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.

The object of the present invention is to provide a method for agitating the contents which will produce a controlled foaming without disturbing 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 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 foam 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 rotor or 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 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 recirculate 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. 287,701 filed April 13, 1939.

The method of the present invention may, of course, be performed with a modified 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 is 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 jet does not cause a modification, will be forced 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 jet does not cause a modification, will be forced
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 subsequently contracted, 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, mayonnaise 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 any one of the following forms: 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 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.

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 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.
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.

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 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.

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 5, 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.

Henry Van Arsdale,  
Acting Commissioner of Patents.