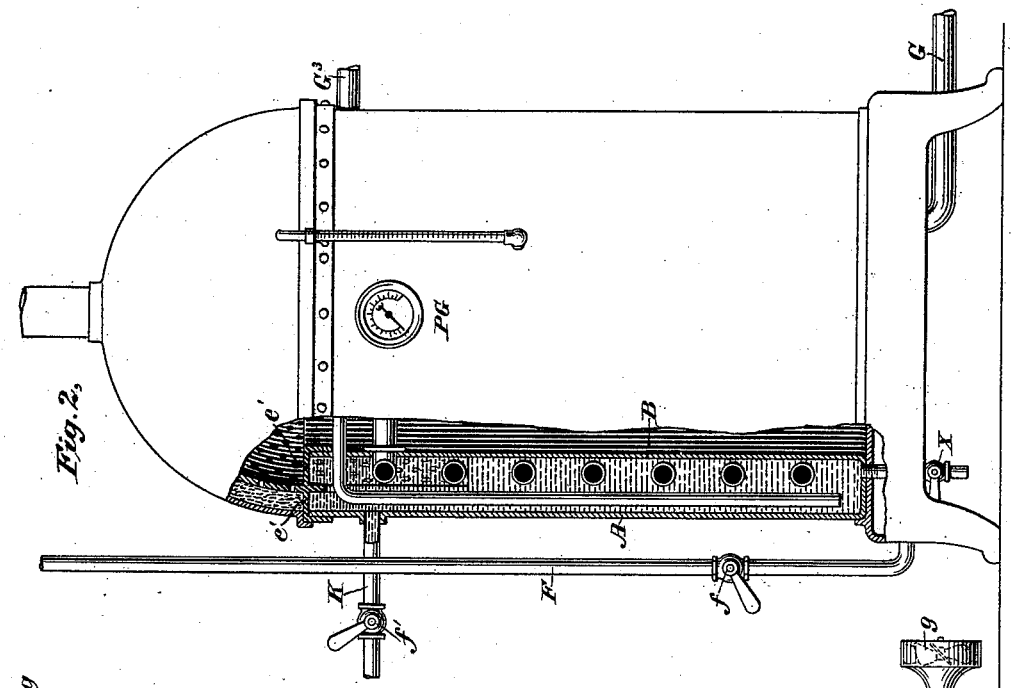
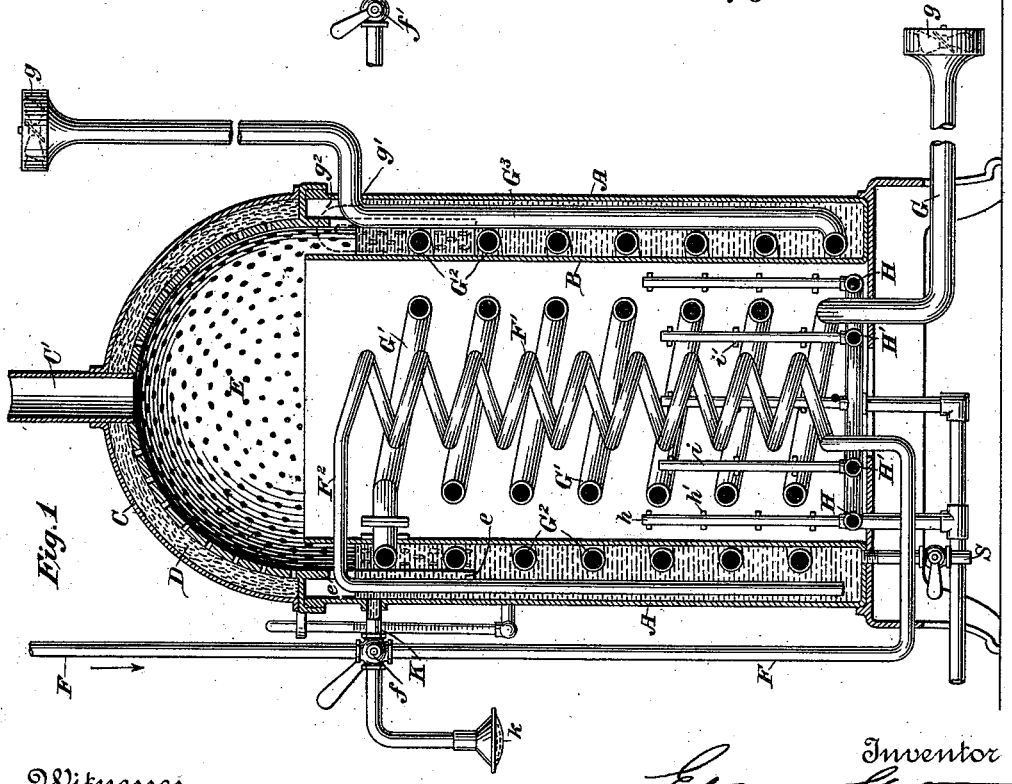
(No Model.)

E. GILLET.

EVAPORATOR.

No. 418,642. Patented Dec. 31, 1889.





Witnesses
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UNITED STATES PATENT OFFICE.

ETIENNE GILLET, OF NEW YORK, N. Y., ASSIGNOR TO ELIZABETH ALINE GILLET, OF SAME PLACE.

EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 418,642, dated December 31, 1889.

Application filed May 10, 1888. Serial No. 273,508. (No model.)

To all whom it may concern:

Be it known that I, ETIENNE GILLET, a citizen of the United States, residing in the city of New York, in the State of New York, have invented certain new and useful Improvements in Evaporators, Water-Heaters, or Boilers, of which the following is a specification.

As suggested in the title, my invention is designed as an evaporator, and may be used for concentrating solutions for refrigerative processes or other purposes. It may be employed for heating water or other fluids for any purpose desired, and especially in heating systems employing circulating hot water, and also as a boiler or steam-generator. In either case the hot air, after having passed through the apparatus, may be conveyed to any suitable point and utilized for heating purposes. The apparatus is, however, specially designed as an evaporator for concentrating liquor—such, for instance, as a "solution of nitrate of ammonia" for refrigerative purposes.

With this general statement I will now describe a particular apparatus in which I have embodied the features of my invention; but I do not limit myself to the special construction shown.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my apparatus arranged as an evaporator. Fig. 2 is an elevation, partly in section, illustrating the adaptation of the apparatus for hot-water-circulating systems and as a steam-generator.

The water or fluid is contained in an annular chamber formed by exterior and interior walls or partitions A B. The exterior casing is closed by a dome C, suitably mounted and secured thereto. The interior of the dome is preferably lined with a coating of asbestus D, placed between the dome and an interior shell E, of metal, which may be perforated, as indicated, but is not necessarily so, and is provided with a depending portion or flange *e*, extending down into the annular chamber and into the fluid contained therein. The depending portion or flange *e* conducts the heat from the dome into the annular chamber and into the fluid therein. The combustion-chamber is the central annular chamber formed by the interior wall or casing B, and C′ is the draft-flue. In Fig. 1 the solution to be concentrated is supplied from any suitable source through a vertical pipe F and two-way cock *f*, hereinafter referred to, to the base of a vertical spiral coil F′, the upper end F^2 of which extends into the fluid-chamber and terminates near its bottom, as illustrated. A hot-air flue or pipe G, which takes the air from any suitable point, connects with a larger vertical spiral G′, surrounding the fluid spiral F′ in the central combustion-chamber. The upper end of the spiral G′ is connected with a pipe or flue G^2, coiled spirally within the fluid-chamber around the casing B to the bottom of the chamber, where it is connected with a vertical pipe G^3, which may pass out of the apparatus at the top of the fluid-chamber, as indicated, and the hot air therein conveyed to any desired point for heating or other purposes. Fan-wheels *g g* may be provided, as shown in dotted lines, at the inlet and outlet ends of the hot-air-pipe system just described, for the purpose of increasing the draft.

In the drawings I have shown an arrangement for burning gas—that is, circular gas-pipes H H′ are arranged in the bottom of the combustion-chamber, the gas-ring H being provided with any desired number of vertical pipes *h*, having gas-jets *h′* on each side, so that part of them throw their flames against the wall or casing B and the others against the hot-air coil. The smaller ring H′ is provided with corresponding vertical gas-pipes *i*, also having burners *i′*, some of which throw their flame against the interior of the hot-air coil and others against the central fluid-coil. Obviously with such an organization a high temperature will be developed in a very brief time. The fluid is heated within the spiral F′ in the fluid-chamber by the hot-air-pipe coil therein and by the direct application of heat to the wall B of the combustion-chamber. In addition to this, the products of combustion coming in contact with the metal shell E in the dome give up a large portion of their heat to it, which, by conduction of the extension or flange *e*, is carried down into the fluid.

The coil G′ G^2 not only serves to carry the

hot air, but the metal itself conducts the heat it receives in the combustion-chamber directly into the fluid in the annular chamber, and this would of course occur whether the coil be a pipe or not. By making it of copper, or some alloy of copper that readily conducts heat, its efficiency will be increased.

Any suitable number of heat-conducting coils of a character best adapted for the purpose will be used. The fluid in the fluid-chamber, being thus subjected to a very high temperature at all points, is rapidly vaporized and brought to the proper degree of concentration, the vapor passing up through the dome and away by the flue C′.

Instead of carrying the air-pipe G^3 out of the apparatus, as shown at g' in Fig. 1, it might be turned over, as indicated by the dotted lines g^2, and its open end slightly submerged in the fluid. With such an arrangement, a proper pressure or draft being supplied by the fan g at the inlet, the hot air will be discharged into the fluid below its surface and further accelerate its evaporation. The upper portion of the fluid-chamber is connected by a pipe K through the two-way cock f, before mentioned, with a sprinkler k. When the handle of the cock f is operated, fluid will be drawn from the chamber through the pipe K and sprinkler, and is at the same time admitted from the source of supply into the chamber. By such an arrangement the proper level in the chamber may be maintained. The sprinkler serves to indicate to the attendant when the proper degree of concentration has been attained, for in many cases that fact is evidenced by the crystallization of the fluid as it falls from the sprinkler. When in proper condition, the fluid may be withdrawn through the tap S. Of course the apparatus may be provided with a level-indicator, as shown.

In Fig. 2 the fluid-chamber is shown closed at the top by the horizontal flange e', connected with the metallic shell of the dome. The fluid-inlet pipe F is provided with its own cock f and the pipe K with its f'. In all other respects the apparatus is the same as that illustrated in Fig. 1. As the fluid-chamber is closed, the water or other fluid may be maintained under pressure and caused to circulate through the pipe F, coil F′, fluid-chamber, and pipe K in connection with any suitable system of hot-water-circulation pipes for heating or other purposes. I have also shown a pressure-gage P G and a level-indicator L. Of course, if the water-level is kept below the pipe K, steam may be generated and the pipe serve as the steam-outlet.

The parts of this apparatus will be constructed of such material as is most suitable for the purpose. The shell E may of course be made of cast-iron, or it might be formed of some other metal having a capacity of conducting heat more readily.

I claim as my invention—

1. The combination of the fluid-chamber, the combustion-chamber, and the metal shell or body E, arranged above the combustion-chamber and having a depending heat-conducting portion e extending down into the fluid-chamber, substantially as set forth.

2. The combination of the combustion-chamber, a suitable heater or burner arranged therein, a fluid-chamber, a fluid-supply pipe passing through the combustion-chamber to the fluid-chamber, and the hot-air pipe passing from outside the heater through the combustion-chamber and then through the fluid-chamber, substantially as set forth.

3. The combination of the combustion-chamber, a suitable burner or heater arranged therein, a fluid-chamber, a supply-pipe passing through the combustion-chamber to the fluid-chamber, the hot-air pipe passing through the combustion-chamber and through the fluid-chamber, and a metal shell or cover E, arranged above the combustion-chamber and having a depending heat-conducting portion e extending down into the fluid-chamber, substantially as set forth.

4. The combination of the annular fluid-chamber, the central combustion-chamber, the fluid-supply and hot-air coils arranged one within the other within the combustion-chamber, and the gas-burners arranged between said coils and between the outer coil and the wall of the fluid-chamber, substantially as set forth.

5. The combination of the fluid-chamber, the central combustion-chamber, and the fluid-supply and hot-air coils arranged one within the other within the combustion-chamber, substantially as set forth.

6. In a heater or boiler, the combination, with the fluid and combustion chambers, of a heat-conducting metallic coil, as G^2, arranged in the fluid-chamber and submerged in the fluid therein, and a heat-conducting metallic coil, as G′, arranged in the combustion-chamber and connected with G^2, so that the heat from coil G′ is carried by conduction to the coil G^2 and to the fluid in which it is submerged, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

ETIENNE GILLET.

Witnesses:
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