No. 807,466. PATENTED DEC. 19, 1905.

H. HUBBARD.

FURNACE.

APPLICATION FILED AUG. 3, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

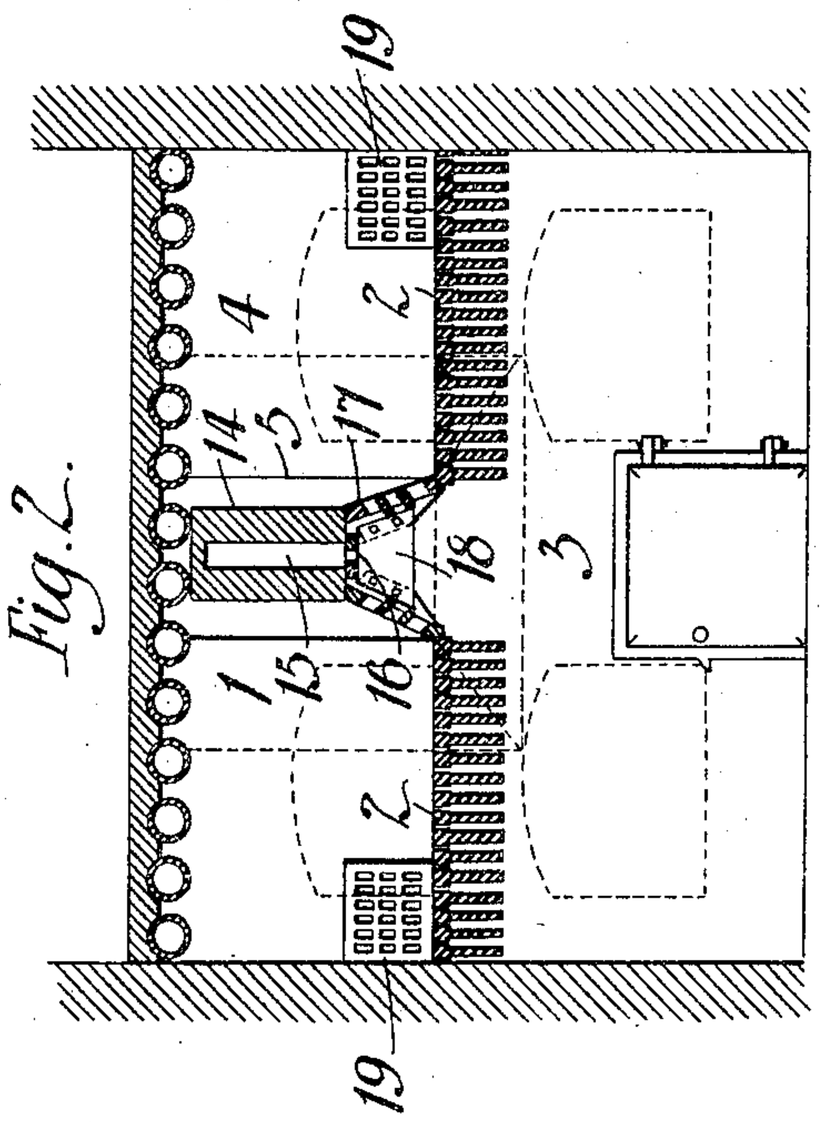
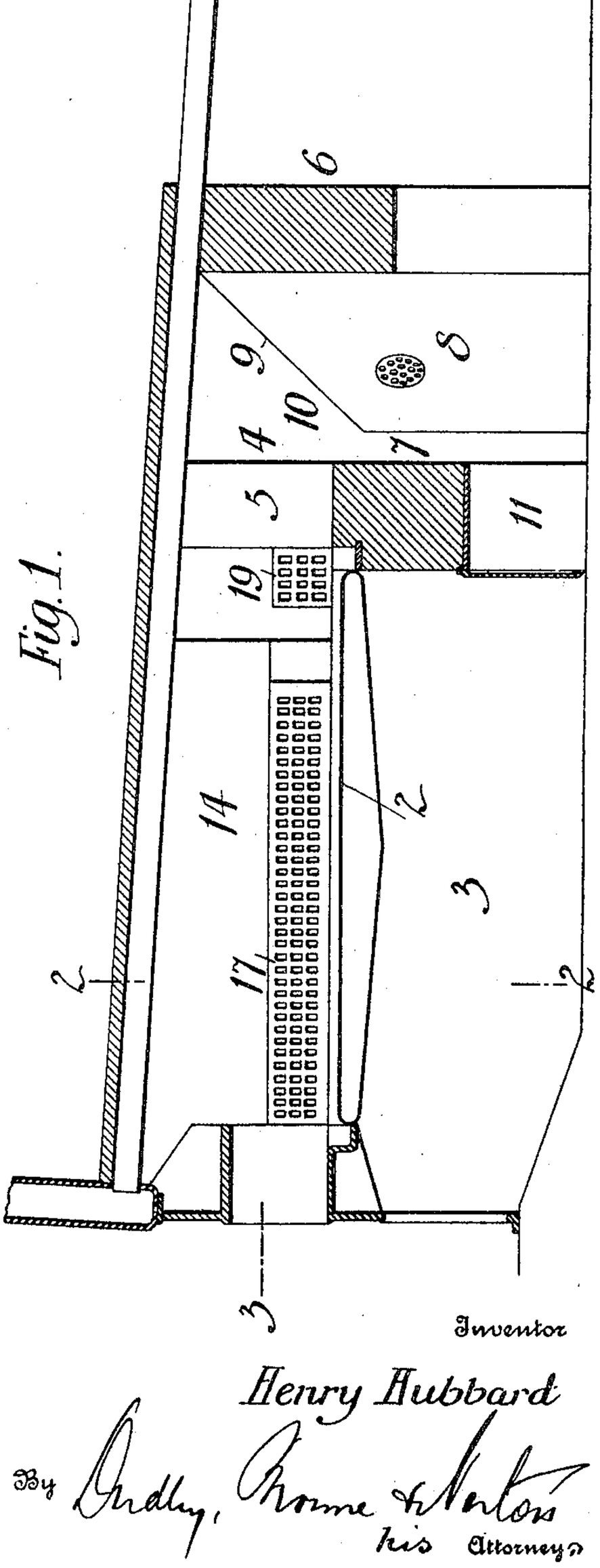


Fig. 1.



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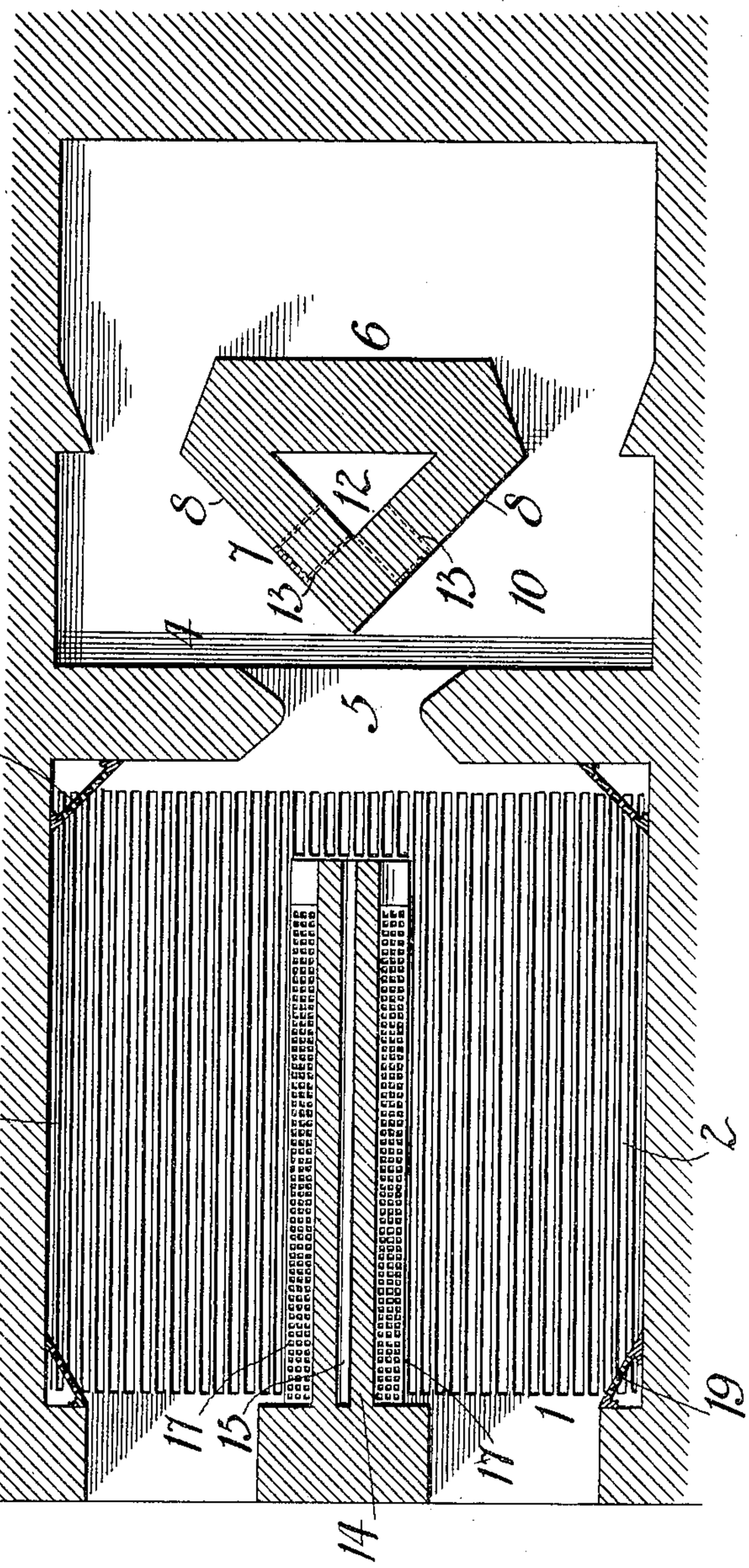
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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FURNACE.

No. 807,466. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed August 3, 1905. Serial No. 272,513.

To all whom it may concern:

Be it known that I, HENRY HUBBARD, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In an application for patent, Serial No. 240,288, filed January 9, 1905, by Hyrum S. Woolley is shown, described, and claimed a furnace provided with a partition forming the rear wall of the fire-box and having a restricted passage for the products of combustion and provided with a bridge-wall beyond said partition having surfaces which act to deflect the products both laterally and vertically.

The present invention, which is an improvement upon the above-described furnace, has for its object the provision of means for introducing in the furnace air extraneous to the volume by which the draft is created, whereby there is obtained increased efficiency and added economy in the consumption of fuel.

The nature of the invention will be readily comprehended, reference being had to the following detailed description and to the accompanying drawings, which illustrate the invention in its preferred form of embodiment, it being understood that various modifications may be made therein without exceeding the scope of the concluding claims.

In the drawings, Figure 1 is a vertical longitudinal sectional view of a furnace embodying the invention. Fig. 2 is a transverse sectional view on line 2 2 of Fig. 1. Fig. 3 is a horizontal sectional view on line 3 3 of Fig. 1.

Referring to the drawings by numerals, 1 designates the fire-box, 2 2 are the grates, and 3 is the ash-pit. The inner end of the fire-box is formed by a wall 4, in the center of which is a restricted opening 5, having its sides beveled, as shown. Adjacent to the wall 4 is a bridge-wall 6, provided centrally, and therefore opposite the center of the opening 5, with a nose 7, formed by beveled surfaces 8 8, said surfaces having a vertical deflection 9. (See Fig. 1.) The bridge-wall 6 is separated from the wall 4 to provide between them a secondary combustion-chamber 10, access to which for the removal of ashes is obtained by an opening 11 in the wall 4. A vertical duct 12 in the nose 7, communicating with the ash-pit, together with lateral openings 13 13, afford passages for heated air, which is discharged into the secondary combustion-chamber to assist in the consumption of the unconsumed products.

There is shown in connection with the furnace a double fire-box, 14 denoting the dividing-partition, in which is a duct 15 for supplying heated air adjacent to the restricted opening 5, said duct being supplied at its forward end through an opening 16, communicating with the ash-pit, and discharging adjacent to the opening 5. In lieu of the double-fire-box arrangement a single fire-box may be employed; but to obtain the best results in the use of this last-named type of fire-box green fuel should be supplied alternately at each side of the grate-surface, whereby there is maintained at all times a bed of fuel in an incandescent condition. The products arising from the green fuel and the incandescent fuel have a common outlet through the restricted opening 5, and in passing to and through said opening the products are mixed to a certain extent and are mingled with the air issuing from the duct 15. Thus there is obtained a partial consumption of the smoke-creating elements in the fire-box and in said restricted opening. Leaving the opening 5, the partly mingled and consumed products enter the secondary combustion-chamber and strike against the nose-surfaces, whereupon said products are subjected to violent agitation and are thoroughly mingled and receive heated air discharging from the openings 13, with the result that all of the products which would otherwise be visible in the form of smoke are consumed and at a point in the furnace where the boiler may receive directly the intense heat derived from this secondary combustion.

In order to increase the grate-surface area without enlarging the lateral dimensions of the fire-box, a supplemental grate-section 17 is provided, which supplemental section may be at the center or sides of the fire-box. The grate-sections 17 are preferably inclined and are supported by the main grate-sections and braced by cross-plates 18. In a furnace of the double-fire-box type the supplemental grate-section may afford the support for the dividing-partition 14, as shown more clearly in Fig. 2. Other grate-sections 19 19 are pro-

vided at the four corners of the main grate for the purpose of promoting combustion at these points, where in existing furnaces the fuel is unconsumed. Preferably the inclined grate-sections 17 extend upwardly to a distance slightly above the surface of the fuel supported on the grate-bars. By this provision the sides of the fuel-bed supported by the inclined grate-sections will receive an increased volume of air, inasmuch as said grate-surfaces will be freer from ash and refuse than the horizontal grate-surface. Also the corner grate-surfaces will extend to a height which is approximately that of the grate-sections 17, resulting in increased volume of air at the corners of the fire-box.

I claim as my invention—

1. In a furnace, the combination of the fire-box the rear wall of which has a restricted outlet, an air-passage in the fire-box discharging toward said outlet, a bridge-wall beyond said rear wall forming between it and the latter a secondary combustion-chamber said bridge-wall having beveled surfaces for deflecting the products vertically and laterally, and an air-passage in said bridge-wall discharging through said deflecting-surfaces.

2. In a furnace, the combination of the fire-box the rear wall of which has a restricted outlet, a partition dividing said fire-box longitudinally and having an air-duct discharging adjacent to said outlet, a bridge-wall beyond said rear wall forming between it and the latter a secondary combustion-chamber, said bridge-wall having beveled surfaces for deflecting the products vertically and laterally, and an air-passage in said bridge-wall discharging through said deflecting-surfaces.

3. In a furnace, a fire-box, a main grate, a supplemental grate supported by the main grate and extending above the surface of the fuel-bed, a restricted outlet in the rear wall of the fire-box for the products of combustion, an air-passage discharging rearwardly through said outlet, a bridge-wall beyond said rear wall forming between it and the latter a secondary combustion-chamber said bridge-wall having beveled surfaces for deflecting the products vertically and laterally, and air-passages leading into said secondary combustion-chamber through the deflecting-surfaces.

4. In a furnace, a fire-box, a main grate, a supplemental grate supported by the main grate centrally thereof and extending above the surface of the fuel-bed, a restricted outlet in the rear wall of the fire-box for the products of combustion, a partition having an air-duct and supported by the supplemental grate and discharging rearwardly through said outlet, a bridge-wall beyond said rear wall forming between it and the latter a secondary combustion-chamber said bridge-wall having deflecting-surfaces, and air-passages leading into said secondary combustion-chamber through the deflecting-surfaces.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY HUBBARD.

Witnesses:
W. E. PORTER,
H. L. EBBERT.