(No Model.) 2 Sheets—Sheet 1.

J. A. MULLER.

ICE MACHINE.

No. 489,387. Patented Jan. 3, 1893.

Fig. 1.

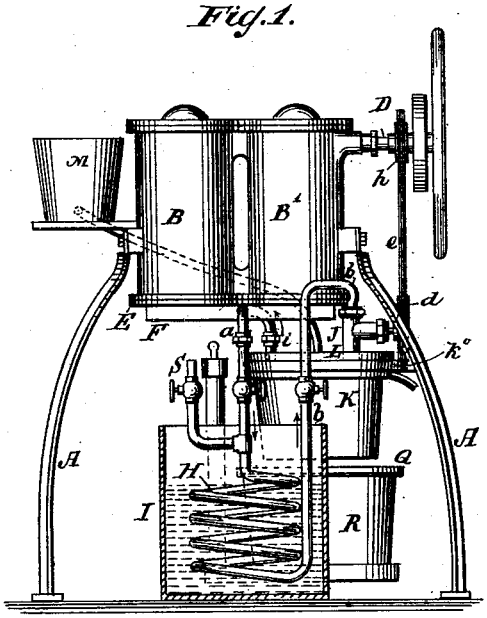


Fig. 2.

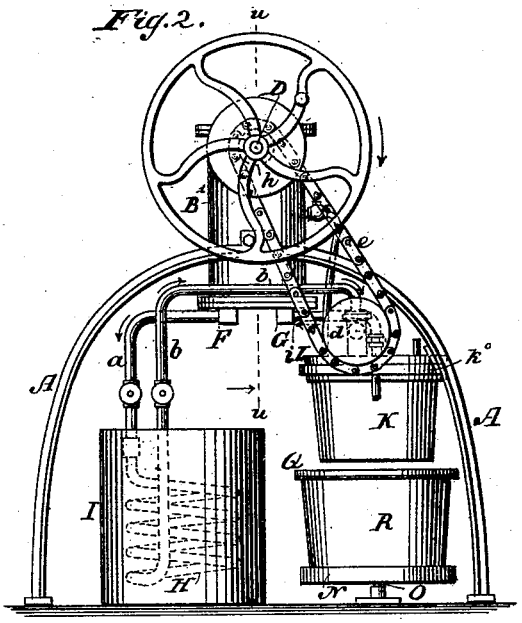


Fig. 3.

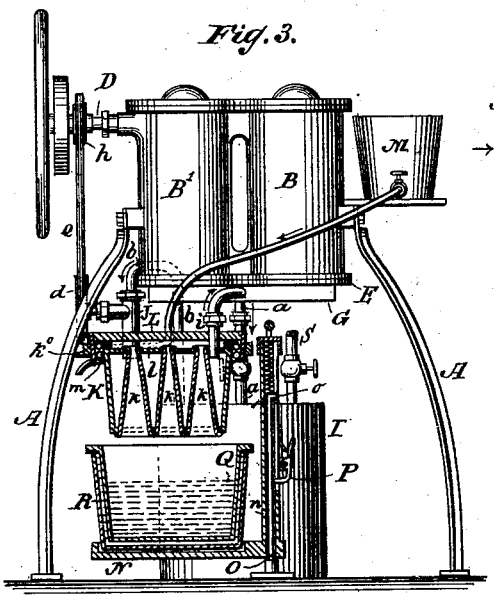


Fig. 4.

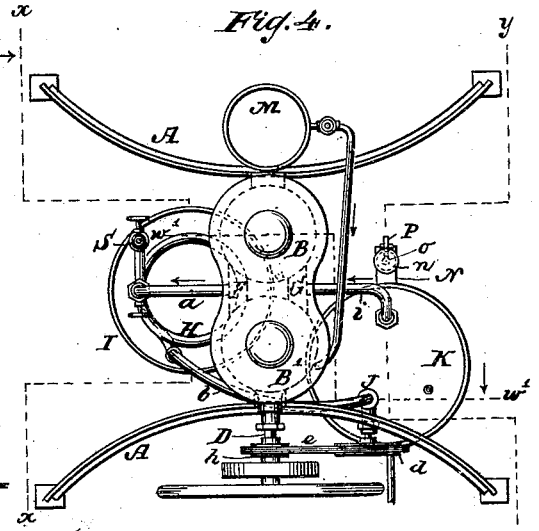


Fig. 5.

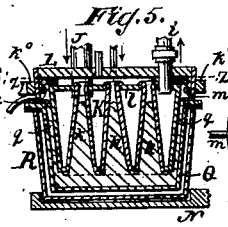


Fig. 6.

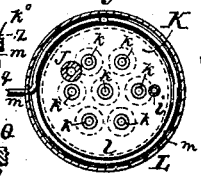
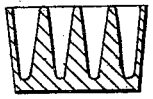


Fig. 7.



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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 8.

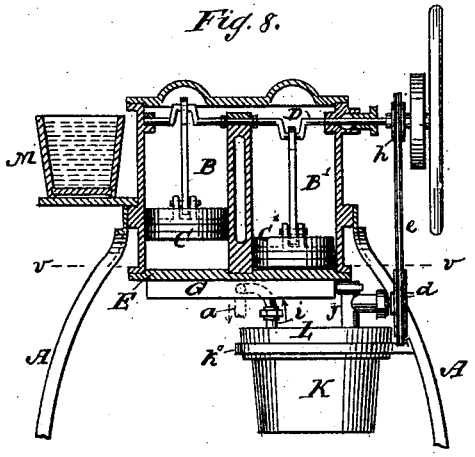


Fig. 9.

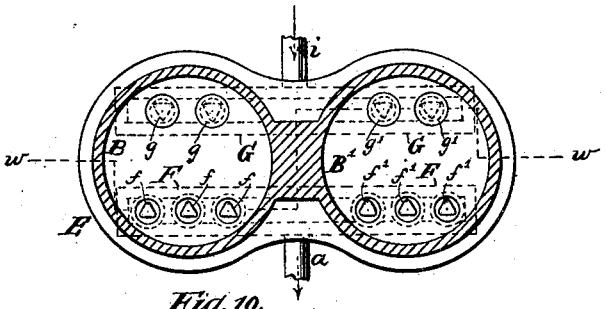


Fig. 10.

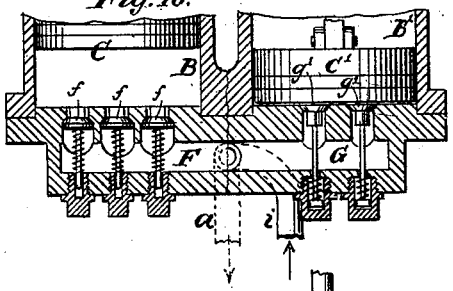
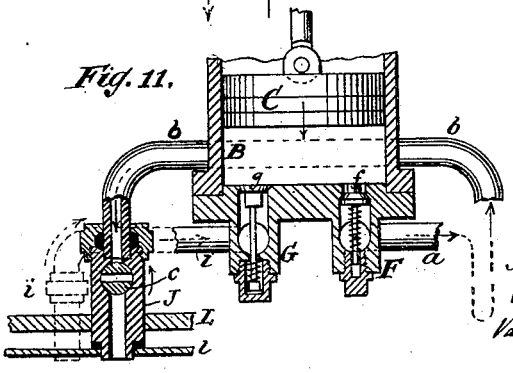


Fig. 11.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN A. MULLER, OF NEW YORK, N. Y.

ICE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,387, dated January 3, 1893.

Application filed December 26, 1891. Serial No. 416,200. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MULLER, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Ice-Machines, of which the following is a specification.

The object of this invention is a machine which can be used particularly in hot climates for the purpose of producing small quantities of ice for immediate consumption.

The peculiar and novel construction of my ice machine is pointed out in the following specification and claims and illustrated in the accompanying drawings in which

Figure 1, represents a transverse vertical section in the plane *x x* Fig. 4. Fig. 2, is a front elevation. Fig. 3, is a transverse vertical section in the plane *y y* Fig. 4. Fig. 4, is a plan or top view. Fig. 5, is a vertical section of the evaporator when the water pot is raised. Fig. 6, is a horizontal section of the evaporator in the plane *z z* Fig. 5. Fig. 7, is a central section of a lump of ice produced in my machine. Fig. 8, is a vertical section in the plane *u u* Fig. 2. Fig. 9, is a horizontal section in the plane *v v* Fig. 8 on a larger scale than the previous figures. Fig. 10, is a vertical section in the plane *w w* Fig. 9. Fig. 11, is a vertical section in the plane *w' w'* Fig. 4.

In the drawings the letter A designates a frame which supports a double acting pump. In the example shown in the drawings the pump is constructed with two cylinders B B' which contain the pistons C C' and the required motion is imparted to these pistons by means of a double crank shaft D so that if one piston rises the other descends and vice versa. The shaft D can be rotated by hand or any other suitable power. The cylinders B B' rest upon a bed plate E in which are formed two chambers F G, an end view of which is shown in Fig. 2, while Fig. 9 shows these chambers in dotted lines and Figs. 10 and 11 show the same in section. The chamber F forms the discharge chamber and it communicates with the cylinder B by means of one or more valves *f* and with the cylinder B' by means of one or more valves *f'* (best seen in Figs. 9 and 11). These valves open outwardly from the cylinders and they are normally closed by springs. The chamber G forms the suction chamber and it communicates with the cylinder B by one or more valves *g* and with the cylinder B' by one or more valves *g'* which open inwardly into the cylinders and are normally closed by their own gravity. The discharge chamber F communicates by a pipe *a* with the condenser H which in the example shown in the drawings consists of a coil situated in a tank I filled with cold water, and said condenser connects by a pipe *b* with the regulating valve chamber J which is situated on the top of the evaporator K and opens into the same.

The regulating valve *c* (Fig. 11) may be made in any suitable manner and it may be opened or closed by hand at the proper intervals but I prefer to gear it with the shaft D, the gearing being so constructed that the regulating valve opens whenever one of the pistons C or C' has passed through one half (more or less) of its downward stroke. In the example shown in the drawings the regulating valve is made in the form of a plug, on the stem of which is mounted a pulley *d* which connects by a belt *e* with a pulley *h* mounted on the shaft D and the pulleys are so proportioned that the regulating valve *c* makes one half of a revolution for each revolution of the shaft D. The suction chamber G connects by a pipe *i* with the evaporator K so that by the action of the pump a vacuum is maintained in the interior of the evaporator. This evaporator is supported by a ring *k*° secured to the frame A. From the bottom of the evaporator K rises a series of conical projections which form conical chambers *k* surrounded by gas spaces *l*, and the conical chambers being open at top and bottom. The evaporator is also provided with a cover L which contains a coil *m* (Figs. 5 and 6) connected to a vessel M which is supplied with hot water. Beneath the evaporator is a platform N from which extends a tube *n* which fits over a standard O firmly secured to the floor or bed plate of the machine. Said standard is provided with a nose *o* which extends into a slot in the tube *n* (Fig. 3) and on this tube is secured a spring catch P so that when the platform N is moved up sufficiently

high, this catch will engage the nose *o* and retain the platform in its elevated position. In the interior of the tube *n* is placed a spring which forms an elastic cushion when the platform N moves downward.

On the platform N is placed a vessel Q the inner diameter of which is somewhat larger than the outer diameter of the evaporator K so that when the platform is raised, the vessel Q embraces the evaporator (see Fig. 5) leaving an annular space *q*. The vessel Q is placed into another vessel R of larger diameter so that any liquid which may overflow from the vessel Q is received by the vessel R.

The pipe *a* which connects the discharge chamber F of the pump with the condenser H is provided with an inlet pipe S (Fig. 1) through which a suitable freezing liquid such for instance, as anhydrous sulphurous acid can be introduced into the condenser. After the condenser has been charged with a sufficient quantity of the freezing liquid, the vessel Q which is charged with water as indicated in Fig. 3, is raised to the position shown in Fig. 5 and the pump is started. When the piston B′ moves upward (Fig. 8) the atmosphere in the evaporator K becomes rarefied and at the same time the piston B descends and as soon as the regulating valve *c* opens, a quantity of the freezing liquid is injected into the evaporator where it immediately expands and the temperature in the interior of the evaporator is reduced and by continuing the action of the pump, the freezing liquid which expands in the evaporator into a gas, is exhausted from the evaporator and returned into the condenser whence the same after having been condensed into liquid form, is again returned into the evaporator so that the temperature in the interior of the evaporator is rapidly lowered to such degree that the water contained in the vessel G and in the conical chambers *k* of the evaporator freezes. In order to release the block of ice from the evaporator a small quantity of hot water is caused to flow from the vessel M through the coil *m* and then the platform is lowered and the block of ice is removed from the vessel Q. The shape of this block of ice is shown in Fig. 7.

I do not herein claim a measure interposed between the condenser and vaporizer, with mechanical means for operating the said measure, as such an arrangement is disclosed in United States Letters Patent No. 127,180, issued May 28, 1872, to Martin and Beath.

What I claim as new and desire to secure by Letters Patent is,

1. The evaporator K closed at the top and bottom and provided with conical projections forming conical chambers *k* open above and below and surrounded by the gas spaces *l* substantially as described.

2. The evaporator K closed at the top and bottom and having the conical chambers *k* open at the top and bottom, in combination with the heating coil *m* surrounding the closed top of the evaporator, substantially as described.

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

JOHN A. MULLER.

Witnesses:
WM. C. HAUFF,
E. F. KASTENHUBER.