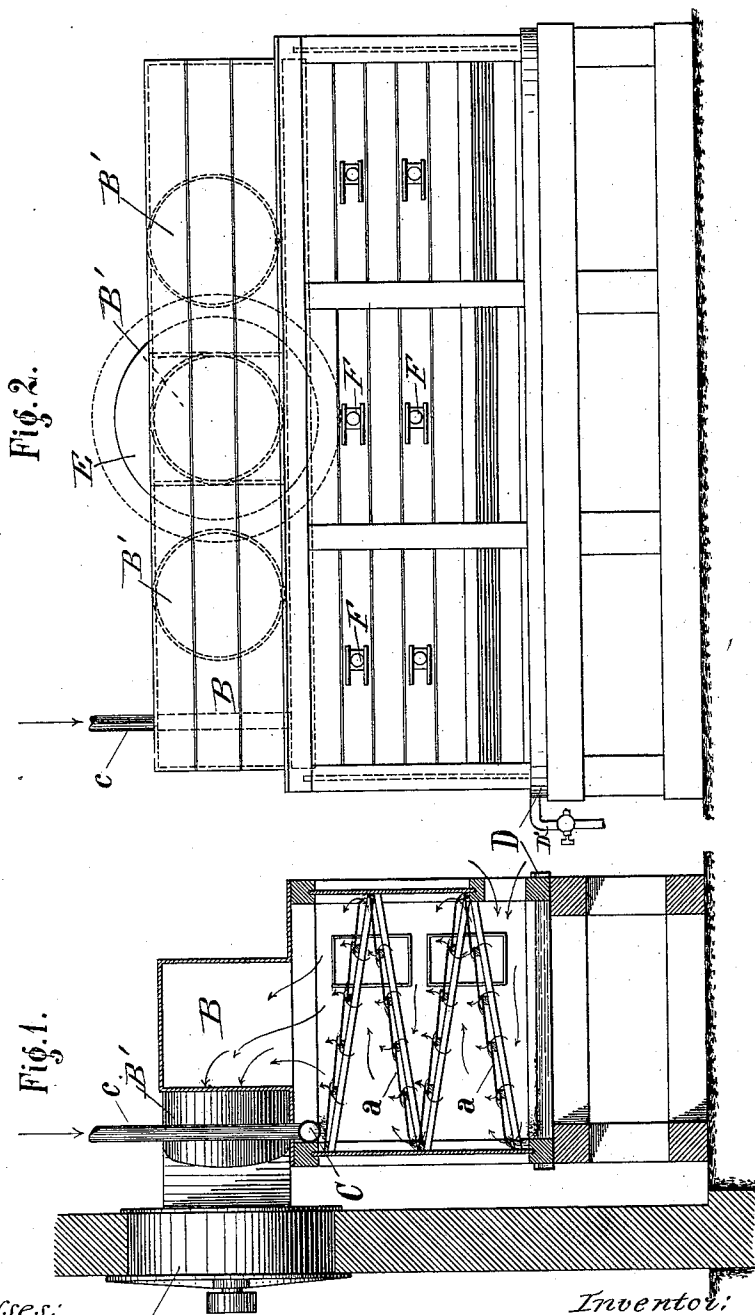


(No Model.)

B. RETTENMEYER.
APPARATUS FOR COOLING FLUIDS.

No. 468,919.

Patented Feb. 16, 1892.



Witnesses:
James W. ...
John E. Moore

Inventor:
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by *Max Georgi*
his Attorney.

UNITED STATES PATENT OFFICE.

BERNHARD RETTENMEYER, OF STUTTGART, GERMANY.

APPARATUS FOR COOLING FLUIDS.

SPECIFICATION forming part of Letters Patent No. 468,919, dated February 16, 1892.

Application filed August 19, 1891. Serial No. 403,143. (No model.)

To all whom it may concern:

Be it known that I, BERNHARD RETTENMEYER, a citizen of the Kingdom of Württemberg, residing at Stuttgart, Württemberg, in the German Empire, have invented a new and useful Improvement in Apparatus for Cooling Fluids, of which the following is a specification.

The present invention relates to apparatus for cooling liquids by means of an air-current caused by suction or blowing to pass through the apparatus in a direction opposite to that of the motion of the liquid, whereby the air is compelled to repeatedly pass the thin stream of liquid in order to come into contact with the same as often as possible.

In the accompanying drawings I have shown an apparatus which in my present opinion constitutes the best embodiment of my invention.

In the drawings, Figure 1 represents a side elevation partially in transverse vertical section, and Fig. 2 a front elevation of the said apparatus.

I convey the liquid to be cooled into the distributing-pipe C in the top of the apparatus by means of the tube c. From the distributing-pipe C the liquid is distributed over the corrugated strips of sheet metal a, arranged in terraced or stepped series one above the other, each series being preferably inclined in a direction opposite to the one immediately preceding, as shown. A slotted opening or openings are left between each two adjoining plates a to permit the passage of air. The liquid flows from the uppermost series, of sheet-metal strips to the next lower one, &c., until it has passed all the series, and is collected in a receiver or tank D at the bottom of the apparatus and carried off.

The air drawn into the apparatus from the bottom of the same by means of an exhaust-pump E passes between the liquid in the receiver D and the lowermost terraced series in the direction of the arrows, and thence through the sheets or cascades of falling liquid between the metal strips a and escapes above the uppermost terraced series by means of the air-duct B and exhaust-pump E.

The air-duct B may communicate by a series of drums or throats B' with the exhaust-

pump E, as shown; but this arrangement is immaterial and may be replaced by any other suitable means of communication. The liquid after arriving in the tank or receiver D may be drawn off by an exit-pipe D' or in any other suitable manner. For the purpose of inspecting the interior of the apparatus I may provide glass-covered sight-holes, as shown at F. In the present arrangement the air is hence compelled to pass through the liquid to be cooled twenty times, whereby the latter is very considerably cooled off. This action is, moreover, assisted by the cooling action of the air passing beneath the thin metal strips a, and hence acting upon the superincumbent layers of liquid. The air, moreover, passes over and cools the liquid upon the upper faces of the metal strips. The cooling action is so great that at a temperature of about 18° centigrade (in the shade) liquid may be cooled from 100° centigrade to 25° or 30° centigrade and from 25° to 11° centigrade.

My arrangement is particularly advantageous when it is desired to mix the air with the liquid to be cooled—e. g., in cooling beer after the same has left the vat to be cooled and prepared for fermentation. By the air-cooling process taking place in my apparatus the temperature of the beer is quickly reduced from about 90° or 100° centigrade to below 30°, thereby averting the dangerous formation of lactic acid. The fermentation of the beer can be immediately induced thereafter. The beer is, moreover, charged with air and made more palatable.

It is manifest that the apparatus may be adapted to any desired quantity of liquid to be cooled by making the same of suitable size or by arranging larger or smaller numbers of superincumbent series of terraced metal strips or plates. It is, however, advisable to limit the number of these series to five, because the dry air is a better cooling medium and its cooling action decreases considerably as soon as the same becomes charged with a notable amount of moisture.

My apparatus is also well adapted to cool the water of condensation in steam-engines and for other industrial purposes.

My apparatus excels the cooling devices heretofore employed in cheapness and sim-

plicity. It may be easily cleaned and never becomes clogged. This drawback occurs after a few days only after starting the apparatus, especially where superimposed foraminated floors or screens are used, by virtue of the formation of hard deposits at the passages or perforations. The costs of cleaning these foraminated floors in this case almost exceed the advantage gained in cooling. Manifestly, instead of exhausting the air the same may also be forced or blown into the apparatus; but in this case the temperature of the cooling air-current is always raised somewhat. The exhausting action will hence, in general, be more advantageous.

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

1. In a cooling apparatus, a series of plates arranged in terraces and provided with air-passages passing through the series and means for forcing a current of air through said air-passages, in combination therewith, substantially as set forth.

2. In a cooling apparatus, a series of plates arranged in terraces and provided with air-passages between each two adjoining plates, in combination with means for forcing an air-

current through said air-passages, substantially as set forth.

3. In a cooling apparatus, a number of series of plates arranged in terraces, the series being arranged one below the other and air-passages being provided between the adjoining plates, in combination with a liquid-supply and means for producing an air-current in the cooling apparatus, substantially as set forth.

4. In a cooling apparatus, a number of series of plates arranged in terraces, the series being arranged one below the other, each series being inclined in an opposite direction to the one immediately preceding and air-passages being provided between the adjoining plates, in combination with a liquid-supply and means for producing an air-current in the cooling apparatus, substantially as set forth.

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

BERNHARD RETTENMEYER.

Witnesses:

AUGUST B. DRAUTZ,
CARL DUSSMAUNT.