

No. 648,586.

Patented May 1, 1900.

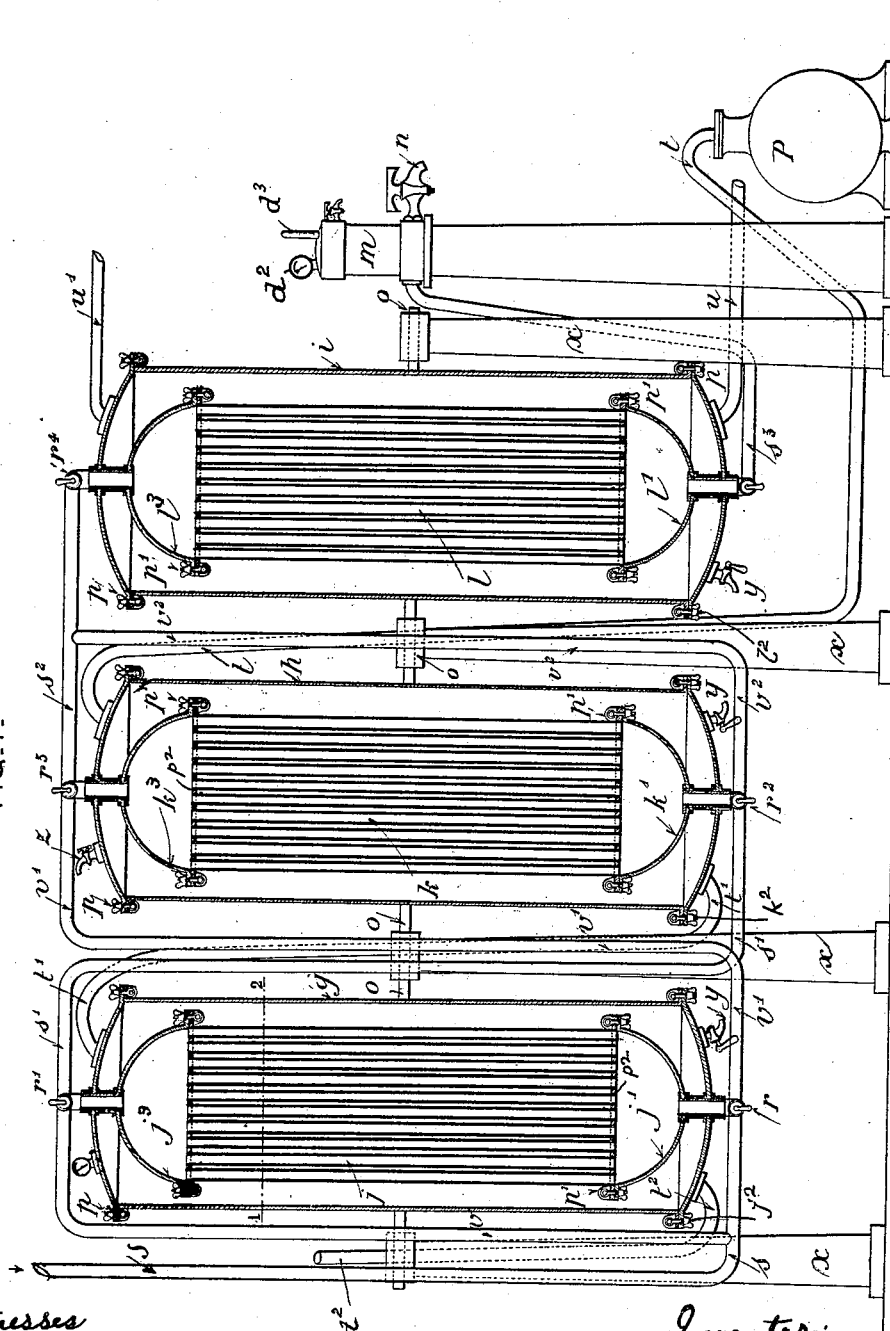
A. BRUNEL.
APPARATUS FOR PASTEURIZING BEER.

(Application filed Dec. 28, 1897.)

(No Model.)

3 Sheets—Sheet 1

FIG. 1.



Witnesses
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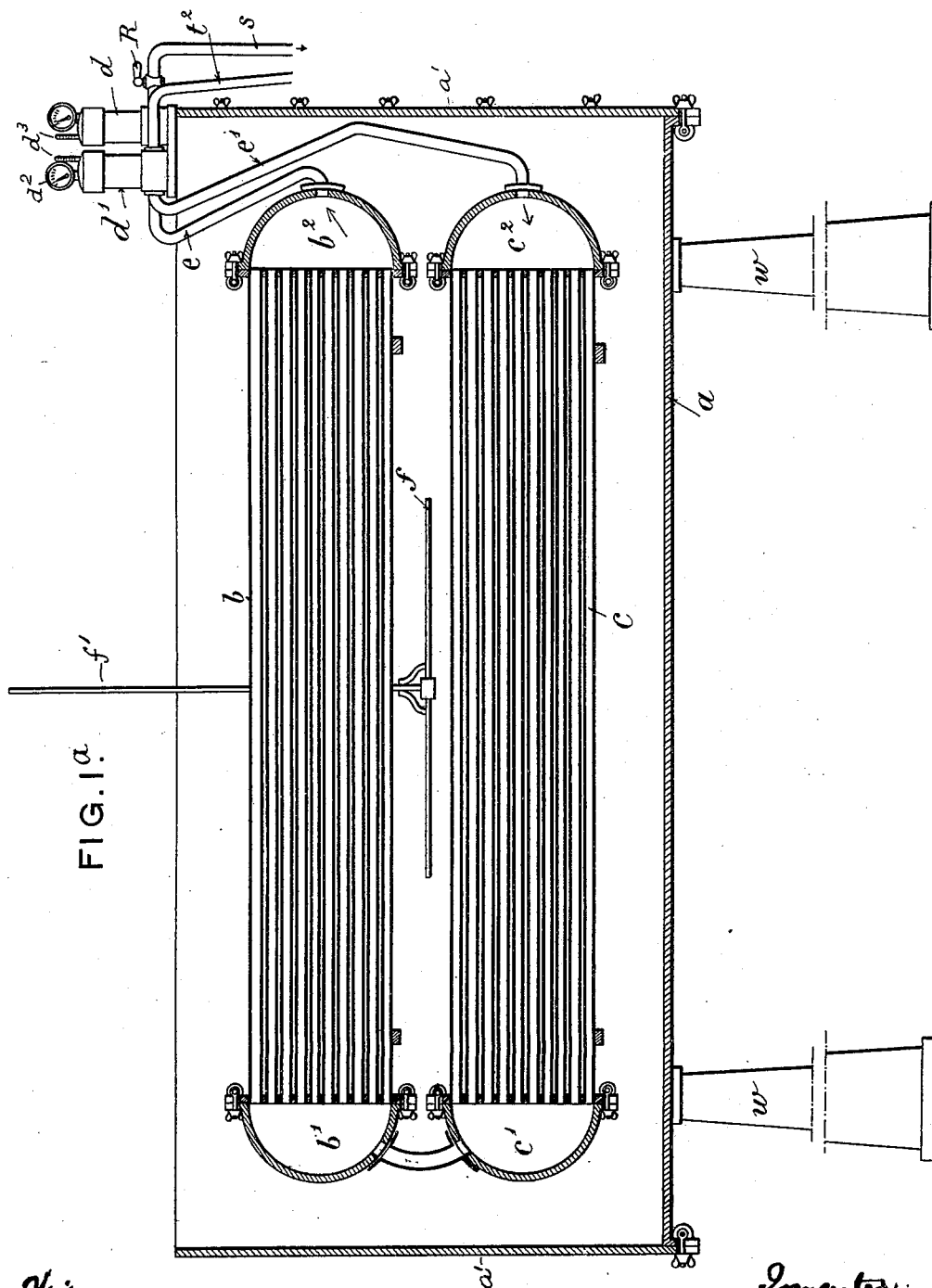
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(Application filed Dec. 23, 1897.)

(No Model.)

3 Sheets—Sheet 2.



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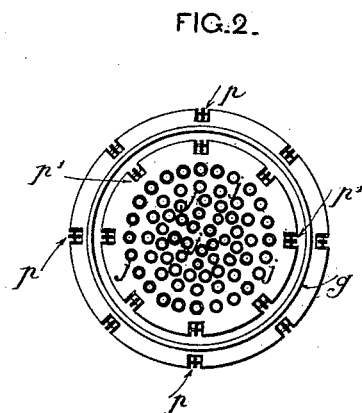
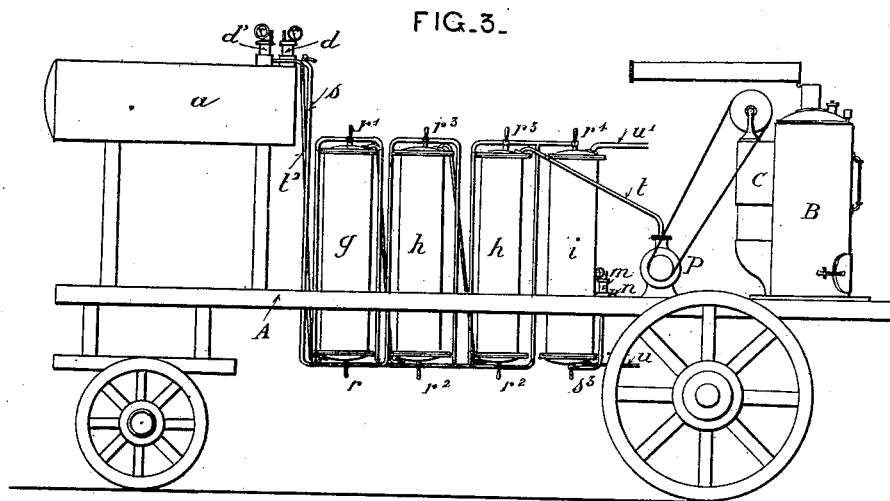
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ANSELME BRUNEL, OF UZÈS, FRANCE.

APPARATUS FOR PASTEURIZING BEER.

SPECIFICATION forming part of Letters Patent No. 648,586, dated May 1, 1900.

Application filed December 23, 1897. Serial No. 663,114. (No model.)

To all whom it may concern:

Be it known that I, ANSELME BRUNEL, brewer, of Uzès, Gard Department, in the Republic of France, have invented new Improvements in Apparatus for Pasteurizing Liquids, (for which I have obtained Letters Patent in France for fifteen years, No. 263,092, dated January 18, 1897; in Great Britain, No. 22,969, dated October 6, 1897; in Germany, dated May 31, 1897; in Belgium, dated September 29, 1897; in Austria, dated November 27, 1897, and in Switzerland, dated October 4, 1897;) and I do hereby declare that the following is a full and exact description thereof, reference being made to the accompanying drawings.

Pasteurization is, as is well known, an operation by which liquids are made safe against the action of ferments and parasites, consisting in gradually heating the same to a temperature of about 140° Fahrenheit.

The disagreeable taste which liquids retain after having been pasteurized in the usual apparatus, and which is due to the irregularity in the heating and cooling operations, entirely disappears in employing my apparatus, in which the changes of temperature take place gradually and very slowly, while, nevertheless, only the minimum of heat is required.

In the accompanying drawings, Figure 1 represents a sectional elevation of a part of the apparatus. Fig. 1^a is a similar view of another part of the apparatus. Fig. 2 is a part section on the line 1 2 of Fig. 1. Fig. 3 represents a modification of the apparatus as required when the apparatus is to be placed on a truck or car in order to be moved about.

This improved apparatus essentially comprises a tank *a*, Fig. 1^a, in which are placed two or more sets of tubes *b* and *c*, connected together at one of their ends by collectors *b'* and *c'*. These sets of parallel tubes present the advantage over serpentine-shaped tubes that they can be easily dismantled and cleaned and the further advantage of causing the liquid circulating in the apparatus to be greatly divided. The ends *a'* of the tank are removable in order to facilitate the operation of dismantling and cleaning the sets of tubes *b* and *c*. This tank, which is supported on columns *w w*, is designed to be filled with water and heated by steam or directly by fire in such a manner as to retain a suitable temperature

during the whole time during which the apparatus is worked. The collectors *b*² *c*² of tubes *b* and *c* are through the medium of tubes *e e'* connected with chambers *d* and *d'*, which are or may be fixed to the wall of the tank and which carry gages *d*² and thermometers *d*³ to indicate the pressure and temperature, respectively, of the liquid passing through said chambers. The tank *a* is further provided with a stirring device *f*, moved by hand (by handle *f'*) or mechanically, and which so agitates the water in the tank as to equalize the temperature throughout its whole mass.

The apparatus further comprises a set of three or more tubular bodies or tight-closing cylinders *g h i*, Fig. 1, in the interior of each of which a set of tubes *j k l* is rigidly fixed. The metallic cylinders *g h i* may have their interior silvered or enameled, according to the liquid they are intended to contain. They rest, by means of journals *o*, upon supports or columns *x*, so as to be capable of easily oscillating and of occupying a horizontal or inclined position whenever the sets or systems of tubes are required to be dismantled or cleaned. The bottoms of these cylinders are removable, being connected to the cylindrical parts by pivoted bolts *j*² *k*² *l*². Moreover, the hemispherical bottoms *j'* *k'* *l'*, forming the collectors for the tubes *j k l*, and the caps *j*³ *k*³ *l*³ are united by bolts *p'* with the end plates *p*² of these sets of tubes. Drain-cocks *q* are arranged on the bottom ends of cylinders *g h i*. A centrifugal pump *P* serves to send liquid to be pasteurized under pressure into that part of the apparatus shown in Fig. 1. A tube *t* conducts the liquid from any suitable source (not shown) into the middle cylinder *h* at the upper part of the same. This liquid fills up this cylinder while circulating around the set of tubes *k*. It leaves at the lower part of the cylinder *h* and is conveyed through the tube *t'* to the upper part of the cylinder *g*, which it fills by circulating around the set of tubes *j* and escapes through a tube *t*², which passes it to the safety device *d'*, Fig. 1^a. It then passes through a tube *e'* into the collector *c*² and through the set of tubes *c*, located in the tank *a*. This liquid passes thence into the collector *c'*, then into the collector *b'* of the upper set of tubes *b*, circulates in the said

latter tubes, and escapes from the collector b^2 through the tube e , by which it is conveyed into the safety device d . A tube s connects this safety device with the lower collector of the first vertical set of tubes j , Fig. 1, the inlet to which is controlled by a three-way cock r . The liquid circulates in the said set of tubes and escapes at the upper part through another three-way cock r' into the tube s' , and after having passed through a three-way cock r^2 it enters at the lower part into the collector of the set of tubes k . After having circulated through these tubes it leaves the same at the upper part through a three-way cock r^3 , passing into a horizontal tube s^2 , then through a cock r^4 into the set of tubes l , at their upper ends. It flows from above downward in this set of tubes, escapes at the lower end, and is conveyed through a tube s^3 to the third safety device or apparatus m , whence it is discharged through the cock n in order to be filtered and introduced into casks, bottles, or other receptacles from which the impure air has been previously expelled by means of carbonic-acid gas, sterilized air, or sulfurous acid, which escapes from the receptacles at the moment of filling.

The cylinder i , which does not receive the liquid to be pasteurized, is filled with cold brine, which is forced into the cylinder at the bottom through pipe u and leaves at the top through pipe u' . Cold water or any suitable cold liquid or mixture may be used instead of brine.

I would also point out that a branch pipe v from the tube s connects upward with the three-way cock r' , that a branch pipe v' connects the lower three-way cock r with the upper three-way cock r^3 , and, finally, that a third branch pipe v^2 connects the three-way cock r^2 with the upper tube s^2 , placed between the cocks r^3 and r^4 . These branch pipes are only used when the apparatus is desired to be emptied, as hereinafter indicated.

Assuming that the tank a has been filled with hot water, if cold brine is fed into the cylinder i and the pump P is started the pasteurizing operation will be as follows: The liquid to be pasteurized fills successively the vertical cylinders h g and the sets of tubes b and c , placed in the said tank. When the liquid reaches apparatus d , which is provided with a pressure-gage d^2 and a thermometer d^3 , the cock R , placed in tube s from the said apparatus, is closed, the pump P being stopped at the same time. The mass or volume of liquid filling the sets of tubes b and c and the collectors b' c' b^2 c^2 is gradually heated by the water in the tank a . When the thermometer d^3 of the apparatus d shows a temperature of about 140° Fahrenheit, suitable for pasteurization, the cock R is opened and the pump P is again started. The hot liquid fills successively the tubes and the dividing-collectors of the sets of tubes j and k , which are surrounded by the non-pasteurized and colder and colder liquid coming from the pump P

and filling the cylinders g and h . A gradual exchange of temperature takes place between the two liquids through the walls of the tubes and collectors, so that the non-pasteurized liquid coming from the pump is already warm on its arrival in the sets of horizontal tubes b and c , placed in the tank a , while the pasteurized liquid coming from the apparatus d is about cooled on its arrival in the third set of tubes l . The cylinder enveloping the set of tubes l being filled with very cold brine, constantly renewed by a special pump, the pasteurized liquid becomes completely cool in the tubes l , and the glutin it may contain coagulates and allows of its being retained by filtering the liquid when leaving the apparatuses. In this way will be prevented the disturbances caused by this matter, especially in cold weather. The liquid on leaving the set of tubes l flows through the tube s^3 into the safety apparatus m , where its temperature and pressure may be ascertained by the pressure-gage d^2 and the thermometer d^3 . It will leave the said apparatus through the cock n in order to be filtered and put into suitable receptacles, as hereinbefore described. Treated in this way liquids will remain for a long time brilliant or limpid, according to their nature, and will keep their good natural taste. The liquids will not have the disagreeable taste left by pasteurization when operated with the usual apparatuses, because all the molecules will have been heated and cooled very gradually, no ferment having been able to pass without being affected by the heat, and all ferments having been removed by filtration after the pasteurization.

If a very effervescent liquid is to be obtained, it will be only necessary to introduce carbonic-acid gas through a special cock z , placed at any suitable point of the apparatus where the liquid passes along. Therefore gasification will easily be effected at the same time as the pasteurization.

If the apparatus is to be completely emptied, the three-way cocks are so placed as to cause the sets of vertical tubes to communicate with the auxiliary branch pipes v , v' , and v^2 , already referred to. The liquid then passes into each of the several sets of tubes through the top and is entirely discharged from the cock n of the safety apparatus m under the action of its own weight and of the air-pressure applied by the pump, all the liquid thus discharged being entirely pasteurized.

The gradual raising of the temperature of the incoming liquid as it passes through cylinders g h before it reaches the main heating device—that is, the hot-water tank a , the tubes b c , and through which the liquid passes, and then the gradual cooling down of the liquid as it passes forward on its way to the refrigerating-cylinder through tubes j k in said cylinders g h by the cooler liquid flowing in or forward—is of great utility. Moreover, as the liquid is already warm on its arrival in the sets of tubes placed in the tank a but lit-

the heat will be necessary to heat it, an important saving of combustible being the consequence. Likewise, as the pasteurized liquid is nearly cold on its arrival in the set of tubes *l* it will abandon only a very small amount of caloric to the cold liquid filling the cylinder *i*, and on that account it will cost but very little to bring back the said liquid to its low temperature at start.

As the glutin is coagulated after pasteurization and before filtration there is no danger of disturbance in the liquid treated as hereinbefore described. Likewise, as the said liquid is filtered after its pasteurization it is freed from the disease-ferments which might still have a bad effect on its taste, its quality, or its preservation. Being given the high pressure to which it will be subjected, filtration will be better effected than with the usual apparatuses, even if the filtering masses were to be thicker and the filters much finer.

The apparatus works continuously, as while the liquid which has been heated is drawn off the liquid coming from the pump and circulating in the apparatus is being heated and then cools down of itself. A single attendant is able to manage the whole apparatus.

I would also point out that the apparatuses are very easy to clean on account of the particular arrangements made in their construction and that the said apparatus can be completely sterilized by means of steam after each operation.

My apparatus instead of being fitted on a fixed stand, as hereinbefore described, may be mounted on a truck or car in order to admit of its ready displacement. It may thus be transported from one wine-warehouse to another in case, for instance, where wine is required to be pasteurized. Fig. 3 of the accompanying drawings represents a scheme of

such a movable fitting for the apparatus. The apparatus remains identical with that described. Upon the rear of the truck or car A, I provide a small boiler B and a vertical steam-engine C. The boiler supplies the steam for heating the tank *a* and at the outset for sterilizing the apparatus. The steam-engine serves for actuating the pump P.

I claim—

1. The combination, in an apparatus for pasteurizing liquids, of means, as pump P for circulating the liquid to be pasteurized, cylinders *g*, *h*, *i*, tubes *j*, *k*, *l*, therein, collectors *j'*, *j''*, *k'*, *k''*, and *l'*, *l''* for the tubes, a pipe from the pump to the upper end of one of said cylinders, a pipe from the bottom of said cylinder to the top of another of the cylinders, a pipe from the bottom of the latter cylinder, a heating-tank *a*, series of tubes therein with which the last-mentioned pipe communicates, a pipe from the outlet end of the series of tubes connecting with the lower ends of tubes *j*, a pipe connecting the upper ends of said tubes to the lower ends of tubes *k*, a pipe to the upper end tubes *l*, and means for drawing off the liquid.

2. The combination, in a pasteurizing apparatus, with cylinders *g*, *h*, *i*, tubes *j*, *k*, *l*, therein, and pipe connections for conveying the liquid to be treated through the cylinders *g*, *h*, in one direction and back through the tubes *j*, *k*, in reverse direction, of pipes *v*, *v'*, *v''*, three-way cocks *r*, *r'*, *r''* and *r'''* for reversing the direction of the liquid through the tubes *j*, *k*.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ANSELME BRUNEL.

Witnesses:

CHARLES RITTER,
CHARLES SCHNYDER.