Patented Jan. 4, 1938 2,104,710

UNITED STATES PATENT OFFICE

2,104,710

PROCESS FOR THE PRESERVATION OF LIQUIDS

Frederick C. Blanck, Washington, D. C., Theodore L. Swenson, Chevy Chase, Md., Hugh H. Mottern, Pullman, Wash., and Harry E. Goresline, Silver Spring, and Elnathan K. Nelson, Sligo Park Hills, Md., dedicated to the free use of the People of the United States of America

No Drawing. Application May 19, 1937, Serial No. 143,538

3 Claims. (Cl. 99—155)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This application is in part a continuation of our prior pending application filed July 19, 1935, bearing Serial Number 32,270.

This application is made under the act of March 3, 1883, as amended by the act of April 30, 1928, and the invention described herein, if patented, may be manufactured and used by or for the Government of the United States of America, for governmental purposes, without the payment to us of any royalty thereon.

We hereby dedicate the invention herein described to the free use of the people of the United States of America, to take effect upon the granting of a patent to us.

We have found it essential, in the successful performance of our invention, that the juice must be in the form of a thin film during the time of deaeration and pasteurization. It is also essential that the containers be sealed before the temperature has been reduced below 170° F. to avoid contamination and/or deterioration.

As a result of the foregoing, we have learned that the juices so treated retain their natural color and flavor after a considerable period of storage, and/or transportation.

Our invention relates to the preservation of liquids by use of a process for the removal of gases, residual or occluded, from such liquids and subsequent pasteurization in a continuous operation. Our process is particularly applicable to food juices, and/or fruit juices.

The object of our invention is to increase the keeping qualities of liquids, such as fruit juices, by the removal of the dissolved and occluded gases usually contained in such liquids. These gases generally contain oxygen, and we have found that oxygen greatly increases the deterioration and shortens the storage time permissible for such products, due to the development of "off flavors" and the loss of vitamins, especially the antiscorbutic factor, vitamin C. This is particularly true in fruit juices, especially citrus, and tomato juices. Oxygen also increases the rate of corrosion of metal containers containing these juices. In the case of citrus juices packed in glass containers, oxygen hastens darkening of such citrus juices.

Prior art has disclosed various ways by which air within the headspace of containers can be displaced by indifferent gases or reduced by vacuum closure. These methods do not, in any measure, attempt to remove the dissolved or occluded air within the substance filling the container. We are also aware of recent attempts to remove this dissolved air by various methods such as the subjection of liquids to the action of a vacuum in a container, with or without agitation, and also by ebullition.

We have discovered that these liquids may be treated by exposing them at room temperature (80°–85° F.) to the action of a vacuum, while in the form of a thin film or spray. The dissolved and occluded gases contained in the liquid are more efficiently and conveniently removed than by any other known method.

In the carrying out of our invention, we do not restrict ourselves to any particular type of apparatus. We have found, however, that the device covered by United States Letters Patent No. 2,060,242, granted November 10, 1936, will adequately perform the initial step of our process when directed to de-aeration. In so far as pasteurization is concerned, which is a subsequent step, any apparatus that performs the function of so-called flash pasteurization, which will expose the liquid in the form of a thin film to the action of heat, may be used. In connection with the cooling of the juice immediately after pasteurization and before sealing in containers, any known type of cooling structure may be used.

By way of illustration of our invention, we submit as examples, the following:

Example 1.—Fruit juices were de-aerated at room temperature (80°–85° F.) under a vacuum of substantially 28 inches, while in the form of a thin film or spray, thereby removing the gases contained therein. The juices were then pumped through the pasteurizer, while still in the form of a thin film, and subjected to a temperature ranging from 185°–205° F. for a period of from 6 seconds to 8 seconds; thence immediately cooled to a temperature of 170°–180° F. and placed in containers. This temperature was then lowered as rapidly as possible to substantially room temperature by applying sprays of cold water and immersion in a tank of cold water.

Example 2.—For juices not so affected by heat, such as tomato or grapefruit juice, a lower temperature of pasteurization, i. e., 185°–190° F., may be used and thence filled directly into containers. The sealed containers are then cooled to room temperature as rapidly as possible by any suitable means.

Having thus described our invention, what we claim for Letters Patent is:

1. The process of preserving liquids subject to deterioration by gas and bacterial spoilage, which comprises reducing the liquids to a thin film, subjecting said thin film to a vacuum and for a length of time, sufficient to remove a substantial amount

of any gas present, and immediately reducing the liquid to a continuously moving thin ribbon, bringing the liquid in ribbon form to a pasteurizing temperature within a period of 6 to 8 seconds, immediately cooling the liquid to 170° to 180° F., filling into containers at this temperature, sealing said containers and immediately cooling.

2. The process of preserving fruit juices, which comprises reducing the fruit juice to a thin film, subjecting said thin film to a vacuum and for a length of time, sufficient to remove a substantial amount of any gas present, and immediately reducing the liquid to a continuously moving thin ribbon, bringing the liquid in ribbon form to a pasteurizing temperature within a period of 6 to 8 seconds, immediately cooling the liquid to 170° to 180° F., filling into containers at this temperature, sealing said containers and immediately cooling.

3. The process of preserving orange juice which comprises reducing the juice to a thin film, subjecting said thin film to a vacuum at room temperature for a length of time sufficient to remove any gas present, collecting the fruit juice free of contact with air, immediately reducing the juice to a continuously moving thin ribbon, bringing the liquid in ribbon form to a temperature of approximately 200° F. within a period of 6 to 8 seconds, thereafter immediately cooling the juice to a temperature of approximately 170° F., and immediately transferring the liquid to containers under aseptic conditions, sealing said containers and immediately cooling.

FREDERICK C. BLANCK.
THEODORE L. SWENSON.
HARRY E. GORESLINE.
ELNATHAN K. NELSON.
HUGH H. MOTTERN.