

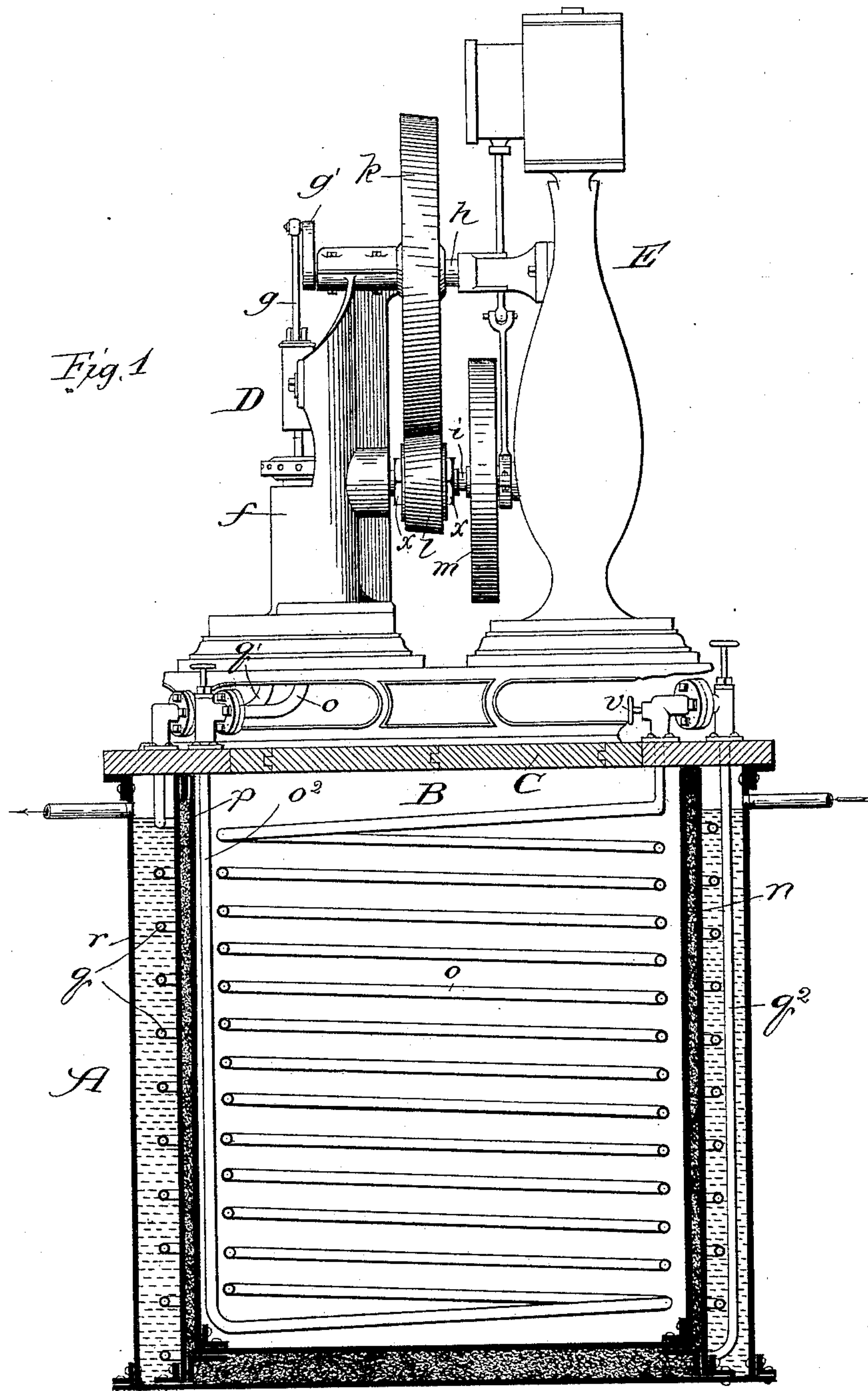
(No Model.)

2 Sheets—Sheet 1.

F. W. WOLF.
ICE OR REFRIGERATING MACHINE.

No. 424,747.

Patented Apr. 1, 1890.



Witnesses:
C. C. Gaylord,
J. M. Dyrenforth.

Inventor:
Frederick W. Wolf,
By Dyrenforth & Dyrenforth
Attys

(No Model.)

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Fig. 2.

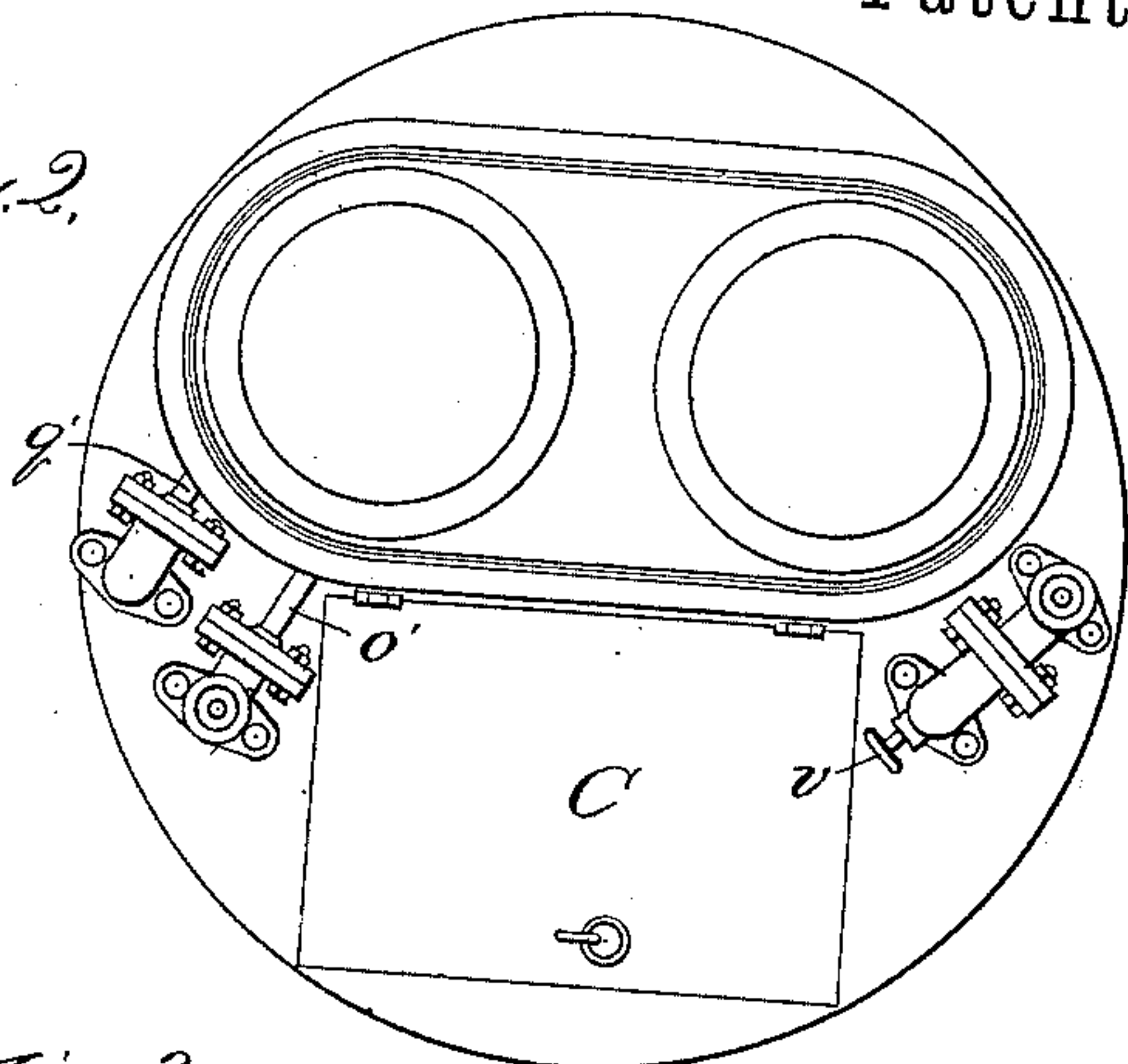
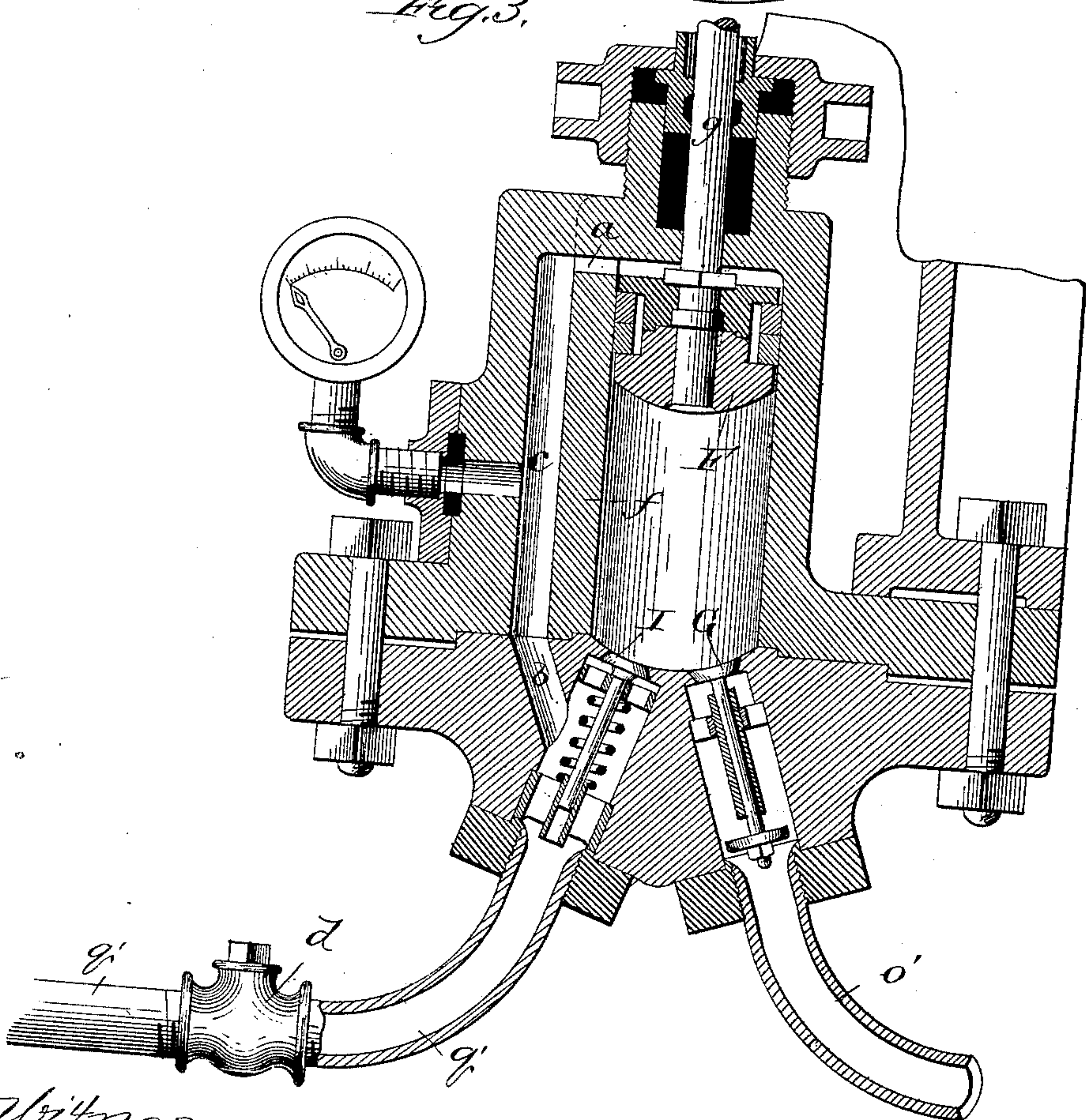


Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK W. WOLF, OF CHICAGO, ILLINOIS.

ICE OR REFRIGERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 424,747, dated April 1, 1890.

Application filed April 24, 1889. Serial No. 308,457. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. WOLF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Ice or Refrigerating Machines, of which the following is a specification.

My invention relates to improvements in the class of ice-making and refrigerating machines employing the expansion of a suitable liquefiable gas to absorb heat from its surroundings and thereby produce cold.

The primary object of my improvement is to provide an ice-making or refrigerating machine which shall possess all the features of the large machines for the same purpose employed for making ice on a large scale or for cooling in breweries, packing-houses, and the like, but which shall be so compact as to its parts (more particularly as to the condenser and refrigerator) that it may be readily provided in dimensions rendering it suitable for domestic, restaurant, and the like uses requiring machines of lesser capacity.

My invention consists in the general construction of my improved machine, and it also consists in details of construction and combinations of parts.

In the accompanying drawings, Figure 1 represents the machine containing my improvements in elevation, the refrigerator and the condenser enveloping it being shown in section. Fig. 2 is a plan view of the machine with the compressor and engine removed; and Fig. 3 is an enlarged view, mainly sectional, of a compressor suitable for use with my improvement.

My improved machine, like other machines of the class to which it relates, involves, as essential features, a compressor and a condenser and a refrigerator communicating with it and with each other, whereby the liquefied gas (usually anhydrous ammonia, which I also employ) may be admitted into and allowed to expand through the refrigerator-pipe and absorb the heat from the medium (as brine, water, or the atmosphere) surrounding it, thence taken into the compressor and introduced into the condenser-pipe, wherein it is cooled with water and liquefied and again introduced to the refrigerator, the action of

the compressor maintaining the circulation. For the purposes of my present machine, however, which bespeak compactness (and which may also sometimes be the case with larger machines) and comparatively small dimensions, I provide the refrigerator inside the condenser, and prefer, though it is not essential to do so, to afford the more important advantages of my improved construction, to impose the compressor and under certain circumstances also the engine for actuating it on the top of the condenser and refrigerator tanks, all as shown in Fig. 1.

A is the condenser, comprising the tank *r*, containing coiled pipe *q*, and B is the refrigerator comprising a tank *p* within the tank *r* and containing coiled pipe *o*.

Between the tank *r* and coiled pipe *q* is a wall *n*, of material non-conductive of heat and cold, and which serves to insulate the refrigerator from the condenser, and the two tanks may be provided with a common cover C, which should be formed of wood or, at least, insulated; or the cover C may close only the refrigerator-tank, or it may extend over the condenser tank merely, which may thus be left open practically.

E is the engine or other motive power, and D the compressor, both of which may, for the sake of economy in space, be imposed upon the cover C.

The engine-shaft *i* carries, besides a fly-wheel *m*, a friction-pulley *l*, which is preferably conical, and should be composed of paper, vulcanite fiber, or the like, in contact with a friction-pulley *k*, (also preferably conical, so that the pulley *l* may be readily adjusted with relation to the pulley *k*, according to the work or to the wear, by setting the nuts *x*,) on the compressor-shaft *h*, supported, like the engine-shaft, in suitable bearings, as shown. The piston F, Fig. 3, is connected through its piston-rod *g* with a crank *g'* on the end of the shaft *h*.

The compressor D, as shown in Fig. 3, involves the following construction: The gas-inlet or suction valve G, opening inward with relation to the compressor-cylinder *f*, and the gas-outlet valve I, opening outward with relation to the compressor-cylinder, are both provided in the lower part or base of

the compressor, the former being interposed between the communication through a pipe o' (forming the outlet of the pipe o) of the refrigerator-coil with the compressor, and the latter between the communication through a pipe q' (forming the inlet to the pipe q) of the condenser-coil with the compressor, and a passage b connects the pipe q' , through the chamber of the valve I, with the upper part of the compressor-cylinder f , through a passage a , leading from a chamber or passage c , afforded by an outer wall f' of the compressor-cylinder, whereby a continuous passage is provided from the condenser to the upper end of the compressor outside the cylinder of the latter.

The operation is as follows: With the upstroke of the piston F gas (and, according to the arrangement of the Linde ice-machine set forth in Letters Patent of the United States No. 228,364, granted June 1, 1880, and reissued on the 16th day of September, 1884, under the number 10,522, vapor mixed with the gas) is drawn from the refrigerator-coil o through the pipe o' into the compressor below the piston, the pressure thereof in the compressor-cylinder being fifteen pounds (more or less) to the square inch. The downstroke of the piston forces the gas through the chamber of the valve I and passage b into the chamber c , and thence through the passage a above the piston into the cylinder f , wherein it exerts a pressure of about one hundred and fifty pounds to the square inch. The succeeding upstroke of the piston draws gas from the refrigerator into the compressor-chamber in the manner described and forces that above the piston through the pipe q' downward into the condenser-coil q , wherein it is cooled and thus liquefied by cold water introduced into the tank r , and liquid ammonia passes upward from the condenser-coil through the vertical extension q^2 thereof into the upper end of the refrigerator-coil o , the supply between the condenser and refriger-

ator coils being controlled, according to requirement, by means of a regulating-valve v . From the refrigerator-coil the gas passes through the vertical extension o^2 thereof into the pipe o' , whence it again enters the compressor-cylinder in the manner described.

The more important advantages of the construction thus described, and which render it particularly desirable for use in my improved machine, are, besides the compactness thereby afforded and hereinbefore referred to, that each double stroke of the piston fills the cylinder f ; that the valves G and I, being in the bottom of the compressor, cannot fall into the latter, and thus obstruct it and tend to cause its bursting or breaking; that the upward stroke of the piston accomplishes the entire compression, and the pressure above it does material work in the downstroke, and with the up or "pull" stroke the piston draws in the gas below the piston at the fifteen-pound pressure and compresses it out of the cylinder into the condenser from above the piston at about one hundred and fifty pounds.

If required, a check-valve d is provided in the communication of the compressed gas passage q' with the condenser.

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

1. In an ice or refrigerating machine, the combination, with a compressor, of a condenser and a refrigerator within the condenser and insulated therefrom, substantially as described.

2. In an ice or refrigerating machine, the combination of a condenser A, a refrigerator B within the condenser and insulated therefrom, a cover C, an engine or other motive power, and a compressor supported on the cover C, substantially as described.

FREDERICK W. WOLF.

In presence of—

J. N. DYRENFORTH,

M. J. BOWERS.