

No. 895,764.

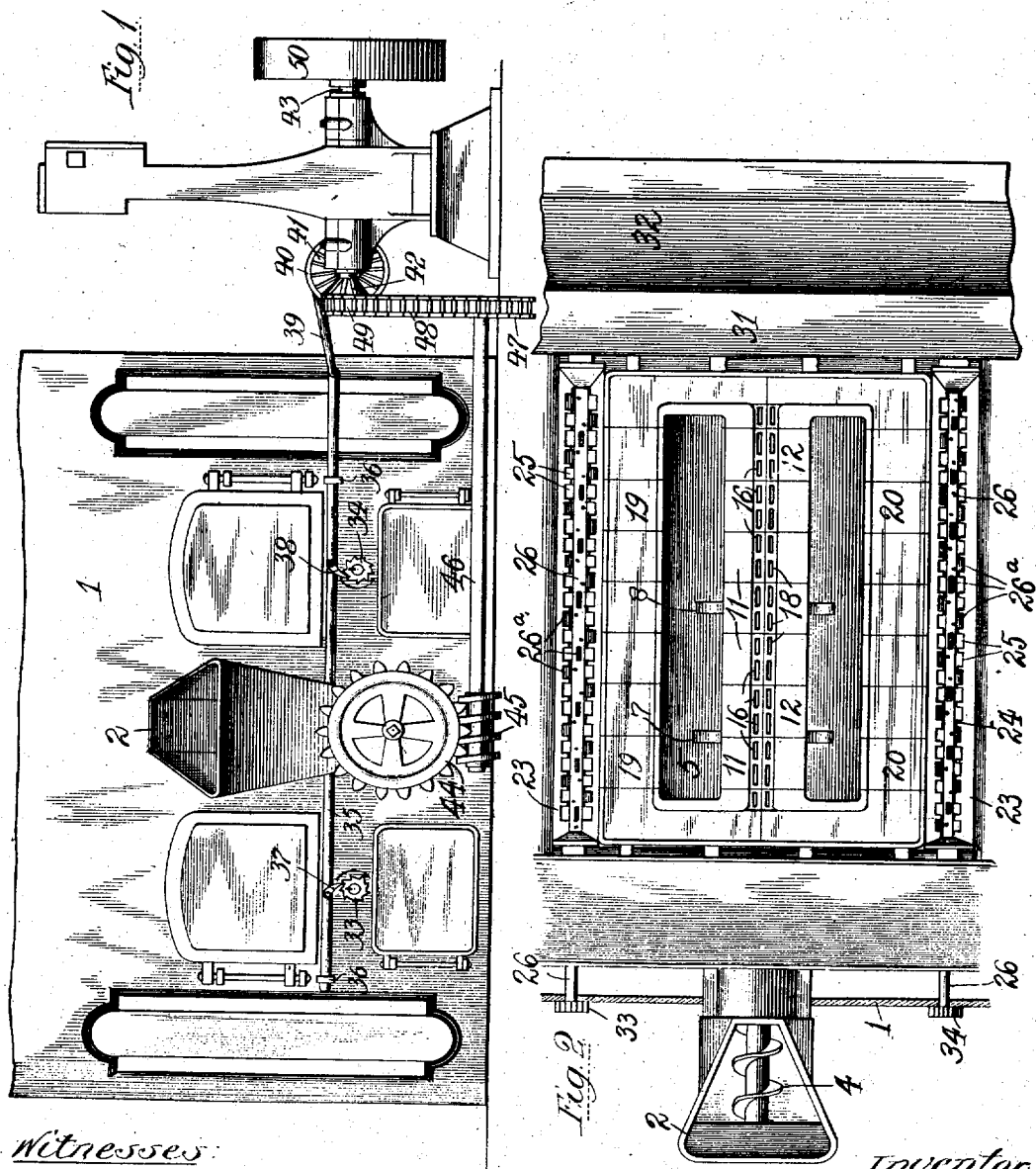
PATENTED AUG. 11, 1908.

J. E. JONES.

AUTOMATIC FURNACE.

APPLICATION FILED JUNE 28, 1900. RENEWED DEC. 6, 1907.

3 SHEETS—SHEET 1.



Witnesses:

Lute S. Altier

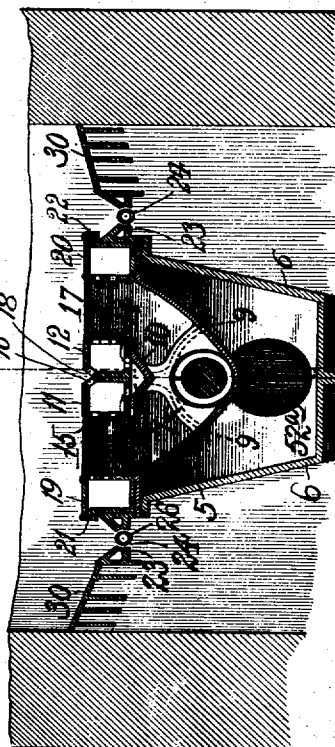
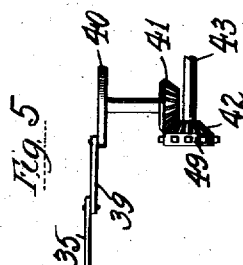
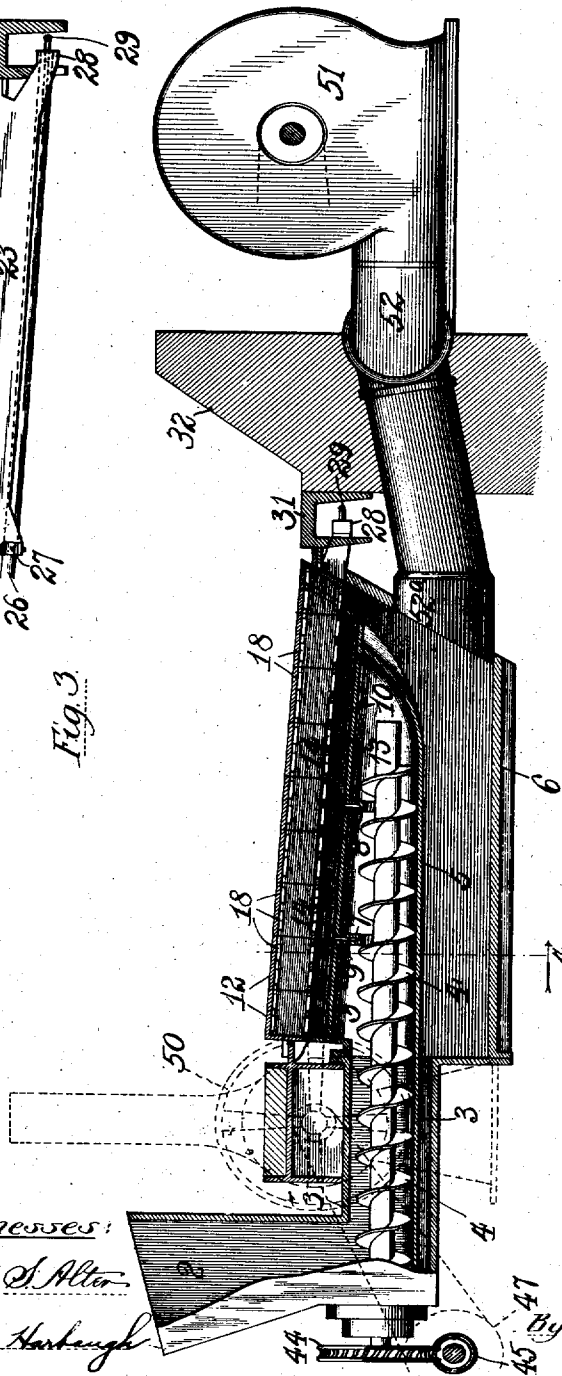
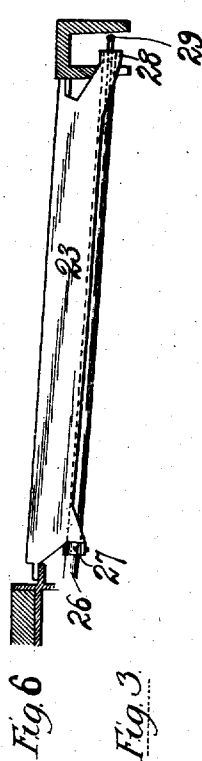
Geo. R. Harbaugh

Inventor
 Joel Edgar Jones
 By Chas. H. Hutton & M. E. Hays

J. E. JONES.
AUTOMATIC FURNACE.

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3 SHEETS—SHEET 2.



Witnesses:
Lute S. Alter
Geo. R. Harbaugh

Inventor:
Joel Edgar Jones
Coburn, Abbott & McElroy
Attys.

J. E. JONES.

AUTOMATIC FURNACE.

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3 SHEETS—SHEET 3.

Fig. 8.

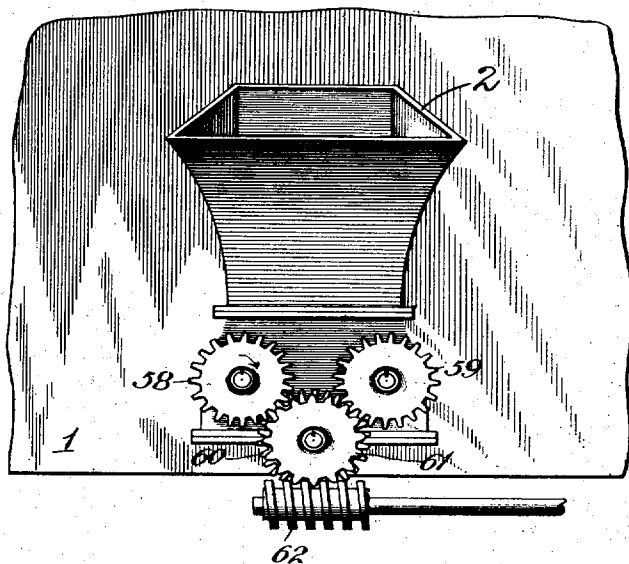
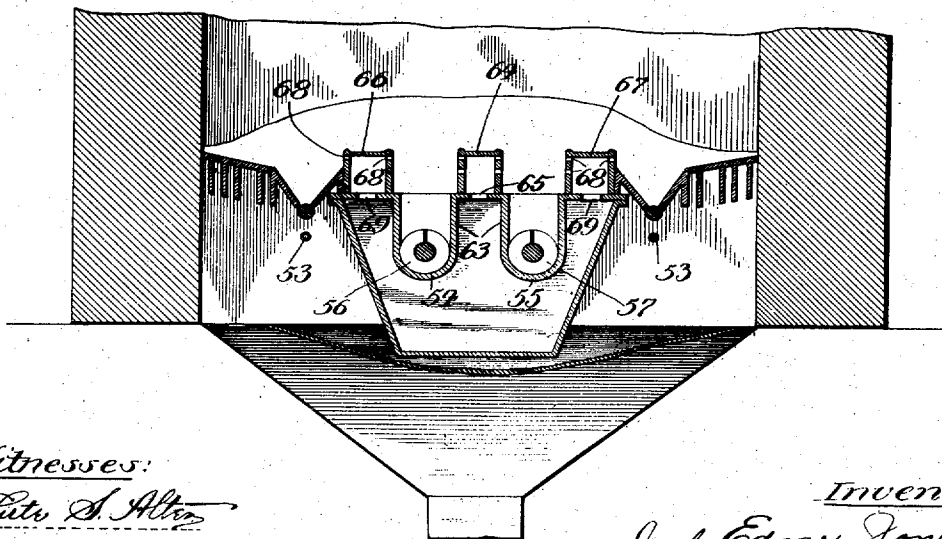


Fig. 7.



Witnesses:

Lute A. Altis

Geo. R. Hardhaugh

Inventor

Joel Edgar Jones
By Coburn, Wilson & McElroy
Attys.

UNITED STATES PATENT OFFICE.

JOEL EDGAR JONES, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO JONES AUTOMATIC STOKER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC FURNACE.

No. 895,764.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed June 28, 1900, Serial No. 21,936. Renewed December 6, 1907. Serial No. 405,422.

To all whom it may concern:

Be it known that I, JOEL EDGAR JONES, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Furnaces, of which the following is a specification.

My invention relates to what are known in the practical art as automatic furnaces or stokers of the under feed class, and one object thereof is to improve the general construction and operation of the retort as well as the fuel feeding mechanism, and another object is to provide suitable and efficient means for grinding and disposing of the slag, and keeping the twyers clean, whereby a self-feeding and self-cleaning furnace is obtained.

My invention also embodies novel and advantageous constructions and operations in connection with the features above mentioned, which will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a front elevation of a portion of a furnace front, also showing a small engine which may be used for operating the mechanism connected with the system; Fig. 2, a sectional plan of the retort, slag or clinker basins and the hopper; Fig. 3, a section on line 3 of Fig. 4, but with the blower shown in elevation; Fig. 4, a section on line 4 of Fig. 3; Fig. 5, a detail view of the mechanism for reciprocating the bar which actuates the clinker bars; Fig. 6, a view in elevation of one of the clinker or slag basins; Fig. 7, a section of a modified form of construction in which two conveyers are used instead of one; and Fig. 8, a view in elevation showing the gears whereby the two conveyers may be properly operated by the same worm.

In front of a furnace or boiler 1 is arranged the usual hopper 2 communicating with a conveyer pipe 3 in which a screw conveyer or worm wheel 4 operates and extends into the retort or magazine 5. The retort may be of the usual form, but is preferably creased at its rear end to present a central wedge to the fuel fed from the end of the conveyer. The conveyer, as shown, is of uniform carrying capacity and its object is to feed the fuel from the hopper and thence upwards in the retort. A casing 6 extends below the retort and may form a support for the retort, as seen in Fig. 4.

The preferable construction and arrangement of the retort and outer casing is shown in the drawings in which the casing has top side flanges on which rest similar flanges of the retort. The slag basins and twyer blocks are also preferably supported on the casing flanges.

The retort which is arranged and supported in any suitable way, consists preferably of a casting provided with the deflecting plates 7 and 8 which are by preference made hollow to afford air passages 9 communicating with the chamber beneath formed by the retort casing 6. Each deflector is arched at its lower end so as to inclose the sides and top of the conveyer, and as it is provided with an opening forming a port or passage substantially the diameter of the conveyer, it provides a cylindrical bearing which is engaged by the periphery of the flights of the conveyer so that the conveyer is held in place and prevented from being lifted by the coal under the conveyer. By reason of the arrangement described of the deflectors 7 and 8 the retort is divided into separate chambers having no communication with each other except between the flights of the conveyer and over the top of the deflectors. A longitudinal V-shaped casting or backbone 10 is also formed on the retort and to the same are secured the two series of hollow twyer blocks 11 and 12 which, when in position on the part 10, form a V-shaped air chamber 13 communicating with the passages 9 of the hollow deflecting plates and with the chambers of the blocks 11 and 12 through ports 14. The blocks 11 have lateral twyer openings 15 and diagonal twyer openings 16 on their inner sides, while the blocks 12 have similar twyer openings 17 and 18.

Along each side of the retort are series of twyer devices 19 and 20 having twyer openings 21 and 22, respectively, and preferably consisting of a series of removable blocks. Arranged longitudinally of the retort, on each side thereof, beyond the series of blocks 19 and 20, is formed what may be conveniently termed a slag or clinker basin comprising a frame work or casting 23 suitably supported and provided with a central longitudinal opening 24 at the bottom of the basin, and a series of lateral openings 25. A bar or shaft 26 having teeth 26^a registering with said openings 25, is located in the opening 24 and extends through the closed ends of

the basin and through the furnace front, bearing at one end in the box 27 and at the other end in a box or journal 28 provided in an extension of the slag basin, which box is preferably arranged outside the retort beyond any injurious effect of the heat. The teeth on the clinker bar are preferably arranged spirally thereon so that only a limited number of the teeth will engage with the openings at any one time. Moreover, the particular shape and inclination of the openings are immaterial so long as the desired purpose is attained.

The clinker bars are preferably hollow and provided with a series of openings preferably arranged spirally. The front end of the clinker bars is closed, but the rear end is open and connected to a small steam pipe 29, communicating with a source of steam, either exhaust or live. By this means steam is caused to be emitted for the purpose both of moistening the clinkers and preventing the burning out of the basin from the great heat, besides aiding in combustion. Between the furnace wall and the basins dead grates 30 may be provided and preferably set on an incline so that the molten slag will run into the slag basins more readily. It is understood that both basins are similar in construction and operation and, therefore, the above description is applicable to both of them.

As shown in Fig. 2, the hollow rotating bars 26 have a series of perforations which are so located with respect to the teeth on the bars as to emit steam against clinkers or slag when the latter are engaged by the teeth and being operated upon or ground. At the same time the steam serves to cool the bars and basins and also aids in combustion.

As shown in Figs. 2 and 3, the basins may be supported upon a flange formed on a combined bearing bar and end grate 31, which may be arranged in the usual way in front of the bridge wall 32.

While the clinker bars may be operated by an ordinary hand wrench or crank and while the different devices may be separately operated, I have shown a system or plan whereby they may be operated by the same engine or power which may serve to run the blower and also the fuel conveyer. Outside the boiler front the clinker bars are provided with oppositely actuated ratchet wheels 33 and 34 movable in the direction of the arrows, respectively. A bar 35 reciprocating in suitable guides or bearings 36 carries pivoted pawls 37 and 38 respectively cooperating with the ratchet wheels 33 and 34. A link 39 connects the bar 35 with a wheel 40 driven by a bevel gear 41 with which meshes the bevel gear 42 on the shaft 43 of any suitable engine.

As shown in Fig. 1, a push on the bar 35 actuates the clinker bar 34 while a pull there-

of actuates the clinker bar 33. This arrangement possesses the advantage of throwing the strain of only one clinker bar at a time upon the actuating bar.

For operating the conveyer, any suitable method may be adopted. As shown, the shaft of the conveyer is carried outside the furnace front where a worm wheel 44 is attached thereto. A driving worm gear 45 meshing with said wheel 44 is secured to a shaft 46 which carries a sprocket wheel 47 driven by a sprocket chain 48 and sprocket wheel 49 on the engine shaft. Obviously, mechanical equivalents of the driving connections shown may be adopted. The engine may also be used to drive the blower and in such case its pulley 50 may be connected by a belt to an air blower 51 whose delivery pipe 52 communicates through the inlet connection 52^a with the air box or chamber formed by the retort casing 6. From the casing 6 air passes through the passages 9 of the deflecting plates into the chamber 13 of the back-bone 10, and then from such chamber through the openings 14 into the chambers of the blocks 11 and 12; from which it emerges by the passages 15, 16, 17 and 18. Air is supplied from the casing 6 to the blocks 19 and 20 through suitable openings (not shown) in the bottom of such blocks. While the air is shown as entering the rear of the retort casing through such delivery pipe, it is obvious that the air may be introduced at any other point in the casing, as may be found convenient or desirable.

In operation, the fuel is underfed, that is, the fuel supplied to the hopper is conveyed by the worm or screw conveyer into the retort, being thereby fed uniformly and at the desired speed. The transverse deflecting plates serve to deflect the fuel upwards, and plate 7, which is located in the forward part of the retort, particularly serves to deflect fuel to the front of the retort. The fuel is coked and the coke overflows on both sides over the top of the twyer blocks, which supply the necessary air to the gases generated in the coking operation and also supply air for the combustion of the coke. The central series of twyer blocks supplies the necessary air to the middle bed or portion of the fuel or coke and prevents the formation at this point of any clinkers, whereby the area of the grate surface covered by the twyers may be materially increased. The slag or clinkers overflowing the sides of the retort fall into the slag basins and when in molten condition are ground down into the ash pit by the action of the rotating clinker bars. The steam emitted at the slag basins serves to cool them as well as the bars and prevent their burning out; it also moistens the slag or clinkers and in addition serves to aid in the combustion of the fuel.

By the use of the clinker bars, a serious

objection incident to the use of automatic stokers is avoided inasmuch as the clinkers in my device cannot clog the outside twyers or collect and prevent the effective operation thereof. Furthermore, the necessity of frequent "slicing" and cleaning the fire in order to clean these twyers, as well as the opening of doors, is avoided. The slag broken by the clinker bars will fall into an ash pit or hopper such as illustrated in Fig. 6, for instance, from which the slag refuse may be conveyed away by a suitable conveyer if the most economical system is adopted.

As will be readily understood from the drawings, the small engine simultaneously actuates the screw conveyer, the clinker bars and also the blower, by means of the connections hereinbefore described. The advantage of having all of these parts operated by a common engine consists in the possibility of regulating the speed of the moving parts concurrently. When the engine is regulated to run slowly, the fuel is fed proportionately slower, and less volume of air is introduced and the clinker bars are also rotated slower. On the other hand, when the fire is to be forced, the engine is regulated to run faster, whereupon the feed of fuel and the volume of air will be increased as well as the speed of rotation of the clinker bars. By this arrangement perfect control may be had from one throttling valve.

The deflecting plates 7 and 8 in the retort are adapted to deflect the coal extending beyond the radius of the conveyer. It is evident that as soon as the fuel is conveyed beyond the pipe 3, some of the coal will spread beyond the radius of the conveyer and this coal will be forced upwardly in the retort by the deflecting plate 7 whereby the coal will not only be thus deflected upwardly, but the front of the retort will be kept filled. Any coal leaving the conveyer after the plate 7 has been passed will be deflected in a similar manner by the plate 8, while the coal continuing with the conveyer will be forced backwardly and upwardly along the sloping rear end of the retort by the action of the conveyer. The V-shaped back-bone 10 serves to divide the fuel and deflect it evenly to both sides of the retort. As shown in Fig. 4, the ribs or plates are hollow, which will permit of the passage of air from the casing 6 and thereby serve to keep these plates comparatively cool. By means of the construction of conveyer and plates, the fuel is fed and distributed in the retort continuously and uniformly so as to form a bed which is substantially level from front to rear.

The central series of twyers 11 and 12 not only have the advantage of supplying air to the middle portion of the fuel bed, but also prevent the formation of clinkers along the middle line of the retort and, furthermore, permit of the use of a retort with a wide open

top or grate surface so that a single retort with a single conveyer may be used in a furnace of considerable width. By reason of the extended grate surface and the increase in the effective air distribution, I am enabled to carry a thin bed of fire over the twyers, through which a sufficient volume of air at low pressure may be supplied, thereby enabling complete combustion in the furnace instead of causing the gases to be driven out before combustion on account of a high air pressure, as required in present practice. Furthermore, the possibility of having a thin fire affords a greater distance between the fire and the crown sheet of the boiler thereby avoiding liability of burning out or blistering such sheet.

In Figs. 7 and 8 is shown a modified construction of my automatic furnace so far as the construction of the retort is concerned. In these figures, the slag basins and dead grates have a construction similar to those shown in the preceding figures and they are, therefore, correspondingly indicated. There is, however, one difference as to the slag basin in that in the form shown in Fig. 7 the clinker bar, which may be hollow or solid, does not have the function of a steam pipe, but small perforated steam pipes 53 are arranged below the slag basin to emit steam for the same purpose as the clinker bar when also used as a steam pipe. These steam pipes 53 run longitudinally of the retort and may be connected to a suitable source of steam supply, either live steam or exhaust steam. When exhaust steam is used it may be preferable to use the clinker bar as the steam pipe and when live steam is used it may be preferable to employ the small separate steam pipes 53.

As shown in Fig. 7, the magazine consists of two retorts 54 and 55 having separate screw conveyers 56 and 57, respectively. The hubs or shafts of the conveyers extend through the furnace front, where they are provided with the gear wheels 58 and 59, respectively, which mesh with a common pinion 60 whereby the conveyers are rotated simultaneously in opposite directions. The gear 60 is connected to a worm gear 61 actuated by a worm 62 driven in any suitable way.

The rectangular upwardly extending portion 63 of the magazine forms the middle part of the air chamber and a series of central twyer blocks 64 having suitable twyer openings is arranged thereon and communicates with such chamber through ports 65. At the sides of each separate retort and on a laterally extending flange are arranged series of twyer blocks 66 and 67 having suitable twyer openings 68 and communicating with the air chamber through ports 69. The retorts may be provided, if desired, with deflecting plates or arches of the same con-

struction as shown in Figs. 3 and 4, and the operation will be substantially the same in the modified form of construction as in the construction hereinbefore described.

5 So far as the self-cleaning feature, as well as the deflecting plates, are concerned; the particular method of feeding the fuel whether by screw conveyer, plunger or otherwise, is immaterial.

10 I claim:

1. The combination of a retort, a conveyer extending into the retort, and a deflector provided with a passage-way of substantially the same diameter as the conveyer, said deflector adapted to deflect laterally the material not positively conveyed through the passage-way by the conveyer.

2. The combination of a retort, a screw-conveyer extending into the retort, and a deflector provided with a passage-way of substantially the same diameter as the conveyer, said deflector adapted to deflect laterally the material not positively conveyed through the passage-way by the conveyer.

3. In an underfeed stoker, the combination of a retort, a conveyer arranged longitudinally thereof, and a series of deflectors, each being so formed and arranged with respect to the retort as to form a passage-way for the conveyer of substantially the same size in cross section as the conveyer and adapted to deflect laterally the material not positively carried through said passage-way by the conveyer.

4. In an automatic furnace, the combination of a retort, a screw-conveyer extending into the retort for forcing fuel therein, and an arched deflecting-plate arranged in the retort in close proximity to the conveyer for deflecting fuel which extends beyond the radius of the conveyer.

5. In an underfeed stoker, the combination with a retort, of a screw-conveyer therein, and a deflector in said retort dividing it into separate chambers having no communication with each other except between the flights of the conveyer and over the top of said deflector.

6. In an underfeed stoker, the combination of a retort, a screw-conveyer within said retort, and a cylindrical bearing within the retort engaging with the periphery of the flights of the screw conveyer and in the line of travel of material fed by the screw conveyer.

7. In an underfeed stoker, the combination with a retort and a screw-conveyer within said retort, of a deflector carried by the retort and inclosing the sides and top of the conveyer to form an opening through which material fed by the conveyer may pass.

8. In an underfeed stoker, the combination with a retort and a screw-conveyer in said retort, of a plurality of bearings surrounding the sides and top of the wings or

flights of the conveyer and located in the line of travel of the material fed by the conveyer, so as to present a series of openings through which material is fed.

9. In an underfeed furnace, the combination of a retort, a screw-conveyer for forcing fuel therein, and a deflecting-plate in the retort against which the fuel strikes and is deflected, and having a port or passage for the conveyer.

10. In an underfeed furnace, the combination of a retort, a deflecting-plate in the retort provided with an opening, and a screw-conveyer for forcing the fuel therein and adapted to the opening in the plate.

11. In an underfeed furnace, the combination of a retort having a transversely curved bottom and deflecting-plates dividing the retort into chambers, said plates being arched at their lower ends, and a screw-conveyer filling the openings provided by the arches in said plates.

12. In an underfeed furnace, the combination of a retort, a screw-conveyer therein, and a dividing deflecting-plate having a port to fit the conveyer whereby such fuel as is in the retort beyond the area of the flights of the conveyer is deflected upwardly by the plate.

13. In an underfeed furnace, the combination of a retort, a deflecting-plate therein dividing the retort into chambers, a port in the plate, and a screw-conveyer whose flights approximately correspond in diameter to the area of the port.

14. In a stoker, the combination with a retort, a screw conveyer within the retort, the said retort substantially fitting the cross-sectional curvature of the conveyer for a portion of its transverse area and then flaring outwardly to increase the fire zone, and combined deflecting and upthrust plates adapted to the flights of the conveyer.

15. In a stoker, the combination with a retort having a transversely curved bottom, a screw conveyer adapted to the curve of the bottom, and deflecting plates in the retort curved to fit the flights of the worm and serving as upthrust bearings therefor.

16. In a stoker, the combination with a retort having a transversely curved bottom, a screw conveyer adapted to the curved bottom of the retort, and a combined upthrust and deflector having its edge adjacent the conveyer in continuation of the curvature of the retort bottom.

17. In a stoker, a retort having a transversely curved bottom, a screw conveyer substantially filling the bottom of the retort, and a deflector within the retort located over the conveyer and having its edge adjacent to the conveyer substantially concentric therewith.

18. In an automatic furnace, the combination of a retort, mechanism for forcing fuel

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therein, and a deflecting-plate arranged transversely of the retort and having a passage for the circulation or passage of air.

19. In a furnace, the combination of a retort provided with a conveyer, twyers, and a deflector in the retort having a passage for conducting air to the twyers.

20. In a furnace, the combination of a casing having an air inlet, a retort, a conveyer and fuel deflectors therefor, and a series of twyer blocks arranged longitudinally of the retort over the conveyer, each of said deflectors having a passage through which the air passes from the casing to the twyer blocks.

21. In a furnace, the combination of a retort provided with means for forcing fuel therein, twyers extending longitudinally of the retort, and a fuel deflector in the retort having a passage for conducting air to the twyers.

22. In a furnace, the combination of a retort having a transverse deflecting plate and a backbone, twyers on such backbone forming, in connection therewith, a chamber which extends longitudinally of the retort and communicates with the twyers, and a source of air supply, the deflecting plate having a passage to conduct the air to the said chamber.

23. In an automatic furnace, the combination of a retort, fuel feeding mechanism therein, and means arranged above the bottom of the retort for dividing and deflecting the fuel to both sides of the retort.

24. In an automatic furnace, the combination of a retort, fuel feeding mechanism therein, and a central back-bone arranged above the bottom of the retort for dividing and deflecting the fuel to both sides of the retort.

25. In an underfeed furnace, the combination of a retort having a transverse deflecting-plate, a longitudinal back-bone above the plate, and a screw-conveyer for forcing the fuel within the retort.

26. In an underfeed furnace, the combination of a retort having transverse deflecting-plates, a back-bone extending centrally of the retort near the top thereof to divide the fuel to both sides of the retort, and fuel feeding mechanism within the retort.

27. In an automatic furnace, the combination of a retort having a transverse deflecting-plate and a longitudinal back-bone, twyer blocks on such back-bone, and means for forcing fuel into the retort.

28. In an automatic furnace, the combination of a retort having a transverse deflecting-plate and a back-bone extending centrally of the retort substantially from end to end at the top plane thereof, twyer blocks on such back-bone, and means for forcing fuel into the retort.

29. In an automatic furnace, the combination of a retort having a transverse deflect-

ing-plate and a central back-bone connected to such plate, twyer blocks on such back-bone, twyer blocks along the sides of the retort, and means for forcing fuel into the retort.

30. In an automatic furnace, the combination of a retort having a transverse plate and a substantially V-shaped back-bone, twyers on such back-bone forming, in connection therewith, a V-shaped chamber longitudinal of the retort, said chamber having an air inlet and communicating with the twyers and an underfeeding mechanism for the retort.

31. In an underfeed furnace, the combination of a retort, a screw-conveyer therein, a series of twyer blocks on each side of the retort, and a central series of twyer blocks supported on the retort in its longitudinal central line.

32. In an underfeed furnace, the combination of a retort, a screw-conveyer therein, a series of twyer blocks on each side of the retort, a central longitudinal back-bone, and a series of twyer blocks on the back-bone.

33. In an automatic furnace, the combination of an underfeeding stoker, twyers therefor, and slag grinding mechanism, for disposing of the slag and keeping the twyer openings clear.

34. In an automatic furnace, the combination of an underfeeding stoker, twyers therefor, and slag grinding mechanism arranged along the sides of the stoker and adapted to dispose of the slag and thereby keep the twyer openings clear and maintain a substantially horizontal bed of fire.

35. In an automatic furnace, the combination of an underfeeding stoker, twyers therefor, slag basins arranged beyond the sides of the stoker and substantially at the fire line, such basins each having a longitudinal opening and a rotatable bar operating in each of such openings to keep the twyer openings clear and to dispose of the slag, thereby preventing accumulation of slag beyond each side of the stoker and maintaining a substantially horizontal bed of fire.

36. In an automatic furnace, the combination of an underfeeding stoker, twyers therefor, slag basins arranged beyond the sides of the stoker and each having a substantially central and longitudinal opening which is provided with a series of side openings, such basins being adapted to receive overflow from the stoker, and rotatable bars having teeth or projections working through said side openings.

37. In an automatic furnace, the combination of a retort, underfeeding mechanism therefor, twyers arranged along the sides of the retort, slag basins arranged longitudinally of the retort and outside and adjacent to such twyers, and rotatable clinker bars in such basins.

38. In an automatic furnace, the combina-

tion of a retort having lateral twyers and slag grinding mechanism at the sides of the retort for disposing of the slag and keeping the twyer openings clear.

39. In an automatic furnace, the combination of a retort with inner and outer lateral twyers, means for feeding fuel thereto, slag or clinker basins along the sides of the retort, clinker bars rotating in such basins to grind the clinkers and keep the twyer openings clear, and means for rotating such bars in opposite directions.

40. In a furnace, the combination of an underfeeding stoker, twyers therefor, slag basins arranged along the sides of the stoker and open at their bottoms, bars rotating in such basins and adapted to dispose of the slag and keep the twyer openings clear, such bars being journaled outside and beyond the front and rear ends respectively of the basins, and means for rotating the bars.

41. The combination of a casing having side flanges, a retort having side flanges resting upon the flanges of said casing, twyer blocks supported on the retort flanges, means in the retort for feeding fuel, and a slag grinding mechanism arranged beyond the twyer blocks and along each side of the retort, such slag grinding mechanisms being supported on the flanges of the casing.

42. The combination of a retort, fuel feeding mechanism therein, twyers therefor, slag grinding mechanism arranged beyond each side of the retort and adapted to keep the twyer openings clear, such mechanism consisting of a basin having a longitudinal opening, and a hollow perforated bar rotatable in such opening and communicating with a source of steam which is emitted through the perforations in said bar to cool the same and the basin and to prevent sticking of the slag to the basin as well as to aid in combustion above the slag basin.

43. The combination of a retort, fuel feeding mechanism therein, twyers therefor, slag grinding mechanism arranged beyond each

side of the retort and adapted to keep the twyer openings clear by disposing of the slag, such mechanism consisting of a basin having a longitudinal opening and a hollow bar rotating in such opening and provided with teeth or projections, said bar communicating with a source of steam and having openings located near said teeth to emit steam against the clinkers or slag while being contacted and operated upon by the teeth.

44. In an automatic furnace, the combination with a retort, of mechanism for feeding fuel into the retort, slag grinding mechanism on both sides of the retort, an air blower supplying air to the retort, and a common motor for actuating such feeding mechanism, such grinding mechanism and said blower.

45. In an automatic furnace, the combination of a retort, means for feeding fuel thereto, and a series of twyers located centrally and longitudinally of the retort.

46. In an automatic furnace, the combination of a retort, means for feeding fuel thereto, slag grinding mechanism along each side of the retort and grates beyond such mechanism and inclined downward thereto.

47. In an automatic furnace, the combination of a retort, means for feeding fuel therein, twyer blocks along two opposite sides of the retort, and slag grinding mechanism along the sides of the retort beyond such blocks and arranged substantially in the same plane as the grate or fire surface of the retort, such grinding mechanism receiving molten slag and refuse flowing over the twyer blocks and disposing of the same to keep the fire clear and clean and to extend the effective fire surface.

48. In an automatic furnace, the combination with fuel feeding mechanism, of a retort whose inner end is inwardly creased at its middle.

JOEL EDGAR JONES.

Witnesses:

SAMUEL E. HIBBEN,
LOUISE E. SERAGE.

Correction in Letters Patent No. 895,764.

It is hereby certified that in Letters Patent No. 895,764, granted August 11, 1908, upon the application of Joel Edgar Jones, of Chicago, Illinois, for an improvement in "Automatic Furnaces," an error appears in the printed specification requiring correction, as follows: In line 61, page 4, the word "onveyer" should read *conveyor*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of September, A. D., 1908.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

tion of a retort having lateral twyers and slag grinding mechanism at the sides of the retort for disposing of the slag and keeping the twyer openings clear.

39. In an automatic furnace, the combination of a retort with inner and outer lateral twyers, means for feeding fuel thereto, slag or clinker basins along the sides of the retort, clinker bars rotating in such basins to grind the clinkers and keep the twyer openings clear, and means for rotating such bars in opposite directions.

40. In a furnace, the combination of an underfeeding stoker, twyers therefor, slag basins arranged along the sides of the stoker and open at their bottoms, bars rotating in such basins and adapted to dispose of the slag and keep the twyer openings clear, such bars being journaled outside and beyond the front and rear ends respectively of the basins, and means for rotating the bars.

41. The combination of a casing having side flanges, a retort having side flanges resting upon the flanges of said casing, twyer blocks supported on the retort flanges, means in the retort for feeding fuel, and a slag grinding mechanism arranged beyond the twyer blocks and along each side of the retort, such slag grinding mechanisms being supported on the flanges of the casing.

42. The combination of a retort, fuel feeding mechanism therein, twyers therefor, slag grinding mechanism arranged beyond each side of the retort and adapted to keep the twyer openings clear, such mechanism consisting of a basin having a longitudinal opening, and a hollow perforated bar rotatable in such opening and communicating with a source of steam which is emitted through the perforations in said bar to cool the same and the basin and to prevent sticking of the slag to the basin as well as to aid in combustion above the slag basin.

43. The combination of a retort, fuel feeding mechanism therein, twyers therefor, slag grinding mechanism arranged beyond each

side of the retort and adapted to keep the twyer openings clear by disposing of the slag, such mechanism consisting of a basin having a longitudinal opening and a hollow bar rotating in such opening and provided with teeth or projections, said bar communicating with a source of steam and having openings located near said teeth to emit steam against the clinkers or slag while being contacted and operated upon by the teeth.

44. In an automatic furnace, the combination with a retort, of mechanism for feeding fuel into the retort, slag grinding mechanism on both sides of the retort, an air blower supplying air to the retort, and a common motor for actuating such feeding mechanism, such grinding mechanism and said blower.

45. In an automatic furnace, the combination of a retort, means for feeding fuel thereto, and a series of twyers located centrally and longitudinally of the retort.

46. In an automatic furnace, the combination of a retort, means for feeding fuel thereto, slag grinding mechanism along each side of the retort and grates beyond such mechanism and inclined downward thereto.

47. In an automatic furnace, the combination of a retort, means for feeding fuel therein, twyer blocks along two opposite sides of the retort, and slag grinding mechanism along the sides of the retort beyond such blocks and arranged substantially in the same plane as the grate or fire surface of the retort, such grinding mechanism receiving molten slag and refuse flowing over the twyer blocks and disposing of the same to keep the fire clear and clean and to extend the effective fire surface.

48. In an automatic furnace, the combination with fuel feeding mechanism, of a retort whose inner end is inwardly creased at its middle.

JOEL EDGAR JONES.

Witnesses:

SAMUEL E. HIBBEN,
LOUISE E. SERAGE.

Correction in Letters Patent No. 895,764.

It is hereby certified that in Letters Patent No. 895,764, granted August 11, 1908, upon the application of Joel Edgar Jones, of Chicago, Illinois, for an improvement in "Automatic Furnaces," an error appears in the printed specification requiring correction, as follows: In line 61, page 4, the word "onveyer" should read *conveyor*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of September, A. D., 1908.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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