

No. 754,151.

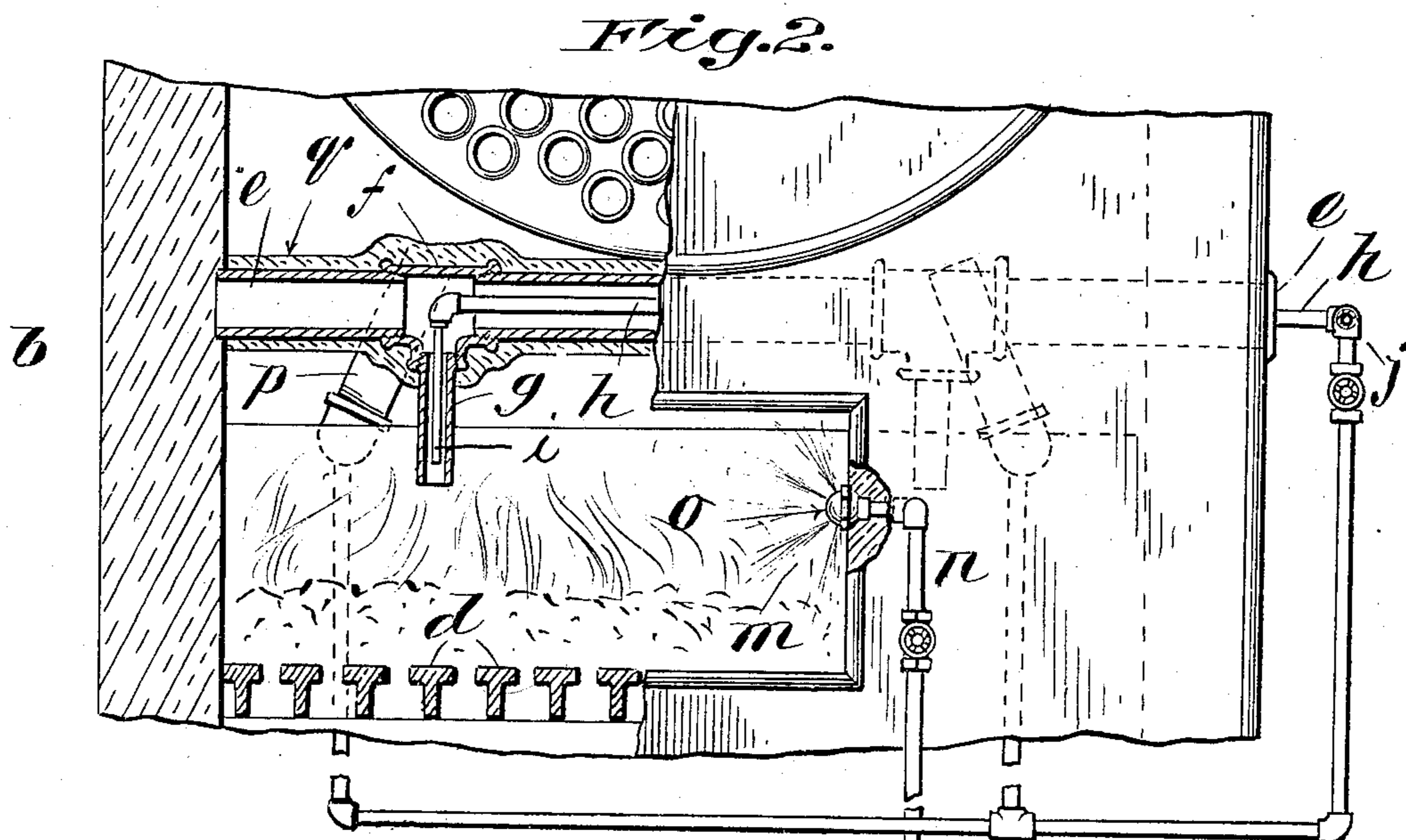
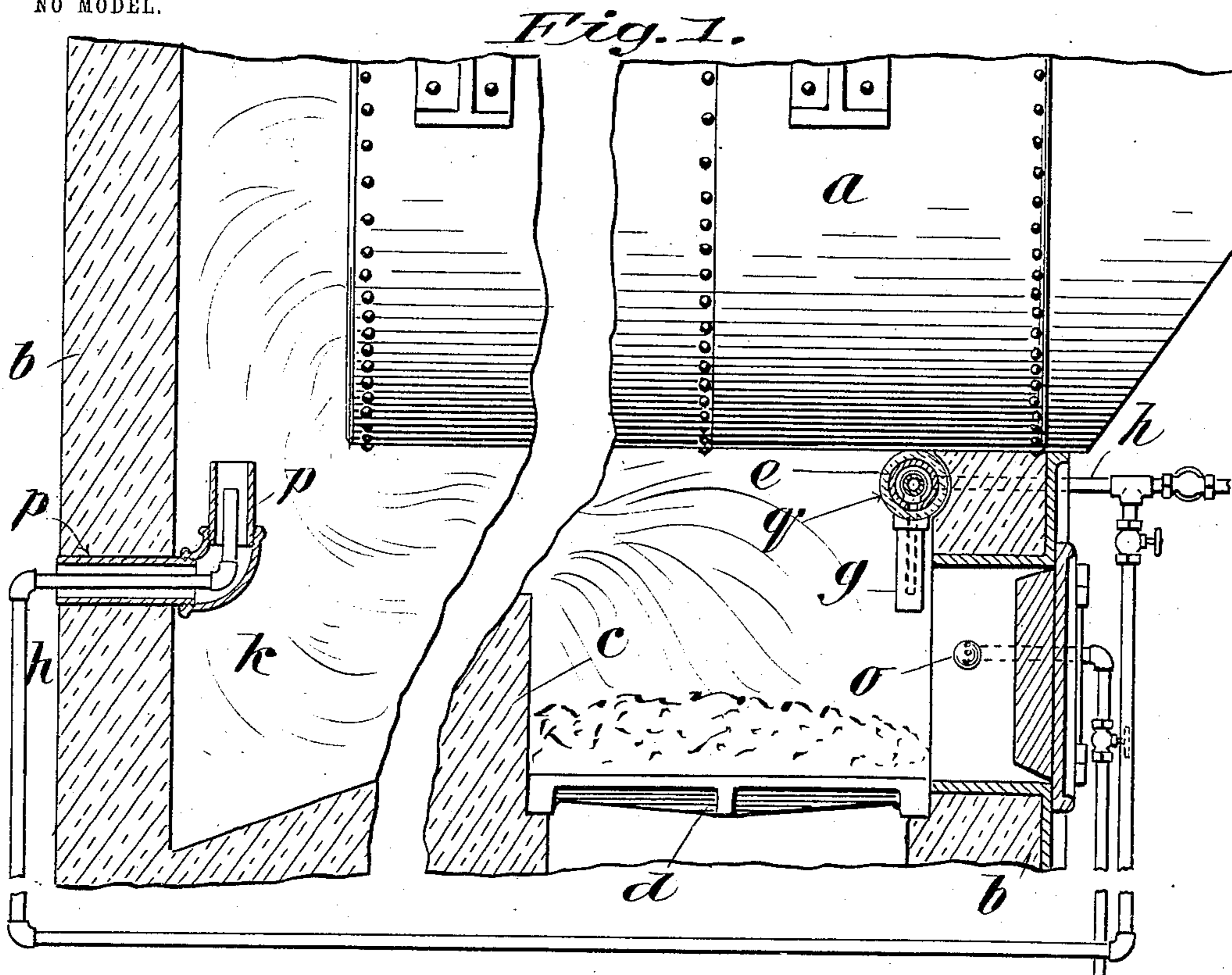
PATENTED MAR. 8, 1904.

E. R. LEWIS.

DEVICE FOR AIDING COMBUSTION IN BOILER FURNACES.

APPLICATION FILED SEPT. 21, 1903.

NO MODEL.



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UNITED STATES PATENT OFFICE.

EDWARD R. LEWIS, OF SPRINGFIELD, MASSACHUSETTS.

DEVICE FOR AIDING COMBUSTION IN BOILER-FURNACES.

SPECIFICATION forming part of Letters Patent No. 754,151, dated March 8, 1904.

Application filed September 21, 1903. Serial No. 173,960. (No model.)

To all whom it may concern:

Be it known that I, EDWARD R. LEWIS, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Devices for Aiding Combustion in Boiler-Furnaces, of which the following is a specification.

This invention relates to improvements in devices for aiding combustion in boiler-furnaces and the like, the object of the invention being to provide devices for this purpose whereby oxygen may be supplied to the product of combustion above the fire both at the point of liberation of said gases and at a point beyond the bridge-wall before the entrance of the gases into the flues of the boiler; and the invention consists in the construction described in the following specification and clearly pointed out in the claims forming part thereof.

In the accompanying drawings, Figure 1 is a sectional elevation of a boiler and its setting, showing my improved devices applied thereto. Fig. 2 is a front elevation, partly in section, of the construction shown in Fig. 1.

Referring now to the drawings, *a* indicates the boiler; *b*, the boiler-setting; *c*, the bridge-wall, and *d* the grate-bars.

The particular type of boiler shown herein is that of the common flue-boiler, and while the device is shown as applied to this type it is equally applicable to other forms of horizontal boilers.

In carrying my invention into practice I employ steam under suitable pressure to deliver air, mingled therewith, to the flame above the fire, and for that purpose a tube or pipe *e* is located transversely of the boiler, preferably close up to the under side of the latter, as shown in the drawings, and also preferably on the inside of the front wall of the setting. One end of this tube projects through the setting at one side thereof, as shown in Fig. 2. At two or more points in this tube a reducing-T (indicated by *f*) is made into the tube, the smaller opening in which preferably looks downward, into which the nipples *g* are screwed. The pipe *e* is closed at its inner end by inserting it in the side wall, as shown.

This pipe is relatively of large diameter—say two and one-half inches—the nipples *g* being of about one-inch pipe. Extending longitudinally and centrally through this tube *e* is a steam-pipe *h*, having branches *i*, which extend down to and nearly through the nipples *g*. The pipe *h* is provided with a suitable valve *j* outside of the boiler, and the construction of the whole is one which operates on the injector principle, whereby steam under pressure flowing through the branches *i* will operate to draw air through the tube *e* and force it out of the nipples *g*. While the direction of delivery from the nipples *g* is downward, the draft through the fire is upward and backward toward the combustion-chamber *a*, and thus the commingled air and steam following the movement of the draft will sweep across the surface of the fire, mixing with the products of combustion just formed. This supply of air and steam is supplemented by a supply of atomized or finely-comminuted water, which is introduced in the side of the fire-door opening *m* through a pipe *n*, the end of which is located close to the inner wall of one side of said opening *m*, as shown in the drawings. This pipe preferably is provided with a semispherical head *o*, pierced with a number of small openings through which the water is forced to form a fan-like curtain in a plane which is at right angles to the air-currents which enter the opening *m* around the door and through the air-openings provided therein. This water in its finely-subdivided state is immediately converted into steam and the component gases thereof liberated by the high temperature of the fire-box. From these two sources—that is, the injection of air and steam through the tube *e* and of the water-spray through the pipe *n*—a sufficient quantity of oxygen and hydrogen gases is provided to effect by their union with the carbon in suspension in the products of combustion the more perfect combustion of this carbon. However, there is a certain amount of carbon evolved from the combustion of the fuel toward the rear end of the grate-bars, which cannot always be reached by a supply of oxygen introduced near the forward end of the latter, and to supply this liberated carbon

with the requisite proportion of oxygen there are located at the rear of the boiler two pipes *p*, which pass through the rear wall of the boiler-setting and then turn upwardly, as shown. These pipes *p* are of substantially the same diameter as the pipe *e*, and in each of them there is located an extension of the steam-pipe *h* to constitute a device similar in action to that described for delivering air and steam at the forward end of the boiler above the fire. These two pipes *p* deliver to the stream of hot gases at the point where they turn to pass up behind the boiler and through the flues of the latter a sufficient quantity of oxygen to complete the combustion of whatever remaining free carbon has escaped combustion before reaching this point. In practice it is possible with these improved devices applied to the boiler to fire the boiler in the ordinary manner and in stoking the fire to break up the clinkers without producing a sufficient quantity of unconsumed carbon to make any material showing at the top of the stack.

Preferably the pipe *e* and nipples *g* are covered with some heat-resisting material to protect them from the great heat to which they would otherwise be subjected, this covering being indicated by *q*. The pipes *p* at the rear do not require it.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with a boiler-setting having the usual fire-door opening therein, of an air-conduit located over said opening transversely of the setting, delivery-nipples in said pipe extending into the fire-box, and a steam-pipe in said conduit, and branches extending into said nipples, together with a water-spraying device located in the fire-door opening.

2. The combination with a boiler-setting having the usual fire-door opening therein, of an air-conduit located over said opening transversely of the setting, delivery-nipples in said conduit looking downward, and extending into the fire-box; a steam-pipe in the air-conduit, and branches extending into the nipples, the whole constituting a device to inject air and steam into the fire-box, a second air and steam injecting device located at the rear end of the setting, together with a water-spraying device located in the fire-door opening and adapted to spray the water transversely of said opening.

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Witnesses:

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