

(No Model.)

2 Sheets—Sheet 1.

J. D. RANDALL & W. A. KING.  
STEAM BOILER AND FURNACE.

No. 312,163.

Patented Feb. 10, 1885.

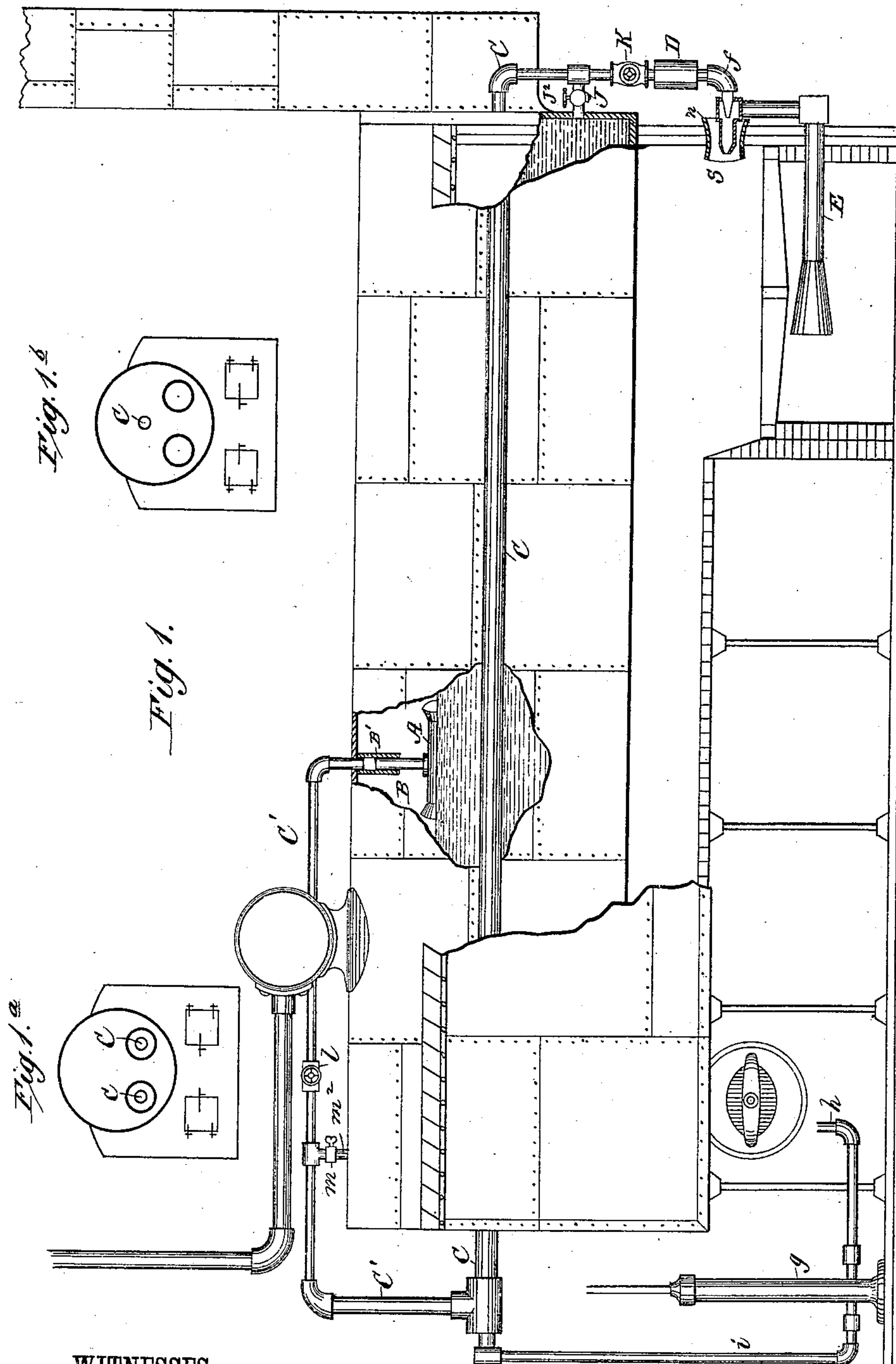


Fig. 1.

Fig. 1.

Fig. 1.

WITNESSES:

*W. W. Hollingsworth*  
*Edw. W. Byrnes*

INVENTOR:

*J. D. Randall*  
*Wm. A. King*  
BY *Munn & Co.*

ATTORNEYS.

(No Model.)

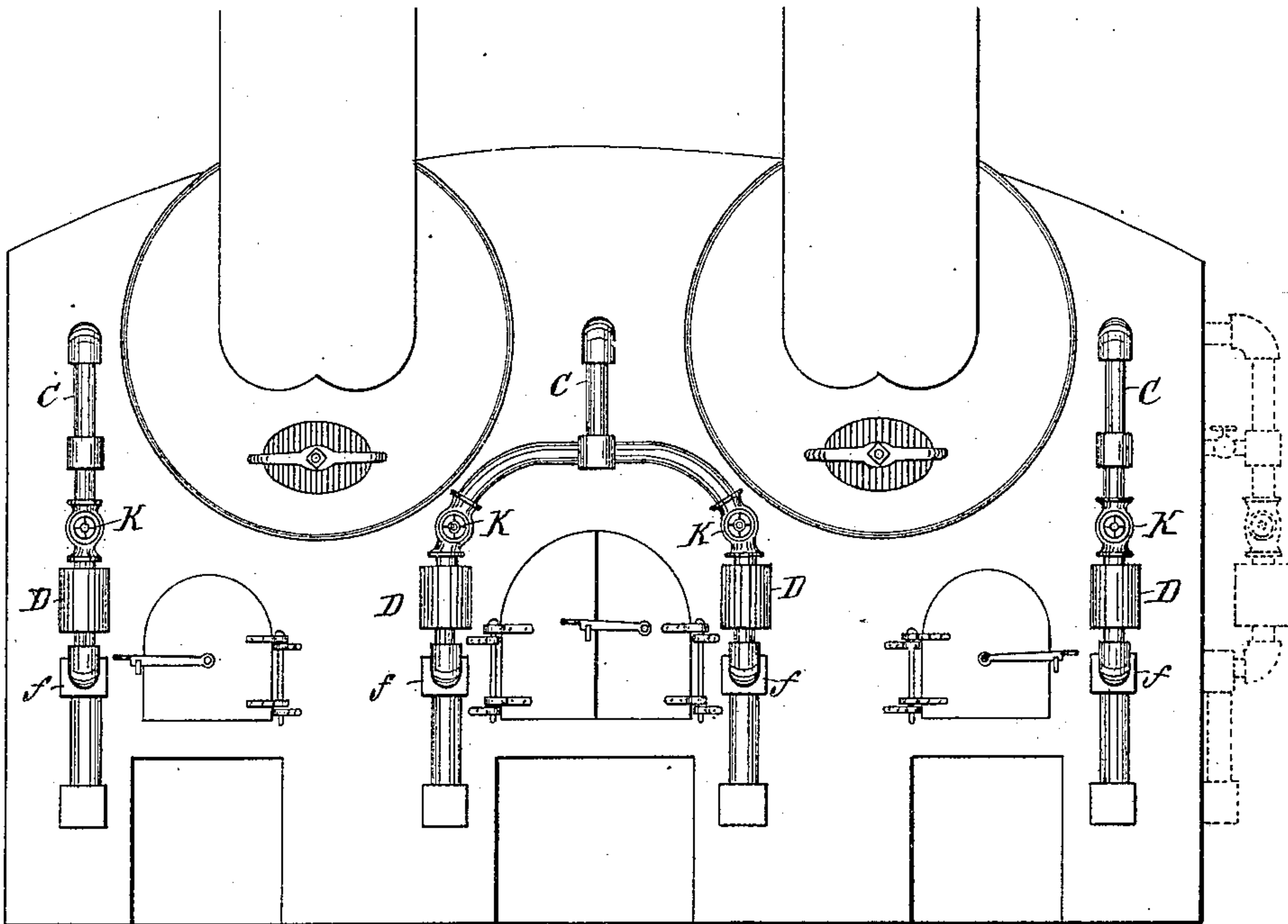
2 Sheets—Sheet 2.

J. D. RANDALL & W. A. KING.  
STEAM BOILER AND FURNACE.

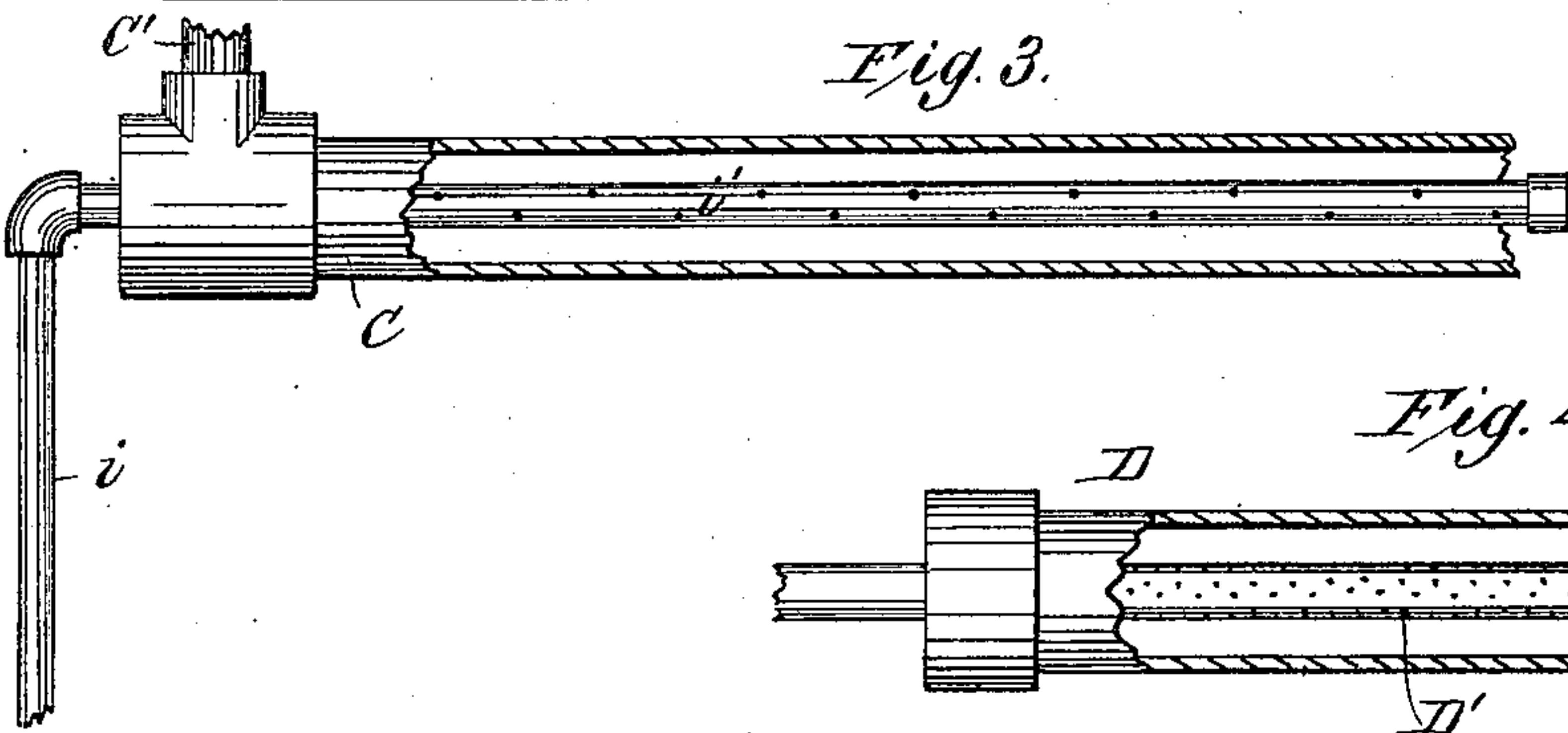
No. 312,163.

Patented Feb. 10, 1885.

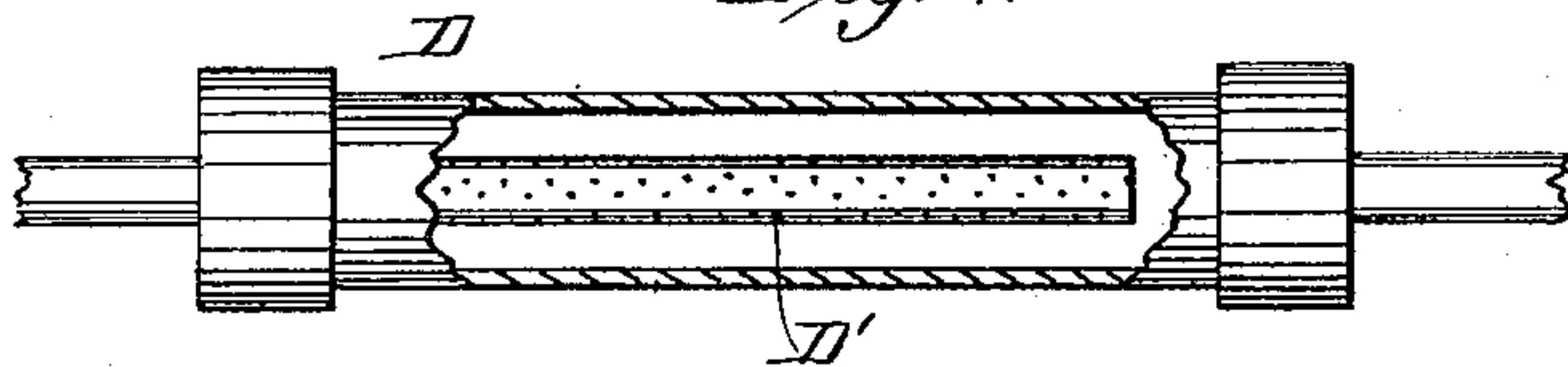
*Fig. 2.*



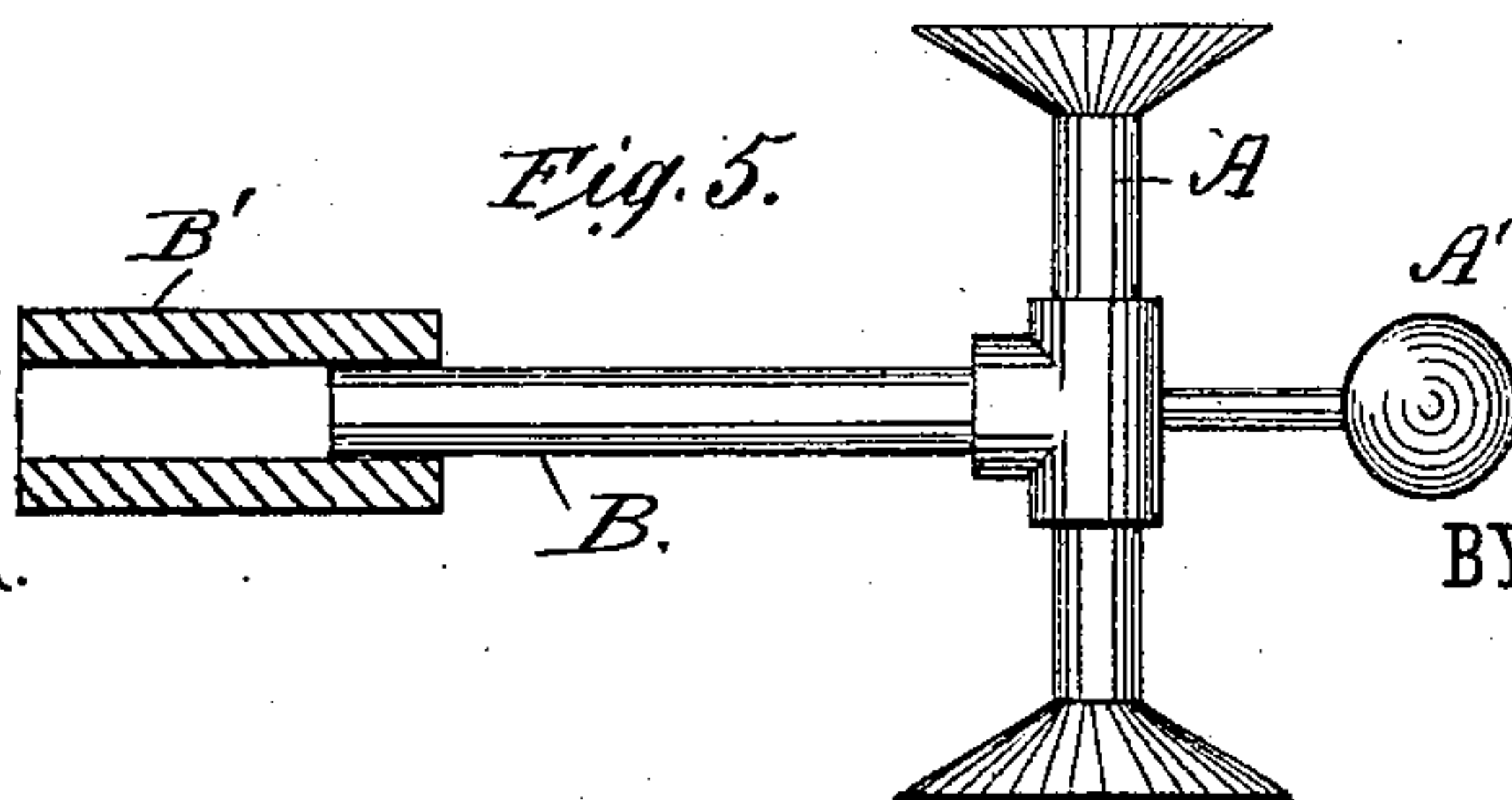
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



WITNESSES:

*W. W. Hollingsworth*  
*Edw. L. Byrn*

INVENTOR:

*J. D. Randall*  
*Wm. A. King*  
BY *Munn & Co*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

JAMES D. RANDALL AND WILLIAM A. KING, OF MEMPHIS, TENNESSEE,  
ASSIGNORS TO THEMSELVES AND W. T. ARRINGTON, OF SAME PLACE.

## STEAM-BOILER AND FURNACE.

SPECIFICATION forming part of Letters Patent No. 312,163, dated February 10, 1885.

Application filed June 4, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, JAMES D. RANDALL and WILLIAM A. KING, citizens of the United States, residing at Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Steam-Boilers and Furnaces, of which the following is a description.

Figure 1 is a side elevation, partly in section. Fig. 2 is a front elevation. Figs. 3, 4, and 5 are details, as hereinafter described. Figs. 1<sup>a</sup> and 1<sup>b</sup> are cross-sectional views of the boiler, showing modifications of our invention.

Our invention relates to steam-boilers and furnaces designed for burning smoke, atomizing and burning animal and vegetable matters, oils, &c., by commingling steam with hot and cold air and with the oil or gases evolved from the water in the boiler in the process of generating steam, which materials are together forced into the furnace, as hereinafter fully described.

In the drawings, *g* represents a force-pump, which receives liquid hydrocarbons or animal and vegetable matters through pipe *h* from a tank, which is not shown, and forces it through pipe *i* into pipe *C*, where it passes (see Fig. 3) into a perforated pipe, *i'*, arranged within pipe *C*, through which perforations these combustible matters issue in fine streams into the pipe *C*. This pipe *C* connects through *C'* with a skimming device, *A*, which takes off the scum and foreign matters on the surface of the water in the boiler, and conducts it also to the pipe *C*, the force of the steam serving to drive it along. The pipe *C'* has a short connection, *m*<sup>2</sup>, with the boiler for taking live steam therefrom through valve *m*, and has also another valve, *l*, which latter is closed, while the valve *m* is opened, when the skimmer *A* is not required to be used—as, for instance, when only live steam is admitted to pipe *C*. The combustible matter from the pump, passing in the pipe *C*, commingles with the steam, gases, and scum from the boiler, and together are carried through the boiler-casing, as shown in Fig. 1,

or through the furnace-flues, as in Fig. 1<sup>a</sup>, or through the boiler, as in Fig. 1<sup>b</sup>, to the front of the furnace, in which passage these commingled elements are heated, transformed, and delivered in front of the furnace into an enlarged chamber or pipe, *D*, through the small perforations in the inner pipe, *D'*, (see Fig. 4,) which connects through valve *K* with pipe *C*. From this chamber *D* these elements, in a thoroughly atomized and mixed condition, pass through a jet-pump or inspirator, *f*, into the furnace at *S*. As this blast passes in, it takes along with it hot air from under the furnace-grate through pipe *E*, and also cold air through a jacket or pipe, *n*, all of which enter the furnace together and produce an active combustion and a very intense heat, which sets fire to and consumes the smoke and sparks arising from the fuel.

*J* is a valve arranged in pipe *J*<sup>2</sup>, having a direct connection with the boiler below the water-line, which pipe *J*<sup>2</sup> connects with the pipe leading from *C* to *D*, and which allows the water to enter the pipe *C* when the skimmer *A* or hydrocarbon-pump is not in use. This insures the same degree of pressure in pipe *C* that there is in the boiler, and permits the water which enters pipe *C* through valve *J* to become converted into steam and circulate through the pipe *C* and *C'* into the boiler, thus preventing the burning of matters in pipe *C* and the clogging of the same when the skimmer or hydrocarbon-pump is not in use and the valve *K* is closed.

*K* is a valve which cuts off communication between pipe *C* and chamber *D* at a point below valve *J*. The skimmer *A* has a loose sliding telescopic joint, *B B'*, and a float, *A'*, which allows the skimmer to rise and fall with the water in the boiler. This float is a hollow ball or casing attached to the pipe, and made air-tight and strong enough to resist the steam-pressure, and large enough to lift the skimmer and the attached pipe as the water-level varies. It is designed that this float and oscillating joint is to place the skimmer under the control of the engineer, enabling him to keep the skimmer in position to remove the gases

and animal and vegetable matter from the boiler without removing the water, thereby purifying the water and utilizing the gases and vegetable matter for fuel.

5 Instead of introducing the commingled steam, gases, and combustible matter at the front of the furnace, as shown, the pipes, burners, and valves, with connections, may be arranged at the side, as shown in dotted lines on  
10 the right of Fig. 2.

Having thus described our invention, what we claim as new is--

1. The combination, with the steam-boiler

and furnace, of the pipes C *i*, pump *g* and pipe *i'*, pipes C' and *m*<sup>2</sup>, with valves *m* and *l*, 15 and valve J, as and for the purpose described.

2. The combination, with the pipes C, C', and *i*, of the valve K, chamber D, with perforated pipe D', inspirator *f*, hot-air pipe E, and cold-air jacket *n*, as and for the purpose de- 20 scribed.

JAMES D. RANDALL.

WILLIAM A. KING.

Witnesses:

J. M. COLEMAN,

E. B. BRITT.