United States Patent

Sterling

[15] **3,656,604**

[45] **Apr. 18, 1972**

[54] CLOSURE HANDLING APPARATUS

[72] Inventor: **Walter S. Sterling,** Quincy, Mass.

[73] Assignee: **Pneumatic Scale Corporation,** Quincy, Mass.

[22] Filed: **Mar. 16, 1970**

[21] Appl. No.: **19,998**

[52] **U.S. Cl.**.....**198/33 AA,** 221/157, 221/160

[51] **Int. Cl.**.....**B65g 47/24**

[58] **Field of Search**.....221/156–161, 173, 221/233, 278; 198/33 AA; 193/43 R, 43 C

[56] **References Cited**

UNITED STATES PATENTS

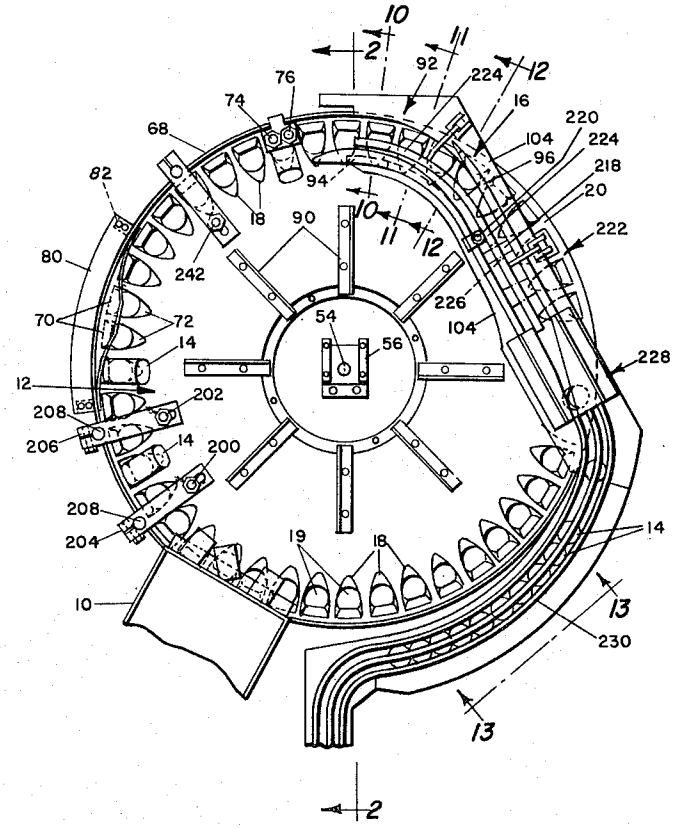
1,700,217	1/1929	Ernst et al	221/159
3,012,651	12/1961	Hawkes	221/160 X
2,904,162	9/1959	Simer	221/160 X
2,402,097	6/1946	Spraker	221/160

Primary Examiner—Samuel F. Coleman
Assistant Examiner—Larry H. Martin
Attorney—Robert R. Churchill

[57] **ABSTRACT**

Closure handling apparatus designed to effect orientation of elongated cylindrical closures which are greater in length than in diameter and in which the closed end is heavier than the open end. Closures are received in radially arranged pockets in either an oriented or non-oriented position, provision being made for rejecting from their pockets the non-oriented closures.

11 Claims, 17 Drawing Figures



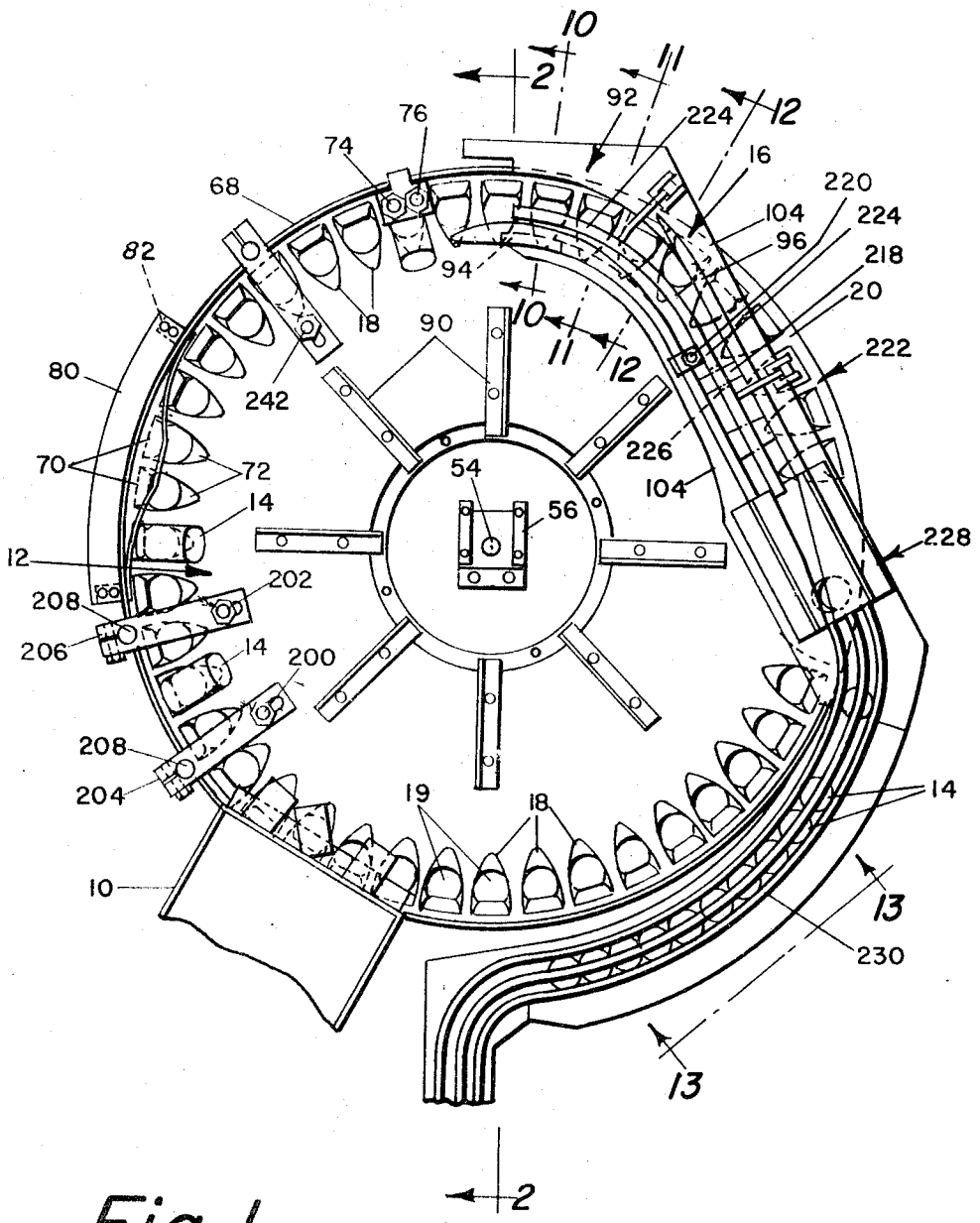


Fig. 1

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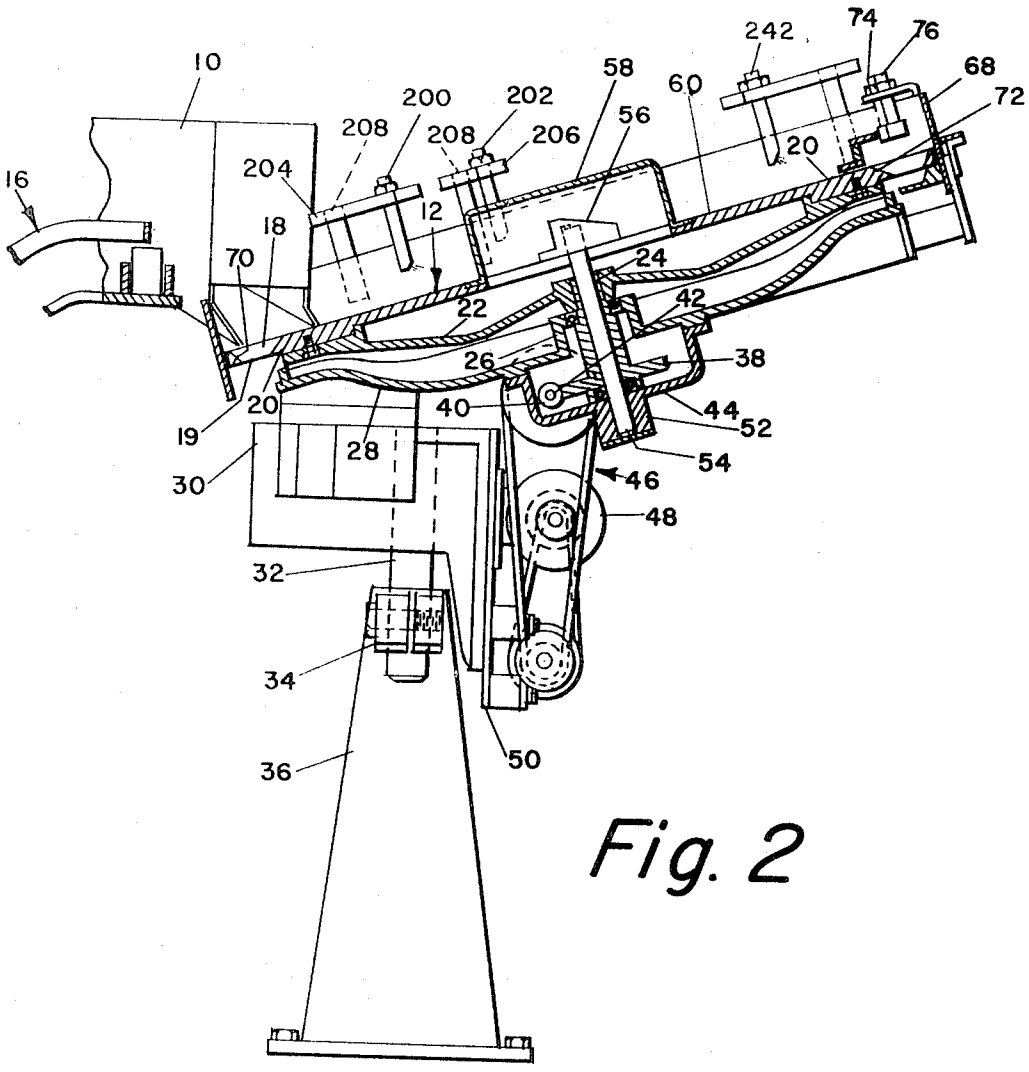


Fig. 2

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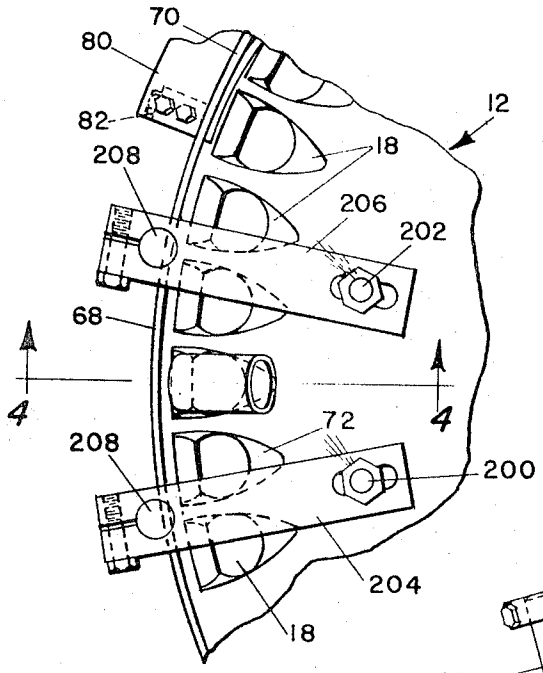


Fig. 3

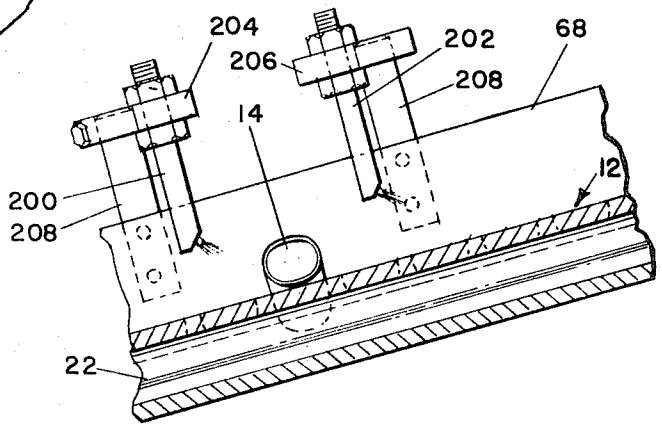


Fig. 5

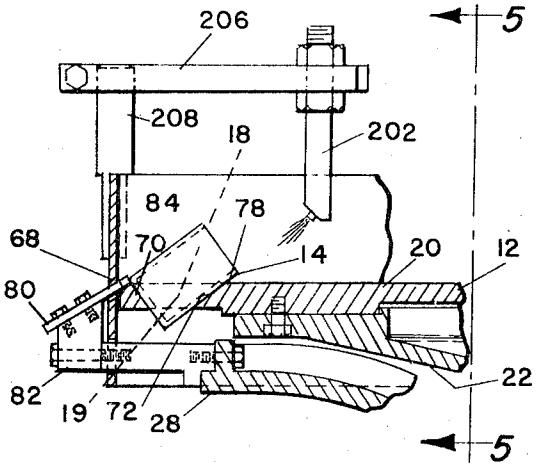


Fig. 4

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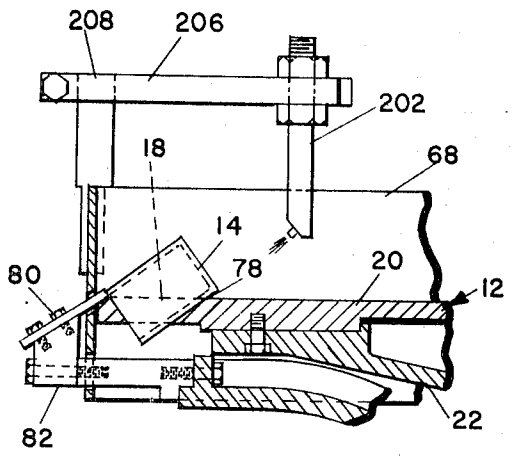


Fig. 6

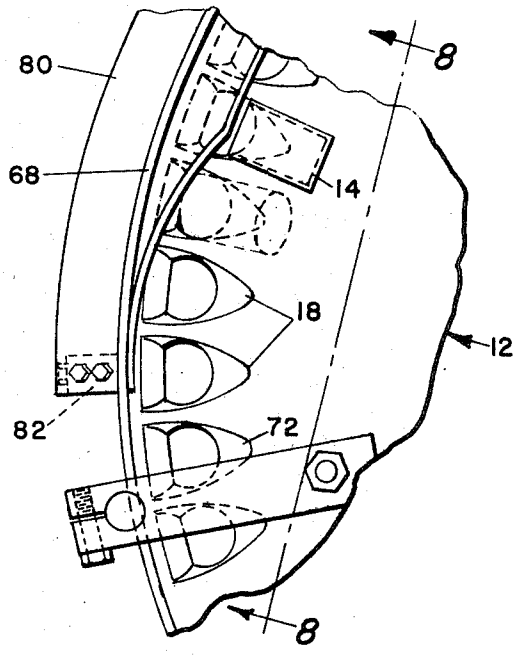
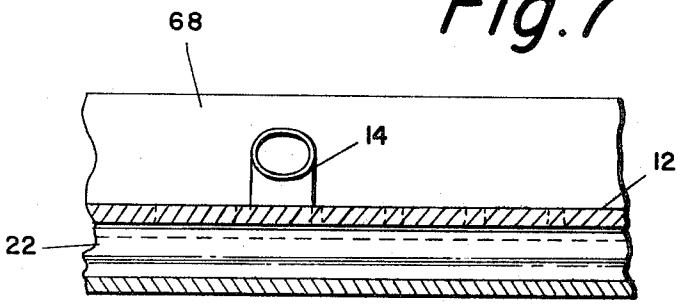


Fig. 7

Fig. 8



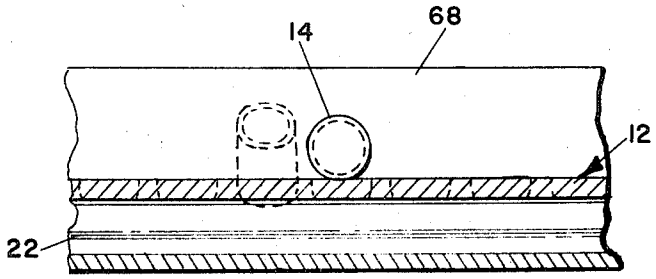


Fig. 9

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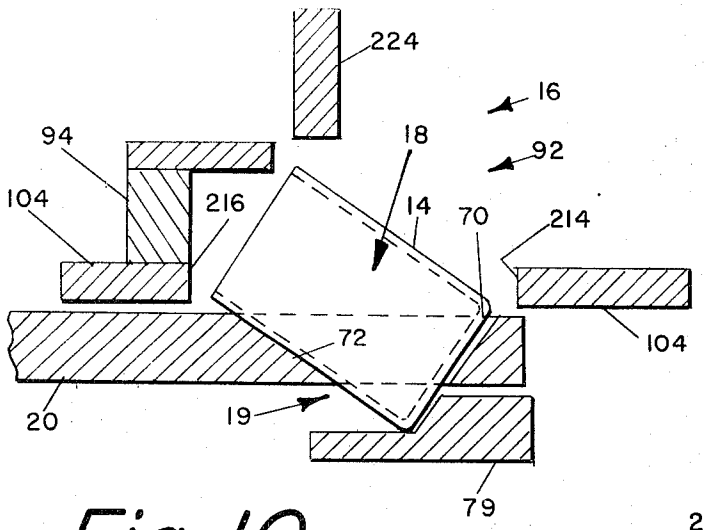


Fig. 10

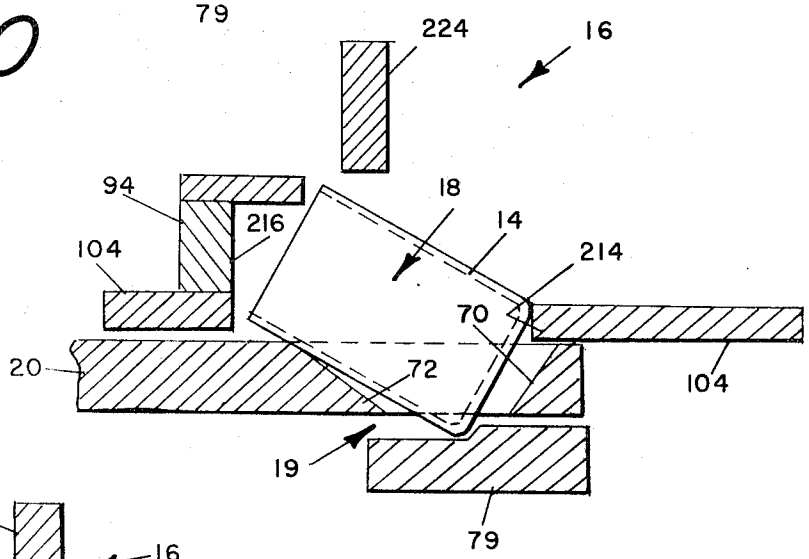


Fig. 11

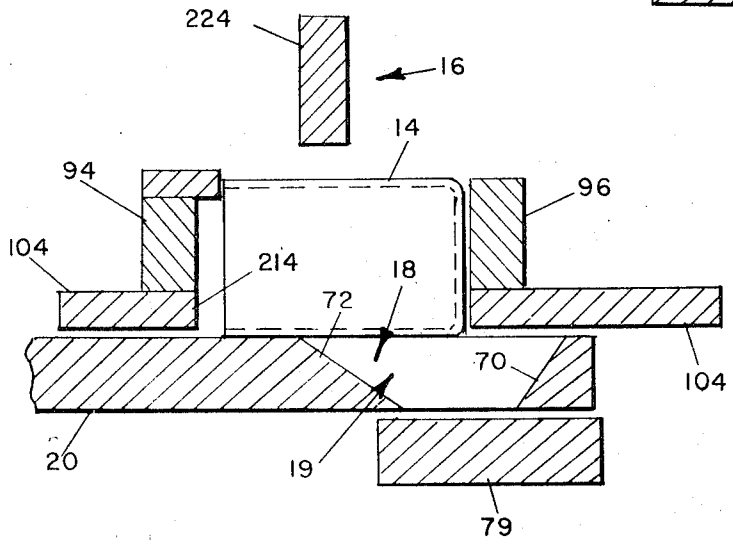
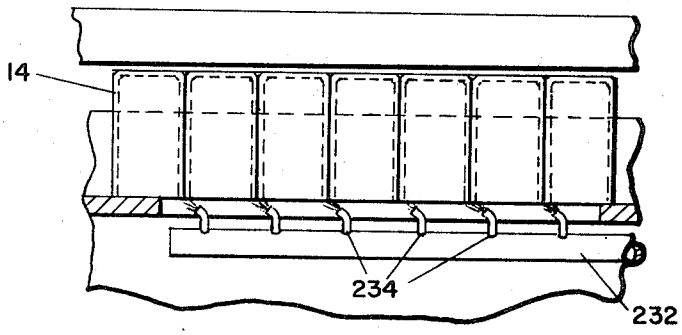


Fig. 12

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Fig. 13



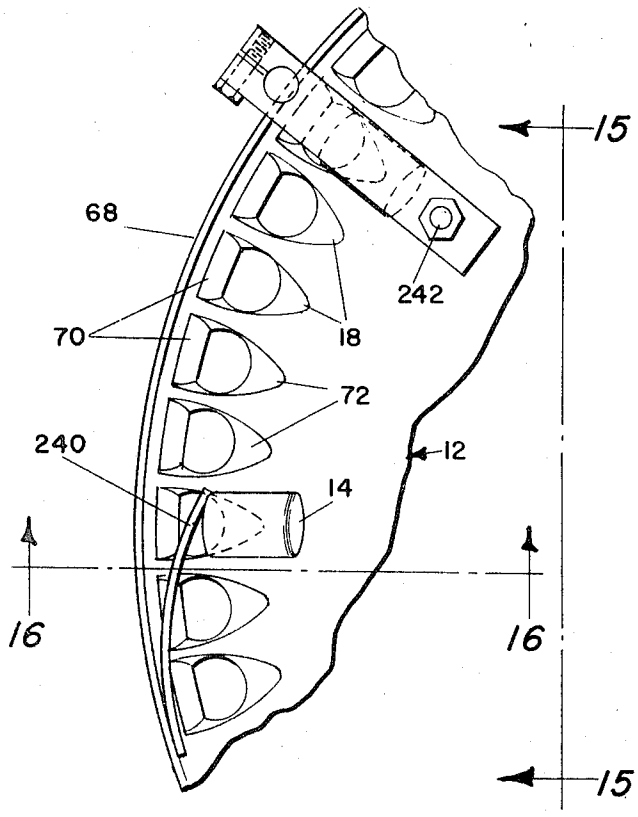


Fig. 14

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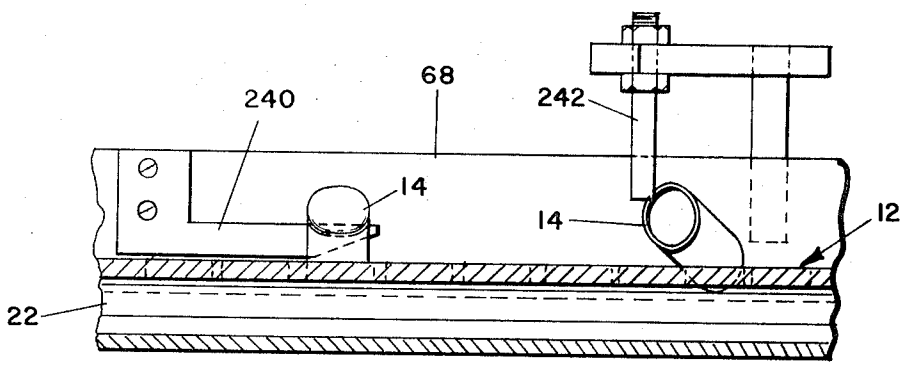


Fig. 15

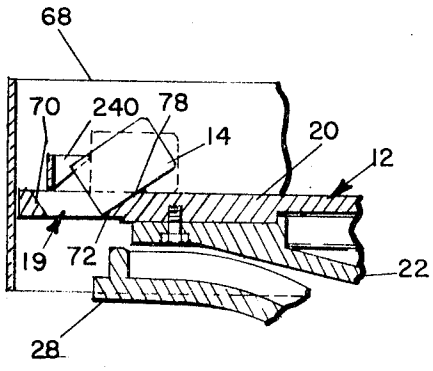


Fig. 16

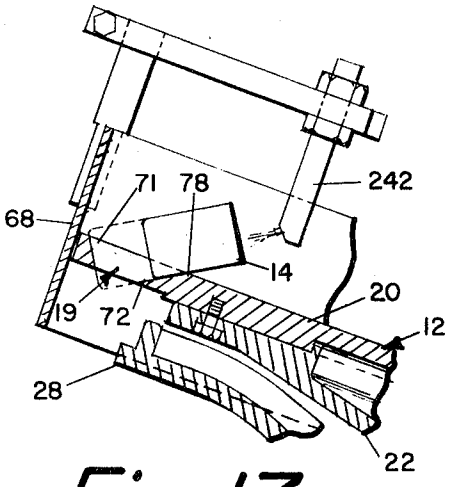


Fig. 17

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CLOSURE HANDLING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to closure handling and orienting apparatus adapted to receive a supply of randomly arranged closures and to orient the same prior to depositing the closures into a supply chute from which successive closures are withdrawn for application to containers.

2. Description of the Prior Art

Prior closure handling apparatus of the same general type is exemplified in U.S. Pat. No. 2,715,978 issued to Walter S. Sterling and assigned to the present assignee. Such prior apparatus takes the form of an inclined rotary disk onto which randomly or haphazardly arranged closures are deposited from a bulk supply thereof. In operation, the closures carried up the rotary inclined disk are guided to be received between the beveled edge of a relatively small disk rotated in a substantially horizontal plane and a cooperating rail. Those closures which assume an oriented position between the beveled edge of the disk and the rail are enabled to maintain a position of equilibrium between the rail and the disk and are deposited into a chute for delivery to a closure applying machine. Those closures which assume a position other than an oriented position between the disk and the rail are overbalanced to fall onto the lower end of the inclined rotary disk to be again carried up and guided between the horizontal disk and the rail.

In such prior apparatus, the closures are arranged to be oriented in a natural or inherent position of equilibrium which may vary with different sizes and shapes of closures, and which may also vary in their distribution of weight, that is, one end may be heavier than the other, for example. In practice, the disk and rail device of the prior art effects removal from a group of randomly arranged closures only those closures which inherently assume an oriented position, those closures assuming a position other than a desired position of orientation being rejected to be returned to the lower end of the inclined disk where they join with and are jostled by other closures to change their positions and to be again carried up the incline until they assume a desired position of orientation. In operation, it has been found that a great majority of the closures tend to assume a natural and substantially uniform position of rest or equilibrium in the desired position of orientation so that the efficiency of the apparatus is surprisingly high. However, relatively large closures of different shapes and weights cannot be conveniently handled on the prior disk and rail type of apparatus in its present form.

SUMMARY OF THE INVENTION

The present invention contemplates container handling apparatus particularly adapted for handling and orienting elongated, narrow cylindrical closures which are heavier at their closed ends than at their open ends and which are substantially greater in length than in diameter. In practice, the elongated narrow closures which the present apparatus is adapted to handle tend to assume an at-rest position lying on their sides so that they tend to roll on the inclined rotary disk, provision being made for causing those closures standing on end to assume a lying down position.

In accordance with the present invention, the apparatus provides a series of closely spaced, radially arranged pockets adjacent the periphery of the inclined rotary carrier into which the closures will fall or roll to be carried upwardly with the carrier. In operation, when a randomly arranged closure deposited at the lower end of the carrier falls by chance into a pocket with its heavier and closed end facing radially outwardly, it will be properly seated in the pocket in the desired position of orientation and in condition to be guided into a chute at the upper end of the rotary carrier. Those closures which are received in a pocket in other than an oriented position are arranged to be rejected therefrom during the upward movement of the closure on the inclined carrier.

Accordingly, the present invention has for an object to provide novel and improved closure handling apparatus particularly adapted for handling and orienting elongated cylindrical closures which are heavier at one end than at the other in an efficient and superior manner.

The invention has for a further object to provide novel and improved closure handling apparatus of the character specified having provision for rejecting those closures which do not assume an oriented position, and for depositing the oriented closure into a chute.

With these general objects in view and such others as may hereinafter appear, the invention consists in the closure handling apparatus as hereinafter described and particularly defined in the claims at the end of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings illustrating the preferred embodiment of the invention:

FIG. **1** is a plan view of closure handling apparatus embodying the present invention;

FIG. **2** is a cross sectional view of the apparatus taken on the line **2—2** of FIG. **1**;

FIG. **3** is a plan view detail of the air jets for maneuvering the closures into a radial position on the carrier;

FIG. **4** is a detail view in cross section taken on the line **4—4** of FIG. **3** of a pocket showing a closure in an oriented position;

FIG. **5** is a detail view in side elevation as viewed from the line **5—5** of FIG. **4**;

FIG. **6** is a cross sectional detail view similar to FIG. **4** but showing a closure in a reversed or non-oriented position;

FIG. **7** is a plan view detail showing a stationary cam adapted to dislodge from its pocket a reversed closure;

FIG. **8** is a cross sectional detail view taken on the line **8—8** of FIG. **7** showing an oriented closure moved upwardly in its pocket;

FIG. **9** is a view similar to FIG. **8** but showing a non-oriented closure moved upwardly to an overbalanced position and showing in broken lines the position of the non-oriented closure before being overbalanced;

FIG. **10** is a cross sectional view taken on the line **10—10** of FIG. **1** showing a stationary cam for elevating the lower end of a closure out of its pocket preparatory to being transferred to the supply chute;

FIGS. **11** and **12** are cross sectional views taken on the lines **11—11** and **12—12** of FIG. **1** showing in sequence the shape of the guide elements for guiding the closure into the chute;

FIG. **13** is a side elevation partly in cross section, as seen from the line **13—13** of FIG. **1**, showing a portion of a manifold having a plurality of spaced air jets disposed beneath the chute;

FIG. **14** is a plan view of a modified form of apparatus for urging a closure part way out of its pocket to effect discharge of an unoriented closure;

FIG. **15** is a side elevation of the apparatus shown in FIG. **14** as seen from the line **15—15** of FIG. **14**;

FIG. **16** is a cross sectional view as seen from the line **16—16** of FIG. **14**; and

FIG. **17** is a view similar to FIG. **16** showing an oriented closure being returned to a seated position in its pocket.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIGS. **1** and **2**, the closure handling machine therein shown comprises, in general, a hopper **10** in which a bulk supply of closures may be stored, and a rotary carrier indicated generally at **12** arranged at an inclined plane and which is adapted to carry upwardly closures **14** deposited by the hopper at the lower end of the carrier. As herein shown, the rotary carrier **12** is provided with a plurality of closely spaced and radially arranged pockets **18** adjacent the marginal edge thereof, each pocket being shaped to receive and retain a closure and to carry the

closure upwardly as described. Those closures assuming a desired position of orientation in their pockets are deposited into the open end of a chute **16** disposed at the upper end of the carrier.

The particular closure **14** which the present apparatus is adapted to handle comprises an elongated cylindrical closure open at one end and closed at the other, the closed end being heavier than the open end. In practice, each pocket **18** is angularly disposed with respect to the plane of the upper surface of the carrier and is shaped in cross section to conform substantially to the shape of a closure disposed on its side with one end directed radially outwardly and downwardly, the other end directed radially inwardly and upwardly. As illustrated in FIG. **4**, each pocket **18** is substantially V-shaped in cross section, one leg **70** disposed adjacent the periphery of the carrier being shorter than the other leg **72** which is directed inwardly and upwardly terminating at a point of intersection with the upper surface of the carrier as indicated at **79**. FIG. **4** also illustrates the present closure **14** in the desired position of orientation, that is, with the heavier closed end resting against the wall defined by the shorter leg **70**, and with the open end facing upwardly and inwardly as shown.

The rotary carrier **12** includes an annular member **20** in which the pockets **18** are formed and which is secured to a flange **22** keyed to a sleeve **24** rotatably mounted in a bearing **26** formed in a supporting disk **28**. The disk **28** is attached to a bracket **30**, the latter being secured to the upper end of a shaft **32** which in turn may be adjustably supported in a clamp **34** formed in a supporting column **36**. The sleeve **24** is formed integrally with a worm wheel **38** arranged to mesh with a worm gear **40** fast on a shaft **42** journaled in a gear box **44** secured to the underside of the supporting disk **28**. The shaft **42** is connected by a belt and pulley drive **46** to a variable speed motor unit **48** adjustably secured to a depending portion **50** of the bracket **30**. The gear box **44** is provided with a hub **52** arranged to support a central stationary shaft **54** extending upwardly through the sleeve **24**.

As shown in FIG. **2**, the upper end of the stationary shaft **54** is arranged to support a bracket **56** forming part of the conventional sorting or orienting unit. In the present apparatus, the sorting unit is removed and a cover member **58** is fitted over the stationary bracket **56** as shown. As herein illustrated, the annular member **20** is extended inwardly towards the center of the carrier, as indicated at **60**, the cover member **58** being attached to the inner marginal edge of the annular member. The supporting disk **28** is provided with an upstanding retaining band **68** surrounding and extending above the upper surface of the carrier **12** for confining the closures on the carrier.

The illustrated supply hopper **10** is supported adjacent the lower end of the carrier **12** and is provided with an opening through which the closures may flow by gravity onto the carrier. Any type of hopper containing a bulk supply of randomly arranged closures may be employed including those wherein provision is made for controlling the release of closures onto the carrier such as is illustrated and described in the U.S. Pat. to Walter S. Sterling, Nos. 3,079,042; 3,164,291; and 3,164,292.

In operation, the majority of the herein described closures **14** deposited on the lower end of the inclined carrier **12** lie or fall on their side and as the continuously moving carrier **12** carries the closures along therewith, some of the closures tend to roll or gravitate into the radially arranged pockets **18**. Each pocket is provided with an opening **19** at the bottom thereof through which a portion of the closure carried by the pocket extends.

In accordance with a feature of the present invention, provision is made for maneuvering the randomly arranged closures **14** to cause them to roll into the pockets **18** as the closures are carried up on the inclined carrier **12**. As herein illustrated, the randomly arranged closures deposited on the carrier may take any position thereon, some even standing on end and some being piled one above the other. Some of those closures which lie on their sides may by chance fall or roll into the radially arranged pockets **18** as they are carried up the incline by the rotary carrier.

It will be understood that only a relatively few closures will fall by chance into an oriented position in the radially arranged pockets. As herein shown, the means for maneuvering the randomly arranged closures into a substantially radial position to cause them to roll into the pockets comprises a pair of spaced air jets **200, 202** disposed at a point near the lower end of the carrier immediately beyond the closure delivery opening of the hopper. The air jets are adjustably supported in spaced radially arranged brackets **204, 206**, respectively, which in turn are clamped to upright rods **208** bolted to the retaining band **68** as shown.

As illustrated in plan in FIG. **3**, the air jets **200, 202** are supported about three to four inches radially inwardly from the retaining band **68** and about 1 inch to 2 inches above the face of the carrier, the distances being variable according to the size of the closure. It was found in practice that with the air jets thus disposed and with the air directed laterally toward the retaining band **68** and at a slight angle upwardly when viewed in plan, the randomly arranged closures will be caused to assume a radial position on the carrier to facilitate engagement with the pockets **18**. In practice, some of the radially arranged closures will be disposed in their pockets in the desired position of orientation with the heavier closed end seated against the angular end wall **70**, and some of the closures will be disposed in a reversed or non-oriented position with the open end against the end wall **70** and with the closed end facing inwardly and upwardly.

In accordance with the present invention, provision is made for moving each closure upwardly from a seated position in its pocket to a position wherein about one half of the length of the closure extends beyond the intersecting point **78** defined by the bottom line **72** of the pocket and the upper surface of the carrier. As herein shown, the means for moving the closures upwardly comprises a stationary cam section **80** concentric with the carrier **12** and having a gradually increasing and decreasing path. In operation, when an oriented closure having its closed or heavier end facing downwardly is moved half way out of its pocket by the cam, it will maintain its stability and will return to its seated position against the end wall **70** when permitted to do so by the decreasing path of the stationary cam **80**. On the other hand, when a non-oriented or reversed closure is moved one-half way out of its pocket, it will be overbalanced by the weight of the closed end of the closure so as to be removed entirely from its pocket, the side of the closure pivoting about the point of intersection **78** as above defined.

The oriented closure **14** will be carried upwardly and transferred from its pocket **18** to the supply chute **16**, while the closures removed from their pockets will roll down to join the group at the lower end of the inclined carrier to be again carried upwardly by the carrier.

As herein shown, the cam section **80** extends at right angles to the end of a closure carried by a pocket **18** and the cam is supported by blocks **82** attached to the supporting disk **28**. The edge of the carrier **12** is beveled to accommodate the cam as shown at **84** in FIG. **4**. In practice, the cam section **80** is disposed to engage the closures as they are being carried upwardly in their pockets **18**.

Prior to entering the mouth **92** of the chute **16**, another contingency is provided for, that is, if a closure is bridged across a pocket at right angles thereto and is caught between two oriented closures in adjacent pockets. In this event, a pair of air jets **74, 76** disposed at a point preceding the mouth of the chute is arranged to reject the bridged closure. It is also important that the oriented closures be fully seated in their pockets prior to entering the mouth of the chute. If a closure is not fully seated against its end wall **70**, it will be extended radially inwardly so that it will fail to line up with the rails at the mouth of the chute and may be obstructed by the inner rail **94** of the chute. The extended closure will leave a space between the

end wall **70** and the closed end of the oriented closure. The closure will also be disposed higher in the pocket than a correctly seated closure. In this event, the air jets **74, 76** will likewise serve to eject the closure from its pocket to be returned to the group at the lower end of the carrier.

Those closures which are rejected at the upper half of the carrier **12** are retained by radially arranged flights **90** attached to the moving carrier **12**. Such closures are released by gravity into the lower end of the carrier. Such control of the release of the rejected closures serves to distribute the same into an area preceding the flow of closures from the feed hopper so as to afford smooth operation.

The oriented closures which arrive at the upper end of the inclined carrier **12** are transferred from their pockets **18** into the mouth or open end **92** of the chute **16**. As herein illustrated, the chute is supported on a base plate **104** attached to the underlying frame members **28, 30**, the plate forming the bottom wall of the chute. In order to lift the oriented closure from its inclined position in its pocket to a plane parallel to the upper face of the carrier, a stationary cam **79** secured to the supporting disk **28** is arranged to engage the portion of the closure extended through the bottom opening **19** of its pocket **18** and to lift it up. As the lower end of the closure is lifted out of its pocket, it is guided between a curved portion **214** of the base plate **104** which is disposed immediately above the face of the carrier and a curved plate **216** attached to the inner rail **94** of the chute. In operation, as the outer end of the closure is lifted up, the plates **214, 216** guide the closure radially inward until the closure rests on the face of the carrier, at which time the closure is guided between the inner rail **94** and an outer rail **96**, both of which are attached to the base plate **104**. The base plate is beveled, as indicated at **218**, providing a small incline, the closure riding up the incline from the face of the carrier to the upper face of the base plate. An air jet **220** may be disposed in a position to assist successive closures to move or roll up the small incline onto the face of the plate. It will be observed that the portion of the chute in which the incline occurs is a substantially straight section as indicated at **222**. It will also be observed that the chute includes a top rail **224** which is also beveled upwardly along its lower edge as indicated at **226** to conform to the incline in the base plate.

Immediately after the closure is received on the base plate **104** and between the rails **94, 96** and the top rail **224**, the chute is shaped at an intermediate portion **228** thereof to effect turning of the closure through 90° so as to present the closures in an upright position. The air jet **220** will assist passage of the closures through the turning section **228**. After the turning operation, the chute is shaped to follow a circular path substantially concentric with the carrier, as indicated at **230**, which terminates at a point substantially in line with the center line of the carrier where it is curved through 90° to follow a radial direction to a point of withdrawal, not shown.

In practice, air jets may be used in any portion of the chute where necessary to facilitate passage of closures therethrough. As illustrated in FIG. **13**, a manifold **232** connected to a source of compressed air extends along the underside of the chute and is provided with a plurality of spaced air jets **234** directed to advance the closures through the chute.

From the above description it will be seen that the present apparatus is adapted to handle narrow elongated cylindrical closures which are substantially greater in length than in diameter and which are heavier at their closed ends than at their open ends. It will also be seen that some of the closures are received in the pockets in an oriented position and that some of the others are maneuvered by air streams into a position to be received by said pockets. It will be further observed that novel provision is made for rejecting those closures which assume a reversed or non-oriented position in their pockets, such provision embodying means for overbalancing a reversed closure when partly moved out of its pocket.

Referring now to FIGS. **14** to **17**, in a modified form of structure for urging successive closures part way out of their pockets, **240** represents a stationary curved baffle arranged in the path of the closures carried in the pockets. In operation, a closure **14** carried in a reversed position in the pocket, as shown in FIG. **16**, is engaged by the baffle and urged upwardly to a point where the heavier closed end effects rocking of the closure onto the face of the carrier where it will roll down to the lower end of the inclined carrier. Conversely, an oriented closure carried with its heavier closed end down against the end wall **70** will not be rocked when engaged and moved upwardly by the baffle **240** and will be returned to its seated position by an air jet **242** as shown in FIG. **13**.

As above described, the present apparatus comprises an adaptation of and improvement on the closure handling apparatus illustrated and described in U.S. Pat. No. 2,715,978. In practice, the present apparatus may also be used for the smaller size conventional closures by replacing the carrier **12** with a conventional carrier and by adding the orienting or sorting unit to the bracket **56** so that the same machine may be adapted for both types of closures by interchangeably replacing the parts required for each type of closure.

Having thus described the invention, what is claimed is:

1. Closure handling apparatus adapted to handle elongated cylindrical closures heavier at one end, comprising in combination, a rotary carrier mounted to rotate in an inclined plane, means for depositing closures at the lower end of said carrier, said carrier having radially arranged pockets formed therein to receive said closures, a chute having an entrance opening at the upper end of said carrier adapted to receive those closures assuming a desired position of orientation in said pockets, and means for rejecting those closures carried by the pockets in other than said desired position, said last named means including a stationary cam engageable with all of the closures in the pockets and arranged to effect overbalancing and rejection of the non-oriented closures only, said stationary cam having a gradually increasing and decreasing surface arranged to move the closures part way out of their pockets to cause said overbalancing when the heavier end is up, those closures with their heavier ends down being permitted to return to their initial position.

2. Closure handling apparatus as defined in claim **1** wherein the pockets are angularly arranged with respect to the upper surface of the carrier, each pocket having an end wall against which the closures are seated, the overbalanced closures being rejected onto the upper surface of the carrier.

3. Closure handling apparatus as defined in claim **1** which includes means including air jets for maneuvering the closures to cause the same to assume a radial position with respect to the carrier so as to be received by a pocket.

4. Apparatus as defined in claim **1** which includes means disposed at a point preceding the entrance to said chute adapted to remove improperly positioned closures including those closures which assume a position bridged across a pocket.

5. Closure handling apparatus adapted to handle elongated cylindrical closures heavier at one end, comprising in combination, a rotary carrier mounted to rotate in an inclined plane, means for depositing closures at the lower end of said carrier, said carrier having radially arranged pockets formed therein to receive said closures, a chute having an entrance opening at the upper end of said carrier adapted to receive those closures assuming a desired position of orientation in said pockets, and means for rejecting those closures carried by the pockets in other than said desired position, said last named means including a stationary cam engageable with all of the closures in the pockets and arranged to effect overbalancing and rejection of the non-oriented closures only, each pocket having an open bottom portion, and a stationary cam disposed beneath the carrier arranged to elevate the lower end of each closure.

6. Closure handling apparatus adapted to handle elongated cylindrical closures heavier at one end comprising, in combination, a rotary carrier mounted to rotate in an inclined plane, means for depositing closures at the lower end of said carrier, said carrier having radially arranged pockets formed

therein to receive said closures, said pockets being angularly disposed with respect to the plane of the upper surface of the carrier, a chute having an entrance opening at the upper end of said carrier and arranged to receive those closures assuming a desired position of orientation in said pockets with the heavier end facing radially outwardly and downwardly, and stationary means engageable with the outer ends of the closures in their pockets during rotation of the carrier for moving the closures radially upwardly and inwardly partly out of their pockets whereby to effect overbalancing of a non-oriented closure from its pocket onto the upper surface of the carrier, those closures assuming an oriented position returning to their initial position in the pocket.

7. Closure handling apparatus adapted to handle elongated cylindrical closures greater in height than in diameter and heavier at one end comprising, in combination, a rotary carrier mounted to rotate in an inclined plane, means for depositing randomly arranged closure onto said carrier, said carrier having radially arranged pockets formed therein adapted to support the closures at a downwardly and outwardly inclined angle with respect to the plane of the upper surface of the carrier, some of the closures assuming a desired position of orientation with their heavier ends down, and some of the closures assuming a position with their heavier ends up, and means for moving the closures a predetermined distance inwardly out of their pockets to effect overbalancing and rejection of those closures whose heavier ends are facing inwardly, those closures whose heavier ends are facing outwardly being permitted to return to their seated position.

8. Closure handling apparatus as defined in claim 9 wherein the means for moving the closures part way out of their pockets comprises a stationary cam having a gradually increasing and decreasing surface.

9. Closure handling apparatus as defined in claim 9 wherein the means for moving the closures part way out of their pockets comprises a curved baffle engageable with successive closures to effect overbalancing of non-oriented closures, and an air jet immediately following the rejecting point for assisting return of the oriented closures to their seated position.

10. Closure handling apparatus adapted to handle elongated cylindrical closures heavier at one end comprising, in combination, a rotary carrier mounted to rotate in an inclined plane, said carrier having radially arranged pockets formed therein to receive randomly arranged closures deposited on the carrier with their heavier ends either up or down, and means for rejecting those closures carried by the pockets with their heavier ends up, said rejecting means comprising a stationary cam having a gradually increasing and decreasing surface whereby all of the closures are moved part way out of their pockets, those closures with their heavier ends down being permitted to return to their initial position.

11. Closure handling apparatus adapted to handle elongated cylindrical closures heavier at one end comprising, in combination, a rotary carrier mounted to rotate in an inclined plane, said carrier having radially arranged pockets formed therein to receive randomly arranged closures deposited on the carrier with their heavier ends either up or down, and means for rejecting those closures carried by the pockets with their heavier ends up, said rejecting means comprising a curved baffle engageable with all of the closures to move them part way out of their pockets, and an air jet immediately following the rejecting point for assisting return of the oriented closures to their initial position.

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