

M. L. KRUEGER.
SMOKE CONSUMING FURNACE.
APPLICATION FILED MAY 13, 1911.

1,018,830.

Patented Feb. 27, 1912.

2 SHEETS—SHEET 1.

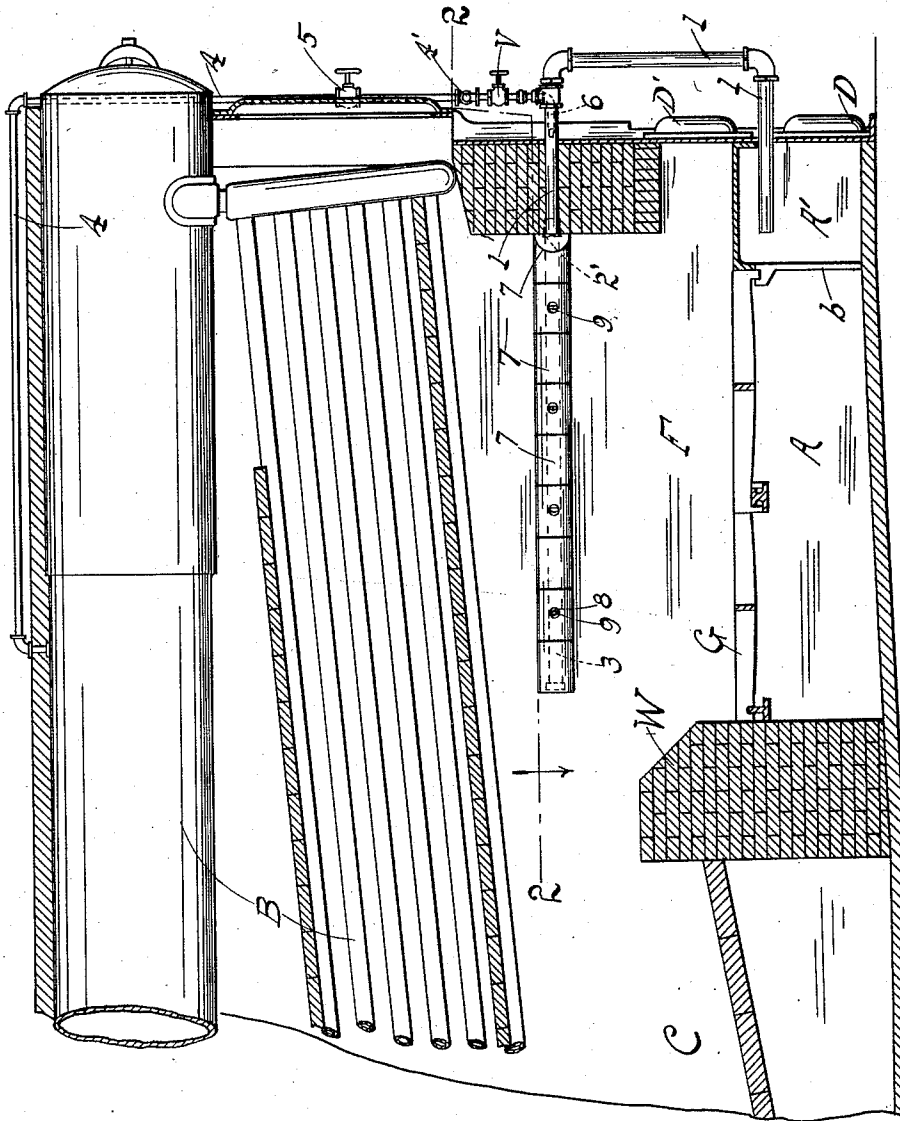


FIG. 1.

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BY

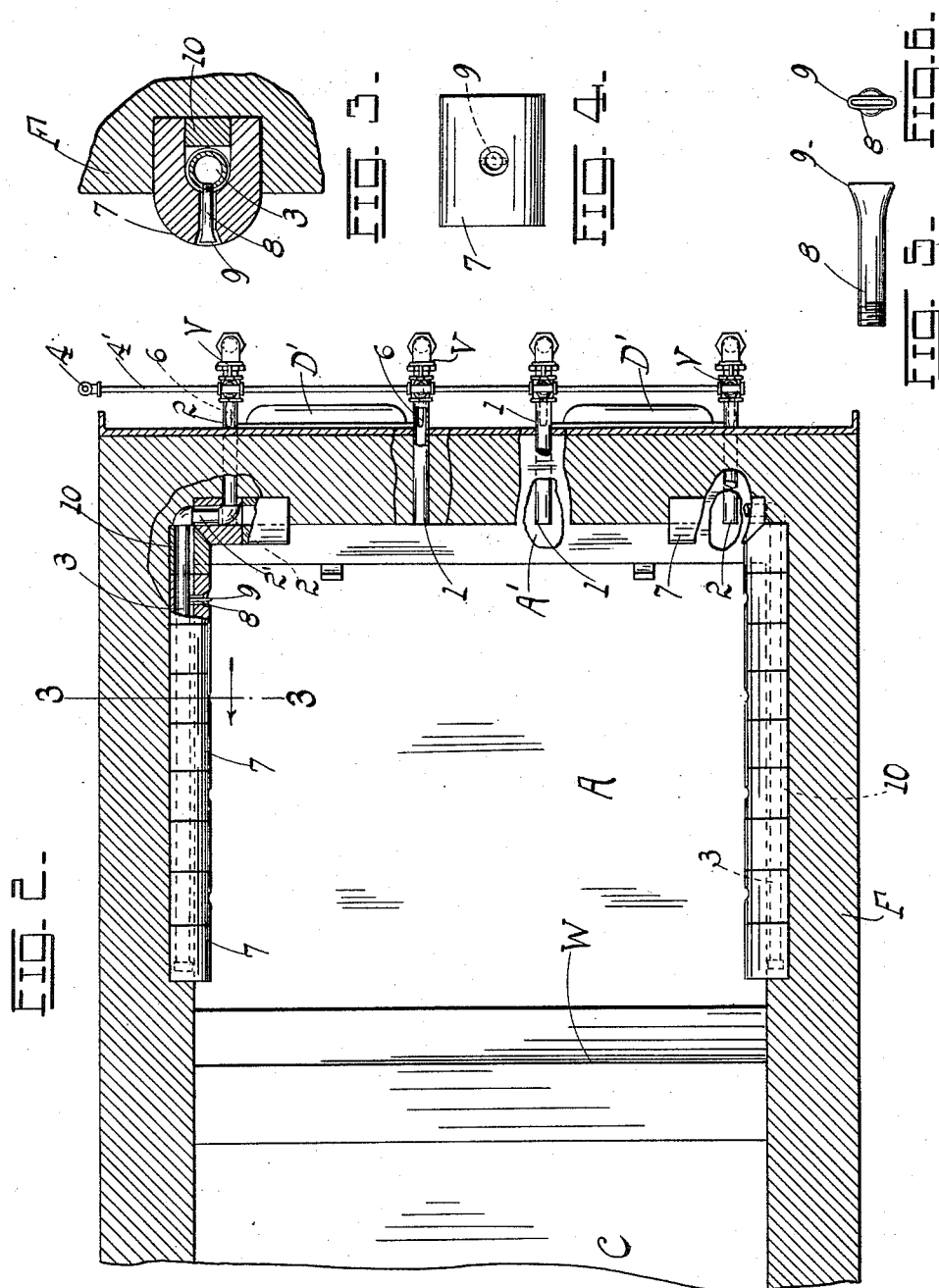
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SMOKE-CONSUMING FURNACE.

1,018,830.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MARTIN L. KRUEGER, citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in smoke-consuming furnaces; and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claim.

In the drawings, Figure 1 is a middle vertical section of a conventional water-tube boiler furnace showing my invention applied thereto, parts being broken away; Fig. 2 is a horizontal section on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional detail on the line 3—3 of Fig. 2; Fig. 4 is an end view of Fig. 3; Fig. 5 is a detached plan of the jet-pipe and spray nozzle thereof; and Fig. 6 is an end view thereof.

The object of my invention is to construct a boiler furnace provided with a fire-box which shall insure complete combustion for the smoke, the invention being herein illustrated (though obviously not restricted to) in connection with a water-tube boiler of conventional design.

The advantages of the invention will be fully apparent from a detailed description thereof which is as follows:—

Referring to the drawings, B represents a conventional water-tube boiler mounted above the fire-box F, and combustion chamber C, the grate G being mounted above the ash-pit A between the bridge-wall W and the corner brackets b as well understood in the art. A' represents a front extension of the ash-pit to which access is had through the doors D, similar doors D' leading into the fire-box. These features are all well understood in the art and form no part of the present invention.

Leading from the medial portions of the compartment A' through the front wall of the furnace and extending upward in front of said wall and terminating in and discharging into the fire-box through the front furnace-wall are U-shaped air induction pipes 1, 1, said pipes being open at both ends. Leading from the front corners of the compartment A' and disposed in a manner similar to the pipes 1, 1, are similar air-

pipes 2, 2, the upper legs thereof being connected by bends 2' at the front corners of the fire-box to the pipes 3, which are disposed along the sides of the fire-box, the rear ends being closed. The pipes 2, 2', 3, form virtually a single air induction pipe as shown. Leading from the boiler shell is a steam-supply pipe 4 provided with a valve or cock 5 of ordinary construction, below which there extends from the pipe 4, a horizontal branch 4', which is provided at intervals with jet-nozzles or injectors 6, the several injectors tapping the adjacent legs of the U-shaped air-pipes 1, 2, respectively, the steam to each injector being delivered through an ordinary globe or similar valve V, this arrangement making it possible to supply steam independently to any injector at the will of the engineer. The pipes 3 are embedded in fire-brick blocks 7 of a cross-section substantially as shown (Fig. 3) the course of blocks being so laid as to cause the rounded ends or noses thereof to overhang or project into the fire-box, a suitable distance beyond the vertical side walls of the box, thus forming collectively an overhanging ridge or rib directly exposed to the hot products of combustion within the fire-box (Fig. 2). The pipe 3 is tapped at intervals by jet-pipes 8 which terminate on the side of the fire-box in flattened or elliptical mouths or nozzles 9 with the longer axes disposed vertically, the nozzles likewise flaring toward the fire-box, so that the mixtures of steam and air projected therefrom into the fire box take the form of vertical sheets which intersect the products of combustion substantially at right angles to the general line of draft. The blocks 7 are substantially U-shaped in cross-section, the cavity of the block behind the pipe 3 being plugged by a filler block 10 as shown. The jets projected into the fire-box through the front wall of the furnace, from the upper legs of the pipes 1, 1, need not necessarily be in the form of sheets, and are merely intended to supplement the side sheets, and to assist the general draft of the furnace.

The operation, though clearly obvious from the foregoing, may be briefly stated as follows: By opening the main steam valve 5, and any of the injector valves V, the steam projected through any injector 6 will induce a flow of hot air from the ash-pit through the pipes 1, 2, the air and steam thus mingling and being subsequently projected into

the fire-box as already described. The precise proportions of steam and air are controlled by a proper manipulation of the valves V. The mixture of steam and air
5 flowing through the pipes 3, 3, is superheated, flowing as it does through pipes embedded in the projecting or overhanging ridges of the highly heated blocks 7, the superheated sheets of oxygen-bearing gases
10 being projected into the fire-box, and mingling with the combustion products in the manner described, these products (smoke, fine particles of coal and dust) being completely consumed before reaching or leaving
15 the combustion chamber. The jets projected from the pipes 1, 1, are not superheated as these pass directly into the fire-box without traversing an inwardly projecting formation or ridge such as is formed by the rounded
20 noses of the blocks 7.

Having described my invention, what I claim is:—

In combination with a boiler furnace hav-

ing a fire-box and an ash-pit, air induction pipes leading from the ash-pit and extended 25 along the sides of the fire-box, a heat absorbing and heat retaining ridge projecting into the fire-box beyond the side walls thereof, and traversed by the side extensions of the air induction pipes aforesaid, jet pipes pro- 30 jecting through the ridge aforesaid, terminating in flaring flattened nozzles discharging the mixture of superheated steam and air in vertical sheets intersecting the general line of draft of the combustion prod- 35 ucts within the fire-box, and supplemental jets projected through the front wall of the fire-box in the general line of draft, for the purpose set forth.

In testimony whereof I affix my signature, 40 in presence of two witnesses.

MARTIN L. KRUEGER.

Witnesses:

EMIL STAREK,

FANNIE E. WEBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."