No. 804,688. PATENTED NOV. 14, 1905.

F. TYSON.

PASTEURIZING LIQUIDS.

APPLICATION FILED MAR. 15, 1905.

Fig. 2.

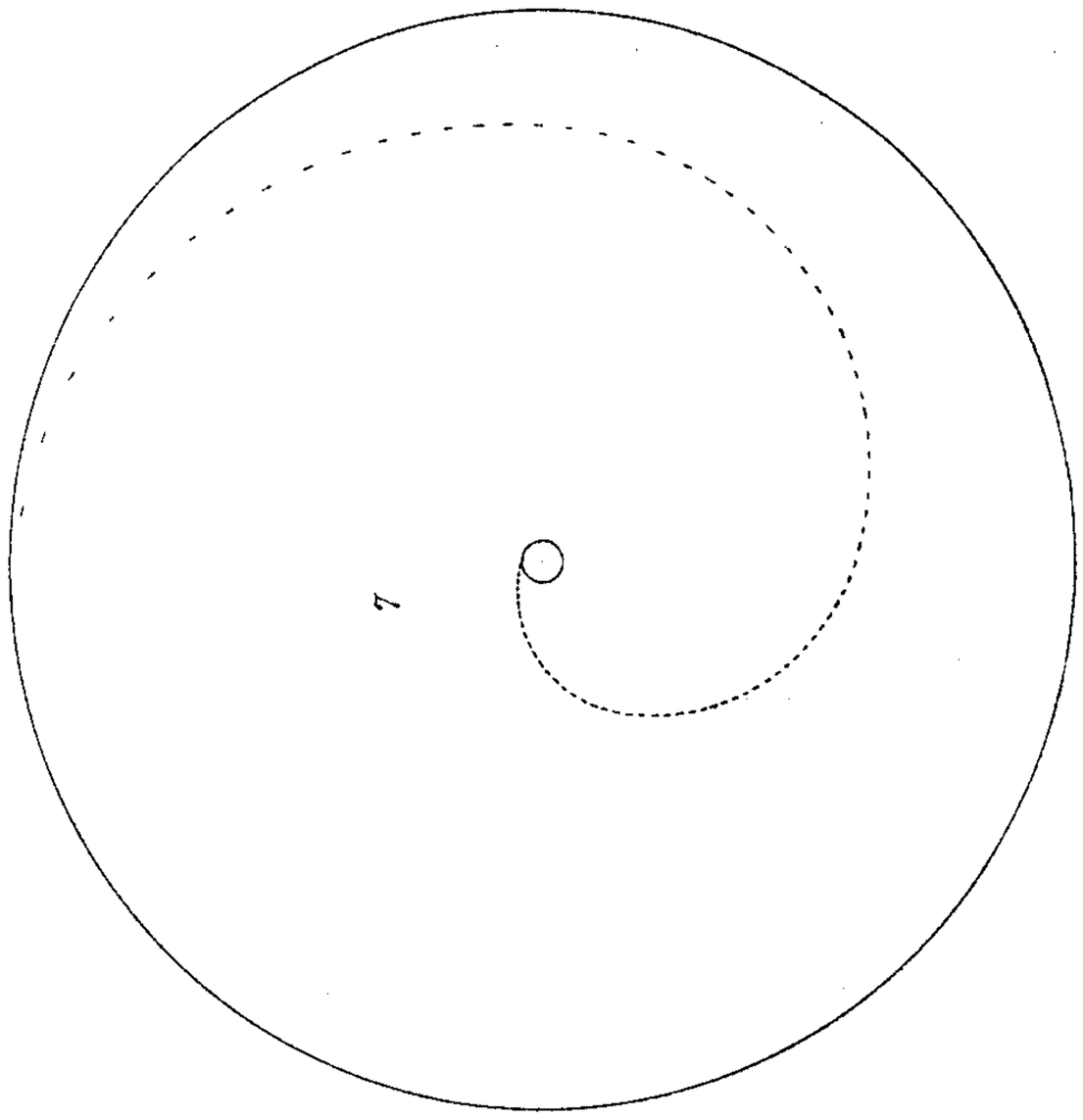


Fig. 3.

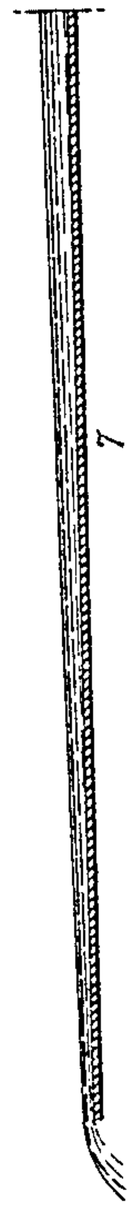


Fig. 1.

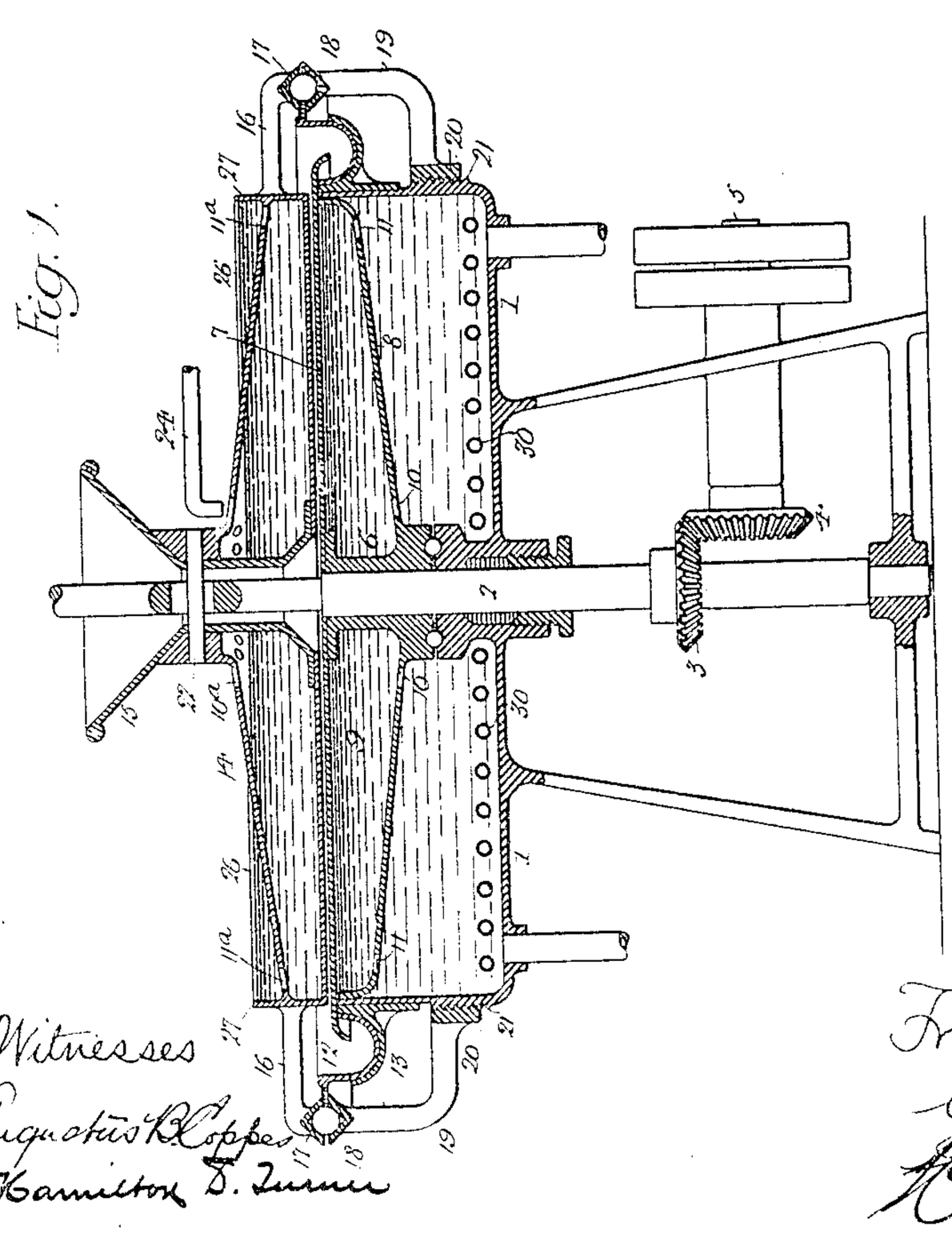
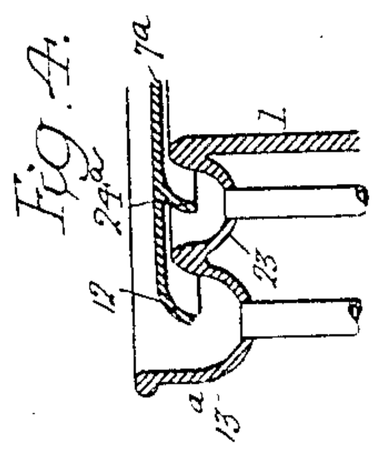


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK TYSON, OF CANTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO H. B. STEWART, OF CANTON, OHIO.

PASTEURIZING LIQUIDS.

No. 804,688. Specification of Letters Patent. Patented Nov. 14, 1905.

Original application filed November 25, 1904, Serial No. 234,309. Divided and this application filed March 15, 1905. Serial No. 250,323.

To all whom it may concern:

Be it known that I, FRANK TYSON, a citizen of the United States, residing in Canton, Ohio, have invented certain Improvements in Pasteurizing Liquids, (the same being a division of my application, Serial No. 234,309, filed November 25, 1904,) of which the following is a specification.

The object of my invention is to provide for the pasteurization of milk or other liquids more expeditiously and effectively than is possible by the use of the present methods with which I am familiar. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of apparatus available for use in carrying out my improved process of pasteurization. Fig. 2 is an enlarged diagram showing a plan view of the treating-plate and illustrating one of the features of my invention. Fig. 3 is a further diagram showing a sectional view of part of the treating-plate and illustrative of another feature of the invention, and Fig. 4 is a view illustrating a modification of the apparatus.

Referring in the first instance to Fig. 1 of the drawings, 1 represents a vessel mounted upon a suitable support and having a central stuffing-box for the passage of a vertical shaft 2, whose lower end is adapted to a bearing in said support, rotative movement being imparted to said shaft 2 by means of a pair of bevel-gears 3 4, driven from a horizontal shaft 5, which is mounted in a bearing on the support for the vessel 1 and is driven in any suitable manner. The vessel 1 has at the top a chambered lid or cover comprising a hub 6, a horizontal top plate 7, and a flaring bottom plate 8, these parts inclosing a chamber 9, which gradually decreases in depth from the center to the periphery of the cover. The hub 6 is secured to the shaft 2 and turns upon a ball-bearing on the central boss of the vessel 1, and in the bottom plate 8 are formed openings 10 and 11, the openings 10 being adjacent to the hub 6 and the openings 11 being adjacent to the periphery of the cover. The horizontal top plate 7 of the cover terminates at the periphery in a downwardly-bent flange 12, which is contained within an annular trough 13, surrounding the vessel 1. Above the chambered cover of the vessel 1 is a chambered hood 14, with hollow hub terminating at the top in a funnel 15, and mounted by suitable arms 16 on this chambered hood is a rail 17, constituting the upper member of a ball-race whose lower member consists of a similar but oppositely-facing rail 18, carried by arms 19 on a threaded ring 20, which engages with a similarly-threaded ring 21, secured to the vessel 1. Hence the lower rail 18 is susceptible of vertical adjustment and the chambered hood 14 can be supported at any desired height above the chambered cover of the vessel 1 and is free to rotate in any position of such adjustment. Rotation of the hood 14 in unison with the cover of the vessel 1 is effected by a transverse bar 22 crossing the hub of the said hood and engaging with a vertically-slotted portion of the shaft 2, as shown in Fig. 1.

The vessel 1 and its chambered cover are filled with water or other liquid heated to a temperature high enough to effect the desired result, this temperature being maintained practically constant by any suitable system of heating devices—as, for instance, by the steam-coil 30. When the chambered cover of the vessel is rotated, there will be a constant circulation of the heated water through the same from hub to periphery, owing to the action of centrifugal force, the water entering the chambered cover through the openings 10 and being discharged therefrom through the openings 11. Hence a uniform degree of heat will be imparted to the horizontal top plate 7 of the cover. The milk or other liquid to be pasteurized is admitted through the hollow hub of the hood 14, the chamber within said hood being likewise filled with water heated to the required temperature, which water, if desired, may be caused to circulate through the chamber in any available manner. For instance, the hot water may be fed from a pipe 24 through openings 10^a near the hub of the hood 14, and may be delivered from the latter through openings 11^a near the periphery of the hood into a top chamber 26, from which when the hood is rotated it escapes over a peripheral rim 27. The milk enters the space between the top plate 7 of the chambered cover and the bottom plate of the chambered hood and spreads itself in a thin film between these two plates,

the flow of the milk from the center to the periphery of the plate 7 being caused by centrifugal force and a constant supply being maintained because of the height of the column of milk in the hollow hub of the hood. A particle of milk coming in contact with the plate 7 at the center of the latter travels in its passage toward the periphery of said plate in a spiral course and with constantly-accelerating speed, the course of the particle being represented diagrammatically in Fig. 2 and an attempt being made to indicate the difference in the speed of travel of the same by the varying distances between the successive dots whereby the course is represented. Thus the dots are close together at the central portion of the plate, but gradually increase in distance apart as they approach the periphery. There is at the same time a gradual diminution in the thickness of the film of milk on the plate 7, for as the volume of milk supplied thereto at the central portion of the same is limited by the width of the space between said plate and the bottom plate of the hood 14, and as the milk travels with constantly-increasing speed toward the periphery of the plate 7 there must be a diminution in the volume corresponding in a measure to such increased speed of travel, and for this reason a practically uniform heating of the body of milk is effected throughout the entire time of its travel over the plate 7, for when the volume is greatest in bulk it has the slowest movement, and as its rate of movement increases its bulk correspondingly decreases. Hence each square inch of heating-surface presented by the top plate 7 of the chambered cover of the water vessel will in a given period of time have passed over it a substantially equal volume of milk to be heated, and the machine is therefore well calculated for the attainment of the end in view—that is to say, the subjecting of the milk for a given time to a substantially uniform degree of heat which acts equally upon all particles of the volume of milk under treatment. For this reason I am enabled to heat the milk to a temperature more nearly approaching that of the water or other heating agent employed than is possible in other apparatus known to me, and I thereby effect a saving, since it is only necessary to heat the water to a temperature a few degrees higher than that desired for the milk and there is no risk of overheating the latter. Measurably the same result may be obtained without the use of the chambered hood 14, the latter being used simply to provide an additional heating-surface for the film of liquid flowing over the plate 7. The heated liquid escaping from the periphery of the plate 7 is collected in the annular trough 13, from which it may be discharged into any suitable receptacle.

Although I prefer to form the cap or cover for the vessel 1 as a chambered vessel, in the manner shown in Fig. 1, such construction is not necessary for the proper carrying out of my invention, since it will be manifest that a plate alone might be used in some cases. For instance, in Fig. 4 I have shown a construction in which the vessel 1 has as a cover a flat plate 7^a and is provided around its top with two annular troughs 13^a and 23, one outside of the other, the innermost trough 23 receiving the water overflowing between the wall of the vessel 1 and the plate 7^a, which overflow-water is directed downwardly into the trough by means of a rib 24^a on the under side of the plate, the pasteurized liquid being discharged from the downturned rim 12 of the plate into the outer trough 13^a.

In some cases it is considered necessary in order to complete the pasteurizing operation to cool the liquid under treatment after gradually heating the same, and it will be evident that the process and apparatus which I have described lend themselves as well to such cooling of the liquid as to the heating of the same. Hence the word "treating" is used in some of my claims to indicate either heating or cooling or heated or cooled.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The mode herein described of effecting the pasteurization of liquid, said mode consisting in causing the liquid to flow by centrifugal force with gradually-increasing speed over the whole treating-surface, substantially as specified.

2. The mode herein described of effecting the pasteurization of liquid, said mode consisting in causing the liquid to flow by centrifugal force in a film of gradually-decreasing thickness over the whole treating-surface, substantially as specified.

3. The mode herein described of effecting the pasteurization of liquid, said mode consisting in causing the liquid to flow by centrifugal force with gradually-increasing speed over the whole treating-surface and thereby form a film whose thickness diminishes in correspondence with the acceleration in the speed of its component parts, substantially as specified.

4. The mode herein described of effecting the pasteurization of liquid, said mode consisting in causing the liquid to flow by centrifugal force with gradually-increasing speed throughout the space between treating-surfaces, substantially as specified.

5. The mode herein described of effecting the pasteurization of liquid, said mode consisting in causing the liquid to flow by centrifugal force in a film of gradually-diminishing thickness throughout the space between treating-surfaces, substantially as specified.

6. The mode herein described of effecting the pasteurization of liquid, said mode con-

sisting in causing the liquid to flow by centrifugal force with gradually-increasing speed throughout the space between treating-surfaces, thus forming a film whose thickness diminishes in correspondence with the acceleration in the speed of its component parts, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK TYSON.

Witnesses:
WILL. A. BARR,
JOS. H. KLEIN.