J. WILLIAMSON.

FIRE GRATE.

APPLICATION FILED NOV. 11, 1907.

899,442. **Patented Sept. 22, 1908.**

2 SHEETS—SHEET 1.

Fig. 1

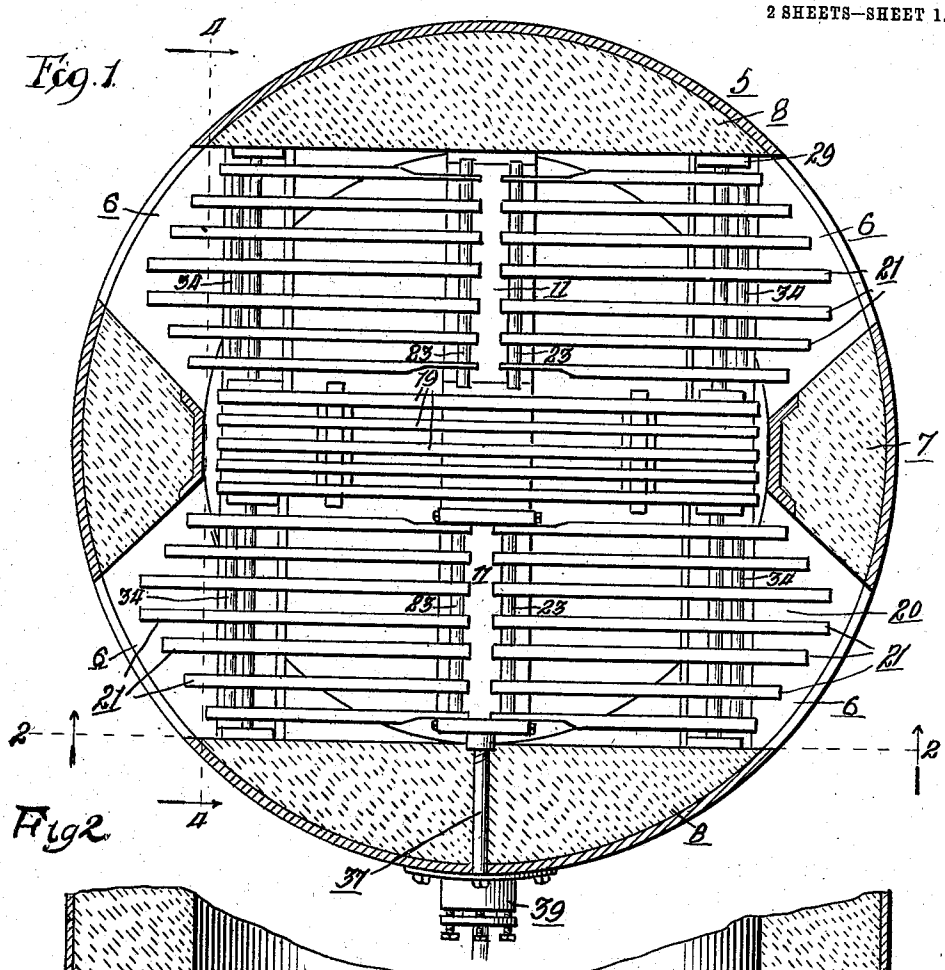
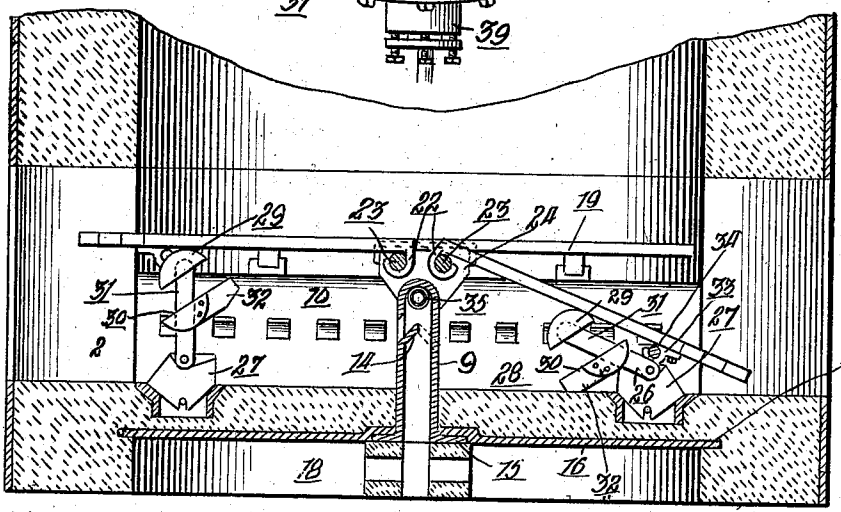


Fig 2.



Witnesses:
Wm. P. Bond
Pierson W. Banning.

Inventor:
John Williamson
by Banning & Banning
Attys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 3.

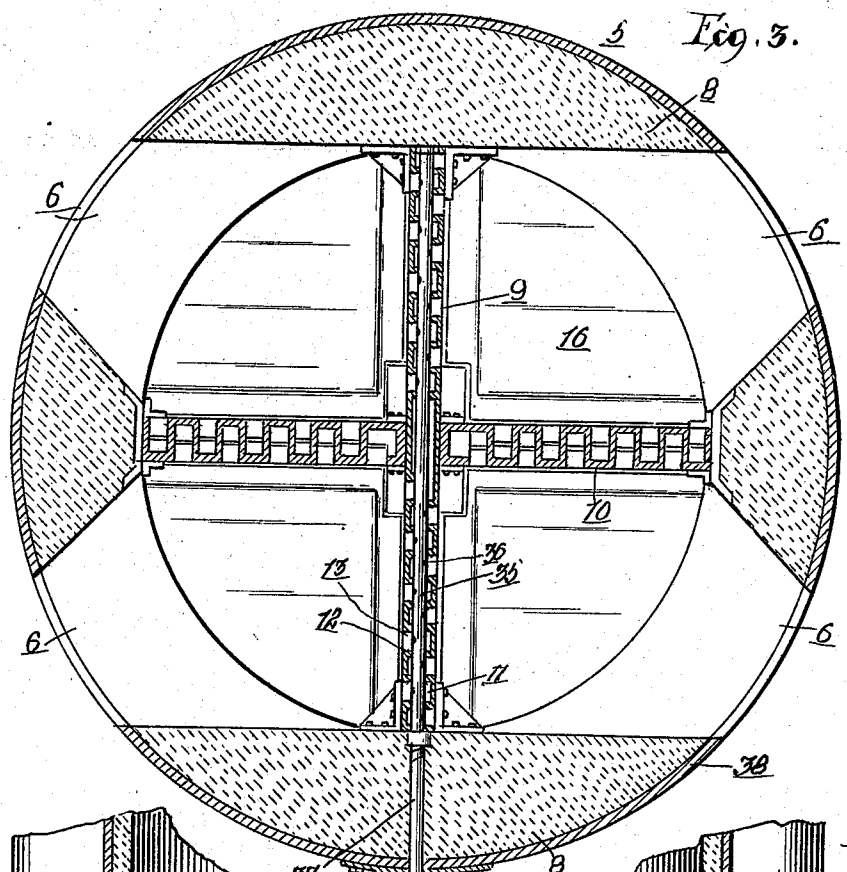
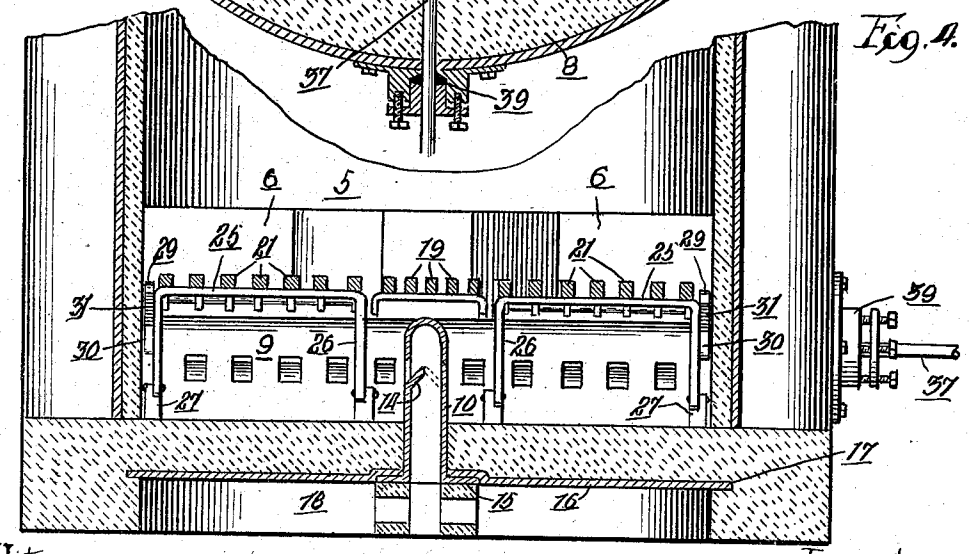


Fig. 4.



Witnesses:

Wm. P. Bond

Pierson M. Banning.

Inventor:

John Williamson

by Banning & Banning

Attys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN WILLIAMSON, OF CHICAGO, ILLINOIS.

FIRE-GRATE.

No. 899,442. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed November 11, 1907. Serial No. 401,697.

To all whom it may concern:

Be it known that I, JOHN WILLIAMSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fire-Grates, of which the following is a specification.

This invention relates to certain features of improvement on the fire grate apparatus described and claimed in application, Serial No. 387,689, filed August 8, 1907, and is particularly applicable for use in connection with gas generators, although it may be employed in other furnace structures in which it is desirable to provide means for quickly discharging and cleaning the grate surfaces.

The invention more specially relates to the construction of the hollow arch cross walls from which the blast is discharged and to the method of discharging steam from the blast openings.

The invention relates to the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a top or plan view of the grate portion of the gas generator; Fig. 2 a sectional elevation taken on line 2—2 of Fig. 1; Fig. 3 a sectional plan view similar to Fig. 1 with the grate bars removed; and Fig. 4 a cross sectional view taken on line 4—4 of Fig. 1.

The furnace structure 5 is of the usual cylindrical formation and is provided with four doors or outlets 6, two on each side. The door openings are of inwardly divergent formation, and the doors of each pair on the same side of the generator are separated by means of a section of wall 7 of segmental shape, which gives to the inner walls of the door openings a convergent formation. The door openings, on their outer sides, are bounded by straight sections of wall 8, in parallel relation with one another, so that the outer sides of the doors are parallel with the cross diameter of the generator structure.

The interior of the generator structure is divided by a continuous cross wall 9 which extends between the straight walls 8, and the continuous cross wall 9 is supplemented by sectional cross walls 10 set at right angles to the center of the cross wall 9, which arrangement gives a cross shape to the wall structure, as shown in Fig. 3. Each of the cross walls is of hollow arch formation and is divided into a plurality of blast chambers 11 by means of partition walls 12, as best shown in Fig. 3. Each of the blast chambers is provided with a discharge opening 13, the openings being in staggered relation on opposite sides of the arch cross wall in which they are formed. Adjacent to and immediately below each of the discharge openings is an inwardly extending baffle plate 14, which projects diagonally upward from the lower edge of the opening 13 and terminates in the center of the arch cross wall, as shown in Fig. 2.

The walls are open at the bottom and are provided along their edges with flanges 15, upon which rest metallic floor sections 16, the outer edges 17 of which are embedded in the masonry of the surrounding generating structure. This arrangement provides a blast chamber 18, below the flooring and in communication with the arch cross walls, so that the blast of air delivered to the blast chamber will be equally distributed through the cross walls and discharged from the openings thereof and beneath the grate. The continuous cross wall 9, extending between the side walls 8 of the generator, serves as a mounting or support for a plurality of fixed center grate bars 19, which extend across the center of the arch wall 9 at right angles thereto and terminate in close proximity to the inner faces of the segmental wall sections 7. Adjacent to the fixed grate bars are four tilting grates 20, each pivoted in the center and adapted to discharge through the adjacent door. The pivoted grates comprise grate bars 21, which extend in parallel relation with respect to the fixed grate bars and with respect to the side walls 8. The inner ends of the grate bars are in alinement with one another, but the outer ends of each of the center bars of the series are extended to conform to the configuration of the door openings.

In describing the construction of the movable grate sections, a single section only will be described, in view of the fact that the same mechanism is employed in connection with each of the four movable grate sections. Each of the grate bars 21 is provided at its inner end with a depending hook 22, which

embraces a supporting rod 23, which is supported by and in parallel relation with the top of the cross wall 9 and slightly to one side of the center thereof. The cross wall is provided at suitable intervals with upwardly extending brackets 24, through which the supporting rods are entered. The outer or free ends of the grate bars of the entire grate section are supported upon a yoke, comprising a cross head 25 and side arms 26, each of which upwardly extends above the floor of the fire chamber. The metallic flooring 16 serves as a foundation or support for a cover 28, of cement or similar impervious substance, which serves the further function of sealing the floor against the escape of air through the perforated cross walls provided with the staggered openings for the distribution of the blast. The outermost side arm of the yoke is provided with upper and lower socket lugs 29 and 30, which are suitably spaced to provide an intermediate socket space 31, which preferably extends in diagonal relation with respect to the side arm of the yoke, which space provides for the insertion of a suitable bar or other implement adapted to actuate the yoke. The lower lug 30 is provided with an inwardly extending foot 32, which, when the yoke has been thrown into the position shown to the right of Fig. 2, serves as a rest for the yoke. The free ends of the movable grate bars, immediately outside the cross head of the yoke, are provided, on their under faces, with eyes 33 in alinement with one another, which eyes are adapted to receive a transversely extending tie bar 34, which serves to clamp together the free ends of the movable grate bars and prevent their displacement.

The continuous arch cross wall 9 has extending therethrough, near the top thereof, a steam pipe 35, which pipe is provided with discharge openings 36, arranged in staggered relation and in register with the blast openings in the sides of the arch cross wall, as best shown in Fig. 3. The steam pipe 35 has screwed into one end thereof a steam supply pipe 37, which passes through the masonry of one of the walls 8 and through a surrounding metallic shell 38 to a suitable source of steam supply. In order to prevent the escape of steam from the fire chamber and along the pipe 37, the latter is entered through a stuffing box 39, which is bolted or otherwise rigidly secured to the outer face of the cylindrical shell 38, which affords a steam tight connection and insures the proper discharge of steam with the blast beneath the grate surface.

In use, the movable grate sections, when raised, will occupy the position shown to the left of Fig. 2, in which position the movable grate bars will be on a level with the fixed grate bars, so that the entire grate surface will be uniform. When it is desired to tilt one or more of the grate sections the operation can be performed by inserting a bar or similar implement into the space afforded therefor and thereafter throwing back the supporting yoke out of its raised position into its lowered position, as shown to the right of Fig. 2, which movement of the supporting yoke allows the free ends of the grate bars to fall by gravity, so that the surface of the lower grate section will assume a sloping position and permit the ashes or refuse to slide out of the intended door; and this operation can be repeated on each of the grate sections independently, which is adapted to discharge through its respective door, thereby permitting access to be had to any portion of the fire space of the generator structure.

The baffle plates, which slope inwardly and upwardly from the blast holes, prevent the ingress of ashes or refuse into the interior of the arch cross walls, and the partitions in the cross walls insure an even and certain distribution of the blast at the intended points. The steam pipe is so located and arranged that the discharge of steam will be evenly distributed, and the cross wall affords a suitable mounting and covering for the steam pipe, which prevents the ingress of ashes or refuse which might otherwise clog the steam discharge openings.

By arranging the blast openings in staggered relation on opposite sides of the cross walls, the interior partitions can be extended entirely across the hollow cross walls, dividing the latter into a plurality of independent chambers each with a single discharge opening. This arrangement considerably simplifies the construction of the hollow cross walls and at the same time directs the blast admitted to each of the chambers thus formed out of a single opening and thus concentrates its force to a greater degree than would be possible if each of the chambers, formed by the partition walls, were provided with two openings on opposite sides of the cross walls.

What I regard as new and desire to secure by Letters Patent is:

1. In a furnace grate, the combination of a plurality of grate bars, a hollow cross wall beneath the bars provided on opposite sides with blast openings arranged in staggered relation, each of the openings having adjacent thereto a baffle plate to prevent ingress of ashes and dirt, and a plurality of partition walls intermediate the staggered blast openings, substantially as described.

2. In a furnace grate, the combination of a plurality of grate bars, a hollow cross wall beneath the bars provided on opposite sides with blast openings arranged in staggered relation, each of the openings having adjacent thereto a baffle plate to prevent ingress of ashes and dirt, a plurality of partition walls intermediate the staggered blast openings,

and a steam pipe entered through the partition walls and provided with openings arranged in staggered relation, said openings being in register with the blast openings, substantially as described.

3. The combination of a furnace structure provided with four grate doors, a transversely extending hollow cross wall, intermediate the doors and provided with partition walls dividing the cross wall into a plurality of blast chambers, each of the chambers having a blast discharge opening, said openings being arranged in staggered relation on opposite sides of the cross wall, four movable grate sections, hinged to the cross wall and extending toward the respective doors, and means for supporting the free ends of the grate sections, substantially as described.

4. The combination of a furnace structure provided with four grate doors, a transversely extending hollow main cross wall, intermediate the doors and provided with partition walls dividing the cross wall into a plurality of blast chambers, each of the chambers having a blast discharge opening, said openings being arranged in staggered relation on opposite sides of the cross wall, inwardly diagonally extending baffle plates, one for each of the blast openings, four movable grate sections, hinged to the cross wall and extending toward the respective doors, and means for supporting the free ends of the grate sections, substantially as described.

5. The combination of a furnace structure provided with four grate doors, a transversely extending hollow cross wall, intermediate the doors and provided with partition walls dividing the cross wall into a plurality of blast chambers, each of the chambers having a blast discharge opening, said openings being arranged in staggered relation on opposite sides of the cross wall, four movable grate sections, hinged to the cross wall and extending toward the respective doors, means for supporting the free ends of the grate sections, and a pair of supplemental hollow cross walls, extending at right angles to the main cross wall and provided with similar partition walls and blast openings, substantially as described.

6. The combination of a furnace structure provided with four grate doors, a transversely extending hollow cross wall, intermediate the doors and provided with partition walls dividing the cross wall into a plurality of blast chambers, each of the chambers having a blast discharge opening, said openings being arranged in staggered relation on opposite sides of the cross wall, four movable grate sections, hinged to the cross wall and extending toward the respective doors, means for supporting the free ends of the grate sections, a pair of supplemental hollow cross walls, extending at right angles to the main cross wall and provided with similar partition walls and blast openings, and an inclosed blast chamber below the cross walls and in communication therewith for supplying a blast to all of the cross walls, substantially as described.

7. The combination of a furnace structure provided with four grate doors, a transversely extending main hollow cross wall, intermediate the doors and open at its bottom, and provided on opposite sides with blast discharge openings arranged in staggered relation with respect to one another, partition walls intermediate the blast openings, supplemental cross walls, one on each side of the main cross wall and at right angle relation thereto, giving the hollow walls a cross formation, said supplemental hollow walls being provided with similar partitions and blast openings and being open at the bottom, an inclosed blast chamber under the cross wall structure for supplying a blast thereto, and grate bars above the cross wall structure, substantially as described.

8. The combination of a furnace structure provided with four grate doors, a transversely extending main hollow cross wall, intermediate the doors and open at its bottom, and provided on opposite sides with blast discharge openings arranged in staggered relation with respect to one another, partition walls intermediate the blast openings, supplemental cross walls, one on each side of the main cross wall and at right angle relation thereto, giving the hollow walls a cross formation, said supplemental hollow walls being provided with similar partitions and blast openings and being open at the bottom, an inclosed blast chamber under the cross wall structure for supplying a blast thereto, grate bars above the cross wall structure, and a steam pipe, extending from end to end of the main hollow cross wall and provided with steam discharge openings in staggered relation and in register with the staggered blast openings, substantially as described.

9. The combination, in a furnace structure, of a plurality of grate bars, a blast distributing structure below the grate bars, of cross formation and comprising hollow walls divided by partitions into a plurality of blast discharge chambers, each of said chambers having a blast discharge opening, said openings being in staggered relation with respect to one another, and a main inclosed blast chamber below the blast distributing structure and in communication therewith, substantially as described.

10. The combination, in a furnace structure, of a plurality of grate bars, a blast distributing structure, of cross formation and comprising hollow walls divided by partition walls into blast distributing chambers, each

of the blast distributing chambers having a blast discharge opening, said openings being arranged in staggered relation, and each of the openings having adjacent thereto an inwardly diagonally extending baffle plate to prevent the ingress of dirt and ashes, and a main inclosed blast chamber below the blast distributing structure and in communication therewith, substantially as described.

JOHN WILLIAMSON.

Witnesses:
S. H. MOORE,
W. J. GOSMAN.