W. ENNIS.

PROCESSES AND APPARATUS FOR THE COMBUSTION OF FUEL.

No. 184,358. Patented Nov. 14, 1876.

FIG. 1.

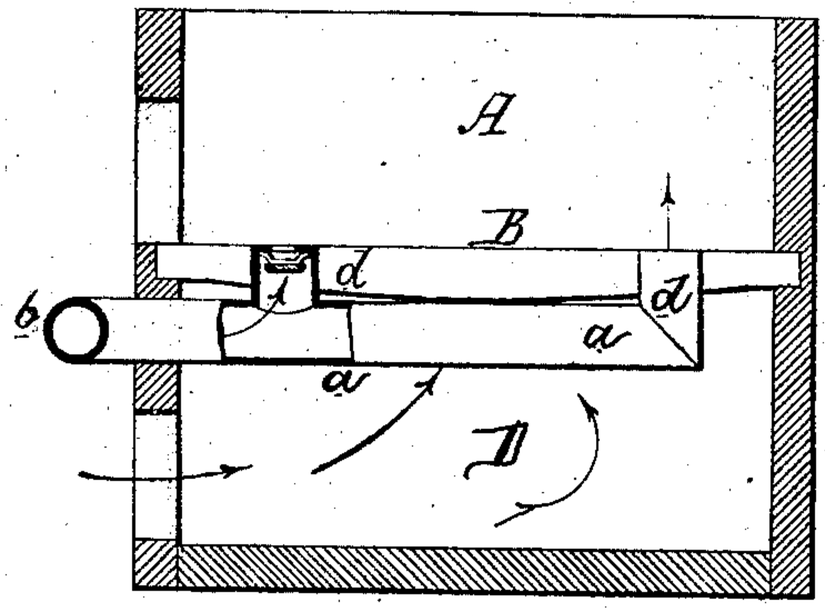


FIG. 2

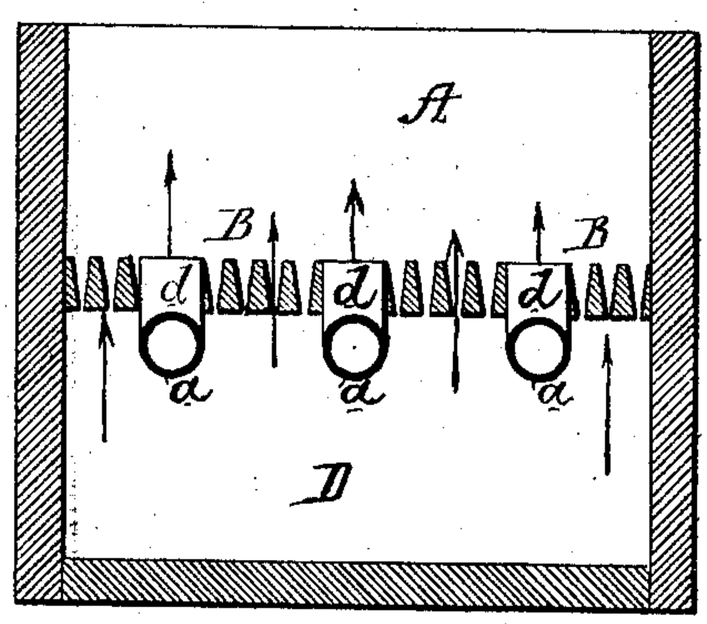
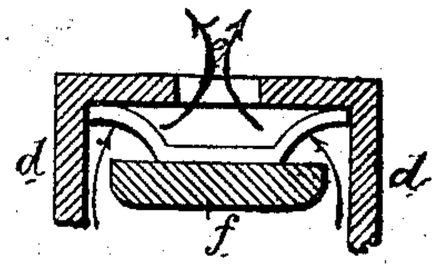


FIG. 3.



Witnesses:—
E. H. Eckfeldt
Harry Smith,

William Ennis
by his Attorneys
Howson and Son.

UNITED STATES PATENT OFFICE.

WILLIAM ENNIS, OF NEW YORK, N. Y.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE COMBUSTION OF FUEL.

Specification forming part of Letters Patent No. **184,358**, dated November 14, 1876; application filed July 14, 1875.

To all whom it may concern:

Be it known that I, WILLIAM ENNIS, of the city, county, and State of New York, have invented an Improvement in the Combustion of Fuel, of which the following is a specification:

The objects of my invention are to insure the thorough combustion of fuel in furnaces, and to produce an intense heat therein, and these objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 represents a vertical section of a furnace, showing the mode of carrying my invention into effect; Fig. 2, a transverse section of the same, and Fig. 3 a sectional view of one of the burners.

A represents the combustion-chamber of the furnace, B the grate-bars, and D the ash-pit. In the latter, immediately beneath the grate-bars, are arranged a number of pipes, *a*, which communicate with a pipe, *b*, outside the front wall of the furnace, and are provided with a number of short vertical branch pipes, *d*, the tops of which are level with the tops of the grate-bars. I prefer to so arrange the pipes *a* and branches *d* that one of the latter will be provided for each square foot of grate-surface.

The process of effecting the combustion of the fuel on the grate B is as follows: Air at a comparatively low pressure is forced into the ash-pit D by any suitable means, and, ascending through the grate-bars B, serves to support the combustion of the fuel, and to convert the same into carbonic oxide. In order that this carbonic oxide may be consumed with full effect, air at a greater pressure must be supplied, and this is effected by means of the pipes *b* and *a*, and branches *d*, through which air at a pressure of from three to five times that of the air which enters the ash-pit D is forced, and, passing through the bed of ignited fuel, unites with the carbonic oxide at the surface of the same, and produces a flame of intense heat.

I construct the branches *d* in the manner shown more fully in Fig. 3—that is to say, with a contracted opening, *e*, in the top, and within the branch and a short distance below the opening, I place a disk or plate, *f*, larger in diameter than the opening *e*, but sufficiently contracted to allow a space between its outer edge and the inside of the branch for the passage of air.

By this arrangement, the free passage of air from the branch is permitted, while the plate *f* prevents the entrance of ashes and cinders which might otherwise tend to choke the pipe and impede the passage of the air.

My invention may be applied with important results to metallurgical operations, in which, at times, an excess of oxygen is required, while at other times this supply must be withheld, this being easily accomplished by my arrangement, in which both feed-pipes are under the ready control of the fireman.

I claim as my invention—

1. The mode herein described of effecting the combustion of fuel in furnaces—that is to say, by forcing through the entire mass of fuel two volumes of air, one at a comparatively low pressure, for the purpose of generating carbonic oxide, and the other at a higher pressure for the purpose of effecting the combustion of the gases, all substantially as set forth.

2. The combination of the pressure-pipe *b*, and the distributing-pipes *a*, beneath the grate-bars of the furnace, with the branches *d* extending to the surfaces of the said bars, as set forth.

3. The combination of the branch *d*, having an opening, *e*, with a disk or plate, *f*, arranged within the pipe beneath the opening, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ENNIS.

Witnesses:

WILLIAM HENRY WILLIS,
FRANK I. LATIMER.