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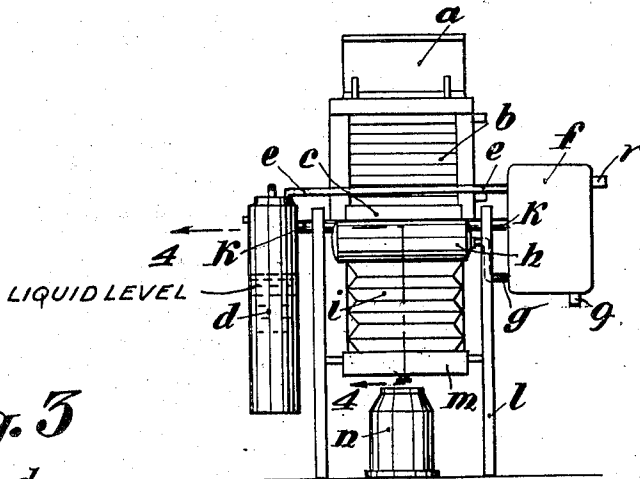
L. STARK

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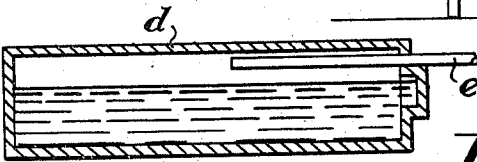
ABSORPTION REFRIGERATING MACHINE

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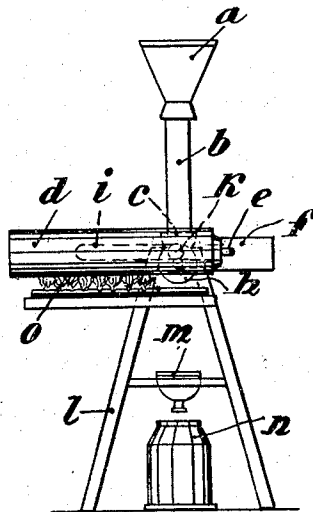
*Fig. 1*



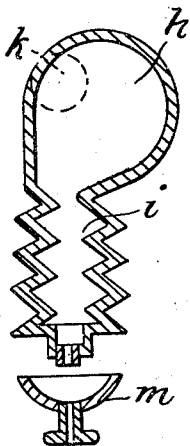
*Fig. 3*



*Fig. 2*



*Fig. 4*



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## UNITED STATES PATENT OFFICE

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## ABSORPTION REFRIGERATING MACHINE

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2 Claims. (Cl. 62-141)

This invention relates to improvements in absorption refrigerating machines for cooling liquids, particularly milk and consists essentially in making the evaporator integral with a surface cooler, and arranging it between a liquid distributor and a collector.

The invention is also directed to the arrangement of the boiler-absorber, the evaporator-surface cooler and the condenser in fixed and rigid relation upon an axle, so the whole assembly can be rotated through an angle of at least ninety degrees.

In the use of refrigerators for cooling milk it is desirable to lower its temperature to 2° C., but this has been impossible before my invention since the evaporator could not be used as a surface cooler because the pressure within it would rise due to the heat absorbed from the milk as it passed over it.

By my present invention, it is possible to accelerate the absorption in such a way that the pressure does not rise in the evaporator and its temperature remains suitable for a surface cooler.

In the accompanying drawing I have illustrated, merely by way of example and not at all in a limiting sense, one embodiment of my invention.

In the drawing:

Figure 1 is a front view of the refrigerator in the cooling position, and

Figure 2 is a side view thereof, looking from the left of Figure 1 in the boiling positions.

Figure 3 is a detail of the arrangement of pipe *e* in the boiler-absorber *d*, and

Figure 4 is a transverse vertical section of the evaporator surface cooler only along line 4-4 of Figure 1 looking in the direction indicated by the arrows.

My refrigerator-cooler consists of a liquid receiver, a pre-cooler, an evaporator-surface cooler, a boiler-absorber, a condenser, and a liquid collector, all mounted upon a supporting frame.

The boiler absorber, evaporator-surface cooler, and condenser form a unit rigidly mounted upon an axle so the unit can be rotated through an angle of at least ninety degrees.

Referring to the drawing, *a* designates a receptacle for the liquid to be cooled, *b* a pre-cooler of the usual form supplied with water flowing from the bottom to the top thereof.

*c* designates a liquid receiver and distributor, *h* and *i* the evaporator-surface cooler assembly and *n* the liquid collector. Liquid distributor *c* and collector *m* may each be supplied with valves to control the outflow of liquid.

*d* designates the boiler-absorber and *f* the condenser which is of the usual construction, supplied with water by a hose through pipe *q* which flows off through waste pipe *r*.

*e* designates a pipe connecting the condenser and boiler-absorber and so arranged within the latter that its end is beneath the surface of liquid therein when the boiler-absorber is in the position of Figure 1 and above the surface of said liquid when in the position of Fig. 2.

Such an arrangement is well known in rotatable boiler-condenser assemblies in this art one form being shown in British patent to Kauffman, 339,121, and another in Fig. 4.

*g* designates a pipe connecting condenser *f* with evaporator-surface cooler assembly *h, i*.

*i* designates a frame on which liquid receptacle *a*, pre-cooler *b*, liquid distributor *c* and liquid collector *m* are rigidly mounted, and which rotatably supports axle *k* upon which boiler-absorber *d*, condenser *f*, and evaporator-surface cooler assembly *h, i*, are rigidly mounted in fixed relation to one another. *n* is a vessel to receive liquid from collector *m*.

*o* designates a burner which is placed upon frame *l* when the boiler-absorber is to be heated. It is understood, of course, that this may be replaced by equivalent heating means without departing from the scope of my invention.

The method of operation of the device is easily apparent to one skilled in the art, but may be described as follows:

The boiler-absorber *d* will be supplied with a liquid, as water, saturated with a freely absorbable gas, as ammonia. The boiler-absorber *d*, condenser *f*, surface-cooler *i* and evaporator *h*, which is mounted above it and as shown in dotted lines in Fig. 2 and by full lines in Fig. 4 opens into it, being rigidly assembled together and mounted upon axle *k* are turned into the position shown in Fig. 2. Burner *o* is secured in place, the heating flame established, and water started flowing through condenser *f*, by means of a hose attached to nipple *q*, the water escaping through nipple *r*.

The gas is driven out of the absorbing liquid in *d*, passes through the tube *e* to condenser *f* where it is liquefied and flows through tube *g* into evaporator *h* and surface cooler *i*, there being no valves in the apparatus to hamper its motion.

The flame is then extinguished and presently water flow through the condenser is stopped.

When boiler-absorber *d* and its contained liquid has cooled, the boiler-absorber, evaporator, and

condenser assembly is turned into the position shown in Figure 1, water flow through the pre-cooler *b* started and the liquid to be cooled, allowed to flow from vessel *a* over the pre-cooler into distributor *c*, thence over evaporator *h* and surface cooler *i* into the receiver *m*.

The liquefied gas which flows from evaporator *h* into pre-cooler *i* when the position of Fig. 1 is assumed absorbs heat from the liquid as it flows over the surface cooler, is vaporized and flows back through condenser *f* and tube *e* into the liquid in the boiler-absorber *d* when it is absorbed.

The operation cycle above described is repeated as often as desired.

I claim:

1. An absorption refrigerating machine for cooling liquids, particularly milk which comprises a vertical frame, a pre-cooler rigidly mounted in the upper portion of said frame, a boiler-absorber, a condenser, means establishing direct communication between said boiler-absorber and con-

denser, an evaporator-surface cooler assembly and means establishing connection between said assembly and said condenser, the boiler-absorber, condenser and evaporator-surface cooler assembly being rigidly connected into a rotatable unit, means for mounting said unit beneath said pre-cooler for rotation between a vertical and a horizontal position, and means for distributing milk over the surface of the pre-cooler and evaporator-surface cooler when the latter is in its vertical position.

2. In an absorption refrigerating machine for liquids, especially milk, a rigidly mounted pre-cooler, a rotatable unit comprising a boiler-absorber, condenser and evaporator-surface cooler rigidly connected together, means for mounting said unit for rotation between a vertical and a horizontal position, and means for distributing a liquid over the surfaces of the pre-cooler and evaporator-surface cooler when the latter is in its vertical position.

LOUIS STARK.