March 10, 1953 J. HOHL 2,630,958

METHOD AND APPARATUS FOR SEALING CONTAINERS

Filed Feb. 10, 1951 4 Sheets-Sheet 1

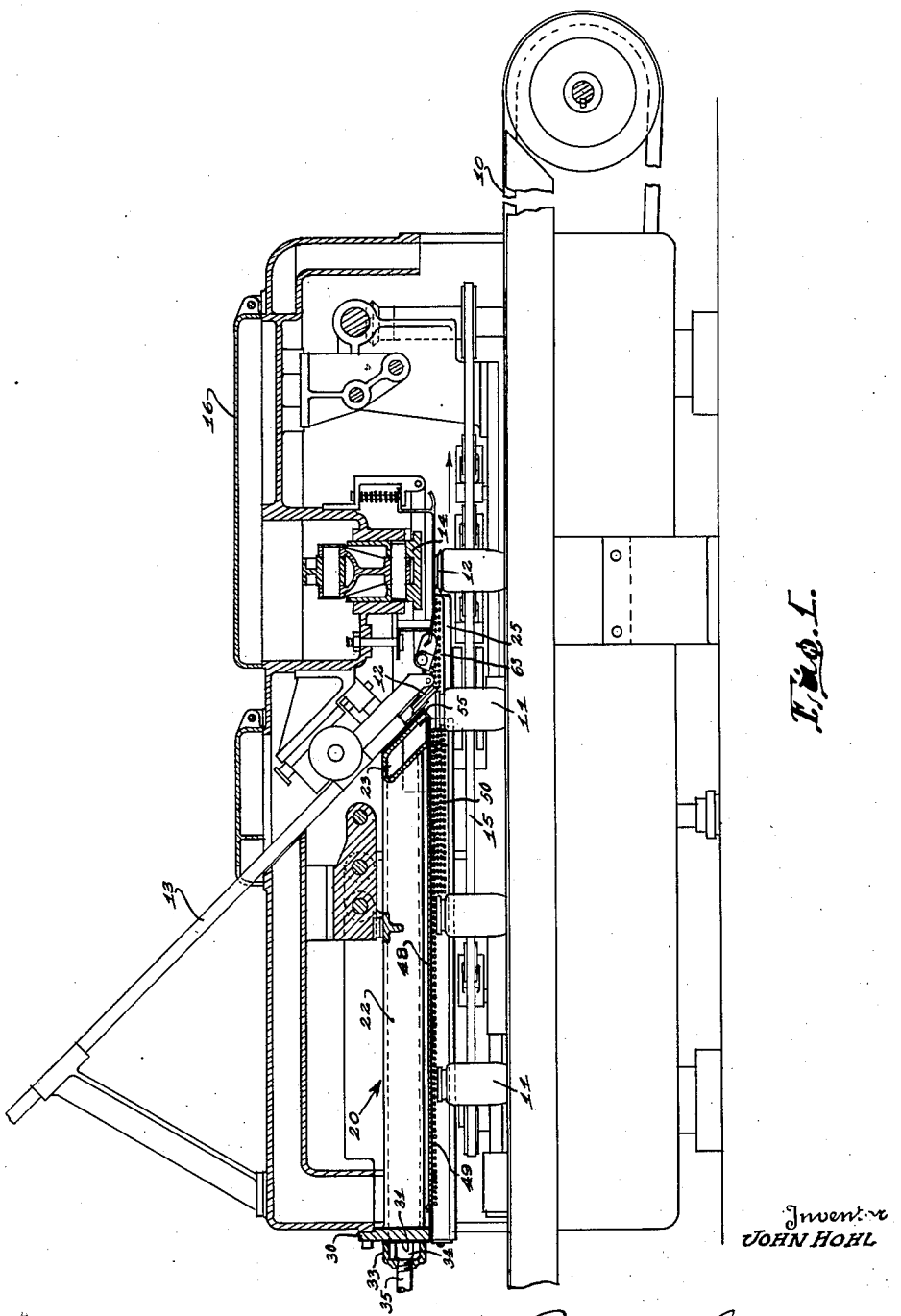


FIG. 1.

Inventor
JOHN HOHL

By Rule & Hoge.

Attorneys

March 10, 1953 J. HOHL 2,630,958

METHOD AND APPARATUS FOR SEALING CONTAINERS

Filed Feb. 10, 1951 4 Sheets-Sheet 2

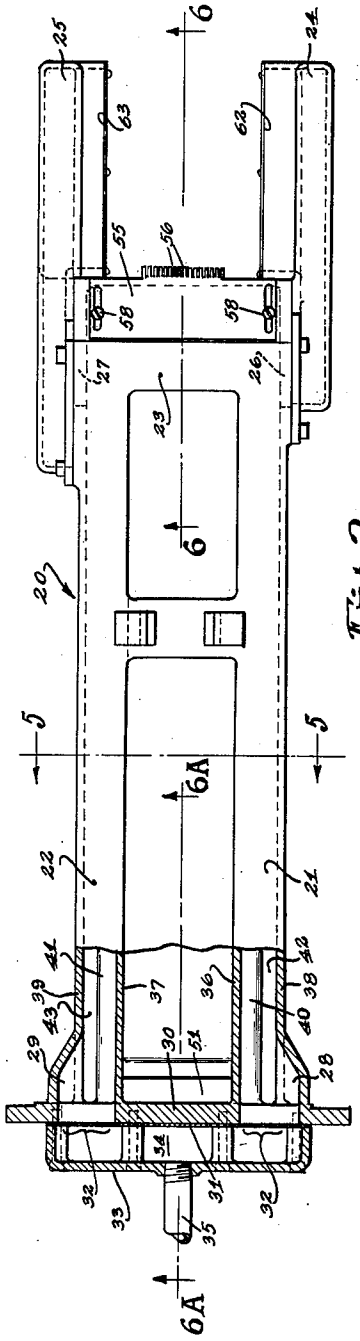


Fig. 2.

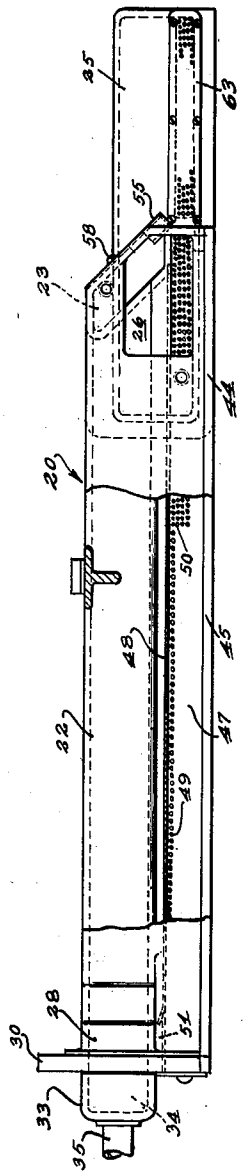


Fig. 3.

Inventor
JOHN HOHL

By Rule and Hoge.

Attorneys

March 10, 1953 J. HOHL 2,630,958

METHOD AND APPARATUS FOR SEALING CONTAINERS

Filed Feb. 10, 1951 4 Sheets-Sheet 3

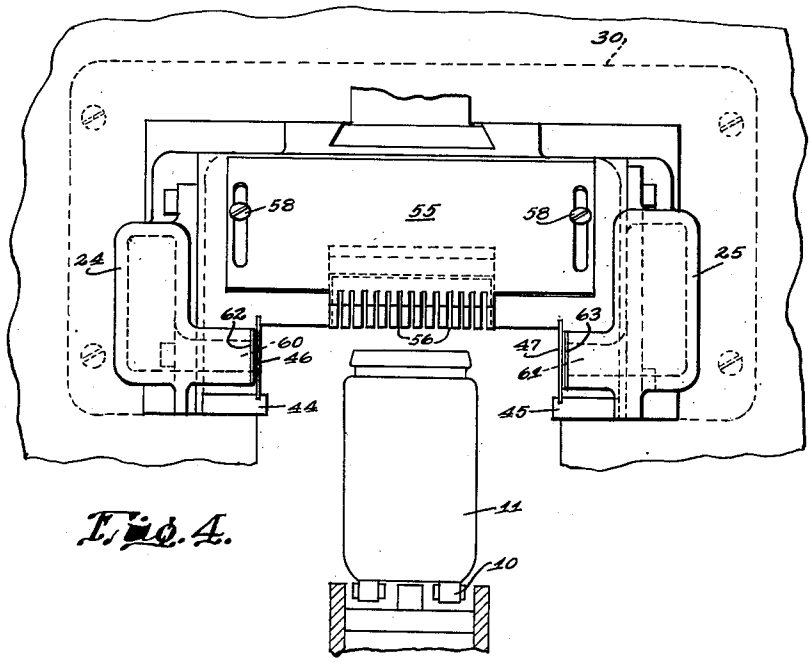


Fig. 4.

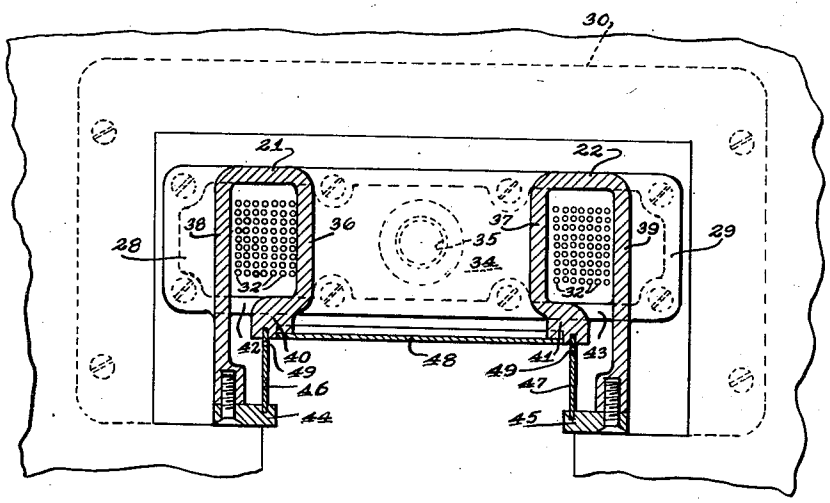


Fig. 5.

Inventor
JOHN HOHL

By Rule and Hoge,

Attorneys

March 10, 1953 J. HOHL 2,630,958

METHOD AND APPARATUS FOR SEALING CONTAINERS

Filed Feb. 10, 1951 4 Sheets-Sheet 4

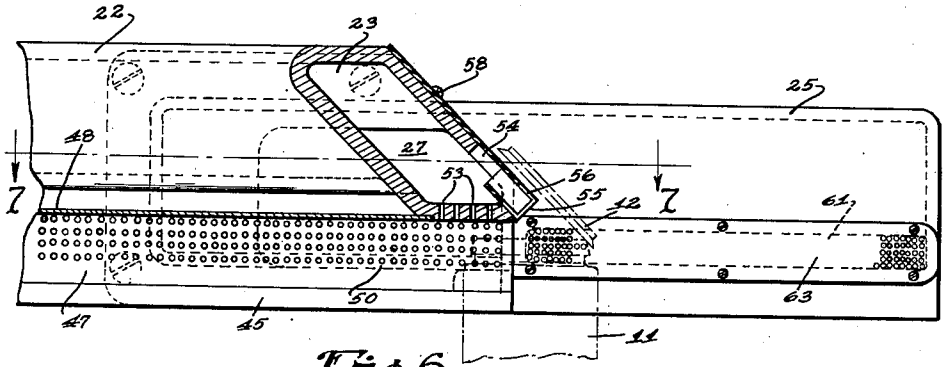


Fig. 6.

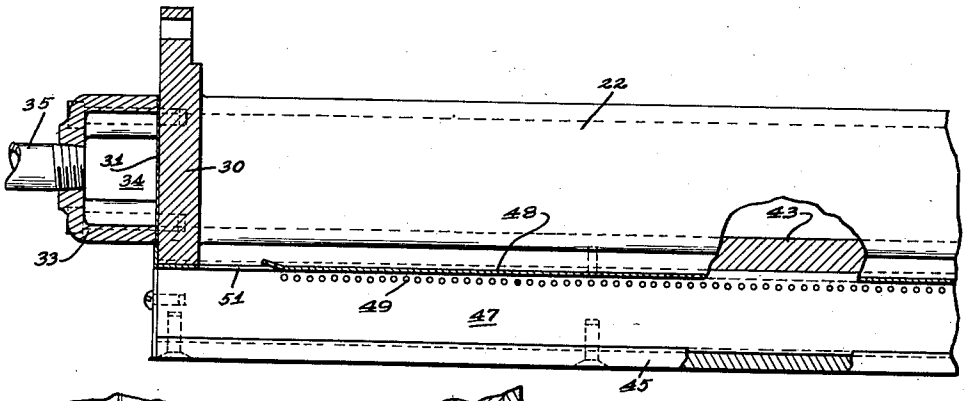


Fig. 6A.

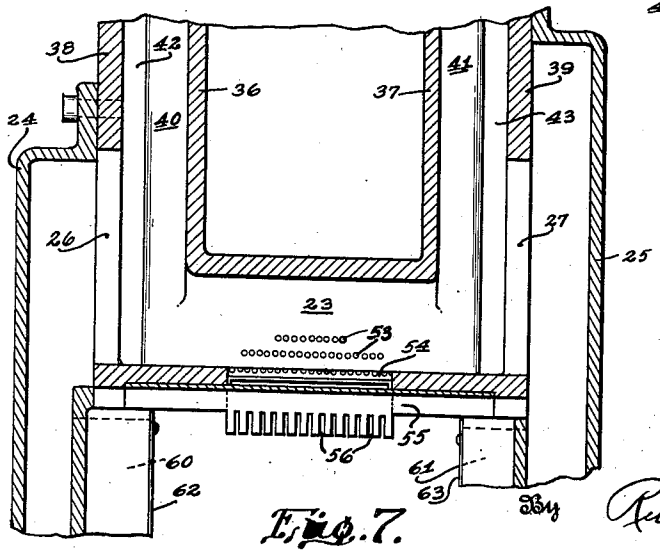


Fig. 7.

Inventor
JOHN HOHL

By Rule and Hoge.

Attorneys

Patented Mar. 10, 1953

2,630,958

UNITED STATES PATENT OFFICE

2,630,958

METHOD AND APPARATUS FOR SEALING CONTAINERS

John Hohl, Toledo, Ohio, assignor to Owens-Illinois Glass Company, a corporation of Ohio

Application February 10, 1951, Serial No. 210,369

23 Claims. (Cl. 226—82)

1

This invention relates to the packaging of commodities in containers and particularly to a method and apparatus for producing an inert atmosphere in the sealed containers.

It is common practice in the art of sealing of commodities in containers to displace the air in the container with an inert gas or to displace the air with a vapor such as steam, which, after sealing and during cooling of the container, condenses and creates a partial vacuum. This invention relates to a new and improved method and apparatus for utilizing the inert gas or vapor in the displacement of air from both the container and the cap.

An object of the invention is to provide a method and apparatus for distributing inert gas or vapor in order to quickly and effectively remove the air from the cap and container.

Another object of this invention is to provide such a method and apparatus wherein a minimum of inert gas or vapor is required.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a part sectional longitudinal elevation of a machine for capping and sealing containers in which the present invention may be embodied and produced, parts of the machine being broken away;

Fig. 2 is a part sectional plan view of the inert gas or vapor distributor;

Fig. 3 is a part sectional elevational view of the distributor with the front extension member removed;

Fig. 4 is an end view of the distributor;

Fig. 5 is a sectional view at the line 5—5 on Fig. 2;

Fig. 6 is a sectional view of the right-hand portion of the distributor at the line 6—6 on Fig. 2;

Fig. 6A is a sectional view of the left-hand portion of the distributor along the line 6A—6A on Fig. 2; and

Fig. 7 is a sectional view at the line 7—7 on Fig. 6.

The invention is herein illustrated as applied to a machine for capping and sealing containers, of the type disclosed in the patent to Hohl #2,357,826, September 12, 1944, entitled "Capping Machine" to which patent reference may be had for full disclosure of the construction and operation of such a machine.

Referring to Fig. 1, the machine comprises an endless belt conveyor 10 driven continuously for conveying containers 11 through the machine. The containers are herein shown as glass jars to

2

which caps 12 are applied. The jars are filled with any desired commodities and subsequently sealed. The commodities may be hot or cold, depending upon the type of commodity being packaged. The jars as they are carried forward with the conveyor, pass in succession beneath an inclined chute 13 down which the caps 12 are fed, and each jar as it passes beneath the lower end of the chute draws a cap therefrom. As the jar advances beyond the chute, it is brought beneath the sealing device comprising a ram 14 which moves downward and forces the cap into sealing position on the container. Side belts 15, which are driven with the conveyor 10, guide the jars in their forward travel. A casing 16 is provided to enclose the entire mechanism. The parts thus far described and the means for driving and operating the moving parts may be the same as disclosed in the above mentioned Patent No. 2,357,826.

Prior to and during the sealing operation, the containers and caps are subjected to inert gas or vapor emanating from a distributor 20, extending lengthwise over the conveyor 10 and spaced thereabove to permit the passage of the containers 11. The forward end of the distributor is directly behind and close to the cap chute 13.

As shown in Figs. 2 and 3, the distributor comprises a front channel 21 and a rear channel 22 spaced from and parallel to the front channel 21. The channels 21, 22 are connected at the forward end of the distributor by means of a hollow cross channel 23. Channel extensions 24, 25 are provided at the forward end of the distributor and are connected to the channels 21, 22 through openings 26 and 27 as hereinafter described.

The ends of the channels 21, 22, opposite to the forward end of the distributor, are slightly enlarged as shown at 28, 29. These portions are spaced apart by the integral plate 30. A diffuser plate 31 containing perforations 32 is placed over the ends of the channels and a cap 33 is positioned over the diffuser plate and the ends of the channels and provides a chamber 34 at the end of the distributor. An inlet 35 is provided to a source of inert gas or vapor. The inert gas or vapor enters through the inlet 35 and strikes the plate 30 and is caused to change its path and flow through the perforations 32 in the diffuser plate 31 and thence through the channels 21, 22 to the extensions 24, 25 and the various parts of the distributor, as subsequently described.

As shown in Fig. 5, the distributor channels 21, 22 are provided with inner walls 36, 37 and

outer walls 38, 39, respectively. Each of the outer walls 38, 39 extends downwardly a greater distance than the inner walls 36, 37. In addition, each of the inner walls 36, 37 is formed with a ridge or bead 40, 41, respectively, extending the length of the channels and thereby restricting the opening in the channel and effectively forming a throat 42, 43 respectively along the length of the distributor. Guide strips 44, 45 are fastened to the bottom of the outer walls 38, 39 and extend horizontally towards the center of the distributor. Vertical slide plates 46, 47 are positioned in slots in the respective inner walls 36, 37 and the guide strips 44, 45 and extend along the length of the distributor. A cover plate 48 extends horizontally between the lower edges of the inner wall 36, 37 and with the channel walls 36, 37, provides a tunnel through which the open ends of containers may be advanced.

As shown in Figs. 3, 6, and 6A, the slide plates 46, 47 are each provided with a single row of perforations 49 extending horizontally along the left-hand portion of the distributor and spaced adjacent to the cover plate 48. The slide plates 46, 47 are each provided with a multiplicity of perforations 50 (Fig. 6) in the right-hand portion of the distributor.

As shown in Figs. 1 and 6A, the length of the cover plate 48 is such that a portion of the space between the channels is left uncovered in the extreme left-hand portion of the distributor shown at 51.

Referring to Fig. 6, the cross channel 23 is parallogram-shaped in cross section and the bottom wall thereof is provided with a series of vertical perforations 53 (Figs. 6 and 7). An opening 54 is provided along the length of the cross channel 23 in the extreme forward portion thereof and a vapor restricting and directing device 55 is positioned in the opening 54. The portion of the device 55 which fits in the opening is U-shaped in cross section and is provided with a series of vertical slots 56, as shown in Fig. 6. This device operates to restrict the flow of vapor out of the opening, and in addition, to direct the flow from the cross channel so that the vapor emanates as a series of vertical sheets. The position of the device may be adjusted in the opening by means of screws 58 (Fig. 4).

The extension members 24, 25 are connected (as shown in Fig. 7) to the channels through the openings 26, 27 and are in the form of channels extending downwardly and horizontally inwardly to provide longitudinal openings 60, 61 along the path of the containers. Perforated plates 62, 63 are provided over these openings. The extension members thus extend the effective length of the distributor so that vapor may be applied to the cap and container during the sealing process, as presently described.

When a vapor such as steam is introduced through the inlet 35, it strikes the plate 30 and is redirected through the diffuser plate 31 to the channels 21, 22. When the steam strikes the plate, any droplets, which are formed in the steam either because the distributor is cold or because the steam is not superheated, will be separated from the stream and collect in the chamber 34. The steam flows through the channels 21, 22 to the extension members 24 and 25 through the openings 26, 27 respectively.

After the usual warm-up period the vapor will continuously emanate from the perforations 49, 50, and 53 in the distributor and through the slots 56 in the vapor directing device 55. In addition, vapor will flow through the perforated plates 62, 63 which are positioned over the openings 60, 61, respectively, in the extension members.

As a filled container 11 approaches and enters the distributor, it passes below a thin layer of vapor formed by the transverse streams emanating from the single rows of perforations 49. This layer of vapor serves to prevent air from entering the space above the path of the containers.

As the container 11 continues its travel through the distributor it is subjected to a multiplicity of transverse streams of vapor emanating from the perforations 50.

The container next passes below the cross channel 23 and is subjected to the vertical streams of vapor from the perforations 53. The container also moves through the vertical sheets of vapor emanating in a fan-like manner from the slots 56 in the vapor restricting and directing device 55.

At the same time, a cap is fed down the chute 13 and passes through the vertical sheets of vapor into the path of the container. Throughout this area the cap and container are also being subjected to the transverse streams of vapor.

The great concentration of vapor due to the transverse streams, the vertical streams, and the vertical sheets of vapor, provides a final scavenging or sweeping action whereby any air remaining in the container or the cap is removed.

As the container continues its travel, it draws the cap from the chute and moves to the sealing zone with the cap loosely applied thereon. The cap and container are retained in an atmosphere of steam formed by the transverse streams emanating from the perforated plates 62, 63 of the extension members. This atmosphere of steam extends substantially throughout the sealing zone, where the cap is sealed to the container by action of the ram 14. The sealed container is then removed by the conveyor.

The particular arrangement of the perforations 49, 50 and 53 has been found preferable, but it should be understood that the arrangement may be modified without deviating from the spirit of my invention.

The invention has been described as adapted for use with steam which I have found desirable in packaging and sealing certain products and may also be used with steam at such lower or higher temperatures as are preferable for use with certain products. In addition, other inert gases may be used, heated if desired. The term "inert gas" as herein used, includes superheated steam, steam vapor and any other gases such, for example, as nitrogen and carbon dioxide, which do not include free oxygen or oxidizing agents and which are suitable for the specified purposes of my invention, and also includes combinations of such gases.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. The method of sealing containers which comprises successively subjecting a container to a series of fine transverse streams of vapor, a concentrated group of transverse streams of vapor, a series of fine vertical streams of vapor, and a concentrated group of transverse streams of vapor, and sealing a cap to said container while subjecting the container to the latter group of transverse streams of vapor.

2. The method of sealing containers which comprises successively subjecting a container to

a series of fine transverse streams of vapor, a concentrated group of transverse streams of vapor, a series of fine vertical streams of vapor, and a concentrated group of transverse streams of vapor, subjecting a cap to sheets of vapor, and sealing said cap to said container while the cap and container are being subjected to the vapors.

3. The method of sealing containers which comprises continuously moving containers in a horizontal path and successively subjecting them to a series of fine transverse streams of vapor, a concentrated group of transverse streams of vapor, a series of fine vertical streams of vapor, and a concentrated group of transverse streams of vapor, and sealing caps to said containers while subjecting the containers to the latter group of transverse streams of vapor.

4. The method of sealing containers which comprises continuously moving containers in a horizontal path and successively subjecting them to a series of fine transverse streams of vapor, a concentrated group of transverse streams of vapor, a series of fine vertical streams of vapor, and a concentrated group of transverse streams of vapor, subjecting caps to a series of vertical streams of vapor, and sealing said caps to said containers while the caps and containers are being subjected to the vapors.

5. The method of sealing containers which comprises continuously moving containers in a horizontal path and successively subjecting them to a series of fine transverse streams of vapor, a concentrated group of transverse streams of vapor, a series of fine vertical streams of vapor, and a concentrated group of transverse streams of vapor, moving a series of caps in a path diagonal to and convergent to the path of the containers in the direction of movement of the containers so that the caps successively move into the path of the containers, injecting vertical sheets of vapor between the caps and containers, and sealing said caps to said containers while subjecting them to a concentrated group of transverse streams of vapor.

6. The method set forth in claim 5, said vertical sheets of vapor being parallel to the path of the containers.

7. The method of sealing containers which comprises continuously moving containers in a horizontal path and successively subjecting the containers to a series of transverse streams of vapor and a series of fine vertical streams of vapor emanating from a vapor distributor positioned along the path of the containers, and sealing caps to said containers while subjecting them to the vapors.

8. The method of sealing open-mouth filled containers which comprises continuously moving containers in a horizontal path below a thin layer of vapor formed by a series of fine transverse streams and through a more concentrated steam zone formed by a multiplicity of fine transverse streams of vapor, subjecting the upper ends of said containers to a series of vertical sheets of vapor while they are moving through said steam zone, and sealing caps to said containers while they are moving through said concentrated steam zone.

9. The method of sealing open-mouth filled containers which comprises continuously moving containers in a horizontal path below a thin layer of vapor formed by a series of fine transverse streams and through a more concentrated steam zone formed by a multiplicity of fine transverse streams of vapor, subjecting the upper ends of said containers to a series of vertical sheets of vapor while they are moving through said steam zone, and simultaneously moving caps through said series of vertical sheets and into contact with the containers, and sealing the caps to said containers while they are moving through said concentrated steam zone.

10. The method of sealing open-mouth filled containers which comprises continuously moving containers in a horizontal path below a thin layer of vapor formed by a series of fine transverse streams and through a more concentrated steam zone formed by a multiplicity of fine transverse streams of vapor, subjecting the upper ends of said containers to a series of fine vertical streams and sheets of vapor while they are moving through said steam zone, and sealing caps to said containers while they are moving through said steam zone.

11. In a container sealing apparatus, the combination of means for continuously moving containers in a horizontal path, means for successively subjecting each container to a series of fine transverse streams of vapor and a concentrated group of fine transverse streams of vapor, and means for sealing caps to said containers while subjecting same to a series of fine transverse streams of vapor.

12. In a container sealing apparatus, the combination of means for continuously moving containers in a horizontal path, means for successively subjecting each container to a series of fine transverse streams of vapor, a concentrated group of fine transverse streams of vapor, and a concentrated group of fine vertical streams of vapor in the vicinity of the concentrated group of transverse streams of vapor, and means for sealing caps to said containers while subjecting same to a series of fine transverse streams of vapor.

13. In a container sealing apparatus, the combination of means for continuously moving containers in a horizontal path, means for successively subjecting each container to a series of fine transverse streams of vapor, a concentrated group of fine transverse streams of vapor, and a concentrated group of fine vertical streams of vapor in the vicinity of the concentrated group of transverse streams of vapor, and means for sealing caps to said containers while subjecting same to a series of fine transverse streams of vapor and a series of vertical sheets of vapor.

14. The apparatus set forth in claim 13 in combination with means for moving the caps through said vertical sheets of vapor into contact with the containers.

15. The combination of a distributor for an inert gas comprising horizontally spaced parallel channels, means for advancing open-mouth containers in a horizontal path extending along the distributor with the open upper ends of the containers extending between said channels, a cover positioned over the channels and extending lengthwise thereof and bridging the space between the channels and forming therewith a tunnel through which the open ends of the containers are advanced, means for supplying an inert gas to the distributor and circulating the gas through said channels, means for directing inert gas from the said channels into said tunnel and thereby enveloping the open ends of the containers in said gas, means for directing a series of sheet-like blasts of inert gas into the open mouths of the containers as they move through the atmosphere of inert gas, and means for sealing caps to the containers while in said atmosphere of inert gas.

16. The combination set forth in claim 15 in-

cluding means for moving the caps through said sheet-like blasts of inert gas into contact with the containers.

17. The combination of a distributor for an inert gas comprising horizontally spaced parallel channels, means for advancing open-mouth containers in a horizontal path extending along the distributor with the open upper ends of the containers extending between said channels, a cover positioned over the channels and extending lengthwise thereof and bridging the space between the channels and forming therewith a tunnel through which the open ends of the containers are advanced, said channels being provided with a series of perforations in the sides thereof adjacent to the tunnel for directing inert gas from said channels into said tunnel and thereby enveloping the open ends of the containers in said gas, the greatest concentration of the perforations being intermediate the ends of the channels, means for directing a series of fine vertical streams of inert gas into the open ends of the containers as they pass the vicinity of the greatest concentration of perforations in the sides of the channels, means for directing a series of sheet-like blasts of inert gas into the open mouths of the containers after they have moved through the vertical streams, and means for sealing caps to the containers while in said atmosphere of inert gas.

18. In a container sealing machine, a steam distributor comprising inverted U-shaped channels, said channels being parallel and spaced apart, the inner walls of said channels adjacent to the space between the channels extending downward a lesser distance than the outer walls, a plate extending between the lower edges of the inner walls to cover the space between the channels and form a tunnel through which the open ends of containers are advanced, each of said channels having narrow flat plates extending from the lower edge of the outer wall inwardly to a point below the lower edge of the inner wall and throughout the length of the channels, thin vertical plates extending between the lower edges of the inner walls and the inner edges of the narrow flat plates, the ends of the channels being connected by a cross channel at one end thereof, said vertical plates being perforated at closely spaced intervals throughout their length, the greatest number of perforations being in the vicinity of the cross channel, and means for introducing steam into the ends of the inverted channels opposite from the cross channel and causing it to flow through the various channels and perforations.

19. In a container sealing machine, a steam distributor comprising inverted U-shaped channels, said channels being parallel and spaced apart, the inner walls of said channels adjacent to the space between the channels extending downward a lesser distance than the outer walls, a cover plate extending between the lower edges of the inner walls to cover the space between the channels and form a tunnel through which the open ends of containers are advanced, each of said channels having narrow flat plates extending from the lower edge of the outer wall inwardly to a point below the lower edge of the inner wall and throughout the length of the channels, thin vertical plates extending between the lower edges of the inner walls and the inner edges of the narrow flat plates, a cross channel connecting the U-shaped channels at one end of the distributor, said vertical plates being perforated at short intervals throughout their length, the greatest number of perforations being in the vicinity of the cross channel, the lower portion of the cross channel being formed with vertical perforations, the extreme lower corner of the cross channel having an elongated opening, said opening extending substantially throughout the length of the cross channel, a steam restricting and guiding device positioned in said opening, means for introducing steam into the ends of the U-shaped channels opposite from the cross channel and causing it to flow through the various channels and perforations.

20. The steam distributor set forth in claim 19, said steam restricting and guiding device being shaped in such a manner that the steam will be directed in a series of vertical sheets of steam parallel with the channels.

21. The steam distributor set forth in claim 20, said means for introducing steam into the ends of the channels including perforated plates over the ends of the channels, a solid plate extending between the edges of said perforated plates and across the space between said channels, a housing surrounding and enclosing said solid plate and the ends of the channels, and an inlet through which steam may be introduced and caused to impinge upon the solid plate and then be directed through the perforated plates to the channels.

22. The steam distributor set forth in claim 21, said cover plate between the lower edges of the inner walls of the channels having a transverse opening therein near the ends of the channels on which the housing is positioned.

23. In a steam distributor of the character described, a pair of parallel horizontally spaced channel members each having intercommunicating upper and lower chambers, the lower chamber being of smaller cross-sectional area than the upper chamber, means for supplying steam to one end of each upper chamber, a transverse channel connecting the other ends of said upper chambers and having both downwardly and longitudinally directed exhaust openings for steam, the opposed walls of said lower chambers having steam exhaust openings for directing steam across the space between said channel members, a pair of parallel longitudinal extensions beyond and communicating with opposite ends of said transverse channel, said extensions having exhaust openings arranged to direct steam across the space between the former, and a cover plate closing at least a major part of the space between the channel members.

JOHN HOHL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,920,539	White	Aug. 1, 1933
2,184,490	Enkur et al.	Dec. 26, 1939
2,357,826	Hohl	Sept. 12, 1944
2,369,762	Stewart et al.	Feb. 20, 1945