J. T. RICH.

STEAM GENERATOR.

No. 108,936. Patented Nov. 1, 1870.

Fig. 1.

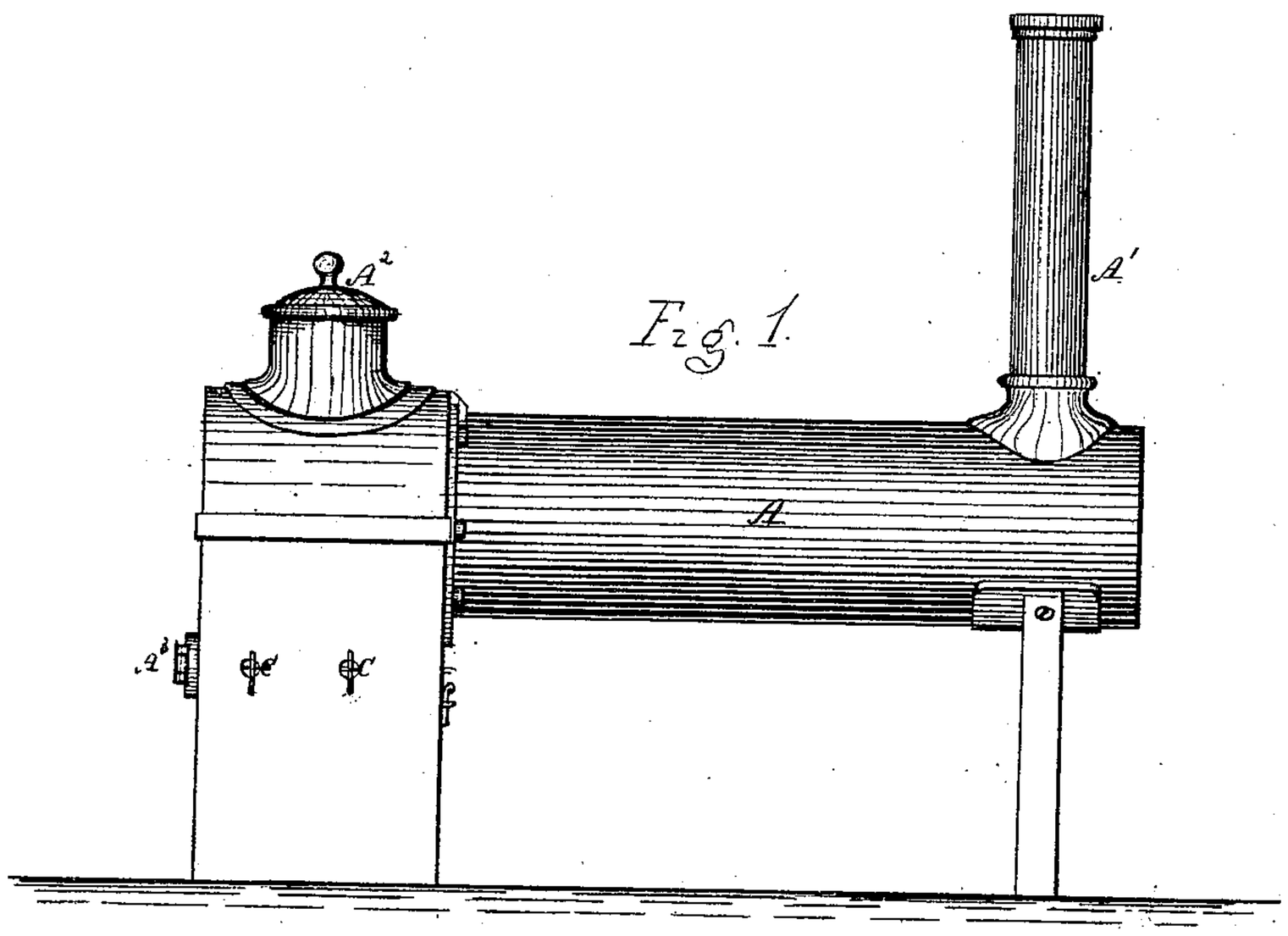


Fig. 2

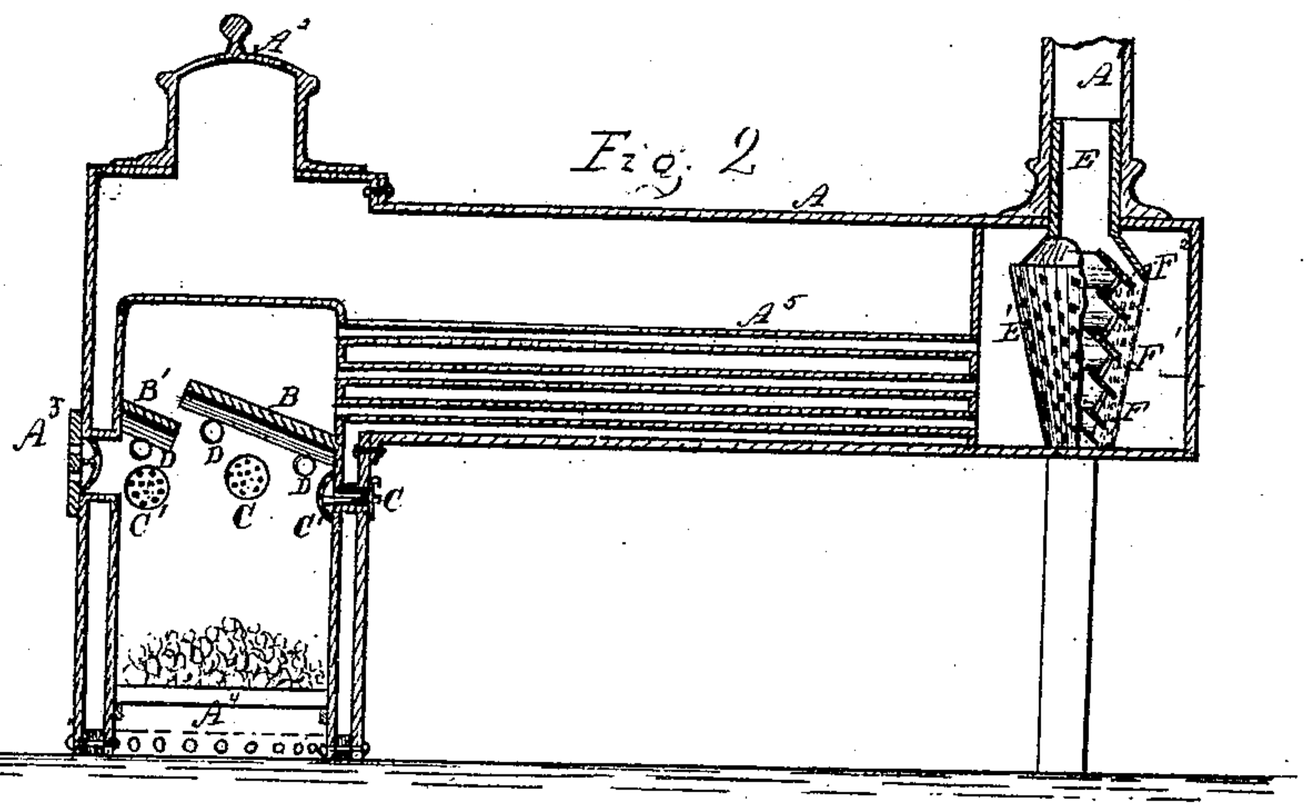
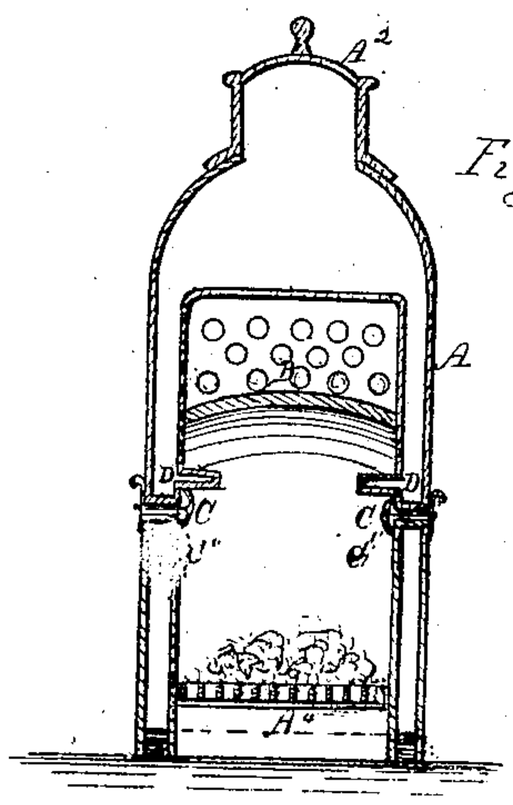


Fig. 3



Attest

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JOHN T. RICH, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 108,936, dated November 1, 1870.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN T. RICH, of the city and county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings making part of this specification, in which—

Figure 1 is an elevation of my improved generator, showing the air-induction apertures upon the side thereof, and the general outline of said generator.

Figure 2 is a sectional elevation, showing the position of the air-apertures, the diaphragms, and the lift-pipe in the smoke-box.

Figure 3 is a vertical transverse section, showing the front diaphragm and the hollow studs upon which it rests.

Corresponding letters refer to corresponding parts in all the figures.

This invention relates to steam-generators; and

It consists in the arrangement of the air-induction passages with reference to the igniting-diaphragms; secondly, in the means of comminuting the air-jets as they pass into the fire-box; and thirdly, in the construction and arrangement of the lift-pipe, which conducts the products of combustion from the generator; its object being to provide a remedy for the objections which exist to the present forms of generators, the first of which is, that when the air-induction passages are placed as low down upon the leg of the generator as they usually are, they direct the ingoing jets of air into or upon the coal, or into the gases near the surface of such coal, and are liable to be stopped up by the coal in the furnace. The second objection consists in the fact that, as at present arranged, the air is admitted in jets of too large an area, the consequence of which is that they pass through the gases as they arise from the burning fuel without being properly mixed therewith, and enter the flues or tubes in a comparatively cold condition, thus cooling the contents of the generator to such an extent as to affect the pressure of the steam, and not unfrequently causing the tubes to leak in consequence of their sudden contraction. Another and very serious objection exists to steam-generators of the locomotive type from the fact the blast consequent upon the escape of the steam from the cylinders operates unequally upon different parts of the fuel upon the grates, thus causing such fuel to burn away more rapidly at some points than at others, the result of which is that "air-holes" are formed through such fuel, which permit large currents of cool air to pass through them and into the fire-box above such fuel, the effect of which is the same or similar to that above described.

The above-recited objections are obviated by this invention, the means used being, first, the arrangement of the air-induction passages in close proximity to the igniting-diaphragms, so that as the gases impinge against them the air shall be thoroughly mixed therewith, and thus become heated to, or nearly to, the temperature of said gases before entering the flues or tubes; and, secondly, by placing a rose-head over the apertures through which the air passes into the combustion-chamber, so that such air shall enter in finely-comminuted jets or currents, and thus be thoroughly mixed or mingled with the gaseous products of combustion, and in that way furnish the oxygen for aiding the thorough combustion of such gases, it being a fact that they must be thus supplied and then brought in contact with something, the temperature of which is sufficient to ignite them in order to produce such combustion. Thirdly, by using in the smoke-box a perforated sheet of metal, which is made to surround a series of cones in the lift-pipe, which cones are of gradually-increasing diameter from the lowest to the highest, I am enabled to control the effect of the blast from the exhaust-nozzles, and cause the fire to burn evenly on the entire grate-surface, and thus prevent the injurious effects above described.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A in the drawings refers to a steam-generator, which may be either of the marine or locomotive type, it being supplied with an up-take, A^1, dome A^2, fire-door A^3, grates A^4, and tubes or flues A^5, all of which may be of any approved form and arrangement.

B refers to an igniting-diaphragm or arch, which may be made of any refractory material, such as fire-brick, soap-stone, the material of which crucibles are made, or any material which is capable of enduring the heat to which in use it is subjected. This diaphragm is to be slightly curved, as shown in fig. 3, and is to be placed upon supports hereinafter to be described, its front edge being in contact with or in close proximity to the front sheet of the fire-box, from which part it rises, as shown, until it reaches a point somewhat above the upper surface of the fire-door, and beyond the center of the fire-box, where it terminates.

B′ refers to a diaphragm, which is to be of the same material as the one above described, it being similarly curved, and arranged so as to be in contact with the rear sheet of the fire-box, and resting upon supports like the c er, but having in its under surface recesses to prevent its falling from such support.

C C refer to air-induction passages, which are arranged within the sides of the fire-box, and also within its front sheet, but so as to be but a short distance below the lower surface of the igniting-diaphragms, the object being to cause the air, as it enters the fire-box,

to impinge directly against such diaphragms, in order that it may be thoroughly mixed with the gases as they arise from the burning fuel.

C′ C′ refer to rose-heads, which cover the air-induction apertures upon the inside of the furnace. These rose-heads are perforated with small holes throughout their entire surface, in order that the air, as it passes through them, shall be divided into small jets, and thus delivered to the combustion-chamber in a condition to be thoroughly and intimately mingled with the gases. These heads may be held in their positions by a bolt which passes through the air-passage, and has a slot through it, near its outer end, through which a key is made to pass, by which they are held firmly in their places.

D D refer to supports, upon which the igniting-diaphragms rest, they consisting of hollow studs screwed into or otherwise attached to the interior surface of the fire-box, so that their interior surfaces communicate with the water-space of the generator, in order that water may enter them, and thus prevent their being burned out. These supports are so placed as to retain the diaphragms in their proper positions, and thus allow the gases, as they ascend, to strike the under surfaces of them, and pass out through the throat between them into the combustion-chamber above them, and then into the tubes or flues.

E refers to the lift-pipe, which is placed in the smoke-box of the generator, it consisting of a straight upper portion (which may pass through the top sheet of such box or chamber and enter the up-take, as shown, or it may stop at the surface of the chamber) and a series of cones, F F^1 F^2, &c., which are enveloped by a sheet of perforated metal. The lower one of these cones is the smallest of the series, they gradually increasing in size upward, the object being to provide for an equable draught through all of the flues or tubes at the same time, in order that the effect of the blast may be the same upon the entire grate surface.

The perforated sheet of metal E′ shown in the drawings further facilitates the equable draught, and at the same time acts as a spark-arrester, by preventing any of the small pieces of coal which are drawn through the tubes from entering the up-take, and thus be thrown out into the atmosphere by the exhaust of the engine.

Having thus described my invention,

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

1. The arrangement of air-induction apertures with reference to the igniting-diaphragms, substantially as and for the purpose set forth.

2. The rose-heads C′, when constructed and arranged upon the interior of the fire-box, substantially as and for the purpose set forth.

3. The lift-pipe E, constructed and arranged 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.

JNO. T. RICH.

Witnesses:

EDWARD WILLIAMS,

OSCAR S. WILSON.