(No Model.)

2 Sheets—Sheet 1.

J. E. SCHLIEPER & J. H. HARRISON.

SMOKELESS FURNACE AND STOKER.

No. 519,683. Patented May 8, 1894.

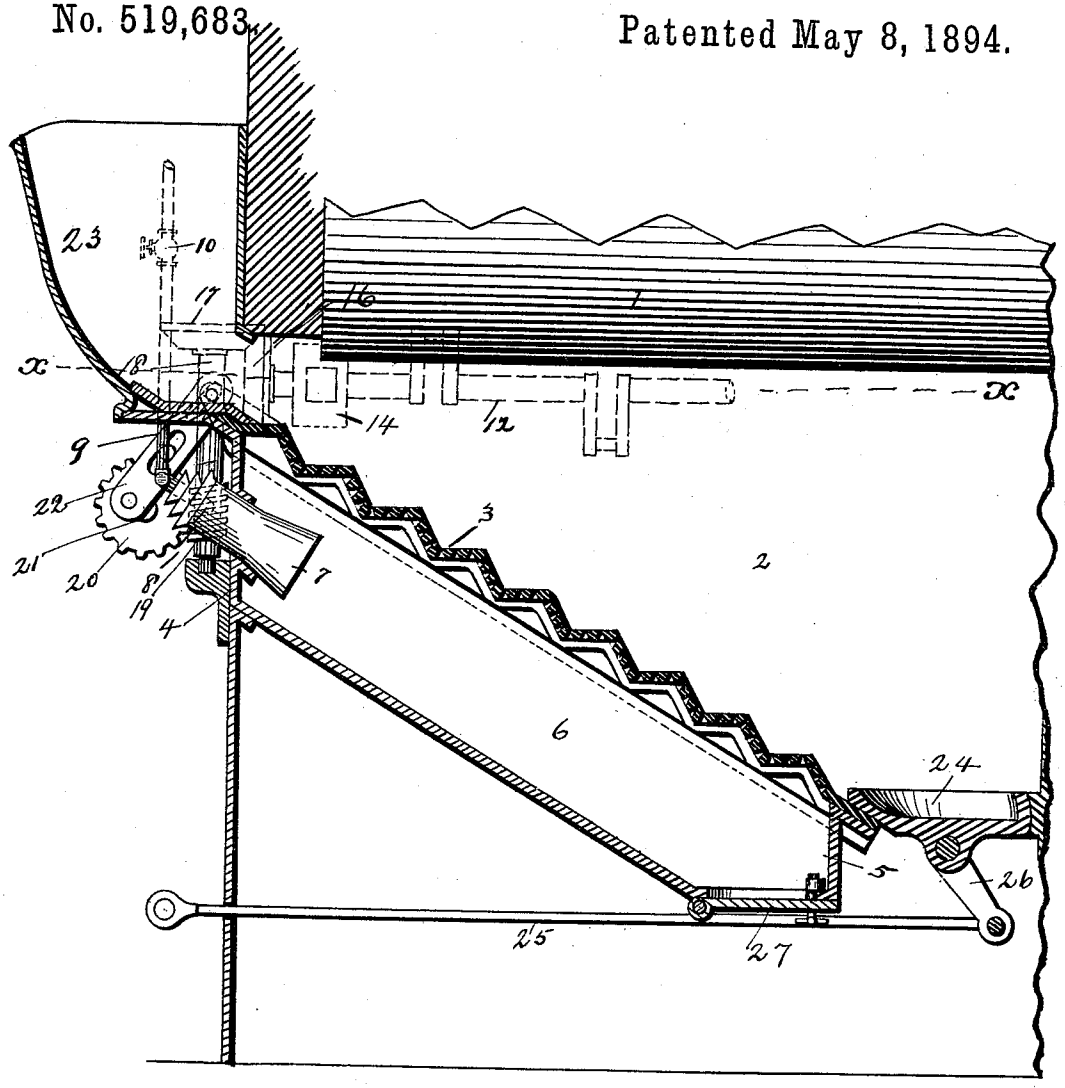

Figure 1

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WASHINGTON, D. C.

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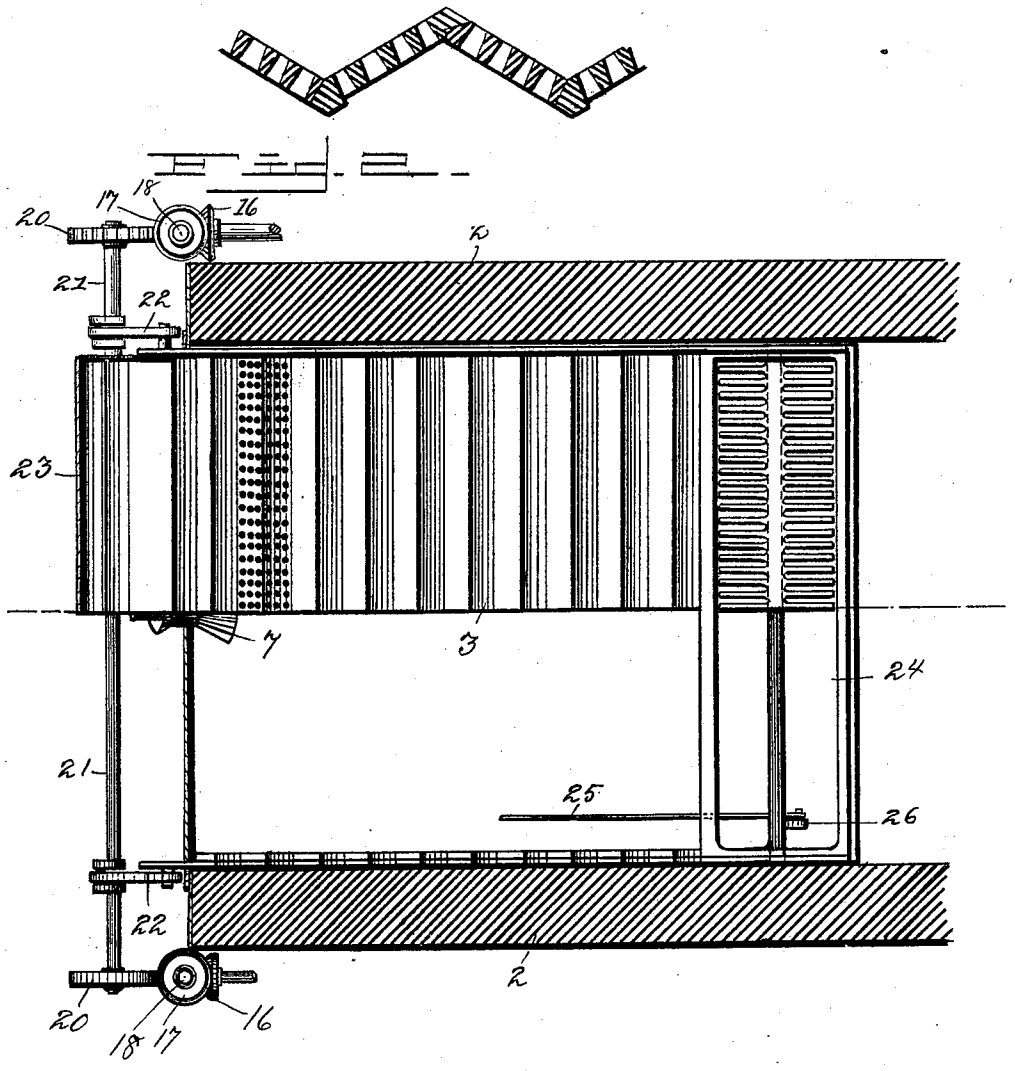

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UNITED STATES PATENT OFFICE.

JOHN E. SCHLIEPER AND JOHN H. HARRISON, OF PITTSBURG, PENNSYLVANIA; SAID HARRISON ASSIGNOR TO WELLS DICKSON WEBB, OF SAME PLACE.

SMOKELESS FURNACE AND STOKER.

SPECIFICATION forming part of Letters Patent No. 519,683, dated May 8, 1894.

Application filed February 7, 1893. Serial No. 461,410. (No model.)

To all whom it may concern:

Be it known that we, JOHN EDWARD SCHLIEPER and JOHN H. HARRISON, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Smokeless Furnaces and Stokers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Figure 1 indicates a side elevation of our improved stoker and smokeless furnace partly in section. Fig. 2, is a plan view of the furnace and stoker, taken on line *x*—*x* of Fig. 1, certain parts being removed for better illustration. Fig. 3, is a detail of the grate bars.

Our invention relates to automatic fuel feeding and smokeless furnaces, and our object is to produce a furnace of this character adapted to produce perfect combustion of carbonaceous fuel and to prevent the formation of clinker, and to this purpose our invention consists of the novel construction and arrangement of parts hereinafter specifically described, reference being had to the accompanying drawings forming part thereof, in which like numerals designate like parts wherever they occur.

Referring to said drawings, 1 is a boiler of any usual construction and is supported in the walls of the furnace, 2, in the forward end of which is located the grate bars, 3, which are formed of a series of plates alternately inclined in opposite directions, the upper and lower ends of which respectively, rest upon the upper and lower walls, 4 and 5 of the aero-steam chest, 6, which extends entirely under said grate bars which having numerous perforations or slots in close proximity and preferably conical as shown in Fig. 1, forming a perforated top therefor, whereby air and steam admitted into said chest through the funnel, 7, which projects in the front wall of said chest is forced in multitudinous jets through the fuel resting upon or slowly descending said grate bars producing practically perfect combustion of the same. Said perforations are formed in the plates at an angle with the surfaces thereof, as shown, so that the air and steam from the chest or chamber beneath is forced through the fuel on the bars in such wise as to promote combustion thereon at every progressive step. The inner end of said funnel is bell shaped and of greater diameter than the outer end thereof into which projects the nozzle 8, which is attached to the lower end of the vertical pipe 9, which is connected with the boiler and is provided with the valve 10, to regulate the supply of steam, which, passing from said boiler into said chest forms a vortex and draws into said chest a quantity of air dependent upon the size of said funnel and pressure of steam in said boiler, said steam and air being forced as heretofore stated through the fuel upon the perforated bars. The smooth surface of said grate bars not only facilitates the downward progress of said fuel, but also prevents the formation of clinker, the grate bars having a longitudinal vertical motion as hereinafter described, likewise tending to assist the progress of the fuel thereon. 12, is the crank shaft of an engine not shown adapted to operate said stoker. Said shaft is journaled suitably in the bearings 14, and is connected with the pitman of the engine and communicates motion to the bevel wheel 16, on one end of said crank shaft and thence to the bevel wheel 17, on the upper end of the vertical shaft 18, the lower end of which is provided with a worm 19, adapted to engage the teeth of the spur wheel 20, journaled on the horizontal shaft 21, whereby motion is communicated to and through the slotted eccentric 22, the upper end of which is attached to the upper end of the grate bar whereby the same is reciprocated in a vertical longitudinal direction thereby dumping the coal charged into the hopper 23, onto the top plates of said grate bar, the constant agitation of the same and the continual discharge of the numerous aero-steam jets from the aero-steam chest beneath said bars immediately consuming the fuel sparsely spread upon said bars and enabling the fuel on the steps above to drop

downward by gravity until the ashes reach the bottom of said bars where it is dropped upon the dumping grate 24, and thence by a forward motion of the rod 25 attached to the arm 26, into the ash pit beneath the chest. The pressure of air and steam from within said chest effectually prevents ashes dropping into said chest and tends to cast said ashes and fine coal dust into the heated gases above the incandescent fuel upon the bars, but in the event of any particles of ash passing through the perforations in the grate bars the same may be readily removed through the door, 27, in the bottom of said chest.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a furnace, the combination of a series of closely perforated and oppositely inclined grate bar plates, an air-steam chest extending under the same, and an air-steam funnel in the upper front end thereof, substantially as described and set forth.

2. In a combined stoker and smokeless furnace, the combination of a series of closely perforated and oppositely inclined grate bar plates adapted to reciprocate in a vertical longitudinal direction, an air-steam chest extending under the furnace, an air-steam funnel in the upper front end of the chest and a dumping grate at the lower end of the grate, as and for the purposes specified.

3. The combination in a stoker and smokeless furnace of an inclined grate formed of a series of closely perforated and oppositely inclined plates adapted to reciprocate in a vertical longitudinal direction, means to operate the same, an air-steam chest extending under the same and provided with a funnel in the upper front end thereof having a nozzle projecting in the same and connected with the boiler, a hopper adapted to receive fuel, a dumping grate at the lower end of the inclined grate, and a door at the bottom of the chest, substantially as described and set forth.

In testimony that we claim the foregoing we hereunto affix our signatures this 19th day of January, A. D. 1893.

J. E. SCHLIEPER. [L. S.]
J. H. HARRISON. [L. S.]

In presence of—
JAS. J. MCAFEE,
C. A. WILLIAMS.