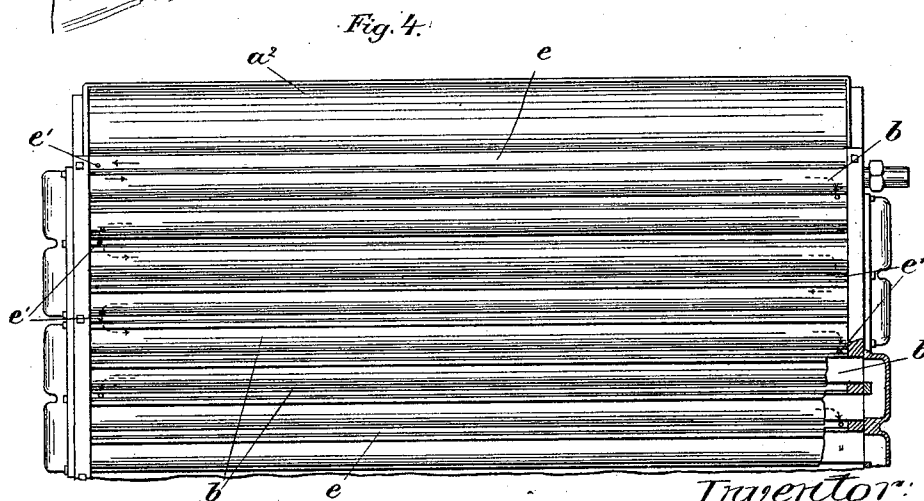
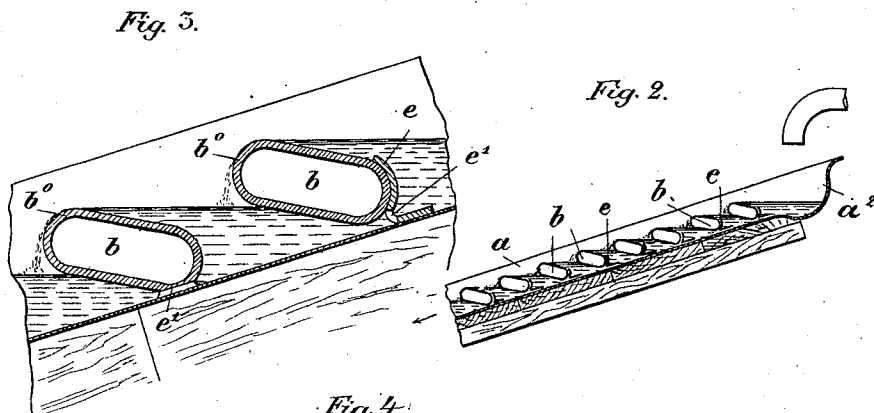
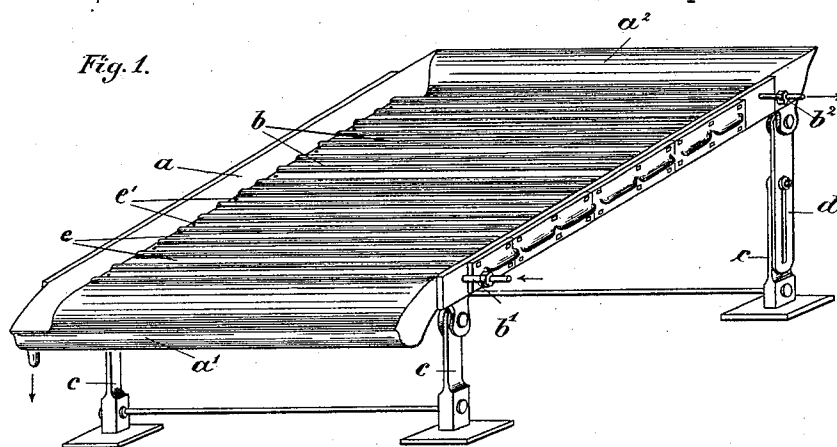


(No Model.)

H. KRACK. COOLING APPARATUS FOR LIQUIDS.

No. 581,351.

Patented Apr. 27, 1897.



Witnesses:
J. Kennedy
W. G. H. Walsh.

Inventor:
H. Krack
By Philipp Munson & Philp.
Attys

UNITED STATES PATENT OFFICE.

HERMANN KRACK, OF TEPLITZ, AUSTRIA-HUNGARY.

COOLING APPARATUS FOR LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 581,351, dated April 27, 1897.

Application filed August 24, 1896. Serial No. 603,666. (No model.) Patented in Belgium March 23, 1896, No. 120,531.

To all whom it may concern:

Be it known that I, HERMANN KRACK, a subject of the Emperor of Austria-Hungary, residing at Teplitz, in the Kingdom of Bohemia, Empire of Austria-Hungary, have invented new and useful Improvements in Cooling Apparatus for Liquids, (for which I have obtained a patent in Belgium, No. 120,531, dated March 23, 1896,) of which the following is a specification.

For obtaining as perfect a cooling effect as practicable in cooling apparatus it is absolutely necessary that the liquid to be cooled should flow down slowly over the cooling-surface, and in order to achieve this object for thin as well as for thick liquids to an equally great extent I place, according to this invention, the cooling apparatus in a more or less inclined position, according to requirements, and arrange the cooling-tubes in such a manner that the liquid to be cooled will be compelled to continually undergo changes between them. The cooling-tubes, arranged upon an inclined support, are preferably made flat in transverse section and are tightly fixed at such an angle and at such a distance from each other upon the said support that their upper and lower sides will always remain in contact with the liquid. Moreover, I provide below each cooling-tube, preferably made tight upon the support by means of a sheet-metal strip, one or more small passages alternately at the right-hand and left-hand ends, opposite to these passages being corresponding openings in the sheet-metal strip, or I arrange the tubes at a short distance from the support in order that during the cooling a circulation of the liquid not running over the cooling-tubes may take place between them and that after the cooling is terminated the liquid may drain off completely from the apparatus. The cooling-tubes may also be soldered directly to the support without the use of the sheet-metal strips and furnished with small openings alternately below their right-hand and left-hand sides for the purpose alluded to.

In the accompanying drawings I have shown, by way of example, how the invention may be conveniently carried into practice.

Figure 1 is a perspective view of the appa-

ratus. Fig. 2 is a partial longitudinal section of Fig. 1. Fig. 3 is a similar section drawn to an enlarged scale, and Fig. 4 is a partial plan.

a designates the box, made, for example, of thick zinc sheet-copper, and serving as a support, and *b* are the flat cooling-tubes, arranged at the bottom of the box at such an angle and at such a distance from each other that their upper and lower sides will always remain in contact with the liquid to be cooled for the purpose of completely utilizing the cooling-surface, and so that the liquid will drop in the form of a thin stratum over the free front edge *b*⁰ of the tubes according to the inclination of the support. According to the drawings the admission of the cooling liquid into the flat tubes *b* takes place below at *b*¹ and the discharge above at *b*², but the arrangement may, if desired, be reversed.

If it is desired to cool alternately thin and thick liquids, the apparatus may appropriately be provided with a suitable device for enabling it to be placed at the necessary inclination. In the constructional form chosen the apparatus is pivoted in front, in proximity to the collecting-channel *a*¹, for instance, to suitable standards *c* of a frame and furnished at the rear at the distributing-channel *a*² with jointed bars *d*, having a longitudinal slot, which enable the apparatus to be fixed by means of bolts and nuts at a greater or smaller inclination relatively to the front standards *c*, which may likewise be provided with slots. If, however, it is desired to continually cool a certain kind of liquid, the proper inclination may easily be determined beforehand. In such a case no further adjustment is needed and the adjusting device may be dispensed with.

As particularly shown in Fig. 3, the tubes are either securely fixed at a short distance above the support by sheet-metal strips *e*, which are provided alternately at the right-hand and left-hand ends with one or more small openings *e*¹ to afford a passage for part of the liquid to be cooled and to permit of the circulation toward the collecting-channel *a*¹, or the tubes *b*, as also shown in this figure, are soldered directly to the support, leaving the openings *e*¹. The said openings *e*¹, as already mentioned, enable the appa-

tus to empty itself after the termination of the cooling.

In the lateral parts of the box *a* the tubes are tightly held and connected on the outside
 5 by small knee-pieces which are adapted to be easily removed for cleaning purposes. In case the room at disposal should not enable a spray cooling apparatus of suitable size to
 10 may be aided by a double bottom with a separate circulation of water.

As hereinbefore set forth, the flow of the liquid in the described cooling apparatus may be regulated in any desired manner by plac-
 15 ing the apparatus at a suitable inclination. With thin liquids—for instance, beer-wort or the like—the apparatus is adjusted to such an inclination that with a length of two to two
 20 to one-half meter, so that the liquid must flow off very slowly, the entire cooling-surface being completely utilized, while with thicker liquids the slope is increased to an
 25 appropriate extent.

By reason of the perfect utilization of the cooling-surface which takes place in the de-

scribed apparatus the latter may be made much smaller, and therefore at a lower cost, to obtain equal effectiveness as compared
 30 with the well-known vertical coolers, a further advantage being that the spurting of the liquid to be cooled over the sides of the collecting-channel, such as happens with verti-
 cal cooling apparatus, is completely obviated.

What I claim, and desire to secure by Let-
 35 ters Patent of the United States, is—

A cooling apparatus consisting of an inclined support from which tubes *b* protrude at determinate distances from each other so
 40 as to form steps or terraces on the surface, the tubes being rigidly connected with the surface, and openings *e'* being provided alternately on the left and right hand sides below
 45 the tubes, all arranged to operate in the manner set forth and for the purpose stated.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HERMANN KRACK.

Witnesses:

ANTON POHLA,
 JULIUS KLINGER.