

[54] **METHOD AND APPARATUS FOR
APPLYING CLOSURES TO CONTAINERS**

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53/308, 330, 314

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Primary Examiner—Travis S. McGehee

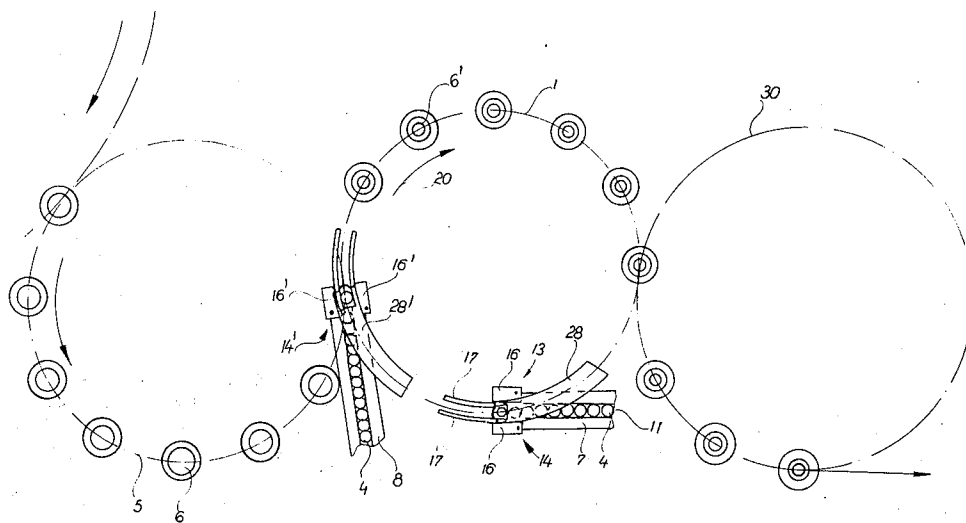
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[57] **ABSTRACT**

To seal containers, closure members are supplied along a pair of downwardly curving tracks to a circle of sealing elements which rotate about a vertical axis. The sealing elements travel in a plane inclined obliquely to the vertical axis and the tracks are arranged tangentially to the circle at angularly spaced positions. Closure members move down each track to an associated transfer mechanism which holds individual closure members as they are picked up by the sealing elements and moved along the circle until they are fixed to the containers.

10 Claims, 5 Drawing Figures



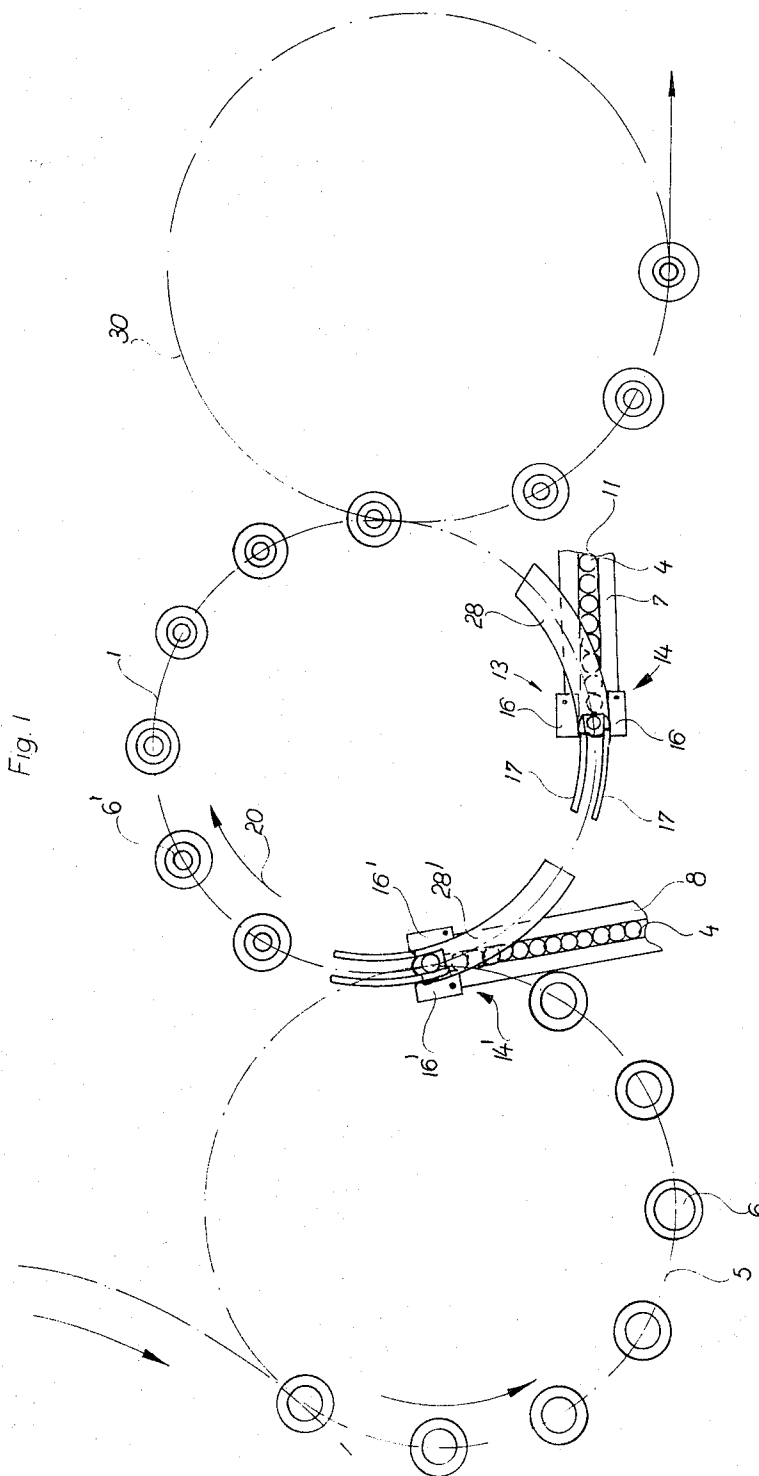


Fig 2

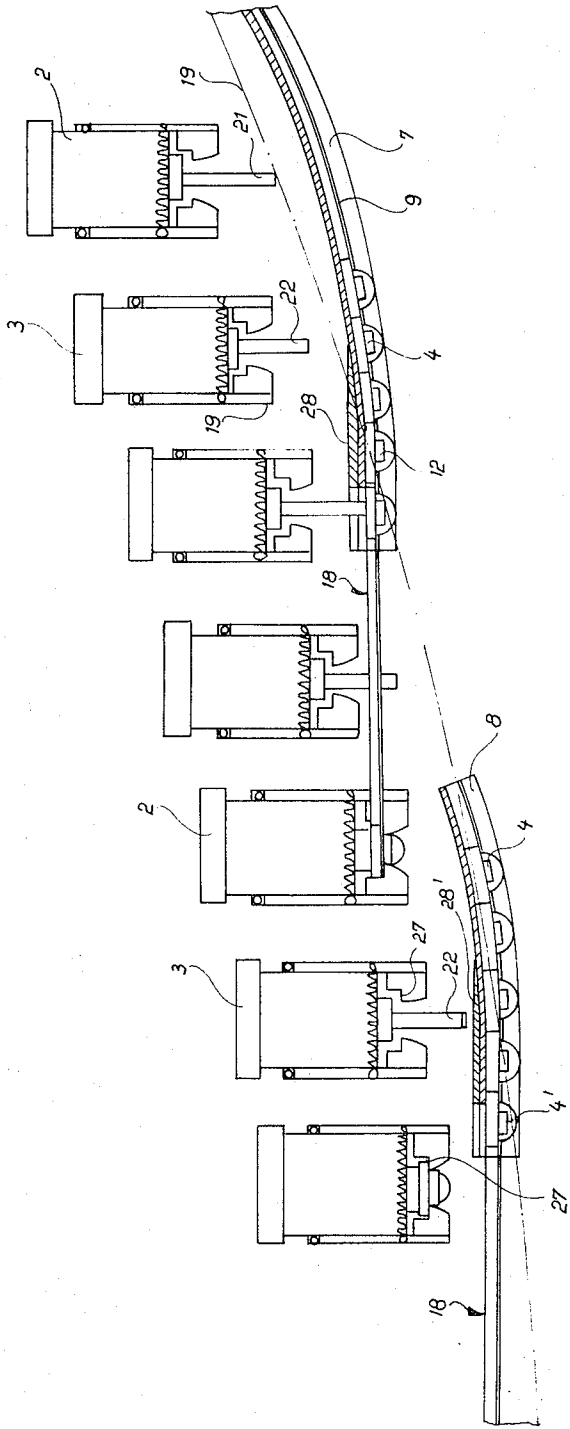


Fig. 3

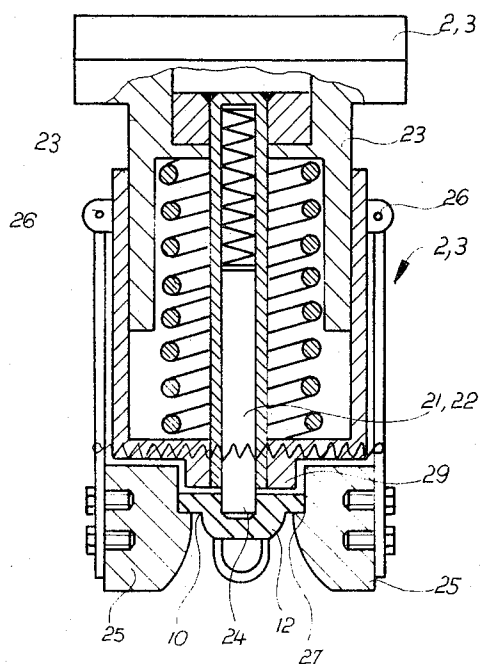


Fig. 4

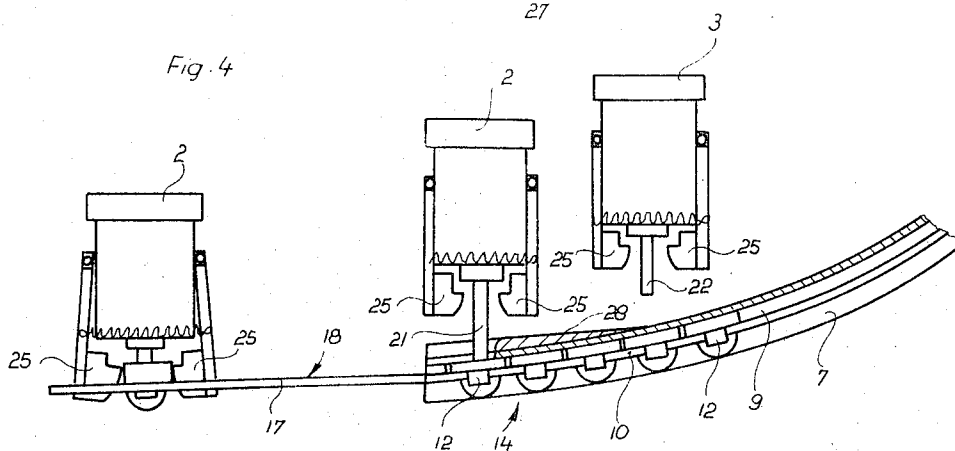
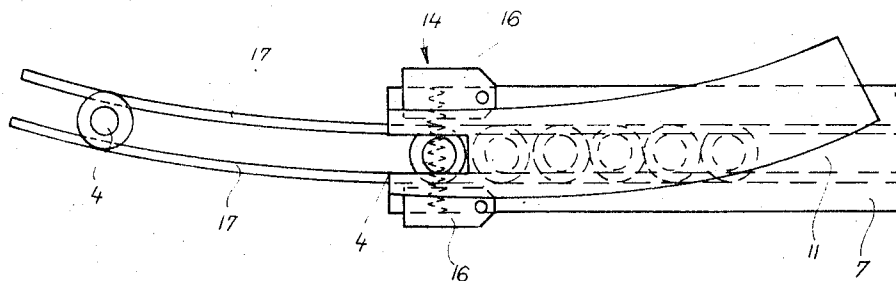


Fig. 5



METHOD AND APPARATUS FOR APPLYING CLOSURES TO CONTAINERS

SUMMARY OF THE INVENTION

The present invention relates to a container sealing operation and, more particularly, it concerns feeding the closure members to a sealing mechanism and holding the closure members as they are applied to the containers.

To increase the efficiency of sealing machines, particularly where plastic closures or seals with a tear-off flap are used, it has been proposed to feed the seals along a track arranged preferably tangentially to the turning circle of the sealing machine. The seals are arranged with the tear-off flaps projecting obliquely downwardly and the seals are guided into alignment above the containers so that when the tear-off flaps bear against the mouth of the container, the container carries the seal along with it under a die for effecting the sealing action.

Where the closure members or seals are engaged directly by the containers, it has been possible only to effect the removal of a relatively small number of seals.

Therefore, based on the procedure described above, the present invention is directed to a method and apparatus for sealing containers with closure members having a hollow plug configuration which is particularly adapted to the requirements of present-day heavy duty machines.

In accordance with the present invention, the closure members are introduced along a pair of tracks each directed tangentially to the turning circle of the sealing elements on a sealing mechanism. The tracks are spaced angularly along the turning circle and feed the closure members in a downwardly curving direction. The sealing elements move upwardly and downwardly and rotate in a plane disposed obliquely to the vertical axis of the sealing mechanism. Due to the spaced relationship of the tracks, one of them is located downstream from the other in the direction of rotation of the sealing elements. Accordingly, the track located upstream transfers the closure members to the sealing elements at a higher level than the closure members which are fed from the downstream track. In this arrangement, the sealing elements alternately pick up the closure members from the two spaced tracks.

By this arrangement the output of the sealing mechanism is considerably increased and a sufficient quantity of closure members is supplied to the sealing elements, independent of the closure member sorting mechanisms which are limited in their output. Further, with this arrangement the difficulties experienced with the channels employed in the past, particularly for supplying plastic closure members, are avoided, since the channels are not required.

The sealing mechanism used in applying the closure members to containers, includes a plurality of sealing elements which rotate about a vertical axis and at the same time move upwardly and downwardly in the direction of their own axes. The sealing elements travel in a turning circle about the vertical axis with the circle disposed in a plane extending obliquely to the vertical axis. As a result, during a portion of their rotational movement, the sealing elements travel along an upwardly curving path and then during the remainder of their rotation along a downwardly curving path. Further, a transfer mechanism is provided along the turn-

ing circle for assisting in supplying the closure members to the sealing elements. The closure members are supplied along at least two tracks arranged tangentially to the turning circle of the sealing elements and each track has a downwardly curving configuration for moving the closure members into position to be picked up by the sealing elements. Due to the inclined orientation of the turning circle, the tracks, which are spaced angularly apart along the circle, are located at different levels at the point of tangency with the turning circle.

Another characteristic of the invention is the provision of a spring biased follower pin in each of the sealing elements which is guided into the hollow plug closure member and then recedes into the sealing element for permitting a pair of clamping jaws to grip the closure member. The clamping jaws are pivotally mounted on the sealing element and lie in a curved plane which coincides with the circumferential path of the turning circle.

Another feature of the sealing elements is the provision of different length follower pins in alternate elements. Accordingly, one group of the sealing elements has longer follower pins and this group is associated with the upstream track which supplies closure members while the other group has shorter follower pins and is associated with the downstream track.

As the sealing mechanism rotates, the sealing elements with the longer follower pins pick up the closure members from the upstream track and carry them along to be inserted into containers supplied to the sealing mechanism at a downstream location. The sealing elements with the shorter follower pins pick up the closure members at a lower level from the downstream track and similarly carry the closure members along for insertion into the containers. In this way the alternating sealing elements with longer and shorter follower pins, alternate in picking up the closure members from the two supply tracks. At each of the transfer points between the tracks and the turning circle of the sealing mechanism, a follower pin of one of the sealing elements is directed into the hollow plug portion of the closure member and directs it along the turning circle until it is securely held by the clamping jaws associated with the sealing element. As the sealing elements move into aligned position above the containers, the clamping jaws are released from the closure member and the closure member is pushed downwardly by the follower pin into sealing engagement with the mouth of the container. The container continues to travel along the turning circle of the sealing mechanism while the sealing action is completed and finally is displaced to another transfer member for subsequent processing.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a schematic representation, in plan view, of an apparatus, embodying the present invention, for inserting closure members into containers;

FIG. 2 is a side view of a portion of FIG. 1;

FIG. 3 is a side view, partly in section, of one of the sealing elements shown in FIG. 2;

FIG. 4 is a view showing a portion of the view in FIG. 2 for illustrating the transfer of a closure member into a sealing element; and

FIG. 5 is a top view of the arrangement shown in FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, a turning circle 1 of a sealing mechanism for inserting closure members 4 into containers 6, is illustrated. As can be seen in FIG. 2, the sealing mechanism consists of alternating sealing elements 2,3 which rotate on the turning circle about a vertical axis with the individual sealing elements moving upwardly and downwardly in the direction of their own axes. The sealing elements move along a curved path 19, which path lies in a plane inclined obliquely to the vertical axis of the sealing mechanism.

Closure members or seals 4, preferably formed of a plastic material and having a hollow plug configuration 12, are supplied to the turning circle 1 from a pair of tracks 7, 8. Each of the tracks is disposed tangentially to the turning circle with the track 7 located upstream in the direction of the sealing elements on the turning circle from the track 8. Further, due to the curved path 19 of the sealing elements, the upstream track 7 is located at a higher level as it approaches the sealing elements than the downstream track 8. Each of the tracks 7, 8 includes a trough 9 with bearing surfaces which support the sealing surfaces 10 of the closure members 4, see FIG. 3. Further, an elongated slot 11 is formed between the bearing surfaces of the trough 9 through which the hollow plug configuration 12 of the closure member extends as it moves downwardly along the track.

Located at each of the points of tangency 13 of the tracks 7 and 8 with the turning circle 1 is a transfer mechanism 14. The transfer mechanism includes a pair of tong-like members 16 arranged in a horizontal plane and movable inwardly toward the turning circle 1. The tong-like members 16 are spring-loaded and firmly grip the closure member 4 located at the point of tangency. Extending from the transfer mechanism 14 along the turning circle 1 are a pair of laterally spaced support arms 17 which are arranged in a horizontal plane and provide support surfaces 18 forming a continuation of the bearing surfaces of the feed trough 9. As can be seen in FIG. 2, due to the horizontal disposition of the support arms 17, they gradually approach the curved path 19 as the sealing elements move in the downward direction along the curved path in the direction of rotation 20 of the turning circle. In FIG. 2, the support arms at each of the points of tangency can be seen extending horizontally from the lower ends of the tracks 7, 8 toward the downwardly directed curved path 19.

Adjacent to one side of the turning circle 1 is a container feed mechanism 5 for supplying containers 6 to the turning circle 1 of the sealing mechanism. The containers 6 are charged from a machine, not shown, to the feed mechanism 5, note the direction of the arrows shown in FIG. 1 indicating the path of movement of the containers into the turning circle 1 and then from the turning circle 1 onto the discharge mechanism 30.

As shown in FIG. 2, another curved path 19' is located below and in parallel relationship with the curved path 19 and is intersected by the feed troughs 9 of the

closure member supply tracks 7, 8 at different levels. As mentioned above, the downstream track 8 is located below the upstream track 7.

Each of the sealing elements 2,3 has a follower pin 21,22, respectively, with the follower pins 21 of the sealing elements 2 being longer than the follower pins 22 of the sealing elements 3. The sealing elements 2 with the longer follower pins 21 are associated with the upstream track 7 while the sealing elements 3 with the shorter follower pins are associated with the downstream track 8 for removing individual closure members 4 from the tracks for subsequent insertion into the containers 6.

In FIG. 3 a typical cross sectional view of sealing elements 2,3 is shown with the spring-loaded follower pin 21,22 retracted within a laterally enclosing member 23. When a closure member is not held within the sealing element, the follower pin 21, 22 projects downwardly between a pair of clamping jaws 25 with its free end 24 located below the lower ends of the jaws. The clamping jaws 25 are located on the opposite sides of the closure members and move along the circumferential path of the turning circle 1. Each of the jaws is articulated to the member 23 about a pivot member 26 and has a bearing surface 27, note FIG. 3, which engages the sealing surface 10 of the closure member. The width or dimension of the jaws 25 measured in the radial direction of the turning circle 1, is sufficiently narrow to permit the jaws to pass between the support arms 17 as the sealing elements 2,3 move downwardly along the curved path 19.

As the sealing elements 2,3 rotate about the vertical axis of the sealing mechanism and move downwardly along the curved path 19, the sealing elements 2 with the longer follower pins 21 each engage one of the closure members 4 from the upstream track 7 at the location of the transfer mechanism 14. Similarly, the sealing elements 3 with the shorter follower pins 22 each engage a closure member 4 from the downstream track 8 at the position of the downstream transfer mechanism 14. As the longer follower pins 21 approach the upstream transfer mechanism 14, they are guided along an inclined surface 28 and then, upon reaching the transfer mechanism, are directed into the hollow plug 12 of the closure member 4 held by the tong-like members 16. As the follower pin 21 of the sealing element 2 engages a closure member 4, the members 16 release the closure member and it continues to move along the path of the turning circle on the support surface 18 of the support arms 17. At this time the sealing elements are moving downwardly and the closure member moves in a horizontal plane along the support arms. Accordingly, as the sealing element 2 moves downwardly its follower pin 21 is moved upwardly against the spring biasing action and recedes into the member 23. Further, due to the rounded configuration of the lower portion of the clamping jaws 25, the jaws are moved apart by the closure member until the support surfaces 27 of the jaws seat against and below the sealing surfaces 10 of the closure member. As the sealing element 2 reaches the ends of the support arms 17 remote from the transfer mechanism 14, the closure member is held securely by the clamping jaws in position to be inserted into the mouth of a container. As the sealing elements 2 proceed along the turning circle 1 and the clamping jaws 25 engage the mouth opening into a container 6, the jaws are released and moved

apart and the closure member, centered by the sealing element is pushed into the mouth of the container. During the further downward movement of the sealing element, the final sealing action of the closure member into the container is effected by the pressure surfaces 29 located at the lower end of the sealing element, note FIG. 3.

Similarly, the follower pins 22 of the sealing elements 3 engage the inclined surface 28' located in the range of the downstream track 8 and are guided, at that location, into engagement with the closure members 4 moving downwardly along the track 8. In the same manner as the closure members are removed from track 7, the sealing elements 3 remove the closure members 4 from the track 8 by means of the transfer mechanism 14' and the tong-like members 16' associated with it. As the sealing elements 3 move the closure members along the support arms 17 until the closure member is gripped by the clamping jaws, after which the sealing element passes beyond the ends of the support arms 17 and moves into alignment with a container for inserting the sealing element into the container.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. Method for sealing containers with closure members, preferably plastic closure members, comprising the steps of applying closure members to containers along a circular path of travel about a vertical axis, introducing the closure members tangentially to the circular path of travel at two spaced positions along the path of travel, locating one of the positions ahead of the other in the direction of movement along the path of travel and also below the other, and feeding the closure members alternately from each of the positions to the path of travel.

2. A method, as set forth in claim 1, further comprising the step of arranging the circular path of travel in a plane inclined obliquely to its vertical axis, and inclining the two tangential paths of movement of the closure members for downwardly directed movement of the closure members toward the circular path of travel.

3. Method, as set forth in claim 2, further comprising the step of feeding the containers to be sealed to the circular path of travel at a location adjacent the downstream position of tangency of the closure members, sealing the closure members to the containers as the containers move along the circular path of travel, and removing the sealed containers from the circular path of travel at a position spaced angularly from the location at which the containers are fed to the circular path of travel.

4. Apparatus for sealing closure members into openings in containers, comprising a sealing machine including a plurality of angularly spaced sealing elements located in a circle rotatable about a vertical axis, said sealing elements are movable in the vertical direction and rotatable in a plane inclined at an oblique angle to the vertical axis of the circle in which said sealing elements are located, means for feeding containers to said sealing member, and means for supplying closure members to said sealing elements for insertion into said con-

tainers wherein the improvement comprises that said means for supplying closure members includes at least two tracks arranged tangentially to the circle of said sealing elements and spaced apart along the circle with one said track located downstream of the other in the direction of movement of said sealing elements, each of said tracks curving downwardly to the point of tangency with the circle.

5. Apparatus, as set forth in claim 4, wherein each of said sealing elements comprises a follower pin resiliently biased in the downward direction, a member laterally enclosing said follower pin with the downward end of said follower pin located below said member in its downwardly biased position, a pair of clamping jaws pivotally mounted on said member and located on diametrically opposed sides of said follower pin and positioned above the downward end of said follower pin in its downwardly biased position, and each of said clamping jaws having a bearing surface arranged to engage and support one of the closure members.

6. Apparatus, as set forth in claim 5, wherein for each adjacent pair of said follower elements one of said follower pins is longer than the other, and said sealing element having the longer said follower pin is arranged to remove closure members from the upstream one of said tracks.

7. Apparatus, as set forth in claim 6, wherein each of said tracks comprises a feed trough along which the closure members move downwardly to the point of tangency with the circle of said sealing elements, said feed trough comprises a pair of oppositely spaced support surfaces defining therebetween an elongated slot extending in the direction of said track so that the closure members move along said track supported by said support surfaces and extending downwardly through said slot, transfer means located at the point of tangency of said track to said circle of said sealing elements for displacing the closure member from said track to said sealing elements, and said transfer means includes a pair of laterally spaced support arms located in a horizontal plane and extending downstream from the point of tangency of said track and said circle of sealing elements and following the path of travel of the circle of said sealing elements.

8. Apparatus, as set forth in claim 7, wherein the spacing between said support arms is greater than the width of said clamping jaws measured in the radial direction of the circle of said sealing elements and less than the outside diameter of the closure members.

9. Apparatus, as set forth in claim 8, wherein said transfer means includes a pair of spring biased holders arranged at the point of tangency of each said track and the circle of said sealing elements for holding the closure member in position to be engaged by said sealing element as it moves through the point of tangency.

10. Apparatus, as set forth in claim 9, wherein an inclined surface member extends upwardly along the path of the circle of said sealing elements from said pair of holders at each of the points of tangency of said track with said circle of sealing elements to a position upstream therefrom for guiding said follower pin associated with said track into engagement with a closure member.

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