(No Model.)

J. E. SIEBEL.

ICE OR REFRIGERATING MACHINE.

No. 388,592. Patented Aug. 28, 1888.

Fig. 1.

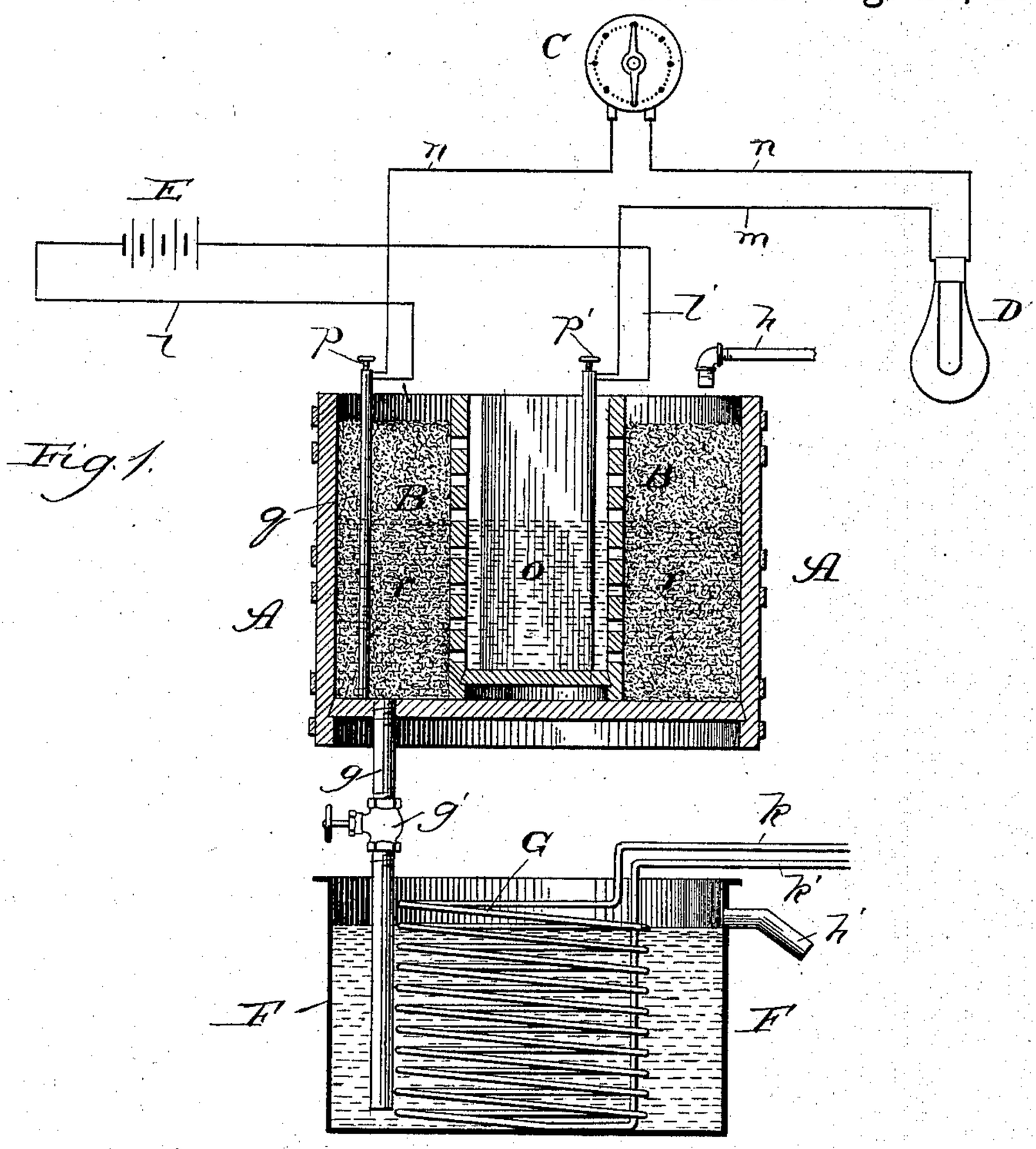
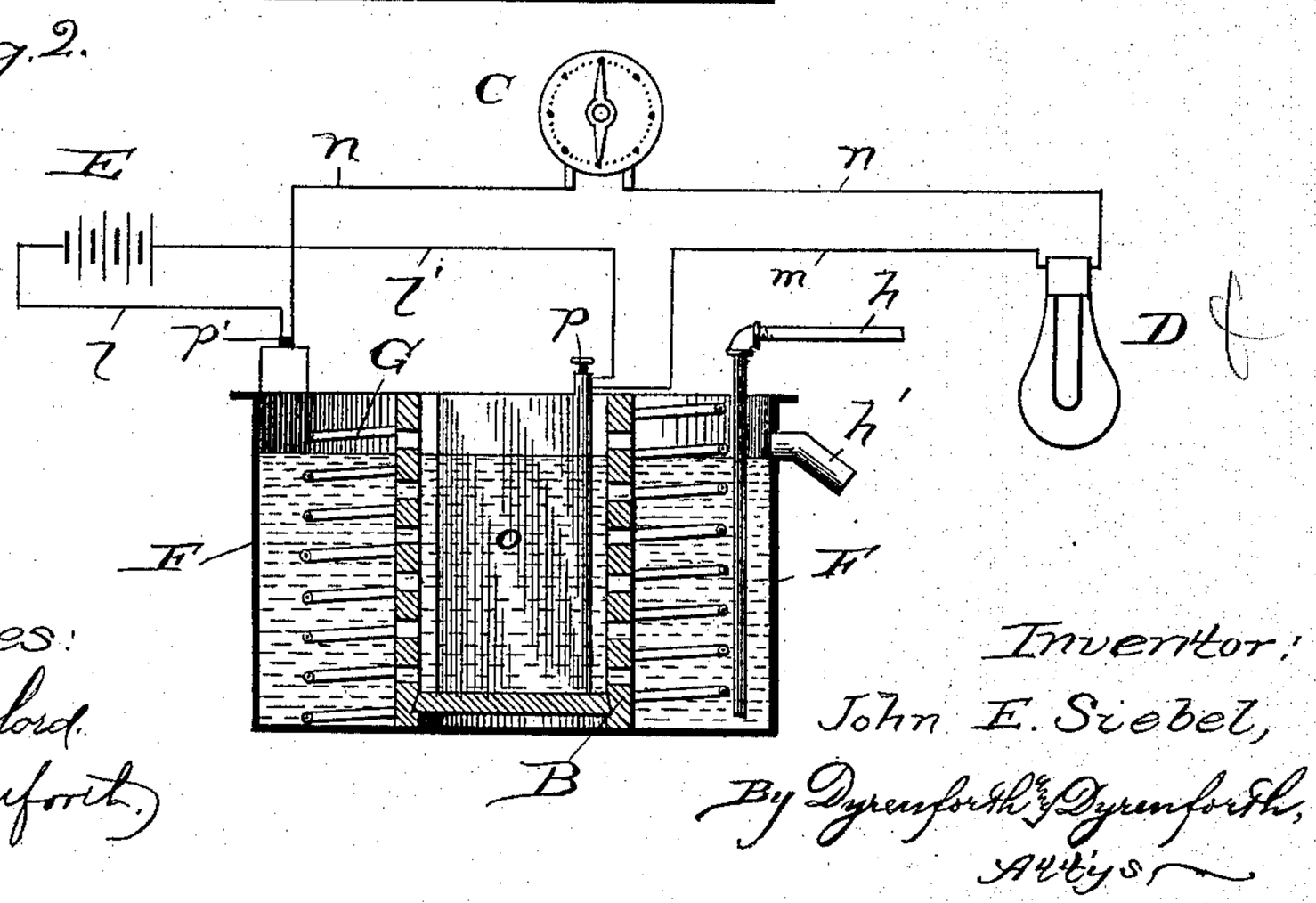


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ICE OR REFRIGERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 388,592, dated August 28, 1888.

Application filed April 9, 1888. Serial No. 270,068. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. SIEBEL, 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, particularly, to an improvement in the condensers of ice or refrigerating machines, whereby the water employed for cooling the refrigerating agent (as anhydrous ammonia) forced into the condenser coil or coils by the compressor, which liquefies and heats it, from the refrigerator, previous to its being again admitted into the latter to absorb, by its expansion, heat from the surrounding body, (as brine,) is deprived of any substance it may contain (as sulphureted hydrogen) which has a corroding effect on metal, or the corroding effect of the substance in the water is neutralized.

A great difficulty encountered in the use of ice and refrigerating machines is that due to the destruction of the condenser-coils by corrosion produced by the effect upon them of a corroding substance commonly contained, inherently, in the water employed for cooling the refrigerating agent in the coils.

The object of my invention is to provide an apparatus, to be used in connection with the condensers of ice or refrigerating machines, which shall act to prevent corrosion of the coils by neutraliizing the corroding substance in the water, or by depriving the water of its inherent corroding substance; and a further object is to provide means for utilizing, extraneously from the apparatus, the electricity generated by its action.

To this end my invention consists in the general construction of my improved device; and it also consists in details of construction and combinations of parts.

In the drawings, Figure 1 shows in elevation, principally sectional, a representation of a condenser provided with means for depriving the water employed to cool the refrigerating medium compressed into the condenser-coil of its inherent corroding substance and before the access of the water to the condenser, and means for utilizing extraneously the electricity generated by the action of the apparatus; and Fig. 2 presents an apparatus for effecting the same ends, but in which the corroding substance in the water is neutralized in the condenser.

A is a tank or vessel containing filings, chips, or other refuse, *r*, of steel or iron, connected through a suitable conductor, *q*, in contact with the material, *r*, with a binding-post, *p*, and a continuous supply of running water is directed from a spout, *x*, into the vessel A.

B is a vessel of perforated material, such as wood, as shown, having lateral perforations, or porous clay containing a material which is electro-negative to iron or steel, such as a sheet of platinum, platinized iron, or other metal, *o*, or carbon, graphite, or other electro-conducting material, which is electrically connected with a binding-post, *p'*.

C represents a galvanometer, though this may be supplanted by an electric alarm or other device which will serve to indicate the condition of the current, and is in the circuit of the battery formed by the materials, *r o*, and water inherently containing the corroding substance in the vessel A through the conducting-wires *n* and *m*, which terminate in an appliance adapted to utilize the generated electricity, such as an incandescent lamp, D, electroplating-tank, or the like.

E is an extraneous battery or other form of electric generator, to be used as an auxiliary means when required, as hereinafter described, and for that purpose capable of being readily connected with and disconnected from the binding-posts *p* and *p'*, respectively, through conducting-wires *l* and *l'*.

F is the condenser-tank, containing a desired number of iron or other metal coils, G, communicating from opposite extremities, as indicated, by the pipes *k* and *k'*, respectively, with the refrigerator and compressor, (not shown,) and the tank F may be provided with the usual overflow, *h*. A pipe, *g*, leading from the vessel A into the vessel F, serves to conduct the water from the former into the latter, and is provided with an ordinary valve, *g'*, for controlling the flow.

The water for cooling the refrigerating agent (which circulates continuously while the ice or refrigerating machine is in operation through the coil or coils G) is caused to flow from the

conduit *h* over the material, *r*, in the vessel A and contents of the vessel B, and thence passes, freed or substantially freed from the deleterious substance referred to, as hereinafter described, into the vessel F, wherein it exerts the desired cooling effect through the coil or coils G before passing off at the overflow *h'*.

The water employed is natural or ordinary water from the most convenient source—say an Artesian well—and commonly contains any of various substances having a corroding action on metal, and which would attack the coils and destroy them for their purpose, as has hitherto been the inevitable eventual result, unless removed or neutralized. A common substance contained in water and having the effect described is sulphureted hydrogen, and as this affords a common example of the various substances which may be deprived of their injurious properties by my improved means, the remainder of the present description wherein reference is made to a corroding substance is, for the sake of convenience, confined to sulphureted hydrogen.

The water which flows continuously over the material, *r*, in the vessel A and contents *o* of the vessel B, as hereinbefore described, excites electricity, which passes over the wires *n* and *m*, and may be utilized for the production of light in the lamp E, or for other purposes within the capacity of the current. The water, while thus performing its part in exciting electricity, also acts as an electrolyte, and as such is more readily disposed to part with or yield its sulphur to the metal, *r*, so that upon leaving the vessel A the water thus freed of the deleterious properties of the sulphureted hydrogen is incapacitated from injuriously affecting the coil or coils G. In case the electrodes *r* and *o* shall become polarized, or from any other cause—as by necessary repairs—the current generated in the vessel A shall become too weak to fulfill its purpose in a satisfactory manner, which would be indicated by the device C, a current from the generator E may be passed through the system by connecting the conductors *l* and *l'* in the manner shown; or the device D may be switched off temporarily by any well-known means for the purpose, (not shown,) or disconnected. An important advantage in my invention is due, however, to the employment of running or moving water for the battery, whereby a tendency to polarization by accumulation on the electrodes of the products of decomposition of the water is prevented, thus rendering the use of an auxiliary generator, E, exceptional at most.

The modified form of apparatus illustrated in Fig. 2 shows the vessel A to be dispensed with, and as having the vessel B, with its contents, placed in the condenser-tank F inside the coil or coils G. This form of apparatus may be employed in cases where water, owing to its plentiful supply and inexpensiveness, after being used for its cooling effect in the condenser, is not subsequently applied to other purposes requiring the removal from it of the neutralized corroding substance, (sulphuret of iron,) but wherein the products of neutralization may be allowed to remain; but it requires that the electrode *o* shall comprise a material electro-positive to the coil, and the connection of the conductor *n* is made with the vessel F, if of metal, and also with the coil or coils G, as shown, electricity being generated and utilized, as described in connection with Fig. 1, but altering the electrical effect upon the water in a manner to leave intact or unaffected the metal of the coil and tank. If the electrode *o* comprise sheet metal (zinc being preferred) or other material of convenient form, the vessel B may also be dispensed with, when, however, the sheet or sheets of metal should be supported (anywhere within the tank F) by wooden or other insulating frames or by suitable insulating means, to avoid contact thereof with the iron coils or tank.

Sometimes the coil stands free, and the cooling water is allowed to flow over it; and this construction is intended to be included in my invention.

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

1. The combination of the metal condenser-coil of an ice or refrigerating machine and positive and negative electrodes connected by a suitable conductor, whereby water containing, inherently, a substance having a corroding effect on metal, passed into contact with the electrodes, is prevented from corroding the coil, substantially as described.

2. The combination of the metal condenser-coil of an ice or refrigerating machine, a vessel or chamber containing positive and negative electrodes connected by a suitable conductor, and water-conducting mains leading to and from the said vessel, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the said vessel in contact with the electrodes, is prevented from corroding the coil, substantially as described.

3. The combination of the metal condenser-coil of an ice or refrigerating machine, a vessel containing positive and negative electrodes connected by a suitable conductor, water-conducting mains leading to and from the said vessel, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the said vessel in contact with the electrodes, is prevented from corroding the coil, and an extraneous auxiliary battery, E, connected with the electrodes, substantially as described.

4. The combination of the metal condenser-coil of an ice or refrigerating machine, a vessel containing positive and negative electrodes connected by a suitable conductor leading beyond the vessel, a device such as the incandescent electric lamp D in the circuit, and water-conducting mains leading to and from

the said vessel, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the said vessel in contact with the electrodes, generates electricity utilized at the device D, and is prevented from corroding the coil, substantially as described.

5. The combination of the metal condenser-coil of an ice or refrigerating machine, a vessel containing positive and negative electrodes connected by a suitable conductor leading beyond the vessel, a device such as the incandescent electric lamp D and an indicator, C, in the circuit, and water-conducting mains leading to and from the said vessel, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the said vessel in contact with the electrodes, generates electricity utilized at the device D, and the condition of which is indicated at the indicator C, and is prevented from corroding the coil, substantially as described.

6. The combination of the metal condenser-coil of an ice or refrigerating machine, a vessel containing positive and negative electrodes connected by a suitable conductor leading beyond the vessel, a device such as the incandescent electric lamp D and an indicator, C, in the circuit, an extraneous auxiliary battery, E, connected with the electrodes, and water-conducting mains leading to and from the said vessel, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the said vessel in contact with the electrodes, generates electricity utilized at the device D, and the condition of which is indicated at the indicator C, and is prevented from corroding the coil, substantially as described.

7. The combination of the condenser of an ice or refrigerating machine, comprising a tank, F, provided with water-conducting mains leading to and from it, and containing a metal coil, G, and an electrode, *o*, positive to the metal of the coil contained in the tank and connected with the coil by a suitable conductor, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the tank in contact with the coil and electrode *o*, is prevented from corroding the coil, substantially as described.

8. The combination of the condenser of an ice or refrigerating machine, comprising a tank, F, provided with water-conducting mains leading to and from it, and containing a metal coil, G, and an electrode, *o*, positive to the metal of the coil contained in the tank, conductors *n* and *m*, leading, respectively, from the coil and the electrode *o*, and a device such as the incandescent electric lamp D in the circuit, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the tank in contact with the coil and electrode *o*, generates electricity utilized at the device D, and is prevented from corroding the coil, substantially as described.

9. The combination of the condenser of an ice or refrigerating machine, comprising a tank, F, provided with water-conducting mains leading to and from it, and a metal coil, G, a porous vessel, B, of insulating material in the tank surrounded by the coil, and an electrode, *o*, electro-positive to the coil in the vessel B, and connected by a suitable conductor with the coil, whereby water containing, inherently, a substance having a corroding effect on metal, passed through the tank in contact with the coil and electrode *o*, is prevented from corroding the coil, substantially as described.

JOHN E. SIEBEL.

In presence of—
J. W. DYRENFORTH,
CHAS. E. GAYLORD.