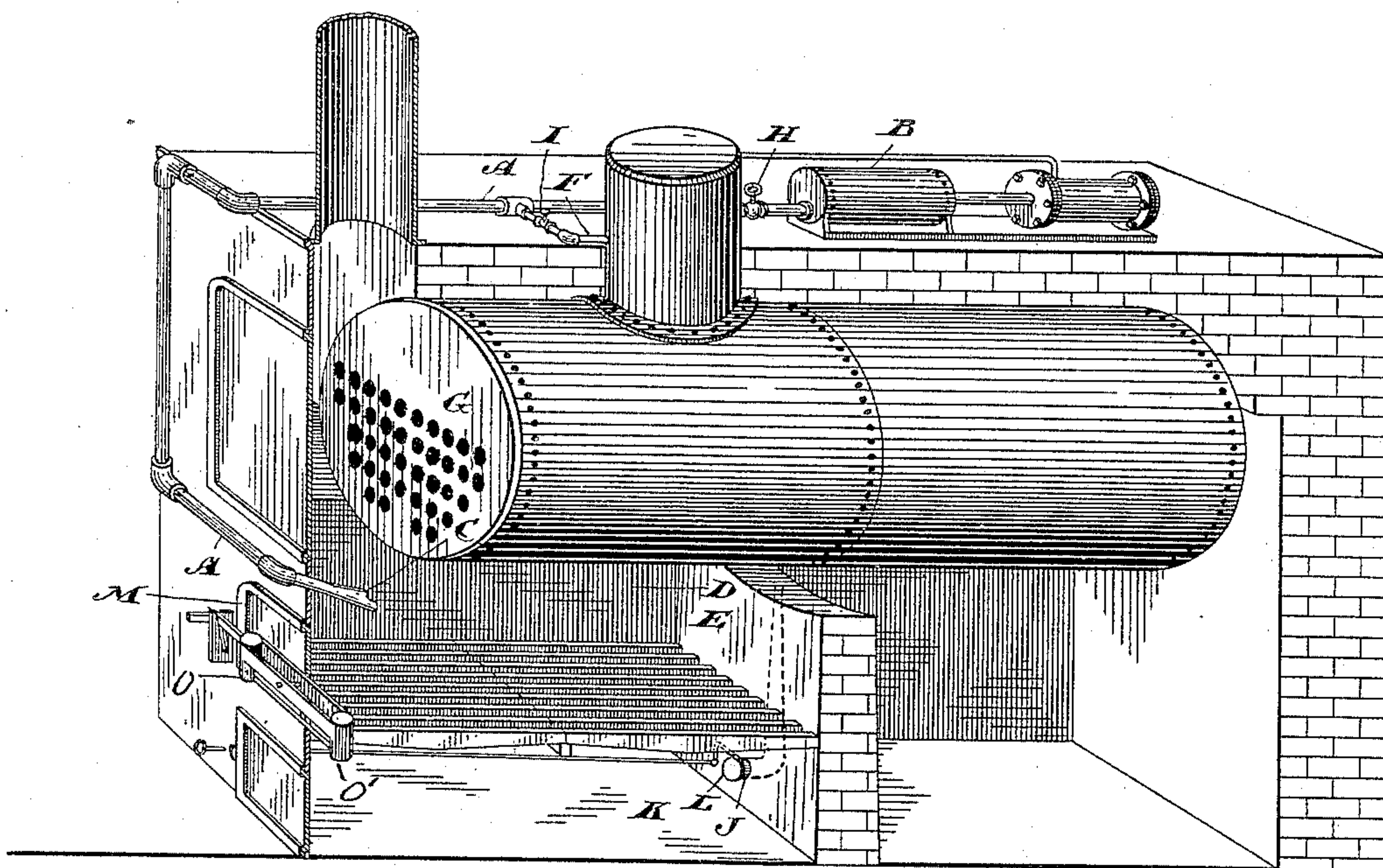


(No Model.)

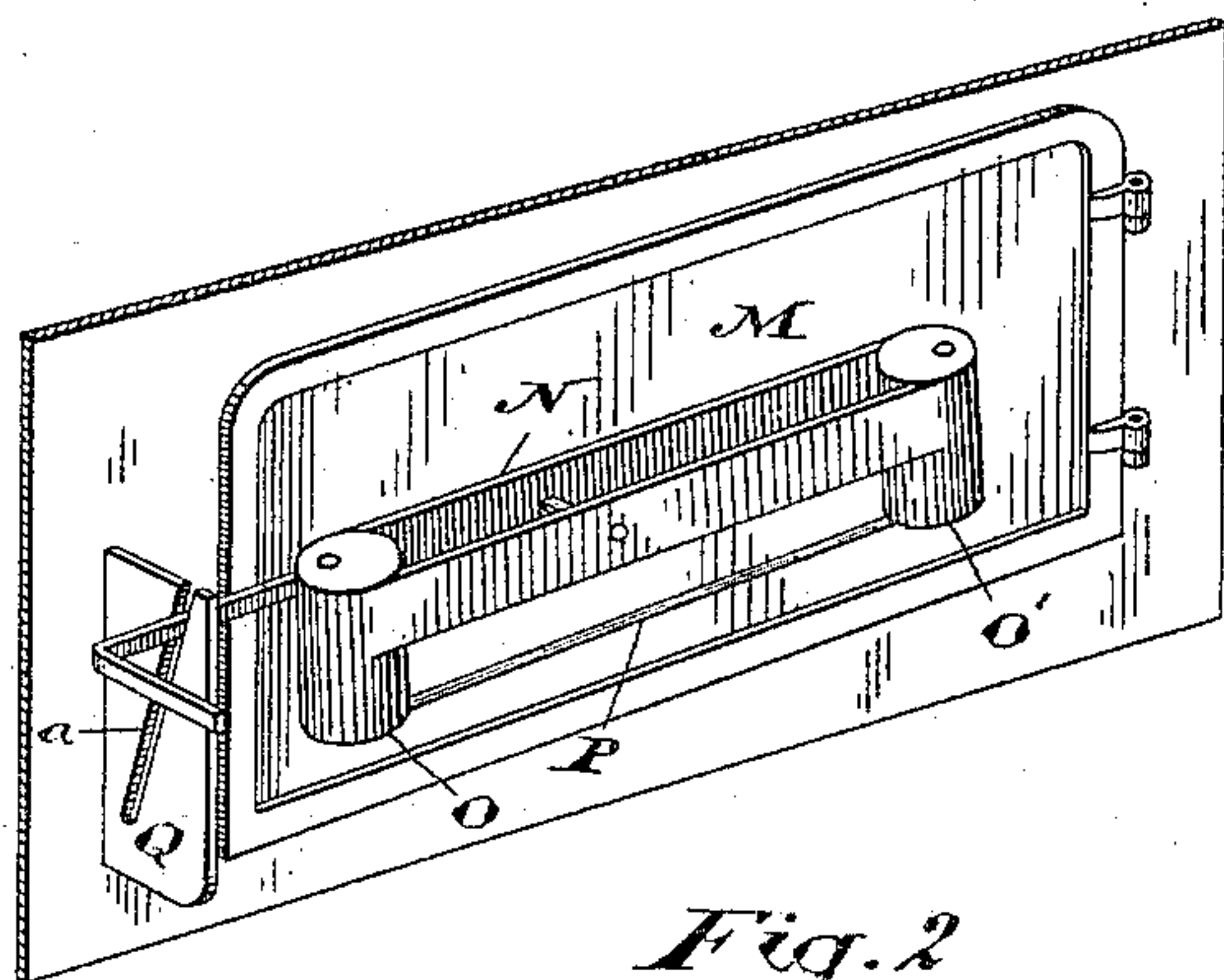
J. T. ELLIS.  
STEAM BOILER FURNACE.

No. 446,705.

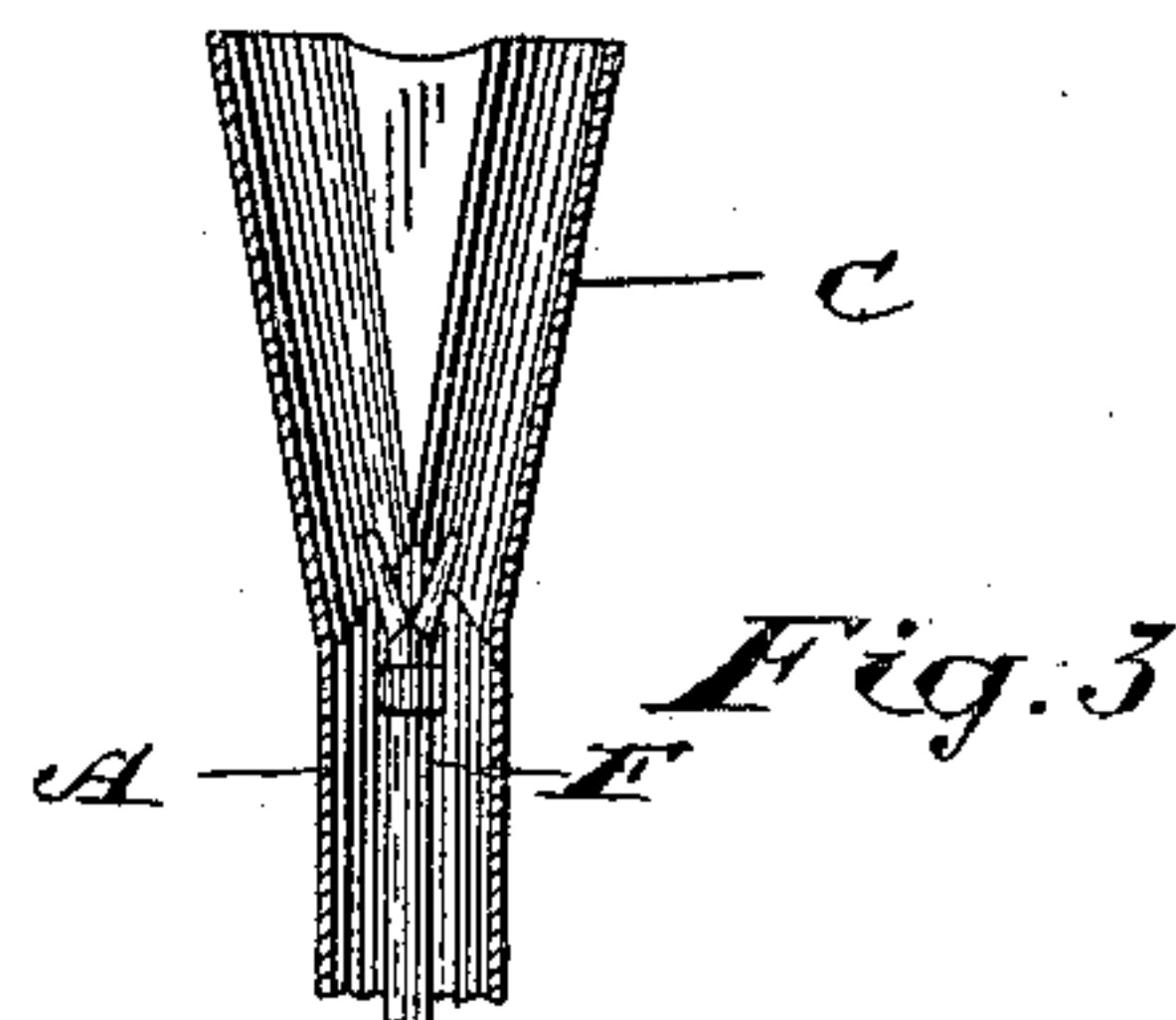
Patented Feb. 17, 1891.



*Fig. 1*



*Fig. 2*



*Fig. 3*

*Witnesses*

J. Edw. Maybee  
H. G. McMillan.

*Inventor*

John T. Ellis  
By Donald C. Ridout & Co.  
Attys.



# UNITED STATES PATENT OFFICE.

JOHN T. ELLIS, OF TORONTO, CANADA.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 446,705, dated February 17, 1891.

Application filed August 26, 1890. Serial No. 363,111. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN THOMAS ELLIS, engineer, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented a certain new and useful Improvement in Steam-Boiler Furnaces, of which the following is a specification.

The object of the invention is to design a simple apparatus by which air and steam separately or combined is admitted into the furnace, so as to practically produce perfect combustion of the burning fuel; and it consists in the peculiar construction, arrangement, and combinations of parts hereinafter more particularly described, and then definitely claimed.

Figure 1 is a perspective sectional elevation of a steam-boiler furnace provided with my improved smoke-consuming apparatus. Fig. 2 is an enlarged detail of the furnace-door and device for automatically closing it. Fig. 3 is an enlarged detail of the fish-tail end of the pipe.

A represents an air-pipe connected at one end to the air-chamber of the air-pump B.

C is a fish-tail outlet formed upon or attached to the end of the pipe A and projecting into the furnace D, as indicated. The fish-tail outlet C is set at an angle pointing toward a point near the base of the bridge E.

F is a steam-pipe communicating at one end with the steam-space of the boiler G. The other end of the steam-pipe F enters the air-pipe A and connects with a small pipe located inside of the said pipe A, forming a continuation of the steam-pipe F through the said air-pipe A, at the fish-tail outlet of which the inner steam-pipe F is branched, so that the steam escaping from it is spread to correspond with the spread of the fish-tail outlet. The air-pipe A is provided with a cut-off valve H, located between the steam-pipe F and the pump D. The steam-pipe F is provided with a similar cut-off valve I. These valves permit the supply of steam and air to be easily regulated, and the supply of either may be entirely cut off, when desired.

J represents a vertical pipe embedded in the bridge E. This pipe is tapered toward its upper end, which communicates with the furnace at or near the top of the said bridge

E. The lower end of the pipe J enters the ash-pit K, and is provided with an adjustable gate or valve L, by which the size of its lower opening may be regulated.

I show only one pipe J; but it will of course be understood that a series of similar pipes may be arranged in the bridge E. The air which passes through the pipe or pipes J is heated and enters the furnace at the point where the smoke accumulates, and by thus supplying fresh oxygen at this point the combustion is greatly improved. By connecting the air-pipe A to a pump I am able to force the air under pressure into the furnace, and thus force the oxygen to the rear of the furnace, where the combustion would otherwise be imperfect.

On reference to Fig. 2 the arrangement by which the door is automatically closed will be understood, and before describing it I may mention that when fresh fuel is put into the furnace the combustion is of course slow and an additional supply of oxygen is required to consume the smoke.

M is the furnace-door, and N is a latch pivoted at its center upon the furnace-door M. Two small water-tanks O O' are fixed to the latch N, one on each side of its pivot. These water-tanks are connected together by the pipe P. When the latch N is raised to open the furnace-door, the water flows into the tank O' on the hinged side of the latch-pivot and holds the said latch open. When the door is closed and the latch N entered into the slanting slot *a* in the catch Q, the door M will still be open sufficiently to admit the air into the furnace. The latch N should be pressed down in the slanting slot *a* sufficiently to raise the back tank O' slightly above the tank O near the front edge of the furnace-door M. The door should then be left alone, when the water flowing from the back tank into the front tank will gradually force the latch N down the slot *a*, and as the said slot slants toward the furnace the door M will gradually be closed. I usually regulate it so that the door takes about two and a half minutes to close; but of course this time may be easily increased or decreased, as required, by simply altering the size of the pipe P.

What I claim as my invention is—

1. An air-pipe connected to a force-pump and provided with a fish-tail outlet extending into the front of a furnace, in combination with a steam-pipe located within the air-  
5 pipe and connected at one end to the steam-boiler and having on its other end a branched outlet, substantially as and for the purpose specified.

2. A furnace-door provided with a pivoted  
10 latch having a small water-tank fixed to it,

one on either side of its pivot and connected together at their bottoms, in combination with a catch having an inwardly-slanting slot to receive the latch.

Toronto, July 29, 1890.

JOHN T. ELLIS.

In presence of—

CHARLES C. BALDWIN,  
F. A. WOODWARD.