(No Model.) 2 Sheets—Sheet 1.

J. SEDLACEK.

COOLING AND SEALING.

No. 604,162. Patented May 17, 1898.

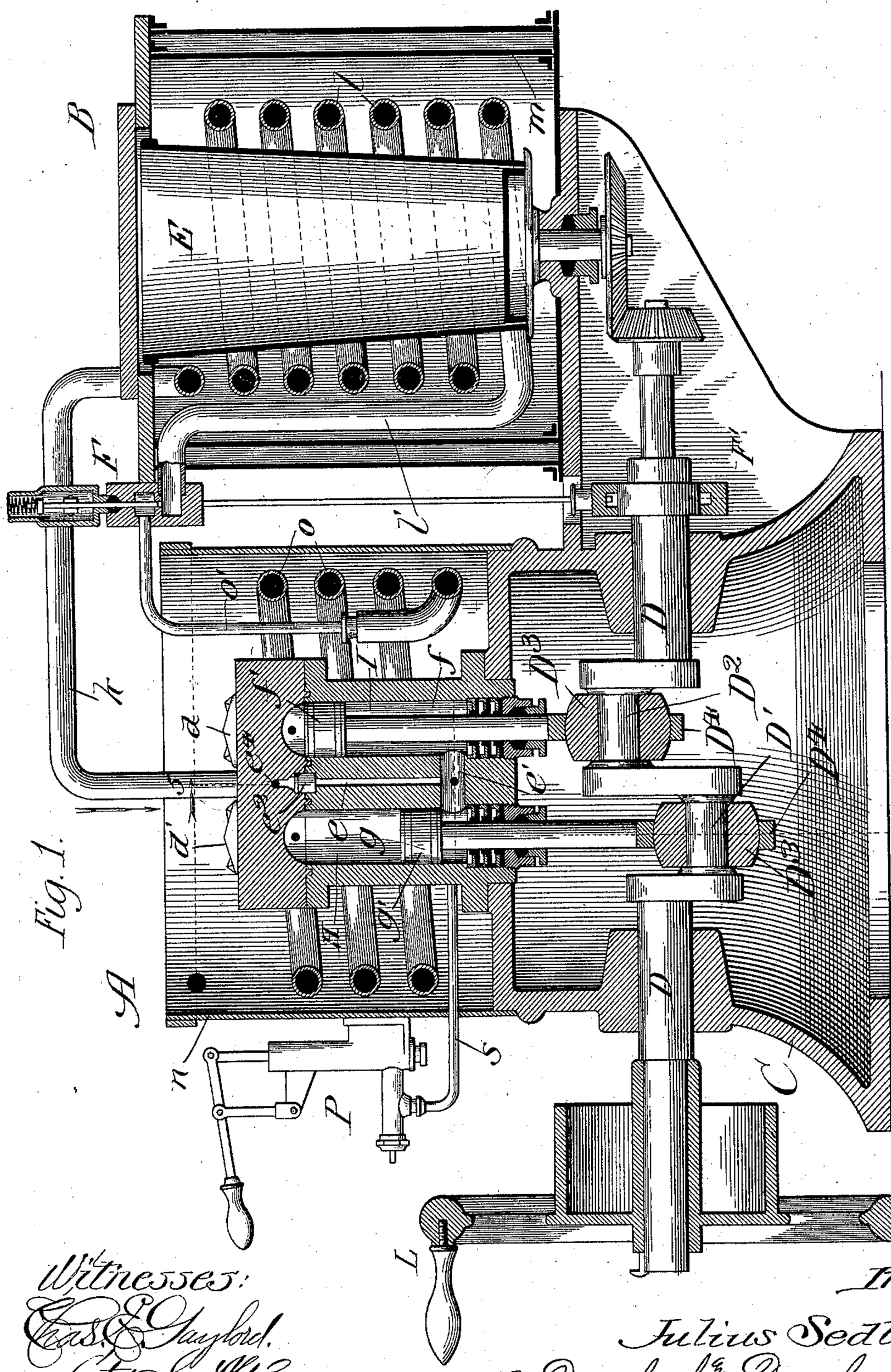

Fig. 1.

Witnesses:
Chas. E. Gaylord.
Luther S. Miller

Inventor:
Julius Sedlacek,
By Dyrenforth and Dyrenforth,
Attys.

(No Model.)

2 Sheets—Sheet 2.

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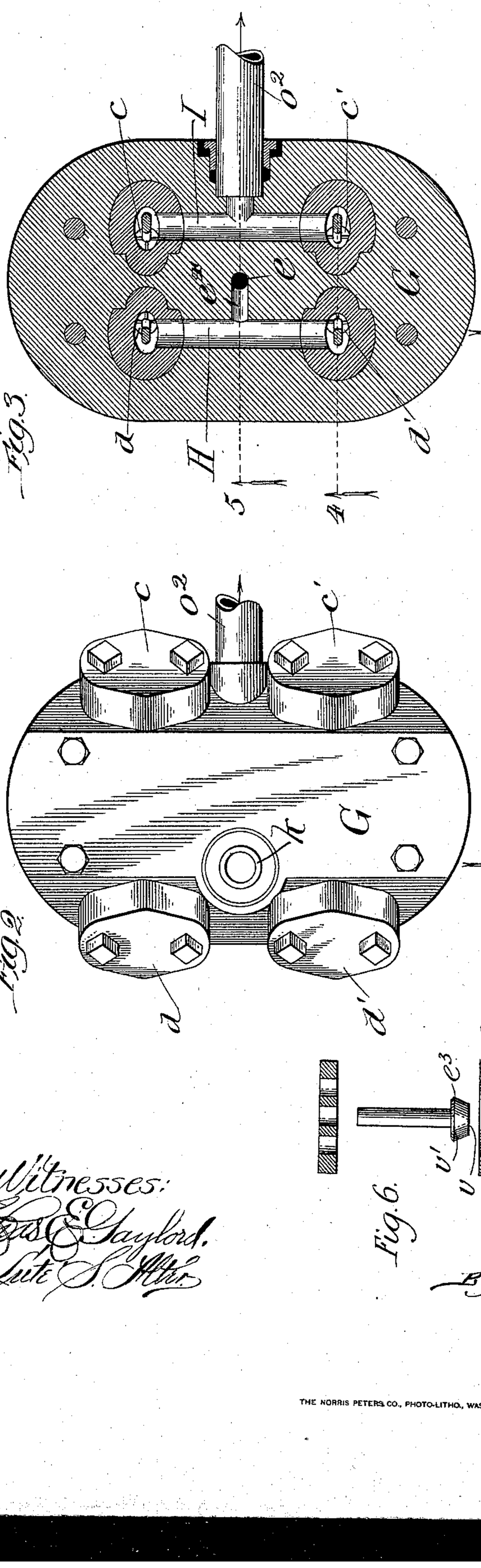

Fig. 3.

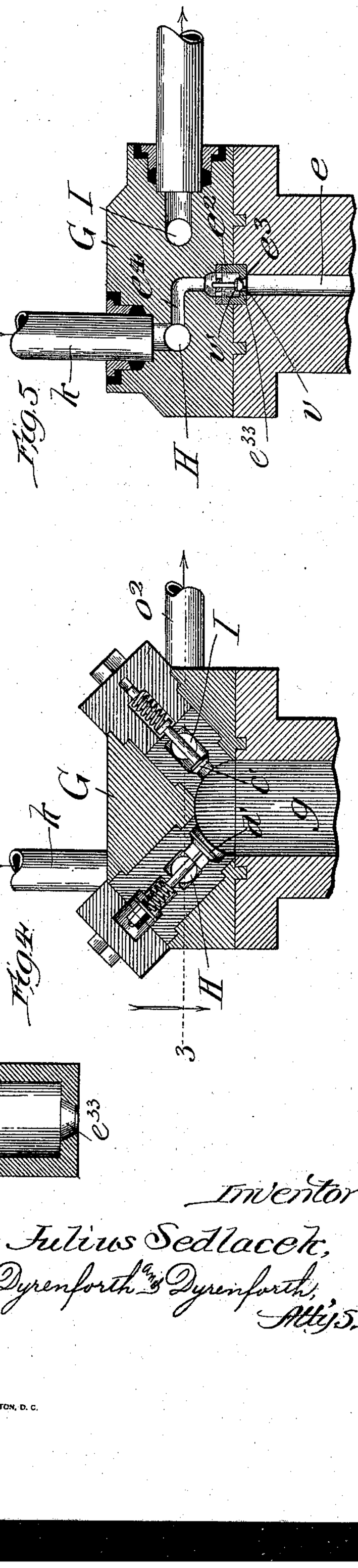

Fig. 5.

Fig. 2.

Fig. 4.

Fig. 6.

Witnesses:
Chas. E. Gaylord.
Lute S. Miller.

Inventor:
Julius Sedlacek,
By Dyrenforth & Dyrenforth,
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UNITED STATES PATENT OFFICE.

JULIUS SEDLACEK, OF NUREMBERG, GERMANY.

COOLING AND SEALING.

SPECIFICATION forming part of Letters Patent No. 604,162, dated May 17, 1898.

Application filed September 27, 1897. Serial No. 653,215. (No model.) Patented in France December 21, 1892, No. 226,556; in Germany February 10, 1893, No. 82,773; in Italy March 28, 1893, No. 1,194; in Austria-Hungary May 6, 1893, No. 1,089 and No. 5,637, and August 30, 1893, No. 10,239 and No. 19,809; in Switzerland June 25, 1894, No. 8,798; in Belgium August 25, 1894, No. 85,843, and in England May 14, 1895, No. 9,530.

To all whom it may concern:

Be it known that I, JULIUS SEDLACEK, a subject of Austria, residing at Nuremberg, Bavaria, Germany, have invented a new and useful Improvement in Refrigerating-Machines, (for which I have obtained patents in the following countries: Germany, No. 82,773, dated February 10, 1893; France, No. 226,556, dated December 21, 1892; Switzerland, No. 8,798, dated June 25, 1894; Italy, No. 1,194, dated March 28, 1893; Belgium, No. 85,843, dated August 25, 1894; England, No. 9,530, dated May 14, 1895, and Austria-Hungary, No. 1,089 and No. 5,637, dated May 6, 1893, and No. 10,239 and No. 19,809, dated August 30, 1893,) of which the following is a specification.

My invention relates to an improvement in the class of refrigerating or ice machines in which a gas liquefiable under mechanical compression, such as ammonia or carbolic acid, is utilized to absorb, by expansion, the heat from a surrounding body to refrigerate or congeal the latter.

A machine of the class to which my improvement relates involves as its essential elements a compressor for the gas, a condenser, and an interposed suction-chamber or suction-pipe, through which latter the gas utilized in the generator-coil is sucked into the compressor-chamber by the action of its contained piston, to be forced by the latter into the condenser, there to be liquefied and to be returned thence to the refrigerator.

By the action of the compressor in forcing the gas into the condenser a material quantity of the gas leaks past the piston; and the primary object of my improvement is to utilize this leakage-gas, which eventually enters the suction-chamber, as a packing to obstruct the leakage by maintaining such a pressure of the leakage-gas behind the piston as will tend to materially counteract the pressure in the compressor-chamber. This I accomplish by providing between the compressor, behind the piston, and the suction-chamber an automatically tapering acting regulating-valve and a tapering valve-seat therefor to present a lesser surface area to the greater pressure between it and the piston and a greater surface area to the lesser pressure from the suction-chamber, the two surface areas being so proportioned or presented that whenever a predetermined pressure is attained behind the piston against the smaller valve-surface area in excess of that required to oppose the pressure in the compressor-chamber it shall equal the suction-pressure against the greater valve-surface area and thereby open the valve to admit the excess of pressure into the suction-chamber.

My invention consists in the general construction of the means employed for accomplishing my aforesaid object; and it also consists in details of construction and combinations of parts, all as hereinafter described, and set forth in the claims.

Referring to the accompanying drawings, Figure 1 is a view in vertical sectional elevation of an ice-machine provided with my improvement; Fig. 2, a top plan view of the compressor; Fig. 3, a horizontal section through the head of the compressor; Fig. 4, a section taken at the line 4 on Fig. 3 and viewed in the direction of the arrow; Fig. 5, a section taken at the line 5 on Fig. 1, viewed in the direction of the arrow and enlarged, or taken at the line 5 on Fig. 3 and viewed in the direction of the arrow; and Fig. 6, an enlarged sectional view in the nature of a diagram, showing the conical form of the valve and valve-seat, the chamber, and the guide-bearing for the valve-stem.

A is the condenser.

B is the refrigerator, that shown being of the variety adapted for making ice.

The mechanism of the machine is supported on a suitable bed C, containing bearings for a rotary crank-shaft D, having the cranks D′ and D^2, each surrounded by a sleeve D^3, convex on its outer surface to fit the inner concave sides of a yoke D^4, in which the sleeve is confined and which is provided on the outer end of each piston-stem of the compressor hereinafter described.

The compressor comprises a casting seated in the bottom of the condenser afforded by the top of the bed C, the casting containing

the two chambers *g* and *f*, which communicate at their lower ends through a passage *e'*, affording a lubricant-chamber, from which leads a duct *e* to a valve-chamber e^2, containing a tapering valve-seat e^{33}. This valve-chamber is formed partly in a head G, covering the chambers *g* and *f*, and in which are cored out a suction-chamber H, into which leads a suction-pipe *k*, and a discharge-chamber I, from which leads a discharge-pipe o^2 to connect with the inlet end of a pipe-coil *o*, surrounding the compressor in the condenser-tank *n*. In the head G is also formed a passage e^4, leading from the valve-chamber e^2 to the suction-chamber H. At opposite ends of the chamber H are provided the inwardly-opening spring-controlled suction-valves *d* and *d'*, controlling the gas-supply from the pipe *k* to the chambers *g* and *f*, and at opposite ends of the chamber I are provided the outwardly-opening spring-controlled discharge-valves *c* and *c'*, controlling the discharge from the chambers *g* and *f* to the pipe o^2. In the chambers *g* and *f*, respectively, are the pistons *g'* and *f'* on the rods g^2 and f^2, which extend through stuffing-boxes into the chambers and are connected, through the medium of the yokes D^4 on their lower ends containing the sleeves hereinbefore described, with the cranks D' and D^2.

As shown, the refrigerator B comprises a covered tank *m*, rising from the bed C and containing coiled pipe *l*, surrounding a rotatable can E for the water to be congealed and suitably geared for its rotation with the shaft D. This shaft may be driven by hand-power applied at the crank (shown at L in Fig. 1) or by other power. The coil *l* is connected from its upper discharge end with the inlet end of the coil *o* by the suction-pipe *k*, and the discharge end of the coil *o* is connected by a pipe *o'*, of reduced diameter, with a pipe *l'*, affording the inlet to the coil *l* through an interposed adjustable valve device F, actuated by its eccentric connection F' with the shaft D to admit, intermittently, gas from the pipe *o'* into the pipe *l'*. This valve device F and its connection with the drive-shaft form no part of my present invention and are not, therefore, herein described in detail; but they are the same as shown and fully described in Letters Patent granted to me April 12, 1898.

In the chamber e^2 is the valve e^3, having a seat e^{33}. The valve-seat is essentially tapering, and the valve must also be either tapering or a ball-valve, which is the equivalent for my purpose of the tapering or conical form. The surface *v* of this valve presented to the duct *e* and through it to the pressure below the pistons *f g* is of smaller area than that of the surface *v'*, which it presents to the pressure from the suction-chamber H, and the difference between the areas of these two surfaces is so proportioned that when the pressure against the surface *v* equals that against the surface *v'* there will be an excess of the predetermined pressure below the pistons, and the valve e^3 will rise to admit such excess into the suction-chamber H through the passage e^4. Such predetermined pressure serves to pack the spaces below the pistons to obstruct the leakage of gas past them in their upstrokes.

At P is shown a pump for injecting the lubricant (as glycerin) into the chamber *e'*, with which the pump communicates through a pipe *s*.

From the foregoing description of the mechanism the operation of the machine will be understood to be that of working the pistons *g'* and *f'* by turning the shaft D to alternately suck gas into the chambers *g* and *f* by the successive downstrokes of the pistons and to force the gas by their successive upstrokes through the discharge-pipe o^2.

While I have for the sake of this explanation shown and described my improvement in connection with a particular construction of refrigerating-machine, I do not intend that it shall be limited to any particular construction of such machine other than has been herein generally outlined as involving certain essential features.

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

1. In a refrigerating-machine, the combination with the compressor and suction-chamber of means for maintaining a predetermined pressure of leakage-gas behind the piston in the compressor-chamber greater than the pressure in the suction-chamber, said means comprising a tapering valve and a tapering valve-seat interposed between the two said chambers and presenting to said pressure behind the piston a smaller surface area and to said suction-pressure a larger surface area, said areas being relatively proportioned substantially as described.

2. In a refrigerating-machine, the combination of a compressor containing a pair of piston-chambers provided with a connecting-passage behind the pistons, a suction-chamber and means for maintaining a predetermined pressure of leakage-gas behind the pistons greater than the pressure in the suction-chamber, said means comprising a duct leading to the suction from said connecting-passage and containing a valve-chamber and a tapering valve having a tapering valve-seat in said chamber presenting a smaller surface area to said pressure behind the pistons and a larger surface area to said suction-pressure, said areas being relatively proportioned substantially as described.

3. In a refrigerating-machine, the combination with the condenser and refrigerator of a suction-chamber into which the refrigerator-coil discharges, a discharge-chamber connected with the condenser-coil, a compressor containing a pair of piston-chambers each having a valve-controlled connection with said suction-chamber and a valve-controlled connection with said discharge-chamber, and means for maintaining a predetermined pres-

sure of leakage-gas behind the pistons greater than the pressure in the suction-chamber, said means comprising a duct communicating at one end with the piston-chambers behind the pistons therein and from its other end with said suction-chamber, and a tapering valve having a tapering valve-seat interposed in said duct and presenting a smaller surface area to said pressure behind the pistons and a larger surface area to said suction-pressure, said areas being relatively proportioned substantially as described.

JULIUS SEDLACEK.

In presence of—
DANIEL MEDUSIKE,
OSCAR BOCK.