T. V. ELLIOTT.

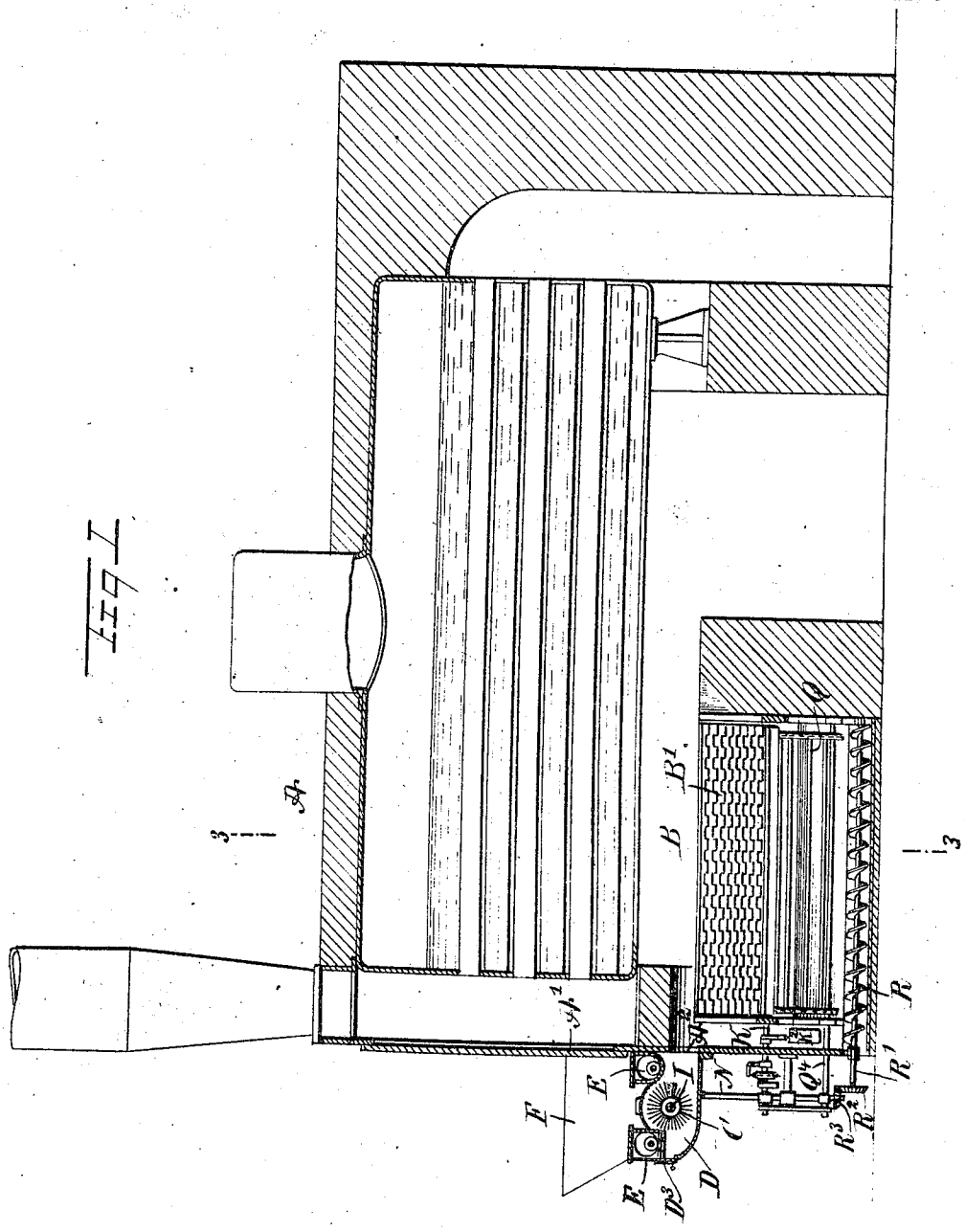
STOKER.

APPLICATION FILED DEC. 8, 1904. RENEWED MAR. 13, 1908.

903,131.

Patented Nov. 3, 1908.

3 SHEETS—SHEET 1



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3 SHEETS—SHEET 2.

Fig 2

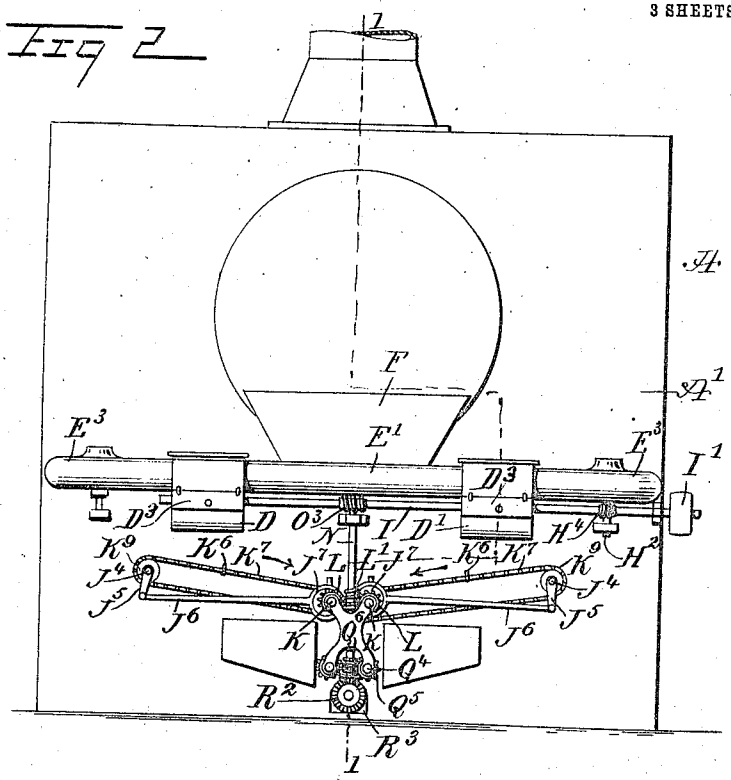
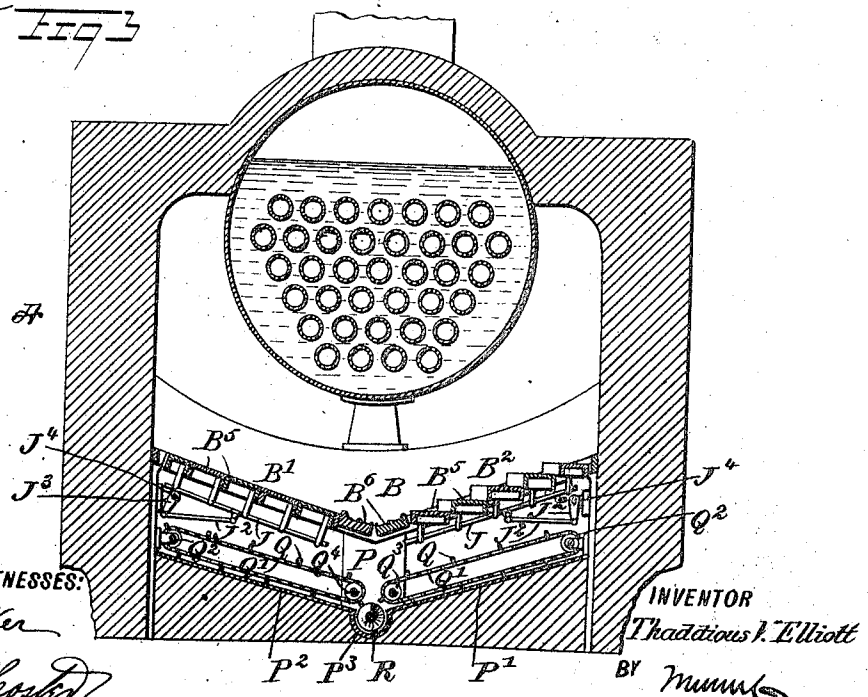


Fig 3



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3 SHEETS—SHEET 3.

Fig 4

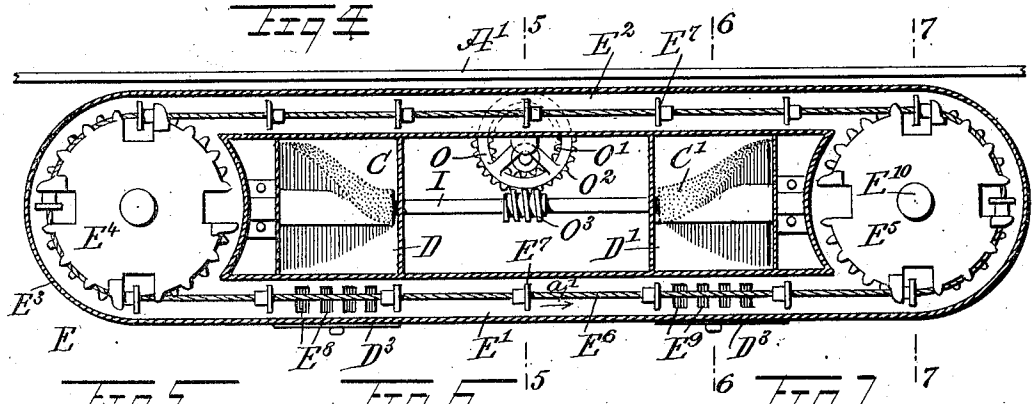


Fig 5

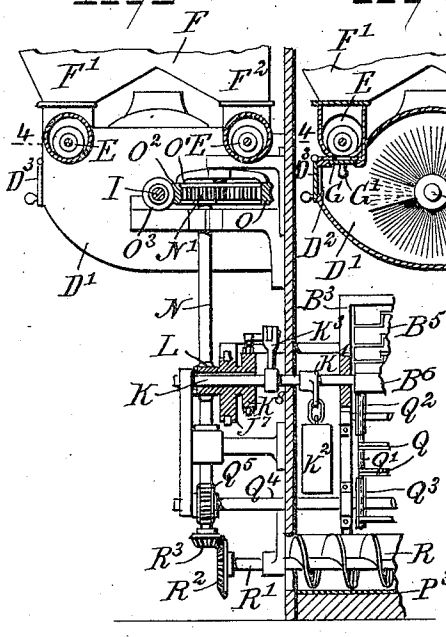


Fig 6

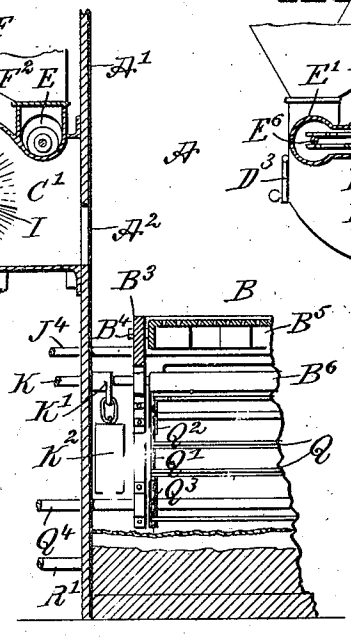


Fig 7

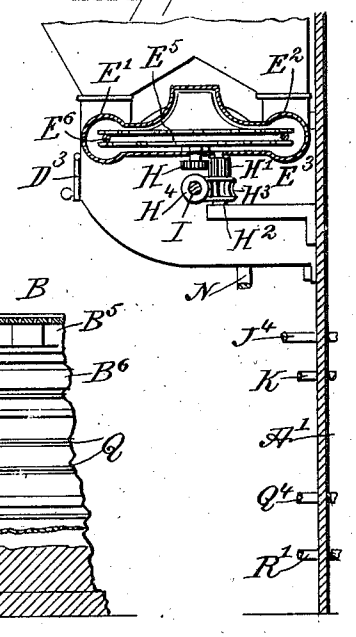


Fig 8

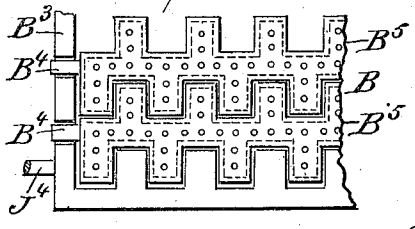


Fig 10

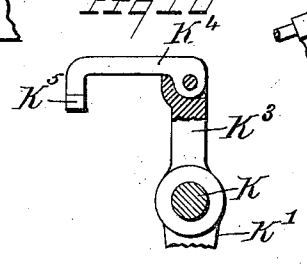
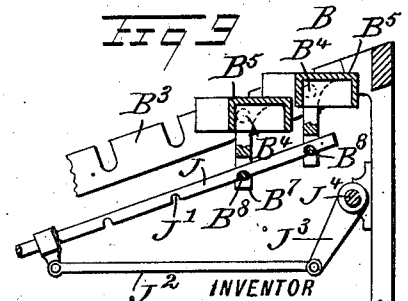


Fig 9



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UNITED STATES PATENT OFFICE.

THADDIOUS V. ELLIOTT, OF NEW YORK, N. Y., ASSIGNOR TO MARIEA ELLIOTT, OF FLATBUSH, NEW YORK.

STOKER.

No. 903,131. Specification of Letters Patent. Patented Nov. 3, 1908.

Application filed December 8, 1904, Serial No. 235,942. Renewed March 13, 1908. Serial No. 420,802.

To all whom it may concern:

Be it known that I, THADDIOUS V. ELLIOTT, a citizen of the United States, residing in the city of New York, Flatbush, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Stoker, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved stoker for automatically feeding coal and like fuel to a furnace, to automatically shake the grate bars and to automatically remove the ashes, to insure at all times a proper uniform combustion of the fuel.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of a boiler furnace provided with the improvement, the section being on the line 1—1 of Fig. 2; Fig. 2 is a front elevation of the same; Fig. 3 is a transverse section of the same, on the line 3—3 of Fig. 1; Fig. 4 is an enlarged sectional plan view of the improvement, the section being on the line 4—4 of Fig. 5; Fig. 5 is a sectional side elevation of the same, on the line 5—5 of Fig. 4; Fig. 6 is a similar view of the same, on the line 6—6 of Fig. 4; Fig. 7 is a like view of the same, on the line 7—7 of Fig. 4; Fig. 8 is an enlarged plan view of a portion of the grate; Fig. 9 is a transverse section of the same and part of the means for shaking the grate bars; and Fig. 10 is an enlarged transverse section of part of the mechanism for shaking the grate bars.

The furnace A on which the improved stoker is applied is provided in its firebox with a grate B, made V-shaped in cross section, to provide inclined sides or sections B′ and B², onto which the fuel, such as coal in a divided state, is scattered by the force of revolving brushes C and C′ arranged in casings D, D′ held on the outside of the front A′ of the furnace, the fuel being fed to the said casings D and D′ and the brushes C and C′ by a delivery device E, receiving the coal from a hopper F, the said delivery device E being superimposed on the casings D and D′ and the hopper F being mounted on top of the delivery device E.

The hopper F is provided with delivery chutes F′ and F², opening into the tubular members E′ and E² of a casing E³, containing revoluble wheels E⁴ and E⁵, around which passes an endless cable or chain E⁶, carrying spaced disks E⁷ for pushing the fuel gradually to and over sets of apertures E⁸ and E⁹ formed in the bottom of the tubular member E′, the said openings leading into the casings D and D′, so that the coal is engaged by the revolving brushes C and C′ and forced by the latter through openings A² formed in the front A′ into the firebox and onto the top of the grate sections B′ and B², for the fuel to be burned on the said grate sections.

In order to control the amount of fuel passing through the sets of openings E⁸ and E⁹, suitable cut-off slides G are provided, mounted on the under side of the bottom of the tubular member E′, provided with handles G′, adapted to be taken hold of by the operator to move the cut-off slides G transversely, to open the openings E⁸ and E⁹ more or less, to allow more or less coal to fall from the tubular member E′ into the casings D and D′. The handles G′ can be reached by the operator inserting the hand through openings D² formed in the casings D and D′ and normally closed by suitable hinged doors D³, as plainly indicated in Figs. 1, 2, 5, 6 and 7.

The shaft E¹⁰ of the wheel E⁵ is provided with a gear wheel H, in mesh with a gear wheel H′ secured on a vertically disposed shaft H², journaled in suitable bearings and carrying a worm wheel H³, in mesh with a worm H⁴, fastened on the main shaft I, extending transversely on the front A′ of the boiler furnace, the said shaft being provided with a pulley I′, connected by a belt with other machinery for imparting rotary motion to the said shaft I. When this shaft I is rotated, the worm H⁴ imparts a rotary motion to the worm wheel H³, shaft H² and gear wheel H′ which, by meshing with the gear wheel H, causes the shaft E¹⁰ and the wheel E⁵ to rotate, so that a continuous traveling motion is given to the endless cable or chain E⁶, to cause the disks E⁷ to push the coal to the openings E⁸ and E⁹, through which the fuel drops into the casings

D and D′, to be brushed by the brushes C and C′ through the openings A^2 onto the grate sections B′ and B^2. The brushes C and C′ are secured on the shaft I, which is rotated at a comparatively high rate of speed, so that the rotation of the brushes is sufficient to forcibly eject the fuel through the openings A^2, to scatter the same over the grate sections B′ and B^2.

Each of the grate sections is mounted on a frame B^3, having bearings for trunnions B^4 formed or secured at the ends of each of the grate bars B^5, preferably of the shape shown in Fig. 8 and adapted to rock, so as to agitate the burning fuel on the grate bars and to cause the same to gradually slip down the grate bars toward the apex of the grate, the burned-out material being finally removed from the apex of the grate by the use of dumping bars B^6, hereinafter more fully described.

Each of the grate bars B^5 is provided with openings for the ready passage of the air, so as to insure complete combustion of the fuel on the said grate bars. Each of the grate bars B^5 is provided with a depending arm B^7, carrying a pin B^8, and the several pins B^8 of one grate section B′ or B^2 engage notches J′ cut in a bar J, pivotally connected by a link J^2 with an arm J^3, attached to a longitudinally extending shaft J^4, journaled in suitable bearings on the corresponding frame B^3 (see Fig. 9). The outer end of the shaft J^4 extends through the front A′ of the furnace and on the outer end of the said shaft is secured an arm J^5 (see Fig. 2), connected with the eccentric rod J^6 of an eccentric J^7, mounted to rotate loosely on a shaft K, carrying the corresponding dumping bar B^6 above referred to.

The disk of each eccentric J^7 is secured or formed on a worm wheel L (see Figs. 2 and 5), in mesh with a worm L′, secured on a vertically disposed shaft N, provided at its upper end with a gear wheel N′, in mesh with an internal gear wheel O′, formed on a wheel O, having its peripheral face provided with a worm wheel O^2, in mesh with a worm O^3 secured on the main shaft I. When the latter is rotated, the worm O^3 imparts a rotary motion to the worm wheel O^2 and the wheel O, so that the internal gear wheel O′ thereof imparts a rotary motion to the gear wheel N′ and consequently to the shaft N, which in turn rotates by its worm wheel L′ the worm wheels L, meshing with the worm wheel on opposite sides thereof. The worm wheels L, on account of being secured to the corresponding disks of the eccentrics J^7, cause the eccentric rods J^6 to impart a swinging motion to the arms J^5, to rock the shafts J^4, whereby the arms J^3, links J^2, bars J, pins B^8 and arms B^7 impart a rocking motion to the grate bars B^5, to agitate the burning fuel thereon and cause the same to gradually work downward to the dumping bars B^6 at the apex portion of the grate sections B′ and B^2 of the grate B.

In order to periodically turn the dumping bars B^6 of the grate sections B′ and B^2, the following device is provided: Normally the bars B^6 are held in a closed position, as shown in Fig. 3, by the action of a weight K^2, hung on an arm K′ depending from the shaft K of a dumping bar B^6. On the shaft K is secured an upwardly extending arm K^3, on which is fulcrumed a link K^4, provided on its free end with a projecting lug K^5, adapted to be engaged by a similar lug K^6 on a sprocket chain K^7 passing over a sprocket wheel K^8, fastened to the hub of the disk for the corresponding eccentric J^7, so as to rotate with the said eccentric disk, the said sprocket chain K^7 also passing over idler sprocket wheels K^9, mounted to rotate loosely on the shafts J^4. When the stoker is in action, a rotary motion is given to the worm wheel L, the disk of the eccentric J^7 and the sprocket wheel K^8, and then the latter imparts a traveling motion to the chain K^7, to bring the lug K^6 thereof finally in engagement with the lug K^5, so that the link K^4, acting on the arm K^3, causes the shaft K to rock and turn the corresponding dumping bar B^6 into a dumping position, for the burned-out clinkers and the like to drop downward into an ash pit P. As the arm K^3 assumes an angular position, it is evident that the lug K^5 gradually moves out of engagement with the lug K^6 and consequently the shaft K is rocked back to its normal position by the action of the weight K^2, so that the dumping bar B^6 moves back into a closed position after the clinkers or spent material is dumped. The ashes falling from the rocking grate bars B^5 down into the ash pit finally reach the inclined bottoms P′ and P^2 of the said ash pit, and the ashes are scraped down the inclined bottoms by scrapers Q onto a conveyer R of spiral shape, mounted to turn in the corresponding casing P^3, into which lead the lower ends of the bottoms P′ and P^2.

The scrapers Q are in the form of longitudinal bars secured to sprocket chains Q′ passing over sprocket wheels Q^2 and Q^3 (see Fig. 3), the sprocket wheels Q^3 being secured on longitudinally extending shafts Q^4, each of which passes with its outer end through the furnace front A′ to the outside thereof, and on the outer end of this shaft Q^4 is secured a worm wheel Q^5, in mesh with a worm Q^6 secured on the shaft N, driven from the shaft I by the gearing above described. Thus, when the shaft N is rotated, the shafts Q^4 are driven and consequently the sprocket chains Q′, to cause the scrapers Q to scrape the ashes down the inclined bottoms P′ and P^2 into the casing P^3 and onto the spiral conveyer R, which conveys the ashes out of the furnace at one end thereof. The clinkers

and other spent material dumped by the dumping bars B^6 also fall onto the conveyer R, to be carried along by the latter with the ashes and thus removed from the furnace. The shaft R′ of the conveyer R is provided at its outer end with a bevel gear wheel R^2, in mesh with a bevel gear wheel R^3, fastened to the lower end of the shaft N, so that when the latter is rotated, a rotary motion is given to the conveyer R, for carrying the ashes and cinders out of the furnace at one end thereof.

From the foregoing it will be seen that when the shaft I is rotated at a high rate of speed, then the brushes C and C′ are revolved at the same speed, to forcibly scatter the coal onto the grate bars B^5 of the grate sections B′ and B^2, and at the same time a traveling motion is given to the endless cable or chain E^6, so that the disks E^7 continually feed coal to the said brushes by way of the openings E^8 and E^9.

By connecting the main shaft I with the vertical shaft N in the manner described, a slow motion is given to the said shaft N, which in turn actuates the rocking grate bars B^5, so that the fuel is continually agitated, to insure a uniform and complete combustion of the fuel. The shaft N also drives the scrapers Q, to cause the ashes to be carried to the conveyer R, and the dumping bars B^6 are periodically actuated, to dump the spent material onto the conveyer, for the latter to carry the spent material off together with the ashes, as previously explained.

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

1. A stoker comprising the following instrumentalities in combination, viz: a fuel supply, a fuel conveyer for conveying the fuel from the said supply and delivering it to a place of discharge, a delivery device for moving the fuel from the said place of discharge onto the grate, a grate having movable grate bars, an ash remover, and means for simultaneously actuating the fuel conveyer, the delivery device, the grate bars, and the ash remover.

2. A stoker, comprising a hopper, a fuel conveyer for removing the fuel from the hopper and delivering it to a place of discharge, a delivery device for delivering the fuel onto the grate, a grate having movable grate bars, an ash remover under the grate bars, an ash conveyer for carrying off the ashes delivered thereto by the ash remover, and means for simultaneously actuating the fuel conveyer, the delivery device, the grate bars, the ash remover and the ash conveyer.

3. A stoker comprising the following instrumentalities in combination, namely: a hopper, an endless fuel conveyer for removing the fuel from the hopper, revolving brushes for brushing the fuel received from the conveyer onto the grate, a grate having movable grate bars, an ash-remover under the grate bars, an ash-conveyer for carrying off the ashes and into which delivers the said ash-remover, and means for simultaneously actuating the said fuel conveyer, the said brushes, the said grate bars, the said ash-remover and the said ash-conveyer.

4. In a stoker, the combination with a furnace, and its grate, of brush casings on the front of the furnace and opening into the same, one at each side of the longitudinal center of the grate, a revolving brush in each casing for feeding fuel onto the grate, a casing above the brush casings and having tubular members, one of which is provided with valved openings in its bottom opening into the brush casings, and an endless fuel conveyer in the tubular members of the said casing for delivering fuel to the brushes.

5. In a stoker, the combination with a furnace and its grate, of a brush casing on the front of the furnace and opening into the same, a brush in the casing for feeding fuel onto the grate, a conveyer casing extending horizontally along the front of the furnace above the brush casing and having tubular members, one of which communicates through an opening in its bottom with the brush casing, an endless conveyer in the conveyer casing and traveling through the tubular members thereof, and means for operating the conveyer from the brush operating means.

6. In a stoker, the combination with a furnace and a grate, of brush casings on the front of the furnace and opening into the same, one at each side of the center of the grate, a revolving brush in each casing for feeding the fuel onto the sides of the grate, the brushes being mounted on a common shaft, a casing having openings leading into the brush casings, a fuel conveyer in the said casing, and means for operating the conveyer from the shaft of the brushes.

7. In a stoker, the combination with a furnace, of brush casings on the outside of the furnace and opening into the same, a revolving brush in each casing, the brushes being on a common shaft, a casing above the brush casings and having tubular members in the bottom of one of which are openings leading to the brush casings, an endless fuel conveyer in the tubular members of the casing, a hopper having chutes opening into the tubular members of the said casing, and means for operating the conveyer from the shaft of the brushes.

8. In a stoker, the combination with a furnace, of brush casings on the outside of the furnace and opening into the same, a revolving brush in each casing, a casing above the brush casings and opening into the said brush casings, an endless conveyer in the casing above the brush casings for feeding the fuel to the brush casings, means for oper-

ating the revolving brushes, and means for operating the conveyer from the brush operating means.

9. In a stoker, the combination with a furnace, and a grate having rocking members, of revolving brushes for feeding fuel to the grate, an endless conveyer for feeding the fuel to the brushes, traveling ash scrapers below the grate, a conveyer for removing the ashes delivered thereto by the scrapers, and means for simultaneously operating the rocking members of the grate, the brush, the fuel conveyer and the ash scrapers and conveyer.

10. In a stoker, the combination with a furnace, of a revolving brush for feeding fuel into the furnace, a feed device for feeding fuel to the brush, means for operating the feed device from the brush shaft, a grate having rocking grate bars and dumping bars, means for operating the grate bars from the brush shaft, and means for operating the dumping bars from the grate bar operating means.

11. In a stoker, the combination with a furnace, of a revolving brush for feeding the fuel into the furnace, a feed device for feeding fuel to the brush, means for operating the feed device from the brush shaft, a grate having rocking grate bars and dumping bars, means for operating the grate bars from the brush shaft, and means for periodically operating the dumping bars from the grate bar operating means.

12. In a stoker, the combination with a furnace, of a revolving brush for feeding fuel to the furnace, a feed device for feeding fuel to the brush, means for operating the feed device from the brush shaft, a grate having rocking grate bars and dumping bars, a vertical shaft, gearing between the upper end of the shaft and the brush shaft, mechanism between the vertical shaft and the grate bars for rocking the same, and mechanism for periodically operating the dumping bars from the grate bar operating mechanism.

13. In a grate the combination with a furnace, of a revolving brush for feeding fuel to the furnace, a feed device for feeding fuel to the brush, means for operating the feed device from the brush shaft, a grate having rocking grate bars and dumping bars, a vertical shaft, gearing between the upper end of the said shaft and the brush shaft, mechanism between the vertical shaft and the grate-bars for rocking the grate bars, mechanism for periodically operating the dumping bars from the grate bar operating means, an ash remover below the grate, means for operating the ash remover from the vertical shaft, an ash conveyer, and means for operating the said conveyer from the vertical shaft.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THADDIOUS V. ELLIOTT.

Witnesses:
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EVERARD BOLTON MARSHALL.