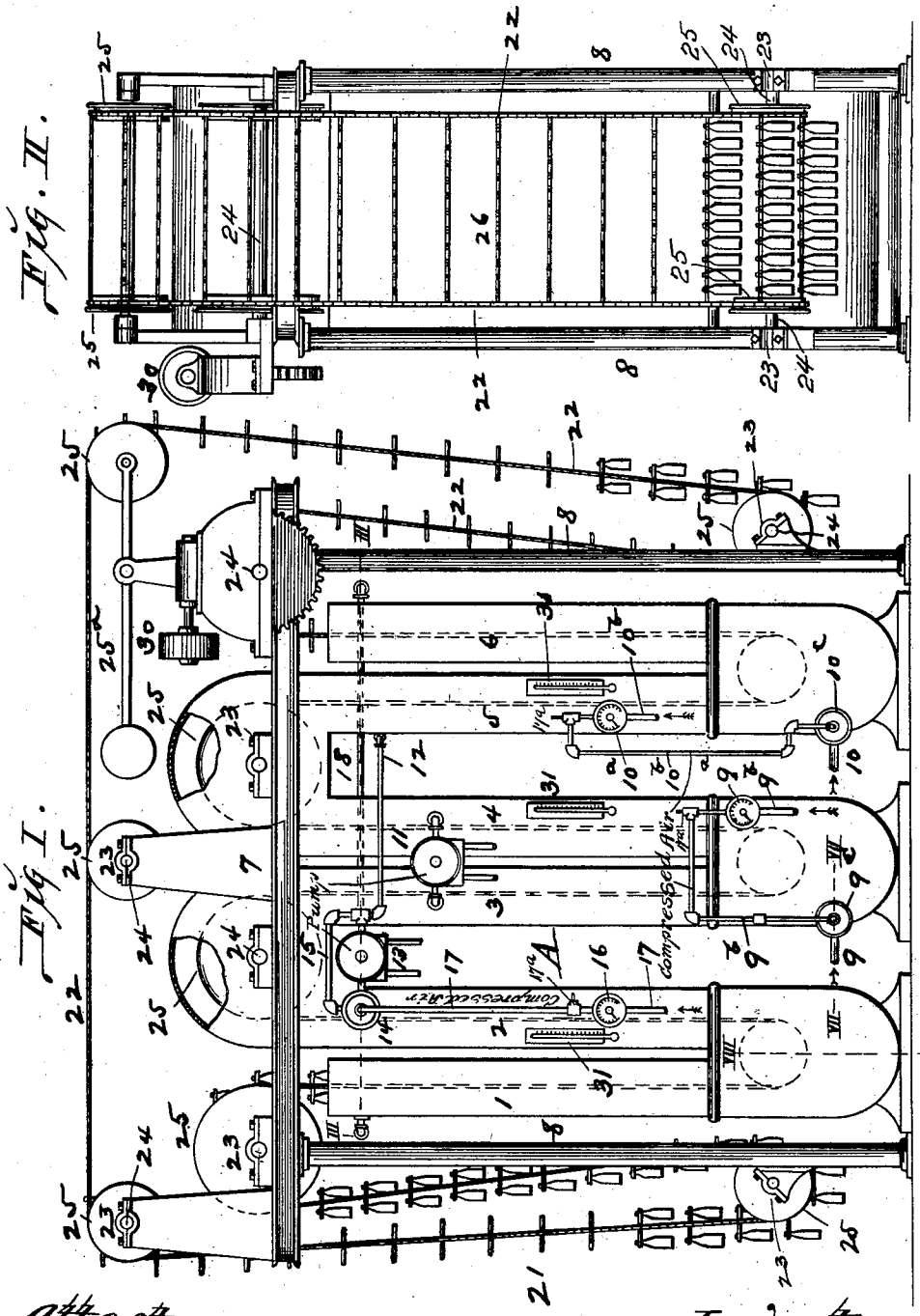
No. 701,622. Patented June 3, 1902.

W. J. RUFF.

PASTEURIZER.

(Application filed Sept. 16, 1901.)

(No Model.) 3 Sheets—Sheet I.



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(No Model.) 3 Sheets—Sheet 2.

Fig. III.

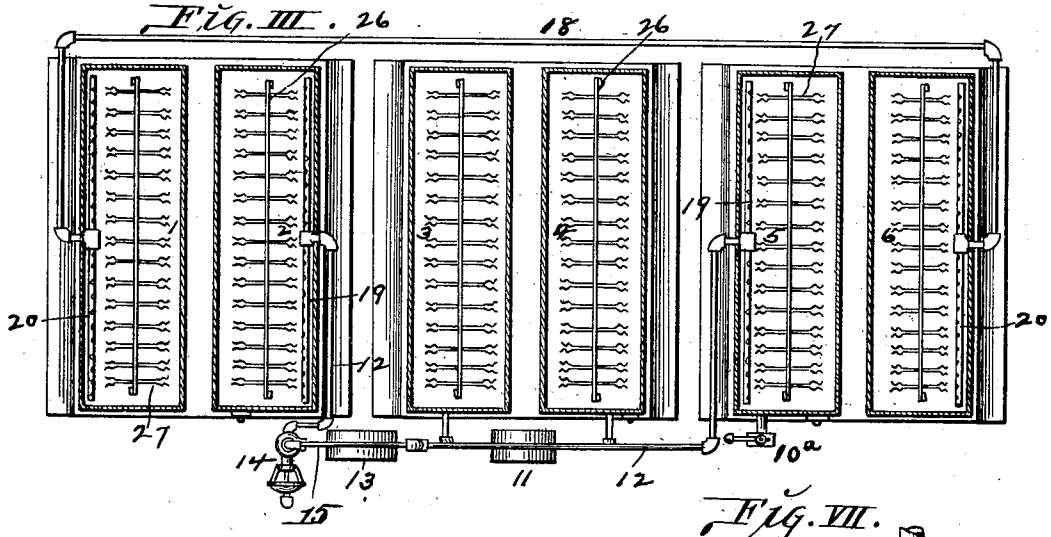

Fig. VII.

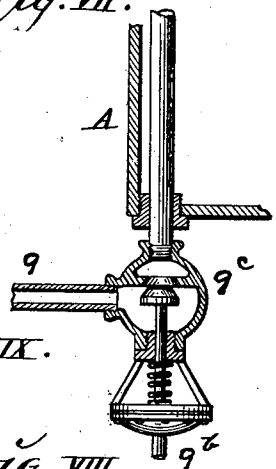

Fig. IV.

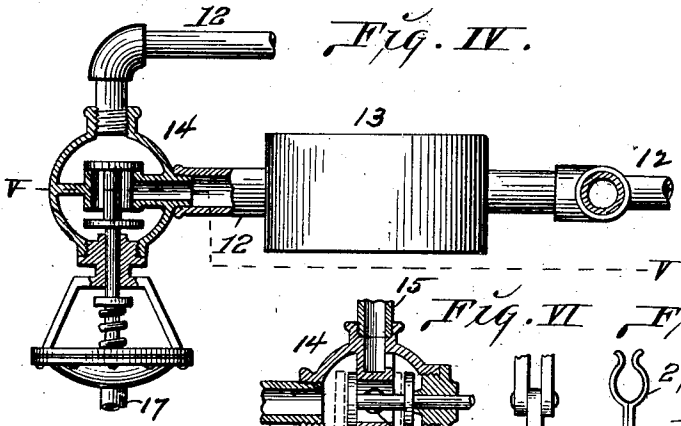

Fig. VI.

Fig. IX.

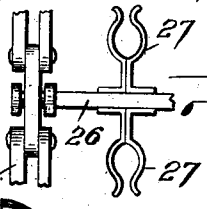

Fig. VIII.

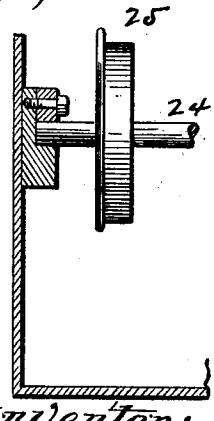

Fig. V.

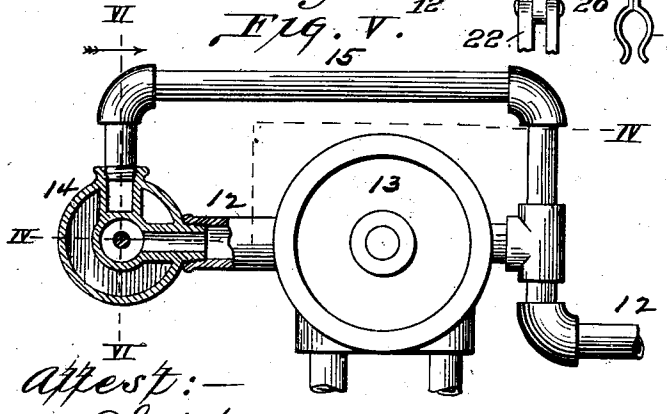

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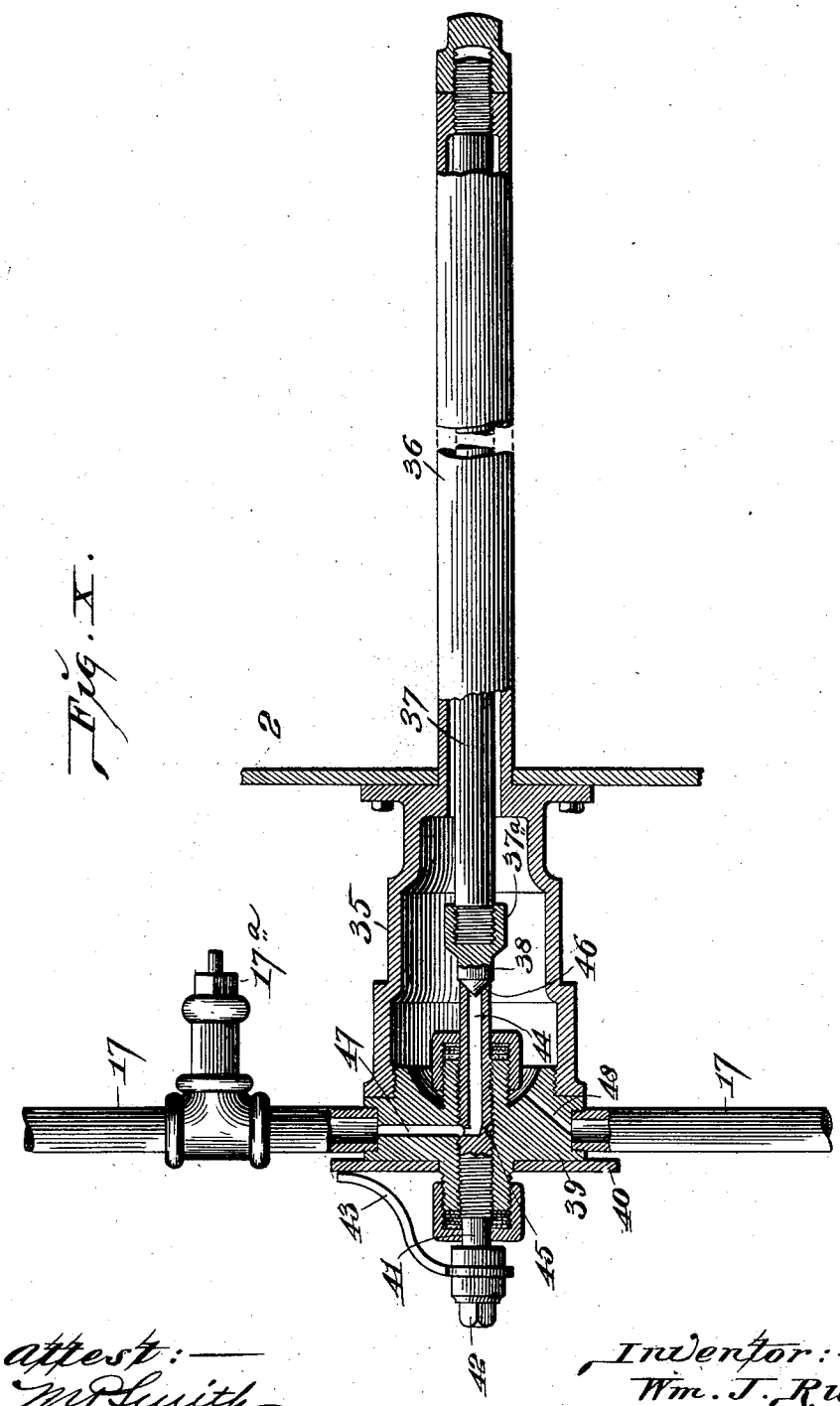
Fig. X.



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UNITED STATES PATENT OFFICE.

WILLIAM J. RUFF, OF QUINCY, ILLINOIS.

PASTEURIZER.

SPECIFICATION forming part of Letters Patent No. 701,622, dated June 3, 1902.

Application filed September 16, 1901. Serial No. 75,509. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. RUFF, a citizen of the United States, residing in Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Pasteurizers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention relates to a pasteurizer or sterilizer wherein the temperatures of the beer itself (or other material being treated) both before and after entering the machine are utilized through the automatic operation of the machine to maintain the proper temperature of the water, thereby increasing the economic operation of the machine.

When beer is being bottled and before it is pasteurized, it is kept at a very low temperature—about 37° Fahrenheit—to prevent foaming, and in pasteurizing it is heated to about 142° Fahrenheit and should be cooled down to less than 100° Fahrenheit before leaving the machine to prevent too rapid cooling and to avoid danger of breaking the bottles and to utilize through the automatic operation of the machine the waste heat in the cooling of the bottles for the initial heating of the bottles and at the same time to utilize the cold temperature of the bottles just as they are entering the machine for the purpose of keeping down the temperature of the water caused by the cooling of the hot bottles is, as stated, the object of my present invention.

With these objects in view my present invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a side elevation of my improved pasteurizer. Fig. II is an end view. Fig. III is an enlarged horizontal section taken on line III III, Fig. I, the pumps, valves, and regulators being shown in plan view. Fig. IV is a section taken on line IV IV, Fig. V. Fig. V is a section taken on line V V, Fig. IV. Fig. VI is a section taken on line VI VI, Fig. V. Fig. VII is an enlarged section taken on line VII VII, Fig. I. Fig. VIII is an enlarged section taken on line VIII III, Fig. I. Fig. IX is an enlarged detail view showing the manner of connecting the bottle-holding bars to their carrying-chains. Fig. X is a side elevation, partly in section, illustrating one of the temperature-regulators made use of in my improved pasteurizer.

A represents a casing or housing forming a conduit consisting of vertical legs 1, 2, 3, 4, 5, and 6, which are preferably rectangular in cross-section, as shown in Fig. III. This casing rests within a frame 7, mounted on posts 8. The legs 1 and 6 are open at top and connect at the bottom, respectively, with the legs 2 and 5. The legs 2 and 5 are connected at top, respectively, with legs 3 and 4, and the legs 3 and 4 are connected at bottom, all of which is illustrated in Fig. I. The bottles pass through the machine first down leg 1, thence up leg 2, down leg 3, up leg 4, down leg 5, and up leg 6, where they leave the conduit. In the use of the machine the conduit is filled with water in any suitable manner—such, for example, as by means of valved pipes (not shown)—it being filled nearly to the top of legs 1 and 6, the water in legs 3 and 4 being heated by means of steam introduced through a pipe 9 until the temperature is raised sufficiently high to effect the pasteurization of beer. In starting the machine and subsequently, if necessary, the water in legs 5 and 6 is likewise heated to the proper cooling temperature by means of steam introduced through a pipe 10. The introduction of steam through the pipes 9 and 10 is automatically controlled by regulators 9^a and 10^a, which are attached to the respective legs and which may be of any well-known form or type. The regulators control the passage of compressed air through pipes 9^b and 10^b, said pipes leading from a suitable compressed-air supply, (not shown,) which may be of any suitable form, such as a compressed-air tank, into which air is forced by any well-known form of air-compressor, which air acts to close the valves 9^c and 10^c in the respective pipes 9 and 10 when the temperature of the water in the machine rises to that which is desired. To maintain the water at a uniform temperature in legs 3 and 4, I provide a rotary pump 11, connected to the upper portion of these legs and which maintains a circulation of the water between the two legs. This pump may be of any well-known form or type.

As already stated, there is in the pasteurizing of beer a change in the temperature from

a very low to a high temperature and back again to a low temperature, and it adds very much to the economic operation of the machine if these temperatures can be utilized to keep the water at the proper temperature in the different parts of the machine, (by dispensing to this extent with the use of fuel for heating and water for cooling.) With my improved machine I am able to do this, the machine acting automatically to maintain the temperature even at all times.

12 represents a pipe forming a connection between legs 5 and 2, and in this pipe is located a rotary pump 13, that acts to conduct the water from leg 5 to leg 2, thus bringing water that has been heated in cooling the beer from leg 5 into leg 2, where the waste heat is utilized for the preliminary or initial heating of the beer. In the pipe 12 is a valve 14, (shown in detail in Figs. IV, V, and VI,) this valve controlling the passage of water through the pump. When the valve is in the position shown by dotted lines in Fig. VI, the water circulates through the pipe 12 from the leg 5 to the leg 2; but when the valve is moved to the position shown in full lines in Fig. IV the water circulates around the pump through a by-pipe 15, so that at this time there is no movement of the water from leg 5 to leg 2, and the water is caused to take this course when the water in leg 2 is at the desired temperature through means of a regulator 16, attached to the leg 2 and which is connected to the valve 14 by means of a compressed-air pipe 17, said pipe 17 leading from the hereinbefore-mentioned compressed-air supply. As soon as the temperature of the water in leg 2 falls beneath the desired point the regulator 16 operates, whereupon the pump will start a circulation of water from leg 5 to leg 2. As soon as the temperature in leg 2 reaches the desired height the regulator 16 operates again and the water simply circulates around the pump through pipe 15. It will thus be seen that the machine operates automatically to maintain the water in the warming or attemperating legs 1 and 2 at the desired temperature.

Any desirable form of a temperature-regulator may be made use of in my improved pasteurizer; but I prefer to use a regulator similar to the one illustrated in Fig. X, this form being simple in construction and positive in operation. In this construction a cylindrical casing 35 is secured in any suitable manner to the legs of the pasteurizer, and to said casing is formed integrally a tubular portion 36, that extends some little distance into the leg to which it is attached. Screw-seated in the outer end of this tubular portion 36 is the end of a rod 37, the opposite end of which carries a valve-plug 37^a, having a conical end 38. The outer end of the casing 35 is closed by a cap 39, on the outer face of which is provided a dial 40. Passing through the center of this plug 39, in alinement with the center of the rod 37, is a screw-threaded rod 41, the outer end of which is provided with a nut 42 and indicating-finger 43. Passing approximately half-way throughout the length of this rod 41 is a bore or passage-way 44, the inner end of which extends laterally through the rod 41 and communicates with a groove 45, formed in the screw-threaded portion of the rod. The inner end of the tubular portion of this rod 41 terminates in a valve-seat 46, adapted to receive the conical end of the valve-plug 38. Formed in the plug 39 is a passage-way 47, the inner end of which communicates with the groove 45. One end of the air-pipe 17 is tapped into the plug 39 and is in communication with the passage-way 47. On the opposite side of the plug 39 one end of the air-pipe 17 is tapped into said plug and is in communication with a bore or passage-way 48, the inner end of which communicates with the chamber within the tubular casing 35. The regulator is set by adjusting the nut 42, which turns the rod 41 in the desired direction to bring the finger 43 to the proper point on the dial 40, and by this operation the position of the valve-seat 46 relative to the end of the conical plug is varied, for the reason that the rod 41 is moved toward or drawn away from the valve-plug 38, according to the direction in which said rod is turned. The proper temperature within the leg expands the tubular portion 36 sufficiently to cause the valve-plug 38, carried by the rod 37, to remain unseated, and while in this position the compressed air from the pipe 17 passes through the bore 48 into the chamber within the casing 35, from thence through the bores 44 and 47 into and through the upper pipe 17 to the diaphragm-valve to keep said valve closed, at which time the pump is simply circulating the water around itself through the pipe 15. When the temperature within the leg 2 falls below the proper point or the point at which the valve is set to actuate, the contraction of the tubular portion 36 due to the lowering of the temperature will move the conical plug 38, carried by the rod 37, which is in turn carried by the tubular portion 36 toward and against the valve-seat 47, thus closing the passage of the compressed air through the regulator. The supply of compressed air thus being shut off will allow the diaphragm-valve to open and the pump will conduct the water from leg 5 to leg 2. When the valve 38 closes, the air in the upper part of the pipe 17 escapes through a valve 17^a, which is so adjusted as to always have a small leak. The regulator-pipe 9^a of pipe 9 is the same and operates the same as the regulator 16, which is above described.

To complete the circulation between legs 2 and 5, a connection is made between legs 1 and 6 by the use of a pipe 18, as shown in Figs. I and III, the cool water produced by the initial heating of the beer thus passing around to legs 6 and 5 and acting to keep down the temperature in these legs which has been created by the hot beer as it passes

through these legs from the sterilizing-legs 3 and 4, the cool temperature of the beer when entering the machine being thus utilized to keep down the temperature created by the cooling of the beer, while the high temperature produced by the cooling of the beer is utilized to offset the lowering of the temperature in heating the beer. The pipe 12 communicates with the legs 5 and 2 by means of perforated headers 19, (see Fig. III,) and the pipe 18 communicates with the legs 1 and 6 by means of perforated headers 20.

21 represents the bottle-carrier, consisting of endless chains 22, that pass around pulleys 25, secured to shafts 24, journaled in boxes 23. The chains are connected together at intervals by means of cross-bars 26, that have pivoted connection with the chains. (See Fig. IX.) These cross-bars are provided with spring-fingers 27, formed to receive the necks of the bottles, as shown in Fig. III, and which support the bottles in a vertical position as they are carried through the machine. The fingers 27 project on each side of the bars 26, and thus provide for the carrying of double the quantity of bottles through the machine that could be carried with a single set of fingers. One pair of the pulleys 25 is supported on a pivoted counterbalanced frame 25^a for the purpose of keeping the carrier-chains taut.

30 represents a driving-pulley geared to one of the shafts 24 for imparting movement to the carrier.

31 represents thermometers attached to the water-legs to indicate the temperature of the water.

The legs 1 and 2 may be referred to as an "attemperating-compartment," the legs 3 and 4 as a "sterilizing-compartment," and the legs 5 and 6 as a "cooling-compartment," and these parts are so referred to in the following claims.

It will be observed that the circulation of water through the legs 1 and 2 and through the legs 5 and 6 is in a direction contrary to that in which the bottles are moved through the legs. The pump 11 is run to pump water from leg 4 into leg 3, and therefore maintains a circulation of water in these legs in the direction of the movement of the bottles through the legs.

I do not herein claim a pasteurizer consisting of an attemperating-tank, a cooling-tank, a sterilizing-tank without communication with said tanks, means for moving the substance to be sterilized from one tank to another, means for causing a circulation of water between the attemperating-tank and the cooling-tank, and means for maintaining the water in the sterilizing-tank at a higher temperature than the water in the other tanks, as such is the subject-matter of my application filed April 15, 1901, Serial No. 55,899.

I claim as my invention—

1. In a pasteurizer, the combination of an attemperating-compartment, a sterilizing-compartment, a cooling-compartment, means exterior of the machine and out of communication with the sterilizing-compartment for creating a circulation between the attemperating and cooling compartments, means for automatically starting and stopping said circulating means, and means for carrying the substance to be sterilized through said compartments, substantially as set forth.

2. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said legs, and means for creating a circulation of water between the attemperating-compartment and cooling-compartment, substantially as set forth.

3. In a pasteurizer, the combination of an attemperating-compartment, a sterilizing-compartment, a cooling-compartment, means exterior of the machine and out of communication with the sterilizing-compartment for creating a circulation between the attemperating-compartment and the cooling-compartment, and means for automatically starting and stopping said circulating means, substantially as set forth.

4. In a pasteurizer, the combination of an attemperating-compartment, a sterilizing-compartment, a cooling-compartment, and automatic means exterior of the machine and out of communication with the sterilizing-compartment for creating a circulation of water between the attemperating-compartment and cooling-compartment, substantially as set forth.

5. In a pasteurizer, the combination of an attemperating-compartment, a sterilizing-compartment, a cooling-compartment, a pump and a return-pipe exterior of the machine and out of communication with the sterilizing-compartment for creating a circulation of water between the attemperating-compartment and cooling-compartment, and a valve and regulator for automatically controlling the passage of water from said pump to said attemperating-compartment as the temperature therein rises and falls, substantially as set forth.

6. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, and a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said water-legs, and automatic mechanism for creating a circulation of water between the attemperating-compartment and the cooling-compartment, substantially as set forth.

7. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying bottles through said compartments, and means for causing a circulation of water from one water-leg of the sterilizing-compart-

ment to the other water-leg thereof, substantially as set forth.

8. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said water-legs, means for creating a circulation of water between the attemperating-compartment and the cooling-compartment, and means for creating a circulation of water between the two water-legs of the sterilizing-compartment, substantially as set forth.

9. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said compartments, automatic means for controlling a circulation of water from the cooling-compartment to the attemperating-compartment as the temperature rises and falls, and means for maintaining a circulation of water between the two water-legs of the sterilizing-compartment, substantially as set forth.

10. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said compartments, means for causing a circulation of water through the attemperating and cooling compartments in a direction contrary to that in which the bottles move, and means for causing a circulation of water through the sterilizing-compartment in the same direction that the bottles move, substantially as set forth.

11. In a pasteurizer, the combination of an attemperating-compartment, a two-part sterilizing-compartment, a cooling-compartment, means for creating a circulation between the attemperating-compartment and cooling-compartment, means for creating an independent circulation between the two parts of the sterilizing-compartment, and means for carrying the substance to be sterilized through said compartments, substantially as set forth.

12. In a pasteurizer, the combination of a pair of water-legs forming an attemperating-compartment, a pair of water-legs forming a sterilizing-compartment, a pair of water-legs forming a cooling-compartment, means for conveying the bottles through said legs, means for creating a circulation of water between the attemperating-compartment and the cooling-compartment, and means for causing an independent circulation of water through the two legs of the sterilizing-compartment, substantially as set forth.

WILLIAM J. RUFF.

In presence of—
E. S. KNIGHT,
M. P. SMITH.