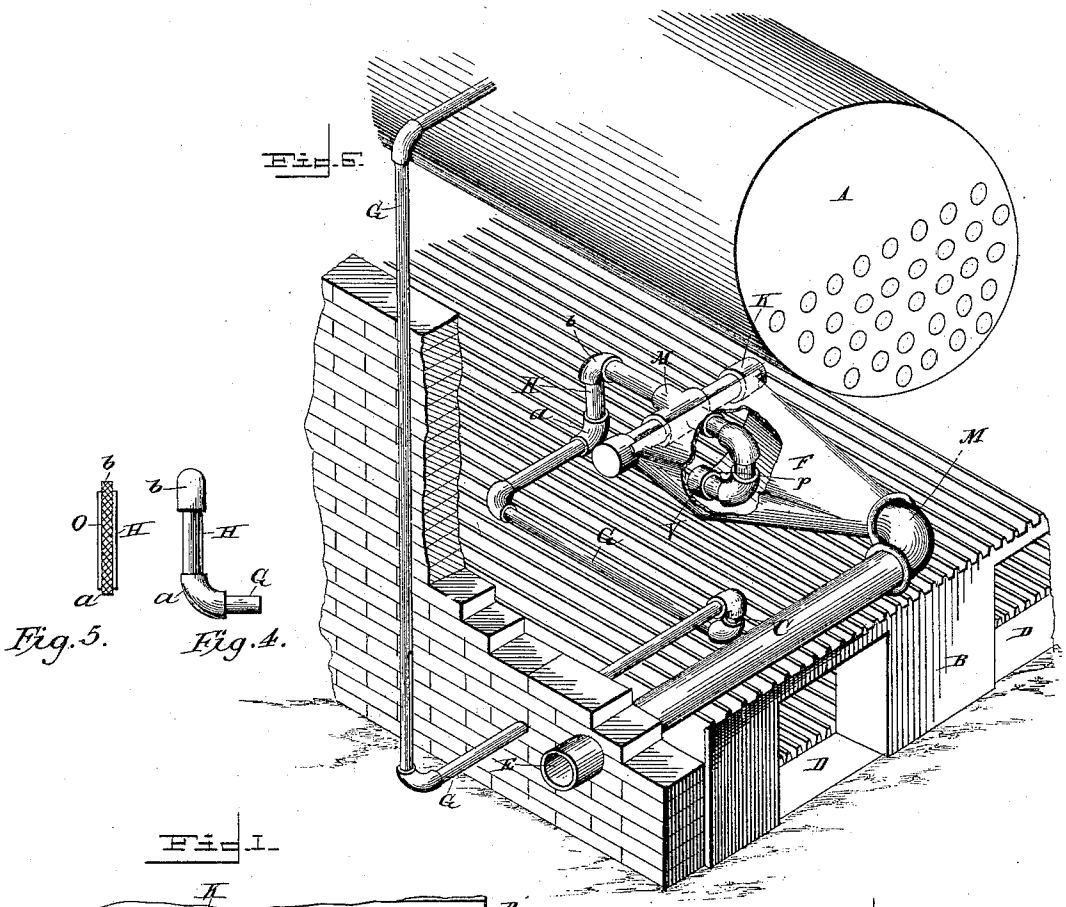
(No Model.)

J. CONRAD.

SMOKE CONSUMER.

No. 432,018. Patented July 15, 1890.



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JOHN CONRAD, OF BURLINGTON, IOWA, ASSIGNOR OF ONE-THIRD TO SAMUEL E. NIXON, OF SAME PLACE.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 432,018, dated July 15, 1890.

Application filed August 2, 1889. Serial No. 319,603. (No model.)

To all whom it may concern:

Be it known that I, JOHN CONRAD, a citizen of the United States, residing at Burlington, in the county of Des Moines, in the State of Iowa, have invented a new and useful Improvement in Smoke-Consumers, of which the following is a specification.

The object of my invention is the introduction, by means of pipes and other arrangement and combination to be described, into the furnace, where gas, smoke, and vapors generated by combustion are to be consumed, of highly-superheated steam, and consequent dissociated hydrogen gas in connection with oxygen and fresh air, whereby the carbon and other combustible material in the smoke and vapor are consumed. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a top view of the mechanism located over the grate of a furnace. Fig. 2 is a vertical side view of the same. Fig. 3 is a vertical view of the end of the same extended into the furnace. Fig. 4 is a vertical view of a section of the steam-pipe containing a wire-filling heat-distributer, and Fig. 5 is a sectional view of the latter. Fig. 6 is a view of the furnace and boiler, with the walls and front plate of the same removed, showing said mechanism in place, located above and over the grates of the furnace.

Similar letters refer to similar parts throughout the several views.

B represents the front plate of the furnace, with its openings or doors D D.

A represents an ordinary steam-boiler located in and above the furnace, and C the grates thereof.

E represents a pipe or tube, open at its exterior and for the admission of cold air passing through the walls of the furnace well in front, so as to be as remote from the fuel as possible, located about ten or twelve inches above the upper surface of the grates. At M this tube E by a joint is attached to the funnel F, with its flaring opening extending backward toward the rear of the furnace, as shown. The side lips of the funnel F at its upper corners are notched or cut, so as to admit and fit to the ends of the section of the superheating device K, so that the upper lips of the funnel may closely fit to the upper longitudinal surface of K, as shown. The tube E and funnel F are held firmly in place by the wall through which the tube passes, and by its connection with the section of the superheating device K other means may be readily devised for giving the mechanism support and rendering it stable in position.

G represents a tube or pipe leading from the steam-chamber of the steam-boiler through the wall of the furnace into the latter. By joints or otherwise it is bent so as to bring the portions of the said steam-tube marked G′, H, K, and L over the central portion of the grate immediately over the fuel in process of combustion, and also so that the part K may be adjusted to the funnel F, and the crook in the steam-pipe N L may rest within the flaring mouth of the funnel, as shown.

In the section of the steam-pipe H, between the joints or turns *a b*, is introduced a packing of wire or metallic gauze packed closely in the tubes, whereby a greater heating-surface will be given for the steam which passes through it. In this application I term this packing a "wire-filling heat-distributer." The terminal or tip L of the steam-pipe is provided with a small perforation or opening in its center at N, so arranged that the escaping jet of gas or steam, or both, will be thrown upon the vertical section of the steam-pipe H, containing the wire-filling heat-distributer. The cross-section K of the steam-pipe, which is shown as united with it by a T-joint N, is provided on each side of the pipe H with three perforations or openings P on the posterior side thereof and slightly below the central line thereof, so arranged and made that the escaping gas and steam, or both, will be carried backward and downward in the direction of the fuel and the flames and smoke proceeding therefrom. In the drawings I have shown three such openings or perforations in the cross-section K; but I do not limit myself to any particular number of openings.

In the operation of my invention, as soon as the fuel upon the grates in the furnace has generated sufficient steam in the boiler to create any pressure steam will pass through the pipe G and seek escape through the orifices P and N. The heat in the furnace and

consequent draft will cause a current of cold air to flow through the tube E and into the furnace through the funnel F. The portion of the steam-pipe G within the furnace will be already intensely heated and the steam in passing through it, and especially in through the wire-filling heat-distributer at H, will be superheated and more or less hydrogen gas will be freed and will escape through the jets or openings P and N. The escape of the steam or gas toward the rear of the furnace will increase the current of cold air coming in through the funnel F. The heated hydrogen gas and superheated steam ignited by the flames from the fuel and their combustion supported by the oxygen of the inflowing air will greatly increase and intensify the combustion and heat. The jet from the end of the steam-pipe L will be thrown directly upon and around the section of the steam-pipe H, containing the wire-filling heat-distributer, as will also portions of the jets from the openings P P in the cross-section K, intensely heating the wire-filling heat-distributer *a b* and greatly superheating the steam (which is somewhat retarding in its passage through the same) and dissociating the hydrogen gas therefrom and pouring the steam and gases mingled with the cold air from the funnel out over and upon the fuel and smoke arising therefrom. By means of their great expansive power when escaping from pressure the hydrogen and superheated steam will expand and practically fill the space in the furnace above the combustion going on, and will commingle with the smoke generated therefrom. The hydrogen and superheated steam will be ignited, and the intense heat generated by the combustion of the hydrogen and superheated steam supported by the oxygen supplied by dissociation and the cold air will burn and consume the cinders, soot, carbon, and other combustible material in the smoke, leaving only the gases and vapors to escape.

It is evident that when furnaces are employed for other purposes than heating steam-boilers a supplemental boiler to provide the steam must be employed to carry out my invention.

In the construction of my apparatus I do not limit myself to the dimensions and lengths and distances given to and between the several parts, nor to the number of devices which may be employed or required to consume the smoke of any given furnace, as these matters necessarily depend largely upon the form and dimensions of the furnace. The purpose for which it is used, the size and height of the chimney, the character of the draft, and for successful and economical operation in each particular case must be ascertained by the judgment of those skilled in the art.

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

1. In a furnace having a grate or other support for the fuel, the combination of a boiler for generating steam, a wire-filling heat-distributer connected to said boiler by a pipe, a steam and gas distributer connected to said wire-filling heat-distributer by a tube, and a cold-air tube provided with a funnel arranged and located over and above the grate or other support, all as substantially set forth.

2. In a smoke-consumer, the combination of a steam-superheating pipe provided with a wire-filling heat-distributer, in combination with a cold-air tube provided with a funnel, all as substantially set forth.

3. In a smoke-consumer, the combination of a steam-superheating pipe G, having a section H, containing a packing of wire-gauze, a cross-section K, with openings or perforations connected to H by a pipe, and a neck terminating at L, the end of the pipe at L provided with an opening or perforation in the plane and direction of the section H, in combination with a cold-air tube E, provided with a funnel F, all as substantially set forth.

4. In a smoke-consumer, a steam-superheating pipe having a section containing a wire-filling heat-distributer, a cross-section provided with openings, and a neck with the terminal of the neck pointed toward the wire-filling heat-distributer and provided with one or more openings, all as substantially set forth.

5. In a smoke-consumer, a cold-air tube provided with a funnel with notches or cuts in its extreme sides to receive and be adjustable to a cylindrical cross-section, arranged all as substantially set forth.

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Witnesses:
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