

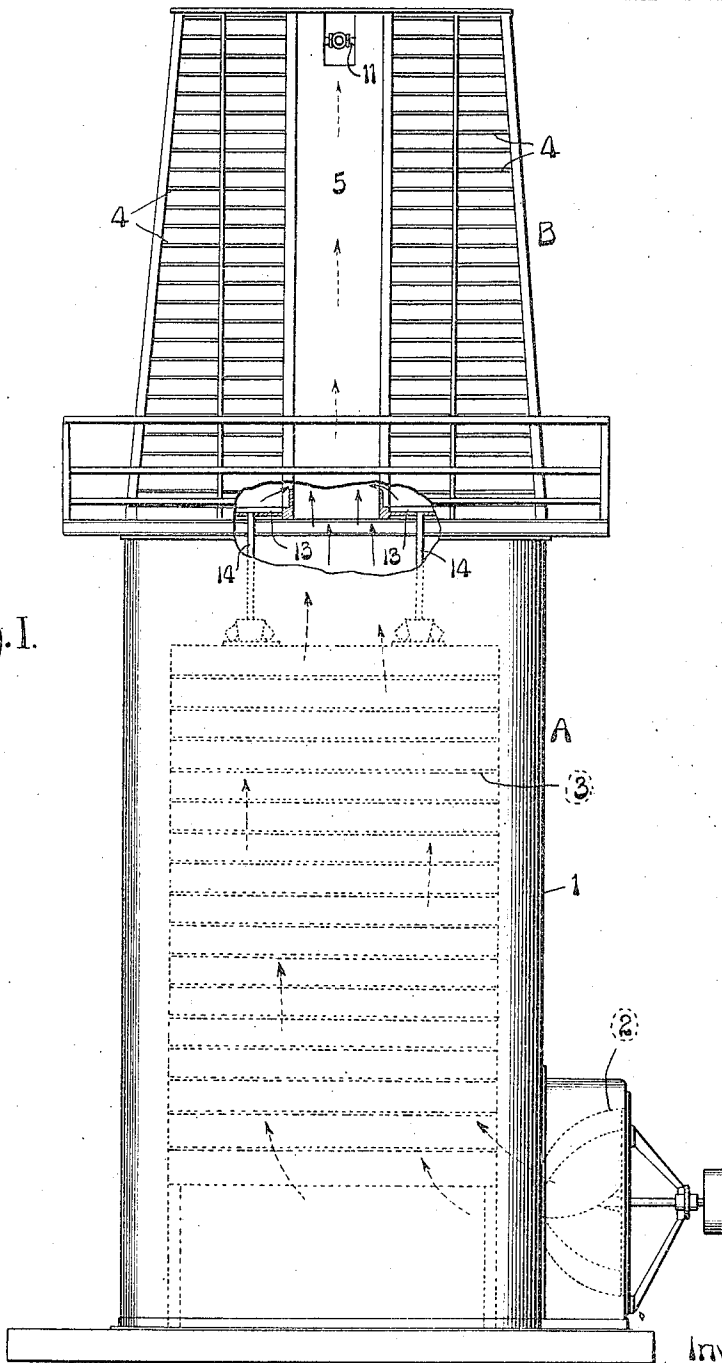
F. BAUER.  
LIQUID COOLING APPARATUS.  
APPLICATION FILED DEC. 30, 1911.

1,050,909.

Patented Jan. 21, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



Attest  
A. J. McCauley  
E. B. Green

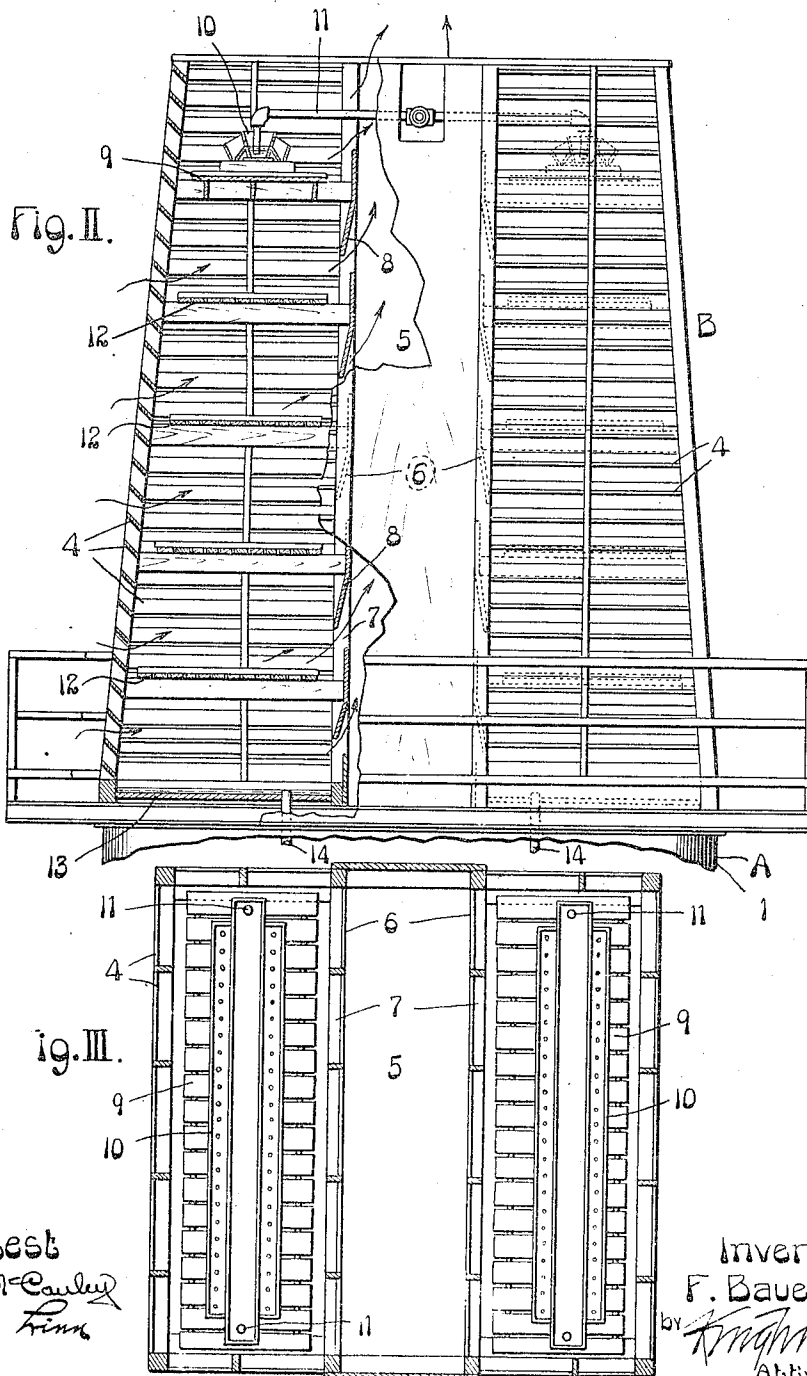
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# UNITED STATES PATENT OFFICE.

FERDINAND BAUER, OF ST. LOUIS, MISSOURI.

## LIQUID-COOLING APPARATUS.

1,050,909.

Specification of Letters Patent.

Patented Jan. 21, 1913.

Application filed December 30, 1911. Serial No. 668,607.

*To all whom it may concern:*

Be it known that I, FERDINAND BAUER, a citizen of the United States of America, and resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Liquid-Cooling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that character of apparatus utilized for reducing the temperature of large quantities of liquid, such as water, an illustration of an example of which is to be found in Letters Patent of the United States, No. 927,766, issued to me July 13, 1909.

The object of the present invention is more particularly to provide in association with an apparatus of the general description of that in my previous patent, and through which air is forced by mechanical means, an auxiliary liquid cooling apparatus into which air enters under atmospheric pressure, and is caused to circulate with efficient liquid cooling action due to suction created by the forced circulation of air through the main apparatus and therefrom to and through the auxiliary apparatus.

By making a liquid cooling apparatus in accordance with the foregoing statement, I am enabled to lower the temperature of liquid passed through the two combined apparatuses of the different types much more effectively and at a much lower expense, this being true for the reason, that the auxiliary apparatus through which the liquid first passes is operable without expense, the temperature of the liquid is materially lowered while passing through this auxiliary apparatus, and thereafter lowered to a greater degree while passing through the main apparatus, to which air is mechanically supplied, without any greater cost being incurred in the operation of the last mentioned apparatus, due to the operation of the auxiliary apparatus.

Figure I is a side elevation of my liquid cooling apparatus, partly broken out to afford a view of the interior at the point of communication between the main and auxiliary apparatuses. Fig. II is in part a side elevation and in part a vertical section of the auxiliary apparatus. Fig. III is a horizontal section taken through the auxiliary

apparatus immediately above the liquid delivery troughs.

In the drawings: A designates the main apparatus and B the auxiliary apparatus used conjointly in my combined apparatus.

The main apparatus A, which is lowermost, comprises a casing 1 into the lower end of which air is forcibly delivered by a suitable fan 2. The said casing incloses a liquid distributing structure 3; (see dotted lines Fig. I), that may, for example, be similar to that shown in my patent hereinbefore mentioned, or may be of any other desired form that will provide for the distribution of liquid within the casing 1, so that it is exposed to the cooling influence of a current, or currents of air, produced by mechanical means.

The auxiliary apparatus B surmounts the main or lower apparatus A and has skeleton or openwork walls through which air under atmospheric pressure may freely enter said auxiliary section. Said walls preferably comprise suitable uprights and slats 4 supported by said uprights, the slats being arranged horizontally at intervals throughout the heights of the walls in which they are present and being preferably inclined inwardly and downwardly, as seen in Fig. II.

5 designates a flue extending centrally through the apparatus B and preferably extending from one wall of said apparatus to the opposite wall parallel with the first named, as seen in Fig. III. The side walls 6 of the flue 5 are apertured, as seen at 7, to permit the passage of air into said flue from compartments B into which the air enters by passing through the openwork outer walls. At the location of said apertures are deflectors 8 extending outwardly from the flue walls and serving to prevent the passage of liquid through the opening 7 into the flue, during the descent of such liquid in the compartments between the openwork outer walls and the flue walls. Near the top of the apparatus B in the compartments between the flue and the outer walls are platforms 9, on which are located liquid delivery troughs 10 that are supplied with liquid to be cooled from a conducting pipe 11, and from which the liquid overflows to flow onto the platforms 12 located one below another at suitable intervals throughout the height of the auxiliary apparatus.

The liquid to be cooled descends from one to another of the several platforms 12 on which it first spreads in thin sheets and then flows over or through the platforms to the lower platforms. During the descent of the liquid in the manner explained, air circulates freely through the openwork outer walls of the apparatus B into the compartments between the outer walls and flue in which the liquid descends, and the flow of air is greatly accelerated through said compartments by a strong current of air passing into and through the flue 5 from the main apparatus A, due to the operation of the mechanical means provided to create a forced circulation through the said main apparatus. When the liquid being cooled reaches the bottom of the auxiliary apparatus, it deposits in catch basins 13, and may be withdrawn from such catch basins for use, if its temperature has been sufficiently lowered by passage through the auxiliary apparatus. I make provision, however, for the delivery of such liquid from the auxiliary apparatus to the main apparatus, in order that it may pass through the latter to have its temperature reduced to a greater degree, the means just referred to being pipes 14 leading downwardly from said catch basins to the liquid distributing structure within the main apparatus.

I claim:—

1. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus open to receive air under atmospheric pressure and through which the air forced into the first named apparatus is passed to draw atmospheric air into said supplemental apparatus.

2. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus being open to receive air under atmospheric pressure and being in communication with the interior of the first named apparatus to receive air forced therethrough.

3. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus comprising a cool-

ing compartment open to the atmosphere, and a flue leading from the first named apparatus in communication with said cooling compartment.

4. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus comprising a cooling compartment having an openwork outer wall through which air at atmospheric pressure may enter, and a flue leading from the first named apparatus in communication with said cooling compartment.

5. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus comprising a cooling compartment having an openwork outer wall through which air under atmospheric pressure may enter, and a flue leading from the first named apparatus having a wall provided with a plurality of apertures permitting circulation of air at different elevations from said compartment to said flue.

6. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus comprising a cooling compartment having an openwork outer wall through which air under atmospheric pressure may enter, and a flue leading from the first named apparatus having a wall provided with a plurality of apertures permitting circulation of air at different elevations from said compartment to said flue; the said flue wall being provided with deflectors overhanging the said apertures.

7. The combination with a liquid cooling apparatus including means for creating a forced circulation of air therethrough, of a supplemental liquid cooling apparatus surmounting the first named apparatus; the supplemental apparatus comprising a plurality of cooling compartments open to the atmosphere, and a flue leading vertically from the first named apparatus into communication with all of said compartments.

FERDINAND BAUER.

In the presence of—

A. J. McCauley,  
E. B. Linn.