

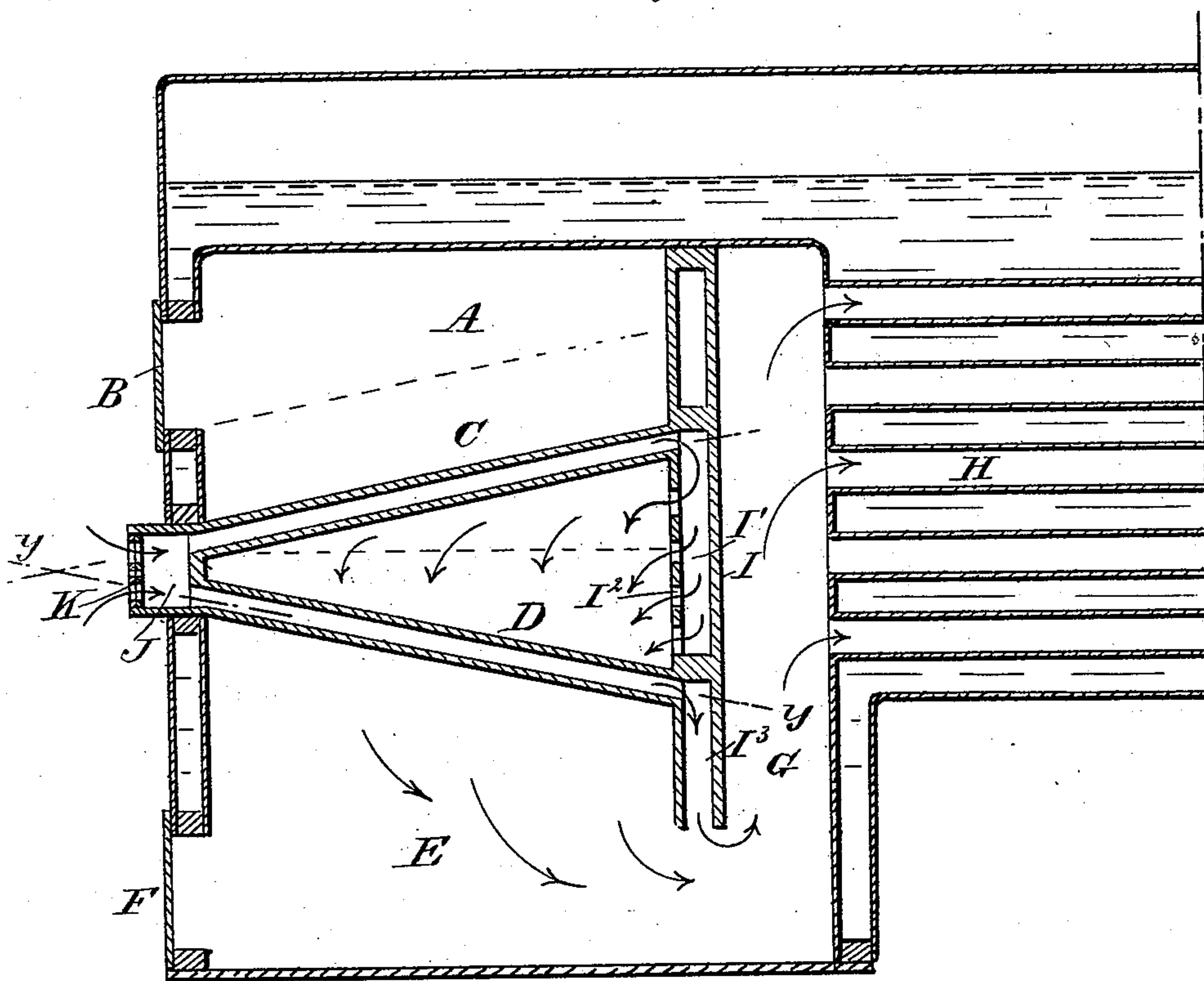
(No Model.)

C. R. BURR.  
FURNACE.

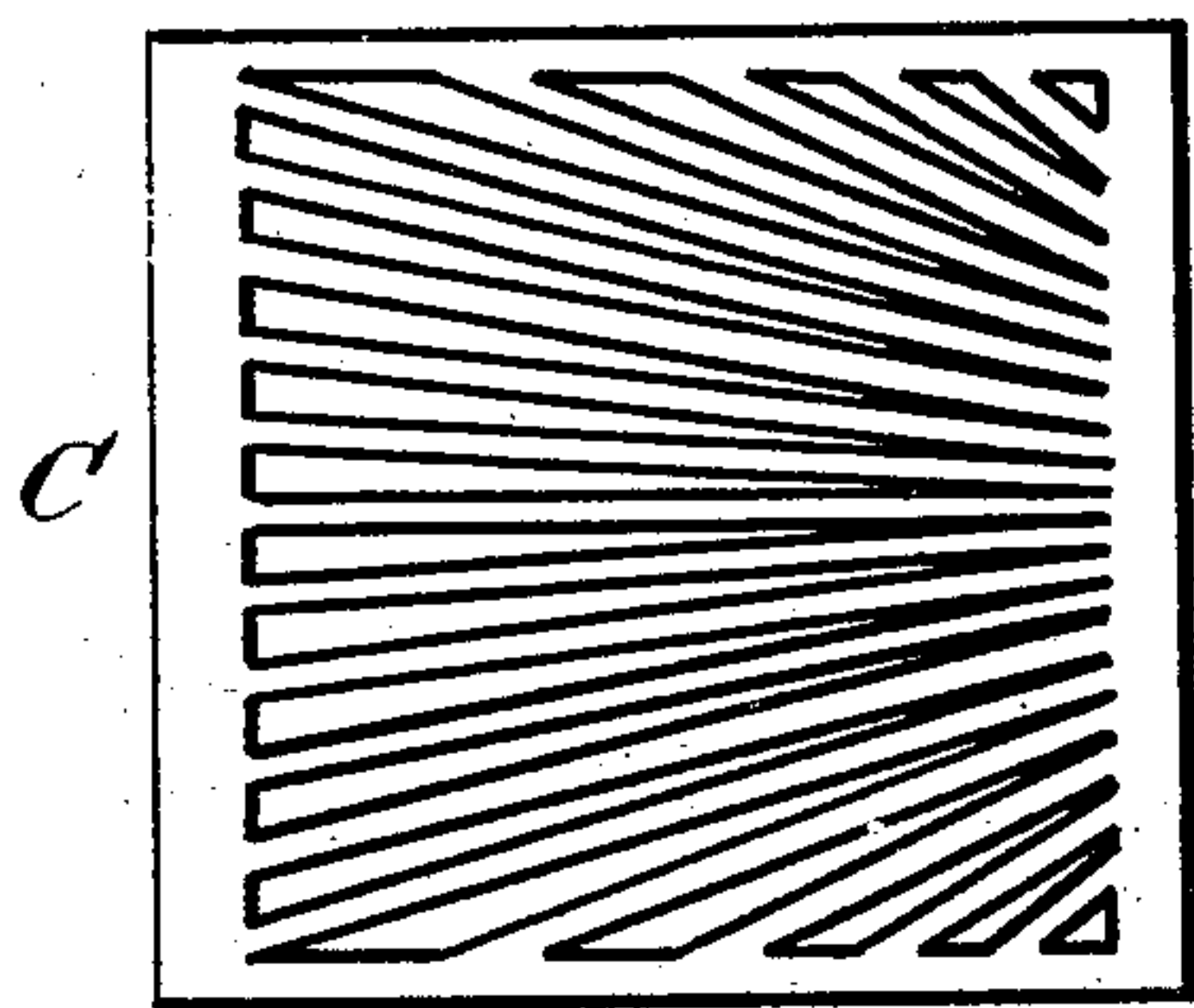
No. 464,425.

Patented Dec. 1, 1891.

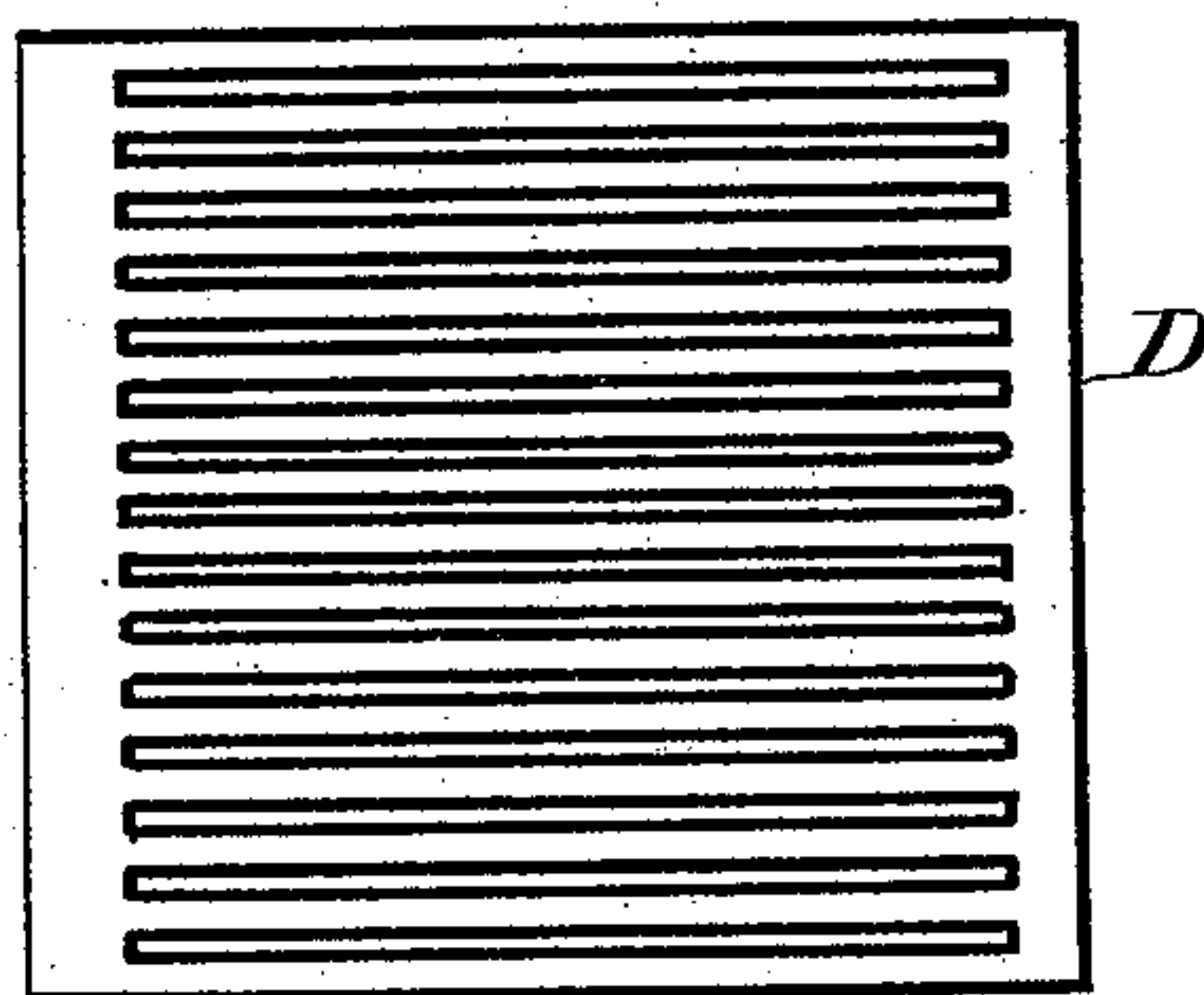
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CHAUNCEY REA BURR, OF BOSTON, MASSACHUSETTS.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 464,425, dated December 1, 1891.

Application filed April 7, 1891. Serial No. 387,967. (No model.)

*To all whom it may concern:*

Be it known that I, CHAUNCEY REA BURR, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved furnace which is simple and durable in construction and insures complete combustion of the fuel without waste or loss of the heat generated.

The invention consists, principally, of two grates located one above the other, and of which the upper one forms a fuel-feed and a hot-air supply for the lower one.

The invention further consists of a fire-box provided with two hollow grates arranged one above the other and diverging from front to rear, the front open ends being in communication with the air, while the rear end of the upper grate discharges upon the burning fuel on top of the lower grate.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement as applied to a steam-boiler. Fig. 2 is a plan view of the upper grate, and Fig. 3 is a like view of the lower grate.

The improved furnace is provided with a fire-box A, formed at its front end with the usual door B for introducing the fuel into the fire-box. In the latter are arranged the two hollow grates C and D, located one above the other and diverging from the front to rear, as plainly illustrated in Fig. 1. Below the front of the lower grate D is arranged an ash-pit E, having a door F at its front end, and connecting at its rear end with a combustion-chamber G, leading to the flues H.

The front of the combustion-chamber G is formed by a partition I, supporting the inner ends of the grates C and D. The partition I extends from the crown-sheet of the fire-box to within a short distance of the bottom of the ash-pit, and reaches from one side of the

fire-box to the other. The front ends of the grates C and D open into an air-chamber J, provided with an ordinary damper K, for regulating the amount of air passing from the outside into the said chamber J. The rear end of the upper grate C opens into a chamber I', formed in the partition I, and from which chamber lead openings I<sup>2</sup> into the space formed between the two grates C and D. The inner end of the lower grate D opens into a chamber I<sup>3</sup>, formed in the bottom of the partition I, the said chamber I<sup>3</sup> opening into the combustion-chamber G at the bottom of the partition, as plainly shown in Fig. 1.

The grate-bars of the grate C are arranged diverging from rear to front, as plainly illustrated in Fig. 2, so that the space between two adjacent grate-bars at the front end of the grate is considerably larger than the space near the rear of the grate-bars. The grate-bars of the lower grate D are parallel, as plainly shown in Fig. 3.

When the furnace is in operation, the fuel is introduced through the door B into that part of the fire-box A above the upper grate C while part of the fuel is burning on the lower grate D, the fuel being derived from the upper grate C, which latter forms a feed for the lower grate. The air passing into the chamber J passes partly through the hollow grate C, and is consequently heated by the burning fuel on the grate D. The heated air from the grate C passes into the chamber I', and from the latter through the openings I<sup>2</sup> upon the top of the fuel on the grate D, so as to supply the latter with the necessary air for combustion, the draft being downward through the fuel and grate bars into the ash-pit E, and from the latter to the combustion-chamber G. Part of the air from the air-chamber J passes down the hollow grate D into the chamber I<sup>3</sup>, and from the latter passes out and mixes with the gases coming through the burning fuel on the grate D and through the ash-pit E to the combustion-chamber G, in which latter a complete combustion takes place, as an inflammable mixture is formed by the gases derived by the burning fuel on the grate D, and the incoming fresh air discharged at the chamber I<sup>3</sup>. The fuel on the upper grate C is raked or agitated so that it



falls between the grate-bars upon the burning fuel on the grate D, so that the latter is constantly supplied with the burning fuel.

It is understood that the fuel on top of the grate C is heated by the burning fuel on the grate D to very nearly its ignition-point. It is further understood that the radiated heat from the burning fuel between the two grate-bars C and D is removed as fast as formed by the downward draft previously described, so that the grates will last much longer than is ordinarily the case.

The object of making the grate-bars of the upper grate C diverging is twofold—namely, first, to prevent the fuel from dropping upon the lower grate-bar at the upper end of the grate C, and, secondly, by keeping the fuel at the upper end of the grate C a greater or lesser space is secured immediately beneath free from ashes and into which the air necessary for combustion can readily pass.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A furnace provided with two grates, one arranged above the other, the upper grate being hollow and communicating with the space between the two grates for supplying air to the lower grate, substantially as described.

2. A furnace provided with two hollow grates arranged one above the other and diverging from front to rear, the upper grate being in communication with the space between the two grates and the lower grate with the space below the same, substantially as described.

3. In a furnace, the combination, with a fire-box provided with a transverse partition and two hollow grates arranged one above the other and diverging from front to rear, of a combustion-chamber arranged in the rear of the said partition and in communication with the under side of the lowermost grate, substantially as shown and described.

4. In a furnace, the combination, with two grates located one above the other, the upper one forming a fuel-feed and a hot-air supply for the lower grate, of a combustion-chamber arranged in the rear of the said grates and in communication with the under side of the lowermost grate, substantially as shown and described.

5. In a furnace, the combination, with a fire-box having a transverse hollow partition, of two grates arranged in the said fire-box and located one above the other, the upper hollow grate forming a fuel-feed and a hot-air sup-

ply for the lower grate, and an air-chamber connected with the front open end of the upper grate, substantially as shown and described.

6. In a furnace, the combination, with a fire-box having a transverse partition provided with two chambers located one above the other, of two hollow grates held in the said fire-box and located one above the other, the rear end of the upper grate opening into the upper chamber of the said partition and the lower grate opening into the lower chamber of the said partition, and an air-chamber in communication with the outer air and into which open the front ends of the said two hollow grates, substantially as shown and described.

7. In a furnace, the combination, with a fire-box having a transverse partition provided with two chambers located one above the other, of two hollow grates held in the said fire-box and located one above the other, the rear end of the upper grate opening into the upper chamber of the said partition and the lower grate opening into the lower chamber of the said partition, an air-chamber in communication with the outer air and into which open the front ends of the said two hollow grates, and a combustion-chamber arranged in the rear of the said partition and in communication with the under side of the said lower grate and with the open end of the lower chamber in the said partition, substantially as shown and described.

8. In a furnace, the combination, with a fire-box having a transverse partition provided with two chambers located one above the other, of two hollow grates held in the said fire-box and located one above the other, the rear end of the upper grate opening into the upper chamber of the said partition and the lower grate opening into the lower chamber of the said partition, an air-chamber in communication with the outer air and into which open the front ends of the said two hollow grates, a combustion-chamber arranged in the rear of the said partition and in communication with the under side of the said lower grate and with the open end of the lower chamber in the said partition, and a chamber arranged in the said air-chamber for regulating the admission of air, substantially as shown and described.

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EVA A. GUILD.