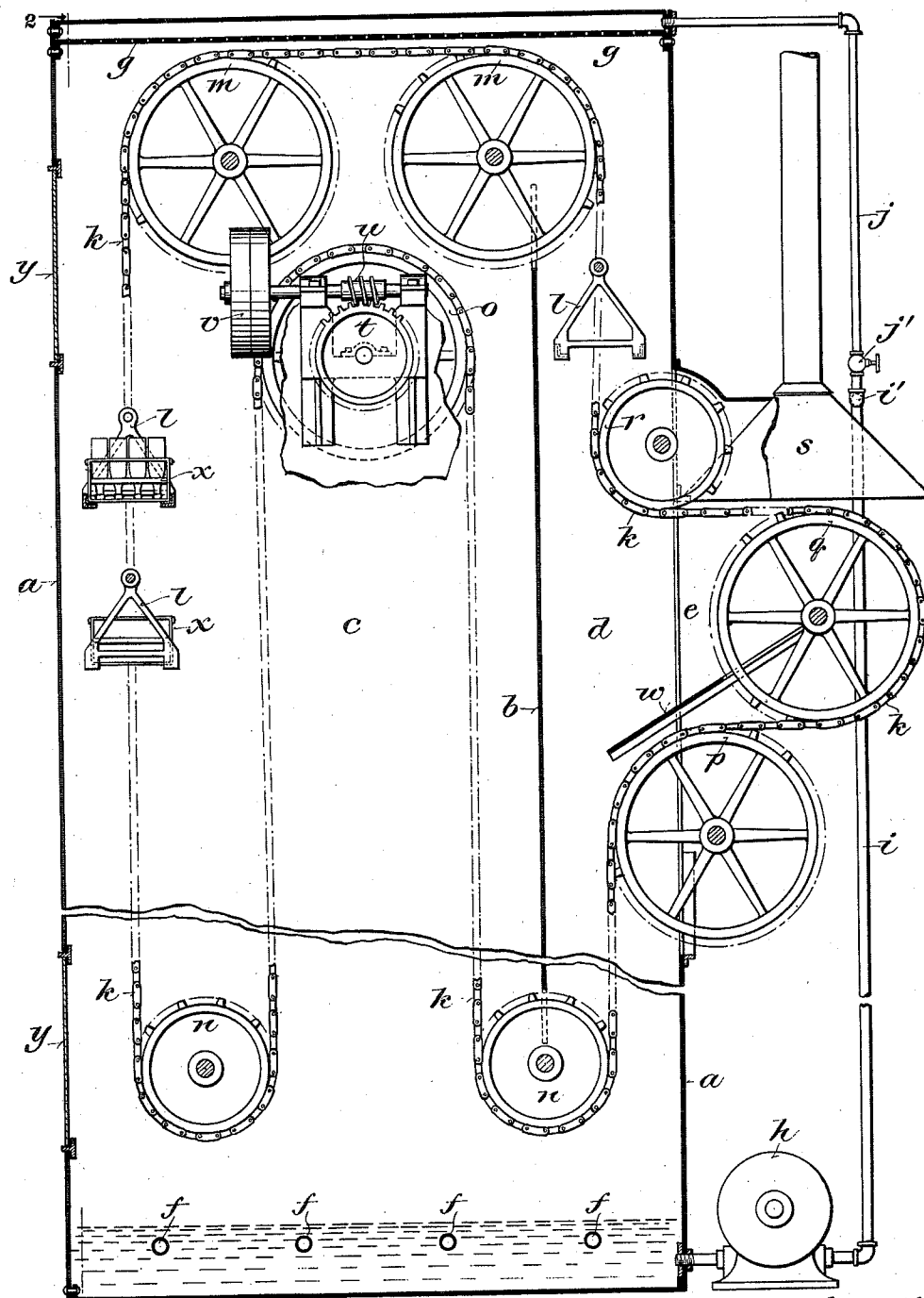


A. S. LINDEMANN & H. F. STOCK.
 PROCESS OF PASTEURIZING BOTTLE BEVERAGES.
 APPLICATION FILED JUNE 8, 1906.

1,005,854.

Patented Oct. 17, 1911.

3 SHEETS—SHEET 1.



Witnesses:
 Fred Palm,
 Chas. L. Goss.

Fig. 1.

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1,005,854.

3 SHEETS—SHEET 2.

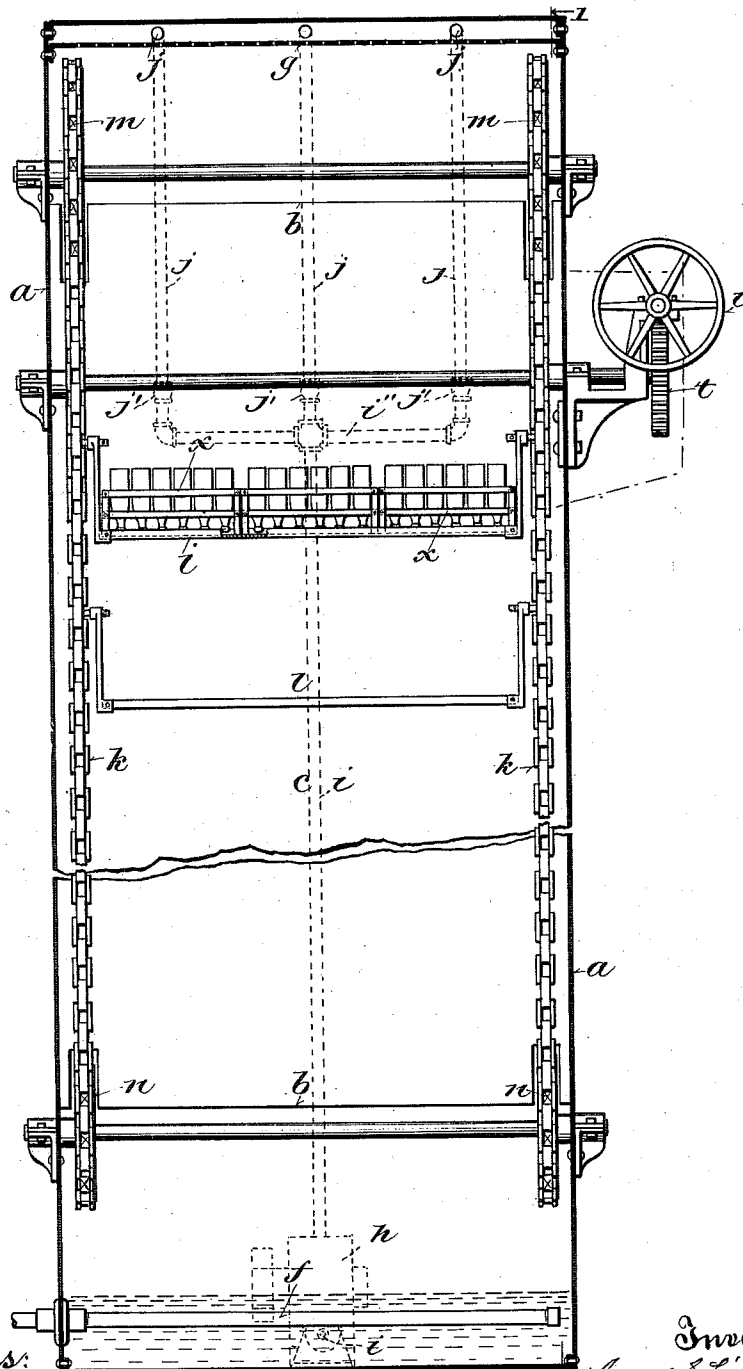


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3

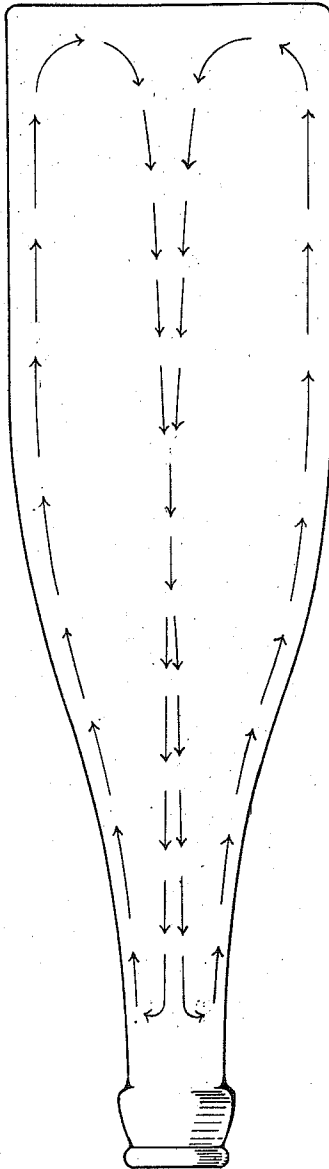
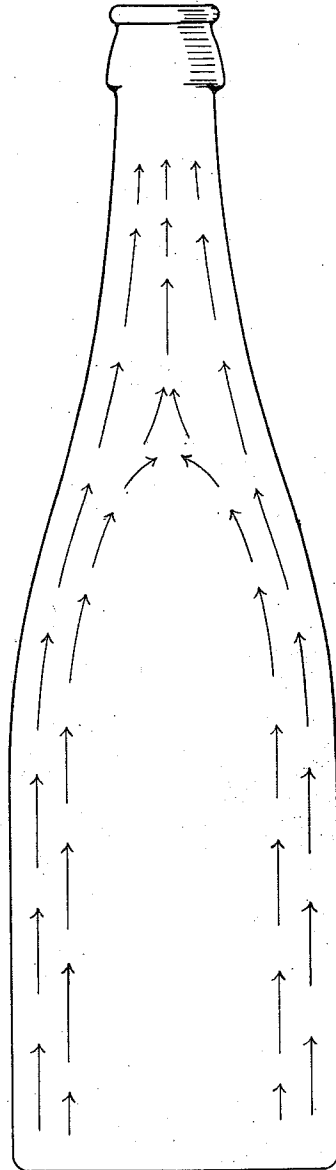


Fig. 4



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UNITED STATES PATENT OFFICE.

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PROCESS OF PASTEURIZING BOTTLE BEVERAGES.

1,005,854.

Specification of Letters Patent.

Patented Oct. 17, 1911.

Application filed June 8, 1906. Serial No. 320,690.

To all whom it may concern:

Be it known that we, AUGUST S. LINDEMANN and HENRY F. STOCK, citizens of the United States, residing at Milwaukee, in the county of Milwaukee, and at Waukesha, in the county of Waukesha, respectively, in the State of Wisconsin, have invented certain new and useful Improvements in Processes of Pasteurizing Bottle Beverages, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The main objects of this invention are to heat the liquid quickly and uniformly to the desired temperature, thus saving time and energy or heat and avoiding injury to the product by keeping it too long at a high pasteurizing temperature; to prevent or reduce loss by breakage of bottles due to uneven heating and unequal expansion thereof; and generally to improve processes of this class.

It consists in certain novel features in the manner of performing the operations which constitute the process as hereinafter particularly described and pointed out in the claims.

In the accompanying drawing, showing suitable apparatus for carrying out the process, like characters designate the same parts in the several figures.

Figure 1 is a side elevation and vertical section on the line 1 1, Fig. 2, of the apparatus; Fig. 2 is a vertical section of the same on the line 2 2, Fig. 1; and Figs. 3 and 4 are diagrams on an enlarged scale illustrating the difference in the effect upon the contents of a bottle when subjected in an inverted position to an external heating medium, from that produced when the bottle is held in an upright position.

Referring to Figs. 1 and 2, *a* designates a casing which may be conveniently constructed of sheet metal. It is partially divided by a vertical partition *b* into two compartments *c* and *d*, which may be called respectively the pasteurizing compartment and the warming and cooling compartment, and is provided in the side next to the compartment *d* with a feed and delivery opening *e*. The lower part of the casing is made to hold a pasteurizing liquid and is provided with suitable means such as a steam coil or pipes *f*

for heating such liquid. The upper part of the casing is provided with a sprinkler chamber or head which may be conveniently formed by a perforated horizontal plate *g* secured at its edges to the side walls of the casing. A pump *h* connected on the suction side with the lower part of the casing and on the discharge side with the sprinkler chamber, is provided for elevating the pasteurizing liquid from the lower part of the casing into said chamber. The discharge pipe *i* connects with a header *j* from which a number of branch pipes *k*, each provided with a valve *j*¹, lead into the sprinkler chamber or head for distributing and regulating the supply of liquid delivered thereto. An endless conveyer consisting of link belts *l* and bottle carriers *l* pivotally connected therewith at intervals, is supported and guided within the casing by sprocket wheels *m*, *n*, and *o*. Adjacent to the opening *e*, sprocket wheels *p*, *q* and *r* are arranged to form a horizontal loop in the conveyer and to carry the link belts in and out through said opening for convenience in loading and unloading the carriers. Above the opening *e* outside of the casing a hood *s* communicating at the top with an escape pipe or flue is provided to catch and conduct off the steam issuing from said opening. The conveyer supporting and guiding wheels are arranged to conduct the belts *l*, with the bottle carriers *l* suspended therefrom, upwardly from the opening *e* through the upper part of the compartment *d* over the upper wheels *m*, across the upper part of the chamber inclosed by the casing below the sprinkler plate *g*, thence down through the compartment *c* around one set of wheels *n*, thence up over the wheels *o*, thence down again around the other set of wheels *n* at the lower end of the partition *b*, thence up through the lower part of the compartment *d* around the wheels *p*, thence outward through the opening *e* around the wheels *q*, thence backward through said opening around the wheels *r*. The conveyer is driven by any suitable connection or connections with one or more sets of the sprocket wheels above mentioned. For this purpose the shaft of the wheels *o* may be provided at one end outside of the casing, as shown, with a worm gear *t* meshing with a worm *u* on a trans-

verse shaft which is provided with loose and tight pulleys *v* for connecting it by a belt with a suitably located driving pulley (not shown). An inclined deflecting plate *w*, extending downwardly from a line adjacent to the axis of the wheels *g* through the opening *e* is provided to catch and conduct the spray falling through the upper part of the compartment *b* upon the bottles ascending through the lower part of said compartment. Open crates or bottle receptacles *x* removably fitted in the carriers *l* are provided for holding bottles in an inverted position, and to facilitate loading them upon and removing them from the carriers *l* as they pass out and in through the opening *e*. The back of the casing *a* is provided adjacent to the upper and lower sprocket wheels *m* and *n*, with doors or removable sections *y* for affording easy access to the interior of the apparatus.

In carrying out our process the apparatus hereinbefore described operates as follows: The water or other liquid pasteurizing medium contained in the lower part of the casing being heated by the steam coil or pipes *f*, and maintained at the required temperature, and the conveyer being set in motion, bottles containing the beverage to be pasteurized are loaded in crates or receptacles *x* upon the carriers *l* as they pass outside of the casing through the opening *e* around the wheels *g*. The ingoing bottles during their ascent through the upper part of the compartment *d*, are sprayed or sprinkled with the hot liquid issuing from the perforations in the plate *g* over said compartment, and are thus gradually heated so that they will not be broken by being suddenly subjected to the bath or spray of hot liquid as it issues directly from the sprinkler head or chamber. The hot liquid flowing down over the bottles in successive carriers in imparting its heat thereto is cooled and utilized, as hereinafter explained, to gradually cool the outgoing bottles ascending through the lower part of said compartment *d*. In their passage across the upper part of the apparatus and down and up through the compartment *e*, the bottles are subjected to the descending spray of hot liquid from the sprinkler head or chamber, and they and their contents are rapidly brought to a pasteurizing temperature and kept at that temperature a sufficient length of time to destroy yeast germs.

The bottles being held with their necks downward in their entire circuit through the apparatus, the comparatively small volume of liquid contained in their necks being heated sooner than the much larger volume in their bodies, rises and produces a circulation within the bodies of the bottles, as indicated by arrows on Fig. 3. By reason of this free circulation the liquid

contents of the inverted bottles are quickly and uniformly heated to the required temperature, thereby materially shortening the time required for pasteurizing. In this way a saving is effected not only in time but also in heat, or in the fuel or energy required to produce it. A better product is also obtained, particularly in the treatment of beverages such as fermented malt liquors which are detrimentally affected by being subjected to a high temperature for a longer period than is absolutely necessary to destroy yeast germs.

According to the usual method of pasteurizing bottle beverages the bottles are held in an upright position, as shown in Fig. 4, and their contents next to the glass being first heated, rises into their necks, as indicated by arrows. The rising currents being congested and arrested in the bottle necks, the hotter portion of the liquid is confined therein, while the greater and cooler portion remains at or near the bottoms or in the bodies of the bottles. It will thus be seen that a very sluggish circulation of the contents of the bottles when they are held in an upright position is produced by the heating medium to which they are exposed on the outside. The contents of the bottles being thus slowly and unevenly heated, a much longer time is required to produce the desired effect and much greater breakage of the bottles will result on account of the concentration of heat in their necks and the consequent unequal expansion of the glass. On the other hand, when the bottles are subjected to the heating medium in an inverted position according to the present invention, their contents next to the glass being first heated rises into the larger parts of the bottles where ample room is afforded for the rising currents to turn and descend, as shown in Fig. 3. This results in a free and rapid circulation throughout the contents of the bottles and a consequent acceleration of the pasteurizing process. The liquid contained in the bottles is uniformly and quickly heated, uneven expansion and breakage of the bottles are avoided, and a better product is obtained.

As the bottles ascend through the lower part of the compartment *d* they are sprayed or flowed with the water which has been cooled by the ingoing bottles and are thus gradually cooled as they approach the opening *e*, the temperature of the liquid flowing over the outgoing bottles being again raised before it reaches the bottom of said compartment to repeat its circuit through the apparatus as above explained.

By sprinkling, spraying, or flowing the hot liquid over the bottles as they are moved with the conveyer through a closed chamber, it has been found that the liquid can be

heated to a higher initial temperature and that the contents of the bottles can be raised to a pasteurizing temperature in a shorter time than by moving the bottles through or immersing them in a hot liquid bath according to the usual method. Furthermore, with the present method of pasteurizing by sprinkling or spraying the bottles with the hot liquid, there is less liability of overheating and injuring their contents in case of break-down or stoppage of the apparatus, since the supply of hot liquid to the sprinkler chamber or head can be instantly shut off, whereas, on the other hand, considerable time would be required to draw off the hot bath with which the pasteurizing tank or chamber is supplied according to the usual practice. Although sprinkling, spraying or flowing the bottles containing the beverage to be pasteurized is the only method described of subjecting a bottled beverage to a pasteurizing medium, the advantages obtained by subjecting the bottles containing the beverage to the pasteurizing medium with the necks of the bottles downward, may be obtained with the pasteurizing medium in different conditions, such as a spray, vapor or liquid bath, or with different mediums.

We claim:

1. The process of pasteurizing bottled beverages consisting in subjecting the bottles with their necks downward to a heating medium till their entire contents are brought

to a pasteurizing temperature, substantially as described.

2. The process of pasteurizing bottled beverages consisting in moving the bottles with their necks downward through a heating medium till their contents are heated to a pasteurizing temperature, substantially as described.

3. The process of pasteurizing bottled beverages consisting in sprinkling the bottles while held necks downward with a hot liquid till their contents are heated to a pasteurizing temperature, substantially as described.

4. The process of pasteurizing bottled beverages consisting in moving the bottles with their necks downward through a spray of hot liquid till their contents are brought to a pasteurizing temperature, substantially as described.

5. The process of pasteurizing bottled beverages consisting in moving the bottles with their necks downward vertically through a falling spray of hot liquid till their contents are brought to pasteurizing temperature, substantially as described.

In witness whereof we hereto affix our signatures in presence of two witnesses.

AUGUST S. LINDEMANN.
HENRY F. STOCK.

Witnesses:

CHAS. L. GOSS,
BERNARD C. ROLOFF.