

Dec. 6, 1966

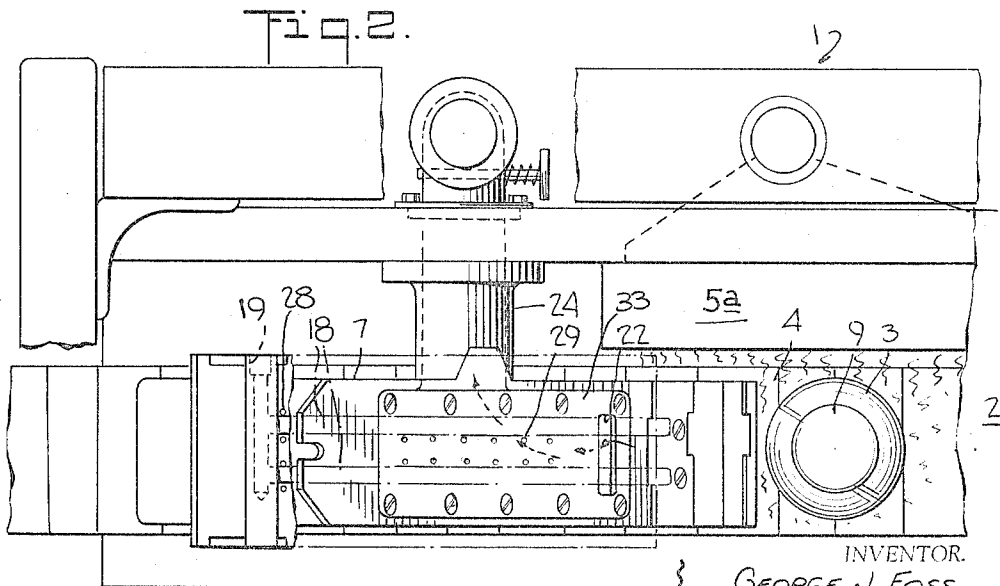
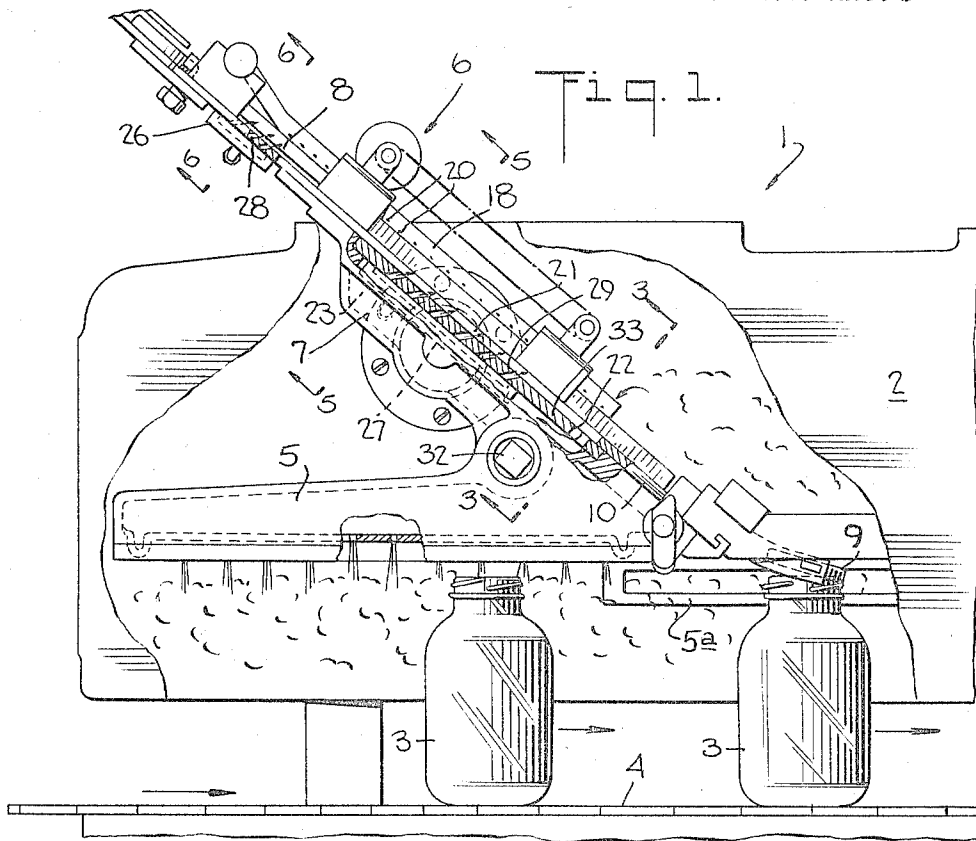
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3,289,383

METHOD AND MEANS FOR FEEDING CAPS

Filed Jan. 27, 1964

3 Sheets-Sheet 1



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METHOD AND MEANS FOR FEEDING CAPS

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3 Sheets-Sheet 2

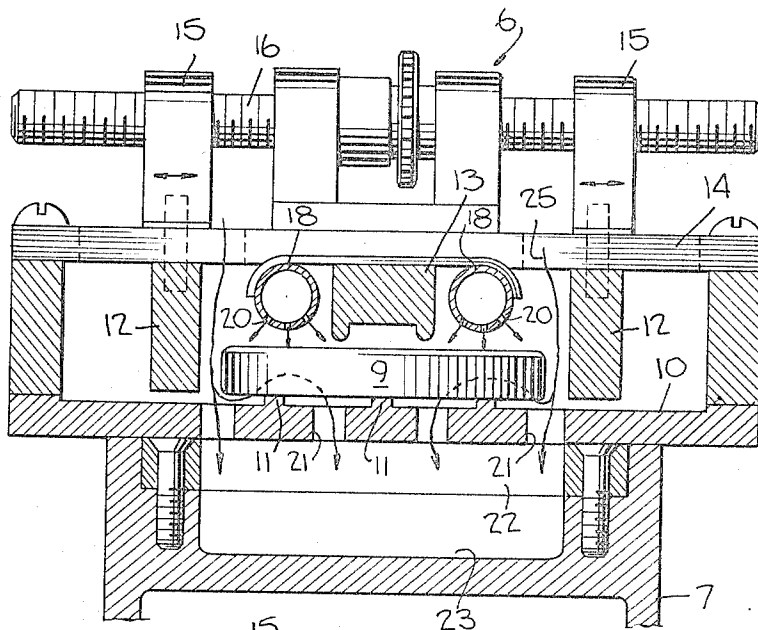


Fig. 3

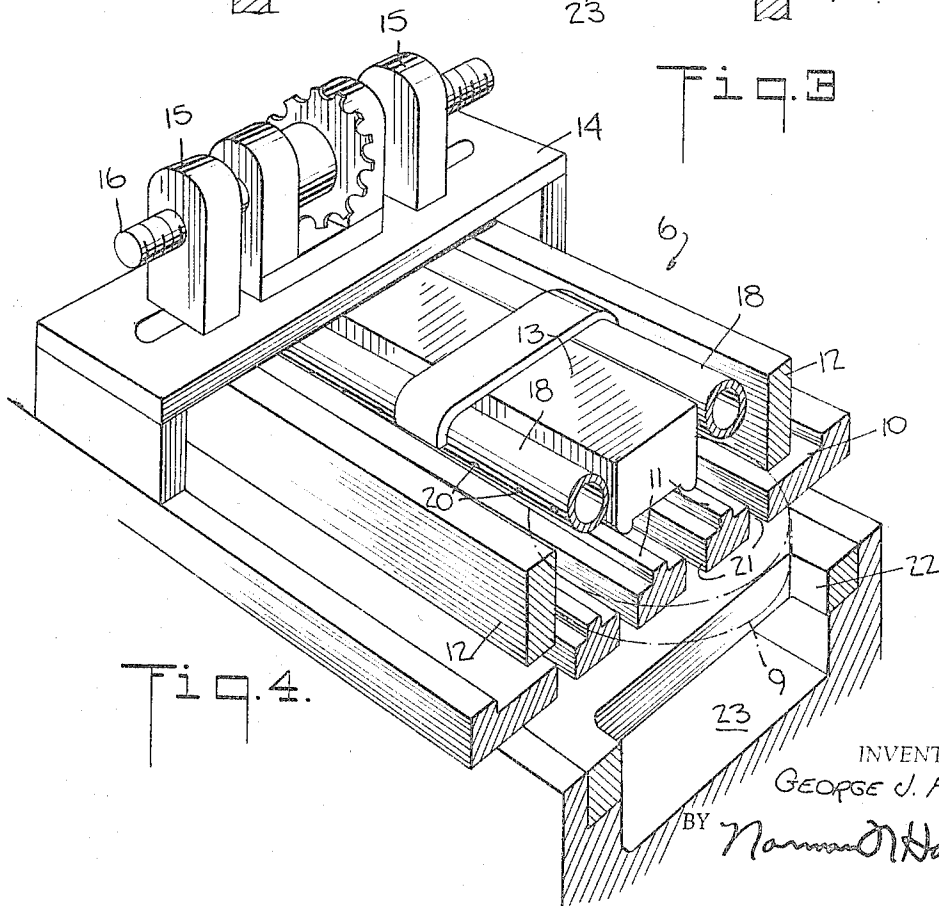


Fig. 4.

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METHOD AND MEANS FOR FEEDING CAPS

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3 Sheets-Sheet 3

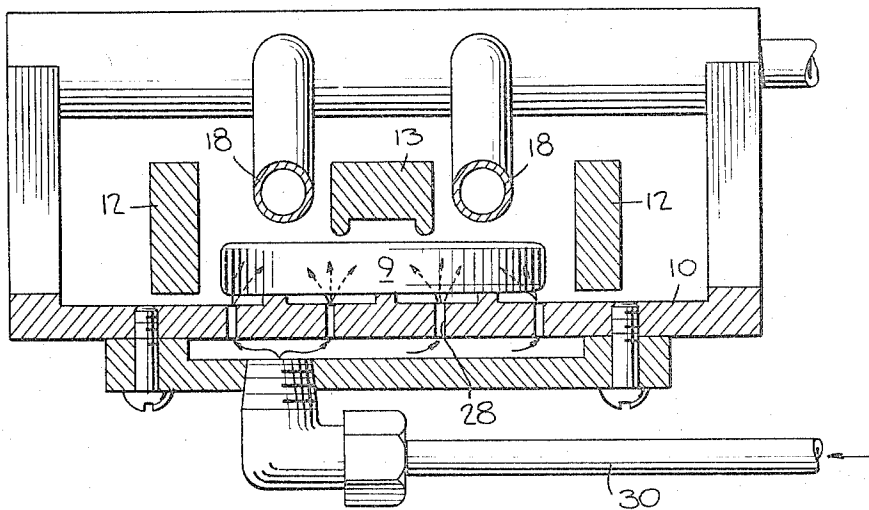


Fig. 6.

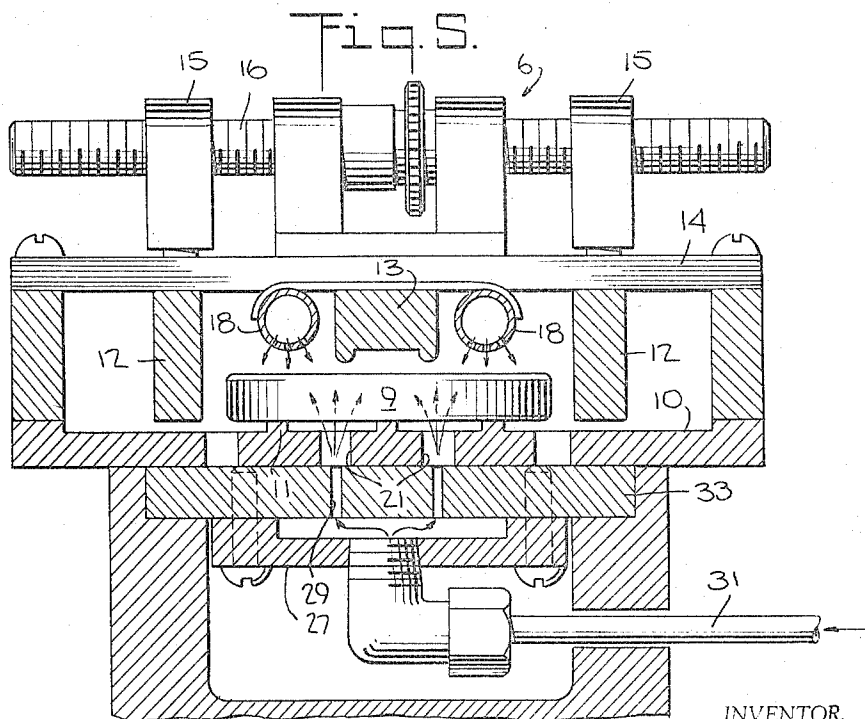


Fig. 5.

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1

3,289,383

METHOD AND MEANS FOR FEEDING CAPS
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14 Claims. (Cl. 53—22)

The present invention relates to a cap feed chute for sealing machines and more particularly to such a cap feed chute having an improved cap heating means and cap atmosphere control for permitting the control of container headspace vacuums and particularly low vacuums.

In sealing machine operations where closure caps are applied to containers at high speeds it is customary to feed the caps to containers by chutes or similar cap handling devices to present the caps one at a time to moving containers. Where flowed-in gaskets or liners of the heat softened thermoplastic type are used in the caps it has been found desirable to heat these gaskets or liners so that they are softened preparatory to being forced against the container sealing surfaces in the sealing operation.

Such cap handling means are very often used in vacuum type sealing machines where the containers passing through the sealing machines are subjected to a steam atmosphere or to steam jets so that container headspaces are filled with steam prior to the application of the caps. This entry of steam into the container headspaces displaces the air from the headspaces and provides a partial vacuum after sealing when the containers cool and the steam condenses.

In such machines where steam is available it has been proposed to use steam in the cap supply means or chute to provide the above described heating action as the steam provides a simple and available source of heat for the closure cap liners or gaskets.

It was found, however, that vacuum control could not be maintained with steam heating of the caps particularly for low vacuums. I have discovered that this loss of vacuum control results from the entry of steam into the regular steam tunnel from the cap chute and directly into the container headspaces from the heating steam trapped in the caps so that it is impossible to reduce the amount of trapped steam to the desirable amount for providing the particular low vacuum desired.

The method and apparatus of the present invention provides a novel exhaust means in combination with a steam heating means for heating cap gaskets and for thereafter exhausting the heating steam from the caps prior to the application of the caps to the containers.

Accordingly, an object of the present invention is to provide an improved method and means for vacuum sealing using closure caps with heated gaskets or liners. Another object of the present invention is to provide an improved method and means for heating caps with steam and for thereafter applying the caps to a container with a controlled degree of vacuum.

Another object of the present invention is to provide an improved means for heating caps in a sealing machine cap feed.

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

2

is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a side elevational view partially in section illustrating a preferred embodiment of the cap feed means of the invention;

FIG. 2 is a top plan view of the cap feed means of FIG. 1 partially cut away;

FIG. 3 is a sectional view of the cap feed means of FIG. 1 taken along line 3—3 of FIG. 1 illustrating the exhaust portion of the cap feed means;

FIG. 4 is a perspective view of the exhaust portion of the cap feed means partially cut way; and

FIGS. 5 and 6 are sectional views of the cap feeding means showing manifolds for heating the undersides of caps taken along lines 5—5 and 6—6 of FIG. 1.

The cap feed of the present invention is for use on sealing machines which seal containers with closure caps. In such machines the caps are fed serially to the containers for an initial placement of a cap on each container top and a subsequent final sealing operation. Such a machine for example is illustrated and described in United States Patent No. 3,054,234 owned by the assignee of the present invention. In sealing machines such as the straight-line sealing machine of the above patent, containers are moved in a straight line beneath a cap feed which includes a chute for feeding the caps downwardly towards the moving container and for presenting a cap to the top of each of the moving containers. The containers draw the caps from the chute and carry them beneath the cap applying and sealing devices where the caps are successively lightly applied to the container sealing finish and then are either pressed or rotated into sealing position depending on whether press-on or threaded-type caps are being used.

In such sealing machines, a source of steam is used for forming a partial vacuum in the headspace or the sealed containers. This is done by injecting the steam into the container headspaces prior to the application of the caps so that the steam remains trapped in the headspaces after the sealing and subsequently forms a partial vacuum by condensing when the headspaces cool. For this purpose the containers are passed through a chamber filled with steam and having a steam distributor alongside the container paths and in some cases a tunnel within the chamber which directs steam directly into the open headspaces of the containers.

FIG. 1 illustrates a sealing machine 1 having a hollow steam chamber 2 positioned above the path of moving containers 3 on a conveyor 4. The cap feed 6 is normally placed at the steam chamber 2 so that caps are fed to the containers 3 within the chamber 2 after the injection of the steam into the container headspaces by a steam distributor 5a and also in some cases by a steam tunnel 5 to trap the desired amount of steam in the container headspace. It is convenient although not necessary to form a cap feed support as an integral part of the molded hollow tunnel member 5 such as the cap feed support 7 illustrated in FIG. 1.

A preferred embodiment of the cap feed 6 comprises an inclined chute 8 which directs caps from a cap feeding hopper (not shown) to a position where the caps are drawn onto the moving containers as illustrated by the cap 9 (FIG. 1). The chute 8 comprises a bottom 10 (FIGS. 3 and 4) with spaced cap support rails 11 and a pair of side rails 12 which loosely hold the caps in place in a single line.

A top rail 13 is mounted above the side rails 12 on suitably spaced supports 14. The supports 14 conveniently mount a pair of spaced and interconnected turn-buckle screws 16 which provide for the support and simultaneous

adjustment of the side rails 12 through threaded support arms 15.

In order to hold the desired vacuum in the sealed packages it is necessary to have a tight seal formed between the cap gasket or liner and the container finish in the sealing operation. It has been found that this result is best obtained with the presently used types of flowed-in heat cured gaskets, such as plastisol or other thermoplastic gaskets, where the gasket temperatures are raised immediately prior to the sealing operation. It has been further found that the gaskets are satisfactorily softened in this manner by subjecting them to steam in the chute 8 as the caps pass down the chute 8. This is done in the preferred embodiment of the cap feed through the use of a pair of elongated steam supply pipes or manifolds 18 coupled to a source of steam through an inlet 19 (FIG. 2) and by spaced bottom manifolds 26 and 27 which inject steam directly into the undersides of the caps 9 (FIGS. 1, 5 and 6). The pipes 18 have a series of small apertures 20 throughout their length which direct the steam downwardly against the cap tops. The manifolds 26 and 27 whose details are illustrated in sectional FIGS. 5 and 6 direct steam into the cap 9 interiors. Manifold 26 communicates with the cap undersides through ports 28 in the bottom 10 of the chute 8 and manifold 27 through ports 29 in the cover 33 of the support 7 and through slots 21 in the chute bottom 10. Steam is supplied under pressure to the bottom manifolds 26 and 27 through inlets 30 and 31 respectively. In order to cooperate with the downward movement of the caps in the cap chute 8, the ports 28 are slanted in the direction of cap travel as illustrated in FIG. 1. The ports 29 are similarly slanted.

In order to provide for an adequate softening of the closure cap gaskets such as flowed-in plastisol gaskets, steam must be supplied to the chute 8 through the manifolds 18 at a high rate and thus at an elevated pressure. This causes steam to be entrapped within each cap 9 and also tends to cause a cloud of steam about the chute 8 and within the chamber 2.

It has been found that this entrapment of steam in the caps 9 in the chute 8 interferes with the headspace vacuum control since the amount of steam carried into the container headspaces under the caps and also the amount of steam passing into the chamber 2 from the chute 8 is excessive where a relatively low container vacuum is being used.

The preferred embodiment of the chute 8 has a steam exhaust port 22 near its lower end.

The exhaust port 22 communicates with a hollow chamber 23 in the cap chute support 7 which is coupled by a suitable outlet 24 (FIG. 2) to a steam exhaust system for evacuating steam from the chamber 23. The port 22 is located near the lower end of the cap chute 8 and the apertures or slots 21 in the chute bottom plate 10 draw the steam from the caps 9 and the surrounding portions of the chute 8 into the exhaust system.

As illustrated by the arrows 25 in FIG. 3, a substantial portion of the surrounding atmosphere drawn through the exhaust port 22 will be provided from the general surrounding atmosphere adjacent the lower end of the cap chute 8 and within the sealing machine chamber 2. Due to the positioning of the apertures 21 and exhaust port 22 immediately beneath a closure 9 adjacent the lower end of the chute 8, this atmosphere will pass through the underside of the cap 9 and will replace the heating steam previously entrapped under the cap 9. The amount of steam in this replacing atmosphere depends on the operating conditions of the sealing machine and where a low vacuum is being used this atmosphere will automatically contain a relatively minor amount of steam since little or no steam will be injected into the container headspaces by the tunnel 5. Thus for low vacuum operation the atmosphere within the chamber 2 will contain only a relatively minor amount of steam in low concentrations

and the container headspace itself will have a negligible amount of steam therein. The cap 9 after the above described exhausting action will also contain only negligible amounts of steam. This permits efficient steam heating of the closure cap gaskets with effective control of the container headspace vacuum by the regular steam tunnel means.

The valve 32 may be opened to connect the tunnel 5 to the hollow exhaust chamber 23 and the steam supply to tunnel 5 cut off. This combination is for very low vacuum sealing where additional steam is removed from the vicinity of the traveling containers through tunnel 5.

Alternatively for extremely high vacuum sealing, the valve 32 may be left open and exhaust outlet 24 closed. Steam is now supplied to both chamber 23, steam distributors 5a, and tunnel 5 to assure a full supply of steam to the headspace of sealed containers.

As various changes may be made in the form, construction 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. A closure cap feed for a container sealing machine comprising the combination of means for feeding closure caps having gaskets to containers, means at the cap feeding means for steam heating the gaskets in the closure, and means for exhausting the heating steam from the closure caps prior to the closure caps engaging a container.

2. A closure cap feed for a container sealing machine comprising the combination of means for feeding closure caps having gaskets to containers, means at the cap feeding means for steam heating the gaskets in the closures, and means for exhausting the heating steam from the closure caps and from the cap feeding means prior to the closure caps engaging a container.

3. A closure cap feed for a container sealing machine comprising the combination of an elongated inclined chute for feeding closure caps to containers, means extending along a portion of the chute for steam heating the gaskets in the closures, said steam heating means terminating short of the lowermost end of the closure cap feeding chute, and means for exhausting steam from the closure caps and from the cap feeding chute adjacent to the lowermost end of the steam heating means.

4. A closure cap feed for a container sealing machine comprising the combination of an elongated inclined chute for feeding closure caps to containers, a steam manifold extending along a substantial portion of the chute and having spaced steam outlet ports for steam heating the gaskets in the closures, said steam manifold terminating short of the lowermost end of the closure cap feeding chute, and means for exhausting steam from the closure caps and from the cap feeding means adjacent to the termination of the steam heating manifold.

5. A closure cap feed for a container sealing machine comprising the combination of an elongated inclined chute for feeding closure caps open side downwardly to containers, a steam conduit having spaced outlet ports extending along a substantial portion of the chute for steam heating the gaskets in the closures, elongated channels in said chute for exposing the undersides of the cap to the steam, said steam conduit terminating short of the lowermost end of the closure cap feeding chute, and an exhaust aperture for exhausting the heating steam from the closure caps and from the cap feeding means adjacent to the termination of the steam heating conduit.

6. In a container sealing machine the combination of means for feeding closure caps to containers, a first steam distribution means at the cap feed for steam heating the gaskets in the closures, means positioned in advance of the exit end of the closure cap feeding means for exhausting steam from the closure caps and from the cap

feeding means prior to the closure caps engaging a container, and a second steam distribution means spaced remotely from said first means for directing steam into the container headspaces.

7. In a container sealing machine the combination of 5
inclined chute means for feeding closure caps to containers, a first steam distribution means extending along a portion of the cap feed for steam heating the top sides of caps in the chute means, a second steam distributing means positioned to heat the undersides of caps in the chute means, and an exhaust port adjacent the exit end of the closure cap feeding means for exhausting steam from the closure caps and from the cap feeding means prior to the closure caps engaging a container.

8. In a sealing machine for sealing containers with 15
closure caps the combination of a steam chamber, means for moving containers through the chamber with the container headspace exposed to steam within the chamber, means for feeding closure caps to the tops of the moving containers in the chamber, means including a plurality of steam manifolds positioned on opposite sides of the caps for heating the gaskets of the closure caps with steam at the cap feeding means, and means in advance of the exit end of the cap feed means for exhausting the heating steam from the underside of the closure caps and from the cap feeding means.

9. In a sealing machine for sealing containers with 20
closure caps having thermoplastic gaskets the combination of a steam chamber, means for moving containers through the chamber with the container headspaces exposed to steam within the chamber, means for feeding closure caps to the tops of the containers in the chamber, means for heating the gaskets of the closure caps with steam at the cap feeding means, and an exhaust aperture in advance of the exit end of the cap feed means for exhausting the heating steam from the underside of the closure caps and from the cap feeding means whereby the atmosphere within the container headspaces upon the application of the caps to the containers comprises steam of a concentration generally similar to that of the steam atmosphere within the steam chamber adjacent the moving containers.

10. In a sealing machine for sealing containers with 25
closure caps having thermoplastic gaskets the combination of a steam chamber, means for moving containers through the chamber with the container headspaces exposed to steam within the chamber, an inclined chute for feeding closure caps to the tops of the containers in the chamber, steam distribution means for heating the gaskets

of the closure caps with steam extending along a portion of the feed chute, means in said chute for exposing the underside of the cap to said heating steam, and a steam exhaust port in advance of the exit end of the cap chute for exhausting steam from the underside of the closure caps and from the cap feeding means whereby the atmosphere within the container headspaces upon the application of the caps to the containers comprises steam of a concentration generally similar to that of the steam atmosphere within the steam chamber adjacent the moving containers.

11. In the method of feeding and applying closure caps having thermoplastic gaskets to containers the improvement which comprises heating the gaskets with steam as they are fed towards the containers, and thereafter exhausting the heating steam from the inside of the caps and from the atmosphere surrounding the caps prior to the final feeding and application of the caps to the containers.

12. In the method of feeding and applying closure caps having thermoplastic gaskets to containers the improvement which comprises applying steam to the gaskets as they are fed toward the containers, and thereafter substantially exhausting the heating steam from the inside of the caps and from the atmosphere surrounding the caps prior to the application of the caps to the containers.

13. The method of feeding and applying closure caps having thermoplastic gaskets to containers in a sealing machine which comprises filling the headspaces of the open containers with steam by a first steam distribution at a predetermined concentration of steam and air, feeding a cap toward each container, steam heating the cap gaskets by a second steam distribution at a position remote from the containers, exhausting the gasket heating steam from the caps, and thereafter applying the caps to the containers and entrapping steam from the first distribution in the container headspaces.

14. The method of feeding and applying closure caps having thermoplastic gaskets to containers in a sealing machine which comprises feeding a cap toward each container, directing steam against the top and underside and gasket of each cap at a position remote from the container, thereafter exhausting the steam from the caps and from the atmosphere surrounding the path of the caps, and applying the caps to the containers.

No references cited.

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