

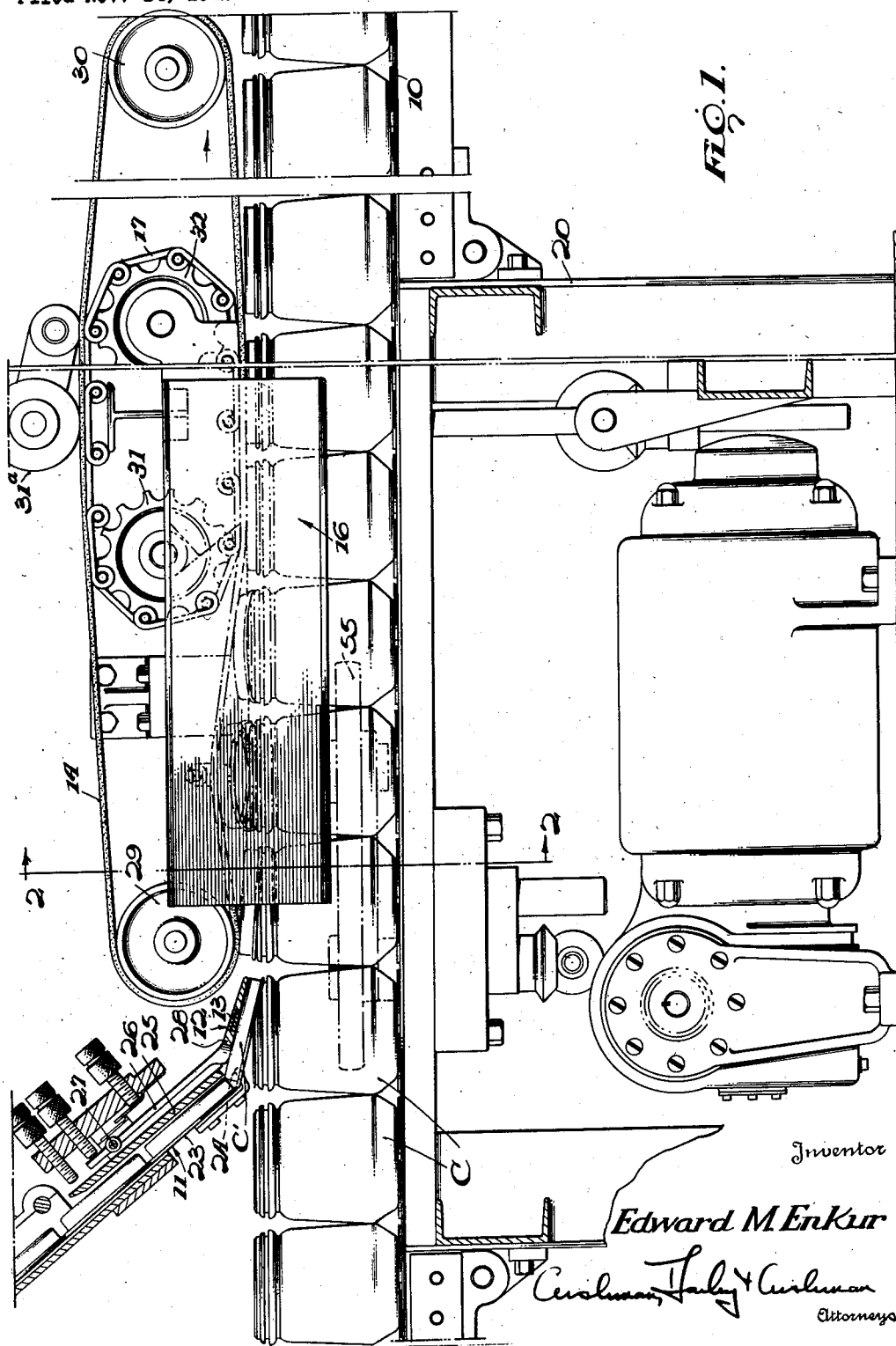
Sept. 12, 1950

E. M. ENKUR
CONTAINER SEALING APPARATUS

2,522,437

Filed Nov. 14, 1942

3 Sheets-Sheet 1



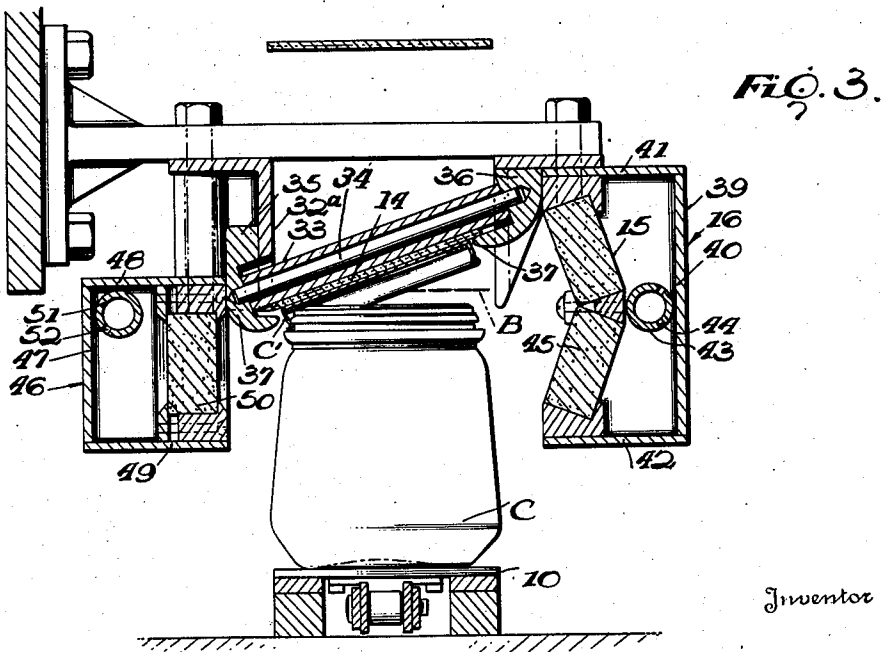
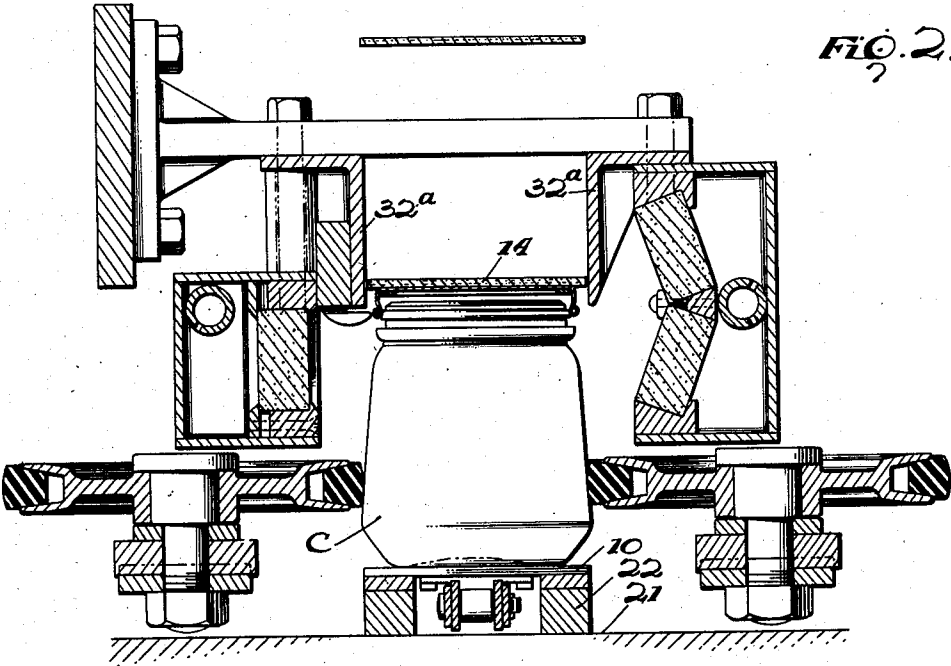
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[illegible]

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UNITED STATES PATENT OFFICE

2,522,437

CONTAINER SEALING APPARATUS

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Application November 14, 1942, Serial No. 465,623

15 Claims. (Cl. 226—82)

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The present invention relates to a container sealing apparatus.

An important object of the invention is to provide an apparatus for tilting or lifting caps with respect to containers.

Another important object of the invention is to provide an apparatus by means of which air in the headspace of a container will be removed or displaced by a rarefied or heated medium or by a gas of such nature that spoilage of the container contents will be prevented and which apparatus is of extremely simple construction.

Most prior apparatus used to displace air from the headspaces of containers are of the type in which steam displaces the headspace air. These apparatus are of two general types. In the first of these the steam has been jetted between the container and the cap as the latter is being applied. The cap is then permitted to drop to closing position. In the second type of apparatus the cap has been held in spaced relation to the container mouth during the jetting of steam into the headspace. The cap is then moved to sealed position.

In the first type of prior apparatus referred to above, it has been necessary to heat the cap before it moves adjacent the container in order to prevent condensation of steam thereon during application of the cap in the steam atmosphere. With such apparatus, a special heated cap chute structure must be provided. Since the cap chute must be open at its upper end, it is possible for steam to escape from the steam chamber through the chute. In any event, the steam tunnel must be of special design.

In the second type of steam chamber apparatus, wherein the cap is held spaced from the container during jetting of steam, some special means must be provided to hold the cap in the desired position with regard to the mouth of the container.

By the apparatus of the present invention, the cap may be loosely applied to the container in the open atmosphere by a cap chute of extremely simple construction. The cap and container then move into a steam chamber so that the cap will be heated. The cap is then held tilted or spaced with respect to the mouth of the container so that steam may displace the air within the headspace. Subsequently, the cap is moved to sealed position.

The present apparatus may be used with air displacing media other than steam and, in such case, has the marked advantage of holding the cap spaced from the container without interrupting forward movement of either.

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A further object of the invention is to provide a structure for moving the cap to a tilted position with respect to the container which is of maximum simplicity and will hold the cap in tilted position without possibility of the cap dropping from the container.

The cap tilting structure provided by the present invention preferably provides a means which will exert a downward pressure upon one portion of the cap to tilt the cap upon the container and thereby lift an opposite portion. This downward pressure also serves to securely hold the cap in contact with the container.

Another object of the invention is to provide a cap feeding means which is highly effective to apply caps to moving containers.

Caps are ordinarily applied to moving containers by passing the containers beneath an inclined cap chute. Because of the light weight of the caps, they are apt to slide off the container during movement from the tilted chute. It is therefore usual to provide special elements on the cap chute to direct the movement of the cap between the chute and the container. These devices usually exert downward and lateral pressure upon the cap and also function to substantially level the cap upon the mouth of the container.

By the present invention, a magnetized element is provided adjacent the lower end of a cap chute or other cap feeding device, so that the cap will adhere to this element while being withdrawn from the chute by the container.

While the magnetic effect of the element is sufficient to hold the cap against free movement with respect to the element, this effect will not be strong enough to prevent the cap from being moved along the element by the moving container. Hence, the cap will eventually be drawn from the magnetized element by the container and will fall into an at least substantially leveled position upon the mouth of the container.

A further object of the invention is to provide a cap applying apparatus which is of such design that the cap will always be held firmly in contact with at least a portion of the container mouth from the moment that the container contacts with the cap in the chute until the cap is in fully sealed position upon the container.

In any capping apparatus involving operations upon moving containers, there is always a possibility that caps will fall from containers by reason of the movement of the latter. By the present invention, the cap is always held pressed against the mouth of the container until it is en-

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tirely sealed. This is preferably accomplished by means associated with the capping chute, such as the magnetized element discussed above, and by other elements which act to exert a pressure upon the cap before the latter leaves the control of the element associated with the cap chute. In this way, the cap is at no time free to fall from the mouth of the container.

It will be understood that the cap tilting or lifting mechanism of the present invention may be used to lift a cap from a container while the container is in any air-excluding atmosphere such as a steam-filled or gaseous atmosphere referred to above or in any rarefied atmosphere. It may also be used in connection with devices which jet a gas or fluid into a headspace so as to replace the air in the headspace. It may also be used to lift a cap within a vacuumizing chamber or in any other situation where it is desirable to momentarily lift a cap with respect to a container, for example, to insert some substance or object in the container.

Other objects and advantages of the invention will be apparent from the following specification and accompanying drawings, wherein:

Figure 1 is a side elevation of the apparatus of the present invention, portions being shown in vertical section.

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1.

Figure 3 is a transverse vertical section on the line 3—3 of Figure 4.

Figure 4 is a longitudinal vertical section of the portion of the tunnel shown at the left of Figure 1, and

Figure 5 is a top plan view of the lower portion of the cap chute of Figure 1.

In the embodiment of the invention particularly illustrated, the cap lifting mechanism of the present invention is used to lift caps so that air may be removed from the container headspace. Furthermore, the air removal is accomplished by means of a steam atmosphere. The apparatus thus disclosed may be generally described as including a supporting conveyor 10 which moves filled and uncapped containers C beneath a cap supply chute 11. As a container is moved beneath the chute 11, the mouth of the container will engage the lowermost cap C' in the cap chute and withdraw it from the chute. The cap chute preferably includes a wiper 12 beneath which the cap will be drawn and which will serve to generally level the cap upon the mouth of the container. The wiper 12 includes a magnetic insert 13 which has the function of preventing the cap from sliding of its own weight with respect to the wiper 12 or the mouth of the container, though the power of the insert 13 is not sufficient to prevent the cap from being drawn from beneath the wiper 12 under the pulling action exerted by the container C moving with the conveyor 10.

After a cap has been loosely applied to a container the continued movement of the latter with the conveyor 10 will bring the cap into contact with a cap lifting or tilting element 14 which is so mounted that it will exert a downward pressure upon one edge of the cap to thereby tilt the cap so that its opposite edge will be lifted in the manner indicated in Figure 3. At the time this tilting occurs the container and cap will be within a steam tunnel generally designated by the numeral 16 and steam will therefore reach the container headspace to displace all air therefrom.

The container will then move beneath a cap-

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ping element 17 of endless form mounted within element 14 and which will force the cap C' to a fully seated and sealed position upon the mouth of the container. The run of the capping element 17 extends sufficiently beyond the outlet end of the tunnel 16, and in the open atmosphere, that the steam within the head space of the sealed container will be condensed to create a vacuum condition before the cap C' moves from beneath the capping element 17.

In more detail, the apparatus of the invention disclosed herein comprises a supporting base element 20 including an upper surface 21 which is provided with a trackway or guide 22 for the supporting conveyor 10.

Filled containers are placed upon the conveyor 10 by any suitable means, either at random or in timed relation and the containers then move beneath the cap supply chute 11, which is preferably of the type disclosed in the application of Edward M. Enkur, Leo F. Pahl and Louis L. Lauve, Serial No. 351,004, filed August 3, 1940, now Patent No. 2,433,549, for Container Sealing Apparatus, except that the wiper 11 includes the magnetic insert 13. As is described in said application, the cap supply chute is provided with a guide-way 23 down which the caps slide, the end of the guideway being defined by upstanding shoulders 24 against which the leading edge of the skirt of the lowermost cap will contact. In this position, the lowermost portion of the cap skirt will be in the path of movement of the leading edge of a container mouth, but this cap will be held downwardly against the guideway 23 by the pressure exerted thereon by transversely spaced arms 25 forming a presser element such as described in said application.

When a container mouth contacts with the skirt of the lowermost cap, the cap will be drawn over the shoulders 24 and to the right as viewed in Fig. 1, thereby moving beneath the wiper 12 as described in said application. Wiper 12 comprises an arm 26 pivoted at 27 and having a tongue 28 extending forwardly therefrom to form the cap engaging portion of the wiper. That is, as best shown in Figure 1, the arm 26 of the wiper normally lies substantially parallel to the surface of the cap chute guideway 23 and hence is at a fairly sharp angle with respect to the surface of the supporting conveyor 10, while the cap engaging surface of the tongue 28 is at a smaller angle with respect to conveyor 10.

As the cap is drawn over the stops or shoulders 24 and after it gets clear of the chute, the magnetic insert will cause it to remain in flat contact with the wiper 12 as shown in Figure 1 so that it cannot, of its own weight, slide in any direction. However, as the container continues to the right, the cap will be drawn from tongue 28 to lie loosely and substantially flat upon the container mouth. The adjacent end of cap tilting element 14 is preferably sufficiently close to tongue 28 that a cap will move into contact with element 14 before it is entirely free of the tongue. In this way the cap is always acted upon by some element which prevents it from sliding from the container mouth.

It will be observed that the provision of the magnetic insert prevents the cap from dropping down upon a container mouth immediately its trailing portion moves clear of the guideway 23 of the chute. For example, the cap illustrated in Figure 1 as in contact with wiper tongue 28 is entirely clear of all contact with guideway 23 and shoulders 24 because its trailing portion is

actually between the shoulders as shown in Figure 5. Nevertheless, the insert 13 prevents it from dropping directly downwardly. Hence, aside from preventing a cap from sliding off a container mouth, the magnetic element causes it to have a more gradual swinging movement from a position at a sharp angle to conveyor 10, as when it is in the chute 11, to a position substantially parallel to conveyor 10.

It is also to be noted that because of the tendency of caps to slide laterally after they become free of a cap chute, it has heretofore been necessary to provide horizontally swinging arms spring urged toward each other to act upon lateral portions of the cap skirt to prevent it from moving laterally and also to exert a slight lateral pressure thereon to limit forward sliding movement of the cap. The provision of the magnetic insert 13 in the wiper 12 will prevent all movement of the cap with respect to both the wiper and the container mouth.

As stated above, before the cap is entirely free of the influence of the magnetic element 13, its forward portion will move in contact with the pressing element 14 which will exert sufficient downward pressure upon a cap to prevent it from moving laterally.

The capping element 17 is also an endless element formed of metal links including a flat cap engaging surface as shown in Figures 1 and 4, the links moving about sprockets 31 and 32 spaced closer together than the rollers 29 and 30. The capping element 17 is preferably of the type disclosed in Patent No. 2,256,415, issued to Robert J. Stewart for Container Sealing Apparatus on September 16, 1941, that is, it is so constructed that it exerts a downward pressure along a line extending diagonally downwardly toward its infeed end.

The cap pressing or tilting element 14 is preferably formed of a fabric or similar material having sufficient bodily resiliency that it will not mar the surface of the caps, but, nevertheless, will exert a firm pressure thereon. As best shown in Figure 1, the pressing element 14 moves about rollers 29 and 30 but a substantial portion of its upper and lower runs are in contact with the upper and lower runs of the endless capping element 17.

The capping element 17 is driven at the same linear speed as conveyor 10 and the cap tilting element 14 is driven at the same linear speed as the capping element 17, because of the fact that a roller 31a bears upon the upper run of element 14 to hold it in firm contact with the upper run of element 17 in the manner described in said application of Edward M. Enkur, Leo F. Pahl and Louis L. Lauve.

It will be understood that the sealing element 17 and the cap tilting element 14 are vertically adjustable, as a unit, with respect to conveyor 10. The chute 11 is also vertically adjustable to permit it to operate with containers of different heights.

As best shown in Figure 2, when the cap pressing element 14 moves from the roller 29 at its inlet end while moving in the direction of the arrow shown in Figure 1, such portion of the belt will be transversely horizontal as shown in Figure 2. At this time the belt will be moving between two vertically extending plates 32a forming part of tunnel 16 and positioned closely adjacent the edges of the belt. Immediately beyond this point the belt 14 will move beneath a roller 33 which is rotatable on a pin 34 having its ends journaled in

bearing brackets 35 and 36 positioned in cut-outs formed in the plates 32a.

The brackets 35 and 36 support the pin 34 at an angle to the surface of conveyor 10 though the pin lies in a vertical plane at right angles to the conveyor. In Figure 3 the dotted line B indicates the horizontal plane in which the mouth of the belt 14 would ordinarily lie at the point in its travel which is in vertical alignment with the axis of roller 33 and it will be observed from this that the lowest end of roller 33 is beneath this line. In other words, the lowest portion of the roller 33 exerts a downward pressure on one edge of the cap C' so that the opposite edge of the cap will be lifted from the corresponding portion of the container mouth, thereby opening the headspace of the container to the body of steam present in the tunnel 16.

It will be observed that each of the brackets 35 and 36 includes a horizontal ledge 37 at its lower portion which extends beneath the edge of belt 14 to thereby prevent the flow of steam upwardly between the edge of the tilted belt and the plates 32a at this point.

Immediately after the belt 14 has moved from beneath roller 33, it will assume its normal transversely horizontal position, restoring the cap to a horizontal position on the mouth of the container. This will occur before the container leaves the cloud of steam within the tunnel 16. In addition, as best shown in Figure 1, the container will move beneath the influence of capping element 17 before it leaves the steam tunnel 16 and this will cause the cap to be forced to a seated and secured position upon the mouth of the container. Further travel of the container with the supporting element 10 and the capping element 17 will cause the cap to be held in sealed position while in the open atmosphere so that the steam confined in the headspace will be cooled and condensed to create a vacuum condition in the headspace. It will be noted that Figure 1 omits a portion of the length of the elements 14 and 17.

The steam tunnel 16 may be of any suitable form, but extremely satisfactory results are obtained if a quiet cloud of steam is maintained within the tunnel in the manner described below.

As shown in Figures 1 and 4, the inlet end of the tunnel is beyond the point at which a cap is applied to a container mouth. Hence the container is closed by the cap before it moves into a steam atmosphere, even though retaining lugs on the cap skirt or the inside diameter of the skirt may prevent the cap from squarely seating on the container mouth under the relatively light pressure applied thereto by wiper 12 and cap tilting belt 14.

Tunnel 16 is generally defined by the belt 14 moving between the vertical plates 32a and two chambers provided with inner foraminous members through which steam may flow. Referring to Fig. 3, the right hand portion of tunnel 16 comprises an inlet chamber defined by a side wall 40 and upper and lower walls 41 and 42 respectively. A steam inlet pipe 43 is mounted immediately adjacent the side plate 40 with its steam ports 44 generally facing this plate. The inner side of the chamber is formed by carbon blocks 45 of substantial thickness as shown in Figures 2 and 3 which are sufficiently porous to permit steam to move therethrough, but which materially decreases the force of the steam so that it will issue from the inner sides of the blocks in a quiet stream.

The opposite side of the tunnel 16 is formed by a chamber 46 consisting of a side wall 47 and

upper and lower walls 48 and 49, respectively, a carbon block 50 forming the inner wall of the chamber. A steam supply pipe 51 delivers steam to the chamber 46, pipe 51 having its jets 52 facing away from the block 50.

Steam in the pipes 43 and 51 is at relatively low pressure, for example, about 1½ pounds. This steam issuing from the jets of the pipe against the walls of the respective chambers other than the carbon blocks 45 and 50 will have its pressure further reduced by the size of the chamber as compared to the diameter of the steam pipe. In addition, no steam will be forcibly jetted against the carbon blocks. The steam will move through the carbon blocks to enter the tunnel defined by the belt 14 and chambers 39 and 46 with only sufficient force to maintain a quiet body of steam in the tunnel. The blocks 45 provided at the side of the tunnel facing the lifted edge of a cap C are so mounted as to provide an obtuse angle between each other and this has some effect in guiding steam to the headspace of the container, though it will give no concentrated jetting effect.

It is desirable to provide a jar centering device 55 adjacent the portion of the path of travel of the supporting conveyor 18 at which the cap supply chute and cap tilting arrangement are positioned. These centering belts may be of the form disclosed in said prior Enkur, Pahl and Lauve application.

While the embodiment disclosed illustrates the cap lifting element of the invention in use with an apparatus to remove air from the headspace of a container and seal the container, it will be obvious that the cap lifting element can be used in any situation where it is desirable to momentarily lift a cap from a container, and without regard to whether headspace air is to be removed. For example, the cap lifting mechanism of the present invention may be used to lift a cap from a container so that some substance or object can be placed in the container. An instance of such use would be the lifting of a cap so that flavoring or fortifying ingredients such as salt or vitamins, perhaps in pellet form, can be added to the container contents.

The terminology used in the specification is for the purpose of description, and not of limitation, the scope of the invention being indicated by the claims.

I claim:

1. In a capping machine, means to support and move along a pre-determined path a container having a cap loosely applied to its mouth, and means movable along at least a portion of said path to exert downward pressure upon a portion of the cap to tilt the cap with respect to the container mouth so that an opposite portion will be lifted from the container mouth, said last-named means including a portion which will contact with the lifted portion of the cap.

2. In a capping machine, means to support and move a container having a cap loosely applied to its mouth, and a moving endless belt of a width substantially corresponding to the diameter of the cap to exert pressure upon a portion of the cap to tilt the latter and thereby lift an opposite portion with respect to the container mouth.

3. In combination, endless means to support and move a container having a cap loosely applied to its mouth, an endless member moving above said first-named means and adapted to engage the cap, and means in the path of move-

ment of said endless member to tilt the latter and thereby cause the cap to be tilted.

4. In a capping machine, endless means to support and move a container having a cap loosely applied to its mouth, an endless member moving above said first-named means and adapted to contact with the cap, means in the path of movement of said endless member to tilt the latter and thereby cause the cap to be tilted, and means within the path of movement of said upper endless member to exert pressure upon the latter to move the cap to sealed position.

5. In a capping machine, endless means to support and move a container having a cap loosely applied to its mouth, and endless member moving above said first-named means and adapted to contact with the cap, means in the path of movement of said endless member to tilt the latter and thereby cause the cap to be tilted, means to provide a heated atmosphere adjacent the point at which the cap is tilted to remove air from the container headspace, and means within the path of movement of said upper endless member to exert pressure upon the latter to move the cap to sealed position.

6. In a container capping apparatus, container supporting and moving means, means to apply caps to containers, a steam tunnel open at both ends and having its inlet end spaced rearwardly from said cap applying means and through which tunnel said container supporting means moves, and means within said tunnel to tilt the applied caps with respect to the container mouths so that the steam in the tunnel may displace air in the container headspace and then seal the caps upon the container mouths.

7. In combination, means to support a container having a cap loosely applied thereto, means to engage the cap, and means to move said last-named means to tilt the cap with respect to the lip of the container and to then force the cap back to normal loose position on the container.

8. The combination according to claim 7, including air removing means operative while the cap is tilted, and means to seal the cap upon the container after it has been restored to normal loose position.

9. The combination defined in claim 7, wherein said container supporting means is a moving element and said cap engaging element is part of a moving endless element.

10. In combination, means to support a container having a cap loosely applied thereto, a cap engaging element including a face positioned to extend diametrically across and above the cap, and means to move said element to position said face at an angle to the plane of the container lip and to then position said face parallel with the plane of the container lip so that the cap will initially be tilted with respect to the container lip and will then be returned to normal loose position by said element.

11. The combination according to claim 10, including air removing means operative while the cap is tilted, and means to seal the cap to the container after it has been returned to normal loose position.

12. The combination defined in claim 10 wherein said container supporting means is a moving element and said cap engaging element is part of a moving endless element.

13. In combination, means to support and move a container, and means moving with said container supporting means to engage a cap

upon a container and tilt the cap with respect to the container, said last-named means including a portion which will contact with the lifted portion of the cap.

14. In combination, means to support an upright container including a horizontally extending lip having a cap loosely applied thereto in substantially horizontal position, a cap engaging element including a face positioned to extend horizontally and diametrically across and above the cap, and means to move said element to position said face at an angle to the plane of the container lip and to then position said face parallel with the plane of the container lip so that the cap will be tilted with respect to the container lip and will then be returned to substantially horizontal position with respect to the container lip and sealed.

15. In a container capping apparatus, container supporting and moving means, means to loosely apply a cap to a container to substantially isolate the container head space, including the cap interior, from the surrounding atmosphere, a steam tunnel open at both ends and having its inlet end spaced from said cap applying means and through which tunnel said container supporting means moves, and means within the said tunnel to tilt the applied cap with respect to the container mouth so that the steam in the tunnel may displace air in the con-

tainer head space, said cap tilting means being positioned at such distance from the tunnel inlet that the steam atmosphere will heat the cap before the cap is tilted, and means to then seal the cap upon the container mouth.

EDWARD M. ENKUR.

REFERENCES CITED

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

UNITED STATES PATENTS

	Number	Name	Date
	1,992,557	Tone et al.	Feb. 26, 1935
	2,041,891	White	May 26, 1936
15	2,054,492	Young	Sept. 15, 1936
	2,076,052	White	Apr. 6, 1937
	2,132,335	White	Oct. 4, 1938
	2,198,589	Bell	Apr. 30, 1940
	2,256,415	Stewart	Sept. 16, 1941
20	2,273,264	Hermani	Feb. 17, 1942
	2,311,707	Stewart	Feb. 23, 1943
	2,319,213	Davies	May 18, 1943
	2,352,761	Bell	July 4, 1944
25	2,361,366	Bell	Oct. 31, 1944
	2,433,549	Enkur et al.	Dec. 30, 1947

FOREIGN PATENTS

	Number	Country	Date
30	429,832	Germany	June 4, 1926