(No Model.) 4 Sheets—Sheet 1.

A. EVANS, Jr.

ICE MACHINE.

No. 344,310. Patented June 22, 1886.

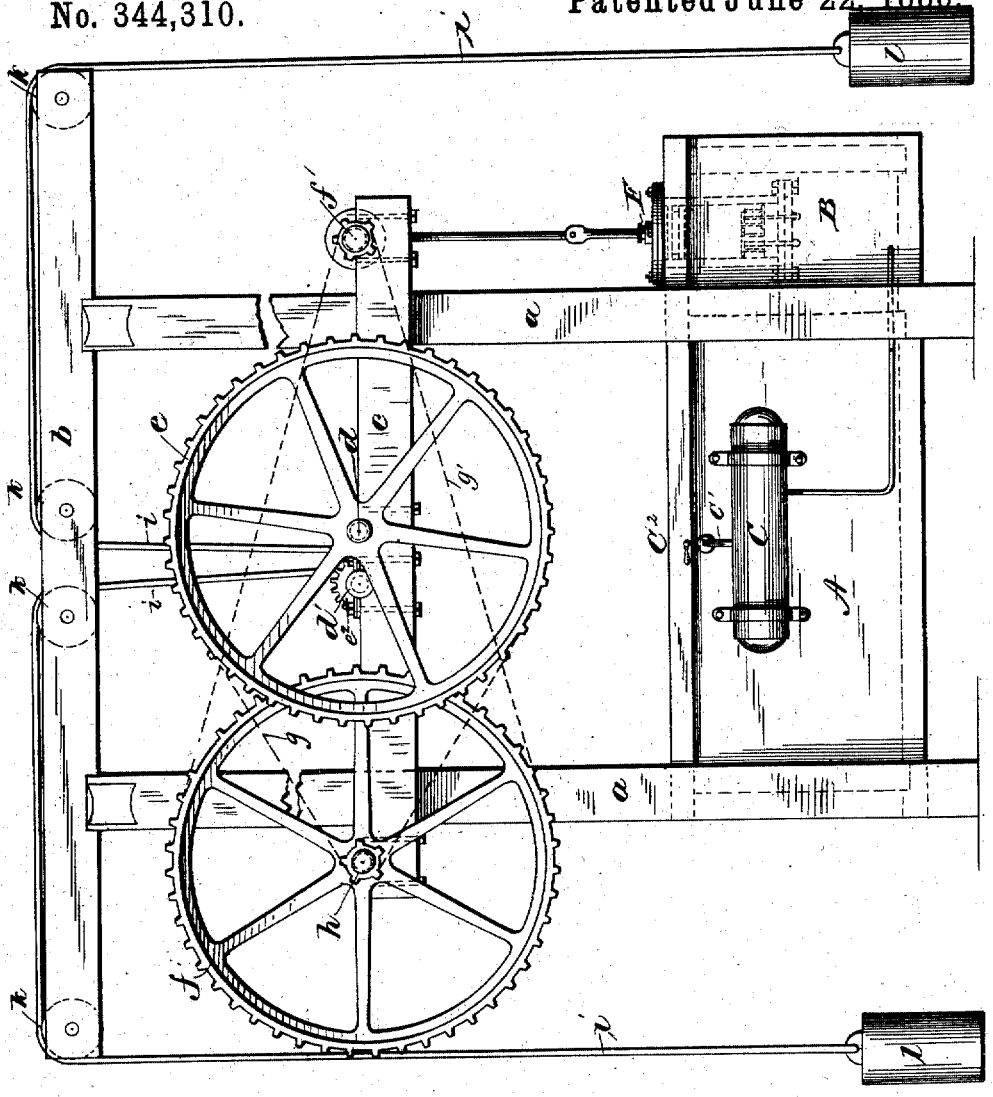

Fig. 1.

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INVENTOR
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by Wm. A. Finckel.
Attorney

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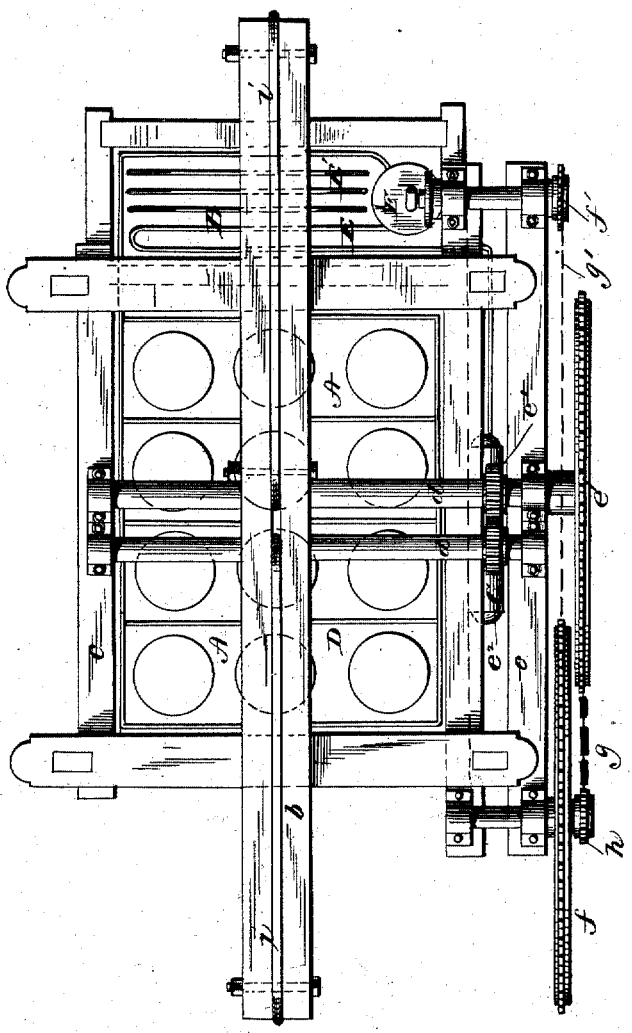

Fig. 2.

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(No Model.)

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A. EVANS, Jr.

ICE MACHINE.

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Fig. 3.

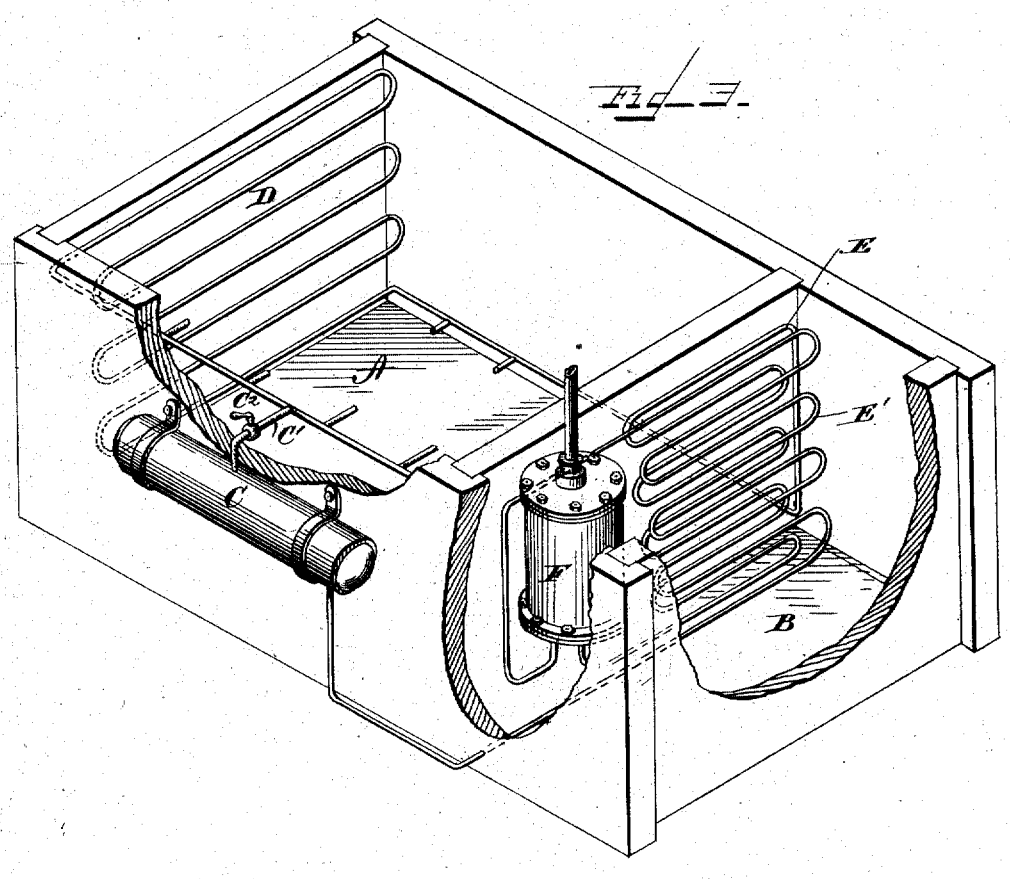
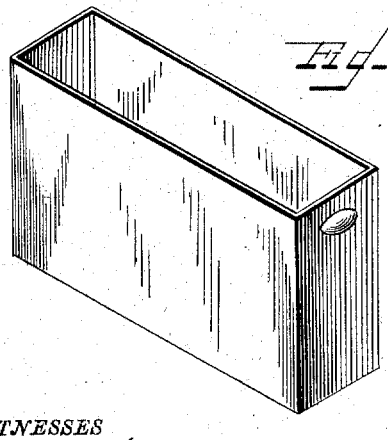


Fig. 4.



WITNESSES

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Attorney

(No Model.) 4 Sheets—Sheet 4.

A. EVANS, Jr.

ICE MACHINE.

No. 344,310. Patented June 22, 1886.

Fig. 5.

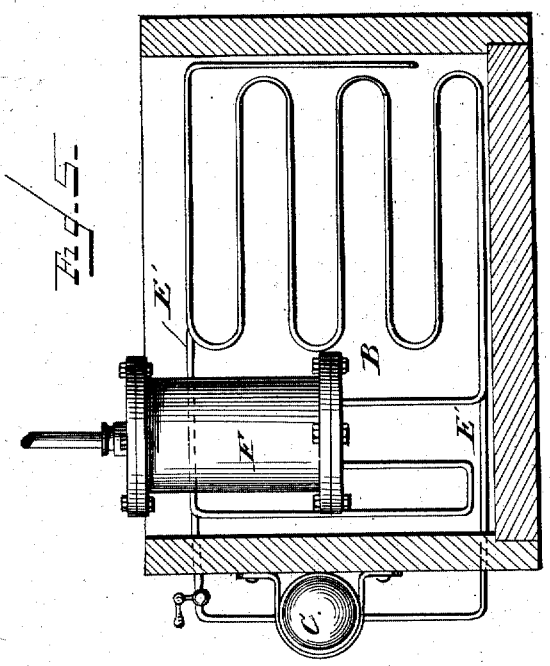


Fig. 6.

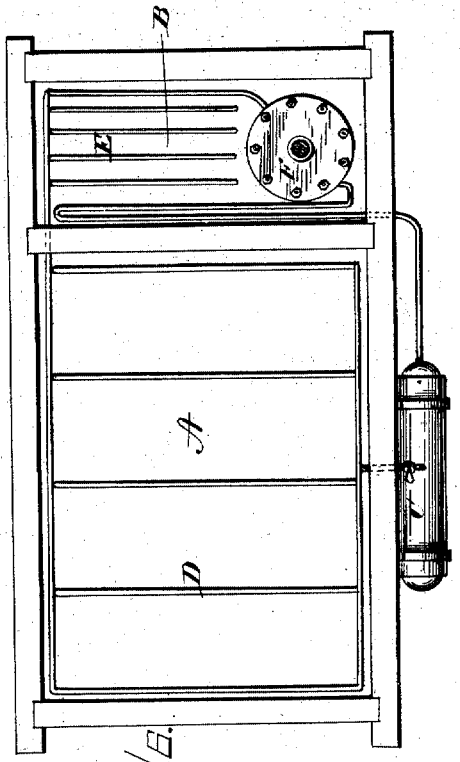
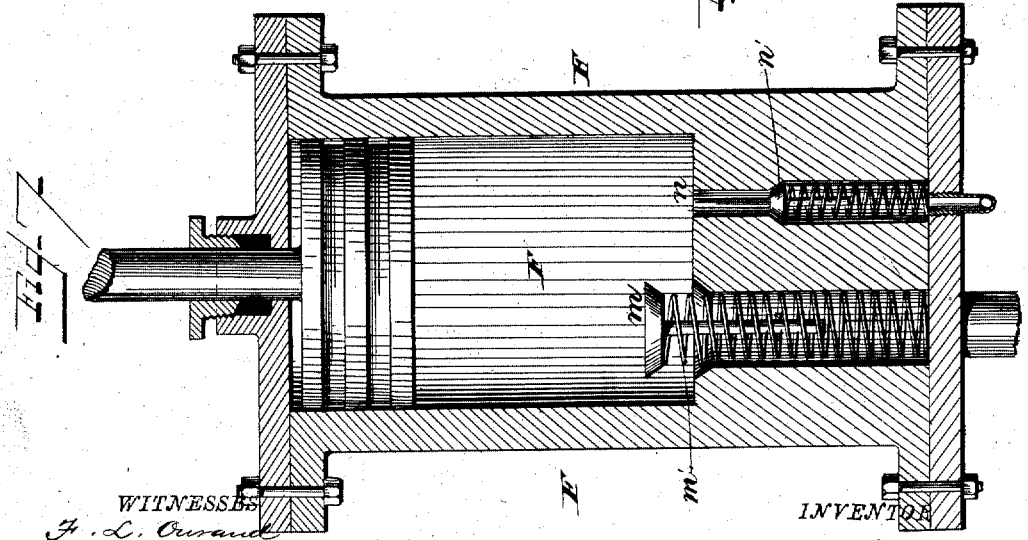


Fig. 7.



WITNESSES:
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INVENTOR
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UNITED STATES PATENT OFFICE.

ABNER EVANS, JR., OF PHILADELPHIA, PENNSYLVANIA.

ICE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 344,310, dated June 22, 1886.

Application filed August 20, 1885. Serial No. 174,891. (No model.)

To all whom it may concern:

Be it known that I, ABNER EVANS, Jr., a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Ice-Machines, of which the following is a full, clear, and exact description.

My invention relates to that class of machines for the manufacture of ice in which the principle that when a liquid is changed to a state of vapor, or a gas is expanded, the result is the abstraction of heat from neighboring bodies or substances.

The object of my invention is, primarily, to construct an apparatus for the manufacture of ice and for refrigerating purposes that shall be of small cost, portable, and automatically and easily operated.

The invention consists in such construction and arrangement of tanks and of the coils for conducting the vaporizing or expanding gas that said gas may be used for both the freezing or refrigerating operation and for cooling the recondensed gas. It might be added that this portion of my invention is generally applicable to this class of ice-machines.

The invention further consists in arranging the condenser or pump in the tank for cooling the recondensed gas, for the purpose hereinafter fully explained.

In the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1 is a side elevation of an apparatus embodying my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a perspective view with parts broken away and the condenser-operating mechanism removed. Fig. 4 is a perspective view of a vessel for receiving a liquid or substance to be frozen or cooled. Fig. 5 is a sectional view on the line *x x* of Fig. 6. Fig. 6 is a top plan view of the apparatus with the operating mechanism for the condenser removed, and Fig. 7 is a longitudinal section of the condenser.

The letter A designates the freezing or refrigerating tank, and B the tank in which the recondensed gas is cooled or condensed. These tanks are preferably formed by dividing a single vessel into two compartments by a partition secured liquid-tight therein.

C represents the receiver or tank for the liquid ammonia or gas-evolving agent. This receiver or tank C communicates through a suitable pipe, C′, with a series of coils, D, the flow into said coils being regulated by a suitable cock, C^2. The expanding or vaporizing gas circulates through these coils D and absorbs heat from any substance in said tank, as usual in this kind of apparatus. These coils communicate with another coil or series of coils, E, in the recondensed-gas-cooling tank B. The gas, after passing through these coils and cooling the water contained in said tank, enters at the inlet into the condenser or pump F. This condenser F by compression recondenses the gas to a fluid form, which thereby becomes heated and evolves heat. The liquid thus heated is passed through the outlet of the condenser into the coils E′, which are cooled by the water, which in turn was cooled by the passage of the gas through the coils E in the tank B. The recondensed gas passes thence back to its primary receptacle C, when the process is repeated.

The evolution of heat from the condensed gas in the condenser heats said condenser, I therefore submerge said condenser in the cooling-tank. It is obvious, however, that the condenser might be otherwise cooled.

As shown in Figs. 1 and 2, the tank is fitted with a frame, *a*, having a top cross piece or beam, *b*, and also intermediate cross-pieces, *c*. Upon cross-pieces *c* are mounted in suitable bearings the shafts *d* and *d′*. The shaft *d* has fitted at one end a large gear-wheel, *e*, and a pinion, *e′*, and the shaft *d′* has a pinion, e^2, engaging the pinion *e′*. At the ends of the pieces or beams *c*, or at the sides of the frame *a*, are mounted upon suitable shafts a large chain-gear, *f*, and a small chain-gear or pinion, *f′*, the shaft of the pinion *f′* being provided with a crank for imparting a reciprocating motion to the piston-rod of the condenser or pump F. Chain *g* connects the gear *e* and pinion *h* upon the shaft of the gear *f*, and a similar chain, *g′*, connects the gear *f* and the pinion *f′*. Cords or bands *i* are fastened to and wound around the shafts *d d′*, as drums, and pass over pulleys *k*, journaled in the cross-piece *b*. The ends of the cords are provided with suitable weights, *l*, which tend to turn the shafts

d and *d'*, to impart the necessary motion. A suitable means for winding the cords upon the shafts may be provided.

I would state here that the means just particularly described for operating the condenser-piston may obviously be changed or modified, or a spring-motor, instead of a weight, used for driving the moving parts.

As shown in Fig. 7, the condenser-cylinder F is fitted with suitable heads, forming a compression-chamber, F'. The bottom head, or the bottom of the cylinder itself, is of sufficient thickness to contain the valves. The inlet and outlet top head is fitted with stuffing-box and glands necessary to pack the piston-rod that passes through the same. The gas is introduced from the coil E into this compressing-chamber through a larger opening, *m*, fitted with an inlet-valve, *m'*, and is discharged through a smaller opening, *n*, fitted with an outlet-valve, *n'*, into the coils E' in the condensing-chamber. The inlet-opening is made larger than the outlet, in order that a downward movement of the piston will receive the resistance necessary for compressing the gas.

It is evident that the vessel shown in Fig. 4 may be of any other shape or construction desired.

What I claim is—

1. The herein-described apparatus for the manufacture of ice, or for refrigerating purposes, comprising a vessel or tank for containing a vapor or other gas-evolving agent, a refrigerating or freezing tank having suitable circulating-coils connected with said gas-evolving tank, and a separate tank for containing water cooled by a coil or coils communicating with the coils in the freezing or refrigerating tank, and a condenser having its valved inlet connected with said water-cooling coils, and having its valved outlet connected with the cooled coils in said tank, which latter returns the condensed gas to its primary receiver, as set forth.

2. The herein-described apparatus for the manufacture of ice, or for refrigerating purposes, comprising a vessel or tank for containing a vapor or other gas-evolving agent, and a refrigerating or freezing tank having suitable circulating-coils connected with said gas-evolving tank, and a separate tank for containing water cooled by a coil or coils communicating with the coils in the freezing or refrigerating tank, and a condenser submerged in the cooled liquid, and having its valved inlet connected with said water-cooling coils and having its valved outlet connected with the cooled coils in said tank, which latter returns the condensed gas to its primary receiver, as set forth.

3. The combination, with the primary gas-producing-agent receptacle, the freezing or refrigerating tank, and the recondensed-gas-cooling tank separate from said freezing-tank, and the condenser in the circuit, of the pipes and coils in said tanks, and means, substantially as described, for producing a forced circulation of the gas.

In testimony whereof I have hereunto set my hand this 13th day of August, A. D. 1885.

ABNER EVANS, JR.

Witnesses:
E. A. FINCKEL,
HARRY Y. DAVIS.

Correction in Letters Patent No. 344,310.

It is hereby certified that in Letters Patent No. 344,310, granted June 22, 1886, upon the application of Abner Evans, jr., of Philadelphia, Pennsylvania, for an improvement in "Ice Machines," an error appears in the printed specification requiring correction, as follows: In line 14, page 2, the words "inlet and outlet" should be stricken out, and the same inserted before the word "valves" in line 13, same page; and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 29th day of June, A. D. 1886.

[SEAL.]

D. L. HAWKINS,
Acting Secretary of the Interior.

Countersigned:

M. V. MONTGOMERY,
Commissioner of Patents.