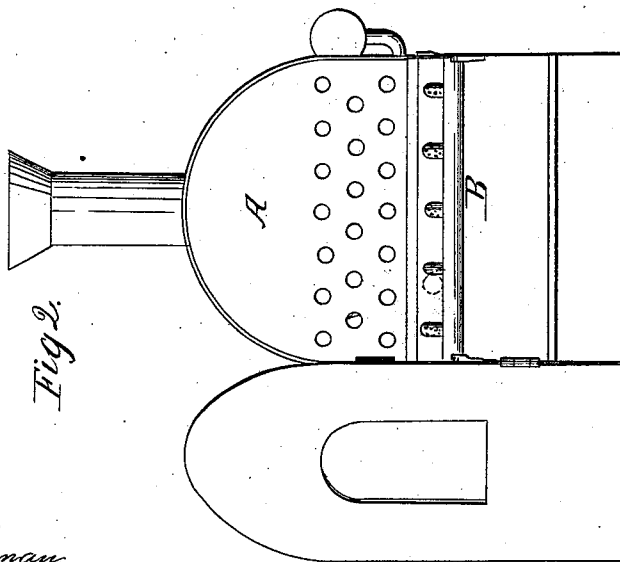
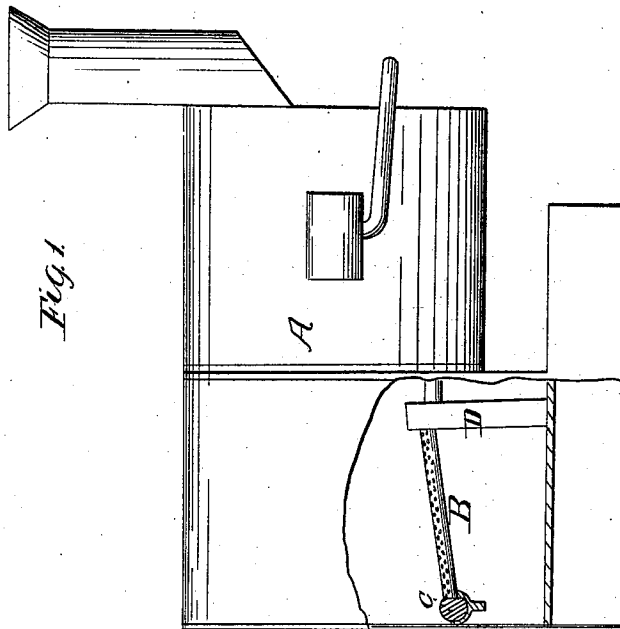


R. H. Isham,
Steam-Boiler Furnace,
No 83,169, *Patented Oct. 20, 1868.*



Witnesses.
John Buchman.
B. M. Spears.

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by
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United States Patent Office.

RALPH H. ISHAM, OF BROOKLYN, NEW YORK.

Letters Patent No. 83,169, dated October 20, 1863.

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, RALPH H. ISHAM, of Brooklyn, in the county of Kings, State of New York, have invented, made, and applied to use what I term a Dumb-Condenser and Draught-Accelerator, or Spark and Smoke-Annihilator and Consumer, for the purpose of accelerating the draught of locomotive and other steam-boilers, and bringing into use all waste fuel, thus causing the consumption of sparks and smoke, and that the following is a full, clear, and correct description of my invention, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a side elevation of a locomotive-boiler provided with my improvement, a portion of the side of the boiler being removed to show the rack.

Figure 2 is an end view of a locomotive-boiler to which my improvement has been applied.

In the drawings, like parts of the invention are pointed out by the same letters of reference.

The nature of the present invention consists in the construction, as more fully hereinafter set forth, of the condenser and draught-accelerator, whereby the sparks and smoke may be consumed.

The object of the invention is to accelerate the draught of locomotive and other steam-boilers, as well as to bring into use all waste fuel.

To enable those skilled in the arts to make and use my invention, I will speak of its construction and operation.

A shows a locomotive-boiler, and B is the distributor for the steam and dumb-condenser, formed of a rack, composed of a series of tubes, placed in the furnace above the fire, the tubes composing the rack being parallel with the bars of the grate.

The tubes of the rack are made to rest, so that a space of about six (6) inches shall intervene between the under side of the tubes and the surface of the fire, or, if space permitted, it would be preferable to raise the back end of the rack to about nine (9) inches, and depress it in front to about five (5) inches, when tubes six (6) feet in length are employed, and when tubes four (4) feet in length are employed, the rack may be five (5) inches back and three (3) inches in front, and in this proportion if longer, but not any lower if the bars be shorter.

The position thus occupied by the bars will give the currents by the exhaust or live steam a direction, first, toward the front, and curving along the top or arch of the furnace, and down through the flues, thus sweeping a flame of combustion over every portion of surface exposed within the furnace.

The front ends of the tubes rest in a half oval tube, C, while the back ends are inserted into a cast-iron

box, D, made sufficiently deep to give the proper height to the tubes above the grate-bars, and sufficiently long to extend across the furnace, which box D shall be so placed and supported as to prevent the passage of the flame, except above it, and giving a space for its escape, at top, say, of five (5) inches, and at the bottom of two or three inches, the average opening or internal space of box being about three (3) inches.

This box is connected with reference to the engine and boiler, and receives the exhaust or live steam, and distributes it to the tubes.

The tubes may be of any form, elliptical, triangular, round, or other form, and may be of any suitable length and diameter.

The tubes are to be perforated by an eighth of an inch, more or less, opening on the top, and an opening on each side at an angle of about forty-five degrees, each being at a right angle to the centre, and repeated at a distance of, say, two (2) inches apart for the entire length of the tube, which perforations should, in measurement, exceed the exhaust-openings, so that there may be no reaction upon the engine.

The tubes should be about four (4) inches apart, and receive the steam and distribute it over the entire surface of the fire, through the perforations in them.

The pipe or pipes, through which the steam is conducted from the boiler to the box D, should connect with it from behind or next to the bridge-wall or flues in any way most convenient; and where there is not sufficient space between the fire-surface and the boiler or top of arch to give the four to six inches required, the grate-bars should be dropped to give this space, so that the beneficial effect of the invention may be obtained.

By the use of a rack thus constructed, the steam will be diffused over the entire surface of the fire, whereby, from the more complete combustion of the sparks, smoke, and other gases of the fuel, by the increased supply of oxygen and hydrogen combined in the steam so distributed over the surface of the fire, and combining with it, oxygen and hydrogen gases are readily ignited, and burn intensely, forming a partial vacuum in the furnace, to which each successive charge of exhaust is communicated, thus keeping up a steady pressure through the flues or draught without the pernicious effect of lifting the cinders and ashes, as by the concussion of the exhaust in the chimney, as is usual.

The oxygen and hydrogen thus supplied, will be in many, if not in all cases, sufficient to sustain combustion, with the damper to the ash-pit, under the fire, entirely closed, thus preventing the rapid decomposition and waste of fuel caused by a rush of air constantly through it.

In any case, when the exhaust steam is insufficient, or when it may be desirable to hasten or facilitate the

raising of steam, as with a locomotive at rest, the draught being sluggish, live steam may be conducted through the rack to accomplish the desired object, and it may be used with equal advantage to the combustion and draught when no engine is used.

As an auxiliary draught, my invention will be found exceedingly valuable from its efficiency, economy, and completeness, enabling, as it does, an engineer to raise his steam, while the engine is at rest, in a much shorter space of time, and avoiding the annoyance and damage resulting from cinders and smoke arising from the locomotive.

An additional valuable result of the invention is in the condenser, in which a partial vacuum is produced and sustained by heat instead of cold, by fire instead of water.

I am well aware that steam has been introduced, in various ways and for various purposes, into furnaces of boilers used for the generation of steam for engines, for heating, cooking, and other purposes, by increasing combustion, but I am not aware of any for accomplishing the specific object or the same results as are accomplished by my invention.

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

The construction and combination of the box-distributor B and tube C with the boiler A, substantially as set forth.

RALPH H. ISHAM.

Witnesses:

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