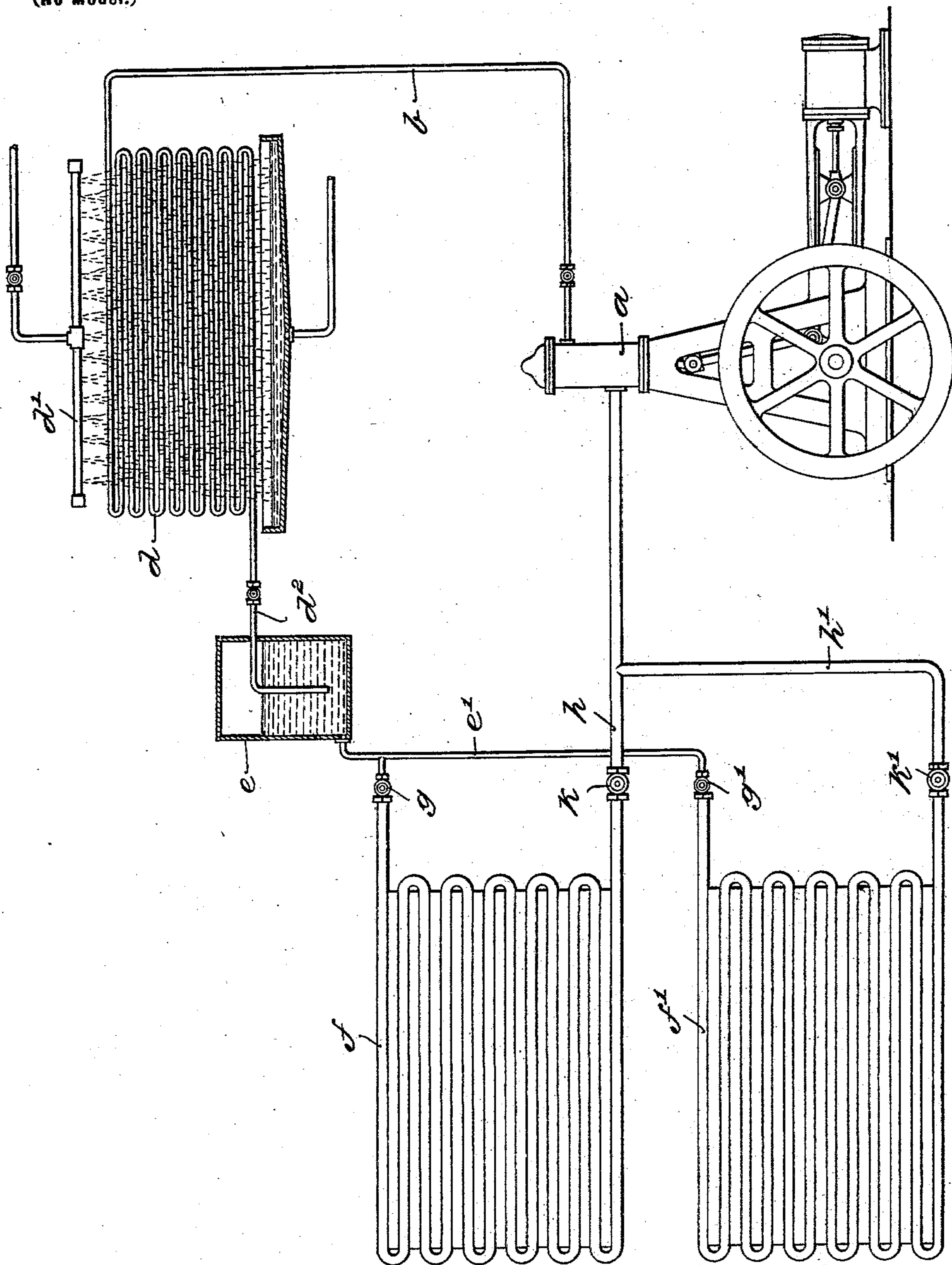


No. 704,772.

Patented July 15, 1902.

E. BARRATH.
MANUFACTURING ARTIFICIAL ICE.
(Application filed Dec. 6, 1901.)

(No Model.)



Witnesses
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MANUFACTURING ARTIFICIAL ICE.

SPECIFICATION forming part of Letters Patent No. 704,772, dated July 15, 1902.

Application filed December 6, 1901. Serial No. 84,865. (No model.)

To all whom it may concern:

Be it known that I, EDWARD BARRATH, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Manufacturing Artificial Ice, of which the following is a specification.

My invention has relation to the manufacture of artificial ice, and in such connection it relates more particularly to the step or steps necessary to thaw or free the ice from the plate or pan upon which it has been previously formed.

Heretofore in the manufacture of artificial ice the step having most difficulties attending it was that in which the ice was released from the plate or pan upon which it had been formed. The usual method of releasing the ice was by forcing hot brine, hot gases, or hot fluid through either the regular refrigerating-pipes or through extra coils of pipe interspersed with the usual refrigerating-pipes in the walls and floor of the pan or plate. The most serious objection to such a method was that the rapid heating of the plate or pan by the introduction of the hot gases or liquid resulted in the warping of the plate or pan and the consequent breaking or splintering of the ice. By my present method the plate or pan is gradually heated by gradually increasing the pressure of the refrigerating liquid in the refrigerating-pipes, whereby the ice may be quickly and safely removed from the plate or pan.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawing, forming part hereof, and which illustrates diagrammatically a system of manufacturing artificial ice embodying main features of my present invention.

Referring to the drawing, *a* represents the usual refrigerating-fluid pump, which in the instance illustrated in the drawing is particularly adapted to force ammonia by a pipe *b* to a coil *d*. The coil *d* is subjected to a cooling liquid sprayed from a pipe *d'* down upon the coil *d*. The cooled liquid ammonia is then delivered by a pipe *d''* to a closed tank

or receptacle *e*, from which it is delivered by a pipe *e'* to a series of coils *f* and *f'*, forming the floor or walls of a plate or pan upon which the ice is formed. The entrance of ammonia to each coil *f* or *f'* is controlled by an expansion-valve *g* or *g'* of the usual construction, so that the liquid ammonia enters the coils *f* or *f'* in an expanded condition and normally is permitted to further expand in said coils *f* or *f'*. The return from the coils *f* or *f'* is by the pipes *h* and *h'* to the inlet of the pump *a*. Normally the pump *a* sucks the ammonia from the series of coils *f* or *f'*, thus permitting of the necessary expansion of the ammonia in each coil *f* or *f'*. Each pipe *h* and *h'* is provided with a shut-off cock or valve *k* or *k'*, by means of which any coil *f* or *f'* may be disconnected from the suction end of the pump *a*. If now the ice formed on the coil *f* is to be released, the cock or valve *k* on the pipe *h*, leading from said coil to the pump *a*, is closed. The pump *a* continues to work, however, and continues to supply the ammonia to the coil through the tank *e* and pipe *e'*. The pressure of the ammonia in the coil *f* entering from the tank *e* will be gradually increased, and hence the temperature of the coil *f* will be raised gradually until it is sufficiently hot to thaw the ice and release it from the plate or pan in which the coil *f* is arranged. When the ice is thus released and removed from the coil *f*, the valve *k* is again opened and the operation of cooling the coil *f* again takes place by permitting the fluid to expand in said coil. Thus one or more, but not all, of the coils *f* or *f'* may be cut out of the refrigerating system by shutting off the return to the pump *a*, and this cutting out will result, as heretofore explained, in gradually backing up the refrigerating liquid in the coil or coils cut out and also gradually increasing the pressure in the coil or coils cut out, and thereby gradually increasing the temperature of the cut-out coil or coils, as required, to release the ice.

Having thus described the nature and object of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In the manufacture of ice wherein the

plate or pan is supplied with refrigerating liquid which expands in the plate or pan to cool the same, the method of releasing the ice from the plate or pan which consists in
5 first preventing the expansion of the liquid in the plate or pan and thereafter continuing to supply to the plate or pan the liquid refrigerant whereby the pressure of the refrigerant liquid is gradually increased within
10 the plate or pan and a gradual increase of the temperature of the plate or pan is secured.

2. In the manufacture of artificial ice, wherein a series of coils are supplied with the
15 refrigerating liquid, said liquid being permitted to expand in said coils, the method of

releasing the previously-formed ice from said coils, which consists in cutting out the required coil from the return to the pump which exhausts the refrigerant from the coil and
20 maintaining the supply of liquid to the coil from the receiver or tank to thereby increase gradually the pressure of refrigerant liquid in the coil.

In testimony whereof I have hereunto set
my signature in the presence of two subscribing witnesses. 25

EDWARD BARRATH.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.