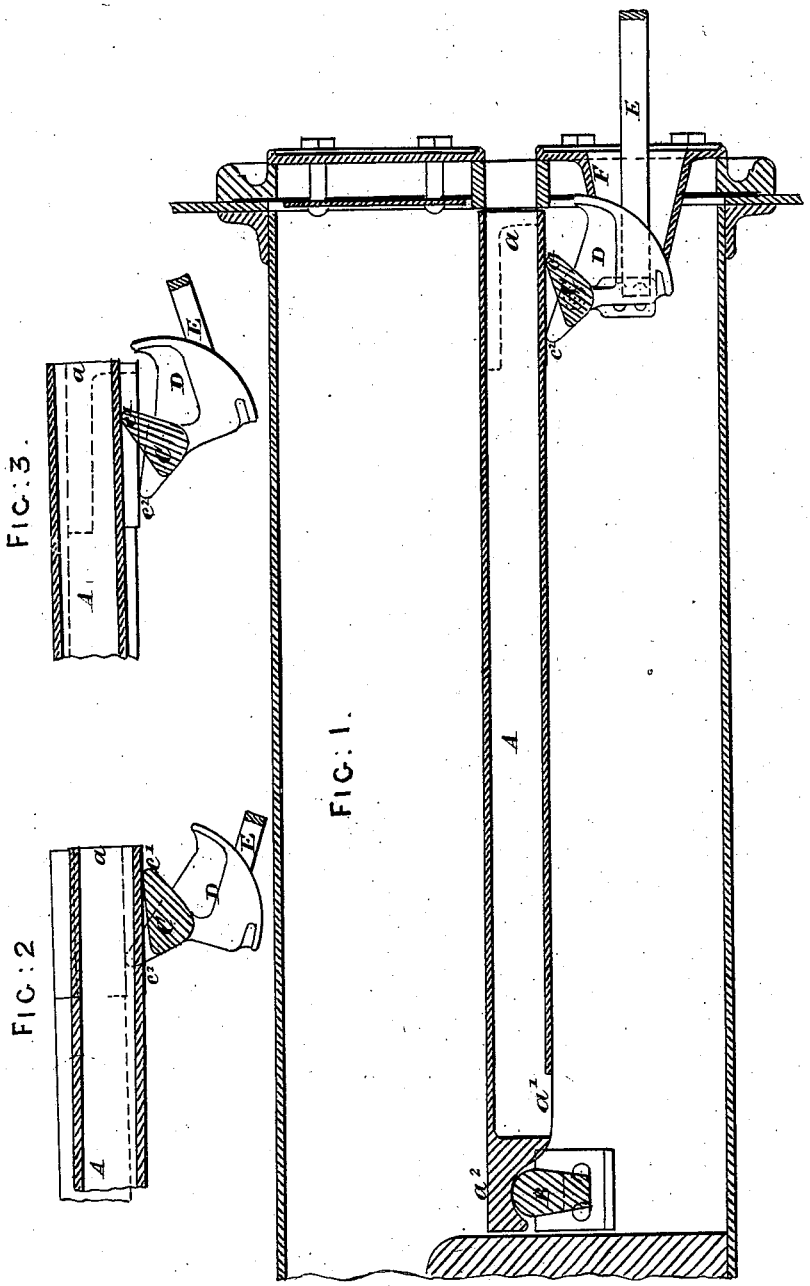
2 Sheets—Sheet 1.

A. W. M. MOORE.

Furnace-Grate.

No. 197,653. **Patented Nov. 27, 1877.**



Attest:
H. L. Perrine.
J. A. Rutherford

Alexander W. M. Moore.
Inventor.
By. James L. Norris.
Atty.

2 Sheets—Sheet 2.

A. W. M. MOORE.

Furnace-Grate.

No. 197,653. **Patented Nov. 27, 1877.**

FIG: 4

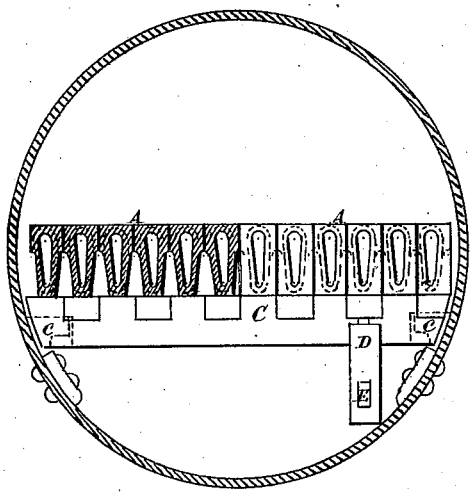


FIG: 5.

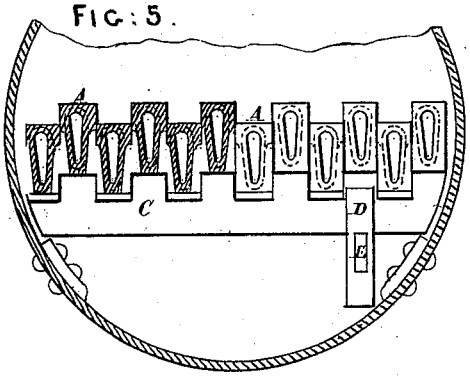
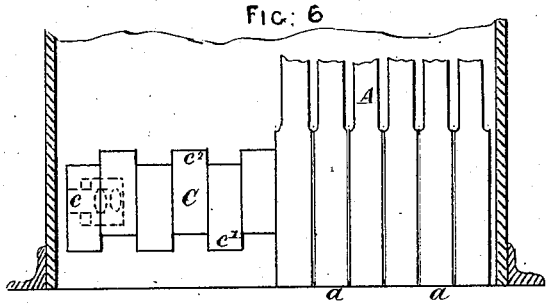


FIG: 6



Alexander W. M Moore.
Inventor

Attest:
H. L. Perrine
J. A. Rutherford

By. James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER WILLOUGHBY MONTGOMERY MOORE, OF LONDON, ENGLAND.

IMPROVEMENT IN FURNACE-GRATES.

Specification forming part of Letters Patent No. **197,653**, dated November 27, 1877; application filed October 31, 1877; patented in England, May 29, 1877.

To all whom it may concern:

Be it known that I, ALEXANDER WILLOUGHBY MONTGOMERY MOORE, of No. 34 Guildford street, London, in the county of Middlesex, England, have invented an Improvement in Furnace-Grates; and do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of of my said improvement, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to secure by Letters Patent—that is to say:

My invention relates to furnace-grates of the kind in which tubular bars are laid side by side; and has for its object means of utilizing such bars for the purpose of heating the air supplied to the furnace, combined with means for clearing the grate of ash, clinker, or other obstructions by the vertical oscillation of the bars.

I will describe the construction I adopt for this purpose, referring to the accompanying drawings, representing a fire-grate according to my improvement applied in a cylindrical fire-tube, such as that of a Cornish boiler. I would have it understood, however, that the construction is equally applicable to furnaces of other forms, the supports for the fire-bars being modified to suit such forms.

Referring to the drawings, Figure 1 is a longitudinal section of the whole grate, and Figs. 2 and 3 are longitudinal sections of the front portion of the grate, showing the two attitudes of the bars when they are oscillated, as I will describe. Fig. 4 represents on the right-hand side a front view, and on the left a transverse section, of the grate when the bars are at rest. Fig. 5 represents corresponding views of the grate when the bars are oscillated. Fig. 6 is a plan of the front part of the furnace, the right hand showing the ends of the bars in position, and the left hand showing part of the oscillating shaft, the bars above it being supposed to be removed.

Each bar A is a tube, open at the front mouth a, and having at its inner end an aperture, a^1, on its lower side. It is also at that end rounded out at a^2, to rest on a rounded bearing-bar, B, so that the bar has freedom to be oscillated vertically on the bearing-bar B, as on a hinge-joint. The front ends of the bar rest upon a rocking shaft, C, which is mounted on trunnions c at each side of the fire-tube. This rocking shaft C is made with its upper surface presenting sloped protuberances c^1 and c^2 on each side at intervals apart corresponding with the breadth of the bars A.

A socket, D, is formed on the rocking shaft C for the insertion of a bar, E, by which the shaft C can be caused to rock on its trunnions. When it is so rocked the protuberances c^1 c^2 on it cause the front end of the alternate bars to be raised and lowered, as shown in Fig. 5, and this oscillation of the fire-bars affects the breaking up of clinker and clearing out of ash and other substances or obstructions from the space between the bars.

The ash-pit being closed by a door, the air for supplying the fire enters by the open mouths a of the fire-bars, flows along the interior of the bars, keeping them cool, and, becoming heated, issues from the bars by the openings a^1 into the ash-pit, whence it passes to the fuel through the interstices between the bars. In order that the bars may be oscillated without opening the ash-pit door, or admitting air except through the bars, I prefer to form the socket D with a circular face, fitting against a circular piece, F, which projects inward from the ash-pit door, and has in it a slotted hole, giving freedom for the movement of the bar E.

The circular face of D and F being struck from the center of the trunnions in which the bar C rocks, fit each other when it is oscillated.

Having thus described the nature of my invention, and the best means I know of carrying it into practical operation, I wish it to be understood that I do not claim, generally, tubular fire-bars through which the air-supply to the furnace is made to pass, nor rocking fire-bars; but

I claim—

A furnace-grate composed of a series of

tubes arranged parallel to each other, and each constructed with an open front end and an aperture on the lower side of its rear end, and recessed at a^2, in combination with the rear supporting-bar and the front rocking shaft, having protuberances for vibrating the grate-bar, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses, this 4th day of October, 1877.

ALEXANDER WILLOUGHBY MONTGOMERY MOORE.

Witnesses:
JOHN INERAY,
JNO. P. M. MILLARD.