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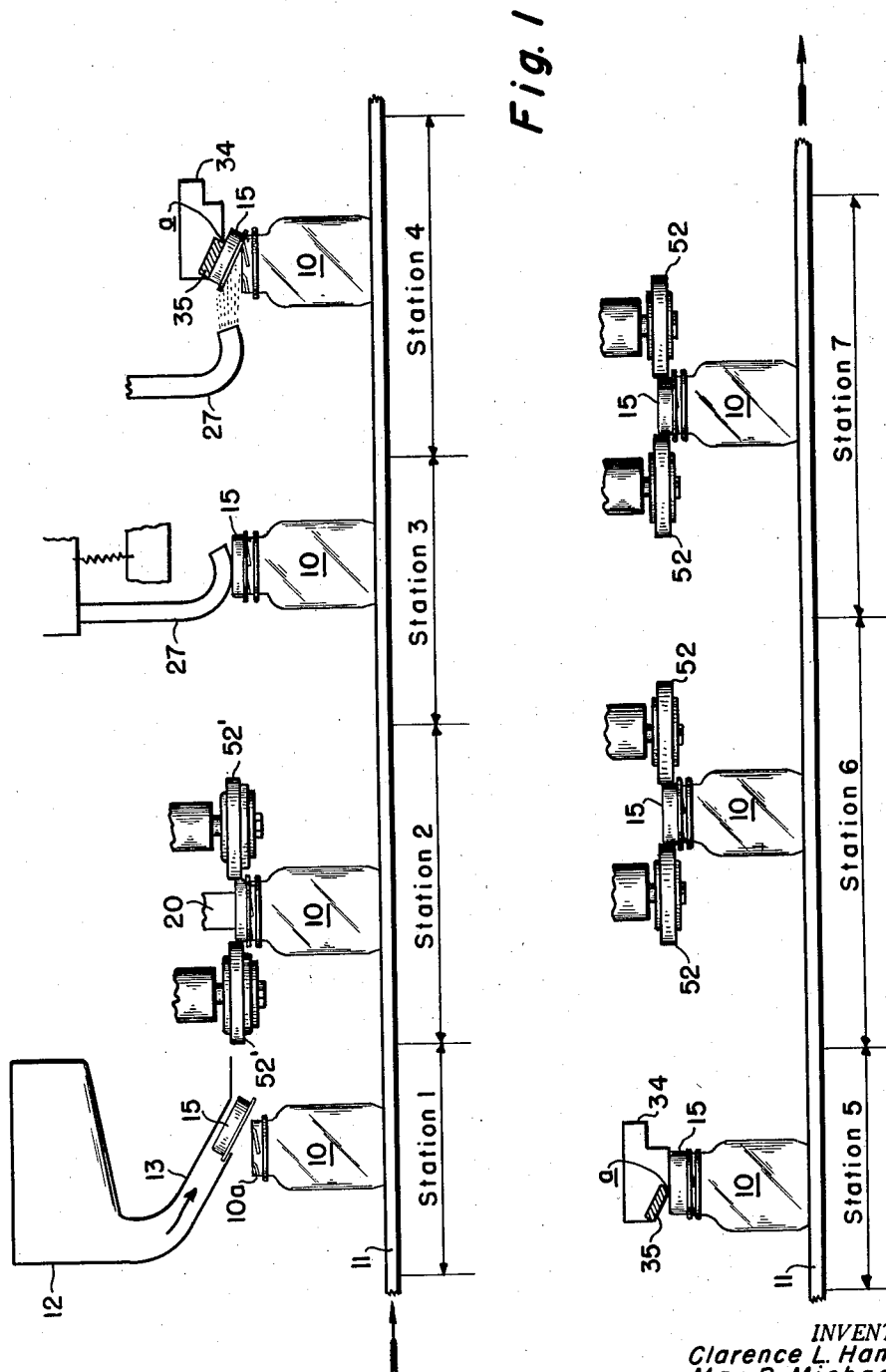
C. L. HAMILTON ET AL

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STEAM VACUUM APPARATUS FOR CLOSING CONTAINERS

Filed April 23, 1956

4 Sheets-Sheet 1



INVENTORS.
Clarence L. Hamilton
Max B. Michael
BY
Green, McCallister & Miller
THEIR ATTORNEYS

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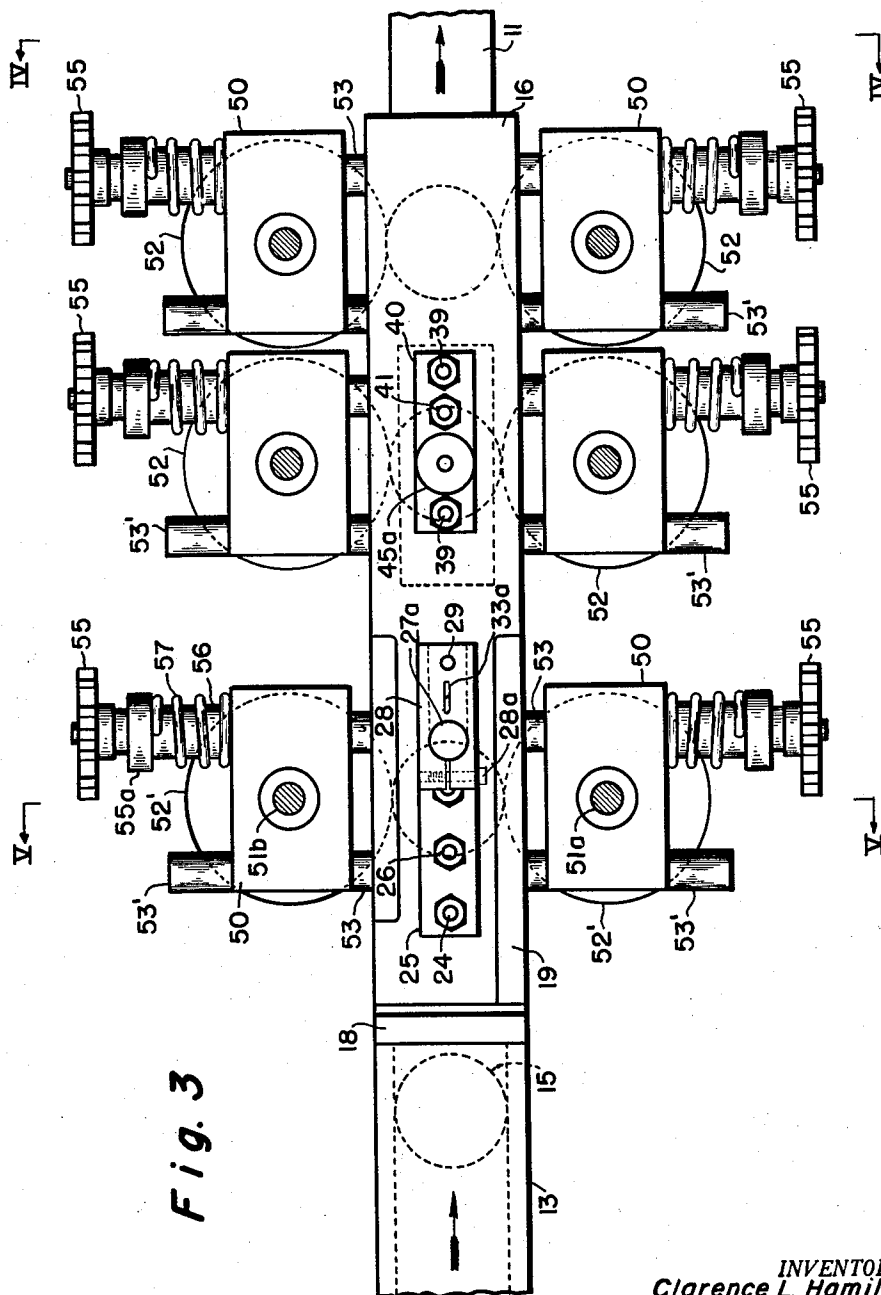


Fig. 3

INVENTORS.
 Clarence L. Hamilton
 Max B. Michael
 BY
 Green, McCallister & Miller
 THEIR ATTORNEYS

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Clarence L. Hamilton and Max B. Michael, Muncie, Ind.,
assignors to Ball Brothers Company, Inc., Muncie, Ind.,
a corporation of Indiana

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2 Claims. (Cl. 53—112)

This invention relates to procedure, apparatus or equipment for handling packers' ware or articles, such as containers, glass jars, etc., to position a closure lid or cap on lips of a mouth portion of the container, and to tilt and reposition the closure for the introduction and retention of a fluid within remaining head space of the container.

The procedure forming a part of the present invention involves moving a container along a defined path while in an upright position, loosely applying a closure over the mouth of each moving container so that the skirt portion of the closure surrounds the lip of the container, occasioning relative rotary motion between the closure and the container in a non-securing direction for the purpose of initially positioning the securing lugs of the closure skirt in cooperative relationship with the lug-engaging threads on the outer peripheral surface of the neck finish of the container, tilting the closure while retaining a portion of a closure skirt in contact with the neck finish of the container, delivering a flow, preferably of condensable fluid beneath the raised portion of the container skirt and against the inner surface of the closure and into the interior of the container, then repositioning the closure on the neck finish with the closure skirt completely surrounding the lip portion to thereby trap within the container the fluid so delivered, then occasioning relative turning movement between the closure and the container to thereby secure the closure to the container in sealing contact with the lip portion of the container.

An object of the invention is to provide mechanical means for rapidly and effectively securing a separate lug type closure in sealing relationship to each of a series of containers and particularly to containers known as packers' ware. In order to maintain food in good condition within the sealed containers it is desirable to produce a vacuum in the head space or unfilled portion of the container so as to avoid oxidation or contamination of the food in the container. It is, therefore, desirable to flush out the head space within the container and to deliver to such space and trap within the container either a condensable fluid such as steam or an inert gas and in that way trap the steam and/or the inert gas within the head space and thereby prevent contamination and/or discoloration of the food material within the container.

An object of the invention is, therefore, to provide effective procedure and apparatus for carrying forward the procedure of securing closures in sealing relationship to containers such as are employed by packers in canning food products.

Another object of our invention has been to provide a new approach to the operation of sealing the contents of packers' ware, as employed in effecting a sealing engagement between threads or lugs of a closure and complementary threads or lugs of a mouth portion of a container;

A further object of our invention has been to provide means for automatically assembling and separately-moving closure and container bodies into at least an aligned

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relationship with respect to each other, then tilting their relationship and providing an opening therebetween while injecting a fluid into the head space of the container body, and finally sealing-off the relationship between the closure and the container body by turning them down with respect to each other;

These and other objects of our invention will appear to those skilled in the art from the illustrated embodiments as well as the description thereof.

In the drawings,

Figure 1 is a somewhat diagrammatic layout in side elevation illustrating procedure for assembling, capping, tilting, blowing and recapping articles in accordance with our invention;

Figure 2 is a side view in elevation and partial section longitudinally through an operating line, including operating and control apparatus employing the principles of our invention;

Figure 3 is a top plan view on the scale of Figure 2 and illustrating the apparatus of such figure;

Figure 4 is an end view in elevation on the scale of Figures 2 and 3 and taken in the direction of the line IV—IV of Figure 3;

Figure 5 is a fragmental end view taken on a scale of and in the direction of the line of V—V of and on the scale of Figure 3; this figure illustrates a lower guided positioning of a closure with respect to a pair of revolving rubber discs, such that the closure is positioned on the lips of a container in aligned relationship with respect to its lugs; and

Figure 6 is a view similar to Figure 5, but illustrates a modified positioning of the closure in which it is held in a vertically-aligned as well as horizontally-parallel relationship with, but above or off the lips of a mouth portion of the container.

Our invention marks a great improvement over regular capping procedure which has heretofore not worked satisfactorily with a lug or screw type of lid, cap or closure. As will be appreciated, a screw type of lid creates a problem from the standpoint of properly centering and leveling it over the mouth portion of or on the top lips of the container. This problem is not present in the case of a simple press-on type of closure.

Our procedure involves moving a screw cap closure into lip-engaging relationship with the neck finish of each container as it is moved by a constantly moving conveyor in aligned relationship with other containers. The closure may alternately, by reason of the employment of an undercut type of roll pair (see Figures 5 and 6), either be seated on the lips of the container and aligned and guided to the next station of the line (see Figure 5) or may be at least temporarily held above and in alignment with lips of the mouth portion of the container and subjected to turning movement imparted thereto in a counter-clockwise direction with respect to the container (see Figure 6).

After a lid or closure has been assembled with and at least positioned or placed in an aligned relationship with the mouth of a container, the two are then moved to a station or position at which the lid is tilted on or with respect to the container. A fluid, such as a condensable fluid in the nature of steam, is injected into the container through the tilt opening thus provided. In the next step, the assembly of cap and container is moved to a closing-off relationship, whereby the cap or lid is closed or moved back to a substantially horizontal, as distinguished from a tilted, vertical relationship. The lid is finally rotated clockwise to screw it on or latch-engage cooperating lugs of the lid and container to seal off contents of the container.

The condensation of the steam trapped within the head space of the container, i.e., the space between the closure

and the upper surface of the contents of the container, produces a vacuum within the container. Now, the container and its contents are ready for shipment to and storage by wholesaling and retailing food establishments. As an alternative procedure we also contemplate injecting an inert gas into the head space of the container with the steam for the purpose of flushing air and preventing discoloration and deterioration of the contents of the container. The inert gas may be injected as a flushing agency immediately ahead of the steam, with or after the flow of steam, as may be desired.

In carrying out our invention, we have endeavored to simplify its application as much as possible. In this connection, the disclosed embodiment is suitable for attachment to and the replacement of units on a typical Resina Capping Machine, Model RU-120, although it will be apparent that its use is in no sense limited in this respect.

Referring particularly to Figure 1 of the drawings, we have shown procedure employed in carrying out our invention. At station 1, a container 10 is being advanced from left to right, while a hopper 12 is successively feeding a succession of separate closures or lids 15 downwardly along an inclined feed chute 13. The timing is proportioned so that the lid 15 and the container 10 reach a cooperating relationship or assembly point at the same time.

To better illustrate rotating disc passes of stations 2, 6 and 7 of Figure 1, each disc pair has been shown at right angles to the actual direction of travel or movement of the line. The closure cap 15 at station 1, as shown in Figure 5, is either guided and resiliently held between lower and inwardly-offset, annular banding faces 52b of disc pair 52' or, as shown in Figure 6 is introduced between and rotated counterclockwise by upper or enlarged annular banding faces 52a of the same pair of discs 52'. If, as shown and as preferred, the cap 15 is positioned as disclosed in Figure 5, then the discs 52' can be employed in contact with the cap or out of contact therewith by adjusting their hand wheels 55, see Figure 4. Rotation of the discs 52 is preferably counterclockwise to aid in aligning the cap 15 in position over the mouth without actually causing a latching or threaded engagement between lugs 10a of the container 10 and those of the cap.

If the arrangement of Figure 6 is employed, the cap 15 is rotated in a parallel relation, at least preliminarily, above and in alignment with the container 10, with its lower edges over lip edges of the container, so that both are carried in-line to the next station 3, see Figure 1.

At station 2, the assembled and aligned container and closure first pass under and along a runner 20 (see Figure 2) of a stabilizer head 19; this assures a "down" positioning of the closure on the lips of the container. As indicated in Figure 1, the jar with a closure loosely applied thereto moves to a position such that rotating discs 52' engage the closure and rotate it in a non-securing direction to thereby position the lugs on the closure skirt with relation to the lug-engaging threads on the neck finish of the container. The container with the closure so positioned thereon then passes under the curved lower end of an upright tube 27 which is located at station 3 and is yieldingly moved downwardly so that it applies a yielding pressure to the closure engaged by it.

At station 4, see particularly Figures 1 and 2, the assembly passes in-line beneath a tipping or tilting head 34, at which time, a forwardly-declining magnet 35 raises the metal cap 15 or tilts it upwardly-backwardly about its front end to define a space or opening between the bottom of the lid and the mouth of the container 10. At this time, steam or inert gas or a combination of steam and inert gas are injected through the tube 27 into the spacing, as shown in Figure 1. This is a momentary operation, as indicated by station 5 of Figure

1, in that the cap 15 is immediately snapped or closed back into position on the container 10 when a portion of the lid 15 reaches a point a on the tilting head 34. Immediately, see station 6, a pair of revolving discs 52 contact opposite sides of the cap 15 and rotate it clockwise to tighten down the cap on the container. Steam which has been injected within the head space of the container (between the top of its open mouth and the top level of the food stuff or material therein) then condenses and creates a vacuum seal. In the next step, a second set of rotating tightening discs 52, see station 7, are also rotated clockwise to complete the tightening-down or snugging-up of the cap and complete the cycle of operation.

It may be noted that the series of pairs of rotating or spinning rubber discs, as represented for example, at stations 2, 6 and 7 of Figure 1 of the drawings, are preferably operated at progressively slower speeds and higher torques, in order to run down, seat and tighten or snug-up the cap or closure. Briefly summarized, the procedure of Figure 1 involves progressively advancing a series of closures 15 and containers 10 into an aligned relationship, assembling them with a closure in an aligned position above each container, stabilizing their assembled position, checking such position, and then tilting the closure on the container and introducing a suitable fluid into the head space of the container. The closure, cap or lid 15 is immediately return-positioned or snapped back over the mouth or on top of the lip edges of the container, and rotating or spinning disc pairs are employed to thread or interlatch and then snug-up the lid on the container.

The caps 15 may be fed from a hopper 12 along a conventional form of inclined feed chute 13, so that they are progressively lined-up with progressively-presented containers 10. The containers 10 are, in turn, continuously moved in a spaced relationship with respect to each other by a continuously-moving, flat-top conveyor 11. As shown particularly in Figure 4 of the drawings, a pair of vertically and longitudinally extending, opposed side guards 11a are positioned along and above the conveyor 11 for guiding the articles 10 therealong.

For simplicity of utilization, we have provided an apparatus or structure whose lower, longitudinally-extending block 16 serves as a positioning head for operating mechanisms and means, as particularly employed in the steps 2 to 7 of Figure 1. The head 16 may, as in the Resina machine, cooperate with an upper block (not shown) that carries driving connections and particularly, those for the revolving disc pairs. In this connection, we employ front and rear and vertically extending spacer brackets 18 and 18' to extend between the upper and lower blocks. Cap screws or bolts 18a, 18b and 18'a and 18'b are respectively employed to secure the end brackets 18 and 18' on the head 16. An inset block 17 is shown provided at the front end of the block 16 to cooperate therewith and provide a substantially rectangular lower block construction for the operating heads of the machine.

A vertically-movable stabilizer head 19 is suspended from the block 16 by a pair of vertically-positioned slide rods 23. At their lower end portions, these rods are reduced in diameter and are secured to the stabilizer head 19 by cross pins 23a. At their upper end portions 23b, the rods are reduced and threaded to receive cross-tie piece or member 25 and mounting bolt and washer assemblies 24. A hex-head, abutment screw or bolt assembly 26 is adjustably carried by the tie piece 25 to project downwardly therefrom. The enlarged lower head of the assembly 26 is adapted to abut wear plate 17d that is carried within the block 17.

Also as shown, stabilizer support rods 23 are slidably carried within upper and lower bearing sleeves 16a, so

that they may freely move between a maximum "down" position (as controlled by abutment of the head of the bolt assembly 26 with the wear plate 17d) and a maximum "up" position (as controlled by abutment of the upper face of the stabilizer head 19 with a lower face of the block 16).

A bottom runner member 20 has a dovetailed, transversely-slidable, mounted relationship within the stabilizer head 19. The runner 20 is secured in an adjusted relationship by opposed, end-positioned cap screws 21 and fingers 22 which project from the head 19 and abut upon opposed ends of dovetail portion 20a. Shims (not shown) may be employed between the fingers 22 and the portion 20a to provide a desired adjusted relationship.

The runner 20, as shown, has a forwardly-inclined receiving face and a substantially planar or flat main face along which the closure lid 15 is adapted to slide, while a closure container assembly is being moved from left to right to a new position. The runner 20 serves to insure a capping of the container, and a proper positioning of the closure on the container before the assembly passes under a fluid supply pipe member 27 on its way to a tilting head 34.

As shown by the full and dotted positions of Figure 2, vertically-extending fluid injection tube 27 is resiliently or flexibly mounted to be alternately moved from the dotted line position to the full line position by an engagement and riding of the lid 15 underneath it while the lid is in position on its associated container 10. This operation flexes tension spring 32. Although not shown, this momentary raising action may be employed to trip a time valve and momentarily inject a burst of steam or other gas or fluid into the opening between the closure and the container when the assembly has moved to the next or tilted position 4 of Figure 1.

The tube 27 is shown provided with a flexible tube connection 27a to a suitable source of steam, inert gas, etc. The tube 27 extends slidably-upwardly through the block 16 and at its upper end portion is held by a clamp support 28. This support has a split sleeve which is clamped over the tube 27 by a cap screw assembly 28a. The tube 27 is normally urged downwardly by tension spring 32 which is secured by upper and lower end ties 33a and 33b to project between clamp support 28 and inset block 17.

To guide movement of the tube 27, we have provided a two-part adjustable slide element or rod assembly 29—30. The upper and male part 29 is threaded and is secured by a cross pin 29a to project downwardly from the clamp support 28. The lower half or part 30 of the assembly has a threaded female bore 30a and an internally-threaded nut-flat portion 30b that adjustably receives the threaded upper part 29. It will be noted that the lower part 30 is guidably received within a vertical bore 17c of the inset block 17 and an aligned bore 16c of the block 16. The abutment of the lower end portion of the part 30 with the end wall of the bore 16c, as urged by the spring 32, limits the maximum "down" position of the tube 27, as indicated by the dash lines of Figure 2 of the drawings. Thus, the spring 32 resists an "up" movement of the tube 27, but flexes and permits it when each container and closure assembly moves thereunder, as indicated at station 3 of Figure 1 of the drawings.

Following the opposed in-line steam tube 27, we have provided a closure cap, tilting and shutting head 34 which, like the stabilizer head 19, is also mounted for limited vertical movement relatively to support block 16. The head 34 is carried for longitudinally slidable support on an upper head portion 36. In this connection, a dovetailed slide mounting is employed which is of the general construction of 20a of the runner 20, except that it projects longitudinally instead of transversely and is secured in an adjusted relationship by clamping set screws 37.

The head 34 has a forwardly-downwardly declining grooved portion or slot 34a to receive and position a

permanent magnet 35. Point a at the extreme forward end or edge of the magnet 35 represents the point beyond which a tilted closure or lid 15 is subjected to a shutting or snapping-back action to quickly close it and hold it in a closed position. This is done as the closure and container assembly move along the forward, substantially flat-riding, underface of the head 34. The head portion 36 is carried by a pair of tipping head slide rods 38 that are mounted for vertical movement within sleeve bearings 16b of the block 16. Lower end portions 38a of the rods are reduced and mushroomed to secure them within the head portion 36, while their upper end portions 38b are reduced and threaded to receive a cross tie-piece or member 40. The member 40 is secured in position by means of nut and washer assemblies 39. The maximum lower position of the tilt head 34 is governed by an adjustable abutment-screw assembly 41 which projects downwardly from the tie-piece 40. The head of the assembly 41 cooperates with a wear plate or insert 16d in the block 16.

The head 34 is normally urged downwardly by a tension spring 42, until the head of assembly 41 abuts the inset 16d. This spring 42 is positioned within a bore portion 16e of the block 16 and extends downwardly and its lower end surrounds an upwardly-projecting stud or post 36a. This post 36a is a part of the head portion 36. To adjust the tension of the spring 42, we have provided a pressure plate or washer 44 that is carried by a lower end portion of an adjusting screw 45. Thus, by turning knurled head 45a of the threaded screw 45, we are able to adjust the resistance that the head 34 has to upward movement. Upward movement is exerted by a closure and container assembly that is moving longitudinally therealong and therebeneath.

Although the pass-defining rotating disc pairs may be positioned and driven in any conventional manner, we have shown a suitable apparatus in Figures 3 and 4 of the drawings. Since each pair of discs 52 or 52' has a more or less standard operating mounting, we have used the same numerals for similar parts. The set 52' may be employed at station 2 in one of the ways shown in Figures 5 and 6. Outside of the specific construction of the discs, themselves, the disc unit of station 2 is the same as the units of stations 6 and 7. We prefer to employ resilient or rubber-like disc wheels 52 and 52'.

As shown in Figures 3 and 4, each disc wheel 52 or 52' is rotatably carried within a housing stand 50 and is actuated by a flexibly-jointed, vertical drive-shafting which has been indicated in Figure 4, from right to left, as 51a and 51b. The housing stand 50 is adjustably carried on a pair of quill shafts 53 and 53' which project from and are at their inner ends secured within the block 16, see also Figure 2 of the drawings. The discs 52 and 52' are transversely-aligned and the discs of cooperating pairs may be resiliently urged toward each other by opposed coiled springs 57.

Each spring 57 is operatively carried on a sleeve 56 that is positioned on the outer portion of the quill shaft 53 which extends beyond the housing stand 50 and its central housing 54. The central housing 54 which is positioned about the housing stand 50, carries the shaft 53 in an endwise-slidable relationship therein. The central housing 54 has a bifurcated portion 54a to slidably and guidably receive short length or stub quill shaft 53' (see Figure 2).

Hand wheel assembly 55 is rotatably-adjustably mounted on the outer end portion of each quill shaft 53 for inner and outer movement. The hand wheel 55 controls maximum or transversely-outwardly expanded positioning or spread of the pass defined by the pairs of discs 52 or 52'. The hand wheel assembly 55 also has an enlarged abutment annulus 55a which abuts the outer end portion of the spring 57 to hold it in position and to compress it and increase its tension resistance. It is thus apparent that the disc pairs are normally urged toward each other,

but have a resilient or flexible "give" when a closure 15 is introduced into the pass defined thereby.

What we claim is:

1. Apparatus for securing a skirted closure to a container comprising means for conveying a succession of 5 containers along a defined path while each such container is in an upright position; means for loosely applying a separate closure to the neck finish of each such container during the continued movement of the containers; magnetic means for tilting each closure so applied by 10 momentarily raising a portion of the edge thereof above the lip of the engaged container while continuing the movement of the containers; means for delivering a flow of fluid beneath the raised edge of each tilted closure and into the interior of each container; a slide head engaging the tilted closure moving with each such container 15 and so positioning such closure that the skirt thereof surrounds the neck finish of the container engaged by it and rotating pass-defining means for engaging each closure during the movement of the containers and for securing 20 the engaged closure in sealing engagement with the neck finish of the container engaged by it.

2. Apparatus for securing a skirted closure to the neck finish of a container and in sealing relationship to the lip of the container, which comprises means for moving 25 the container along a defined path while in an upright position; means for loosely applying a skirted closure to the neck finish of the container during the movement

of the container; means for turning the so-applied closure, relatively to the neck finish of the container, to position the securing lugs relatively to the cooperating threads on the neck finish; magnetic means for tilting the closure during the continued movement of the container, by raising one portion of the closure skirt above the lip of the container while maintaining the oppositely disposed portion of the skirt in contact with neck finish of the container; means for delivering a flow of condensible 10 fluid beneath the raised portion of the closure and into the container; a resiliently positioned slide head located in the path of travel of the container for engaging the tilted closure moving with the container and positioning such closure on the container with the closure skirt thereof completely surrounding the lip of the container; and 15 rotating, path-defining, spaced discs for engaging opposite sides of said closure and turning the closure during the continued movement of the container to thereby secure the closure to the neck finish of the container and in sealing relationship with the lip of the container. 20

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