

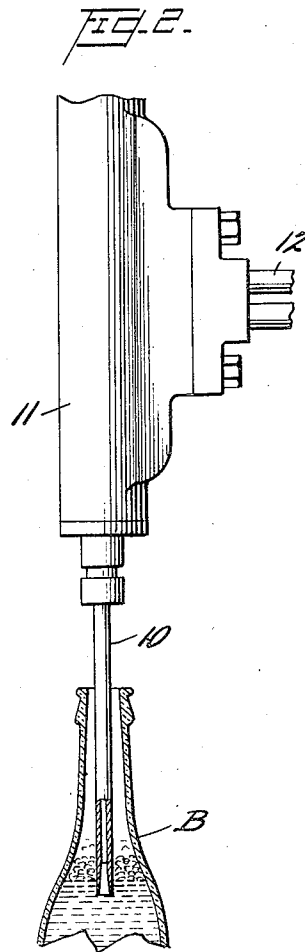
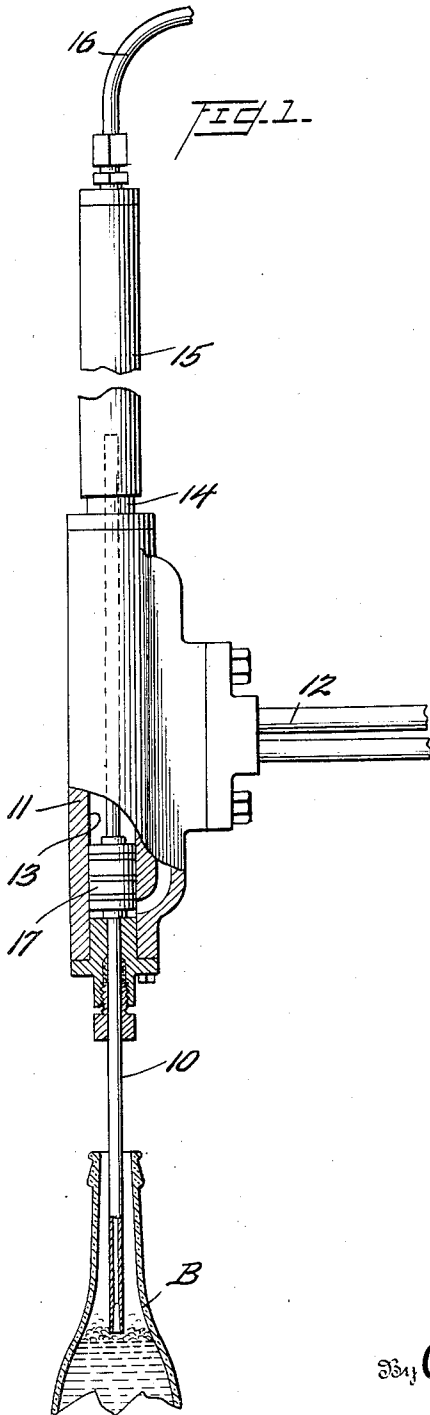
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METHOD OF PACKAGING BEVERAGES

Filed April 13, 1939



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## UNITED STATES PATENT OFFICE

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## METHOD OF PACKAGING BEVERAGES

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7 Claims. (Cl. 226-68)

The present invention relates to a method of packaging beverages.

In the packaging of beverages of the readily foaming type containing a gas, such as carbon dioxide, it has heretofore been recognized as desirable to remove as much air as possible from the space in the receptacle above the beverage surface before sealing the receptacle. Various expedients have been proposed and utilized for this purpose.

The present invention relates to that type of air expelling means in which the receptacle contents are agitated to release carbon dioxide, and thereby expel the air from the space above the beverage surface.

In the packaging of many beverages, it has been suggested that this agitation may be accomplished, for example, by tapping the container, and such a method is disclosed in Fisher Patent No. 2,046,256, granted June 20, 1936. It has been found, however, that in some instances the agitation of the receptacle or bottle contents by an agitating force applied to the exterior of the container is objectionable, for instance, because it is difficult to regulate the degree of tapping force and the extent of the consequent foaming of the beverage.

It has also been proposed to heat the contents of the receptacle either generally or locally, and the present invention contemplates the use of heat in some instances as a medium in causing agitation of the receptacle contents.

An object of the present invention is to provide a method for agitating the contents which will produce a controlled foaming without diluting the beverage and which will preferably make use of the advantages incident to the production of agitation by localized heating without relying entirely upon heat as the agitating medium.

The invention is based upon discovery that if a jet of preferably heated gas, usually carbon dioxide, is directed against the liquid either from a point immediately above the surface of the liquid, or a point immediately below the liquid surface, a very fine and stable foam will be created such as will force all air upwardly from the receptacle head space. In the particular embodiment of the invention disclosed herein, a heated gas of such nature that it will not affect the beverage is caused to impact with the latter.

It has previously been proposed to inject a gas into the head space of a container by a nozzle having its discharge orifice positioned above the surface of the liquid. However, in such prior

arrangements, the injected gas did not have a forceful contact with the beverage to agitate the latter and cause foaming. On the contrary, where such injection into a receptacle head space was performed, the sole purpose and result was to fill the head space with the injected gas to drive air out of the head space, rather than to create foam for the purpose of displacing the air. A very practical objection to the above idea is that the normal movement of the container through the filling machine subsequent to the filling of the head space with carbon dioxide (and prior to capping of the receptacle) has caused a large portion of the carbon dioxide to be swept from the head space. Furthermore, even the normally rapid descent of a capping head toward the container has caused the carbon dioxide to be forced from the head space. The only manner of correcting this fault has been to place a temporary seal upon the container immediately after the head space has been filled with carbon dioxide, or at least use a slowly moving capping mechanism. These expedients obviously complicate the mechanism of the filling machine and reduce the speed of production.

It has also been heretofore proposed to inject a gas below the surface of the liquid to cause the latter to foam and thereby remove air from the head space. However, by this method the orifice of the gas jet was positioned a substantial distance below the surface of the liquid with the result that a rather coarse and therefore unstable foam would result, and the foaming would furthermore be liable to become uncontrollable, with the result that a portion of the receptacle contents would be dissipated. It has been found that all of these disadvantages were due to the fact that too large a portion of the receptacle contents were agitated by the injected gas. That is to say, any agitation of the entire contents, as occurs when the container is tapped, or even an agitation of the greater portion of the container contents, as when a gas injecting tube is positioned a substantial distance beneath the surface of the liquid, will cause gas bubbles to rise from the lower portion of the liquid. These bubbles, in rising through the beverage, accumulate additional gas so that when they reach the surface of the liquid they are rather large and will break so readily that the foam, even if not excessive, will not remain in place. Also, the ascent of large bubbles through the beverage is apt to induce continuous and therefore uncontrollable foaming.

By the method of the present invention, where-

in the orifice of the jet nozzle is positioned either immediately above the surface of the beverage, or immediately below it, foaming may only occur from the extreme upper portion of the beverage, so that the rising bubbles of gas cannot accumulate additional gas during their short travel upwardly through the liquid. Hence the foam is extremely fine, and the bubbles will not readily break, nor can the foaming possibly become uncontrollable. As indicated above, it is also found that the heating of the injected gas plays an important part in the formation of a fine and stable foam. In fact, the foam formed when heated carbon dioxide gas is used as the injected medium is formed of unusually small bubbles which steadily rise in the head space at a sufficient rate to permit capping almost immediately after injection of the gas. The excellent results obtained will be realized from the fact that the foam formed by the present invention will rise a substantial distance above the lip of the container without spreading outwardly or toppling over. Hence, the rapid descent of a capping head toward the container will not disperse the foam and all air within the cap will further be displaced by the mound of foam above the mouth of the bottle.

Other objects and advantages of the invention will be apparent from the following drawing wherein:

Figure 1 is a diagrammatic showing of a device for treating beverages in accordance with my invention, the view being partly in vertical section; and

Figure 2 is a fragmentary view showing a modified method of treating beverages.

Referring to the drawing, wherein an apparatus for performing the method of the present invention is diagrammatically disclosed, the numeral 10 designates a jet tube which is reciprocable in a casing 11. It will be understood that a plurality of the casings 11, including jets, may be circumferentially spaced about a suitable rotary turret fragmentarily indicated at 12, and that bottles or other receptacles moving from the filling table of a filling machine would move beneath the turret with a bottle in alignment with each casing and jet, and that after a bottle has received a charge of fluid from the aligned jet tube 10, it would be conveyed from beneath the turret 12 to a capping mechanism beneath which the bottles would be sealed.

The jet tube 10 extends upwardly through a chamber 13 in the casing 11 and thence upwardly through a seal 14 into a chamber 15 connected to a source of carbon dioxide by a tube 16. The portion of the tube 10 extending through chamber 13 is surrounded by a body of steam so that gas moving through the tube will be heated. Also, the heating steam may serve to vertically reciprocate the jet 10 by alternate pressure of the steam upon the opposite faces of a piston 17 which is fixed to the tube 10 within chamber 13 in the manner disclosed in the application of Robert J. Stewart for Apparatus for treating beverages, Serial No. 267,701 filed April 13, 1939.

The method of the present invention may, of course, be performed with numerous types of apparatus, and various means may be used for heating the jet tube 10 or the fluid supplied to the same and to reciprocate either the tube or the bottle.

When a bottle such as B is positioned in alignment with the jet tube 10, the jet will be caused to descend to bring its lower end and orifice into

close contact with the surface of the liquid within the container as indicated in Figure 1. Simultaneously, or immediately thereafter, a jet of fluid, preferably carbon dioxide, will be forcibly ejected from the orifice of the jet. The impact of this jet of fluid upon the surface of the liquid will cause the upper portion of the liquid to be agitated so that it will foam. It is found that if heated carbon dioxide is used as the jetted fluid, the heat of the jetted gas, acting with the local shock effect upon the liquid, will result in the formation of a foam consisting of extremely fine bubbles and which will be very stable. In fact, the foam will be of sufficient stability that it may rise very slightly above the mouth of the container without tumbling over the mouth. This is an important advantage in that when a cap is subsequently placed upon the container, all air within the cap will be displaced by the mound of foam projecting above the mouth of the bottle.

The fact that by the present method the entire head space is filled with a very fine and very stable foam will prevent any foam from being swept from the bottle during rapid movement of the bottle toward the capping mechanism, or even by downward movement of the capping head toward the container.

With the proper coordination of the various factors involved, i. e., the size of the passage and orifice of jet 10, the pressure under which the gas is injected, the temperature of the gas or the extent to which the gas is expanded, the duration of the injection, degree of carbonation and temperature of the beverage, as well as the volume of the head space of the container, the volume of the foam to be formed in the head space may be so closely controlled that it will completely fill the head space and yet not rise too far over the mouth of the bottle. It is found that though the foam created by the use of heated carbon dioxide gas is extremely fine, it will form very rapidly, with the result that an adequate quantity of foam to fill the head space in the manner referred to above will form in sufficient time to permit almost immediate capping of the container. In other words, the method of the present invention can be readily practiced with a suitable apparatus positioned upon a filling machine between the usual filling table and the capping mechanism.

Figure 2 shows a modification of the method of Figure 1 in that it involves positioning the mouth of the jet 10 slightly below the surface of the liquid in the container B at the time that fluid is ejected from the nozzle. The results of this procedure differ from those described above in connection with Figure 1 only in that a slightly faster foaming may result. Also, if the gas is jetted into the liquid at a point immediately below the surface of the liquid, and if the gas is at sufficient pressure, some of the injected gas may go into solution in the liquid, thereby replacing such gas as may be liberated from the liquid during foaming.

It will be understood from the above that the present method involves the formation of foam by impact of a fluid upon the liquid, with a resultant agitation of the liquid such as will cause foaming, and that the method also preferably involves the use of a heated fluid, it being well known that the application of heat to a carbonated beverage will result in foaming. It is also important to note that heating of the gaseous fluid will cause it to expand. This is a desirable attribute of the present method because should a particular run of liquid being handled be of such

nature that it will not readily foam in time to have a cap applied thereto, the air in the head space will at least be replaced by a body of expanded gas which, when it subsequently contracts, will create a vacuum in the head space of the container, the important point being that all air will at least be driven from the head-space. To obtain this effect, it is of course necessary to use a gas such as carbon dioxide, i. e., a gas of greater density than air and which may be heated and expanded to some degree and still be of greater density than the air within the head-space of the container.

Also, the injection of a hot and therefore expanded gas or other fluid into the head-space of containers filled with vegetables, mayonnaisse and other similar liquid or solid products is contemplated by the present invention. That is, the invention includes the delivery of an expanded gas to a container head-space to simply displace air in the head-space and without any co-action from the product itself such as occurs when the product contains a gas in solution. When a hot and expanded dense fluid such as carbon dioxide is flowed into a container head-space, the air in the head-space will be forced upwardly and out of the head-space because of the greater density of the carbon dioxide. The container may immediately be sealed so that the head-space will contain only carbon dioxide. When the carbon dioxide cools and contracts, a sufficiently reduced pressure will exist in the head-space to hold in place a closure of the type designed to be held seated by a vacuum or low pressure condition. Obviously, since the only atmosphere within the head-space will be an inert gas, this embodiment of the invention has certain advantages over a process which relies upon reduced air pressure to hold a closure sealed.

With respect to the injection of a fluid into a beverage container, it is highly desirable to use a fluid which will not affect the beverage in any way, and any fluid of such nature may be used. However, it is found that carbon dioxide gives particularly satisfactory results, especially when injected below the surface of the carbonated liquid. That is, when the method is practiced in such a way that some of the injected gas may go into solution in the liquid, it is desirable that the added gas be of the same type as the gas which is already in solution in the liquid. As stated above, it has also been found that the use of heated carbon dioxide results in the formation of exceptionally fine and stable foam.

It will be understood that the terminology used in the specification is for the purpose of description, the scope of the invention being indicated by the claims.

I claim:

1. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by bringing into contact with the beverage a gas heated sufficiently and under sufficient pressure to agitate the beverage and cause it to release gas in the form of foam and thereby expel at least a part of the air from the space above the beverage, and then sealing the container.

2. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by bringing into contact with the beverage carbon dioxide gas heated sufficiently and under, sufficient pressure to agitate the beverage and cause it to release gas in the form of foam and thereby expel at least a part of the air from the space above the beverage, and then sealing the container.

3. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by directing against the surface of the beverage heated gaseous fluid under sufficient pressure and sufficiently heated to agitate the beverage and to cause it to release gas in the form of foam and thereby expel at least a part of the air from the space above the beverage, and then sealing the container.

4. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by directing against the surface of the beverage within the receptacle heated gas under sufficient pressure and sufficiently heated to agitate the beverage and to cause it to release gas in the form of foam, and then sealing the container and thereby expel at least a part of the air from the space above the beverage.

5. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by directing against the surface of the beverage within the receptacle heated carbon dioxide gas under sufficient pressure and sufficiently heated to agitate the beverage to cause it to release gas in the form of foam and thereby expel at least a part of the air from the space above the beverage, and then sealing the receptacle.

6. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by injecting into the beverage below its surface carbon dioxide having sufficient heat and

pressure to agitate the beverage and cause it to release gas in the form of foam, and thereby expel at least a part of the air from the space above the beverage, and then sealing the receptacle.

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7. The method of packaging in receptacles readily foaming beverages containing a gas, such as carbon dioxide, which comprises partially filling a container with the beverage in an atmosphere containing air whereby the space in the receptacle above the beverage will contain
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air and immediately prior to sealing the receptacle agitating the beverage in the receptacle to cause a part of the gas in the beverage to be liberated by injecting into the beverage below its surface gas having sufficient heat and under sufficient pressure to agitate the beverage to cause it to release gas in the form of foam and thereby expel at least a part of the air from the space above the beverage and then sealing the receptacle.

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DAVID B. STONE.

CERTIFICATE OF CORRECTION.

Patent No. 2,204,833.

June 18, 1940.

DAVID B. STONE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 46, claim 4, strike out the comma and words ", and then sealing the container" and insert the same after "beverage" and before the period in line 48, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of March, A. D. 1941.

(Seal)

Henry Van Arsdale,  
Acting Commissioner of Patents.