April 19, 1966 S. R. SMITH ETAL 3,246,447

AIR PURGING MECHANISM

Filed Feb. 25, 1963

Fig. 1.

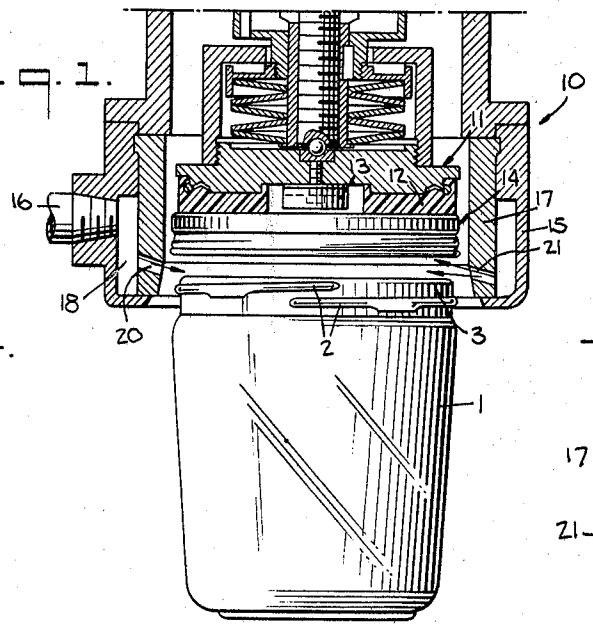


Fig. 4.

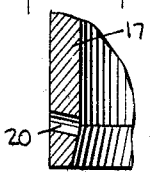


Fig. 5.

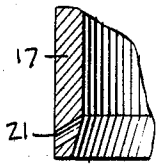
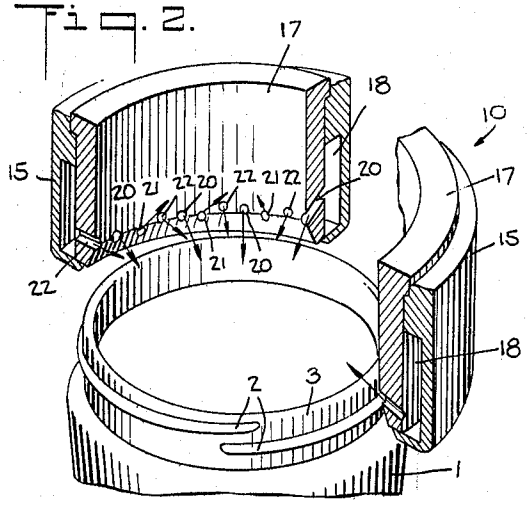


Fig. 2.



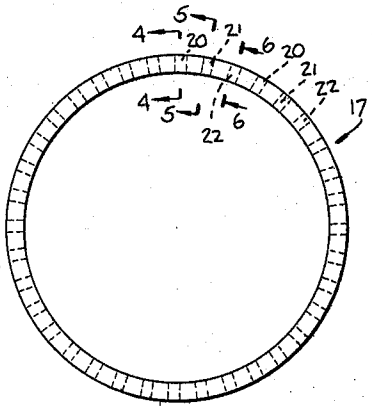


Fig. 3.

Fig. 6.

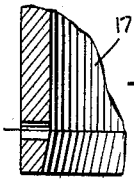


Fig. 7

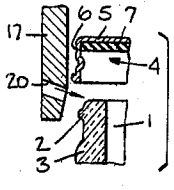


Fig. 8.

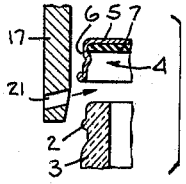
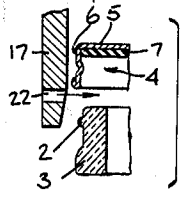


Fig. 9.



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AIR PURGING MECHANISM

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2 Claims. (Cl. 53—88)

The present invention relates to the sealing art and more particularly to an improved mechanism and method of purging or removing air from a package before the package is heremetically sealed.

In order to lengthen the storage life of food products and to prevent deterioration of the packaged food by oxygen, it is desirable to remove the air from the packages prior to their being sealed. For example where closure caps are applied to containers, air is removed from the space between the top of the product and the closure cap. This is done either by removing substantially all of the air by forming a partial vacuum or it may be done by displacing the air with a gas which is inert with respect to the packaged product. The formation of a vacuum is preferably done by replacing the air with a condensable vapor such as steam so that a vacuum is formed when the steam cools and condenses. Thus it is seen that both the formation of a vacuum or the introduction of an inert gas requires the injection of a gaseous fluid into the container top to displace the air. Where the following description describes the injection of an inert gas, it is clear that the injection of a condensable vapor such as steam is advantageously performed using the same mechanism and method.

For convenience in description, the application will be described with reference to an inert gas. However, it will be understood that the present invention is adapted to be used with any fluid which will displace air, such as steam and similar fluids, and that the use of the term inert gas is intended to include any such fluid.

In practice, an uncapped container is moved underneath a sealing hood wherein air is removed from the container as the vapor or inert gas is introduced therein through an opening in the sealing hood. When all the air is displaced by the vapor or inert gas, a closure cap is applied to the container to form a sealed package. An example of such a mechanism is the one shown in United States Patent No. 2,510,568 dated June 6, 1950.

Heretofore the opening in the hood for the introduction of the vapor or inert gas therein has been a continuous slot in a so-called "distributor-ring." Other distributor rings have utilized a plurality of spaced openings all oriented in the same direction, i.e. all positioned to direct the inert gas downwardly or all positioned to direct it upwardly. It has been found that these prior devices were not effective to give a commercially satisfactory vacuum or replacement of the air by the inert gas.

The present invention overcomes these defects and provides an improved mechanism and method for purging air from a container in which a commercially satisfactory vacuum will be created or where an equivalent reduction in the oxygen of the headspace is obtained by the replacement of the air by an inert gas.

Another object of the present invention is the provision of an improved mechanism and method of purging air from a container which will operate at greater speeds than present mechanisms.

Another object of the present invention is the provision of an improved mechanism and method of purging air from a container which is inexpensive to manufacture and maintain.

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 sectional view showing the improved mechanism of the present invention in operation;

FIG. 2 is a perspective view partly in section showing the improved steam head of the present invention;

FIG. 3 is a bottom plan view of the improved distributor-ring of the present invention showing the position of the gas injection openings;

FIG. 4 is a sectional view of the distributor-ring taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view of the distributor-ring taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view of the distributor-ring taken along line 6—6 of FIG. 3;

FIG. 7 is a sectional view showing the path of inert gas emitted from one opening in the distributor-ring;

FIG. 8 is a sectional view showing the path of inert gas emitted from another opening in the distributor-ring; and

FIG. 9 is a sectional view showing the path of the inert gas from still another opening in the distributor-ring.

Referring more particularly to FIG. 1 of the drawing, a container **1** from which air is to be evacuated has the usual sealing thread **2** on its finish **3**.

A closure cap **4** having the usual cover portion **5**, skirt portion **6** and sealing gasket **7** is adapted to be applied to the container to form a sealed package. In the embodiment shown in the drawings the skirt portion **6** has a continuous thread **8** adapted to cooperate with the thread **2** on the container finish **3** in order to hold the closure cap **4** in place after the sealing operation.

It will, of course, be understood that the closure cap and container shown in the drawings are illustrative only and that the closure cap and container with which the invention may be used may vary in structure as desired without departing from the invention.

The container **1** is moved beneath a sealing hood **10** which has a sealing clutch **11** reciprocably mounted therewithin. The sealing clutch **11** is provided with a magnet **13** adapted to hold the cap **4** in an elevated position while the purging operation is performed and a plunger friction cover **12** which is adapted to apply the closure cap **4** to the container **1** after the air has been replaced by an inert gas.

The sealing hood **10** comprises an outer imperforate gas head **15** into which an inlet pipe **16** is mounted and a perforated distributor-ring **17** spaced from the outer wall of the gas head **15** to form a gas chamber **18**.

The perforated distributor-ring **17** has a plurality of openings or perforations **20**, **21** and **22** therein which are angled with respect to each other. The perforations **20** are oriented or angled downwardly to direct a stream of inert gas in a downward direction against the mouth of the container **1** to displace air from the headspace in the container, as clearly shown in FIGS. 4 and 7. Perforations **21** as shown in FIGS. 5 and 8, are oriented upwardly to direct a stream of inert gas in an upward direction to displace air from the inner confines of the closure cap **4**. Perforations **22** (FIGS. 6 and 9) are oriented horizontally to permit a stream of inert gas to be directed across the top of the container in a substantially horizontal direction to keep air from entering the container and the closure and to assist in moving displaced air quickly from the container and the closure.

In the preferred embodiment of the invention as shown in the drawings, the perforations **20**, **21** and **22** are on substantially the same elevational plane with each other. This plane is preferably between the mouth of the container **1** and the lower edge of the cap. As seen in FIGS. 2 and 3 (in a clockwise direction) downwardly oriented perforation **20** is followed by upwardly oriented perforation **21** which, in turn, is followed by a horizontally oriented perforation **22**. This sequence is preferably repeated throughout the circumference of the steam ring **17**. However, it will be understood that the sequence of the perforations may be changed, if desired.

The upwardly oriented perforations **21** are preferably at about an angle of 15 degrees from the horizontal and the downwardly oriented perforations **20** are preferably at an angle of 10 degrees to the horizontal. However, these angles may be changed if desired.

The perforations **20**, **21** and **22** are wide enough to eject a stream of inert gas to give optimum results. Preferably the perforations are circular and are about one-eighth of an inch in diameter. Furthermore, while in the preferred embodiment the perforations have been shown as being circular, it is also within the scope of the invention to make the perforations of any shape, such as oval, square, rectangular, etc.

Furthermore, in the embodiment shown in the drawings there are thirty-six perforations **20**, **21**, **22** all spaced about 10 degrees from each other, i.e. there are twelve upwardly oriented perforations **20**, twelve downwardly oriented perforations **21**, and twelve horizontally oriented perforations **22**. However, it will be understood that the total number of perforations and the number of perforations in any particular direction may be varied, if desired.

As shown in FIG. 7 and as mentioned above the downwardly oriented perforations **20** will direct a stream of inert gas against the head space in the container to displace air therefrom. The upwardly oriented perforations **21** (FIG. 8) will simultaneously direct inert gas against the undersurface of the closure cap and displace air therefrom and the horizontally oriented perforations **22** (FIG. 9) will simultaneously direct inert gas in the area between the cap and the container to assist in moving displaced air quickly from the container and the closure cap and to keep air from reentering the container and the closure cap.

The simultaneous injection of the inert gas in many directions will displace the air in a lesser amount of time and will permit a more efficient operation. With this structure a reduced amount of oxygen equivalent to a vacuum of about 28 to 29 inches has been achieved with the sealing rate of about 20 seals per minute.

After the air is replaced with an inert gas, the sealing clutch **11** is lowered and the closure cap **4** is applied to the container **1**.

While the terms horizontal, downward and upward have been used herein, it will be understood that such terms are relative and apply only with respect to the reference plane as shown in the drawings.

It will be seen from the above that the present invention provides an improved mechanism and method of displacing air from glass containers packaged with a commercially acceptable reduction of oxygen and in order to permit greater efficiency in operation.

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 our invention, we claim:

1. A sealing head comprising closure applying means, a substantially annular and uninterrupted distributor ring, a plurality of spaced radially positioned openings in said ring, said openings being substantially on the same elevational plane, a number of said openings being oriented in a downward direction, openings adjacent said downwardly oriented openings being oriented in an upward direction and openings adjacent said upwardly oriented openings being horizontally oriented.

2. A sealing head comprising closure applying means, a substantially annular and uninterrupted distributor ring in said sealing head, a plurality of spaced radially positioned openings in said ring, said openings being substantially on the same elevational plane and spaced at an angle of about 10 degrees from each other, said openings being arranged so one of said openings is horizontally oriented, an opening adjacent said horizontally oriented opening being oriented in a downward direction at an angle of about 10 degrees, an opening on the other side of said horizontally oriented opening being oriented in an upward direction at an angle of about 15 degrees.

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