Jan. 20, 1959 H. E. STOVER 2,869,301

MACHINE FOR HERMETICALLY SEALING GLASS CONTAINERS

Filed Dec. 9, 1953 8 Sheets-Sheet 1

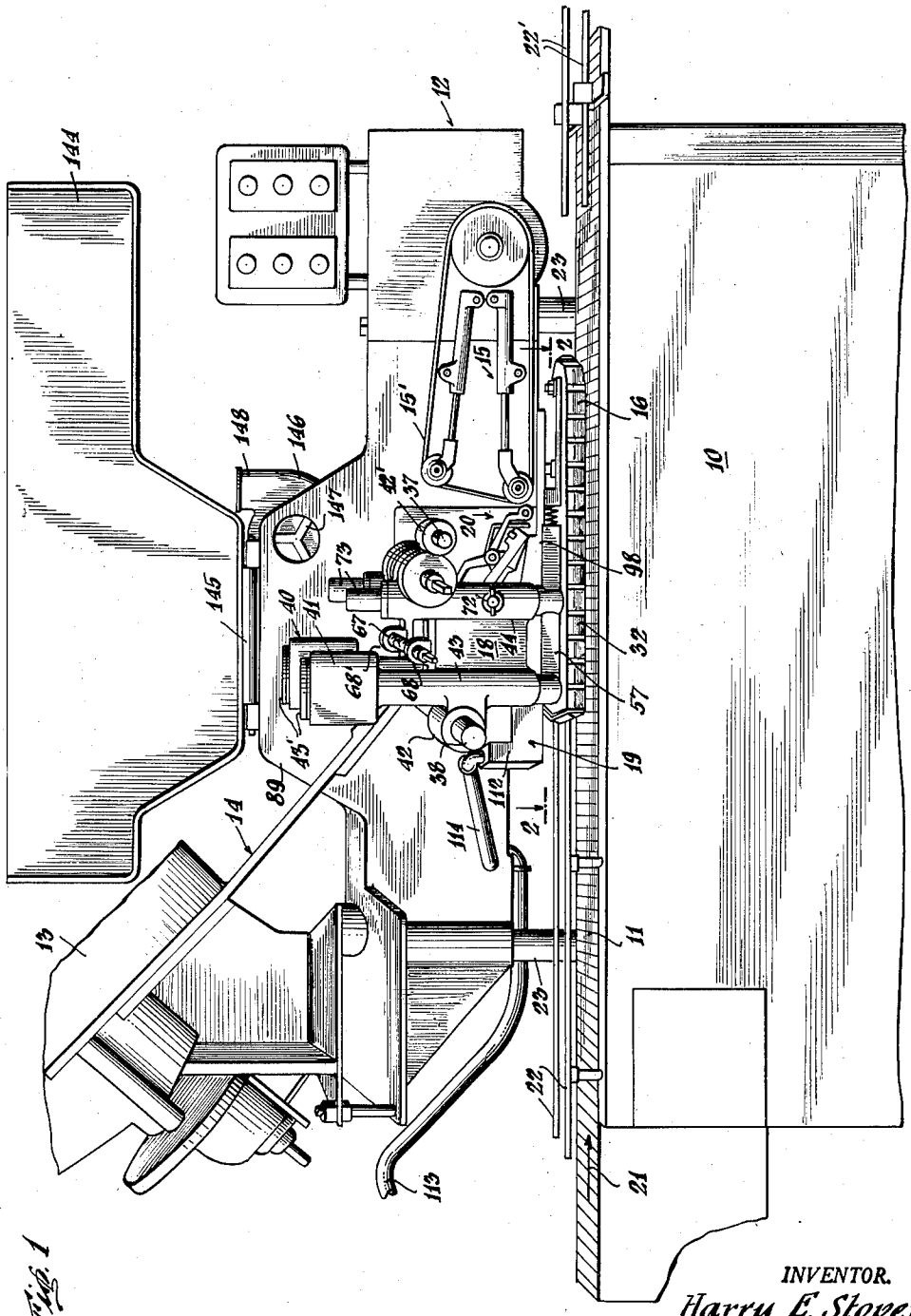

Fig. 1

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Filed Dec. 9, 1953 8 Sheets-Sheet 2

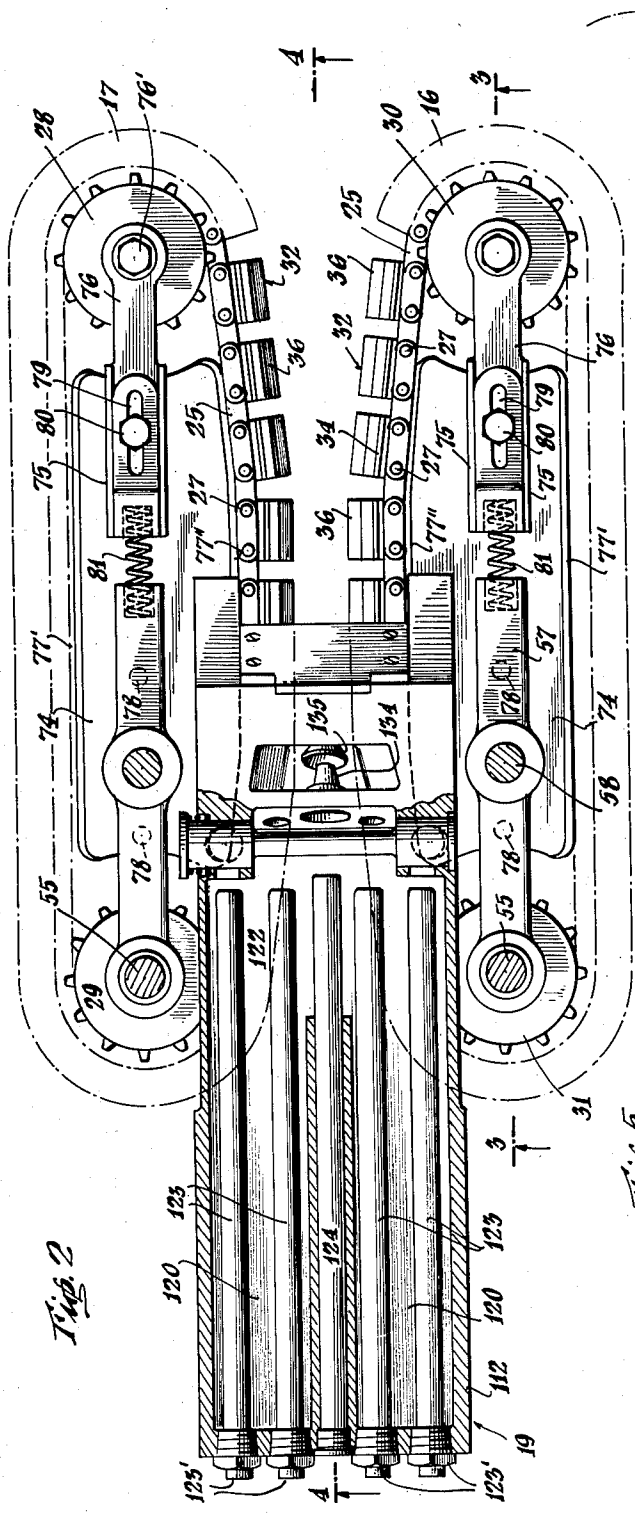

Fig. 2

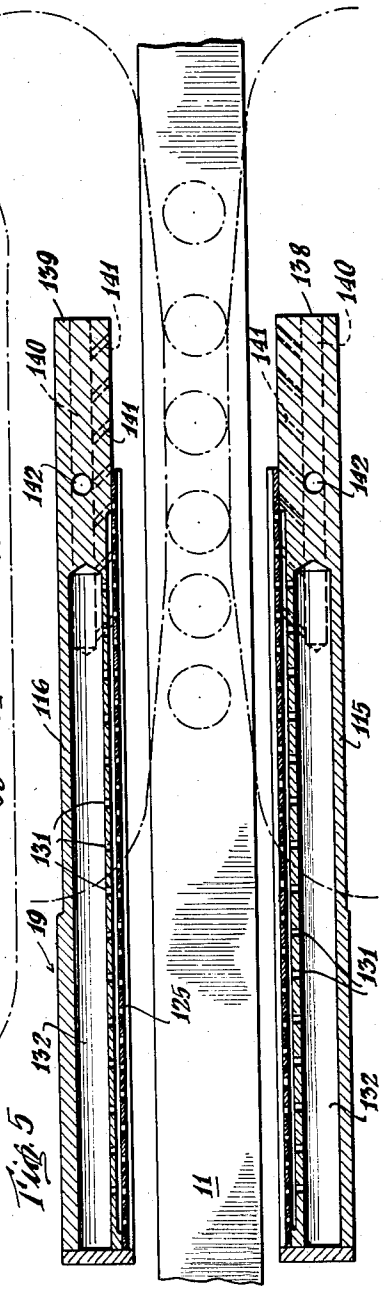

Fig. 5

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MACHINE FOR HERMETICALLY SEALING GLASS CONTAINERS

Filed Dec. 9, 1953

8 Sheets-Sheet 3

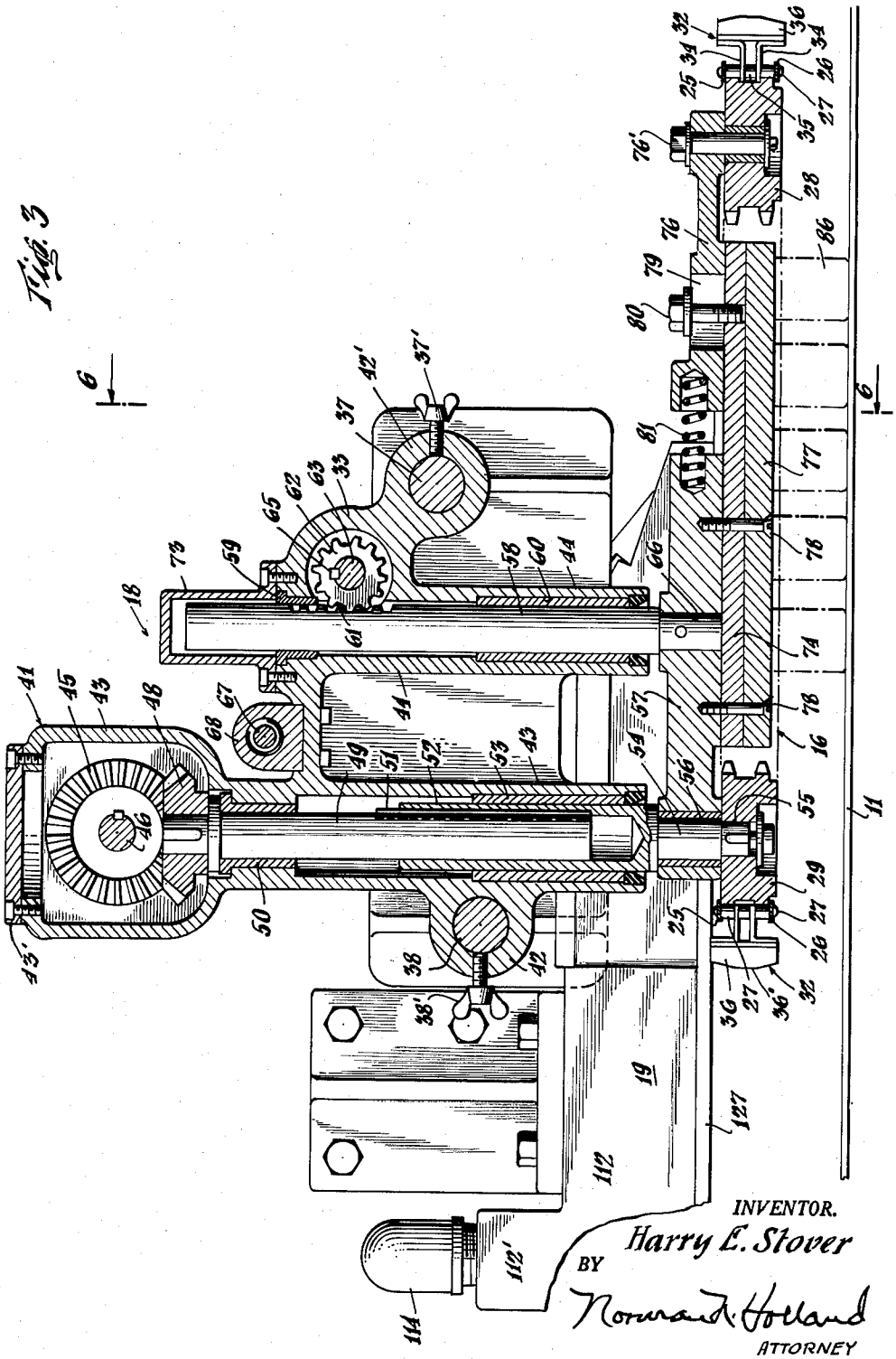

Fig. 3

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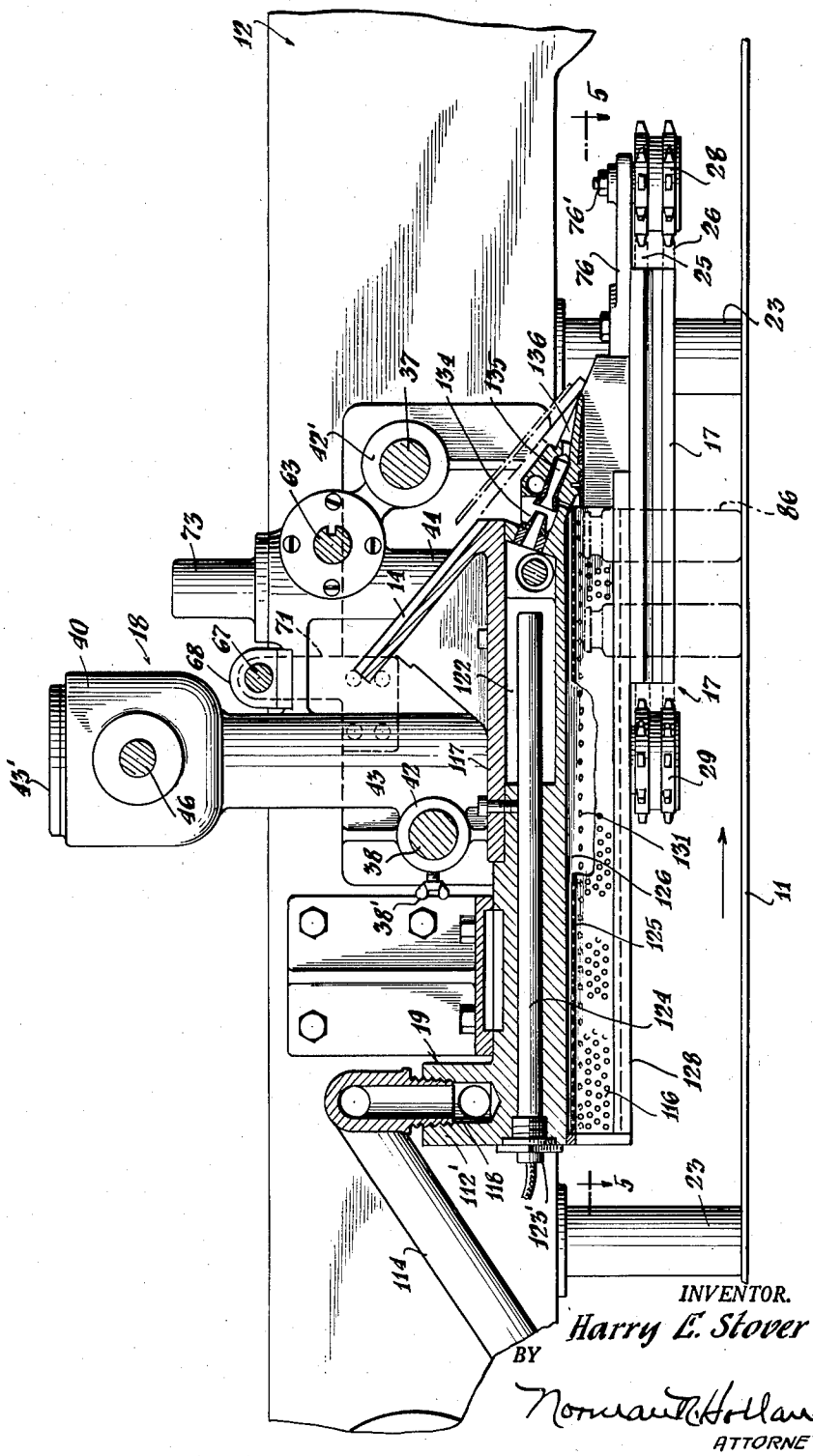
Fig. 4



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MACHINE FOR HERMETICALLY SEALING GLASS CONTAINERS

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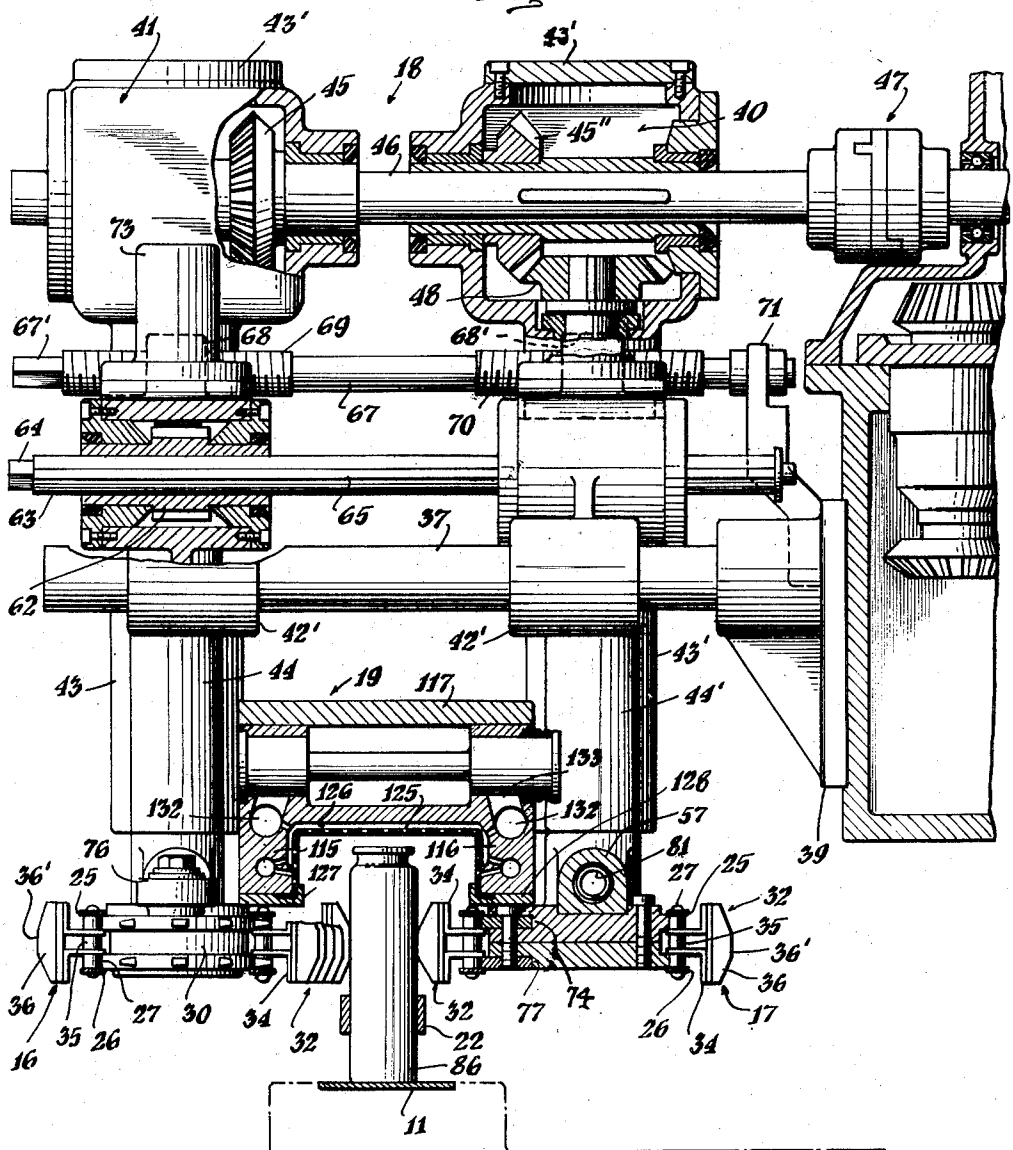
Fig. 6



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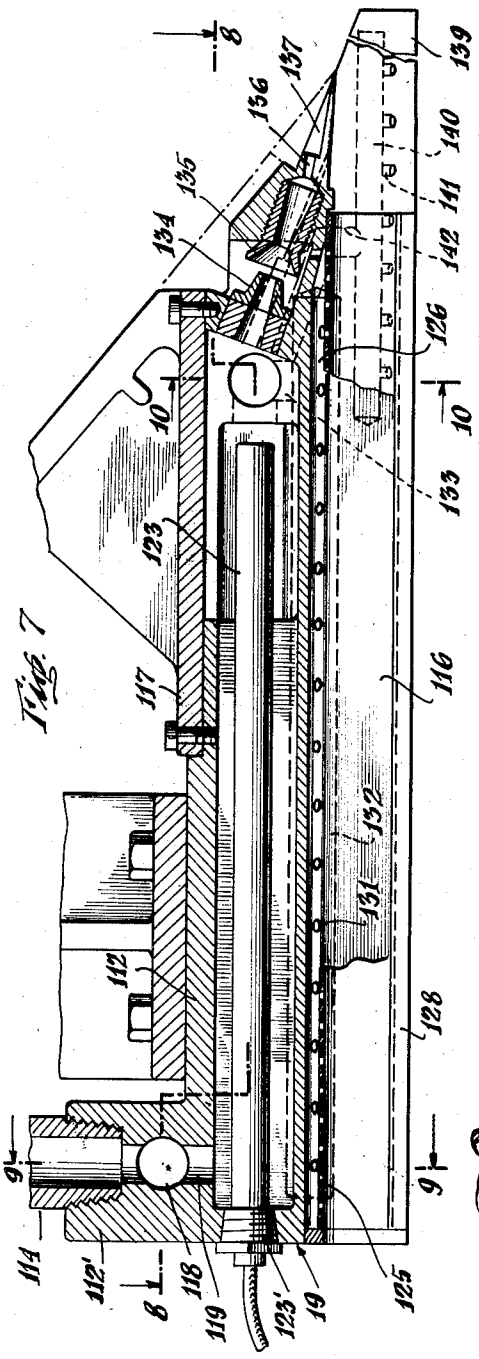

Fig. 7

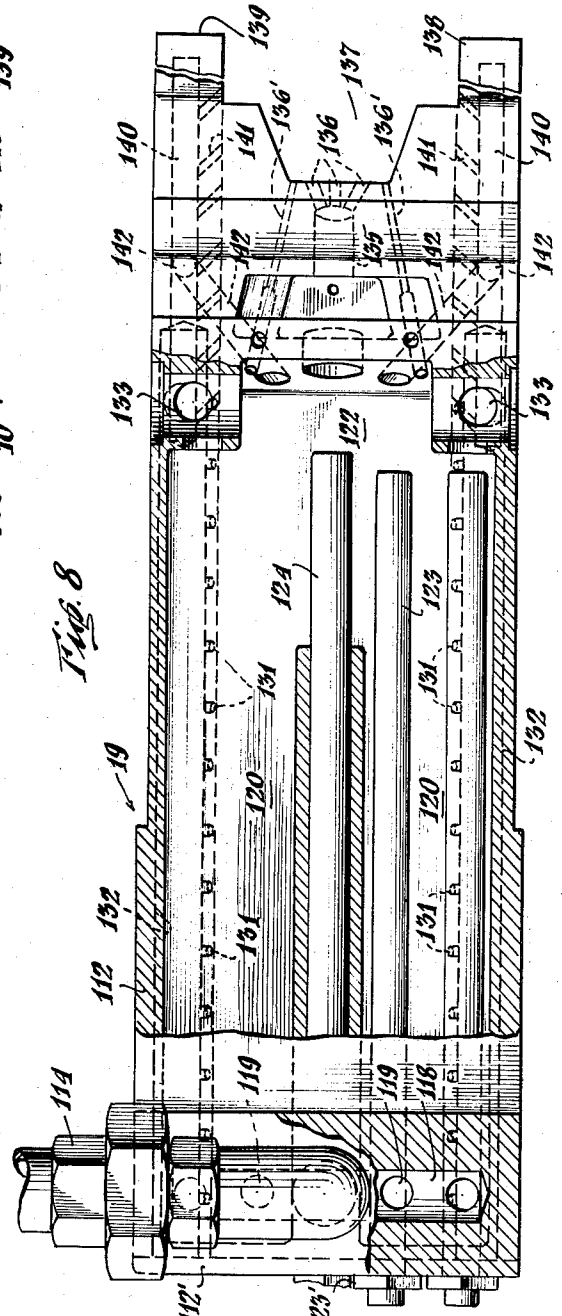

Fig. 8

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Fig. 9

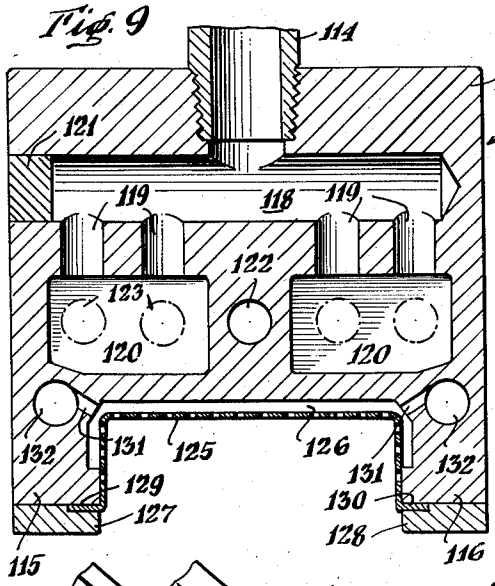


Fig. 10

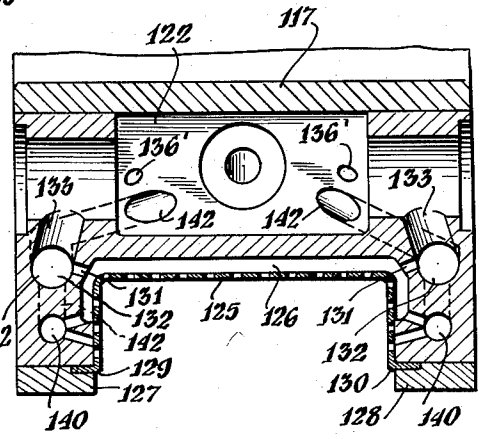
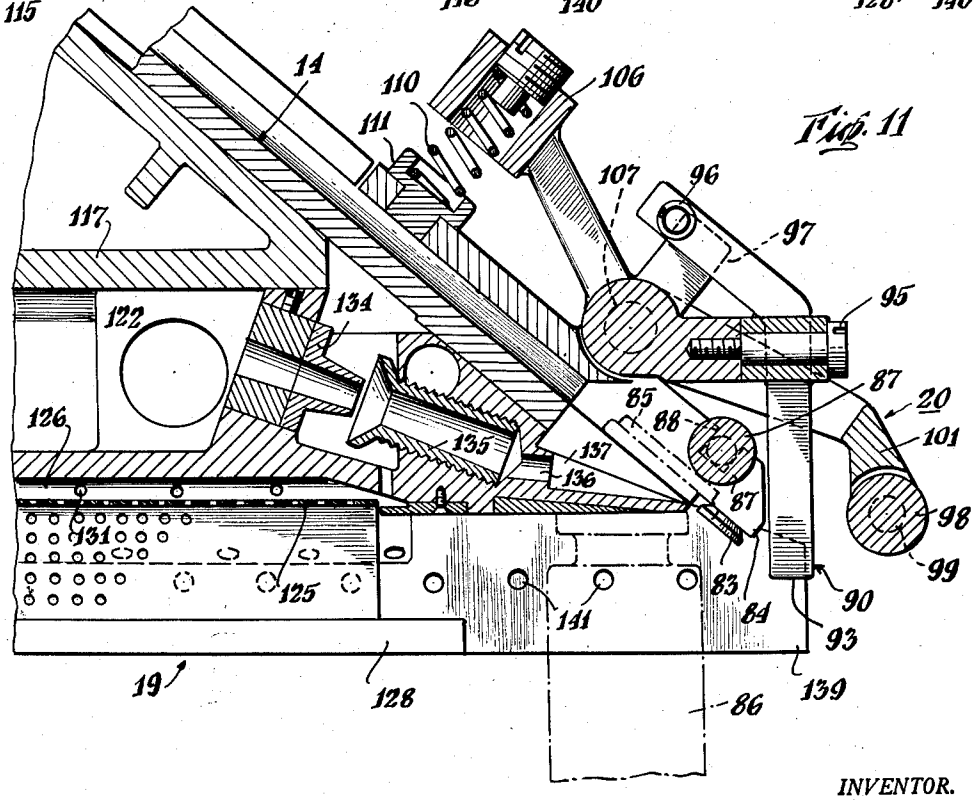


Fig. 11



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MACHINE FOR HERMETICALLY SEALING GLASS CONTAINERS

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Fig. 12

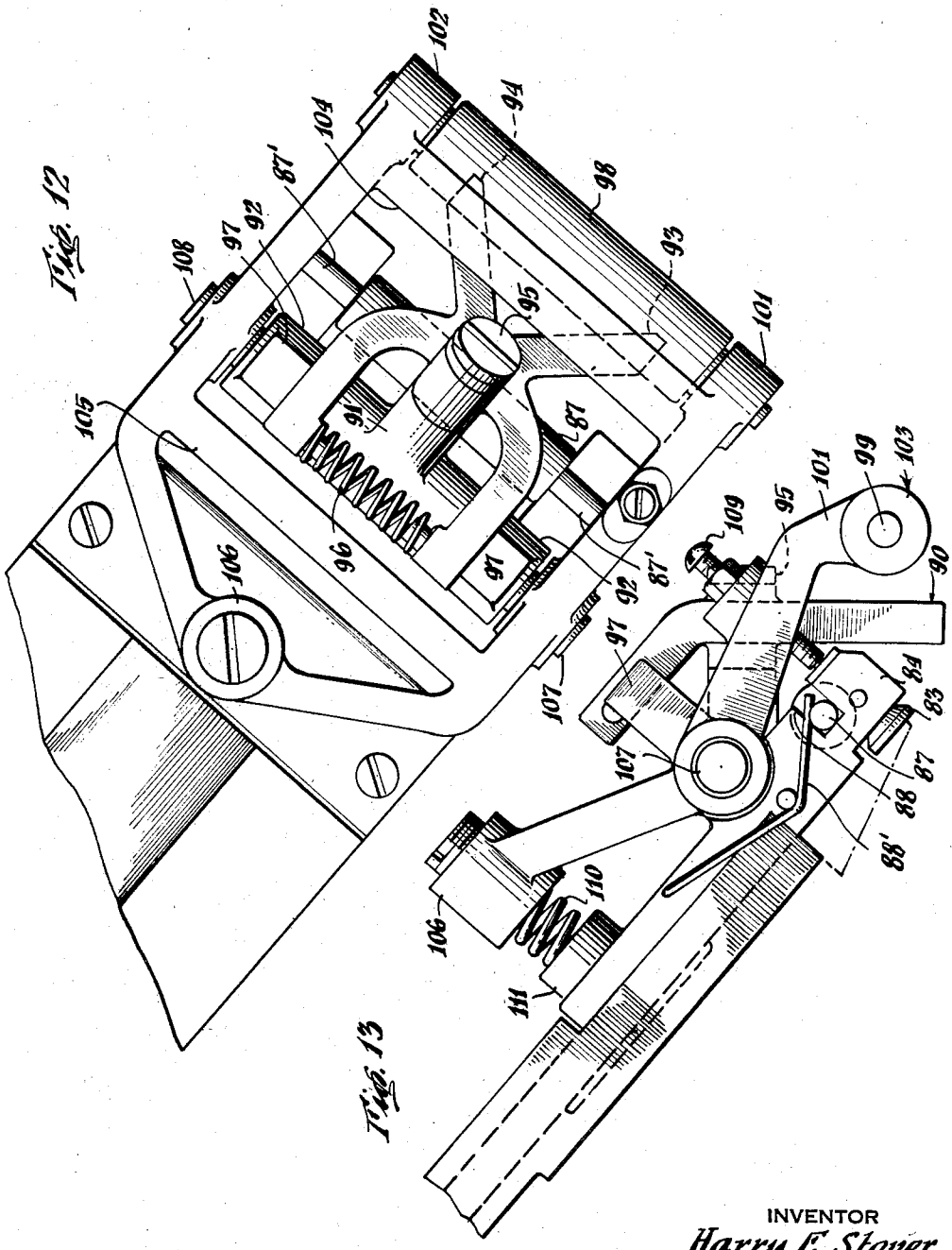

Fig. 13

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United States Patent Office

2,869,301

Patented Jan. 20, 1959

2,869,301

MACHINE FOR HERMETICALLY SEALING GLASS CONTAINERS

Harry E. Stover, Lancaster, Ohio, assignor to Anchor Hocking Glass Corporation, Lancaster, Ohio, a corporation of Delaware

Application December 9, 1953, Serial No. 397,223

17 Claims. (Cl. 53—110)

This invention relates to the sealing art and more specifically concerns a method and apparatus for applying and sealing closures to containers. In one aspect it comprises an improvement of United States Patents Nos. 2,529,199, 2,618,425 and 2,618,426 while in another aspect it constitutes an independent invention.

In the sealing of jars and containers by the application of closures, it is important that each container be held firmly during the sealing operation to avoid tipping which may not only spill part of the contents thereof and impede the sealing process but may result in an imperfect seal or in breaking the coating on the inside of the cap, thereby exposing the metal to corrosive effects of the material within the container. Accordingly, one object of the invention is to provide an improved method and apparatus for applying closure caps to containers that will not only prevent tipping of the container and damaging the cap but will enable capping of containers of a wide variety of sizes and shapes by a single machine.

Another object of the invention resides in a new and improved construction and arrangement of the closure securing means to effect more positive and dependable sealing action and minimize the danger of damage to the cap before it is firmly set on the container.

Still another object of the invention resides in a simplified and relatively inexpensive method and apparatus for vacuum sealing of each container under controlled conditions whereby the magnitude of the vacuum can be accurately determined. This is attained through the direction of steam into the container at the point at which the cap is applied so that condensation of the steam after sealing is effected will produce a substantial vacuum. In addition, improved means are included for the admission of controlled quantities of air to the container so that the amount of steam and consequently the degree of vacuum can be adjusted as desired. This is important in connection with the packaging of different foods since some should be subjected to a high vacuum while with others, such as jellies and jams, it is desirable to package them under a lower vacuum.

A further object of the invention is an improved method and arrangement of elements for displacing air from within each container and preventing its readmission until after the seal is effected. As pointed out above, a vacuum is attained by supplying steam to the unfilled portion or headspace of the container which will condense quickly to form drops of water upon contact with the colder package and product. Through displacement of the air from the open container prior to admission of steam and causing the jar or container to remain enveloped in steam at the time of and immediately after the sealing process, accurately controlled vacuums can be produced.

Another object is an improved method and means for dispensing and diffusing the steam in and about the open containers in the form of a quiet cloud with a minimum of steam currents and agitation and to provide

means for this purpose which is not easily clogged by food products and which may be quickly and easily cleaned at periodic intervals.

Another object of the invention is a new and improved hood for sealing machines for applying closures to containers.

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

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

Fig. 1 is a perspective view of one embodiment of the invention;

Fig. 2 is a cross sectional view of Fig. 1 taken along the line 2—2 thereof;

Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view of Fig. 2 taken along the line 4—4 thereof;

Fig. 5 is a cross sectional view of Fig. 4 taken along the line 5—5 thereof;

Fig. 6 is a cross sectional view of Fig. 3 taken along the line 6—6 thereof;

Fig. 7 is an enlarged cross sectional view of the steam supplying and diffusing means of Fig. 4;

Fig. 8 is a cross sectional view of Fig. 7 taken along the line 8—8 thereof;

Fig. 9 is a cross sectional view of Fig. 7 taken along the line 9—9 thereof;

Fig. 10 is a cross sectional view taken along the line 10—10 of Fig. 7;

Fig. 11 is an enlarged cross sectional view of the cap applying mechanism;

Fig. 12 is an end view of the cap applying mechanism of Fig. 11; and

Fig. 13 is a side elevation of the cap applying mechanism of Fig. 12.

Referring to Fig. 1 showing a perspective view of one embodiment of the invention, there is shown generally a base part 10, a movable belt or conveyor 11 for carrying containers to be sealed through the several sealing steps, and a superstructure 12 which carries certain of the apparatus for feeding and applying the closures or caps to the containers. Among the elements forming part of the superstructure are the hopper 13 and chute 14 for feeding closures, a sealing head 15 having a belt 15', container guiding and holding belts 16 and 17, supporting, adjusting, and driving apparatus 18 for the belts 16 and 17, steam dispensing and supplying means 19 and the closure applying and preliminary sealing apparatus generally denoted at 20.

In operation, the jars or containers to be sealed are fed through the machine by conveyor 11 in the direction of the arrow 21. They are held in place on the belt by guide rails 22 and engaged by the horizontal jar aligning and holding belts 16 and 17 which move in synchronism with the conveyor 11. As each jar reaches the cap or closure chute 14 its leading edge picks up a cap which is then pressed onto the jar by the applying or preliminary sealing means 20 before passing beneath the sealing belt 15' which completes the sealing operation. At the moment the jar picks up a closure and before the closure is seated on the jar, steam is supplied into the headspace of the container so that the air and low temperature steam is displaced. It is during this displacement and immediately thereafter that the closure is firmly seated

on the jar or container whereupon cooling and condensation of the steam will create a vacuum.

Inasmuch as several of the elements forming part of the embodiment of this invention have been fully described in the United States patents referred to above, they will be described in this application only to the extent necessary to enable a clear understanding of the present invention.

More specifically, the base **10** includes the supporting and driving apparatus for the conveyor belt **11** as well as means for raising and lowering the superstructure **12**. This is accomplished by a plurality of vertically disposed rods or shafts **23** which carry the superstructure **12** on their upper ends and extend downwardly into the base **10** where they are engaged by suitable raising and lowering means.

Guide belts

The guide belts **16** and **17** together with the adjusting, supporting and driving mechanism generally denoted by the numeral **18** in Fig. 1 are shown in detail in Figs. 2, 3, and 6. The preferred embodiment of these belts is in the form of link chains with each chain having upper and lower sets of links **25** and **26** respectively coupled by transverse pins **27** and intervening spacers **35**. These chains are supported in a horizontal position by sprocket wheels having two spaced sets of teeth for engaging the two sets of links with the chain for belt **17** being supported by front and rear sprockets **28** and **29** respectively and the chain comprising part of belt **16** being supported by sprockets **30** and **31**. Each of the belts is provided with a plurality of container engaging shoes **32** carried between alternate links of the upper and lower chain parts **25** and **26**. These shoes are secured to the links by ears **34** formed integrally with the links and having their outer ends bent to lie in a vertical plane. The shoes proper are formed of resilient pads **36** of rubber or the like cemented, bolted, or otherwise secured to the ears **34** and may extend slightly beyond the ends of the pins **27** and are tapered to provide a narrowed container engaging part **36'**. The length of the respective pads is such that they will be spaced slightly one from the other when in line so that each container as it passes between the belts will be firmly gripped by one or two of the shoes **32** and will not tend to slip forwardly or backwardly.

The supporting and driving means **18** for the side belt sprockets **28, 29** and **30, 31** are carried by a pair of horizontal rods **37** and **38** secured to and extending outwardly from the frame **39** of the superstructure **12** and actually comprise two interconnected assemblies **40** and **41** as shown in Fig. 6. These belt supporting and driving structures are provided with pairs of collar **42** and **42'** which slidably engage the rods **37** and **38** and have set screws **37'** and **38'** to lock them in position after being properly adjusted. Since the drives **40** and **41** are substantially identical only the drive **41** will be described and corresponding parts of the drive **40** will be denoted by similar primed numbers.

The drive assembly **41** includes two integrally formed housing parts **43** and **44** with the housing **43** carrying one collar **42** and the housing part **44** another collar **42'**. The upper end of housing **43** is enlarged to accommodate a bevel gear **45** rotatably mounted in one side wall thereof. This gear is keyed to and slidably engages the horizontal drive shaft **46** driven in turn by the coupling **47**. The shaft **46** also extends through the housing part **43** of the drive **40** and slidably engages the bevel gear **45''** to drive the belt **17** in a similar manner. With this arrangement the drives **40** and **41** are movable relative one to the other for adjustment of the spacing between the belts **16** and **17** and are always in engagement with the shaft to effect the transmission of power. In the base of the top section of housing **43** is a second bevel gear **48** meshing with the gear **45** and carrying a shaft **49** journaled at **50** in the housing **43**. Thus rotation of the horizontal shaft **46** is transmitted to the vertical shaft **49**.

The shaft **49** includes at least one fixed key or rib **51** extending from the outer surface thereof and in alignment with the axis of the shaft. This key **51** meshes with a corresponding keyway in the surrounding tubular shaft **52**, which in turn extends downwardly through the bearing **53**. The bottom end of the tubular shaft **52** is narrowed as shown at **54** and is further narrowed at **55** to engage the sprocket **31**. The narrowed section **54** is journaled in a corresponding opening **56** of the horizontal bracket **57** disposed between the axes of the sprockets **30** and **31**. Since the sprocket **31** is fixedly attached and keyed to the lower end of shaft **52** it functions to retain the bracket **57** about the narrowed section **54** of the shaft **53**. With the structure thus far described, rotation is transmitted to sprocket **31** through the telescoped shafts **49** and **52** so that the sprocket **31** and horizontal bracket **57** can be moved vertically relative to housing **43**.

In order to adjust the vertical position of the sprocket **31** and hold the horizontal bracket member **57** in proper alignment a vertical shaft **58** is slidably retained within housing part **44** and aligned therein by bearings **59** and **60**. One side of the shaft is machined to form a rack gear **61** which is arranged to cooperate with the pinion **62** carried on shaft **63** and journaled in the housing part **33**. The shaft **63** has a longitudinal key **65** which slidably engages a corresponding keyway in the gear or pinion **62** so that rotation of the shaft will function to rotate the pinion while the two are slidable one relative to the other. The outer end of the shaft **63** is provided with squared portion **64** (Fig. 6) to facilitate engagement of a wrench to effect rotation of the shaft **63**.

The lower end of the vertical shaft **58** engages and is fixed in the opening **66** of the bracket **57** so that the latter will at all times remain horizontal or parallel to the main conveyor **11** on the base or bed **10** of apparatus. This structure therefore provides for vertical positioning of the bracket **57** and sprocket **31** by rotation of the shaft **63**. Since the shaft **63** engages a pinion in the drive assembly **40** corresponding to pinion **62** in the drive assembly **41**, it is apparent that operation of shaft **63** will simultaneously raise and lower both of the belts **16** and **17**.

Before considering the structure for supporting the idler sprockets **28** and **30**, it may be pointed out that horizontal adjustment of the drive assemblies **40** and **41** is accomplished by a transverse shaft **67** (Fig. 6) which has threaded sections **69** and **70** for engagement with collars **68** and **68'** of the assemblies **41** and **40** respectively. The sections **69** and **70** are threaded in reverse directions so that rotation of the shaft in one direction will move the assemblies **40** and **41** apart while reverse rotation will bring them together. In order to effect proper alignment of the belts **16** and **17** on either side of the conveyor **11**, the inner end of the adjusting rod **67** is rotatably fixed to the bracket **71** which in turn is fixed to the superstructure frame part **39**. The outer end **67'** of rod **67** is provided with a squared section corresponding to the end **64** of rod **65**. When the heads or assemblies **40** and **41** are properly set for a particular container, they are locked against horizontal displacement by the set screws **37'**, and **38'** (Fig. 3) and against vertical motion by a set screw **72** in the side of housing part **44** (Fig. 1) which bears against the shaft **58**. The upper end of the housings **44** are closed by caps **73** to prevent the admission of dust and dirt into the operating parts of the assemblies. Similarly, the upper ends of housing parts **43** are closed by top covers **43'** (Fig. 3).

The idler sprocket **30** is rotatably supported in the plane of the driven sprocket **31** of belt **16** and is spring loaded to maintain constant tension on the belt. This is attained by plate member **74** (Fig. 3) having a pair of upwardly extending flanges **75** which act as parallel guides for slidably holding the idler sprocket support **76** to

which the idler sprocket 30 is rotatably secured by a pin 76'. The plate 74 together with a guide plate 77 are secured to the bracket member 57 by screws 78 or by other suitable means. The idler support 76 is retained between the flanges 75 by a bolt 80 extending downwardly through an elongated slot 79 in the support 76 and threadably engaging the plate 74. The support is urged outwardly of bracket 57 by the compression spring 81 retained by cooperating recesses in the members 57 and 76. The bottom guide plate 77 has its outer edge 77' in alignment with the edge of sprockets 30 and 31 while its inner edge 77'' is tapered inwardly toward the center of the conveyor. Since the belts follow the contour of these plates, engagement and disengagement of the containers by the belts 16 and 17 will be gradual rather than abrupt as illustrated in Fig. 5 and the maximum gripping pressure will be effected when the container is at the point of engaging a closure.

With the guide belts as above described, a wide variety of containers can be handled merely by adjusting the vertical and horizontal positioning thereof. Moreover positive gripping action is attained which will carry the containers through the critical stages of the sealing process and function to prevent tipping of the containers which may result in an imperfect seal or damage to the closure of such a nature that it will corrode.

Closure applying mechanism

This portion of the preferred embodiment of the invention is illustrated in Figs. 1, 4, 11, 12, and 13 of the drawings. As previously mentioned, the closure caps are deposited in a suitable hopper 13 which is secured to and supported by the superstructure 12. The caps are then fed individually to the chute 14 and slide downwardly to point of engagement with the containers. This structure may be any suitable cap feeding means, for example, the cap feeding means of United States Patents Nos. 2,618,425 and 2,529,199 and a detailed discussion is deemed unnecessary. If desired, the caps may be fed to the chute by hand. The closure caps are preferably of the hermetically sealing type, for example, the cap and glass finish shown in the Harry E. Stover et al. patent application Serial No. 217,492, filed March 26, 1951, now Patent No. 2,670,868.

Each cap upon reaching the lower end of the chute, as shown for instance in Fig. 11, is engaged by suitable stops or pins 83 in the lower end 84 of the chute 14 and is restrained from riding over the stops by a spring pressed roller 87 mounted in slots 88. A pair of springs 88' urge the roller toward the bottoms of the slots. A cap 85 is shown in Fig. 11 about to be engaged by a container 86. It will be observed that the leading edge of the cap is slightly below the leading edge of the container so that forward motion of the container under the action of the conveyor 11 and supported against tipping by the guide belts 16 and 17 causes engagement of the cap and container to withdraw the cap from the chute part 84. In so doing, the cap 85 will be lifted over the pins 83 and rest on top of the container 86.

Forwardly of the roller 87 is a fork-like member 90 pivoted to a bracket 91 extending from the stationary frame part 92 bridging the chute 14. The lower arms 93 and 94 of the fork extend downwardly and outwardly from a central pivot bolt 95 to form an inverted V while the upper ends of the arms are in the shape of a U with a compression spring 96 supported between the ends thereof. With this arrangement as the lower ends of the fork are spread apart, the upper ends tend to compress the spring 96. In order to limit the inward closing of the fork members 93 and 94 about the pivot bolt 95, a pair of stops 97 are provided for cooperation with the upper ends of the fork parts 93 and 94 to limit the action of the compression spring 96.

Beyond the fork 90 is a second sealing roller 98 rotatably carried by a shaft 99 journalled in the lower ends of members 101 and 102 forming part of yoke 103. The side members 101 and 102 are joined by cross members 104 and 105 while their upper ends are brought together and joined to a central collar 106. The yoke members 101 and 102 are pivoted for movement in a vertical plane by trunnions 107 and 108 extending outwardly from the bracket member 92. Clockwise motion of yoke 103 as viewed in Fig. 13 is limited by a screw 109 threadably engaging the yoke arm 101 and bearing against the upper side of the bracket member 84. Counter clockwise motion is limited by the action of a compression spring 110 between the collar 106 and a stop 111.

Considering now the operation of the fork 90 and roller 98, as indicated above each container 86 after engaging a cap or closure 85 carries it from its position in the chute 14 beneath the roller 87. Prior to leaving roller 87 the cap is engaged by the fork 90 which spreads to follow the edges of the cap and simultaneously tends to pull the cap backwardly so that the front end thereof is in engagement with the leading edge of the container. This pressure on the cap is effected by the spring 96 which functions to exert a vector force downwardly on the edges of the cap and during substantially the entire travel thereof beneath the fork. As the container proceeds beneath the fork 90 it engages the pressure roller 98 which acts under the pressure of spring 110 to firmly apply the cap to the container. During the time of engagement of the cap by roller 98, the fork 90 is also in engagement with the cap and thereby prevents tilting of the cap as the container and cap pass under the roller 98. In this way the closure is firmly and securely seated on the container in an effort to provide a hermetic seal under the influence of the vacuum formed within by condensation of the steam.

When the foregoing sealing operation is concluded the capped containers are carried beneath the sealing head 15 as shown in Fig. 1. This sealing head functions to apply the final sealing pressure to the containers and to assure a hermetic seal. A preferred embodiment of this sealing head is shown and described in United States Patent No. 2,618,426. A further description herein is not deemed necessary.

It will be observed in Figs. 1 and 2 that the engagement of each container 86 with a cap 85 and the subsequent sealing steps are accomplished while the containers are firmly gripped by the side belts 16 and 17 so that they cannot be tipped by the action of fork 90 or pressure rollers 87 and 98. Moreover, should the containers be slightly offset from the center of the conveyor 11, the fork 90 by reason of the independent movement elements 93 and 94 thereof will exert substantially uniform pressure on each side of the cap 85.

Steam dispensing and supplying means

The preferred embodiment of the steam dispensing means is generally denoted in Fig. 1 by the numeral 19 and the major portion thereof lies rearwardly of the point of closure and container engagement although part thereof extends forwardly beneath the sealing head 15. Steam is supplied to the housing 112 forming part of the dispersing apparatus 19 by the hose 113 and conduct 114. As will be pointed out, the steam is further heated in the housing 112 and is then distributed to preheat the head space in each of the containers 86 to be sealed, to fill the headspace just prior to application of the closure cap 85, and to envelop at least part of the containers after application of the closure so that if leakage occurs during the preliminary sealing steps, steam rather than air will be drawn into the containers to prevent impairment of the vacuum.

The details of this structure are shown in Figs. 2, 4, 5, and 7 to 11 and reference will now be made to those figures. The housing 112 has two downwardly depending side members 115 and 116 which form a longitudinal concavity lengthwise of the conveyor 11 for

enveloping the upper part of the containers **86** as they approach the closure applying and sealing apparatus. The entire housing **112** is supported in spaced relationship to the conveyor **11** and carried by the frame part **39** of the superstructure **12**. The support in part includes a triangularly shaped bracket **117** secured to the top of the housing **112** and to the closure chute **14** which insures among other things proper alignment of the elements and effects proper direction of the steam supply to the containers as will be described.

The left hand end of the steam housing **112** as viewed in Fig. 4 has an upwardly extending section **112'** to which the inlet steam conduct **114** is attached. This portion of housing **112** also includes a transverse chamber **118** (Fig. 9) communicating with the inlet **114** which distributes the steam to four downwardly extending passages **119** which, in turn, communicate with a pair of longitudinally disposed chambers **120**. The chamber **118** is sealed by a plug **121** (Fig. 9). The longitudinal chambers **120** merge into a common chamber **122** as may be observed in Figs. 2 and 7 of the drawings. Within each chamber **120** is a pair of cylindrical electric heating elements **123** extending substantially the entire length thereof and supported therein by members **123'** threaded in the housing **112**. A thermostat **124** extends through the housing part dividing the chambers **120** and extends slightly beyond the ends of the elements **123**. The heating elements superheat the steam in the several chambers while the thermostat **124** automatically controls the temperature of the steam as desired.

It has been found desirable to envelop the heads of the containers **86** to be sealed with a cloud of steam prior to sealing. In order to dispense the steam uniformly and at the same time avoid undue clogging of the orifices through which the steam emerges to fill the longitudinal concavity, a readily removable perforated sheet is employed. This sheet or plate is denoted by the numeral **125** (Figs. 9 and 10) and extends throughout the entire length of the housing **112** and terminates just short of the closure engaging station. It is spaced from the housing to form a shallow chamber **126** and is secured in position by means of plates **127** and **128** fastened to the side members **115** and **116** of the housing **112**; the plate has outwardly extending flange parts **129** and **130** clamped between the plates **127** and **128** and the members **115** and **116**. Steam is admitted to the chamber **126** between the perforated plate **125** and the housing **112** by means of a series of ducts **131** communicating with tubular passages or manifolds **132** on each side of the concavity. The steam enters the manifold **132** by passages **133** extending from the chamber **122** and intersecting the manifolds as viewed in Fig. 10 of the drawings. With this arrangement the steam delivered to the concavity is hottest near the forward end so that the jars or containers entering beneath the housing **112** become gradually heated by an enveloping cloud of steam. The perforated steam dispersing plate **125** which is preferably of stainless steel or the like is effective not only in providing a uniform cloud of steam but also resists the clogging effects of food that may be spattered on it prior to the application of the closure and thus constitutes an important feature in avoiding frequent interruption of the sealing process for the purpose of cleaning and the like. Moreover by reason of the improved supporting means for the plate it can be quickly and easily replaced when necessary with minimum interruption of the sealing process.

Forward of the chamber **122** within the housing **112** is a vacuum control means comprising a nozzle **134** and cooperating aspirator **135** threaded into the forward part of the housing **112** and adjustable relative to the nozzle **134**. The central orifice in nozzle **134** communicates with the steam chamber **122** while the aspirator discharges a controlled mixture of air and steam through the passages or injecting orifices **136** and into the recess **137**, the latter being adjacent the underside of the leading closure **85** in the chute **14**. In addition to the nozzle **136**, steam is discharged directly from the chamber **122** and into the recess **137** by means of passages **136'** on each side of the aspirator **135**. Steam continues to be supplied during the entire closure-applying operation so as to completely fill the head space of the container with superheated steam and displace substantially all of the air therein. By adjustment of the aspirator **135** relative to the nozzle **134**, the amount of air drawn in by the steam can be adjusted to secure a wide range of mixtures and in this way control the vacuum ultimately secured in the sealed containers. This is important since many foods such as jellies and jams are preferably sealed with low negative pressures while the highest possible negative pressures are useful for vegetables, meats, and the like. In this way a wide range of pressures can be easily attained and by calibrating the aspirator, it can be more easily set to provide any desired vacuum. Where a very high vacuum is desired, the air supply is cut off entirely.

During the sealing procedure, the seal may not be complete before the steam starts to cool, in which case the container will of course draw in air. To avoid this undesirable condition, the housing part **112** also includes a pair of forwardly extending arms **138** and **139** disposed on either side of the conveyor **11**. These arms each include a passage **140** and a plurality of exit orifices **141** directed inwardly to envelop the containers in steam until they actually engage the sealing head **15**. Steam is delivered to the passages **140** (Figs. 7 and 8) by a pair of diagonally disposed passages **142** opening at one end in chamber **122** and at the other end in passages **140**.

With the new and improved steam chamber and distributor, the head of each container is uniformly heated by a cloud of steam with the temperature gradually increasing until the actual closure applying and sealing step. Thereafter, the containers continue to be enveloped by steam until the seal is effected. The entire structure for the attainment of these ends is simple, relatively inexpensive and easily maintained. Moreover it is carried by the superstructure **12** so that raising and lowering thereof to accommodate different size jars automatically raises and lowers the steam chamber and distributor accordingly.

Hood and steam exhaust means

Another aspect of the invention resides in means for minimizing the escape of steam from the machine and the resulting discomfort to the operator and undesirable condensation on walls and ceilings. This is attained through the use of a hood **144** shown in Fig. 1 in its open position. The hood is hinged at **145** to the upper edge of the frame part **89** of the superstructure **12** and covers the sealing head **15**, steam distributor and injector **19**, side belts **16** and **17** and their associated drives. It is readily lifted about its hinge **145** for adjustment or repair. The hopper **14** is offset sufficiently to permit opening and closing of the hood.

In addition to the hood, an exhaust fan **146** having a suction inlet **147** and air outlet **148** may be carried by the superstructure **12**. This fan is preferably coupled with an exhaust conduct and functions to withdraw steam and air from within the confines of the hood **144**.

This invention as described above not only enables the rapid sealing of containers but also provides a dependable machine that will insure positive application of the closure and prevents tipping or displacing of the containers which often results in damage to the closure and an ineffective seal. Moreover, the degree of vacuum in each container can be quickly and easily regulated.

As various changes may be made in the form, con-

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

Having thus described my invention, I claim:

1. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine, means for supporting a closure in inclined position to be engaged at its lower edge by the rim of a moving container for removal of the closure from the support, a pair of members pivotally connected at one point and extending outwardly from the pivot substantially in the form of an inverted V for engaging the sides of the closure and for applying it to a moving container, a first resilient means urging said pair of members toward each other whereby the closure is forced backwardly against the container rim and is centered laterally thereon, and a second resilient means urging said pair of members downwardly to hold the closure down against the container top.

2. A sealing machine according to claim 1 in which a resiliently mounted roller is mounted to engage the closure as it emerges from between said pivoted members to force the closure down on the rim of the container.

3. A machine according to claim 1 in which means is provided for directing steam between the cap and container at the time of application to fill the head space with steam.

4. A sealing machine according to claim 1 in which a steam and air directing nozzle is positioned in advance of said pair of members to fill the container head space with predetermined proportions of steam and air before the application of the closure.

5. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine, means for supporting a closure in inclined position to be engaged at its lower edge by the rim of a container for removal from the support, a pair of members pivotally connected at one point and extending outwardly from the pivot substantially in the form of an inverted V for engaging the sides of the closure for applying it to the moving container, and resiliently mounted rollers engaging the closure in front and back of said pivoted members as the closure passes between said pivoted members to force the closure down on a container.

6. A claim according to claim 5 in which the roller engaging the portion of the closure after its passage between said pivoted members applies a much greater pressure thereto than either the pivoted members or the other roller.

7. A claim according to claim 5 in which means is provided for directing vapor between the closure and the container as it is being applied to the container.

8. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine, means for applying closures to the containers moving on the conveyor, and a pair of sprocket driven means for holding each container as the closures are applied comprising a splined vertical shaft carrying one of said sprockets at the lower end thereof and having a drive at its upper end thereof, a second splined vertical shaft carrying the other sprocket on its lower end and means for raising and lowering the lower ends of said splined shafts and the sprockets thereon without changing the position of the upper ends of said shafts.

9. A claim according to claim 8 in which a pair of horizontal members support said vertical shafts and related parts.

10. A claim according to claim 8 in which means is provided for positioning said vertical shafts toward and away from each other.

11. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine; a canopy extending longitudinally over the conveyor having a longitudinal concavity covered with a sieve-like member to direct a cloud of steam about the upper ends of the containers; an applicator for applying caps to the moving containers including a support for retaining a closure in inclined position so that the lower edge thereof will be engaged by the rim of a moving container, an expandable fork adapted to wipe the closure onto the rim of the container and a pressure member for forcing the closure down on the container; auxiliary steam supplying means for supplying steam at the upper end of the container at the time the closure is applied to it; and container stabilizing means for holding the container upright during the cap applying operation including side belts, means for positioning said side belts toward and away from each other to accommodate different diameters of containers and means for raising and lowering said side belts to accommodate different heights of containers.

12. A sealing machine comprising a movable conveyor for carrying successive containers to be sealed, means along said conveyor for preheating the upper portion of each container, means for applying closures to successive containers after they are preheated, a two-fluid nozzle adapted for connection to a source of steam and a source of gas for directing a controlled quantity of a steam gas mixture into the headspace of each container as the closure is applied, and means for sealing the closures on said containers.

13. A sealing machine according to claim 12 including a steam distribution means for enveloping the containers being sealed in a cloud of steam to prevent undesired intake of air within the container until the seal is effected.

14. In a sealing machine the combination of means for aligning and seating a closure on each container after engagement of a container and its closure comprising a pair of independently pivoted arms extending at an angle one relative to the other and into the path of said containers, resilient means for moving said arms inwardly one toward the other to a predetermined closure engaging position, said arms frictionally engaging said closure to seat it snugly against the leading edge of the container as the latter moves relative to said arms, and roller means for engaging and pressing said closure onto said container, said roller being positioned forwardly of said arms and adapted to engage the closure during at least a part of the period of engagement by said arms.

15. In a sealing machine the combination of a pair of elongated members each pivoted for rotation about a point between the ends thereof, resilient means coupled with the portions of said members on one side of the pivots to urge the portions of said members on the other side of the pivots one toward the other, said last said portions frictionally engaging a closure on a container and exerting a pressure thereon as the container is moved therebetween to snugly hold said closure in engagement with the leading edge of said container and roller means following said elongated members to press the closure onto said container as the closure is held in position by said members.

16. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine, an elongated steam housing above said conveyor having a downward facing channel therein generally parallel to said conveyor, means at the exit end of said steam housing to apply closures to containers being moved through said machine on said conveyor, a steam distributing channel in said steam housing running lengthwise thereof and communicating with said channel at spaced intervals, a sieve-like member positioned in said steam housing channel and spaced therefrom whereby steam passing from said steam distributing channel is uniformly dispersed along said steam housing channel by said sieve-like member in the path of containers on said conveyor, a nozzle directed toward the container head spaces at the exit end of said steam housing in advance of said closure applying means and communicating with said steam distributing channel whereby steam is directed into the head-

space of containers on said conveyor, and said nozzle having a mixer thereon adapted to mix a gas with the steam from said steam supply channel.

17. In a sealing machine the combination of a conveyor for moving containers to be sealed through the machine, an elongated steam housing above said conveyor having a downwardly facing channel therein generally parallel to said conveyor, means at the exit end of said steam housing to apply closures to containers being moved through said machine on said conveyor, a steam distributing channel in said steam housing running lengthwise thereof and communicating with said channel at spaced intervals, a sieve-like member positioned in said steam housing channel and spaced therefrom whereby steam passing from said steam distributing channel is uniformly dispersed along said steam housing channel by said sieve-like member in the path of containers on said conveyor, a nozzle directed toward the container head spaces at the exit end of said steam housing in advance of said closure applying means and communicating with said steam distributing channel whereby steam is directed into the headspace of containers on said conveyor, and said nozzle having an aspirator thereon adapted to mix air with the steam from said steam supply channel.

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