Oct. 15, 1935. G. W. MULLEN 2,017,766

SEALING MACHINE AND METHOD

Original Filed Oct. 10, 1928 3 Sheets-Sheet 1

Fig. 1.

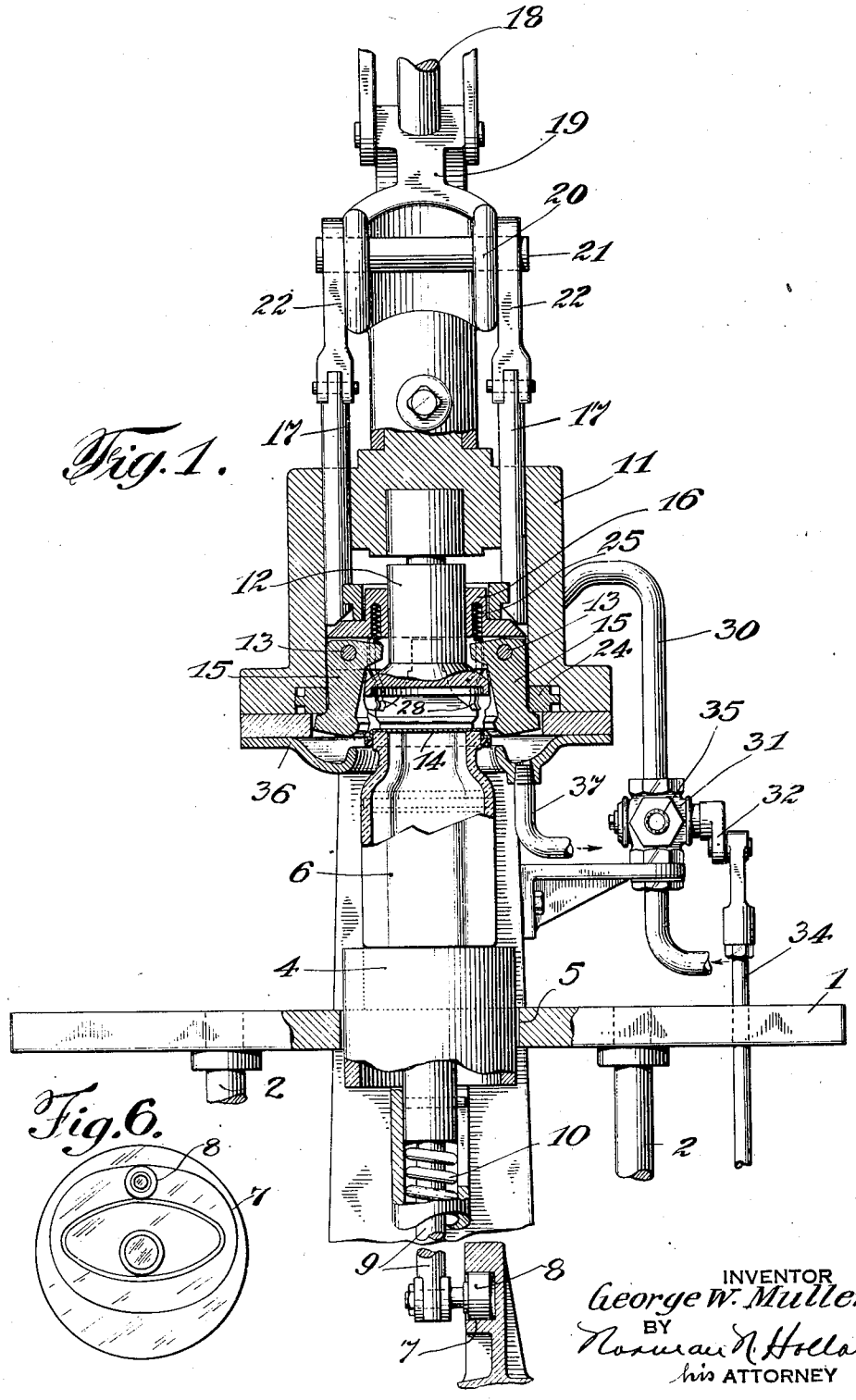


Fig. 6.

INVENTOR
George W. Mullen
BY
Norman N. Holland
his ATTORNEY

Oct. 15, 1935. G. W. MULLEN 2,017,766

SEALING MACHINE AND METHOD

Original Filed Oct. 10, 1928 3 Sheets-Sheet 2

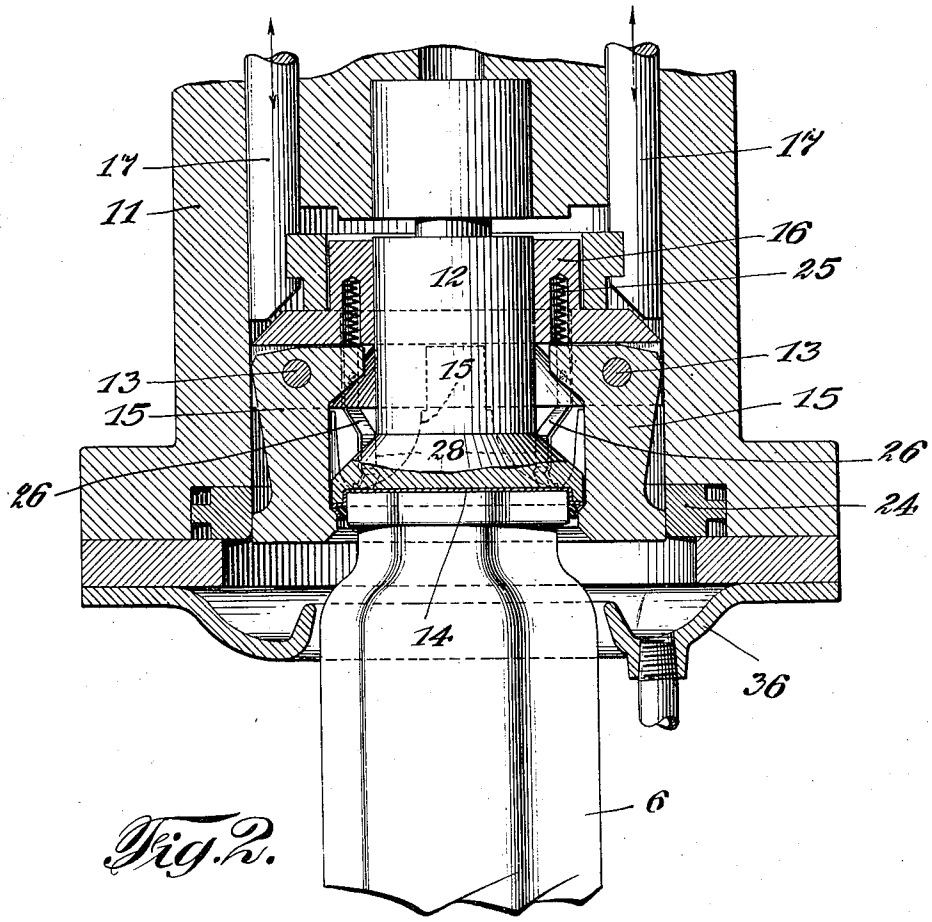


Fig. 2.

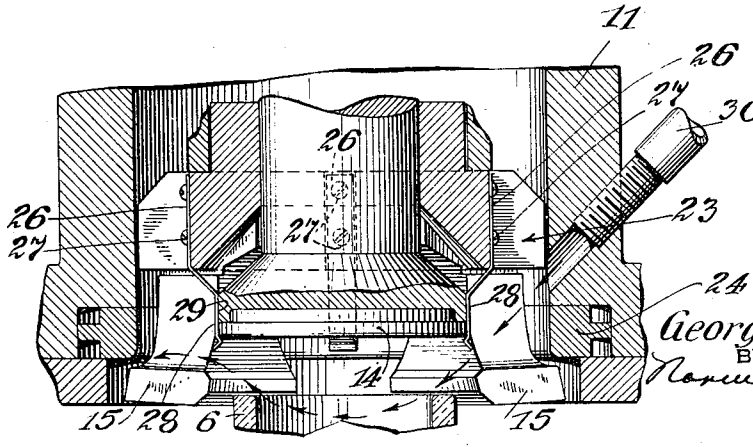


Fig. 3.

INVENTOR
George W. Mullen
BY
Norman N. Holland
his ATTORNEY

Oct. 15, 1935. G. W. MULLEN 2,017,766

SEALING MACHINE AND METHOD

Original Filed Oct. 10, 1928 3 Sheets-Sheet 3

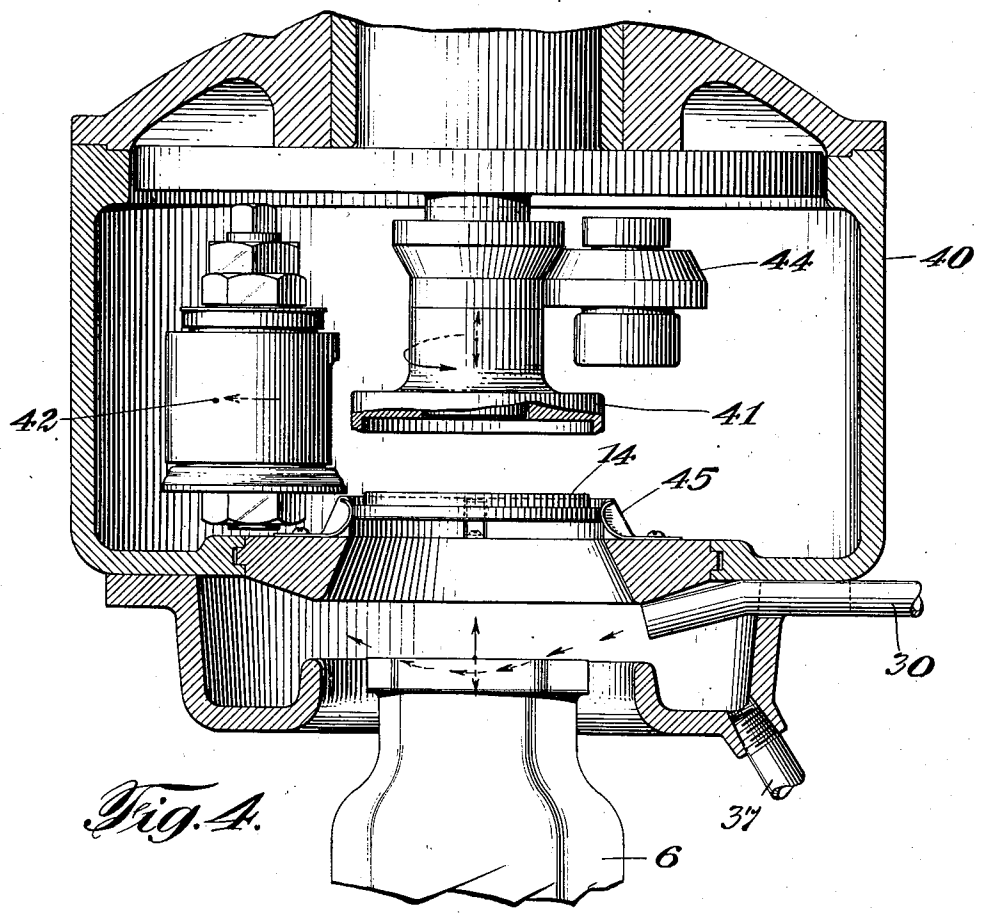


Fig. 4.

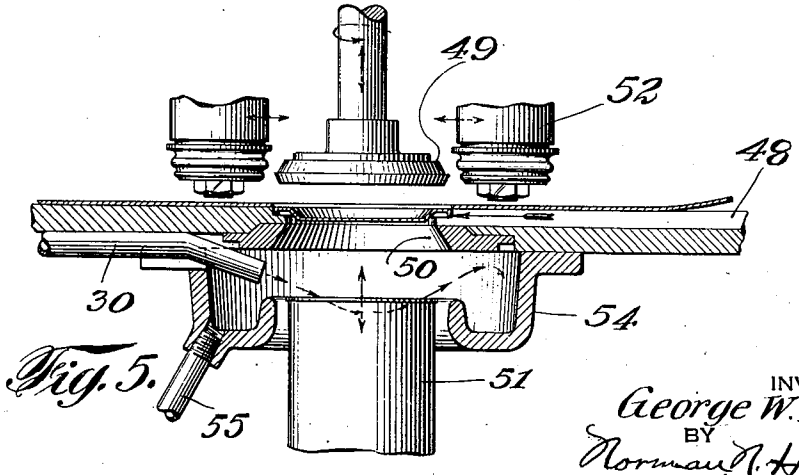


Fig. 5.

INVENTOR
George W. Mullen
BY
Norman A. Holland
his ATTORNEY

Patented Oct. 15, 1935

2,017,766

UNITED STATES PATENT OFFICE

2,017,766

SEALING MACHINE AND METHOD

George W. Mullen, Lowville, N. Y., assignor to Anchor Cap & Closure Corporation, Long Island City, N. Y., a corporation of New York

Application October 10, 1928, Serial No. 311,426
Renewed December 17, 1934

26 Claims. (Cl. 226—82)

The present invention relates to the art of sealing closures to containers and more particularly to a machine and method for hermetically sealing containers with a partial vacuum therein.

Heretofore it has been customary to utilize expensive machines for vacuum sealing necessitating vacuum pumps. In some instances, the pumps are integral with sealing machines and in other instances a separate vacuum tank and exhaust pump are used. In both cases, the cost of the sealing equipment is expensive. Frequently defective pumps impair the vacuum resulting in losses where vacuum seals are necessary.

Due to the complicated machines necessary for vacuum sealing, some packers go to the trouble of heating the contents of the packages before sealing in order to get a partial vacuum therein. The containers pass through and remain in a water bath for a substantial period of time in order to permit the contents to reach a substantial temperature. This method can only be used for products requiring a low vacuum and even then it is very unsatisfactory. The reason is that the contents cool, particularly the air space in the container during the interval while the container is being removed from the bath to the sealing machine. Further, the containers must be handled hot, which is very objectionable. Another fatal handicap is that production is materially reduced on account of the heating operation. The operators in an effort to speed up production, frequently cut down the period that the containers remain in the bath, and a very low vacuum results which occasions losses.

The present invention overcomes the disadvantages of prior art structures by providing a very simple machine and method which will effectively produce a high vacuum without necessitating pre-heating the contents or using mechanical pumps.

An object of the invention is to simplify the present method and apparatus for sealing products under a vacuum.

Another object of the invention is to eliminate complicated machinery thereby to reduce the cost of manufacture; and to increase the speed of production in packing plants by eliminating the necessity for heating the contents of packages to produce a partial vacuum therein.

Another object of the invention is to provide an effective method and machine readily applicable to present packers' equipment for sealing containers under a vacuum without heating the contents and without utilizing complicated pumping mechanisms.

Other and further objects of the invention will be obvious upon an understanding of the illustrated 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.

Described generally, the above objects may be attained by a machine adapted to hold for an instant, a container and cover spaced slightly from each other and during this time to direct a jet of steam into the mouth of the container to displace the air therein. The jet of steam in addition to displacing the air also heats up the cap and the upper surface of the contents of the container giving a very high vacuum and sterilizes these parts to a considerable extent prior to the sealing operation. Preferably, the packages are presented to the sealing head with the caps thereon, and raised upwardly until the caps are engaged by resilient means associated with the sealing head after which the container is lowered slightly to separate it from the cap. At this point, a jet of steam is directed between the cap and the container to displace the air. The container is again raised to sealing position and the sealing operation effected. In some cases, it is more practical to feed the containers and caps separately, in which case steam may be passed over the open end of the container at the time of placing the cap on the container to displace the air and sterilize the product. Immediately thereafter, the container is moved to the sealing position for the sealing operation. Suitable drains may be utilized for removing the condensate and suitable mechanisms may be utilized to maintain the steam in a superheated state to avoid the condensate collecting upon parts of the package.

A preferred embodiment of the invention, which demonstrates one way of practicing the method, has been chosen for purposes of illustration and description and is shown in the accompanying drawings, wherein

Fig. 1 is a side elevational view, partly in section, of a part of a machine illustrating an embodiment of the present invention applied thereto;

Fig. 2 is a sectional view of the sealing head as the sealing operation is completed;

Fig. 3 is a sectional view taken in a direction diagonal to that of Fig. 1 illustrating features of the invention;

Fig. 4 is a sectional view of a spinning mechanism for sealing containers, illustrating the application of the invention thereto;

Fig. 5 is a sectional view illustrating the appli-

cation of the invention to a sealing machine for cans where the caps and containers are fed separately; and

Fig. 6 is a side elevational view of a cam member for operating the means for presenting the containers to the sealing machine.

Referring to the drawings, particularly Figs. 1, 2, and 3, the present invention is shown applied to a machine for sealing closures to glass containers. Since the details of the machine are not a part of this invention only those portions are shown, which relate particularly to the sealing mechanism. A table 1, supported by legs 2, is provided for the vessels with a seat in form of a piston 4 extending through a suitable aperture 5 at the center of the table adapted to move a vessel 6 to and from sealing position. A cam 7, by means of the cam roller 8 and rod 9, positions the container in timed relation to the sealing mechanism. Preferably, the seat 4 is resiliently retained in position by means of a spring 10 which eliminates the necessity for accurate adjustment of the table.

The sealing mechanism may comprise a hollow casting 11 having an upper die 12 attached to the central portion thereof with its lower end shaped to fit about the upper part of a closure cap 14. A plurality of sealing jaws 15, preferably four in number, are adapted to cooperate with the upper die 12 to effect the seal on the receptacle. These jaws 15 are pivotally attached by means of the pins 13 to a member 16 which in turn is suspended within the casting 11 by a pair of rods 17. These rods are reciprocated in a vertical direction by a suitable source of power which may be connected to the rod 18 to oscillate an arm 19 about a suitable pivot to raise the bifurcated portions 20. The latter are connected through pin 21 and links 22 to the rods 17.

The rods 17 and the jaws 15 are shown in their lowermost position in Fig. 1. When raised upwardly, the outer surfaces of the jaw engage a ring 24 which acts as a cam to force the jaws inwardly into sealing engagement with the bead of the cap as shown in Fig. 2. Suitable springs 25 retain the jaws normally in their ineffective position. The mechanism so far described will seal caps to containers but no vacuum will be created.

Suitable leaf springs 26, preferably four in number, are secured by means of screws 27 to slots 23 provided in the supporting member 16 to which the jaws 15 are pivoted. The springs 26 extend downwardly and inwardly with a flat portion 28 engaging the outer cylindrical surface 29 of the upper sealing die. When the jaws 15 are in their lower position the lower ends 28 of the springs project sufficiently far below the bottom of the upper die to engage and hold a cap as shown more particularly in Fig. 3. As the jaws move upwardly to seal the closure, the member 16 moves upwardly also; and hence the spring fingers are moved to the position shown in Fig. 2 with the ends thereof above the cylindrical surface 29 of the upper die.

In other words, the spring fingers move out of the way of the sealing jaws to permit them to effect the sealing operation. When the sealing jaws are moved to their downward position again, the ends 28 of the springs 26 slide on the inclined surface of the upper die down over the cylindrical surface as shown in Fig. 3 ready to receive another cap.

A steam conduit 30 extends through the casting 11 and is adapted to direct a jet of steam intermediate two of the sealing jaws 15. As shown in Fig. 1, a three-way valve 31 controls the flow of steam and is operated through an arm 32 and rod 34 operatively connected to a suitable cam which is driven in timed relation to the cam 7. Preferably, the steam is superheated to avoid condensation and may be permitted to run continuously for the same purpose. During the period that the steam is cut off from the sealing head, the valve 31 permits a flow of steam through a pipe 35 so that there will be no accumulation of water when steam is again directed into the sealing head 11. In order to drain the condensate from the parts of the machine, there is provided a casting 36 beneath the sealing head adapted to catch the drip and conduct it to a drain pipe 37.

In the operation of the device, the container 6 is placed on the seat 4 and the cam 7 operates to raise the container with a cap 14 thereon until the top of the cap fits within the recess in the upper sealing die. In reaching this position, the cap moves through the spring fingers 26 and is retained by these within the upper sealing die. The cam 7 then lowers the seat 4 to the position shown in Fig. 3, where the cap and container are separated slightly. At this point, the valve 31 is operated to introduce steam through the conduit 30, the path of the steam being between a pair of jaws, on one side of the sealing head, over the top of the receptacle and under the closure, as shown in the dotted lines in Fig. 3, out through the drain pipe 37. While the steam is being injected, the cam 7 moves the vessel upwardly to the sealing position as shown in Fig. 2 and the sealing operation is effected by means of the upward movement of the rods 17, pulling the jaws 15 upwardly into engagement with the cap. The outer surface of the jaws is such that the ring 24 exerts a cam action to press them inwardly into their proper position to effect the sealing operation as the jaws are moved upwardly (see Fig. 2). The pipe 27 removes the condensate which collects in the casting 36. The steam may continue to flow into the sealing head, throughout the sealing operation, but it is usually sufficient if supplied until the jar reaches the closure. In fact, very excellent results may be obtained with a shorter period of emission.

The steam fills the space about the upper end of the container and displaces the air creating a very high vacuum. In addition, its temperature is such that it helps to sterilize the upper part of the receptacle and the closure cap. The steam, being permitted to run continuously, is in a vaporous state when it reaches the receptacle and there is practically no condensation and no water left within the receptacle, hence it may be used with any type of product.

In Fig. 4 the invention is illustrated as applied to a spinning head machine for sealing closure caps. Described generally, the mechanism comprises a casting 40 within which an upper rotating die 41 is mounted to move upwardly and downwardly as shown by the arrows. Adjacent this die, there is provided a roller 42 which moves inwardly and outwardly to effect the sealing of the closure to the container. The movement of the roller is controlled by the member 44. In order to simplify the drawings and to avoid confusion, the mechanism connecting the roller 42 and member 44 is not shown herein but its general construction may be found in Patent No. 1,605,954. The lower part of the casting 40 through which the receptacle is raised is provided

with a plurality of spring members 45, preferably four in number located ninety degrees apart.

In the operation of the device, the receptacle 6 with a closure 14 thereon is raised upwardly to a point where it is engaged by the springs 45 and held by these. Thereafter the vessel is moved downwardly by a cam 7 to the position shown in Fig. 4 at which time steam is introduced through the pipe 30 as described hereinbefore and passes over the top of the receptacle just below the closure. The cam 7 then moves the receptacle upwardly until it engages the cap and moves toward the die 41 which in turn moves downwardly to effect the sealing operation.

In Fig. 5 the invention is shown applied to a mechanism for sealing cans where the covers are fed separately from the containers. As shown, the covers are fed in from the right through a passageway 48 to a point just below the die 49 and just over an aperture 50 through which a can 51 is adapted to be moved. A pair of spinning rollers 52 are adapted to seal the closure to the can.

In the operation of the device the closures are fed through the passageway 48 until they are positioned between the cap and the upper sealing die. Thereafter the can 51 is moved upwardly and when it reaches a point spaced slightly from the closure cap, a jet of steam is emitted through the pipe 30 to pass over the can and to displace the air therein, after which the can moves up to engage the closure and press it against the upper sealing die so that it may be operated upon by the rollers 52 and properly sealed to the container. A casting 54 may be provided to catch the condensate and to run it off through a conduit 55. If desired, the can may be moved directly upward until it is engaged by the upper die. The injection of the steam is sufficient to create a vacuum in a very short period of time. Naturally, if the upward movement of the can is stopped at the time it is subjected to steam, better results may be obtained.

It will be seen that the present invention is readily applicable to existing commercial machines and that it may be applied to these with a minimum of trouble and expense. Further, it is simple in construction and operation, and readily constructed from commercial parts. It eliminates the necessity for vacuum pumps and other complicated equipment. The results are certain because they are not dependent upon a closed chamber; as long as steam flows through the conduit, over the container at the proper time, excellent results are obtained. Further, the device is rugged in construction and fully capable of withstanding the rough usage to which it may be subjected.

While steam is the preferred heating medium, it is clear that other fluids may be utilized with excellent results. As various other changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention and without sacrificing 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. The method of sealing containers which comprises presenting a container to a sealing mechanism, supporting a closure cap, moving the container away from the sealing mechanism to space the cap from the container throughout its periphery, injecting a hot fluid between the cap and container to partially remove the air therefrom and thereafter sealing the cap to the container.

2. The method of vacuum sealing which comprises presenting a container with a closure thereon for the sealing operation, moving the container slightly away from the sealing position while maintaining the cap in its sealing position, directing a jet of steam between the separated cap and container and thereafter sealing the cap on the container.

3. In a device of the class described, the combination of a sealing mechanism, means for elevating a container into its sealing position, means for directing a jet of hot fluid into and across the top of the container prior to the sealing operation, and means associated with said sealing mechanism for collecting the resulting condensate of the fluid.

4. In a device of the class described, the combination of a sealing mechanism, means associated with said sealing mechanism for engaging and removing a cap from a container, means for raising a container towards its sealing position, a cam member for operating said means, said cam member being effective to raise the container whereby the cap is removed by said engaging means, said cam member being also effective to lower the container a short distance and thereafter adapted to again raise the container to present it to said sealing mechanism, and means for directing a jet of hot fluid over the upper end of the container to produce a vacuum after the container has been lowered and the cap has been separated therefrom.

5. The method of vacuum sealing which comprises presenting a container to a sealing mechanism, holding the container and closure cap spaced from each other, injecting a hot fluid between the cap and container to provide an atmosphere of hot fluid above the upper end of the container and sealing the cap to the container in said atmosphere of hot fluid while said fluid is being injected.

6. In a device of the class described, the combination of means for raising a container with a cap thereon into sealing position and for lowering said container, devices for engaging the cap prior to the lowering of the container, and mechanism for injecting steam about the upper end of said container while said cap and said container are separated to provide a partial vacuum above the contents of the container.

7. In a device of the class described, the combination of a sealing head, a plurality of rollers associated with said head adapted to reform the skirt of a cap resilient means associated with said head, devices for raising a container with a closure thereon into operative relation to said resilient means and for lowering said container to separate said closure and said container prior to the sealing operation and means for creating a partial vacuum about the container.

8. In a sealing mechanism, the combination of a sealing head, means in said sealing head for engaging a cap, devices for raising the container with a cap thereon into operative relation with said engaging means and for lowering said container, devices for introducing a vapor in the space about the upper end of said container, and mechanism for raising said means upon the operation of the sealing mechanism.

9. In a sealing mechanism, the combination of a sealing head, means for raising a container to sealing position, devices for directing a jet of steam across the upper end of said container

prior to the sealing operation, and means for draining the condensate from the sealing head.

10. In a sealing mechanism, the combination of a sealing head comprising an upper member for engaging the upper side of the cap and sealing jaws for forming a seal, means associated with said upper member, devices for raising the container with a cap thereon until the cap engages said upper member and is held in position by said means and for lowering said container a predetermined amount, and mechanism for directing steam about the upper end of the container, and devices for moving said means out of the way of said sealing jaws.

11. In a mechanism for sealing containers, the combination of a sealing head providing a sealing chamber, means for raising the container into sealing position, said sealing head being provided with means for removing a cap from a container when said raising means are effective and devices connected to said sealing head for directing a jet of hot fluid across the upper end of said container prior to the sealing operation.

12. In a device of the class described, the combination of a sealing head, means associated with said head for engaging and holding a cap, devices for bringing a container with a cap thereon into operative relation to said means, mechanism for lowering said container to separate said cap and said container, and devices for introducing steam about the upper end of the container.

13. The method of sealing containers which comprises moving a container having a cap thereon under a sealing head, removing the cap from the container, maintaining the cap spaced from the container throughout its periphery, subjecting the upper portion of the container to an atmosphere of steam to displace the air and thereafter sealing the cap on the container while in said atmosphere of steam.

14. The method of vacuum sealing which comprises presenting a container with a closure thereon to be sealed, separating the cap from said container, creating an atmosphere of steam between the cap and container, said atmosphere of steam being effective about the entire periphery thereof, and thereafter sealing the cap on the container while subjected to said steam.

15. In a device of the class described, the combination of a sealing head for sealing closure caps to containers, means for presenting a substantially filled container with a closure cap thereon to the sealing head, devices for engaging the closure cap, said means being adapted to lower said container and means for creating an atmosphere of vapor about the unfilled portion of the container when said lowering means are effective.

16. In a device of the class described, the combination of means for raising a container having a cap thereon into a predetermined position, devices for engaging and holding the cap, said means being adapted to separate the cap from said container, and means for creating an atmosphere of vapor about the upper end of the container while said first means are effective.

17. In a sealing mechanism, the combination of a sealing head, devices associated with said sealing head adapted to seal a cap upon a container, means for elevating a container having a cap thereon into sealing position, means for removing the cap from the container, and devices for introducing steam about the upper end of the container prior to the sealing operation to create a partial vacuum therein.

18. The method of vacuum sealing which comprises presenting a container to a sealing mechanism, holding the container and closure cap spaced from each other, injecting a hot vapor between the cap and container to provide an atmosphere of hot vapor above the upper end of the container, sealing the cap to the container in said atmosphere of hot vapor while said vapor is being injected, and collecting the resulting condensate of said vapor.

19. The method of vacuum sealing containers, which comprises presenting a container having a cap thereon to a sealing mechanism, enclosing only the upper end of the container within a sealing chamber, spacing the cap from the container, subjecting the container momentarily to an atmosphere of steam and sealing the cap to the container in said atmosphere of steam, while said steam is effective.

20. The method of sealing containers which comprises presenting a container having a closure thereon to a sealing mechanism, moving the container downwardly to separate the closure and the container, injecting superheated steam between the closure and the container to partially remove the air therefrom and thereafter sealing the cap to the container.

21. The method of vacuum sealing which comprises presenting a container to a sealing mechanism, creating an atmosphere of steam at and substantially above the upper end of the container while a cap for sealing the container is out of sealing position with respect to the container, moving the container into engagement with the cap while in said atmosphere of steam and sealing the cap to the container while the container is subjected to said atmosphere of steam.

22. The method of vacuum sealing, which comprises moving a container into a chamber, creating an atmosphere of steam about and above the open end of the container, moving a container into engagement with a cap to apply the cap to the open end of the container, injecting steam over the open end of the container between the cap and container, simultaneously with the application of the cap, and sealing the cap to the container while in said atmosphere of steam.

23. The method of vacuum sealing, which comprises moving a container into a chamber, creating an atmosphere of steam about and above the upper end of the container, moving the container into engagement with the cap to apply the cap to the container in the chamber, causing a jet of steam to impinge on the cap and on the upper end of the container simultaneously with the application of the cap thereto, continuing the movement of the container with the cap applied thereto to bring the cap into engagement with a sealing mechanism, and sealing the cap to the container while in said atmosphere of steam.

24. The method of sealing containers which method comprises moving a container into a chamber which extends upwardly a substantial distance from the upper end of the container, creating an atmosphere of steam in said chamber, applying a cap to the container and simultaneously directing steam between the cap and upper end of the container, and sealing the cap on the container while the container is in said chamber and is subjected to said atmosphere of steam.

25. The method of vacuum sealing containers which method comprises, supporting a closure in a steam chamber, moving the upper end of a container into engagement with the closure to apply the closure thereto, directing a jet of steam about

the upper end of the container during the application of the closure, and thereafter sealing the closure to the container in the atmosphere of steam in said steam chamber.

26. In a device of the class described, the combination of a chamber adapted to extend above the upper end of a container, means for applying a cap to the upper end of a container while in said chamber, means for directing vapor or steam between the cap and the upper end of the container during the application of the cap, and means in said chamber for sealing the cap on the container.

GEORGE W. MULLEN.