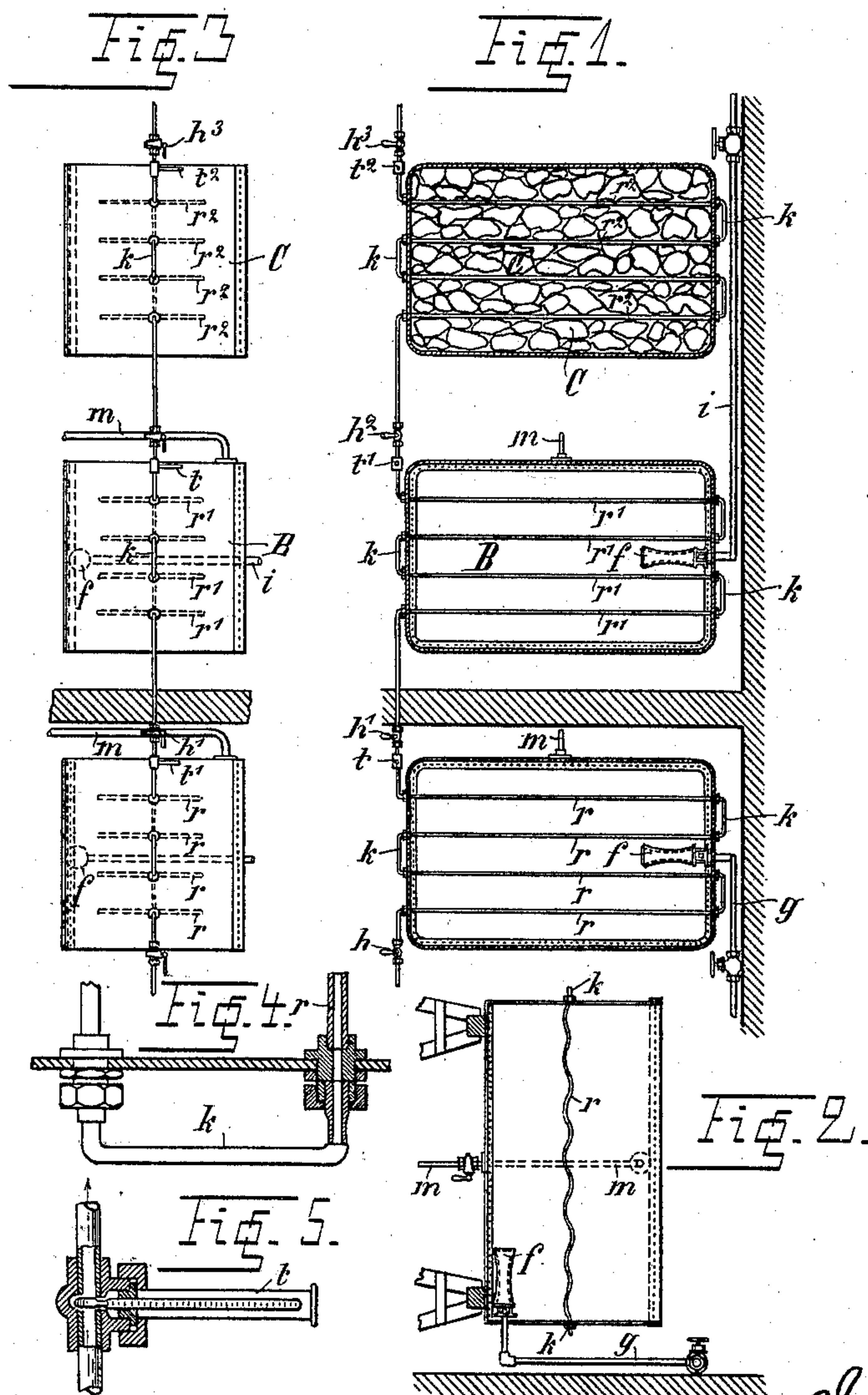


(No Model.)

J. H. W. ORTMANN.
PROCESS OF PASTEURIZING LIQUIDS.

No. 603,920.

Patented May 10, 1898.



Witnesses:
James R. Mansfield.
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UNITED STATES PATENT OFFICE.

JOHN HENRY WILLIAM ORTMANN, OF HAMBURG, GERMANY, ASSIGNOR TO
HERMAN LEONHARDT, OF SAME PLACE.

PROCESS OF PASTEURIZING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 603,920, dated May 10, 1898.

Application filed October 28, 1896. Serial No. 610,378. (No specimens.) Patented in Norway March 21, 1895, No. 4,376; in Germany June 10, 1895, No. 82,470; in Sweden February 13, 1896, No. 6,685; in Denmark May 18, 1896, No. 537; in Belgium October 25, 1896, No. 123,700; in Austria January 28, 1897, No. 47/305; in Canada March 10, 1897, No. 55,220; in Hungary April 23, 1897, No. 8,104, and in England June 5, 1897, No. 1,203.

To all whom it may concern:

Be it known that I, JOHN HENRY WILLIAM ORTMANN, machinist, of 9 Gothenstrasse, Hamburg, in the German Empire, have invented a new or Improved Process of Pasteurizing Liquids, (for which I have obtained Letters Patent in the following countries: Austria, No. 47/305, granted January 28, 1897; Hungary, No. 8,104, granted April 23, 1897; England, No. 1,203, granted June 5, 1897; Belgium, No. 123,700, granted October 25, 1896; Canada, No. 55,220, granted March 10, 1897; Germany, No. 82,470, granted June 10, 1895; Sweden, No. 6,685, granted February 13, 1896; Norway, No. 4,376, granted March 21, 1895, and Denmark, No. 537, granted May 18, 1896;) and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention is an improved method or process of pasteurizing beer and other liquids containing gases; and its object is to effectively pasteurize the liquid (preferably on its way from the storage-vat to the receptacles from which it is ordinarily dispensed) and at the same time cause it to completely reabsorb or assimilate all the gases which are or may be separated therefrom by the heat in the pasteurizing process. This object is effected by passing the liquid to be pasteurized through a system of vertically-arranged undulating pipe coils or bends, in which it is first heated to the requisite degree and then cooled. The gas separated by the action of the heat collects in the upper bends of the undulating pipes, is carried down in the descending legs of the pipes by the liquid flowing through them, and then rises again in bubbles through the liquid in the ascending pipes. This process continues until the whole of the separated gas has been reabsorbed by the liquid. Loss of gas is by this means completely avoided, and the liquid remains as fully charged with gas after the pasteurization has been effected as before.

The accompanying sheet of drawings illustrates an apparatus for pasteurizing beer arranged and constructed in accordance with my invention, and therein—

Figure 1 is a horizontal section through the apparatus. Fig. 2 is a vertical transverse section therethrough. Fig. 3 is a side elevation,

and Figs. 4 and 5 show certain details of construction.

The apparatus consists of three principal parts—namely, a pasteurizer A, a water-cooler B, and an ice-cooler C. Each of these parts consists of a tank or vat provided with a series of undulating pipes connected together by connecting-pipes *k* into a continuous system or worm, through which the liquid is conducted. The three tanks or vats may be placed at suitable distances from each other, as shown. All three tanks are filled with water. The contents of the tank A are then heated to and maintained at a temperature of from 75° to 95° centigrade by means of steam supplied through a pipe *g* and steam-distributing apparatus *f*. The contents of tank B are maintained at a temperature of about 15° centigrade by water supplied through the pipe *i*, and the contents of the tank C are maintained at 0° centigrade by means of ice, as shown. The inlet end of the pipe system in tank A is connected by a pipe *s* with the storage-vat. (Not shown.)

The beer is forced from the storage-vat by suitable means into and through the above-described apparatus. When the above-mentioned degree of heat has been attained in the tank A, the tap *h'* is opened. The beer then enters the pipe *r* of the tank A and is raised to a pasteurizing temperature, which is shown by the thermometer *t*. The beer then passes through the tap *h'* into the pipes *r'* of the tank B and is there cooled to a temperature of from 15° to 20° centigrade, which is shown by the thermometer *t'*. The cooled beer then passes through the tap *h''* into the pipes *r''* of the ice-water tank C and is there cooled to a temperature of about 5° centigrade, which is about the temperature at which it should have left the storage-vat. The thermometer *t''* serves to indicate this temperature. The now pasteurized beer can be withdrawn through the tap *h'''* into casks or into a filling-machine, whence it can be drawn off into bottles, or it may be passed through a filter or be otherwise dealt with.

The connecting-pieces *k* for the pipes *r* *r'* *r''* are arranged outside the tanks, so that by removing the said connecting-pieces the said pipes can be readily got at for cleaning purposes. The construction of these connecting-

pieces is clearly shown in Fig. 4. The manner of fixing the thermometers in the pipes is shown in Fig. 5.

I do not claim *per se* the arrangement of
5 pipe-coils.

An undulating arrangement of pipes is necessary in carrying out my invention, as it is necessary that the gas be trapped at or in the upper parts of the undulating portions of each
10 pipe, while the lower bends of the pipes will remain filled with liquid.

I have found in attempting to pasteurize beer in ordinary apparatuses that the gases liberated by the heat being lighter than the
15 liquid fly ahead of the liquid and remain separate therefrom, and in a horizontal layer of pipe there would be a current of gas and a current of liquid flowing side by side through the pipe, the gas being on top. In order to
20 break up and intermingle these currents, so as to cause the liquid to reabsorb the gas, I found that by making the horizontal sections of the pipe-coils undulating the gases separated from the liquid in the pasteurizer would
25 be arrested at the top of the bends and in order to get ahead it would have to descend through the liquid in the lower bends and in doing so would be commingled with the liquid and more or less absorbed thereby, so
30 that toward the end of the system of undulating pipes no gas would remain separated from the liquid if a sufficiently lengthy coil be used. By continuing the undulating coils through the cooler and refrigerator I am enabled to cause the liquid to completely re-
35 absorb the gases, and the decanted beer is as lively after pasteurization by my process in my apparatus as it was when leaving the storage-vat. This result has never before been
40 realized, and therefore I believe myself entitled to protection on my process and apparatus as herein described and claimed.

The undulations of the pipes are preferably so formed that the proper flow of liquid and
45 gases will not be retarded, but the gases will be forced along through the liquid from one undulation to the other, and the length of the system of pipes is such that prior to the exit of the beer the gases are completely re-
50 absorbed.

In order to efficiently operate my process, the apparatus employed must have a sufficient number and length of bends to effectively produce a reabsorption of the gases by
55 the liquid. These bends should not be so great as to require an excessive pressure upon the liquid in order to force it therethrough, but they should be of such size and so numerous that the gas evolved will be retarded in
60 the pipes and not allowed to rush ahead of the liquid and escape, but will be divided into numerous small quantities which will be trapped in the numerous bends and thus subjected to the action of the liquid flowing
65 through the pipes. In the first bends, of course, there would probably be more gas trapped, because of the greater evolution of

gas in the pasteurizing part of the apparatus; but as the liquid flows through the pipe-bends the trapped gases are either moved on
70 with the liquid, and consequently caused to commingle therewith in descending or ascending through the bends, or the liquid partially flows through the gases in the bends and in either case absorbs part of such liquid, so
75 that although the gases are or may be shifted from bend to bend along with the moving liquid flowing through the set of pipes, yet more and more of the gas is absorbed by the liquid until eventually no free gas remains
80 in the pipes, and the beer or liquid finally decanted or drawn off has no free gas remaining in it. Thus the process may be said to consist in retarding the flow of the gases and dividing them into numerous small bodies, each
85 of which is subjected to the presence of and commingled with the passing fluid, by which the free gases are absorbed. This process will be readily distinguished from other merely decanting or refrigerating apparatus
90 having pipe bends or coils in which the gases can either rush ahead of the liquid or collect in such quantities that it would escape with the liquid, because the gas is neither sufficiently retarded nor subdivided or sufficient
95 bends employed to cause the complete absorption of the gas by the liquid.

I might add that the drawings are merely diagrammatical of the apparatus and do not
100 show a sufficient number of bends to practically accomplish my process; but with the foregoing description any one skilled in the art would be enabled to practice my process and realize the beneficial results of my invention.
105

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

The herein-described process of pasteurizing beer and other carbonated liquids consisting in passing the liquid through a lengthy
110 system of connected horizontal pipes with vertical undulations, said system being heated at one end and cooled at the other end, the liquid being admitted into the heated part of
115 said pipes so as to pasteurize it, and said liquid being then passed on through the undulations of the pipes, whereby any gas freed from the liquid is retarded in its flow by the bends and divided into numerous small portions which are trapped in the upper part of
120 the undulations of the pipes and therein subjected to and commingled with the liquid flowing through the pipes, until the gas is reabsorbed by the liquid and the latter cooled,
125 substantially as and for the purpose described.

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

JOHN HENRY WILLIAM ORTMANN.

Witnesses:

CARL WILHELM CORNELIUS HERBZ,
GUSTAV WIBER.