

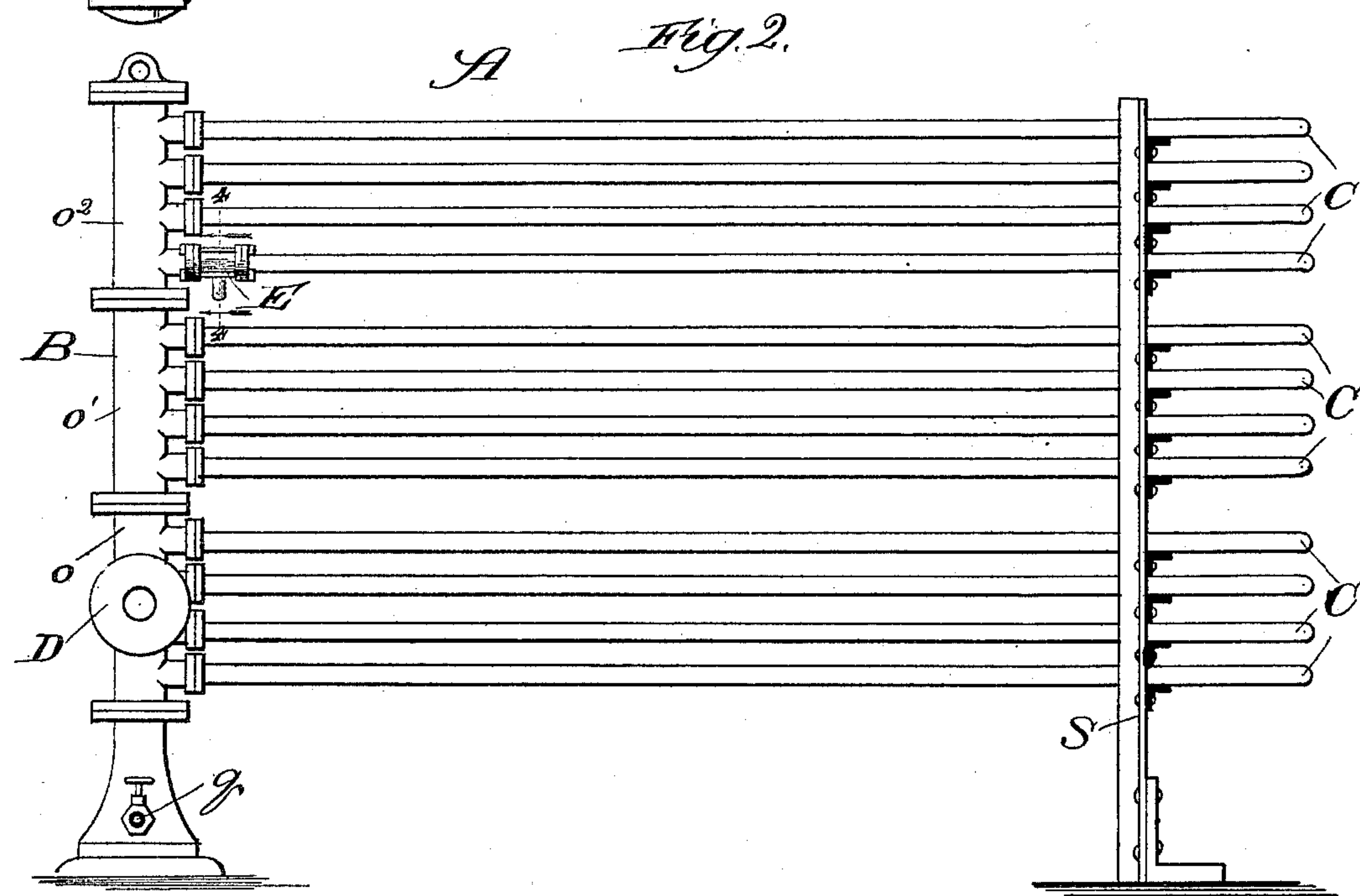
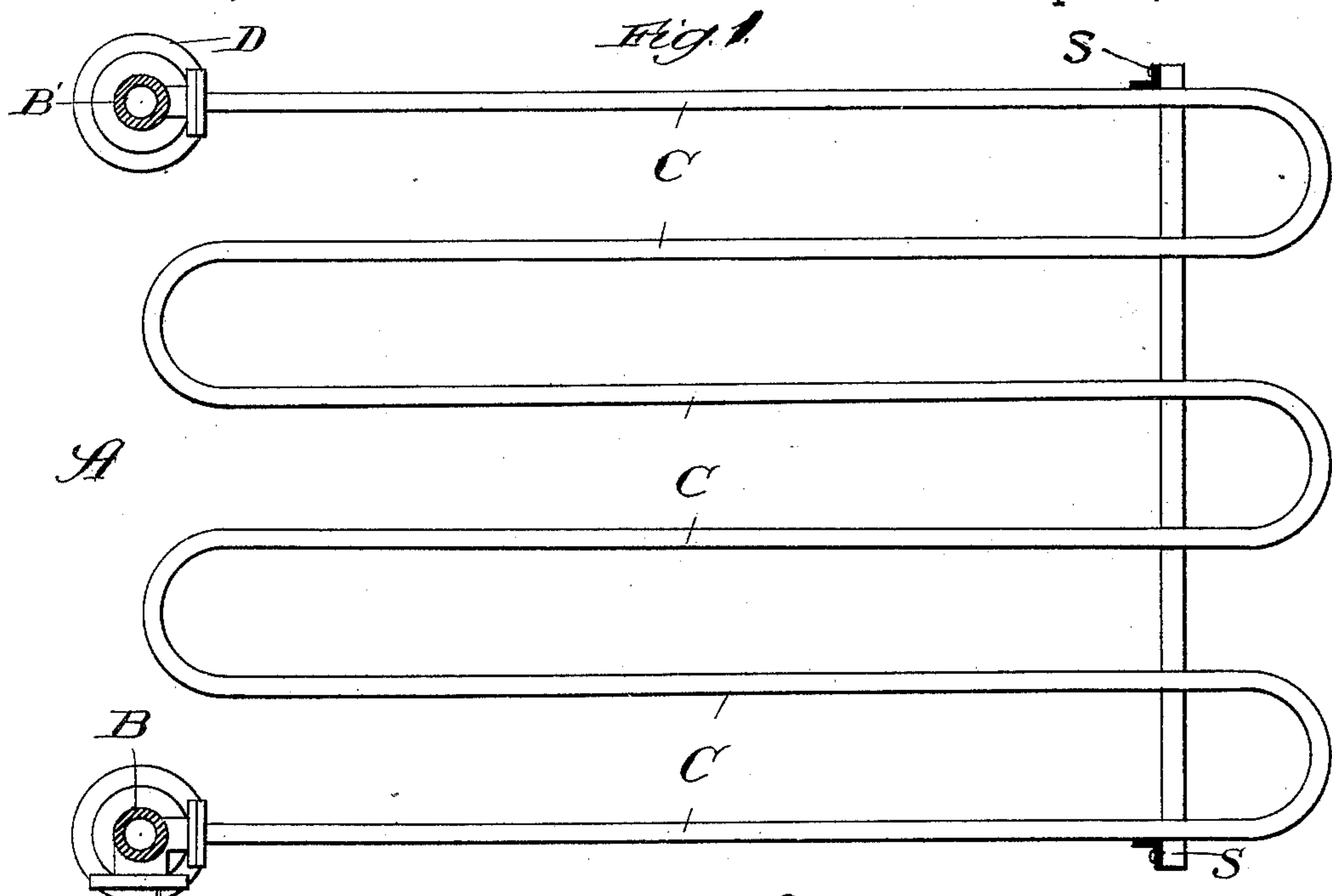
(No Model.)

2 Sheets—Sheet 1.

F. W. WOLF.
ICE OR REFRIGERATING MACHINE.

No. 424,746.

Patented Apr. 1, 1890.



Witnesses:
Charles Gaylord,
J. H. Dyrenforth.

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

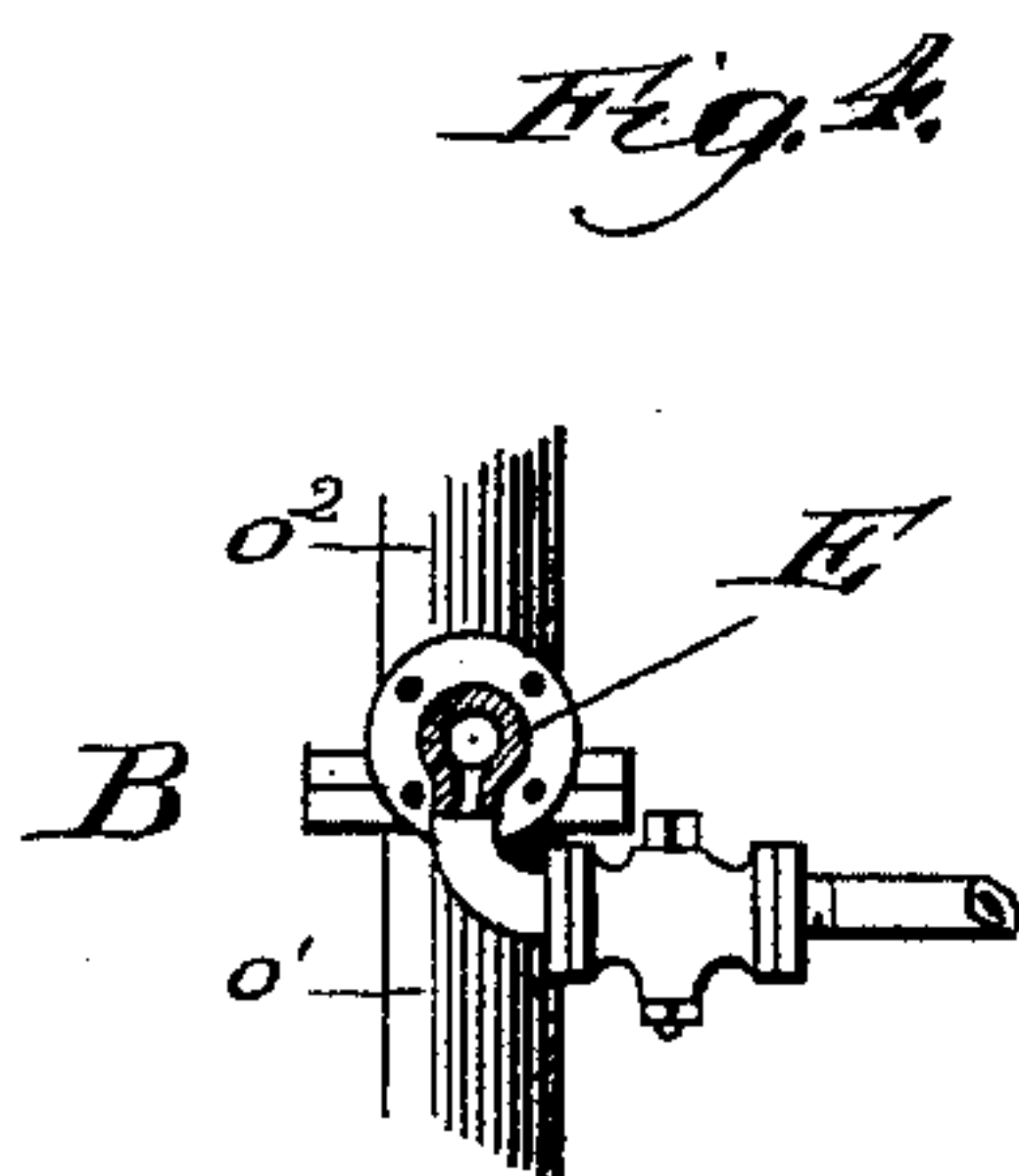
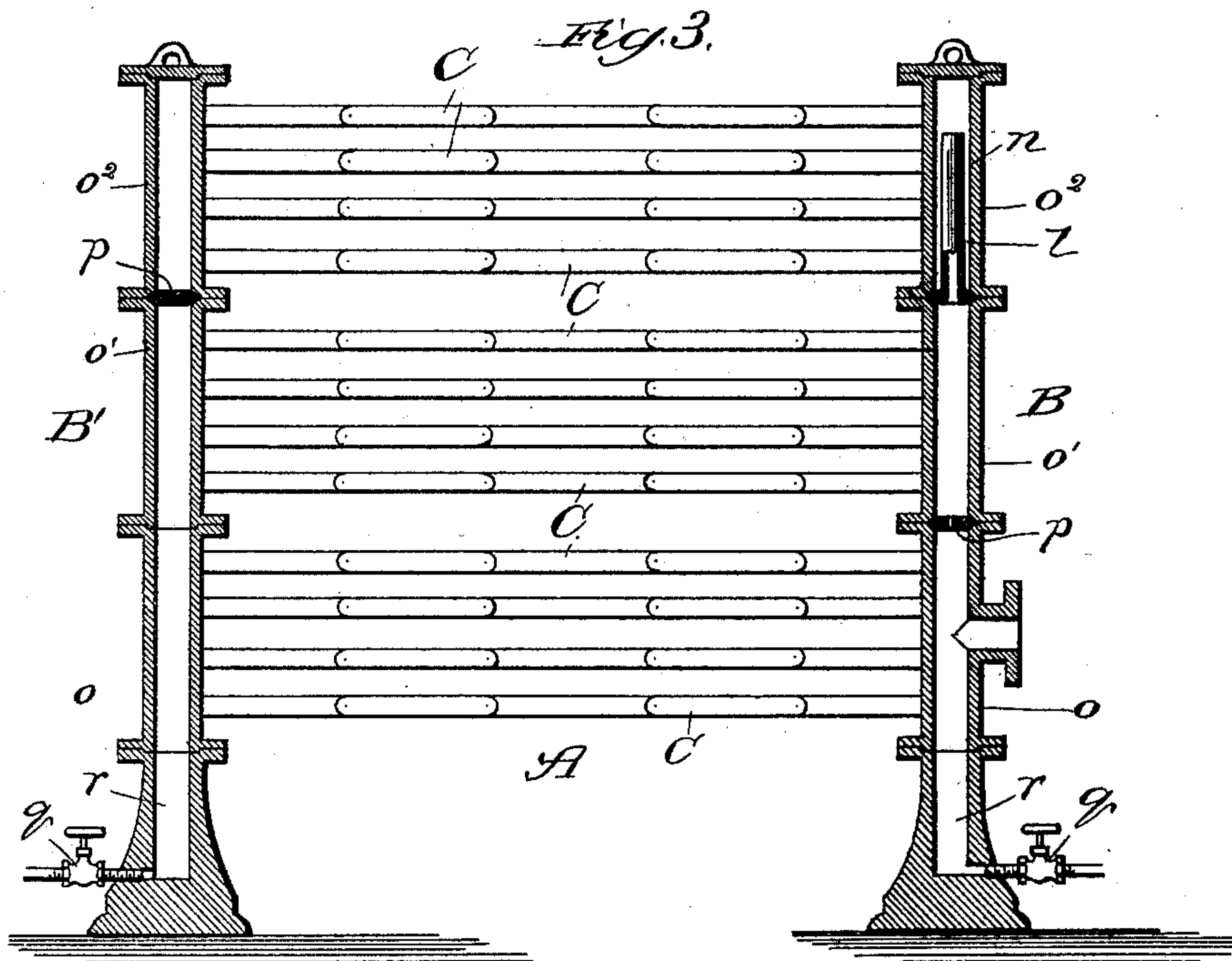
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UNITED STATES PATENT OFFICE.

FREDERICK W. WOLF, OF CHICAGO, ILLINOIS.

ICE OR REFRIGERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 424,746, dated April 1, 1890.

Application filed April 9, 1889. Serial No. 306,495. (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 more especially to improvement in the class of ice-making or refrigerating machines, in which the cooling effect is produced by the expansion of a gas liquefiable under mechanical compression, (as anhydrous ammonia, which is the medium used by me,) and circulated, by the action of a compressor, through the coil or coils of the refrigerator, in which the effect of its expansion is exerted, and thence by way of the compressor through the coil or coils of the condenser, wherein it is liquefied by cooling with cold water caused to flow over the coiled pipe in a tank or in the open air.

My invention relates, more particularly stated, to an improvement in the construction of the condenser portion of a machine of the above-described class or to a device for use in cooling liquids generally—such as beer, mashes, and the like.

The objects of my invention are to provide a condenser or “cooler” which shall afford a large course for the circulation of the gas to be liquefied or liquid to be cooled and a large surface upon which to exert the cooling effect in a comparatively small space, and to provide a generally improved construction of device for the purpose.

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

Inasmuch as I have invented my improved device for use as a condenser of the gas in ice and refrigerating machines it is hereinafter referred to only as a condenser.

In the accompanying drawings, Figure 1 is a sectional plan view of my improved condenser; Fig. 2, a view of the same in side elevation; Fig. 3, a front view of the same, regarded from the left-hand side of Fig. 1, and showing the standards in vertical section; and Fig. 4, a section on the line 4 of Fig. 2, viewed in the direction of the arrow.

As illustrated, my improved construction

is shown to be embodied in a so-called “open-air” condenser, the term signifying a condenser not inclosed in a tank in which to cause the cooling-water to circulate around it, but over which water is caused to flow with the condenser coils or piping exposed to the surrounding atmosphere, and because of the illustration the description hereinafter contained applies particularly to an open-air condenser, though the construction need not be changed materially, if at all, for a “tank” condenser.

A is a condenser comprising, essentially, two vertical tubes or hollow standards B and B', forming manifolds or “headers,” each extending from a base *r*, which should be hollow and provided near its bottom with a draw-off cock *q*, for the waste oil, and bent or convoluted piping C, leading horizontally from one standard to the other. Each standard or manifold B and B' is preferably formed, as shown, in sections, properly joined together, and in any desired number, according to the length of standard required, and the sections may be of equal length or of any length adapting them to serve their purpose.

For the purposes of this description the three sections *o*, *o'*, and *o*² illustrated are sufficient to convey a clear understanding of the construction and manner of operation of the condenser. The lowermost section *o* in each manifold has unobstructed communication with the hollow base of the standard directly below it. Between the sections *o* and *o'* of one of the manifolds (as the manifold B) is a diaphragm or partition *p*, which should be provided with an opening through it, as shown, and in the section *o*² of the same manifold (or uppermost section, whatever the number) is a vertical pipe *n*, having open communication with the section below it, but having the space surrounding it in the section *o*² closed from the section *o'*, as by means of a flange *m*, at which to secure and sustain the pipe between the two sections. The other manifold is open from its base to the section *o*², where communication of the latter with the sections below it is cut off by a diaphragm or partition *p*, like that already described, or imperforate, as shown. The diaphragms *p* thus divide the standards internally into chambers.

It will be understood that the reason for showing and describing only the two diaphragms p is owing to the fact that the condenser is illustrated as comprising only three sections in each manifold, between alternate pairs of which sections the diaphragms are held, if the construction be sectional, which, however, it need not be necessarily. If, however, each manifold were divided into, say, to illustrate, six sections, the manifold B would be open between its two lower sections, and a diaphragm p would be provided between the second and third and fourth and fifth, and in the manifold B' the diaphragms would alternate with those in the manifold B—that is to say, one would be provided between sections one and two, and one between sections three and four, when the inlet D would be on the left-hand manifold B'.

The pipe n affords a trap, for a purpose hereinafter explained.

From each section in the manifold B to the corresponding section in the manifold B', there leads a series of pipes C, one above the other, each series, as shown, consisting of four pipes, though this number is subject to change according to requirement, and the extension of the pipe between the manifolds is not direct; but to afford the desired length of the course through each pipe without thereby occupying great space, the pipe is bent back and forth the desired number of times, making convolutions of desired length and in desired number, as the six straight lengths indicate in Fig. 1.

Suitable frame-work is provided for supporting the pipe C, as indicated in Fig. 2 at S, but is not shown in detail, as it presents no features thought to involve patentable novelty and would tend to confuse and obstruct parts desired to be clearly represented.

The operation is as follows: Cold water is caused to flow from the top of the device over the pipe C and manifolds B and B' to cool and liquefy the gas, which is introduced into the condenser at the openings D, to be connected for the purpose with the compressor, (not shown,) which performs its function of producing the desired circulation through the refrigerator (also not shown) and condenser and compresses the gas into the latter, all in any ordinary or suitable manner. The gas first enters the chamber afforded in the section o of the manifold B and circulates through the lowermost horizontal series of pipes C into the corresponding section in the manifold B', in which it rises to the section o' , (the two said sections o and o' affording one chamber,) passes thence through the next higher series of pipes C into the corresponding section in the manifold B, wherein it rises in a more or less densified condition through the pipe n . In the section o^2 , containing the pipe n , the gas that has become liquefied enters the space around the pipe, which thus affords the trap

l , and the lower or several of the lower of the uppermost series of the pipes C and section o^2 affording the uppermost chamber in the manifold B', while the remaining gas passes through the upper pipes of the said series, all the time undergoing condensation, and into the last-named section o^2 , by the time of reaching which it should be all liquid. To draw off liquid ammonia a suitable connection E is provided in one (preferably the lowermost, as shown) of the upper series of pipes or in a manifold, if preferred, and communication is afforded at such connection E of the condenser with the refrigerator. Oil carried along with the circulating gas into the condenser will accumulate in the hollow bases of the headers B and B', whence it may be drawn off from time to time through the cocks q .

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

1. In a cooler or condenser, the combination of two vertical manifolds B and B', diaphragms p , dividing the manifolds into alternate sections, an inlet for the initial section, an outlet for the terminal section, a pipe n , affording a trap l in the section last preceding the terminal section, and pipes C, connecting opposite sections, whereby a fluid injected courses sinuously from the inlet to the outlet, and is prevented from receding from the final group of pipes and the sections which they connect, substantially as described.

2. In a cooler or condenser, the combination of two vertical manifolds B and B', having hollow bases provided with draw-off cocks q , diaphragms p , dividing the manifolds into alternate sections, a series of pipes C in groups, connecting at opposite ends with opposite sections of the manifolds, an inlet D, for the initial section, an outlet E, for the terminal section, and a pipe n in the section last preceding the terminal section, affording a trap l , substantially as and for the purpose set forth.

3. A condenser or cooler comprising, in combination, two vertical manifolds B and B', formed of separate tubular sections secured together and having hollow bases provided with draw-off cocks q , diaphragms p , at alternate heights in the manifolds at the junctions of tubular sections thereof, convoluted pipes C, connecting at opposite ends with corresponding sections in the two manifolds, an inlet D, for the initial section, an outlet E, for the terminal section, and a pipe n in the section last preceding the terminal section, having at its base a flange m , held between the adjoining tubular sections of the manifolds, and affording a trap l , substantially as described.

FREDERICK W. WOLF.

In presence of—

J. W. DYRENFORTH,
M. J. BOWERS.