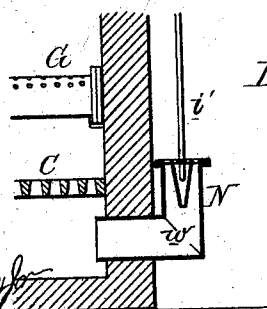
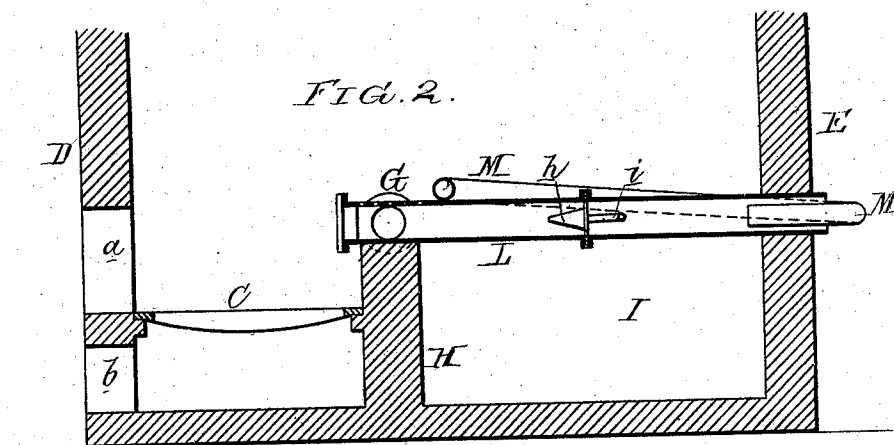
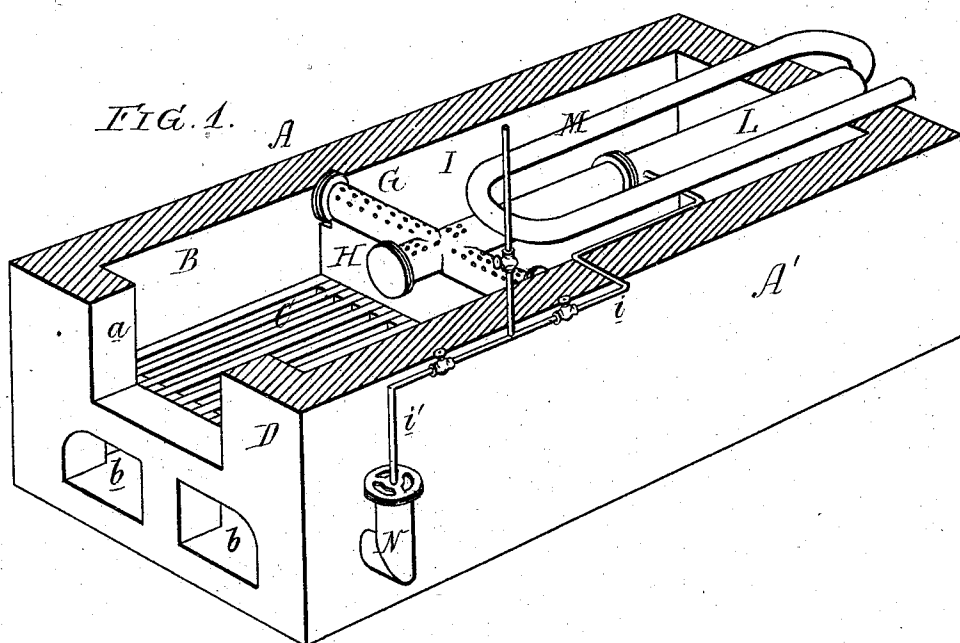


G. W. MORRISON.
Combustion of Fuel in Steam-Boiler Furnaces.
No. 203,485. Patented May 7, 1878.



Witnesses Henry Lawson
Harry Smith

Inventor
George W. Morrison
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

GEORGE W. MORRISON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, HENRY C. CAREY, ABRAM HART, AND ELIZABETH RICH, ADMINISTRATRIX, OF SAME PLACE.

IMPROVEMENT IN THE COMBUSTION OF FUEL IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **203,485**, dated May 7, 1878; application filed January 7, 1878.

To all whom it may concern:

Be it known that I, GEORGE W. MORRISON, of Philadelphia, Pennsylvania, have invented new and useful Improvements in the Combustion of Fuel in Steam-Boiler Furnaces, of which the following is a specification:

The object of my invention is the effectual and economical burning of coal in steam-boiler furnaces; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a perspective view of a steam-boiler furnace and flue, with my improvements; Fig. 2, a vertical section of the same, and Fig. 3 a transverse section of part of the furnace.

A and A' are the opposite side walls of the furnace; D, the front wall; E, the rear wall; B, the fire-place; C, the grate; H, the bridge-wall; I, the flue at the rear of the same; *a*, the doorway for the introduction of fuel into the fire-place, and *b b* the ash-pit openings, both doorway and openings being furnished with suitable doors.

On the top of the bridge, or near the same, is a transverse pipe, G, having a number of perforations, preferably on the upper side only, and with this pipe communicates a horizontal pipe, L, contained in the flue at the rear of the bridge, and passing through the rear wall E. Into this pipe L projects a tube, M, which traverses the flues at the rear of the bridge, its outer end being open to the atmosphere. The course of this tube will depend, in a great measure, upon the character of the flues; but it should be arranged in such a circuitous or zigzag course within or near the flues that the air which passes through it will be thoroughly heated.

Within the pipe L is a nozzle, *h*, to which superheated steam is conveyed by a pipe, *i*. This nozzle projects into a second nozzle, so secured to the interior of the pipe L that air can pass freely between this second nozzle and the interior of the said pipe, which must be larger in diameter, owing to the presence in it of the two nozzles, than the pipe M. The forcible jet of superheated steam ejected from this nozzle will induce air to enter the pipe

M, and in its rapid course through the latter the air will be thoroughly heated before it reaches the steam-jet, with which it will be combined, the mixture of heated air and dry steam passing through the perforations of the pipe G in forcible jets, and being intimately commingled with the products of combustion as they pass from the fire-place, so that the unconsumed gases of these products will be ignited, and a resultant flame of intense heat will pass through the flues.

The invention can be applied to any steam-boiler furnace without any change of the fire-grate bars or alteration in the settings.

In burning anthracite coal, I prefer to employ a blast beneath the grate, this blast being created by a jet of steam ejected from a nozzle, *w*, in a bent pipe, N, which passes through the wall of the fire-place beneath the grate, the jet of steam causing air to pass through the said pipe N into the ash-pit with a force and in a volume depending upon the size of the jet, the small steam-pipe being furnished with suitable cocks, by which the force of the steam-jets may be regulated.

I do not desire to claim, broadly, the discharge into the products of combustion in steam-boiler furnaces of jets of combined air and steam; nor do I claim, broadly, the discharging of combined heated air and superheated steam into the products of combustion at the rear of the furnace; but

I claim as my invention—

The combination, with a steam-boiler furnace, of the air-heating tube M, arranged in the flue, a pipe, L, receiving air from the said tube M, a nozzle in the pipe L, a nozzle, *i*, projecting into the first nozzle and communicating with a steam-pipe, and a perforated distributing-pipe, G, with which the said pipe L communicates, and from which jets of combined air and steam are projected, all as set forth.

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

GEORGE W. MORRISON.

Witnesses:

HARRY A. CRAWFORD,
HARRY SMITH.