T. Shaw,

Burning Hydrocarbon.

No. 28,539. Patented May 29, 1860.

Fig. 1.

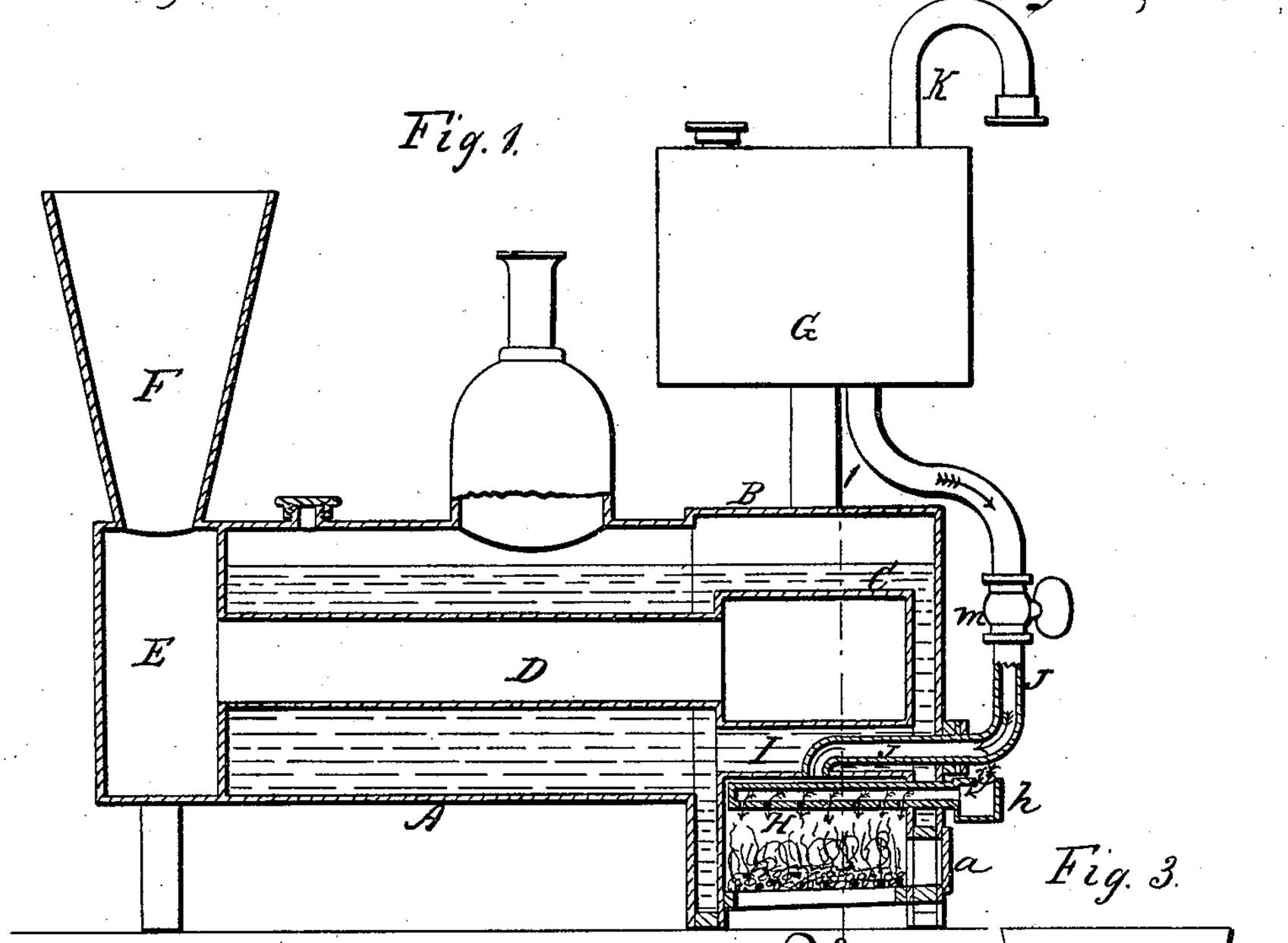


Fig. 2.

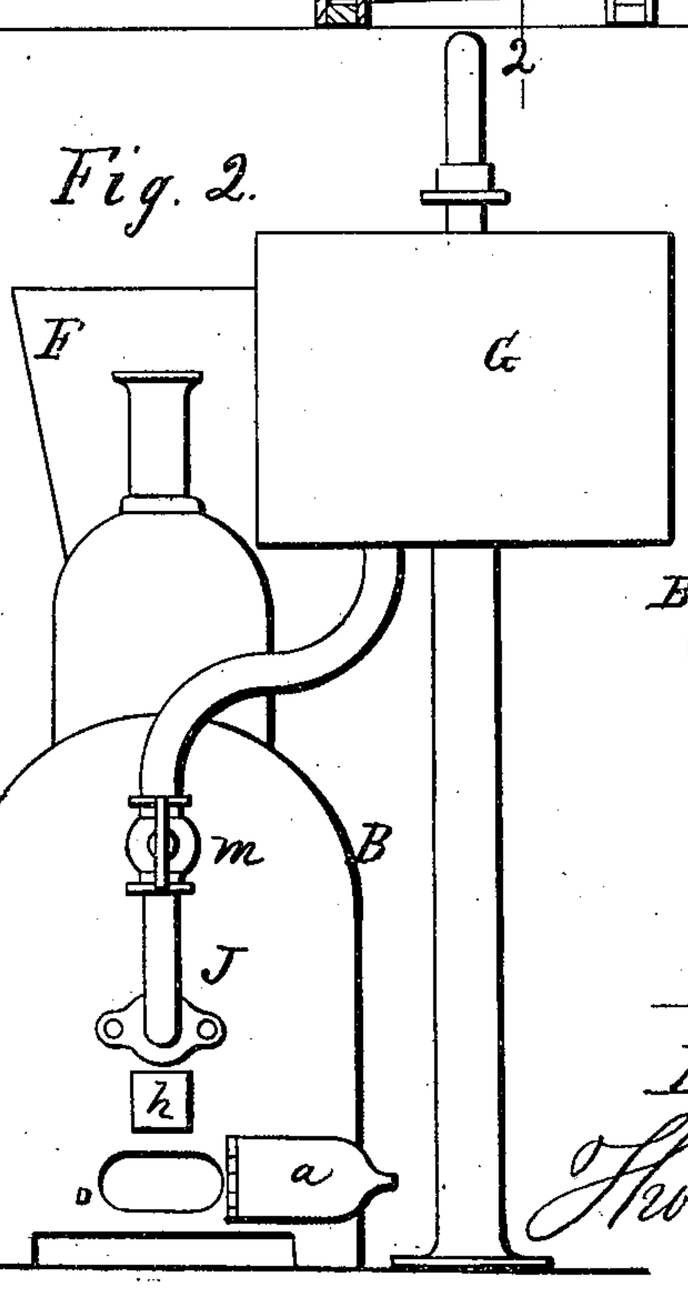
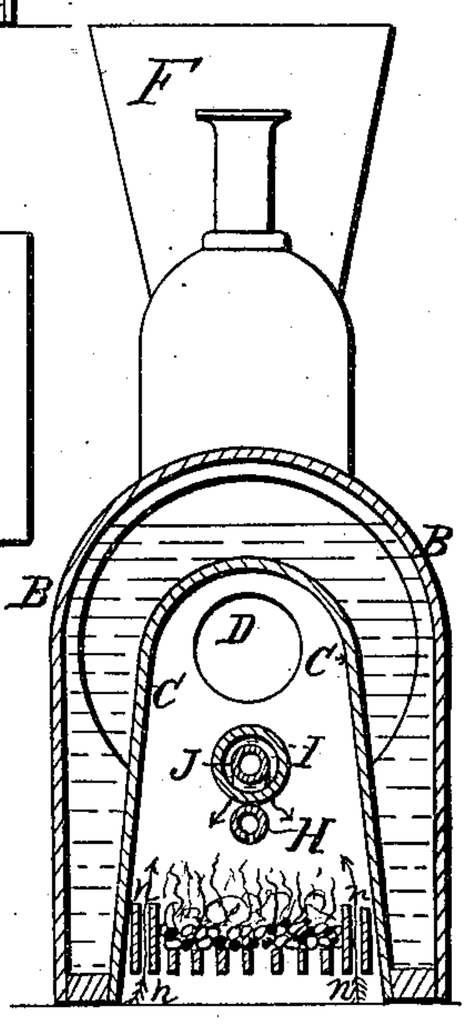


Fig. 3.



Witnesses:
Henry Howson
Horace See

Inventor:
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UNITED STATES PATENT OFFICE.

THOMAS SHAW, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND L. N. BROGNARD.

IMPROVEMENT IN FURNACES FOR BURNING COAL-OIL OR OTHER HYDROCARBON FLUIDS UNDER STEAM-GENERATORS.

Specification forming part of Letters Patent No. **28,539**, dated May 29, 1860.

To all whom it may concern:

Be it known that I, THOMAS SHAW, of the city and county of Philadelphia and State of Pennsylvania, have invented a new and Improved Mode of Employing Equitable Fluids as a Fuel for Generating Steam; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists in using coal-oil or any other ignitible fluid as a fuel for generating steam by discharging it into the fire-chamber of a steam-boiler and onto a body of ignited coal or its equivalent through a pipe surrounded by the water contained in the boiler, substantially as described hereinafter; also, in a perforated tube and a box communicating therewith, both being arranged in respect to the fire-box in the manner set forth hereinafter, so as to admit air saturated with the vapors of the ignitible fluid to the fire-chamber; also, in certain plates or bars arranged in respect to the fire-grate and fire-chamber in the manner described hereinafter, so as to admit a plentiful supply of air to the said fire-chamber; also, in a reservoir for containing the coal-oil or other fluid, said reservoir being furnished with a pipe and valve so arranged and operating as to admit sufficient air to the reservoir to allow the fluid to flow freely therefrom, and yet prevent the escape of noxious vapors from the said reservoir.

In order to enable others to practice my invention, I will now proceed to describe the manner in which I carry it into effect.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a sectional view of a steam-boiler with my improved apparatus for generating steam by the use of ignitible fluids as a fluel; Fig. 2, an end view of Fig. 1; and Fig. 3, a vertical transverse section on the line 1 2, Fig. 1.

Similar letters refer to similar parts throughout the several views.

A is the body of an ordinary steam-boiler of the form similar to those used in connection with locomotive-engines. B is the outer casing of the fire-box; C, the inner casing of the same; D, the longitudinal flue communicating with the smoke-box E, the latter being furnished with the usual chimney, F.

In any convenient position in the neighborhood of the boiler, and at a proper height above the same, is situated a reservoir, G, containing coal-oil or other ignitible fluid to be used as a fuel for generating steam.

The interior of the fire-box is furnished with a grate of the peculiar construction described hereinafter, and in front of this grate is a door, *a*, for the admission of coal or its equivalent to be used in connection with the ignitible fluid. Above this grate is a tube, H, perforated with holes on the under side, the closed end of this tube being close to the back of the the fire-chamber, and the opposite end passing both through the plates and water-space of the fire-box.

On the outside of the latter the tube is connected to and communicates with the box or chamber *h*, which is closed on all sides, with the exception of a small opening, *i*, at the top. Above the tube H is another and larger tube, I, extending across the fire-chamber and forming a communication between the water-spaces on the front and back of the fire-box. Within this tube is a pipe, J, the bent end of which is connected to the lower end of the tube I, at which point it communicates with the interior of the fire-chamber. This pipe J passes through the front of the fire-box and upward to the reservoir G, and is furnished with any suitable cock or valve, *m*, for regulating the flow of the ignitible fluid into the fire-chamber.

On each side of the fire-grate, and extending the entire length of the same, are two bars or plates, *n n*, which are of such a depth that the fuel will not obstruct the opening between them.

Air is admitted to the reservoir G through a pipe, K, which is furnished at its bent outer end with a valve opening upward and closing the orifice for the admission of air at all times, excepting when the flow of fluid from the reservoir causes a partial vacuum, thus preventing the escape of offensive vapors.

It should be understood that the coal or other fuel on the grate-bars is not used directly as a means of generating steam, but as

a heated surface for the conversion of the fluid into gas and igniting the same, so that as the fluid passing into the fire-chamber through the pipe J drops onto the fuel a flame of intense heat is generated, which imparts to the plates of the fire box and flue the necessary heat for generating steam.

It will be observed that the portion of the pipe J within the boiler is surrounded with a body of water, which maintains the interior of the pipe at a uniform temperature; but for this arrangement the fluid would be converted into gas before it escaped from the pipe, which would thus act as a retort and would speedily become clogged with carbonaceous matter. The air passing into the box H through the opening *i* becomes heated, and in a heated state passes along the tube H and through the perforations of the latter in small forcible jets into the fire-box, thereby rendering the combustion of the gases more perfect and increasing the intensity of the heat.

Ignitible fluids may be deposited in the box *h*, so that the air as it passes into the box and thence along the pipe becomes saturated with the vapors generated in the box by the heat of the boiler, and passing through the perforations into the fire-chamber is ignited and adds to the heat.

A plentiful supply of oxygen is necessary for the perfect combustion of the gas, and this supply is furnished by the plates or bars *n n*, through which the air passes freely into the fire-chamber without being interrupted by the fuel on the grate-bars.

It will be evident that different forms of boilers will demand different arrangements of the above-described apparatus, which may be varied in form without any alteration in the result.

Without confining myself, therefore, to the precise arrangement or construction of parts herein described, I claim as my invention and desire to secure by Letters Patent—

1. The conveying of ignitible fluids to the interior of the fire-chamber by means of a pipe surrounded by water within the boiler, substantially as and for the purpose set forth.

2. Saturating the air with vapors of a fluid, by means of the perforated tube H and its box *h*, when arranged in respect to the fire-chamber of the steam-boiler, substantially as set forth.

3. The bars *n n*, arranged in respect to the grate-bars and fire-chamber, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS SHAW.

Witnesses:
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CHARLES D. FREEMAN.