

F. HAECK.

Apparatus for Cooling and Aerating Liquids.

No. 45,004.

Patented Nov. 8, 1864.

Fig. 2.

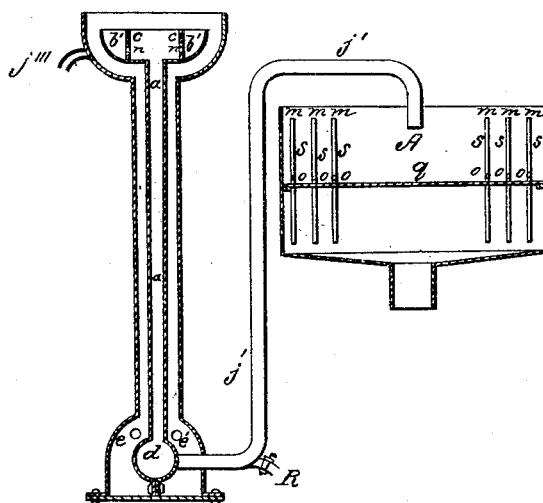


Fig. 1.

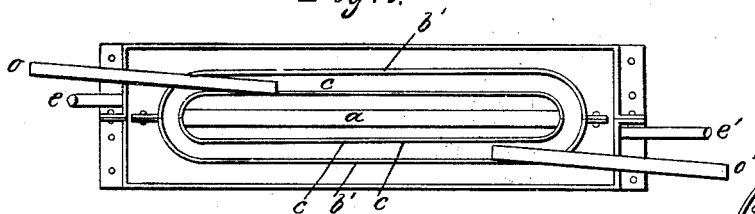


Fig. 4.

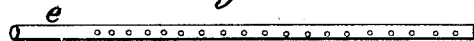


Fig. 3.

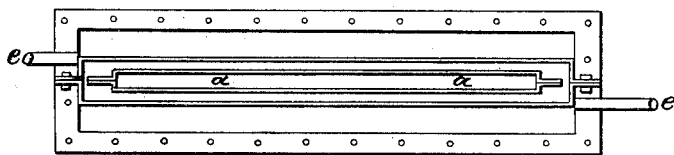
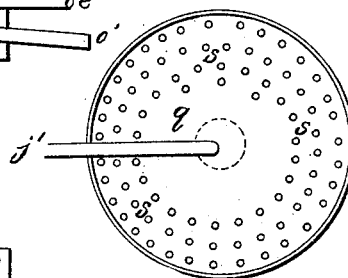


Fig. 5.



Inventor.

Witnesses:

Melville Biggs.
Jas S. Ferguson.

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C. S. Kenrick

UNITED STATES PATENT OFFICE.

FRANCOIS HAECK, OF BRUSSELS, BELGIUM.

IMPROVED APPARATUS FOR COOLING AND AERATING LIQUIDS.

Specification forming part of Letters Patent No. 45,604, dated November 8, 1864.

To all whom it may concern:

Be it known that I, FRANCOIS HAECK, a subject of the King of Belgium, residing at Brussels, Belgium, have invented an Improved Oxygenator and Cooler for the Use of Distillers and Brewers; and I do hereby declare that the following is a full, clear, and exact description of the same.

Very often in distilleries it is necessary to reduce to a very low temperature and at the same time to oxygenate considerable quantities of liquid intended to afterward undergo alcoholic fermentation. To attain this double end it is usual to spread these liquids in large shallow troughs, similar to the cooling-troughs used in breweries for the cooling and oxygenating of worts. The operation of cooling in these troughs is accelerated by fans; but as the temperature and the amount of oxygenation which should be imparted to these liquids are always the same, in order to produce good fermentation, while the temperature of the air and consequently the length of time the liquids are allowed to remain in the troughs are variable, the operation of cooling and oxygenating the liquids is not performed for the most part under conditions favorable to the best alcoholic fermentation. Now, it is exceedingly easy, by the employment of the apparatus represented in Figures 1 to 5, to perform the cooling and oxygenation of the liquids with mathematical precision.

Figure 1 is a plan of the apparatus; Fig. 2, a vertical section, and Fig. 3 a horizontal section.

The open jacket *b'*, Figs. 1 and 2, is constructed in the form of a gutter. The inner side, *c*, of the jacket is pierced with vertical rectangular holes *n* at small distances from each other. The liquid to be cooled, coming from the reservoir sufficiently hot, enters the narrow gutter *b'* in a double stream by pipes *o o'*, Fig. 1, in such manner as to produce in the gutter a circulating motion as rapid as possible. This circulating motion of the liquid causes it to pass into the space *a* by the lateral holes *n* from the gutter. By the motion imparted to the liquid the portions which pass through the holes *n* descend with a uniform motion into the space *a* to the widened bottom *d* thereof.

j' is a pipe by which the cooled liquid makes its exit from *d*. This pipe rises to the height

necessary for the level of the liquid in the gutter *b'*. It is fitted with a cock, *R*, to empty the space *a* at the end of the operation. The refrigerating-water enters by two pipes, *e e'*. They extend horizontally the whole length of the interior of the space, as indicated in Fig. 4, which is a view of the pipe *e*. They are pierced with holes at top, by which the water is divided and projected toward the top of the apparatus, so that the whole breadth of the refrigerating-space is made to act. One of these pipes leads the water to the bottom of the narrow space at the right of the apparatus, while the other pipe leads it to the bottom of the narrow space at the left of the apparatus. By this method of introducing the water the liquid which descends in the space *a* is surrounded on both sides by refrigerating-water, which is renewed according to the quantity of liquid which passes through the space *a*. The refrigerating-water having become heated runs off by the pipe *j'''*.

The apparatus thus described is constructed in parts united by flanges and bolts, so that the four parts—two together in juxtaposition—which form the apparatus may be entirely separated to be cleansed by hand.

The two parts which form the space *a* are of tinned copper, and the two parts which form the vessel surrounding the water are of iron or wood.

It is easy to understand that by introducing cold water proportionate in quantity to the quantity of liquid introduced the liquid may always be reduced to the exact temperature required for the fermentation.

I now proceed to explain the manner in which the exact amount of oxygen indispensable to good fermentation is introduced into the liquid. For this purpose I place at the orifice of the pipe *j'* a cylindrical vessel, *A*. *q* is a division-plate in this vessel, in which are fitted a number of small tubes, *s*, open at their two ends. (See the vertical section, Fig. 2, *A*, and plan, Fig. 5.) These tubes are all of the same diameter. Immediately above the division-plate *q* they have an opening, *o*, through which the liquid passes from the trough and flows through the lower ends of the tubes. This flowing produces in the bottom of each tube a continuous suction which draws air through the upper opening, *m*, of

each tube. The current of air mixes with the current of liquid which passes through the tubes. It mixes with it also by the falling of the liquid on the division-plate of a second vessel placed immediately under the first, and constructed in every respect the same.

It is obvious that the liquid will be more oxygenated the more tubes and superposed vessels it passes through. As all the liquid mass is actuated by the same conditions of oxygenation, the oxygenation will be homogeneous, and will insure an equal and regular fermentation of the liquid.

The operation just described for the cooling and oxygenating of the liquid applies also to the cooling and oxygenation of worts of beer.

The process above described for regulating at a fixed temperature and oxygenating to an exact amount is also applicable to the manufacture of vinegar, since the production of vinegar is only an oxygenation of the liquid by means of air introduced in suitable quantity. The refrigerating and oxygenating apparatus thus described allows of imparting rapidly the exact degree of temperature and the precise amount of oxygenation necessary for the best alcoholic fermentation of a liquid. This apparatus performs the refrigerating of the liquid by the process of reducing it into thin layers or films. The liquid to be cooled is equally distributed in the central narrow space of the apparatus by causing it to enter first as forcibly as possible a narrow gutter, which it rapidly traverses all round the apparatus, escaping by equidistant lateral orifices formed in the inner side of the gutter. The cooling medium enters below on both sides, and is distributed the whole length of

the apparatus; and the oxygenation of the liquid is effected by means of a vessel or trough into which the liquid is carried on coming out of the refrigerator, from which vessel the liquid cannot escape except by flowing through a number of tubes open at both ends and traversed by a quick current of air drawn into the tubes by the flowing of the liquid, which air enters the tubes by holes formed at the level of the bottom of the vessel.

The refrigerating apparatus may be made of the cylindrical form.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The cooler hereinbefore described, containing a thin chamber for the liquid to be cooled, thin chambers for the cooling liquid, a perforated gutter or its equivalent to distribute the liquid to be cooled, a pipe for its escape, and suitable means for the supply and escape of the cooling-liquid, all the parts being constructed substantially as set forth.

2. The oxygenator hereinbefore described, composed substantially of two chambers and perforated tubes, through which tubes air is drawn by the flow of the liquid, all constructed substantially as set forth.

3. The combination of the cooler and oxygenator, as described, so that the liquid may be cooled and oxygenated at one continuous operation.

In witness whereof I have heretunto set my hand.

FRANCOIS HAECK.

Witnesses:

T. VIRNEBURG,
G. DAWES.