

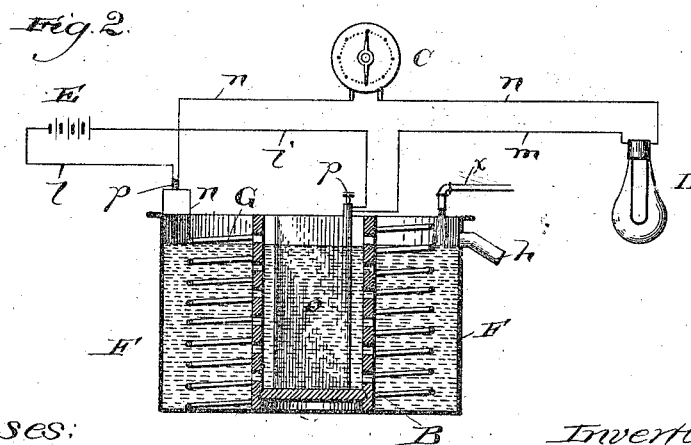
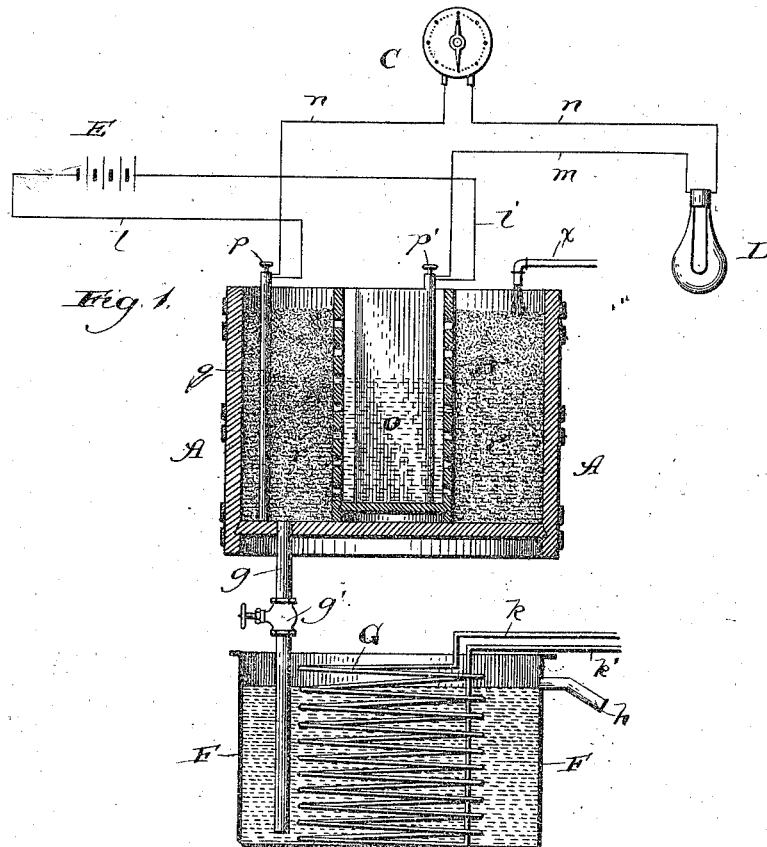
(No Model.)

J. E. SIEBEL.

METHOD OF GENERATING ELECTRICITY AND PURIFYING WATER.

No. 385,145.

Patented June 26, 1888.



Witnesses:  
Carl G. Gayard,  
J. M. Dyrenforth

Inventor:  
John E. Siebel,  
By Dyrenforth & Dyrenforth  
Attorneys

# UNITED STATES PATENT OFFICE.

JOHN E. SIEBEL, OF CHICAGO, ILLINOIS.

METHOD OF GENERATING ELECTRICITY AND PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 385,145, dated June 26, 1888.

Application filed November 7, 1887. Serial No. 254,503. (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 Method of Generating Electricity for Extraneous Use and Treating Water to Prevent its Corroding Action on Metals, of which the following is a specification.

Natural water commonly contains sulphureted hydrogen or some other substance which exerts a corroding action on metal, and particularly iron and steel, and thus in the various industries employing boilers, conduits, tanks, and the like of metal, wherein water is required to be in constant contact with the metal, these devices are gradually impaired and with time rendered unfit for use, thereby entailing expense and trouble.

The principal object of my invention is so to treat natural water inherently containing any of the injurious substances, referred to as to prevent the latter from corroding the metal.

Although my invention may be applied with equally beneficial results to any of the various devices wherein it may be desired to neutralize the effect upon metal objects of the corroding tendency of any substance the water may contain, I design my improvement immediately for use in connection with ice-making or refrigerating machines; and for that reason, and more particularly for the sake of convenience in demonstrating my invention, I confine the description and illustration thereof to such application and to a particular form of refrigerating machine.

The ice or refrigerating machine referred to is of the class involving as its principal parts a refrigerator comprising a tank containing a desired number of iron coils surrounded by brine, a condenser also comprising a tank inclosing a coil or coils of iron over which water is caused to flow, a conduit through which the coils in the condenser and refrigerator tanks are controllably connected from corresponding ends, and a compressor in the conduit-connection of the opposite ends of the condenser and refrigerator coils. The cold-producing medium is a gas liquefiable under mechanical compression and which by expansion takes the heat from a surrounding body,

and thus renders such body cold. Ammonia is an example of gas having the properties referred to, and is quite commonly employed in ice or refrigerating machines. The expansion takes place in the coil or coils of the refrigerator, thereby depriving the surrounding brine of its heat, and the cold brine is circulated through coils in the apartments; or the gas itself may constitute the direct cooling medium by being caused to circulate and expand through coils in the apartments to be cooled. After expansion, the gas is compressed into the coil or coils of the condenser, the compression action heating it and necessitating cooling thereof on its passage through the condenser-coils to the refrigerator, wherein its expansive property is again utilized. The cooling of the compressed gas is produced by means of cold water, which is caused to flow constantly over the condenser-coils.

While the foregoing description refers to a machine which in itself forms no part of my invention, it affords one of many mediums for the practical application thereof, and is intended to assist in rendering my invention readily comprehensible.

The part of the machine to which my invention is applied is the condenser. Accordingly I illustrate in the accompanying drawings such part of an ice or refrigerating machine in connection with an appliance for practicing my improvement.

Figure 1 shows in elevation, principally sectional, a representation of a condenser provided with means for neutralizing the corroding substance contained in the water employed to cool the refrigerating medium compressed into the condenser-coil; and Fig. 2 presents means in a modified form for accomplishing the same purpose.

My invention consists in purifying water to abstract from it an inherent substance having a corroding effect on metal by filtering it through divided fibers of iron or steel and rendering the iron or steel electro-positive to the said inherent substance by connecting it with an electrode electro-negative to the said substance, and in purifying by galvanic action water containing an inherent substance having a corroding effect on metal, and utilizing the water so purified and the electricity

excited, which consists in employing the water as the exciting liquid of an electric battery, thereby abstracting the said inherent substance, leading off the purified water to the place of its use, and conducting off to the place of its application the electricity generated by the purifying action.

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 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 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 over the material, *r*, in the vessel A and contents of the vessel B, and thence passes, freed from the deleterious substance referred to, or, at least, with the corroding property of such substance neutralized, 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 the 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 good example of the various substances which may be deprived of their injurious properties by my improved method of treating water containing them, the remainder of the present description bearing reference to a corroding substance is, for the sake of convenience, confined principally 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 D, 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 substance, is incapacitated from injuriously affecting a metal surface—as the coil or coils G—with which it may come into contact. 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 purposes 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 C may be switched off temporarily by any well-known means for the purpose (not shown) or disconnected. An important feature of my invention consists, however, in employing running or moving water for the battery, whereby a tendency to polarization by the 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 used in cases where the water, after having been used—as for its cooling effect in the condenser—is not desired for other purposes, requiring the removal from it of the neutralized corroding substance, (sulphureted iron in the present instance,) 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 *c* comprise sheet metal or other material of convenient form, (zinc being preferred,) the vessel B may also  
5 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  
10 coils or tank.

Should it be desired to save the substance originally contained in the water in a condition to work the injury which my process thus prevents, this may be done. For example, the  
15 sulphuret of iron may be obtained from the treated water by filtration and the sulphur from the sulphuret of iron by simple evaporation after exposure to the atmosphere, thereby yielding oxide of iron and sulphur in available and merchantable conditions. This is an  
20 important advantage incidental to my invention, inasmuch as it adds materially to its utility in the sense that it renders the process cheap by permitting the injurious substance,  
25 which is present to the extent of hundreds of pounds in the daily supply of some Artesian wells, to be utilized as a merchantable product. Other substances than that referred to, when  
30 contained in the water employed, may be saved by well-known chemical processes for the

same purpose. I reserve the apparatus used for the practice of my improved method for a future application for Letters Patent.

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

1. The method of purifying water to abstract from it an inherent substance having a corroding effect on metal, which consists in filtering it through divided pieces of iron or steel and rendering the iron or steel electro-  
40 positive to the said inherent substance by connecting it with an electrode electro-negative to the said substance, substantially as described.

2. The method of purifying by galvanic action water containing an inherent substance having a corroding effect on metal and utilizing the water so purified and the electricity excited in the operation of purifying, which consists in employing the water as the excit-  
50 ing-liquid of an electric battery, thereby abstracting the said inherent substance, leading off the purified water to the place of its use, and conducting off to the place of its application the electricity generated by the purifying  
55 action, substantially as described.

JOHN E. SIEBEL.

In presence of—

J. W. DYRENFORTH,  
CHAS. E. GORTON.