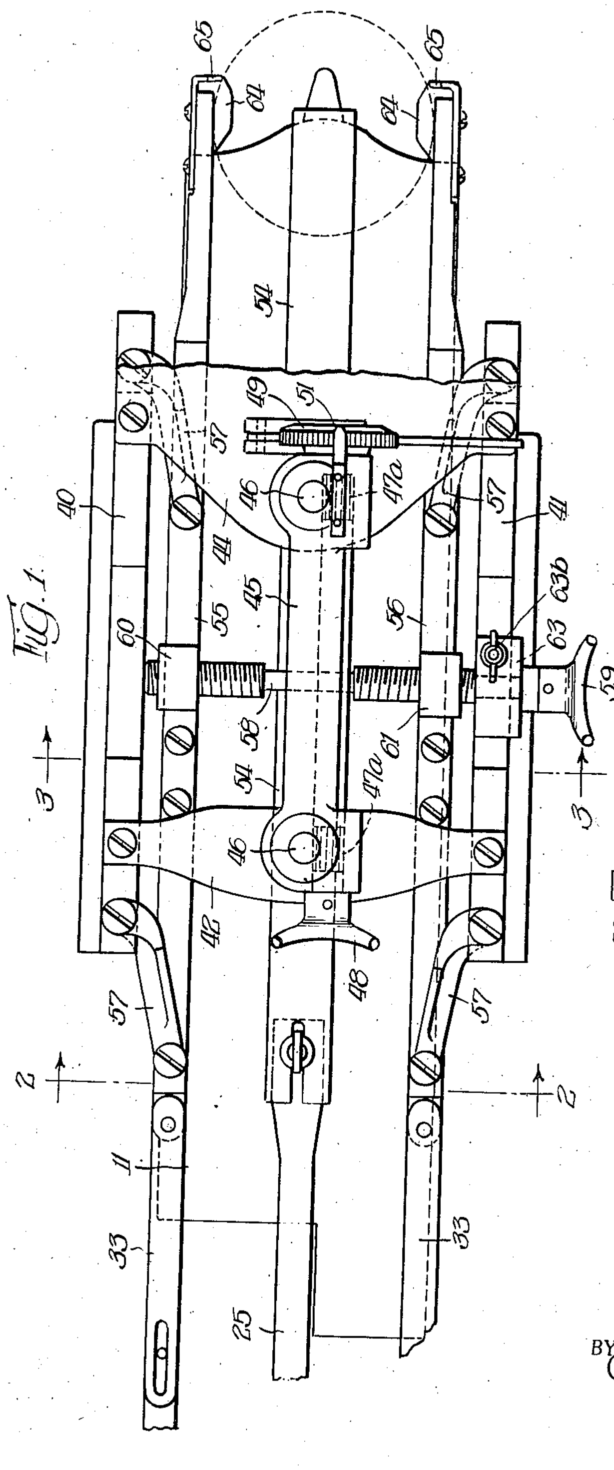
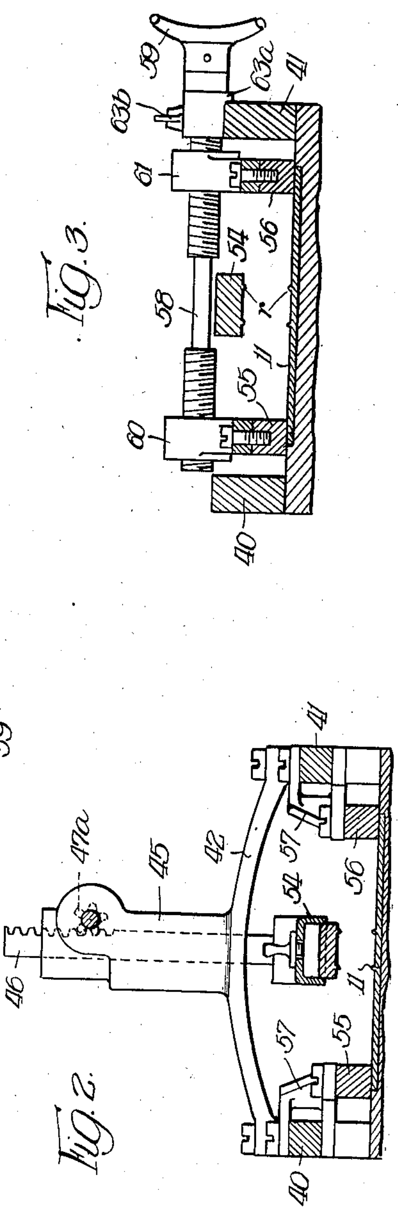
Aug. 15, 1939. L. E. DAVIES 2,169,973

APPARATUS FOR FEEDING AND APPLYING CLOSURE CAPS

Filed July 18, 1938 3 Sheets-Sheet 1





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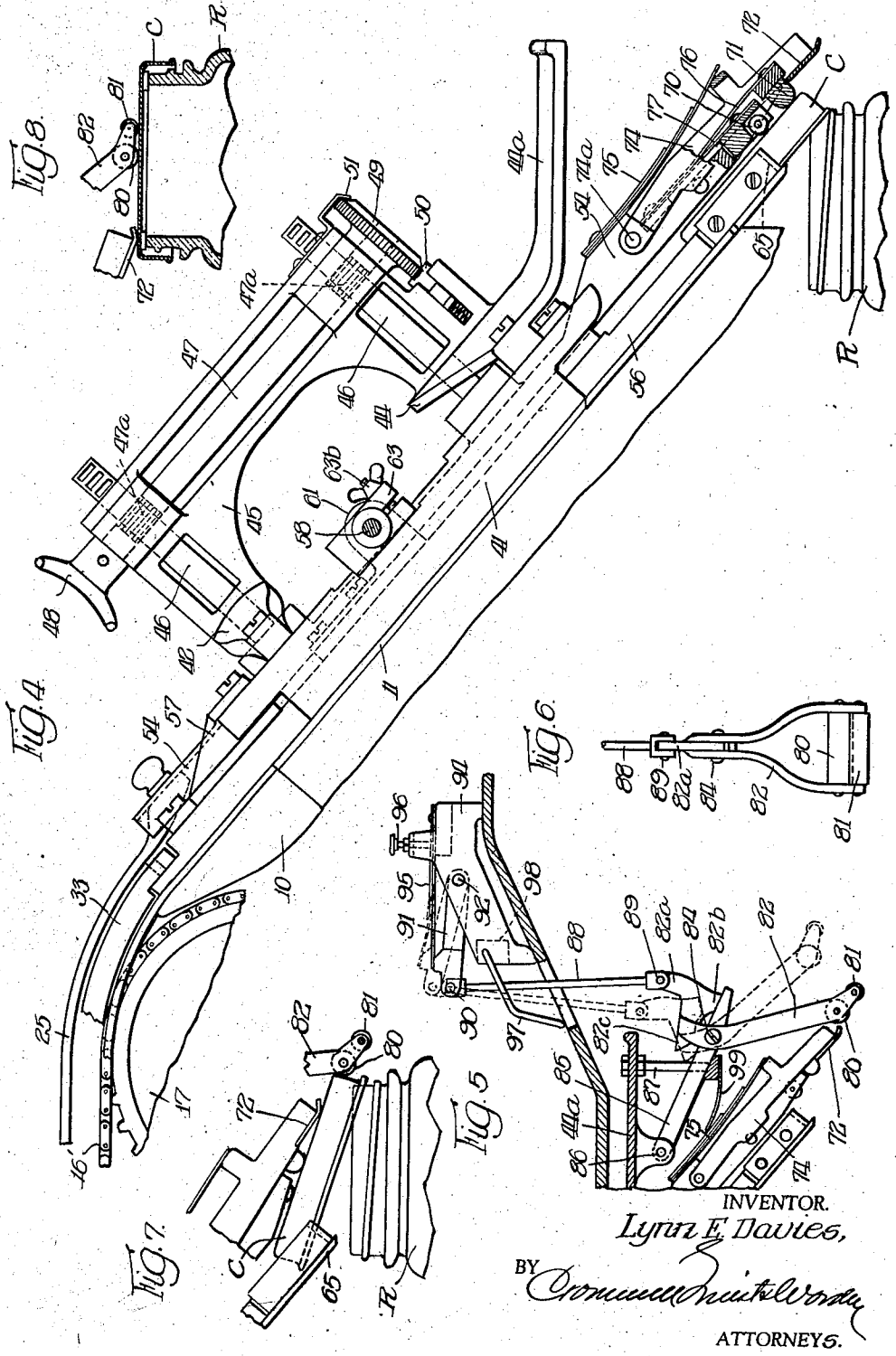
APPARATUS FOR FEEDING AND APPLYING CLOSURE CAPS

Filed July 18, 1938 3 Sheets-Sheet 2



APPARATUS FOR FEEDING AND APPLYING CLOSURE CAPS

Filed July 18, 1938 3 Sheets-Sheet 3

Fig. 9.

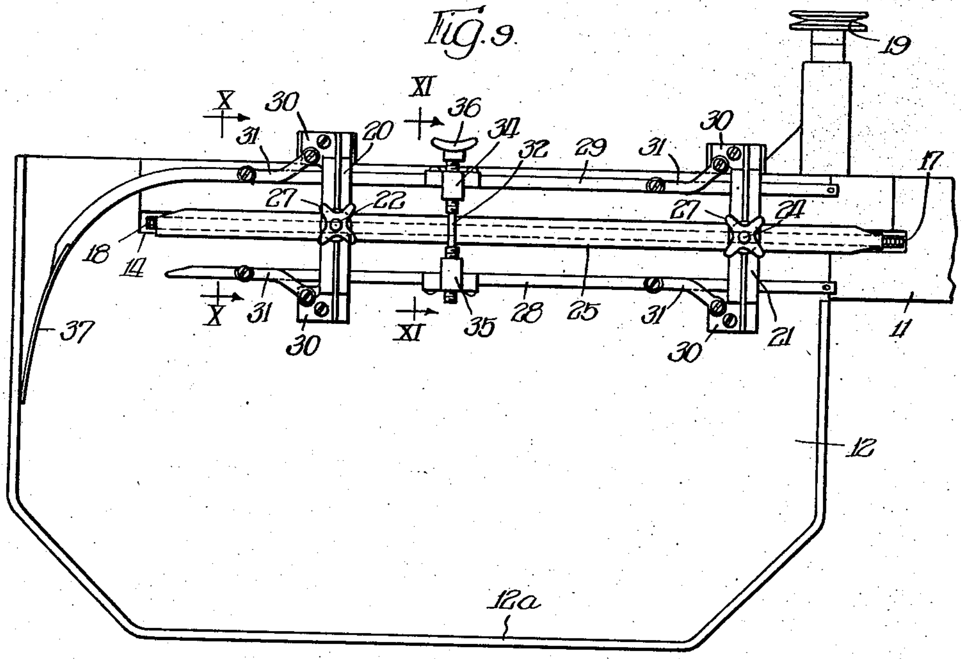


Fig. 10.

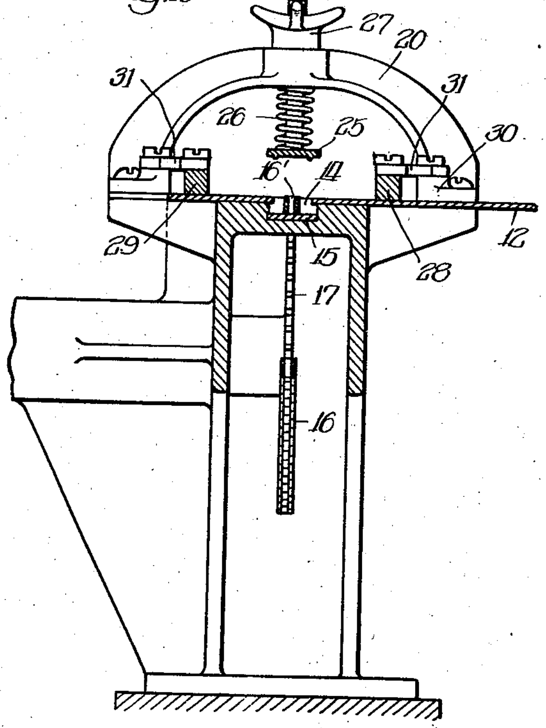
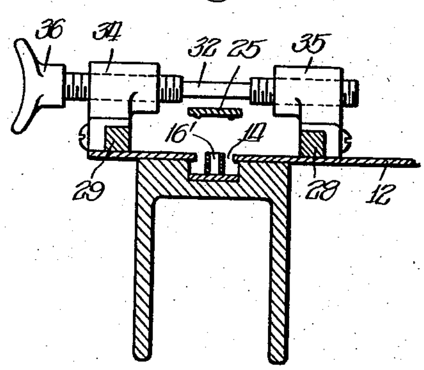


Fig. 11.



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UNITED STATES PATENT OFFICE

2,169,973

APPARATUS FOR FEEDING AND APPLYING CLOSURE CAPS

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Application July 18, 1938, Serial No. 219,717

12 Claims. (Cl. 226—80)

This invention relates to packaging, and pertains particularly to apparatus for automatically feeding and applying closure caps to packing receptacles such as bottles, jars, and the like. It relates to that type of apparatus wherein the closure caps are fed successively, one after another, to devices whereby they are applied successively to the receptacles which are presented in a series, one after another, the application of the caps to the receptacles being accomplished while the latter continue their progressive movement.

It will be understood that a packer who packages a variety of food products, such as fruits, jellies, jams, pickles, fruit juices, etc., ordinarily requires quite a number of different sizes of closure caps, because of the various types and sizes of containers in which such products are packaged. For example, it is quite obvious that a glass jar for the packing of peaches must of necessity have a larger mouth, and hence requires a closure cap of much larger diameter, than would be necessary for a bottle of the type in which fruit juices customarily are packed. Between these two extremes are any number of different intermediate sizes as, for example, for different jelly glasses of different capacities, chili sauce bottles, containers for small fruits such as berries, etc.

Accordingly, it is of primary importance that a machine or apparatus for feeding or applying closure caps to packing receptacles in a packing plant be capable of adjustment or adaptation in such fashion as to enable it to handle caps of any of this great variety of sizes, and it is likewise of primary importance that it be capable of handling caps of all of the sizes with equal effectiveness as to speed and certainty of operation. Moreover, it is of very great importance that the adjustments whereby the machine is adapted to the different sizes of caps be accomplished very quickly and the absolute precision and without requiring any dismantling or change of parts in the machine.

It is the object of the present invention to provide an apparatus meeing these requirements, viz., one which is susceptible of handling closure caps of a great variety of sizes with equal rapidity and precision, and wherein the adjustments may be made quickly and accurately for the purpose of adapting it to such caps which vary in proportion as well as in size, for example, caps of different diameters but of the same depth, caps of different depts but of the same diameter, and likewise caps of different diameters and different depths.

Another object is the provision of such apparatus which is associated with the receptacle-handling means whereby the receptacles are presented for reception of the caps, and which is of such character that the proper operative relationship between the cap-applying means and the receptacle-handling means is automatically attained at all adjustments of the cap-feeding means.

Other and further objects of the invention will be pointed out or indicated hereinafter, or will be apparent upon an understanding of the invention or its employment in use.

For the purpose of aiding in an explanation of the invention, I show in the accompanying drawings forming a part of this specification, and hereinafter describe, certain mechanisms in which it may be embodied. It is to be understood, however, that these are presented merely for purpose of illustration and hence are not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 is a top view of certain portions of the cap-feeding mechanism, showing also a part of the cap-applying means;

Fig. 2 is a transverse sectional elevation on line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional elevation on line 3—3 of Fig. 1;

Fig. 4 is a side elevation of the mechanism illustrated in Fig. 1, but showing also, partly in section, additional elements of the cap-applying means;

Fig. 5 is a side elevation showing further elements of the cap-applying means;

Fig. 6 is an end elevational view of a portion of the mechanism shown in Fig. 5;

Fig. 7 is a side elevational view of part of the mechanism shown in Fig. 5 in the course of the operation of applying a closure to a container;

Fig. 8 is a part side elevational view showing portions of the same mechanism at the end of the operation of applying the closure to the container;

Fig. 9 is a top view of other portions of the cap-feeding means;

Fig. 10 is a transverse sectional elevation of same on approximately line X—X of Fig. 9; and

Fig. 11 is a transverse sectional elevation on approximately line XI—XI of Fig. 9.

The particular apparatus which is shown in

these drawings and which is here used for the purpose of illustrating and explaining the invention is designed primarily for use on sealing machines of the types illustrated and described in U. S. Letters Patent Nos. 1,920,539, granted August 1, 1933, and 2,041,891, granted May 26, 1936, both to White Cap Company.

It is to be understood, however, that the invention is intended for use also with various other types of machines used for the automatic application and sealing of closure caps on packing receptacles such as tumblers, bottles, or jars, wherein the receptacles are presented in a series to cap-applying apparatus whereby the caps are applied to them one after another incident to their progressive movement. This application of the closures to the receptacles may be accomplished incident to, preliminary to, or subsequent to evacuation of air from the head spaces of the receptacles.

The apparatus here illustrated is adapted or adaptable for the handling of closure caps of a great variety of kinds and sizes, but is here illustrated as handling closure caps of the sort illustrated in Fig. 8, which is a deep skirted cap carrying a sealing gasket on the under surface of its top for sealing engagement with the mouth rim of a jar.

Described in a very general way, the invention comprises mechanism whereby closure caps may be fed continuously in a series to a cap-applying means whereby they are applied individually, one after another, to the packing receptacles which are presented one after another to said means, and it includes also a construction and organization of parts whereby the instrumentalities which guide the caps and which present and hold them in the desired position for application to the receptacles may be quickly and accurately adjusted to caps of different selected sizes and kinds, and whereby also the cap-applying devices may be quickly and automatically adjusted to the various sizes and kinds of caps, both to the effect that the caps in all instances shall be accurately and properly applied to the receptacles. The nature of the invention will be understood more completely from the following description of the illustrative embodiments shown in the drawings.

Let it be understood that in said drawings the reference numeral **10** (Fig. 4) designates a portion of the frame or casing or other fitting of a machine, for example, a portion of the steam distributor described in U. S. Letters Patent No. 2,107,237, granted February 1, 1938, and the reference numeral **11** designates a sloping plate constituting a runway down which the closure caps are fed, or slide by gravity, to a location where they are arrested, one after another, in position to be picked up, or for application to receptacles which are moved progressively in the direction of the arrow from a location indicated by the upper portion of the receptacle R in said figure. This plate or runway **11** leads from a table **12** (see Fig. 9) on which the closure caps are deposited and from which they are fed, a portion of said table constituting, in effect, a continuation of said runway.

In said portion of the table **12** is provided a slot **14** and under this slot a trackway **15** upon which runs the upper flight **16'** of a sprocket chain **16**, which chain is entrained on a driven sprocket **17** and on an idler guide sprocket **18**, said sprocket **17** being driven through the instrumentality of a shaft and pulley **19**, so that the upper flight of the chain is moved in the direction indicated by the arrow in Fig. 9.

Directly over the slot **14** are bridge members **20** and **21**, and slidable vertically in said arch members over the slot **14** are screw-threaded rods **22** and **24** which support and have affixed to their lower ends a hold-down strip **25** which extends parallel with and above the slot **14**. The strip **25** and rods **22** and **23** are urged downwardly by coil springs **26** compressed between the strips and the arch members, and the elevation of the strip **25** is controlled by manually adjustable nuts **27**.

Resting on the table **12** and extending under the arch members **20** along opposite sides of the slot **14** are adjustable guide members **28** and **29**, in the nature of rods of rectangular cross section. These adjustable guide members are adjustably connected to suitable stationary anchorages **30**, by means of links **31**, the connections being made by pintle screws on which the said links may swing, thus to permit the adjustable guide members **28** and **29** to move toward and from the slot **14**, but to maintain them in parallel relationship.

For accomplishing this adjustment of the guide members **28** and **29**, an adjusting rod **32** is threaded in tapped bushings **34** and **35** which are rigidly fixed to the guide members **29** and **28** about midway their length, the threading of said rod and bushings being right handed in the case of bushing **35** and left handed in the case of bushing **34**, and said rod being rotatable by means of a hand wheel **36**. Accordingly, rotation of hand wheel **36** in one direction will draw the guide members **28** and **29** toward each other, and in the other direction will cause them to move apart from each other, but in all positions they will be maintained parallel with the slot **14**.

The table **12** is provided with an upstanding ledge **12a** along its margins, excepting that with which the guide member **29** is associated, and a resilient upstanding tail member **37** is carried by the guide member **29** and bears against a portion of said ledge.

The location of the trackway **15** is such that the chain portion **16'** extends slightly above the upper surface of the table **12**, so that thereby it may engage the lower rim portions of closure caps which are placed over the slot **14**, and feed them along, in the direction of the arrow of Fig. 9, simply by friction.

Accordingly, closure caps which are placed upon the table **12** and moved along the member **37** and curved rear end of guide member **29** to a position over slot **14**, will be engaged by the chain and fed along, one after another, between the guide members **28** and **29**. By adjustment of the bolt **32**, the said members **28** and **29** are placed at the proper spacing to cooperate with the peripheries of the caps sufficiently to guide them in alignment one after another. By adjustment of the hand nuts **27**, the hold-down strip **25** is arranged at such elevation as to prevent one cap from climbing up onto the one ahead of it. Obviously, the adjustment of members **28**, **29** and **25** should not be such as to impose a holding or retentive friction on the caps. As a result, so long as the series of caps which are engaged by the chain is restrained against movement by an obstruction at the head of the series, the chain will slide harmlessly along below the caps without advancing them, but as soon as the obstruction is removed, the caps in the entire series will be advanced. The friction from the chain is suf-

ficiently effective on the several caps which contact it to move forwardly additional caps which may be in alignment beyond them on the runway 11. Thus the caps are fed in a series onto the sloping upper end portion of the runway 11 shown in Figs. 1 and 4.

The mechanism illustrated in Figs. 1 to 4 inclusive comprises a pair of stationary rails 40 and 41 which are fixed in approximately parallel relationship along opposite sides of the runway 11. Affixed to these stationary rails are bridge members 42 and 44, which carry a bracket 45 having slideways extending at right angles to the runway 11, in which slideways are guided rack bars 46. Extending at right angles to these slideways are journals in which is rotatably mounted a gear shaft 47 having pinions 47a which mesh with the rack teeth of the rack bars 46. Said gear rod is rotatable by means of a hand wheel 48, and it carries a toothed wheel 49 with which a spring-pressed detent 50 cooperates to restrain it in selected rotary position or adjustment. A pointer 51 is associated with the toothed wheel 49 and the latter may be provided with appropriate figures as indices of the rotary adjustment of the shaft 47.

Fixed to the lower ends of the rack bars 46, and supported by them, is a top bar 54 which extends parallel with the sloping runway 11. This top bar 54 is a rigid member, and to its rearward end is slidably connected the forward flexible end portion of the holding-down strip 25.

By virtue of the construction above described, the top bar 54 may be adjusted toward and from the runway 11 by rotation of the hand wheel 48, and the position of adjustment is definitely controlled by the detent 50 and may be ascertained by reference to the indicia on the wheel 49 in reference to the pointer 51.

Resting on the slideway 11 and extending along opposite sides of the top bar 54, are the adjustable guide members 55 and 56. These are adjustably connected to the fixed rails 40 and 41 by swinging links 57, whereby they are rendered adjustable toward and from each other but maintained in approximately parallel relationship. This lateral adjustment of the guide members 55 and 56 is accomplished by means of the adjusting shaft 58 which is manually rotatable by means of the hand wheel 59 and is provided with a right hand thread engaging the threaded bushing 60 affixed to the guide member 55 and a left hand thread engaged in the bushing 61 which is affixed to the guide member 56. Shaft 58 runs through a clamp block 63, which is slidable longitudinally in a depression in rail member 41, and also bears against it laterally by a flange 63a. Said clamp block may be tightened down on shaft 58 by means of a wing nut 63b, to secure said shaft against inadvertent rotation. Accordingly, rotation of shaft 58 in one direction will draw the members 55 and 56 toward each other, and rotation of it in the other direction will move them apart, thus to permit adjustment of said guide members to positions where they will cooperate with the peripheries of caps of different diameters in such fashion as to guide said caps in alignment and center them properly relative to the top bar 54.

On the lower ends of adjustable guide members 55 and 56 are carried wing ledges 64, which extend beyond and in alignment with runway 11, and stop members 65 which project inwardly beyond the inner faces of the guide members 55 and 56. Accordingly, the wing ledges 64 form supports upon which portions of a closure cap beyond the end of the runway 11 may rest, and the stop members 65 form stops which prevent such cap from sliding downwardly off of the wing members and runway. Thus the lowermost cap, which is held against forward movement by the stops 65, holds all of the following caps against forward movement inasmuch as they are in abutment with one another. This is true of the entire series of caps, including those which are riding on the forwardly moving sprocket chain 16' between the guide members 28 and 29. The top bar 54, like the hold-down strip 25, keeps the caps from riding up onto those ahead.

The lowermost cap, which is thus retained on the wing ledges 64 by the stop members 65, is held in a sloping position with its forward rim or flange depending beyond said ledges and stop members and in the path of the mouth portion of the advancing receptacle R, in order that said cap may be engaged by the receptacle and withdrawn from its support by being lifted until its lower rim may pass over the stop members 65, and then dragged forwardly by the advancing receptacle. In order that the movements and positions of the cap during this operation may be controlled with accuracy and precision and in order that the cap may be quickly and accurately applied in proper position on the receptacle when it is thus withdrawn from the support, appropriate cap-applying devices are associated with the lower end of the runway in positions where they will become effective on the cap when it is raised to override the stop members 65 and in the course of its subsequent advancing movement.

In the embodiment here illustrated, certain of these cap-applying elements are represented by the roller 70 and the presser 71. These are mounted on the top bar 54 in a manner hereinafter described, so that they occupy positions above the path in which the cap is moved in the course of its withdrawal from the runway.

In order that the movements of the cap may be controlled with precision, it is necessary that these cap-applying elements be located in a certain spacial relationship to the top and the forward margin of the cap when it rests on the ledge members 64 in engagement with the stop members 65. Inasmuch as the different kinds of caps may vary in height from a minimum of five millimeters or less to a maximum of eighteen millimeters or more, and in overall diameter from a minimum of about thirty millimeters to a maximum of eighty millimeters or more, it becomes quite apparent that no single position or relationship of the cap-applying devices to the ledge members 64 and stop members 65 will be effective for all caps.

The perpendicular adjustment of the cap-applying devices relative to the plane of the runway and its ledges 64 is accomplished by adjustment of the top bar 54 by rotation of hand wheel 48 as above described. This has the effect of moving the devices 70 and 71 perpendicularly toward or from the plane of the runway. That adjustment may be adequate for the requirements of caps of the same diameter but of different heights. The inward and outward adjustment of the guide members 55 and 56, of course, accommodates the positions of the stop members 65 and ledge members 64 to caps of different diameters. However, these adjustments do not answer all requirements for insuring accurate application of the cap to the receptacle.

It will be apparent that caps of different diame-

ters will extend or depend to different distances beyond and below the forward extremities of the ledges 64. As a consequence, their forward portions will bear different relationships to the cap-applying elements 70 and 71, in the front-to-rear directions.

To compensate for this, I provide the swinging connections between the adjustable guide members 55, 56 and fixed rails 40, 41, by means of the links 57, so that, incident to the inward and outward movement of the guide members 55 and 56, they are also given a longitudinal movement. In other words, when the guide members 55 and 56 are moved toward each other by rotation of hand wheel 59, so as to accommodate them to a cap of smaller diameter, said members 55 and 56 are at the same time given a forward longitudinal movement, due to the fact that the links 57 are moved toward a perpendicular relationship to the rail members 40 and 41; and when the guide members 55 and 56 are moved outwardly away from each other, they are at the same time given a rearward longitudinal movement, due to the fact that the links 57 are swung toward the planes of the rail members 40 and 41. These longitudinal movements of the members 55 and 56, consequently, effect a forward or rearward adjustment of the stop members 65, with the result that the proper relationship of the forward portions of the cap to the cap-applying elements 70 and 71 is established automatically for caps of the different diameters. The rear ends of the guide members 55 and 56 are connected to the forward ends of the guide members 28 and 29 by guide strips 33, which have both pivotal and sliding movement relative to the guide members, so that they can accommodate themselves to the adjusting movements of said members.

In addition to the elements 70 and 71, the cap-applying mechanism illustrated in Figs. 4 to 8 inclusive includes a leveler 72, which is a plate carried on a swinging yoke 74, pivoted at 74a, in such relationship that it normally occupies a sloping position forwardly beyond and somewhat below the presser 71, the normal relationship being illustrated in Fig. 4. This yoke is adjustable toward and from the runway by adjustment of the top bar 54 as above described, and it is spring pressed downwardly by the leaf spring 75. The presser 71 likewise is spring pressed downwardly by its spring 76, and the roller 70 by its spring 77, all of which springs are affixed at their rearward ends to the top bar 54. The proper elevation of the top bar 54 relative to the runway 11 for any given cap is such that it will clear the tops of the caps as they slide down the runway, and the roller 70 and presser 71 will lightly contact the top of the lowermost cap when it is retained in position on the runway and wing ledges 64, to hold it down in engagement with the stops 65, so that it will not slide out, substantially as illustrated in Fig. 4, wherein the lowermost cap is designated by the reference character C.

Associated with these instrumentalities, as illustrated in Fig. 5, is a cap-restraining mechanism which comprises a primary roller 80 and a secondary roller 81 which are rotatably journaled in a yoke 82, which yoke is pivoted at 84 on a link 85 which, in turn, is hinged at 86 on an apron member 44a which extends forwardlly from bridge member 44. A stirrup member 87 is secured in fixed position on said member 44a, and depends therefrom to form a rest or support for said link 85 when it is in its lower limit position. The yoke member 82 is irregularly shaped, having at its upper end, above the forward end of the link 85, a forwardly extending arm 82a which is formed with stop portions 82b and 82c adapted for cooperation with the link 85. A thrust rod 88 is pivoted at 89 to the upper end of the arm 82a, and at its upper end said rod is pivoted at 90 to a swinging lever 91 which is pivoted at 92 to a stationary element 94. A spring 95, secured to said element 94, presses the rearward end of said lever 91 downwardly, the effective stiffness or pressure of said spring being adjustable by means of a screw 96. A lever 97 is rotatably journaled in the element 94, and carries a throw-off member 98, so that by swinging said lever upwardly and forwardly, the throw-off element 98 may be rotated into engagement with the lever 91, to lift the rearward end of said lever for a purpose hereinafter described.

In the normal position of these various parts, which is shown in Fig. 5, the stop member 82b rests upon the arm 85, being held in that position by the pressure of spring 95, and the pivot point 89 is a substantial distance forwardly beyond the straight line intersecting the two pivot points 90 and 84. This restrains the roller 80 in its position immediately at the forward end of the leveler 72. The purpose of this roller 80 in this position is to restrain the closure cap from dropping down too far on the mouth or neck portion of the jar after it has been lifted to clear the stop 65 and is in the process of being withdrawn from the runway. The relative positions of the advancing receptacle R and the lowermost cap C, at the time the latter is first contacted by the former, is approximately as shown in Fig. 4. In this position the presser 71 engages the top of the cap and exerts a yielding downward pressure upon it, thus preventing its being lifted too quickly or too easily. As the receptacle advances, it lifts the forward portion of the cap, until the bottom rim of the cap is above the stop 65. Thereupon the cap is drawn forwardly by the further advancing movement of the receptacle, and it comes first under the restraining pressure of the leveler 72, which is spring pressed upon it, thus tending to level it in the transverse direction, the rearward margin of the skirt being still supported on the runway 11. However, almost immediately after the cap contacts the leveler 72, the foremost upper portion of the cap comes into abutment with the roller 80, in the position illustrated approximately in Fig. 7. Under the pressure of the spring 95, this roller exercises a rearward pressure against the cap, for the purpose of holding it tightly against the forward portion of the jar neck, and preventing the forward portion of the cap from slipping down onto the jar neck, under the pressure of the leveler 72 and presser 71, at too early a point in the procedure, namely, before the rear end of the cap is clear of the runway. The purpose of all this is to bring the cap to as nearly a horizontal position before it is allowed to drop down onto the jar, because, if the cap is freed when it is in a too steeply sloping position, it is likely to jam on the jar neck, and never reach the proper horizontal position thereon.

Accordingly, as the cap is moved forwardly by the advancing jar, the roller 80 remains pressed against the forward skirt portion of the cap, while said roller also is swung forwardly by the advance of the jar and cap, the frame 82 swinging on its pivot 84. This movement of the yoke lifts the stop 82b from the arm 85, and swings the stop 82c downwardly toward said arm. Of

course, this movement is all resisted by the spring 95, but the leverage exerted by said spring upon the yoke 82 is being gradually decreased, because the pivot point 89 is approaching the dead center line of the pivot points 84 and 90. Consequently, just as the rear end portion of the cap rides off of the lower end of the runway 11, the roller 80 rides lightly up on top of the forward portion of the cap, and the cap now having assumed an almost horizontal position, it is thrown down onto the jar neck by pressure of the leveler 72. As the jar proceeds beyond the leveler, the roller 80 and the auxiliary roller 81 continue to ride upon it, holding it firmly in place. This relationship of the parts is illustrated approximately in Fig. 8, and in the dotted line position shown in Fig. 5. However, even though the pivot point 89 has almost reached the dead center position, and the swinging of the yoke has been arrested by engagement of the stop 82c against the arm 85, the rollers still may have an upward movement against the action of spring 95, due to the pivotal connection of the arm 85 at 86. This accommodates variations in the height of the receptacles.

In some instances, as where the cap is a very shallow one, it is not necessary or desirable to avail of the restraining action of the roller 80 as above described, and in such instances the roller and yoke 82 are set outwardly somewhat toward the dotted line positions shown in Fig. 5 by rotating the lever 97 so that the lever 91 is lifted and held elevated by the throw-off device 98. In this position the rollers 80 and 81 come into action upon the top of the cap after it has been applied to the receptacle and has moved forwardly from the leveler 72. In some instances, as where a deep cap of the sort illustrated is being used, it may be desirable to augment the downward pressure of the leveler 72 after the cap has first moved under it, and in order to accomplish this, a spring 99 may be mounted on the stirrup 87 in position where it will engage spring 75 to further resist the lifting of the swinging yoke 74. For shallower caps, the top bar is necessarily lower, and hence the spring 99 will be spaced above spring 75, and consequently be ineffective.

For operation in application of closure caps to jars, the apparatus is adjusted as above described, by setting the lateral guide members 28, 29, 55 and 56 at the proper spacing for guiding cooperation with opposite side portions of the caps which are to be used, and the top bars 25 and 54 are adjusted to the proper elevation with respect to the upper surface of the table 12 and runway 11 respectively. The adjustment of the guide members 55 and 56 positions the stop elements 65 in proper relationship to the cap-applying devices 70, 71 and 72, as above described. The machine is started and operates the conveyor to move the receptacles past the cap-applying devices in approximately the relationship shown in Fig. 4, and such operation of the machine likewise actuates the sprocket chain 16. The caps having been placed on the table 12, right side up, are moved by hand to a position over the upper flight 16' of the sprocket chain, and by the movement of said chain are carried forwardly in the direction of the arrow in Fig. 9, until they reach the sloping portion of the runway 11 (see Fig. 4) whereupon they slide downwardly on the runway until the foremost cap is arrested by the stop elements 65 in approximately the dotted line position illustrated in Fig. 3, and the succeeding caps are stopped by contact with one another in series.

When the advancing vessel reaches the lowermost cap, it contacts the depending skirt portion thereof, approximately as illustrated in Fig. 4, and drags the cap forwardly, in the horizontal direction. This necessarily lifts the points of the cap which are in contact with the stops 65, against pressure of the spring-pressed elements 70 and 71, until said points are elevated sufficiently to pass over the stop elements 65. This occurs almost immediately, and then the cap is dragged forward by the advancing jar against the resistance of the element 71, and almost immediately against the resistance of the spring-pressed leveler 72, and comes up against the restraining roller 80, which presses rearwardly upon the forward skirt portion of the cap and thus holds it against the forward portion of the jar neck and prevents its dropping downwardly thereon. Meanwhile the rearward portion of the cap slides downwardly on the lower end portion of the runway 11, so that the cap gradually approaches a horizontal position, the leveler 72 and presser 71 urging it downwardly. Just as the rear end of the cap slides off the end of the runway 11, the rearward pressure of roller 80, which has been swung forwardly with the advance of the jar, reaches its minimum, as above described, thus reducing this restraint to the point that the cap then is at once pressed down onto the jar mouth by the pressure of the leveler 72. It takes its final dropping movement when it is almost a horizontal position, consequently insuring an unobstructed entry of the jar neck into it. Accordingly, when it drops, the gasket of the cap engages the mouth of the jar uniformly. As the vessel advances, the rollers 80 and 81 roll upon its top, as illustrated in Fig. 8.

This application of the caps to the jars may be accomplished in vacuo, or in a hot vapor atmosphere, substantially devoid of air, as described in the above identified Patents Nos. 1,920,539 or 2,041,891, from the latter of which patents it may be ascertained how the jars are retained against being tilted while they are withdrawing the caps as above described. Pursuant to evacuation of air from the head space of the jar and the cap and the application of the cap as above described, it may be sealed hermetically on the jar as described in said patents.

In this fashion the application of the closure caps to the vessels may be carried on very rapidly and at the same time with great precision and accuracy, and when it is desired to use caps of a different size or kind, the machine may be readily adapted to them by the simple adjustments which have been described above in detail.

What I claim is:

1. In apparatus for applying closure caps to packing vessels, in combination, a runway along which the caps may slide, guide members movably associated with opposite sides of the runway and extending longitudinally thereof to guide the caps in their course, and means operable to adjust said guide members simultaneously both laterally and longitudinally in approximately parallel relationship.

2. In apparatus for applying closure caps to packing containers, in combination, a runway along which caps may slide, a cap-applying device associated with the forward end of said runway, guide members movably associated with opposite side portions of the runway and extending longitudinally thereof to guide the caps in

their course, said guide members having stops adjacent their forward ends for retaining a cap adjacent the cap-applying device, means for moving said guide members laterally toward and from each other and means rendered effective by said movement to adjust the guide members longitudinally toward and from the cap-applying device.

3. Apparatus as specified in claim 2 and wherein the last mentioned means comprises pivotal links retaining said guide members in parallel relationship and the first mentioned means is operable to move said guide members respectively like distances toward or from each other, thereby effecting their longitudinal movement.

4. In apparatus for applying closure caps to packing containers, in combination, an approximately horizontal runway, a sloping runway leading therefrom, guide members associated with said runways for guiding closure caps one after another from the horizontal runway to the sloping runway and down the latter, a stop adjacent the lower extremity of the sloping runway for arresting a cap in stationary position thereon, a constantly-operating feeding device frictionally effective on caps on the horizontal runway to propel them toward the sloping runway, and a top guide member over the runways and adjustable toward and from them and the said feeding device.

5. In apparatus for applying closure caps to packing containers, a combination as specified in claim 4 and wherein said feeding device comprises an endless belt running below the horizontal runway but having its upper flight projecting through the same to a slight distance above its upper surface along approximately its median line.

6. In apparatus for applying closure caps to packing containers, in combination, a sloping runway, bridge members spanning the same and formed with slideways extending perpendicularly relative to the runway, rack bars guided in said slideways, a top bar carried by said rack bars above the runway, a gear shaft journaled in the bridge members and carrying pinions meshing with the rack bars, whereby the top bar is maintained in parallel relationship with the runway and is adjustable toward and from the same, and a detent cooperating with the gear shaft to retain the top bar in selected position.

7. In apparatus for applying closure caps to packing containers which includes a conveyor for moving the containers progressively in a series, in combination, a sloping runway over the path of the containers, a stop for arresting a cap in a sloping position at the lower end of the runway, cap-applying elements adjacent the forward end of the runway in position to apply pressure downwardly on the top of the cap as it is withdrawn past said stop, and a restraining element in position to engage the forward portion of the cap in the course of its withdrawal past said stop and oppose its forward movement, said restraining element being movable forwardly against yielding pressure.

8. In apparatus for applying closure caps to packing containers, which includes a conveyor for moving the containers progressively in a series, a combination comprising cap-supporting means for holding a closure cap in a sloping position where it may be engaged by a container which is being moved forwardly by the conveyor, cap-depressing means associated with said cap-supporting means in position to press the cap downwardly toward the container incident to forward movement of the cap, and restraining means in position to engage the forward portion of the cap and press it rearwardly against the advancing container, said restraining means being movable forwardly with the cap against yielding pressure.

9. In cap-applying apparatus, a combination as specified in claim 8 and including a spring for applying yielding pressure to the restraining means and a lever through which the spring pressure is applied, said lever being arranged so that the effective length of its power arm is decreased progressively as the restraining means is moved forwardly.

10. In cap applying apparatus, a combination as specified in claim 8 and including means rendered effective by forward movement of said restraining means to decrease said yielding pressure.

11. In apparatus for applying closure caps to packing vessels which includes means for moving the vessels progressively in a series, cap positioning means which comprises, in combination, a runway along which the caps may slide toward the path of the vessels, a pair of stop members for engaging and retaining a cap on the runway in position to be engaged by a vessel, and means operable to adjust said stop members toward and from each other in directions crosswise of the path of the vessels and at the same time longitudinally of the path of the vessels.

12. In apparatus for applying closure caps to packing vessels which includes means for moving the vessels progressively in a series, cap positioning means which comprises, in combination, a runway along which the caps may slide toward the path of the vessels, a pair of stop members for engaging and retaining a cap on the runway in position to be engaged by a vessel, and means operable to adjust said stop members toward and from each other in directions crosswise of the path of the vessels and at the same time toward and from the path of the vessels.

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