

H. M. SMITH.
STEAM-GENERATOR.

No. 170,196.

Patented Nov. 23, 1875.

Fig. 1

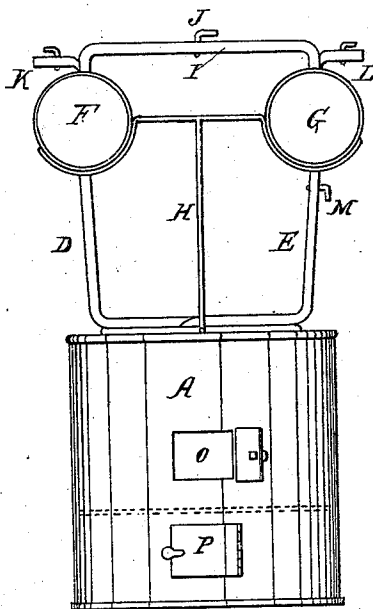
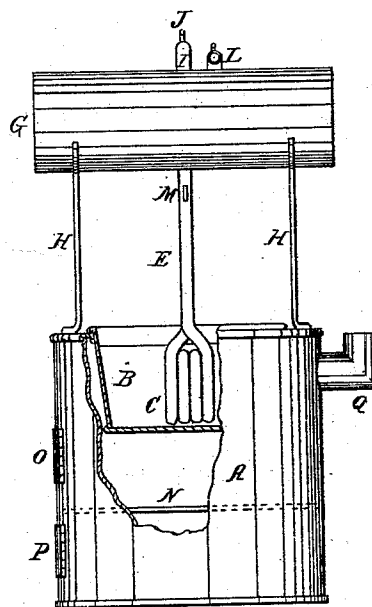


Fig. 2



WITNESSES

F. F. Warner.
F. H. Herring

INVENTOR

Horatio M. Smith

UNITED STATES PATENT OFFICE

HORATIO M. SMITH, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS HIS RIGHT TO MOSES W. LESTER AND FRANKLIN LESTER, OF SAME PLACE.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **170,196**, dated November 23, 1875; application filed October 7, 1874.

To all whom it may concern:

Be it known that I, HORATIO M. SMITH, of Chicago, in the county of Cook and State of Illinois, have invented a new, useful, and Improved Steam-Generator, of which the following is a full, clear, and exact description, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings forming a part of this specification, and in which—

Figure 1 represents a front elevation of an apparatus embodying my invention; and Fig. 2, a side elevation of the same, a part of the apparatus being broken away for the purpose of showing the coil of iron used in the molten metal.

Like letters of reference indicate like parts.

The object of my invention is to provide a steam-generator which generates and at once superheats the steam, acts rapidly, and with perfect safety, at a comparatively small cost. To that end it consists of a pot or other suitable vessel, containing lead or other easily-fusible metal, placed within the influence of a furnace or other heating apparatus or arrangement for keeping the said metal in a molten state or at the desired temperature, in which easily-fusible metal is placed a duct, pipe, or tube, of iron or other suitable material, preferably in the form of a coil, in which the steam is generated, highly heated in its passage through said duct, and conveyed to an engine or elsewhere.

In the drawing, A represents the outer shell or wall of the furnace or heater. B is a pot or vessel, arranged in the upper part of the furnace. C is preferably a coiled pipe, of iron or other material not easily melted and a good heat-conductor. This coil is immersed in an easily-fusible metal contained in the pot or vessel B. That part of the generator in which the steam is generated and superheated is wholly immersed in or surrounded by the fusible metal. D is a steam-pipe, connected to or forming a continuation of the coil C, and entering the steam-drum F. E is a water-supply pipe, connected with or forming a continuation of the coil C and opening into the water-

tank G. The steam-drum F and water-tank G are connected at their tops by the steam-pipe I, provided with a stop-cock, J. K is a steam-conducting pipe, passing from the top of the steam-drum F to an engine or elsewhere, for the purpose of using the steam. L is a water-pipe, for conducting water into the tank G. The pipes K and L are provided with stop-cocks, for regulating the supply of water and the escape of steam. M is a stop-cock in the pipe E, for regulating the flow of water from the tank G to the coil or generator C. N represents the grate of the furnace or heater. O is a door opening into the fire-chamber, for supplying fuel. P is a door to the ash-pit. Q is a smoke-stack.

The coil C performs the functions of a steam-boiler, and, instead of being constructed in the form of a coil, may be made in any form of a duct or tube which will serve the same purpose, substantially, when immersed in the metal in the manner described.

In order to use the apparatus thus described, a fire is made in the heater, and a sufficient degree of heat is produced either to melt or sufficiently heat the lead or other fusible metal in the vessel B to convert into steam the water admitted into the coil or generator C from the tank G through the pipe E. The steam thus made and highly heated passes through the pipe D into the steam-drum F, and thence out through the pipe K, for the various uses to which it may be applied.

The steam-pipe I performs two functions: First, by conveying steam from the steam-drum F to the tank G, any tendency to a vacuum in the tank G, resulting from the passage of the water from it to the generator through the pipe E, is prevented, and the outward passage of the water aided. Second, by closing the cocks J and M, and opening the cock at L, the steam already in the tank G will be condensed, and thereby resupply the tank G with water through the pipe L, communicating with a well or other water-supply.

One of the advantages in surrounding the said duct or tube with molten metal is the rapid transmission of heat to the water, and to the steam thereby generated, thus suddenly

converting the water into steam, and the steam into superheated steam in its passage through the submerged part of the tube or duct—a result which cannot be had by the employment of a steam-boiler floating upon a metallic bath, for the reason that in a floating boiler the steam generated therein cannot come in contact with the part of the boiler which is in contact with the molten metal, as only the water would occupy that part.

Another advantage is, a much smaller, stronger, and safer generator or boiler is employed than has heretofore been used.

It will be perceived that, though it be at first necessary to melt the lead or other metal in order to properly surround the generator therewith, yet, since lead melts at about 600° Fahrenheit heat, and since steam is generated at about 212° Fahrenheit heat, it follows that the metal in which the generator is immersed need not be brought up to the molten state in order to generate steam. It is evident, however, that steam could not be generated to any satisfactory extent by placing a steam-generating vessel upon, but not surrounded by, the metal when the latter is not fused. If,

however, a dry or superheated steam be desired, the temperature of the molten metal may easily be raised to the desired degree.

It will also be perceived that any other means than those above described may be employed for supplying the water to, and conducting the steam from, the steam coil or generator.

In my apparatus no explosion can occur from a low supply or even no water in the generator; nor can the generator or boiler be warped or burned by the furnace-heat, it being protected by the metal surrounding it.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination, with a vessel containing an easily-fusible metal, of a pipe partly coiled and immersed in the molten metal, the ends of the pipe constituting a water-inlet and a steam-outlet, substantially as and for the purposes specified.

HORATIO M. SMITH.

Witnesses:

FRANCIS F. WARNER,
FREDERICK A. HERRING.