

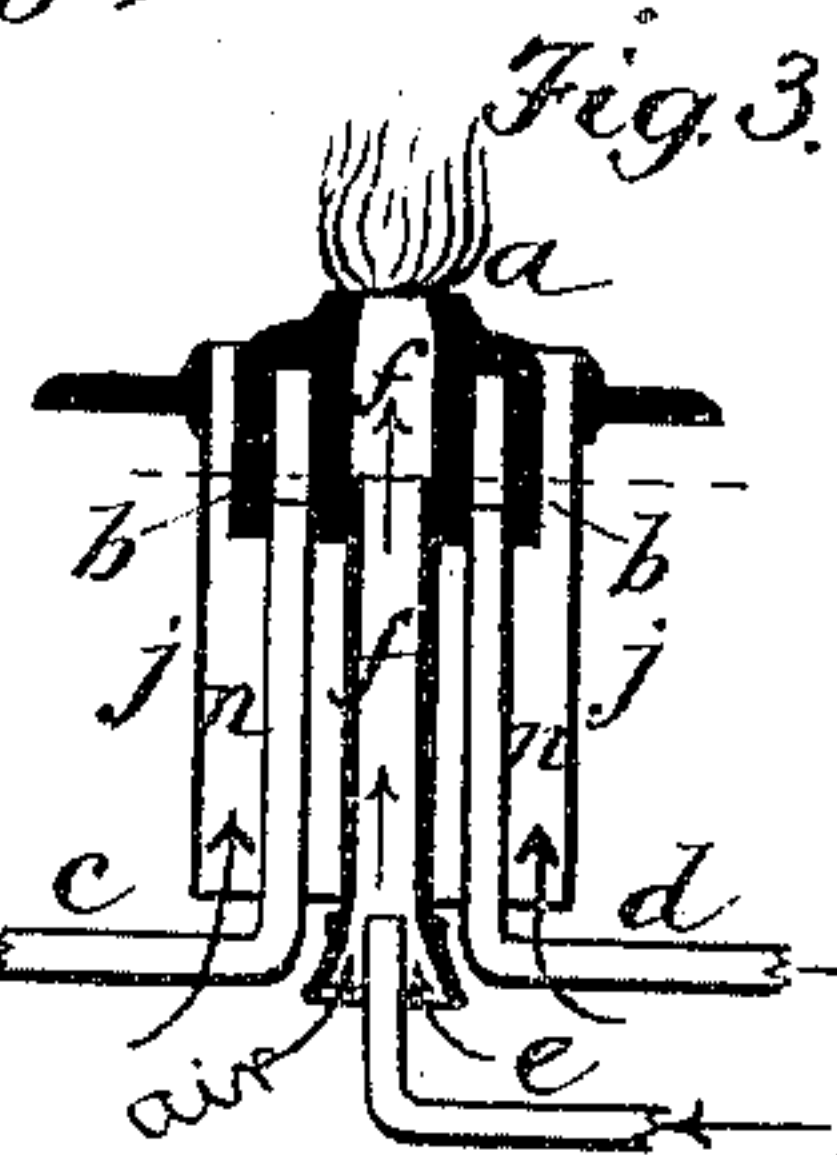
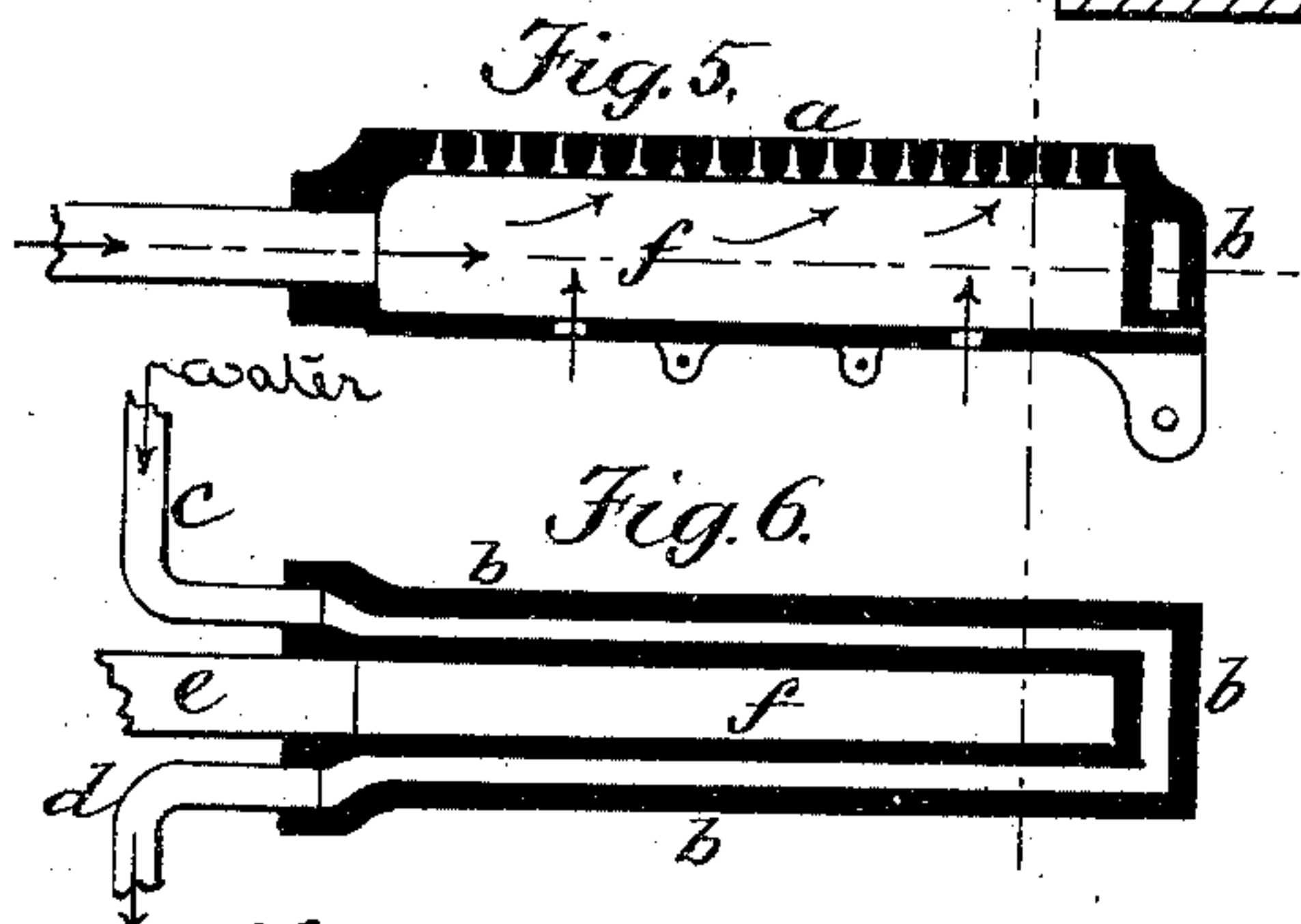
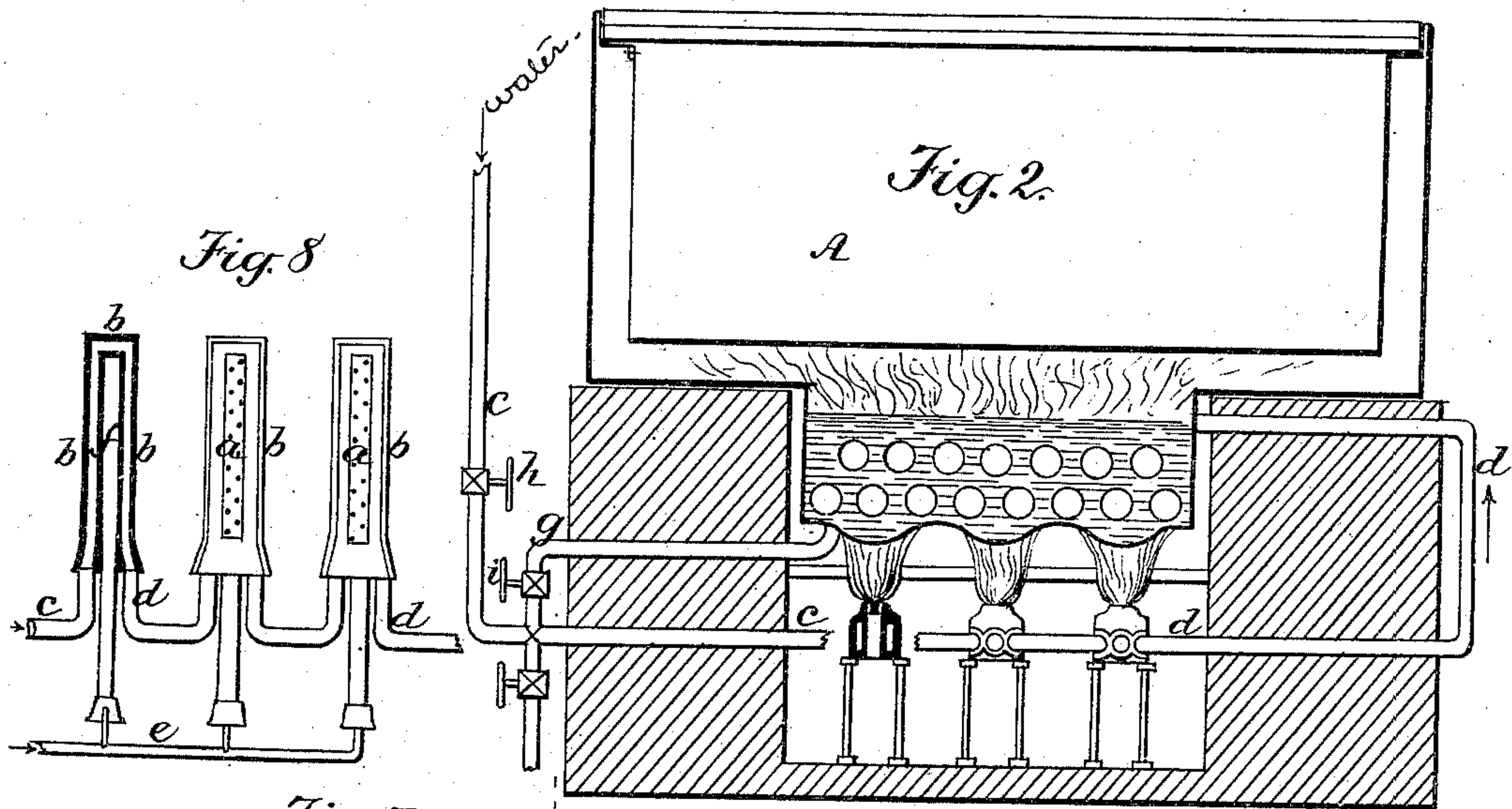
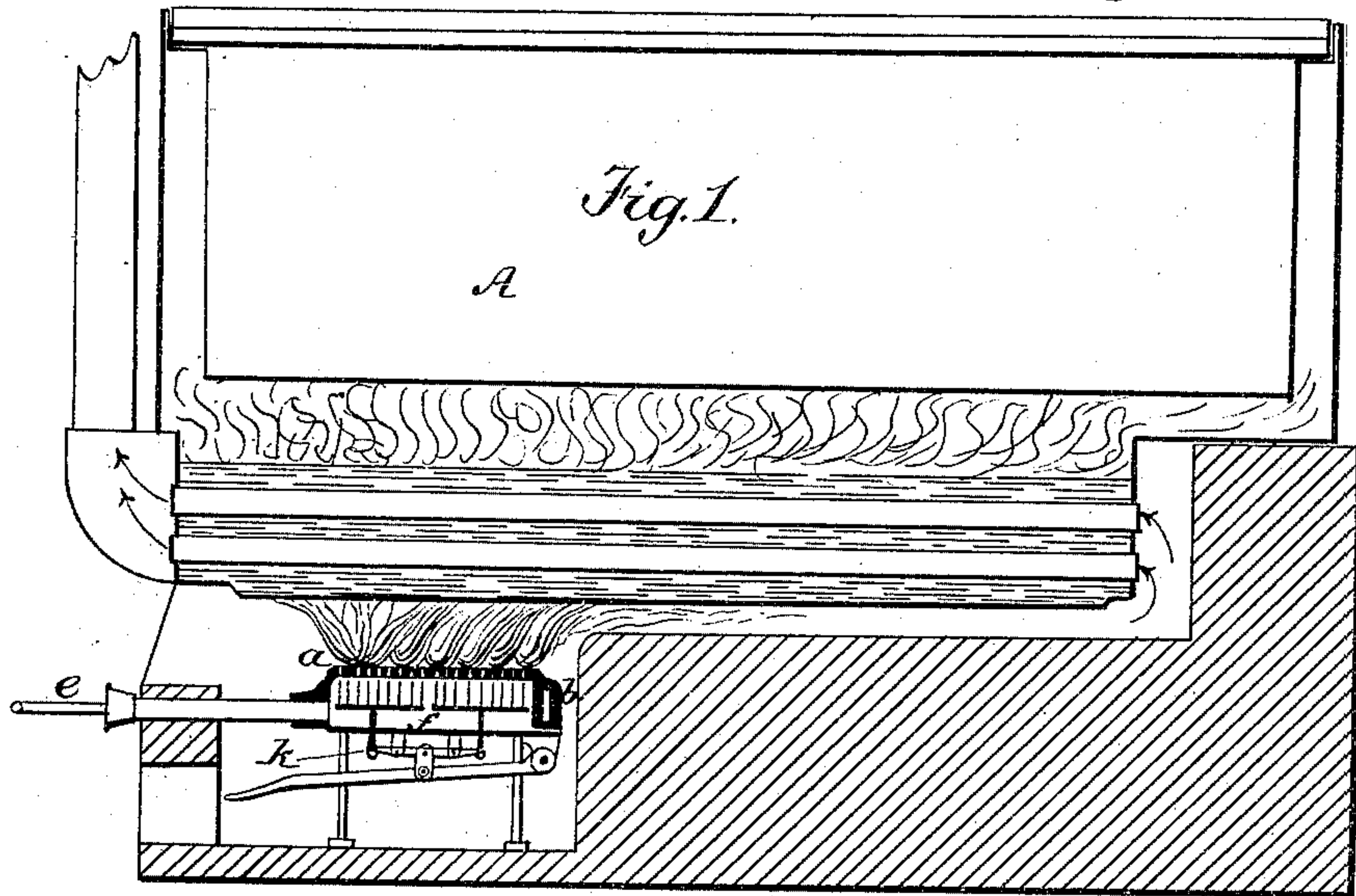
(No Model.)

E. DETWILER.

GAS BURNER.

No. 324,665.

Patented Aug. 18, 1885.



Witnesses:
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UNITED STATES PATENT OFFICE.

EMANUEL DETWILER, OF MILWAUKEE, WISCONSIN.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 324,665, dated August 18, 1885.

Application filed June 30, 1885. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL DETWILER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Gas-Burners for Steam-Generators, Heaters, and Stoves, of which the following is a specification.

My invention relates to improvements in gas-burners for steam-generators, heaters, and stoves; and the object of my improvement is to produce a pure, odorless, heat-giving combustion of gas and air under conditions where the surface to be heated is very near the burners, or where the walls which confine the heat are in close proximity to them. Under these conditions, when there is any considerable outflow of gas and air, a perplexing experience or objection soon arises from the heated state of the burners. In order to a clear understanding of the object of my improvement I will state what this perplexing experience is. In the use of such gas-burning heaters the burners become highly heated from the issuing flame, and the heat is reflected upon the burners from the surfaces on which it directly acts. Under this heat the flame changes unfavorably in volume, color, and energy, due to the disturbance of the proper proportions of gas and air. The normal bluish tint of the flame will be changed by flashes of yellow light, and at length into a resulting yellow flame, freely depositing carbon upon the surface to be heated, and thereby diminishing the heating power of the flame. These results plainly indicate a large deficiency of air, which may be caused in part by the repulsion of the air from the hot burners in the mixing-chamber, where the gas and air should freely unite, as in the Bunsen burner, or by the high vacuum produced in the mixing-chamber, which rarefies the air to such a degree that the contribution of oxygen is insufficient to sustain an intense heat-giving flame; or, if both be contributory causes, the bad effects may be wholly obviated by lowering the temperature of the burners; and the object of my improvement is to maintain a low temperature of the burners, and thereby produce a pure, odorless, heat-giving combustion of gas and air, depositing comparatively little carbon.

I attain the objects by constructing the

burner with a water jacket as a provision for the circulation of water to prevent the burner from being highly heated, and thereby overcome the difficulties which I have stated, and to the overcoming of which are due the advantageous results which I have stated, and which as a matter of fact I have demonstrated in burners having such cooling provision. I have shown two forms of gas-burners with the water-jacket, and when they are used in batteries of three to ten they make a formidable fire capable of generating steam, and such application I have shown; but I propose to use my invention in gas heating and cooking stoves, and for kilns for firing china and the like.

In the drawings, Figure 1 represents a vertical section of my improved water-cooled burner as applied to a tubular boiler. Fig. 2 is a vertical cross-section of the same, showing a battery of burners and the water-cooling circuit therefor. Fig. 3 is a vertical section of what is known as the "Bunsen" burner. Fig. 4 is a horizontal section of the same. Fig. 5 is a vertical section of a multitubular burner; Fig. 6, a horizontal and Fig. 7 a cross section of the same; and Fig. 8 shows a battery of the jacketed burners partly in top view and partly in section, all illustrating the water-cooled gas-burner of different forms.

a is the burner formed with a water-jacket, *b*, through which water flows all around the burner, so as to absorb heat therefrom and maintain a low temperature of the air and gas mixing chamber. The water is admitted to the burner-jacket by a pipe, *c*, and passes therefrom by a pipe, *d*, and a series of burner-jackets may be connected for such flow. The water enters the jacket and flows round the outside walls of the burner and leaves the jacket, so that the water-space of each burner has an inlet and an outlet, and the burner-walls are inclosed by flowing water and perfectly protected from the reflected heat, while the heat from the burner-top is absorbed by the water, keeping the body of the burner at a low temperature, and a battery of burners capable of giving a uniform high heat to the surface to be heated can be used with full effect of heating capacity.

The gas enters the burners by the pipe *e* and mixes with the air in the chamber *f*, which

is surrounded and kept at a low temperature by the water-jacket, so that under no conditions will the heat of the burner be intense enough to prevent the free entrance of the air into the mixing-chamber and its mixing with the gas at the point of combustion, or to rarefy the air to such a degree that the presence of oxygen will be insufficient to sustain a pure heat-giving flame. This is the important matter of my improvement, which I have demonstrated by experiments in stopping the water-flow and causing the mixing-chambers to become highly heated, showing a yellow flame, and then by establishing the flow the mixing-chamber becomes cooled and the flame changes to its normal bluish color, characteristic of a good heating flame.

In the example shown the boiler A is in the burner-jacket water-circuit, the pipe *d* discharging into the boiler from the burner-jacket, and a branch pipe, *g*, may connect the burner-jacket supply-pipe *c* with the boiler. When sufficient water has entered the boiler, the supply-cock *h* may be closed, and the cock *i* being open, the water will circulate through the burner-jackets and boiler, maintaining a moderate temperature of the burners and utilizing the heat absorbed therefrom to aid in raising the temperature of the water in the boiler.

In boilers used for steam-generating the return water passing through the water-jacket is raised to the boiling-point, and the latter therefore has the advantage of raising steam and maintaining a low temperature of the burner and of the mixing-chamber for the air and gas within the burner, for the purpose stated.

For generating steam the burner would become red-hot and defeat using gas with effectiveness and economy, whereas my improvement maintains the burner at a temperature of steam. The multitubular form of burner is fourteen inches long and four by four inches deep and wide, and this is the form of burner I would use where great heat is required for the generation of steam. The round form of burner can also be used in groups, and is more particularly suited for gas-stoves and for kilns or retorts.

The water-jacket may be supplemented by an air-jacket, *j*, as seen in Fig. 3, and particularly when the burner is used for the heating of kilns or retorts having fire-brick walls which become intensely heated. This air-jacket surrounds the water-jackets, and is made of some refractory substance, so as to shield the water-jacket and the mixing-chamber of the burner by acting as a barrier to the

intense rays of the heat, and also to form an air-space, *n*, open at the top and at the bottom, so that the air will pass up through it, and thus aid especially in preventing the mixing-chamber from being too highly heated, because the lower the temperature of this chamber can be kept the more perfect will be the mixture of the gas and air therein. The hot air from the air-jacket enters the combustion-chamber in a condition to support the combustion and draft above the burner.

In Fig. 1, *k* is an attachment for cleaning the burner-orifices to prevent them becoming clogged, as shown and described in a patent granted to me November 28, 1882, under No. 268,083.

I have shown the burner-jacket water circulation as being through the boiler; but it may be through a vessel supplied with water from time to time, the circulation being effected by the heat of the burners in a well-known manner.

I do not claim cooling pipes by water circulation. I do not claim a gas-burner having a mixing-chamber for gas and air; nor do I claim a discharge-pipe for supplying liquid fuel to a furnace using solid fuel and surrounded by a current of water to prevent the fuel-conduit from becoming so hot as to change the character of the fuel, as my invention is directed to a gas-burner for heating purposes, with the sole object and purpose of avoiding difficulties in burners used for this purpose, such as the exclusion of the air from the mixing-chamber of the burner, which is necessary to maintain a proper heat-giving flame.

I claim—

1. A gas-burner having a mixing-chamber for gas and air surrounded by a water-jacket, combined with an inlet and an outlet pipe for maintaining a circulation of water around the burner mixing-chamber, to maintain a condition therein suitable for the proper proportions of gas and air, as shown and described.

2. The combination, with a gas-burner having a mixing-chamber for gas and air and a jacket for water circulation around said burner, of an air-jacket of refractory substance supplementing the water-jacket and the mixing-chamber, substantially as described, for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMANUEL DETWILER.

Witnesses:

MORITZ WITTIG, Jr.,
CORNELIUS J. HARING.