No. 663,456. Patented Dec. 11, 1900.

F. E. MÜLLER.

REFRIGERATING APPARATUS.

(Application filed Jan. 20, 1900.)

(No Model.)

Fig. 1.

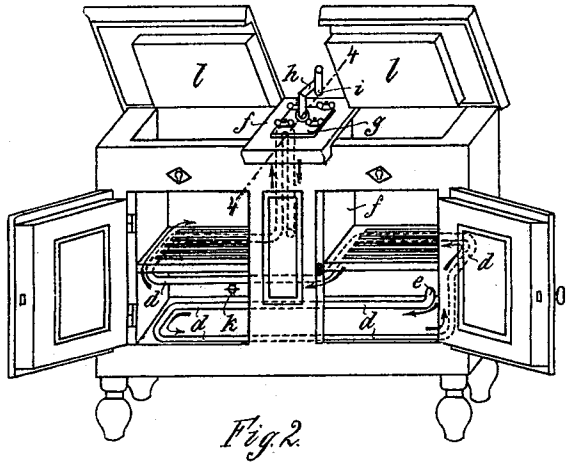


Fig. 2.

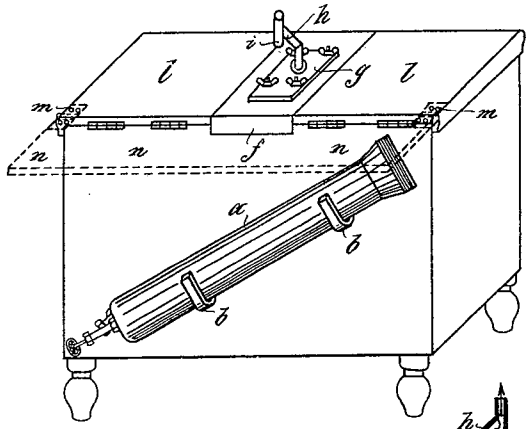
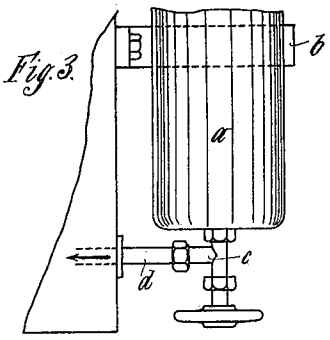


Fig. 3.



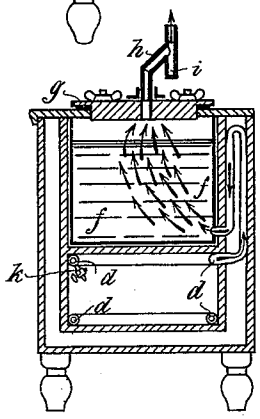


Fig. 4.

Witnesses:

Inventor:
Franz E. Müller.
by

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANZ EUGEN MÜLLER, OF DRESDEN, GERMANY.

REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 663,456, dated December 11, 1900.

Application filed January 20, 1900. Serial No. 2,161. (No model.)

To all whom it may concern:

Be it known that I, FRANZ EUGEN MÜLLER, a subject of the King of Saxony, residing at Schubertstrasse 29, Dresden A, Saxony, Empire of Germany, have invented certain new and useful Improvements in or Relating to Refrigerating Apparatus, (for which I have applied for Letters Patent in Germany M. 17,404, I/17, dated October 23, 1899; in Austria, dated October 23, 1899; in France, dated October 26, 1899; in Belgium, dated November 2, 1899, and in Great Britain, No. 21,160, dated October 23, 1899, in the name of Carl Krausse,) of which the following is a specification.

This invention relates to refrigerators or refrigerating apparatus in which liquid carbonic acid acts as the refrigerating or cooling agent by evaporation. The recovery of the carbonic acid (an inexpensive material now) is not attempted; but in this way the manufacture of a refrigerator is possible, supplied with liquid carbonic acid, which can be used in any place and is not dependent on either a supply of ice or on mechanical contrivances nor on the use of chemicals, (such as sulfuric acid,) such refrigerators in ordinary households being attended with a certain amount of danger, as well as requiring careful attention. The energetic absorption of heat accompanying the evaporation of liquid carbonic acid is made use of in two ways—first, by means of a conduit or pipe system suitably arranged in the refrigerating-chamber, in which the acid is allowed to expand, and, secondly in a water-tank in which the tubular system ends, the water being energetically, rapidly, and effectually cooled by the carbonic acid passing through it, thus forming a kind of "cold" reservoir, lasting for a considerable time. The refrigeration may be carried on until ice is formed; but this is not usually practiced or necessary, as it is not usually required to reduce the temperature in the refrigerator to the freezing-point, although it is quite possible in case of need to produce by this means artificial ice and even carbonic-acid ice. Water taken from the water-tank when tolerably fresh contains a quantity of carbonic acid far above the amount which water contains naturally and may be used in making or mixing cool beverages and the like. Besides the property of the carbonic acid thus used of acting as a refrigerating agent its preservative and antiseptic property may also be rendered serviceable by producing in the refrigerating-chamber a carbonic-acid atmosphere which, according to recent experiments, is more conducive for preserving foodstuffs and the like than the natural atmosphere—the more so, as air in the closed space of a refrigerator rapidly deteriorates.

In the accompanying drawings a refrigerator according to this invention is represented, by way of example, in the form of an ordinary refrigerator or ice chamber with two doors.

In said drawings, Figure 1 is a perspective view of a refrigerator, looking from the front, having my invention applied thereto. Fig. 2 is a similar view looking from the rear. Fig. 3 is a detail view of a portion of the cylinder carrying the liquid carbonic acid. Fig. 4 is a sectional view on the line 4 4, Fig. 1.

A cylinder *a*, containing liquid carbonic acid, is supported on two arms *b* at the back of the refrigerator. The neck *c*, Fig. 3, is connected with a pipe *d*, which enters the interior of the chamber at *e* and is there formed, coiled, or arranged in any suitable manner and ends behind the water-reservoir *f* in a bend, Fig. 4, the descending end of which enters the said water-reservoir near the bottom of the same. The water-reservoir is tightly closed at the top by a cover or lid *g*, an orifice of which communicates with a pipe *h*, forming a flue or exhaust-passage for the used carbonic-acid gas, the pipe *h* being provided with a trap *i* for the purpose of collecting any water particles carried away with the escaping carbonic-acid gas. The pipe *h* is connected with a chimney or extends out of doors in case it is not advisable to allow the gas to freely escape into the room in which the refrigerator stands. In any convenient part of the pipe *d* easily accessible is provided a cock *k*, Figs. 1 and 4, for the purpose of admitting the gaseous carbonic acid to the interior of the refrigerating-chamber.

The space occupied by the cylinder *a*, for which allowance must be made when placing the refrigerator against a wall, may be cov-

ered by a lid or projection *n*, (see dotted lines, Fig. 2,) connected by hinges *m* to the top or lids or covers *l* of the refrigerator.

On opening the valve of the carbonic-acid cylinder *a* the liquid rapidly issues, expands, and evaporates in the tubular structure *d*, thus refrigerating the chamber, and then passes into and through the water in the tank *f*, refrigerating it, and finally out through the escape-pipe *h*. When the cock *k* is opened, part of the expanding carbonic-acid gas enters the refrigerating-chamber, in which the air is gradually driven upward and replaced by an atmosphere of carbonic-acid gas.

According to the purpose the refrigerator is intended for (for domestic or trade purposes and the like) and according to its general or special use the refrigerator will be constructed on the lines illustrated, by way of example, in the drawings or in other forms. The same considerations govern also the arrangement of the refrigerating tubing or conduits. The manner of supporting the carbonic-acid cylinder as represented in the accompanying drawings has also been shown only by way of example.

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

1. In a refrigerator, the combination with the system of pipes or conduits arranged therein connected at one end with a source of carbonic-acid gas under pressure, of a water-tank within the refrigerator into which the pipe system opens at or near the bottom thereof, substantially as described.

2. In a refrigerator, the combination with the system of pipes or conduits arranged therein, connected at one end to a source of carbonic-acid gas under pressure, of a closed water-tank within the refrigerator into which the pipe system opens at or near the bottom thereof, and an escape-pipe for the carbonic-acid gas leading from the water-tank; substantially as described.

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

FRANZ EUGEN MÜLLER.

Witnesses:
OTTO WORK,
C. Z. AUGUST MUARY.