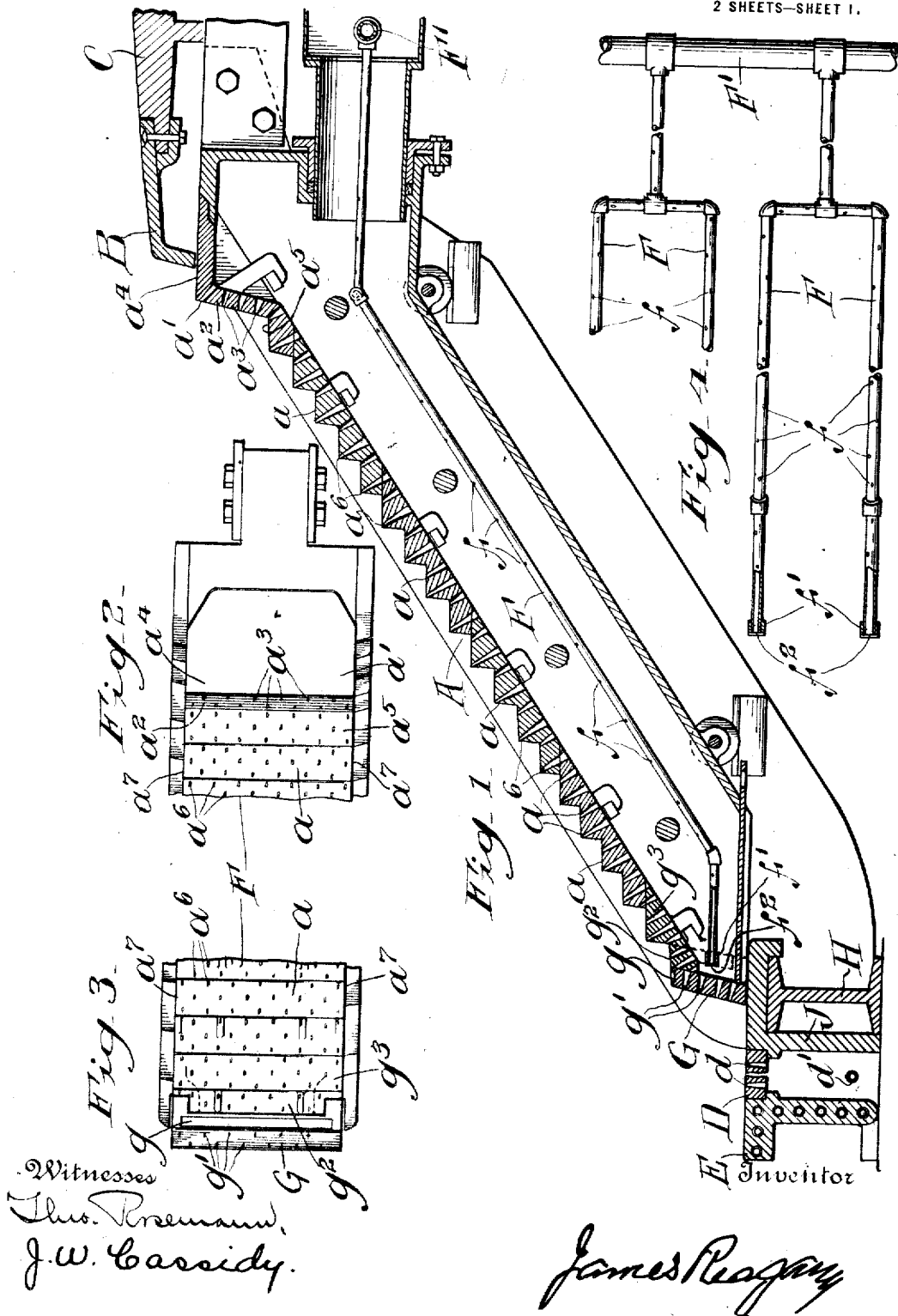


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BOILER AND OTHER FURNACE.
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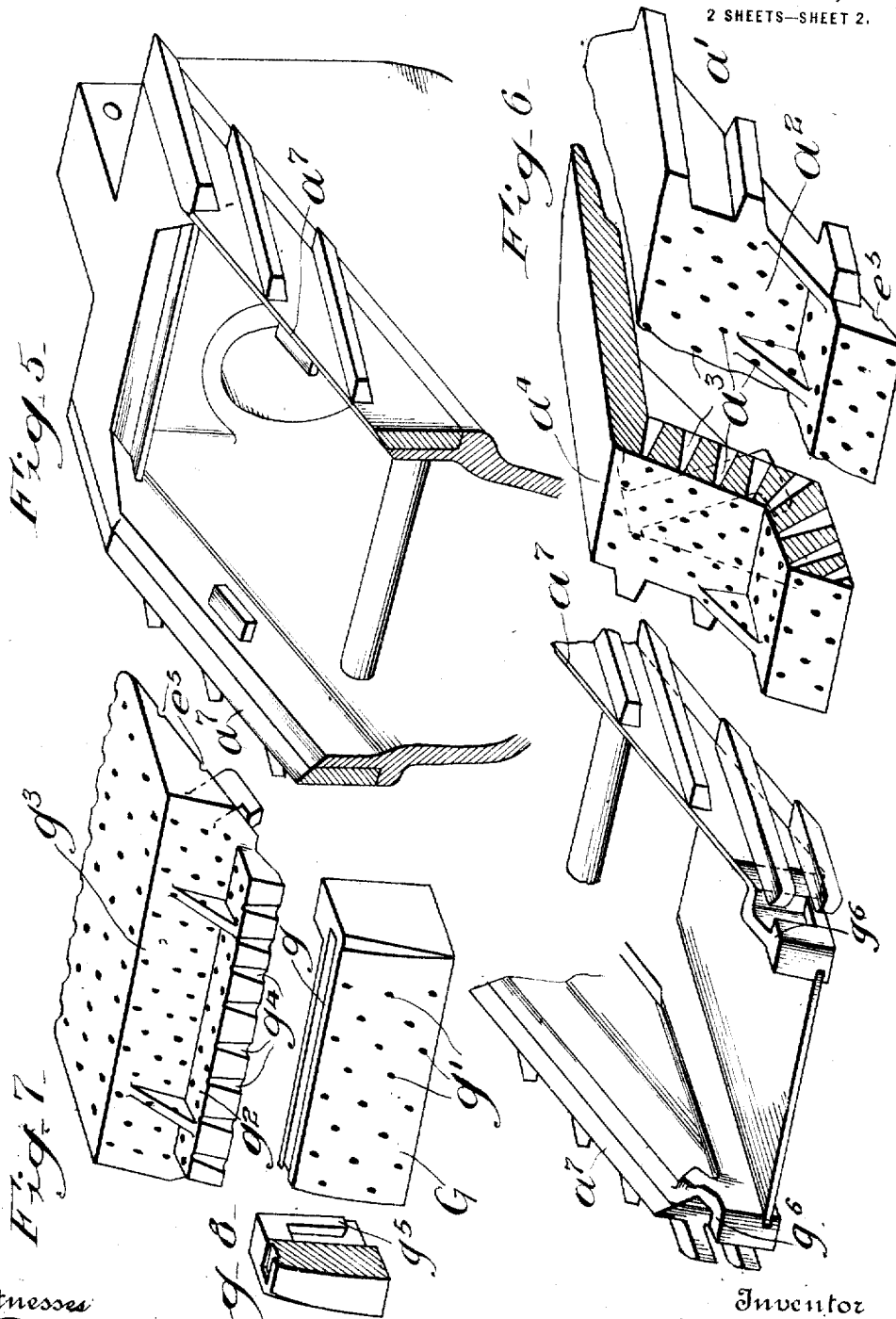
2 SHEETS—SHEET 1.



1,210,364.

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Patented Dec. 26, 1916.
2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES REAGAN, OF PHILADELPHIA, PENNSYLVANIA.

BOILER AND OTHER FURNACE.

1,210,364.

Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed May 5, 1916. Serial No. 95,706.

To all whom it may concern:

Be it known that I, JAMES REAGAN, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Boiler and other Furnaces, of which the following is a specification.

My invention relates to furnaces of the type shown in my Patent #1,171,803, dated February 15, 1916, and characterized by the inclusion of a hopper, a fuel feeder, a stationary head block, forming the bottom of a coking zone, a grate having reciprocary stepped hollow bars, a rest grate, and means for removing ashes from the furnace. The same type of furnace is shown in another application of even date herewith.

The present improvements involve the construction of the upper end of the grate bars and the contiguous head block; the construction of the lowermost sections of the grate bars; the rest grate, and means for preventing the accumulation of clinker.

In the drawings—Figure 1 represents a vertical section of the grate; Figs. 2 and 3 represent upper and lower portions of the grate; Fig. 4 is a view of the perforated steam supply pipes appearing in Fig. 1; Fig. 5 is a perspective view showing the upper and lower parts of one of the grate bars with the stepped plates removed; Fig. 6 represents sections of the upper stepped plate of the grate; and Figs. 7 and 8 represent sections of the lower end of the grate.

The grate bars A are arranged parallel and are composed of perforated stepped sections a , as in my previous construction. They are adapted to reciprocate independently, and to receive coked fuel from the stationary head block B under which their upper ends extend. C is the bottom of the fuel hopper from which the fuel is expelled by the fuel feeder (not shown).

The uppermost step a' of each of the grate bars is made of greater height than the other steps, and its front wall a^2 is perforated, the perforations being designated a^3 . The upper wall is imperforate. The head block B is so placed as to always form with the upper end of the grate bar a further step a^4 which is narrowed and widened as the grate bar is reciprocated, but never entirely disappears, as is the case in the construction shown in my companion application. In consequence of this arrangement,

the sheet of fuel slowly impelled over the head block B by the fuel feeder, finds temporary lodgment on the step a^4 , from which it is partially dislodged at each reciprocation of the grate. The increments of dislodged fuel drop past the openings a^3 , and then find their way over the grate in the same manner as in my earlier construction. I have by experimentation found that it is desirable when some kinds of fuel are employed, and especially if the fuel be wet, to cause a leading increment thereof to separate or draw away from a following increment, in order that the radiant heat may gain access to and affect a large number of the fuel particles, and this, I have found, may be well accomplished by the means just described. It will be observed, that the sheet of fuel passing over the step a^4 , and down over the next step a^5 , of the grate bar, is not bodily agitated, but only separated by gravity as to the leading and following increments above mentioned. Furthermore, as the feeding of the sheet of fuel is extremely slow, the opening up of the interstices is very gradual until the time arrives for the gravitative separation, which causes a transverse rift to appear, thereby subjecting more of the particles to the radiant heat. More air is required at this stage of the operation, and this is supplied through openings a^3 . I find that the separation, without a mass disturbance of the fuel, is remarkably effective in securing a perfect combustion and the consequent elimination of smoke which, in many furnaces, is due to an over-supply of the gaseous products of destructive distillation and a relatively small supply of air. The height of the uppermost step of the grate section, is to be determined by the character and condition of the fuel, but I have made the height six inches. The normal width of the step a^4 may be about three and one-half inches, and this width is increased by from one-half an inch to three and one-half inches when the grate bar reciprocates. The other steps of the grate sections are about one and one-half inches high, and about two inches wide.

The rest grate I have narrowed, and I have dispensed with the slots thereof, as heretofore constructed, and provided it with round holes d which prevent the passage of unconsumed particles of fuel. A steam pipe d' delivers steam to the space below and

through the rest grate, and the steam, besides acting to break up clinkers, tends to keep the openings clear. The rest grate is protected by a water beam E, such as is described in my companion application.

Other steam pipes F, perforated at *f*, fed from a common supply pipe F', deliver steam laterally into the hollow grate bars A. This steam flows, not only through the openings *a*⁶ at the tops of the grate bars, but over the edges *a*⁷ of the trough-like portions of said bars, and up between the bars, there being spaces *e*⁶ there for the exit of air under forced draft, as shown at *e*⁶ in my pending application, Serial #28,742, filed May 17, 1915. The steam, therefore, is uniformly distributed to all parts of the grate area, the result being the breaking up of the clinkers throughout that area by the cooling effect of the steam which is of a much lower temperature than the frangible clinkers.

The grate bars are each provided with a removable ash-pushing plate G, perforated at *g*¹, the upper edge *g* of which constitutes one half of the top surface of the lowermost step of the bar, the other half of the surface being formed by a projecting perforated flange *g*² of a grate section *g*³, that has grooves *g*⁴ in its edge. The plate G is secured to the hollow grate section by lugs *g*⁵, that engage flanges *g*⁶ on said hollow grate section. The steam pipes F have caps *f*¹ slotted at *f*² for the emission of steam toward the openings *g*¹, the object being to supply steam to this part of the grate, just as it is supplied to the other portions thereof for the purpose of breaking up the clinker. H is an I-beam covered by a protecting plate J supporting the rest grate D at one edge, the other edge being supported by the water-beam E.

Having thus fully described my invention what I claim is—

1. The combination with a stepped reciprocatory grate, of a stationary head block disposed at the bottom of a coking chamber, the upper step of the grate being of greater height than the other steps, and the grate actuating mechanism being so adjusted as to always expose a fuel supporting surface of the upper step.

2. The combination with a stepped reciprocatory grate having alternately acting sections, of a stationary head block disposed at the bottom of the coking chamber, the upper step of the grate being of greater height than the other steps, and the grate actuating mechanism being so adjusted as to always expose a fuel supporting surface of the upper step.

3. The combination of an inclined reciprocating grate, a rest grate situated at the lower end of said inclined grate and adapted to unobstructively discharge material rearward, the lower end of the inclined grate being perforated, vertically disposed and shaped to act as an ash pusher.

4. A lower grate section comprising two parts, one of which is a stepped plate having a perforated flange and the other is a vertical perforated plate fitting said flange.

5. The combination with a grate having hollow spaced and perforated bars, of steam supply pipes adapted to supply steam to the perforations in and the spaces between said bars and means for supplying air under pressure to said bars.

6. The combination with the vertically arranged perforated lower section of a grate constituting an ash pusher, of a steam pipe for delivering steam to and through the perforations, and a rest grate disposed adjacent said lower sections.

7. A foot grate in combination with a supporting beam, a protecting plate for said beam, and a water beam supporting an edge of said foot grate.

8. The combination with a furnace, of an inclined stepped grate, the uppermost step being of greater height than the other steps, means for uniformly supplying steam to all parts of the grate area, a rest grate, a perforated plate constituting an ash pusher disposed at the lower end of the grate and means for supplying steam through the ash pusher.

In testimony whereof I affix my signature in presence of a witness.

JAMES REAGAN.

Witness:

J. W. CASSIDY.