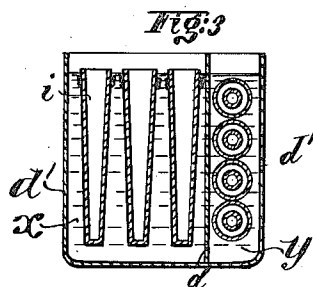
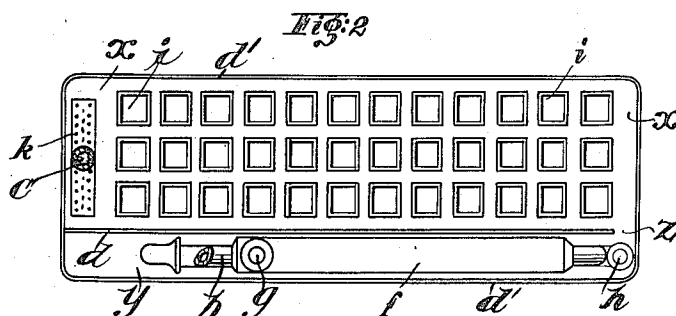
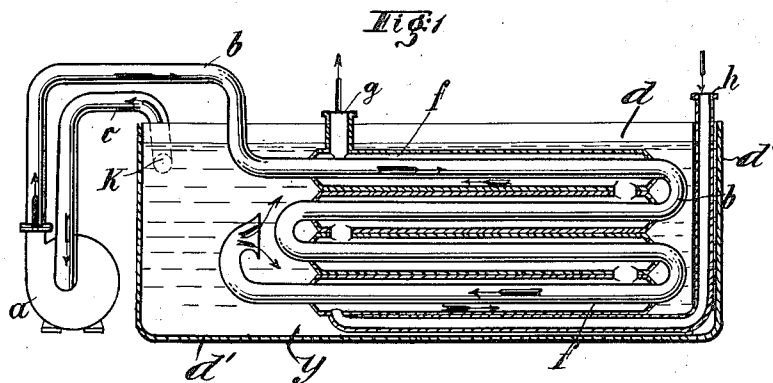


E. VOLLAND.
REFRIGERATING APPARATUS.
APPLICATION FILED DEC. 8, 1911.

1,050,877.

Patented Jan. 21, 1913.



Witnesses:
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UNITED STATES PATENT OFFICE.

ERNST VOLLAND, OF SÜRTH-ON-THE-RHINE, NEAR COLOGNE, GERMANY.

REFRIGERATING APPARATUS.

1,050,877.

Specification of Letters Patent.

Patented Jan. 21, 1913.

Application filed December 8, 1911. Serial No. 664,589.

To all whom it may concern:

Be it known that I, ERNST VOLLAND, director, a citizen of the German Empire, residing at Sürth-on-the-Rhine, near Cologne, Germany, have invented certain new and useful Improvements in Refrigerating Apparatus Specially Intended for Manufacturing Ice; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention has for its object a refrigerating apparatus specially intended for manufacturing ice in which a jacketed tubular coil serves for the refrigeration through the jacket of which the cold producing medium is circulated.

The apparatus comprises two communicating chambers in one of which a liquid as salt water is cooled and is utilized in the other chamber for abstracting heat from the ice molds.

The essence of the invention resides in the fact that the inner tube of the jacketed tubular coil which is connected with a refrigerating brine pump opens into the chamber of the refrigerating coil in such a manner that the liquid discharged is forced along the outside of the tubular system and into the ice mold chamber from which the pump again draws it. This arrangement presents the advantage that by means of a single pump the complete counter current circulation of the brine is obtained in the inner tube and in the chamber relatively to the refrigerating liquid which flows through the jacket and simultaneously therewith the brine is conveyed through the ice mold chamber.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a longitudinal section through the refrigerating tube system in one chamber. Fig. 2 is a plan. Fig. 3 is a vertical section through Fig. 1.

The molds *i* in which the ice blocks are to be formed are arranged in the larger compartment or freezing chamber *x* of a tank *d'*. This larger compartment of freezing chamber is separated from a narrower

compartment or brine cooling chamber *y* by a partition *d* extending nearly across the tank *d'*, so as to leave a small space *z*, Fig. 2, for the passage of the cooled brine from *y* into *x*. The brine or refrigerating liquid flows over the surface of the ice molds and is also contained in the narrower lateral compartment *d*. The tubular coil system is arranged in the smaller compartment *y*; it consists of a continuous tube or coil *b* connected with discharge side of a centrifugal pump *a* or the like. The other end of this tube *b* opens into the brine chamber *y* and has its discharge end directed toward the space *z* in partition *d*. A suction pipe *c* with strainer *k* leads from the ice reservoir or refrigerating chamber *x* to the suction side of pump *a*. The tubes *b* at their straight portions are inclosed by other tubes *f* through which the cold producing medium flows and the connection between these outer tubes is established in such a manner that the refrigerating medium must flow around all the lengths of tube *b* in succession. As indicated by the arrows it enters at *h* and issues at *g*. The brine flows over the outer surface of these outer tubes *f*.

The operation is as follows: The brine is forced through the tubular coil *b* by the pump *a* in the direction indicated by the arrows, is discharged from *b* into chamber *y*, passes through *z* into one end of chamber *x* and circulates around the ice molds *i* in said chamber and is again taken up by the pump at the end of chamber *x* through the strainer *k*, and pipe *c*. The refrigerating medium circulating between the tubes *b* and *f* not only cools the contents of these tubes *b* but transmits its refrigerating action through the outer tubes *f* to the brine discharged in the compartment *d* as it circulates toward chamber *x*. The brine is therefore doubly cooled thus greatly increasing the efficiency as compared with the single acting apparatus hitherto constructed while the dimensions of the novel apparatus are much reduced. The refrigerating medium can be caused to circulate at a much higher velocity than is the case with single acting devices.

The construction of the novel apparatus is exceedingly simple as the tubular system *b f* can be inserted in and removed from its chamber at any time. The reservoir as a whole can be made of metal or of

ferro-concrete. The arrangement may also be such that the brine first of all flows over the surface of the tubes *f* where it is cooled and then sucked through the tubes *b*. In this case a reversed circulation would be produced.

What I claim and desire to secure by Letters Patent of the United States is:

1. A cold transmitting apparatus having a reservoir comprising two communicating compartments, ice molds contained in one of said compartments, a tubular coil in the other compartment, having one end opening therein, a tubular jacket for said coil, through which a refrigerating medium may be circulated, means for continuously circulating liquid through said coil and its compartment in proximity to the tubular system and through the ice mold compartment.
2. A cold transmitting apparatus having a reservoir comprising two communicating compartments, ice molds contained in one of said compartments, a tubular coil in the other compartment having one end opening therein, a tubular jacket for said coil, through which a refrigerating medium may be circulated, a pump for circulating liquid through said coil and the ice mold compartment and means for returning same to the pump to insure complete circulation.
3. A cold transmitting apparatus having

a reservoir comprising two communicating compartments, ice molds contained in one of said compartments, a tubular coil in the other compartment having one end opening therein, a tubular jacket for said coil through which a refrigerating medium may be circulated, a pump for circulating brine in the counter direction through said coil and the ice mold compartment and means for returning same to the pump to insure complete circulation.

4. A cold transmitting apparatus having a reservoir comprising two communicating compartments, ice molds contained in one of said compartments a tubular coil in the other compartment having one end opening therein, a tubular jacket for said coil, through which a refrigerating medium may be circulated, a centrifugal pump for circulating brine in the counter direction through said coil and the ice mold compartment, and a suction pipe for returning the brine to the pump to insure complete circulation.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ERNST VOLLAND.

Witnesses:

V. REPING,
ANNIS VANDORY.