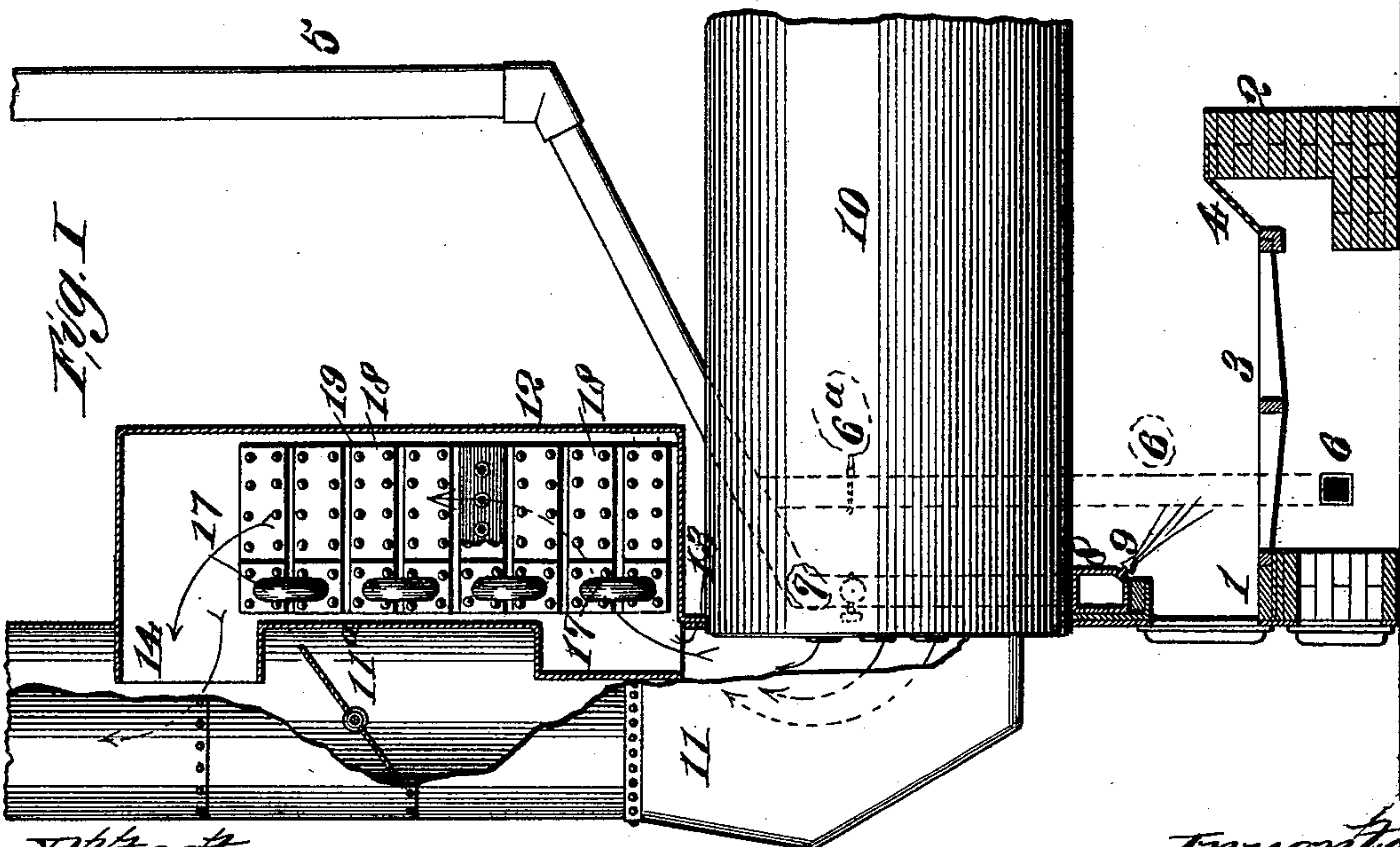
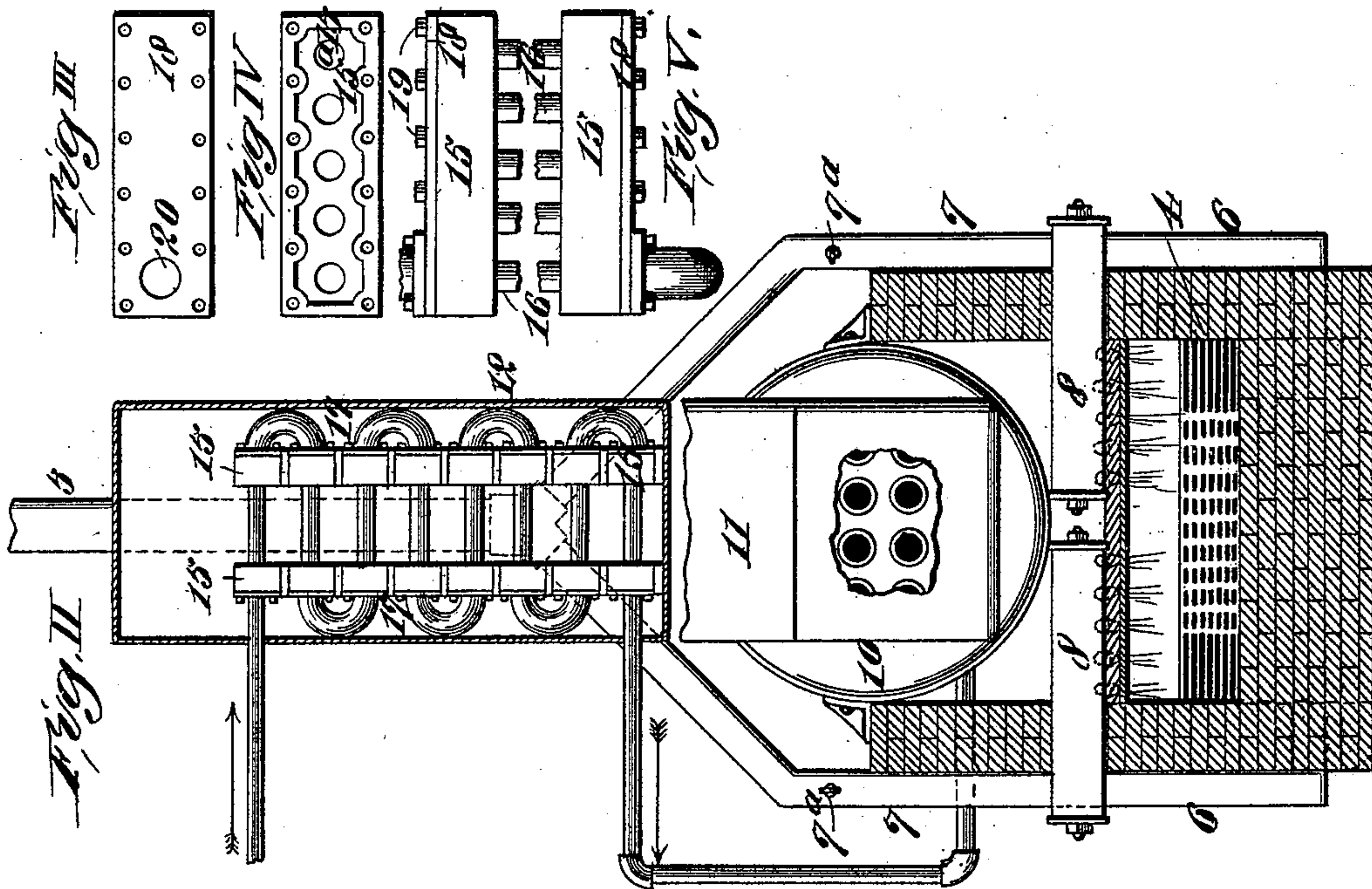


(No Model.)

J. B. BELL.  
SMOKE CONSUMER AND FUEL ECONOMIZER.

No. 538,495.

Patented Apr. 30, 1895.



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Atty



# UNITED STATES PATENT OFFICE.

JOSEPH B. BELL, OF ST. LOUIS, MISSOURI.

## SMOKE-CONSUMER AND FUEL-ECONOMIZER.

SPECIFICATION forming part of Letters Patent No. 538,495, dated April 30, 1895.

Application filed August 18, 1894. Serial No. 520,717. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH B. BELL, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Smoke-Consumers and Fuel-Economizers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a smoke consumer and fuel economizer in which a blast of air is introduced above and below the fire and in which a constant supply of feed water is heated by the waste heat as it passes from the furnace into the smoke stack; and my invention consists in features of novelty hereinafter fully described and pointed out in the claims.

Figure I is a view partly in side elevation and partly in longitudinal vertical section, the boiler and a portion of the smoke-stack being shown in elevation, and the furnace, a portion of the smoke-stack, and the fuel-economizer box being shown in section. Fig. II is a vertical cross-section through the furnace and the fuel-economizer box. Fig. III is a detail view of one of the feed-water-heater box cap-plates. Fig. IV is a detail view of one of the feed-water-heater boxes. Fig. V is a detail top view of one of the feed-water-heater sections.

Referring to the drawings, 1 represents the front wall and 2 the bridge wall of the furnace, between which the grate 3 is supported as usual.

Back of the grate is a perforated plate 4 provided to admit air from the ash pit in evenly distributed currents over the rear portion of the fire to assist in the combustion of the gases arising from the fire at this point.

5 represents a pipe in communication with a suitable blower located in any suitable location adjacent to the furnace for the purpose of supplying a blast of fresh air to the furnace. The pipe 5 diverges into pipes 6 leading into the furnace ash pit and 7 are pipes leading from the pipe 5 into an air box 8 located above the fire door against the front wall 1. Suitable dampers 6<sup>a</sup> and 7<sup>a</sup> are provided in said pipes. In the air box 8 are nozzles 9 pointed downward to direct a blast of air onto the forward portion of the fire.

10 represents the boiler and 11 the smoke stack connected thereto as usual.

In the rear of the smoke stack is the fuel economizer box 12 provided at its lower end with an inlet 13 and at its upper end with an outlet 14. For the purpose of causing the hot smoke and gases to pass through the box 12, instead of directly up the stack, I provide a damper 11<sup>a</sup> in the stack.

The hot smoke and gases in passing through the box 12 pass among a system of pipes that constitute a feed water heater of which 13 is the water inlet pipe leading from a pump and connecting with the upper section of the heater and 14 is the outlet pipe connecting with the lower section and leading to the boiler, by this means employing heat that would otherwise be wasted to impart a high temperature to the water before it enters the boiler.

The sections of the feed water heater are composed of chambered boxes 15 into which are fitted the ends of short sections of pipe 16. The sections of the heater are connected together by return bends 17, attached near the ends of the sections.

The boxes 15 are formed with chambers 15<sup>a</sup> that allow passage of water from the entrance to the opposite ends of the boxes so that it may pass through the pipes 16 into the next box opposite. The outer sides of the boxes are closed by cap plates 18, suitably secured by screws 19, and in the cap plates are openings 20 for the connection of the return bends 17.

I claim as my invention—

1. In a smoke consumer and fuel economizer, the combination of air blast pipes discharging into the furnace above and below the grate, a smoke stack, a fuel economizer box on said smoke stack, and a feed water heater in said box, said feed water heater consisting of a series of pairs of boxes, pipes between said boxes, and return bends connecting said pairs of boxes: substantially as described.

2. In a fuel economizer, the combination of the box 12 on the smoke stack, chambered boxes 15 arranged in pairs in said box 12, pipe sections 16 located between the boxes 15, and return bends connecting said pairs of boxes 15: substantially as described.

JOSEPH B. BELL.

In presence of—

E. S. KNIGHT,

CLARA G. EDWARDS.