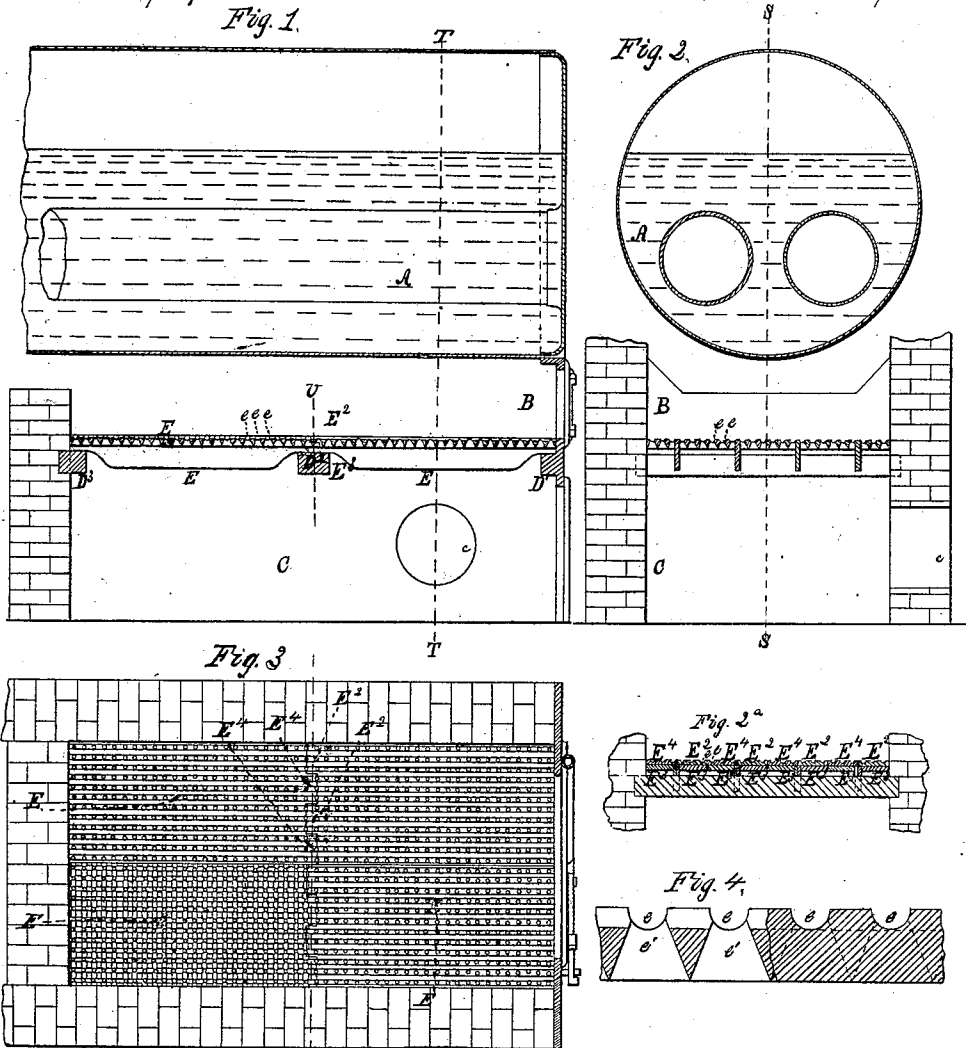


J. Alexander, Furnace Grate.

N^o 60,842.

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Witnesses

D. L. Huston
A. Hörmann.

Inventor

John Alexander

United States Patent Office.

JOHN ALEXANDER, OF GREEN POINT, NEW YORK.

Letters Patent No. 60,842, dated January 1, 1867.

GRATES FOR FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN ALEXANDER, of Green Point, in the city of Brooklyn, in the county of Kings, in the State of New York, have invented certain new and useful improvements in Grates for use in the Furnaces of Steam Boilers, and analogous situations; and I do hereby declare that the following is a full and exact description thereof.

My invention is especially adapted for use with coal dust, breeze, and analogous bad fuel, which is not well sustained by an ordinary grate; but it may be used in burning any kind of fuel. I have tested it with most success in burning coal dust, with the aid of a strong artificial blast. I will first proceed to describe what I consider the best means of carrying out my invention, and will afterwards designate the points which I believe to be new. The accompanying drawings form a part of this specification.

Figure 1 is a vertical section on the line S S in fig. 2.

Figure 2 is a corresponding section on the line T T in fig. 1.

Figure 2^a is a corresponding section on the line U U in fig. 1.

Figure 3 is a plan view of the grate. The drawings represent the novel parts with so much of the other parts as is necessary to show their relation thereto.

Figure 4 is a section of a portion on a scale full size. The left side of the latter figure is in section in the plane of a row of holes. The right side is a section in a plane between the holes.

Similar letters of reference indicate like parts in all the figures. Tints are employed to aid in distinguishing parts and do not imply a difference of material. The material of my grate may be ordinary cast iron.

A is the boiler. B is the furnace, or the space between the grate and the boiler. C is the ash pit, or the space below the grate. Into the ash pit C a strong blast of air is forced through the side passage c. From the furnace B the hot gases escape through flues in the ordinary manner. D¹ D² D³ are bars extending across the furnace. E E, &c., are castings which compose the grate. They are grooved on their upper surfaces, as indicated by e, and are thickly studded with small tapering holes, as indicated by e'. These holes, e', should be about five-sixteenths of an inch in diameter where they open into the furnace, and are about one inch in diameter at their lower ends. The holes e' are arranged in rows across each other at right angles. The distance apart being only one inch, it follows that the holes are so close together as to touch each other on the lower face of the castings E. E¹ E² are webs formed on the lower face of the casting E. They serve the ordinary function of strengthening and stiffening the casting E. The ends of the castings E which rest upon the front and rear bearings D¹ D³ are plain, as represented. The other ends are recessed or adapted to lock together, as indicated by E² E³ E⁴ E⁵. In case, by reason of a great length of furnace, or different cause, I should prefer to introduce another bearing bar, and divide my grate into three lengths instead of two, I should make both ends of the middle lengths adapted to lock, as described. In other words, I should form both ends of the middle sections with locking parts, E² E³, &c. In using my invention with coal dust, and analogous material containing a large proportion of impurities, the material clinkers and forms a coating upon the grate. Operating with a slice in the ordinary manner, by scraping along the upper surface of the grate, detaches and breaks up the clinkers, and leaves a broken or porous stratum of clinker intervening between the grate and the glowing fuel. The blast of air being thrown into the ash pit, a strong current flows upward through the tapering holes e', and distributes itself along the grooves e, on the upper surface of the grate, into which the tapering holes e' communicate, as above described. The air is thus circulated in these grooves with excellent effect, even if an occasional hole, e', is stopped; but in practice, the great taper given to the holes e' prevents their clogging by any material sifting through them; and the fact that the holes e' and the grooves e are so small and so close together allows the slice to lift the clinker and clear them, and thus provides very perfectly for the distribution of the air under all parts of the elevated and broken stratum of clinker. I have tested my grate for a sufficient period and by sufficient ordeals to satisfy myself of its superiority over any before known to me. Immediately after kindling a fire the fuel is burned directly upon the grate, but in a very short period sufficient clinker has collected to serve as a protection for the grate. I have discovered no injury to the grate after a considerable period of use with an intensely hot fire. The great taper given to my holes e', and the nearly semi-cylindrical form of the grooves e, allow my grates to be cast in ordinary green sand, without coring. This is a matter of great practical

importance, because many elaborate forms of cores, otherwise judiciously devised, would be open to serious objections if much labor and expense were involved in their construction. I make the parts E^2 of such size that the sections of the grate can be matched together and fitted with but a very trifling labor in finishing or smoothing the surfaces. In most cases the sections may be driven together tightly by a few blows. I apply the sections together before the grate is laid upon the bearings. I am aware that tapering holes and grooves have been separately employed; also that such parts have been employed in the same grate, but am not aware that they have been before arranged so that the holes should introduce the air at points near together and discharge it directly into grooves, so that the grooves should serve as distributing channels therefor, and thus circulate the air effectually and freely under the whole mass of the broken clinker lying thereon. I have observed that the combustion on my grate results in the production of more flame or incandescent gases than usual. I prefer to make my grates in sections about seven-eighths of an inch thick, eight inches wide, and in length from two or three to six feet, locked together as specified. I have found it advisable to slice up the clinker about once in each hour, adding the fresh fuel upon the top of the fire at short intervals, as usual. I have blown with an ordinary fan-blower. It will be observed that the webs E^1 are continued over the bearers D^1 D^2 D^3 ; and although the webs are less deep at those points than along the middle of each bar, they are sufficiently deep over each bearer to allow the air free access to the holes e' , and thus to the grooves e at those points. I attach much importance to this fact. With the ordinary arrangements of grates the surface of the grate is liable to be inefficient over each bearer. With my arrangement these portions are equally efficient with the other parts, or so nearly so that the difference is inappreciable. I may add that the violent whirling agitation of the air blown vigorously from a fan-blower keeps the spaces over the bearers clear of ashes.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. I claim in grate-bars the grooves e , and tapering holes e' , arranged in the manner and so as to perform the functions herein specified.
2. I claim, in combination with the above, the locking parts E^2 E^3 , on the ends of the perforated and grooved sections E^1 , and adapted to serve in combination therewith, as herein specified.
3. I claim, in combination with the perforations e' and grooves e , the continuation of the webs E^1 over the bearers, so as to provide free access for the draught to the holes and grooves located in that part of the grate.

Witnesses:

D. L. FREEBORN,
A. HORMANN.

JOHN ALEXANDER.