generally perpendicularly from the cap tops and with rounded corners between the skirts and the

cap tops comprising the combination of a means for guiding a moving line of said caps, said guiding means being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said guiding means for engaging and supporting the skirts of caps moving through said chute, a cam adjacent the uppermost edge of said guiding means to engage caps moving therethrough and having a sensing surface shaped to freely pass the uppermost edge of caps having said rounded corners uppermost and to slidably engage the uppermost edge of the skirt having said rounded corners at said guiding means thereby tilting the latter named caps with respect to said guiding means whereby they pass out of said chute under the combined forces of said cam and gravity, and means for spacing the cap at said cam from the moving line of caps.

10. A selector for closure caps having spaced circular edges with one edge having a greater diameter than the other comprising the combination of a channel having a cap supporting bottom for guiding a moving line of said caps and being inclined from the horizontal in a transverse direction, a guide rail along the lowermost edge of said channel for engaging and supporting the skirts of caps moving through said channel, and a tilting means on the uppermost edge of said channel positioned above the channel bottom for engaging the uppermost circular edge of each cap on the inclined channel and pressing it against the bottom whereby those caps having their greater diameter uppermost are tilted with respect to said channel and pass out of the channel over said guide rail under the force of gravity.

11. The selector as claimed in claim 10 which further comprises a spacer for spacing the cap at said tilting means from the remaining caps in the moving line.

12. The selector as claimed in claim 10 which further comprises a star wheel adjacent said tilting means and having its arms positioned to pass between adjacent caps at said tilting means for spacing the cap at said tilting means from the remaining caps in the moving line.

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