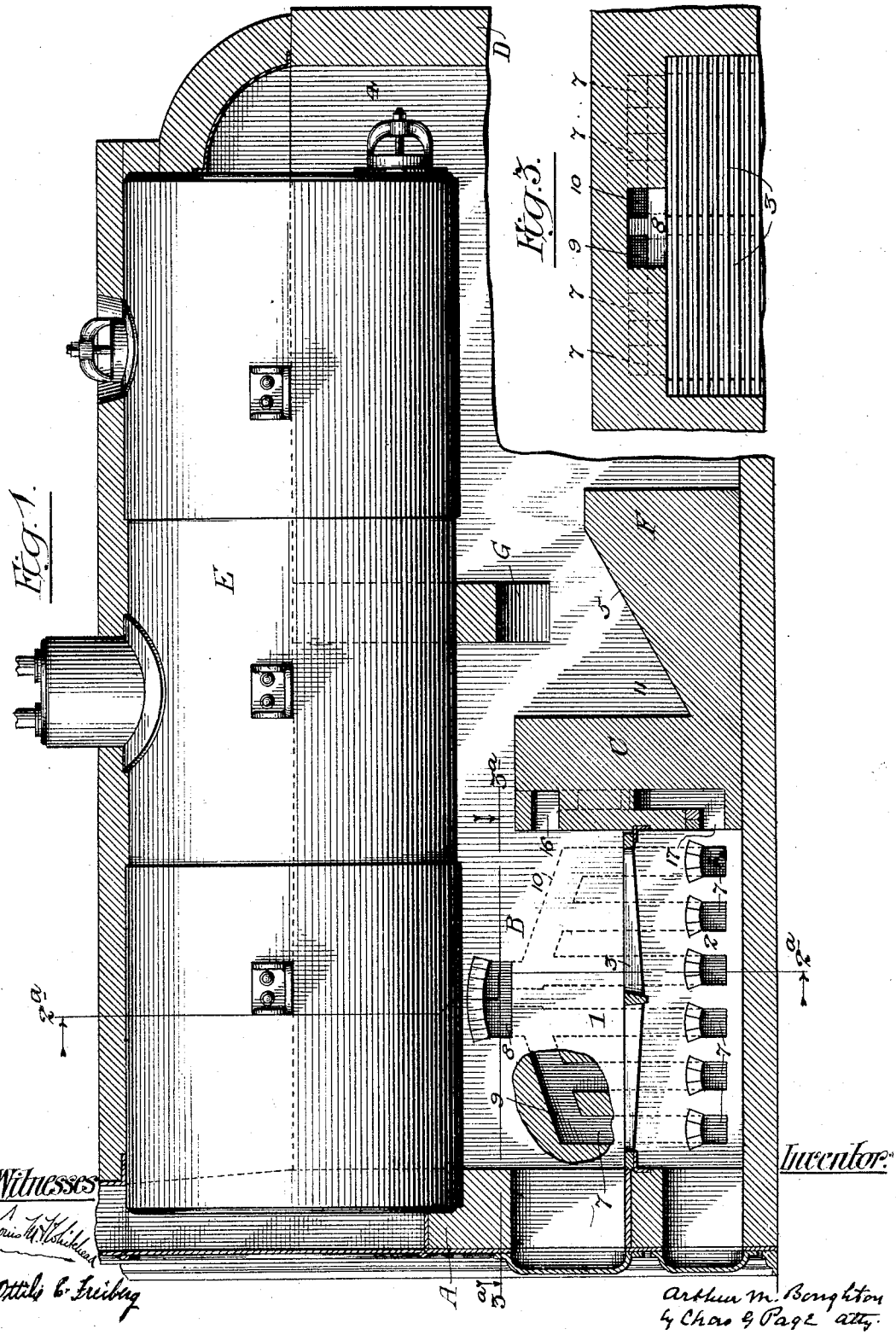
No. 788,239. PATENTED APR. 25, 1905.

A. M. BOUGHTON.

FURNACE.

APPLICATION FILED MAR. 26, 1904.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2.

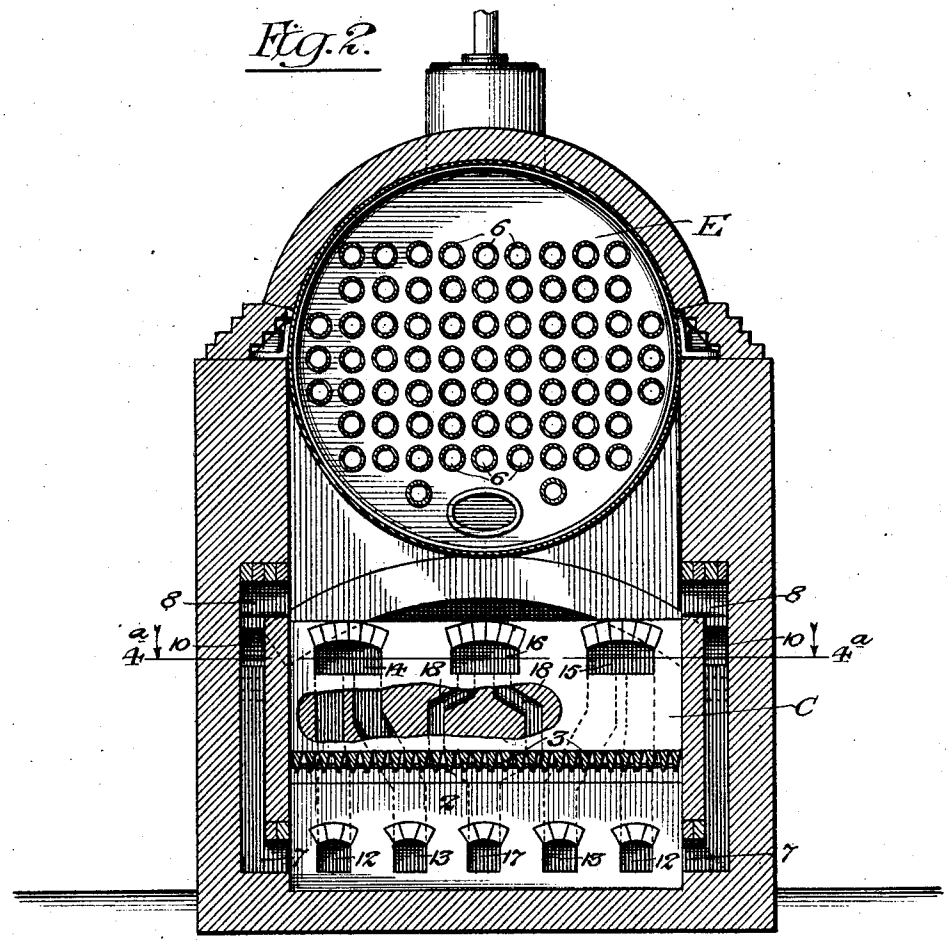
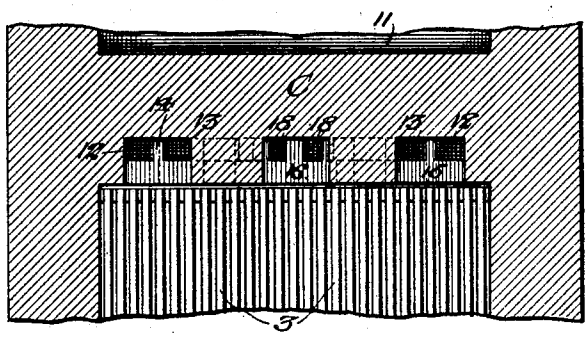


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

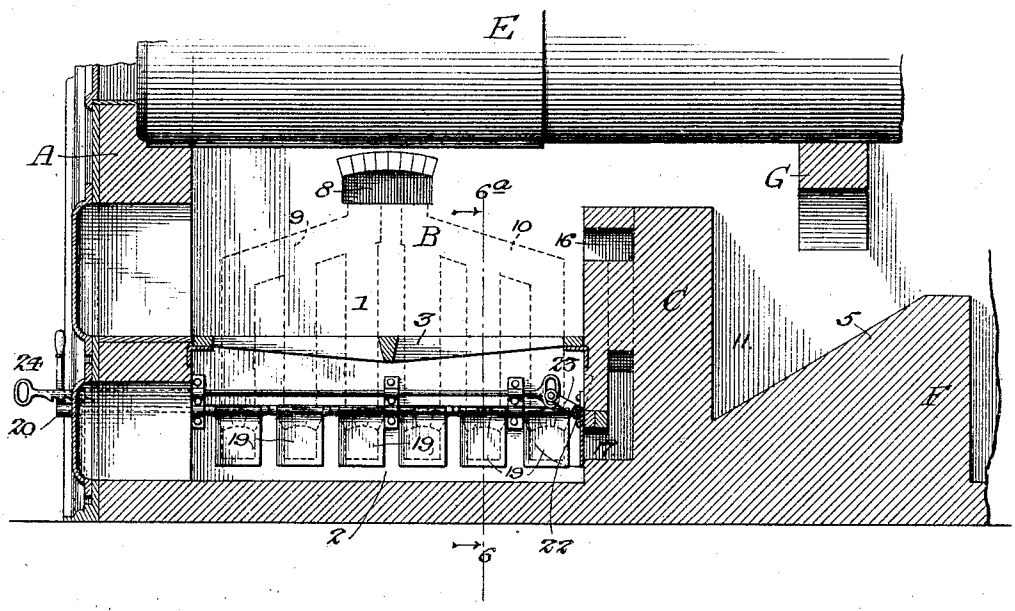
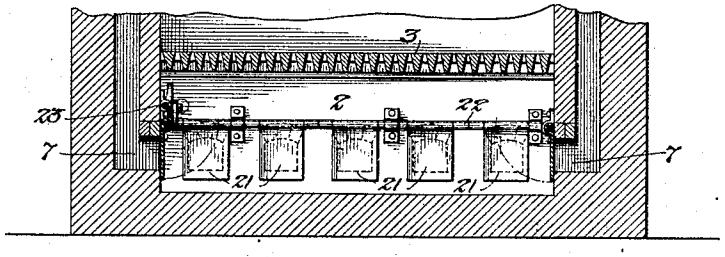


Fig. 6.



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UNITED STATES PATENT OFFICE.

ARTHUR M. BOUGHTON, OF HARVEY, ILLINOIS.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 788,239, dated April 25, 1905.

Application filed March 26, 1904. Serial No. 200,149.

To all whom it may concern:

Be it known that I, ARTHUR M. BOUGHTON, a citizen of the United States, residing at Harvey, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates more particularly to boiler-furnaces, although it may be applied to furnaces of other types.

Objects of my invention are to perfect combustion, avoid smoke, and save fuel.

In the accompanying drawings, Figure 1 is a longitudinal central section through a furnace embodying my invention. Fig. 2 is section on line 2^a 2^a in Fig. 1. Fig. 3 is a detail section on line 3^a 3^a in Fig. 1. Fig. 4 is a detail section on line 4^a 4^a in Fig. 2. Fig. 5 is a longitudinal vertical section of a portion of the furnace with dampers for opening or closing the air-passage openings within the ash-pit. Fig. 6 is a detail section on line 6^a 6^a in Fig. 5.

The furnace thus illustrated is constructed with a front wall A, a pair of oppositely-arranged side walls B B, a bridge-wall C at the rear of the combustion-chamber 1 and ash-pit 2, and a grate 3, arranged between the combustion-chamber and ash-pit. The side walls extend back of the bridge-wall C, so as to meet the rear wall D of the structure.

The boiler E is arranged over the combustion-chamber 1 and the bridge-wall C and is extended to the rear end of the furnace, which when constructed for a boiler of the type shown has its wall D formed to leave a space 4 back of the rear end of the boiler and forming the rear terminal portion of a space or passage under the boiler and extending back from the combustion-chamber. The passage thus formed under the boiler and extending back from the combustion-chamber is contracted and rendered tortuous for a portion of its length by a second or rear bridge-wall F, arranged back of the front bridge-wall C, and a deflecting-arch arranged as a support for the boiler at a point between the ends of the latter and positioned over the inclined front side 5 of the rear bridge-wall F. This front side 5 of the rear bridge-wall slopes forwardly and downwardly to the rear side of the front bridge-wall C, so as to form between the two bridge-walls a passage portion increasing in depth from the rear to the front bridge-wall, but overhung by the deflecting-arch G and receiving a portion of such arch to an extent to render transverse area of passage-way between the arch and the front bridge-wall equal or substantially equal to the transverse area of passage-way between the arch and the rear bridge-wall and also equal or substantially equal in transverse area to the combined tranverse area of the flue-tubes 6 of the boiler where a boiler of such construction is employed. By this arrangement the passage between the two bridge-walls extends downwardly along the rear upright side of the front bridge-wall and then upwardly over the inclined front side 5 of the rear bridge-wall, the deflecting-arch being arranged between the upper portions of the two bridge-walls and acting to divert the flames downwardly into such passage portion at a point forward of the highest point of the rear bridge-wall.

Each side wall B of the furnace is constructed with a series of air-passages 7, opening at their lower ends into the ash-pit and forming ducts which extend upwardly within the side wall and communicate with a discharge-opening 8, through which the heated air passes into the combustion-chamber. In the construction shown each side wall has but one of these outlets or openings 8 for its series of air flues or passages 7, the area of each opening 8 being less than the combined transverse areas of the passage 7, which communicate with it. Each opening 8 is shown arranged midway of the front wall A and the first or front bridge-wall C, and as a matter of further improvement the upright passages 7 connect with the discharge-openings 8 by way of inclined passages 9 and 10, formed in the side wall and intersected by the upper ends of the upright passages 7, the inclined passage 9 being shown partly in full and partly in dotted lines in Fig. 1 and the corresponding passage 10 being indicated entirely by dotted lines. The opening 8 is elevated relatively to the grate 3 so as to discharge

over the bed of fuel, and the passages 9 and 10 diverge and incline downwardly from such opening 8, the passage 9 being extended toward the front and the passage 10 being extended toward the rear of the furnace. With this arrangement the series of upright flues or passages 7 in a side wall of the furnace combine two sets, the flues of one set opening into the passage 9 and the flues of the other set opening into the passage 10, all of the flues 7 of the two sets being arranged to open into the ash-pit below the grate and the two inclined flues or passages 9 and 10 being arranged to terminate at their higher ends in an opening 8. Each side B of the furnace has a like arrangement of flues or passages, and where the furnace is unusually long the arrangement of opening 8 and flues or passages communicating therewith can be duplicated. The opening 8 is contracted relatively to the combined areas of flues or passages, whereby air is retained within such passages sufficiently long to superheat or render it exceedingly hot when the furnace is in operation, it being seen that the relatively small area of opening 8 retards the upward flow of air through the passages for such purposes and that it also permits the pressure of heated air within the flues or passages to eject a suitable volume of hot air over the fire-bed, thereby insuring combustion. I also find in practice that by reason of the arrangement of bridge-walls C and F and deflecting-arch G combustion is further perfected to such an extent that the pocket or depression 11 between such bridge-walls is kept from carbon deposits.

The bridge-wall C is also provided with a series of upright flues opening at their lower ends into the ash-pit and communicating at their upper ends with discharge-openings through the front side of such bridge-wall. As shown, the bridge-wall C contains two pairs of flues or passages 12 13, operating at their lower ends with the ash-pit, one of such pairs of flues terminating at their upper ends in a discharge-opening 14 and the other pair similarly terminating in a discharge-opening 15. The openings 14 15 are above the level of the grate, and between such openings is a similar discharge-opening 16 for a flue 17, which opens into the ash-pit at its lower end and which at a point higher up divides into two branches 18, which connect with the opening 16. In this way the bridge-wall presents transverse series of discharge-openings, so as to supply air at different points across the rear portion of the combustion-chamber. The side walls B, however, have a marked and distinctly-different arrangement, the air being taken by the flues 7 by ports arranged in series extending between points under the front and rear portions of the combustion-chamber, thence conducted upwardly in flues in the opposite side walls of the combustion-chamber, and then directed and discharged into the combustion-chamber by a relatively contracted port-opening 8 between the front and rear ends of the combustion-chamber.

As a matter of further improvement the inlet-openings of the air-supply passages are provided in Figs. 5 and 6 with dampers, which can be closed after the coal in the combustion-chamber is coked. These dampers or valves may be of any suitable construction and operated in any suitable way. As illustrated, the dampers 19 for the lower ends of the flues or passages 7 are understood to be arranged in sets, said sets being respectively secured upon longitudinally-arranged rock-shafts, one of such rock-shafts, 20, being shown in Fig. 5. The lower ends of the air-passages in the bridge-wall C are in Fig. 5 provided with valves or dampers 21, secured upon the rock-shaft 22, having a crank-arm 23, which is engaged and operated by a thrust-rod 24, as shown in Fig. 5.

What I claim as my invention is—

1. In a furnace constructed with a combustion-chamber and ash-pit, a series of air-passages opening into the ash-pit at each of two opposite sides thereof, inclined passages intersected by such upright passages at points along opposite sides of the combustion-chamber, the inclined passage at each side being connected with an opening arranged to discharge into the combustion-chamber.

2. In a furnace constructed with a combustion-chamber, an ash-pit, and a grate between the combustion-chamber and ash-pit; a series of air-passages formed in a longitudinal side wall of the furnace and arranged to open in the ash-pit below the grate and to extend upwardly from such openings to points above the plane of the grate; an outlet common to said passages opening into the combustion-chamber between the front and rear passages of said series; and longitudinally-arranged passage connection between said outlet and the upper ends of the air-passages of said series.

ARTHUR M. BOUGHTON.

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