

(No Model.)

3 Sheets—Sheet 1.

G. POPP & H. BECKER.
STERILIZING APPARATUS.

No. 529,190.

Patented Nov. 13, 1894.

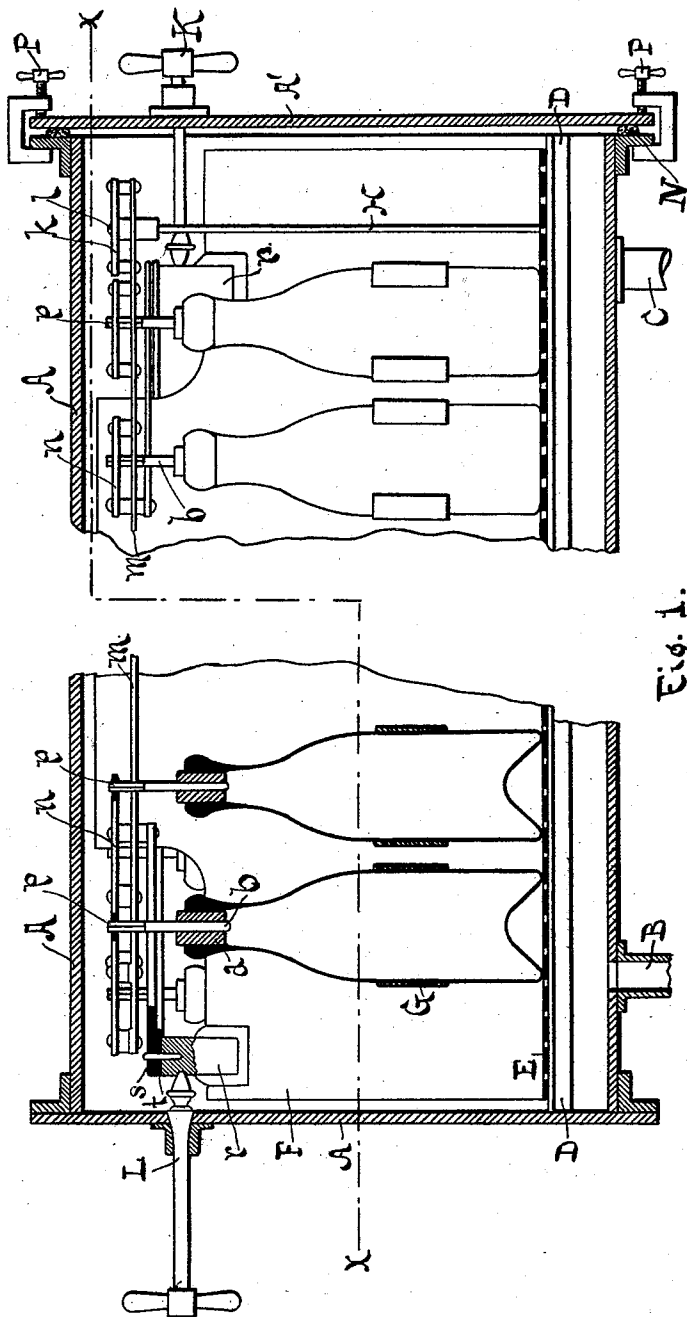


Fig. 1.

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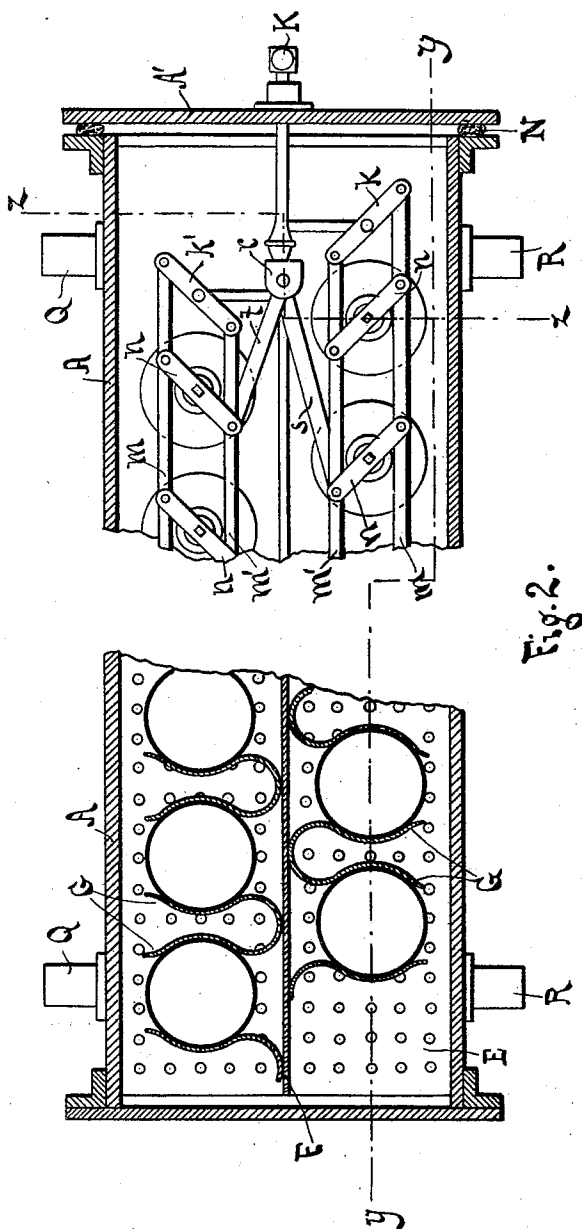


Fig. 2.

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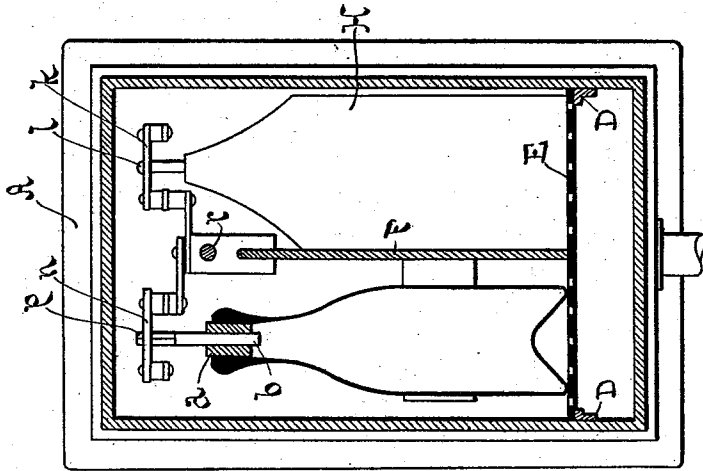


Fig. 3.

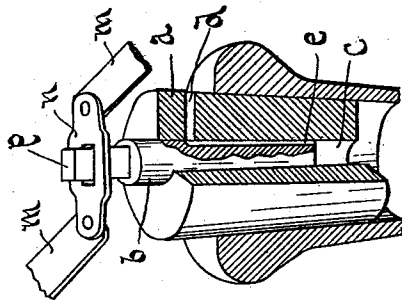


Fig. 4.

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UNITED STATES PATENT OFFICE.

GEORG POPP AND HEINRICH BECKER, OF FRANKFORT-ON-THE-MAIN,
GERMANY.

STERILIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 529,190, dated November 13, 1894.

Application filed May 11, 1894. Serial No. 510,863. (No model.) Patented in Germany July 29, 1892, No. 69,824; in Switzerland March 16, 1893, No. 6,543; in Norway March 20, 1893, No. 3,441; in England March 20, 1893, No. 5,957; in Belgium March 21, 1893, No. 103,981; in Italy March 31, 1893, XXVII, 33,816, LXVII, 192; in France June 20, 1893, No. 228,817, and in Austria-Hungary August 29, 1893, No. 14,575 and No. 39,099.

To all whom it may concern:

Be it known that we, GEORG POPP and HEINRICH BECKER, subjects of the Emperor of Germany, both residing at Frankfort-on-the-Main, Germany, have invented new and useful Improvements in Sterilizing Apparatus, (for which we have obtained Letters Patent in Germany, No. 69,824, dated July 29, 1892; in Austria-Hungary, No. 14,575 and No. 39,099, dated August 29, 1893; in France, No. 228,817, dated June 20, 1893; in Great Britain, No. 5,957, dated March 20, 1893; in Italy, No. XXVII, 33,816, LXVII, 192, dated March 31, 1893; in Belgium, No. 103,981, dated March 21, 1893; in Norway, No. 3,441, dated March 20, 1893, and in Switzerland, No. 6,543, dated March 16, 1893,) of which the following is a specification.

Our invention has reference to means for simultaneously closing or opening a series of bottles, jars or like receptacles from the exterior of the heating chambers commonly used in sterilizing or pasteurizing liquids.

It has for its object to provide efficient mechanism whereby the receptacles can be readily opened or closed in series from the exterior of the heating chambers; but it refers only to mechanisms to open or close the receptacles by turning the closure or stopper.

The mechanism for operating the closures of a series of the receptacles consists essentially of a series of rotary or oscillating devices adapted to engage with the closures for the purpose of turning the same; said devices being so connected as to be capable of being operated simultaneously from the exterior of the sterilizing chambers.

The nature of our said invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a vertical section in the plane $y-y$ Fig. 2, of a sterilizing apparatus charged with bottles, part being broken away. Fig. 2 is a horizontal section in the plane $x-x$ Fig. 1. Fig. 3 is a transverse section in the plane $z-z$ Fig. 2. Fig. 4 is a sectional perspective view of a bottle closure.

Similar letters of reference designate corresponding parts.

Referring to Figs. 1 to 3 of the drawings, 50 the letter A designates the sterilizing or heating chamber to which steam is conducted through the pipe B, while the water of condensation is led away through pipe C. In the chamber A are located parallel rails D D 55 adapted to support a removable rack consisting of a foraminous bottom E and a central vertical wall F having attached spring clamps G constructed to embrace and firmly hold the bottles or other receptacles. The door A' 60 through which the bottle carrying rack is introduced is closed air tight by means of the packing N and screws P. The mechanism for operating the closures of the bottles is carried by and is removable with said frame. 65

The bottle closure we preferably employ is illustrated in Fig. 4, and consists of a stopper a of rubber fitted tightly to the neck of the bottle, and having fitted into its longitudinal central bore c a plug b preferably made of glass and slightly tapering. The upper end of the plug is formed with a post p . In the stopper a is formed so as to come above the neck of the bottle, a radial channel d which terminates in the central bore c of the stopper, and on the periphery of the plug is formed a longitudinal groove e . When the channel and groove are in connection, the steam can enter the bottle and the air therein escape, but when the plug is turned from this position the bottle is closed air-tight. The construction of this stopper forms the subject matter of an application filed by us April 11, 1893, Serial No. 469,991.

n designates the links of two systems of 85 parallel movements located on opposite sides of the central wall F of the frame and provided with sockets adapted to fit the posts p on the plugs b . The longitudinal bars m of the systems are pivoted to the links in the 90 usual manner. The movements are supported by centrally pivoting the end links $k k'$ on suitable studs l , secured on the end walls H of the frame. For imparting motion to the systems the inner longitudinal bars are connected by rods s and t with slides $r r$ located at opposite ends of the frame and guided on the longitudinal wall F. These slides are en-

gaged by push bars K L, one of which extends through the door A', and the other through the rear wall of the steam chamber.

In the example illustrated we have shown two parallel rows of bottles, and consequently two parallel movements are employed, but of course if the apparatus is arranged for but one row of bottles, one parallel movement is all that is required. It is now evident that if one of the push bars is pressed inwardly, the links *n* will cause the plugs *b* to be turned in one direction, say to open the bottles, and when the second push bar is pressed inward the plugs are turned in the opposite direction to close the bottles.

It is clear that motion may be imparted to the rotating or oscillating parts of the mechanism by other means than the push bars.

The practical operation of the apparatus is as follows:—The bottles filled with milk or other liquid to be sterilized, and provided with the closure described are so placed within the springlamps G (Figs. 1, 2, and 3) that the posts of the plug *b* can enter the sockets in the links *n* of the closure operating mechanism, care being taken that the horizontal channels *d* in the plugs for the admission of steam to the bottles all point in the same definite direction. The rack with the open bottles is now slid into the steam chamber and the latter closed air tight. Steam at about 102° centigrade is now admitted for a definite period of time. The micro-organisms of the milk are destroyed at this temperature after a sufficient exposure. The milk, after proper exposure to this temperature, is caused to boil up by permitting part of the steam to escape from the chamber to reduce the pressure, whereby any air or gas which may be contained in the milk is positively removed and a vacuum is consequently obtained in the bottles after the latter are closed and the steam therein condenses. After the milk has boiled up, a full head of steam is supplied for an instant, and, while the liquid is under the influence of the same, the closure mechanism is operated from the exterior to hermetically close all the bottles simultaneously. The space in the bottles above the milk is now filled with steam. This steam condensing, the ensuing vacuum as well as the tightness of the closure will be recognized by the milk in the bottles boiling for a considerable time after closure has been effected. In view of the vacuum created, the pressure of the air drives the plug farther into the stopper, thus aiding in obtaining a tight closure, which is especially the case when conical plugs are employed.

When it is desired to sterilize the liquid a second time the bottles are permitted to cool while closed to a certain temperature; then the racks are again placed into the steam chamber, the latter is closed, and steam is again admitted. As soon as all the air has been driven out of the steam chamber, so that

the bottles are surrounded only by gases free from germs, the bottles are opened by pushing in the second push bar. The process is then repeated.

In case it is not desirable to remove the bottles from the apparatus for the purpose of cooling the same to the requisite temperature, or if the cooling is to be obtained as rapidly as possible, then, in that case, hot water (about 90° centigrade) drawn from a suitable reservoir, is introduced through the lateral openings Q Q (Fig. 2) in sufficient quantity to fill the chamber A to the level of the necks of the bottles. While the hot water is being drawn from the reservoir, cold water is admitted to the reservoir and cools the water, which then enters the steam chamber and thus gradually, but in a comparatively short time, cools the bottles therein to the desired temperature. The water is discharged from the tank through the orifice R, which has an area equal to or somewhat greater than that of the inlet orifices.

Instead of using water for the purpose of cooling, air may be used, and if sterilized air is employed, the bottles may be permitted to remain open during the cooling process.

We are aware that heretofore apparatus have been constructed for the purpose of closing the receptacles for liquid when in a closed steam filled chamber, but in none of these were the closure mechanisms adapted to both close and open the bottles, nor were they arranged to operate closures of a series of bottles by the turning of a body which when in one position places the interior of the bottles into communication with the steam space and upholds this communication with certainty, while in the second position it breaks this communication and forms an air tight closure permitting the formation of a vacuum above the cooled liquid, which permits the bottles to be again introduced and reopened in the steam chamber as is often necessary. Furthermore in the apparatus heretofore used the closures were pressed upon the necks of the bottles, which is very objectionable, since the bottles break very easily while subjected to the heat of the steam.

We do not herein claim the method of sterilizing set forth, as we have claimed the same in a patent granted to us August 14, 1894, for processes of sterilizing milk, &c., and serially numbered 524,649.

What we claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus of the character specified, the combination of a heating chamber with means for holding a series of receptacles stationary, mechanism in operative connection with the closures of the receptacles for turning the same to open, or close and to maintain the receptacles in an open or closed condition; and a suitable handle extending outside of the chamber and arranged

to engage and actuate the closure operating mechanism in opposite directions, substantially as described.

2. In an apparatus of the character specified, the combination of a heating chamber provided with a lateral door, a removable rack for holding the receptacles, mechanism containing oscillatory members in operative connection with the closures of the receptacles for turning the same to open and close the receptacles, and a suitable handle extending outside of the chamber and arranged to engage and actuate the closure operating mechanism in opposite directions, substantially as described.

3. In an apparatus of the character specified, the combination of a heating chamber with means for holding the receptacles, a parallel movement having links provided with means for engaging the closures of the receptacles, and a member passing through the wall of the chamber for operating the parallel movement, substantially as described.

4. In an apparatus of the character specified, the combination of a heating chamber with means for holding the receptacles, and a closure mechanism provided with oscillatory members containing sockets adapted to receive the posts of the closures for the receptacles, substantially as described.

5. In an apparatus of the character specified, the combination of a heating chamber, a removable rack constructed to hold the re-

ceptacles, a parallel movement connected to said rack and provided with oscillatory members adapted to engage the closures of the receptacles, and members projecting into the interior of the chamber and arranged to engage the parallel movement, substantially as described.

6. The combination with a heating chamber with means for holding the receptacles, of a closure operating mechanism consisting of two parallel bars connected by links provided with means for engaging the closures, and with a centrally pivoted end link, or links; and means for imparting a longitudinal movement to the bars, substantially as described.

7. The combination with a heating chamber, of a removable rack for holding the receptacles, a closure operating mechanism consisting of two parallel bars connected by links provided with means for engaging the closures and with end links adapted to oscillate about pivots carried by the rack, and means for imparting longitudinal movement to the bars, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORG POPP.

HEINRICH BECKER.

Witnesses:

ALVESTO S. HOGUE,
JEAN GRUND.