

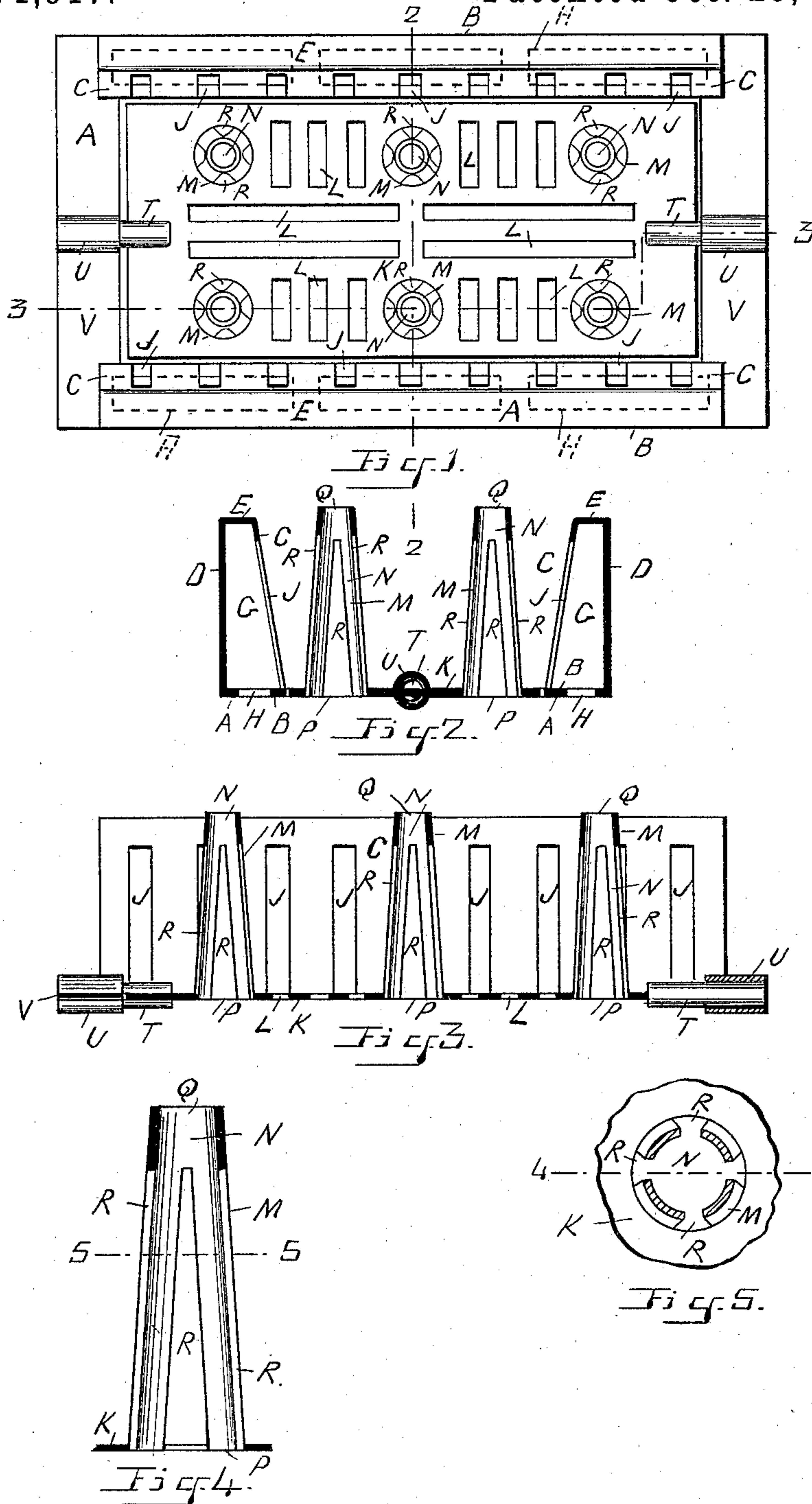
(No Model.)

D. E. BANGS.

GRATE.

No. 371,917.

Patented Oct. 25, 1887.



Witnesses  
Percy Bryant.  
*[Signature]*

Inventor  
David E. Bangs  
PER *[Signature]*  
Edwin W. Brown  
Attorney



# UNITED STATES PATENT OFFICE.

DAVID E. BANGS, OF MEDFORD, MASSACHUSETTS.

## GRATE.

SPECIFICATION forming part of Letters Patent No. 371,917, dated October 25, 1887.

Application filed August 31, 1886. Serial No. 212,330. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID E. BANGS, of Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Grates for Stoves, Furnaces, &c., of which the following is a full, clear, and exact description.

This invention consists of a grate for a stove or furnace, &c., constructed and arranged for operation, all substantially as hereinafter fully described, reference being had to the accompanying plate of drawings, in which—

Figure 1 is a plan view; Fig. 2, a vertical cross-section on line 2 2, Fig. 1; Fig. 3, a vertical longitudinal section on line 3 3, Fig. 1; Figs. 4 and 5, detail views, to be hereinafter referred to.

In the drawings, A represents a flat rectangular frame of cast-iron or of any suitable material, and adapted to fit within a fire-pot or combustion-chamber of a stove or furnace, &c. On each side bar, B, of this frame are upwardly-projecting walls CD, connected at their top by a plate, E, and at their ends, and forming between them a longitudinal vertical chamber, G. Each bar B has a series of openings, H, through it, forming communication with said chamber, and each inner wall C has a number of vertical openings, J, communicating with the chamber, the side walls C being slightly inclined from the bottom toward the back walls, D, which are substantially vertical.

K is a flat grate, of cast-iron or of any suitable material, having openings L through it and having upwardly-projecting pipes or tubes M, each making a tubular chamber, N, having an opening, P, in the grate communicating therewith, and being open at their upper ends, as at Q, forming a free passage through the grate and each pipe-tube. Each of these pipes or tubes M has a number of elongated openings, R, in its side walls, in the present instance four in each tube, and extending from the grate portion up nearly to the upper end of the tube. The grate K is adapted to fit within the frame, and at each end it has a longitudinally-projecting central pin, T, which lies within a respective bearing, U, in the end bar, V, of the frame, and by which the grate can swivel or turn within the frame when de-

sirous of clearing the grate of ashes, &c., as usual in grates.

The frame A is of a size to fit closely within the walls of a fire-pot or combustion-chamber of a stove or furnace, &c., and can be cemented therein to close up the space between its edges and the walls of the fire-pot; or it can be adapted to be inserted therein and removed at pleasure.

In the use of a grate constructed according to this invention in a stove, &c., the coal or coke is placed within the fire or combustion chamber of the stove, between the chambered walls, and around about and over the several tubes or pipes and ignited, and as the material burns air from the outside of the stove passes up through the usual openings, L, in the grate, up through the openings H into the wall-chambers, and out at the openings J; also up through the openings P into the pipe-chambers N and out at their elongated openings R in their side walls, and out through the openings Q in the tops of the tubes into the fire-chamber and among the coal or coke being burned. By such an arrangement of the wall-chambers and the pipes or tubes with their respective openings for the circulation of air a complete and perfect combustion of the material within the combustion-chamber will be accomplished, because a full and complete supply of oxygen is secured directly to all portions and particles of the fuel within the combustion-chamber, so that a pure heating fire, and free of carbon and smoke, will be produced, thus insuring the greatest amount of heat from the material being burned in the combustion-chamber.

The opening at the top of the tubes is essential, as it prevents the burning out of the upper part of the tube by the material being burned, as would be the case if closed up and solid.

This invention is particularly adapted to furnaces for locomotives, where perfect combustion and a high degree of heat and freedom of carbon and smoke are essential.

The grate can be adapted to any form of fire-pot—as, for instance, a circular fire-pot, as well as a rectangular one, as shown—and in the circular one the wall-chambers would be preferably continuous around the same; also,



the wall-chambers can be at the ends as well as at the sides. They can be on the grate K, instead of the frame portion, dispensing with the frame, the frame and grate being one; or  
5 they can be dispensed with and the tubes only used. A more or less number of tubes can be used, as desired. The tubes can be straight, in lieu of tapering, as shown, and the openings in the tubes and walls can be of any suitable or desired form, although elongated and  
10 extending upward, substantially as shown, is preferable. The grate, with its tubes, can be cast in one piece of any suitable material, as also the frame and its walls; or they can be  
15 constructed in any suitable manner and of any suitable metal.

In Fig. 4 a tube is shown in vertical cross-section enlarged; and Fig. 5 is a cross-section on line 5 5, Fig. 4.

20 Having thus described my invention, what I claim is—

1. A grate for a fire-pot of a stove, &c., having a series of vertical tubes, M, located on each side of the center thereof, and having vertical elongated openings in the sides and open  
25 at the top and bottom, substantially as described.

2. A grate for a fire-pot of a stove, &c., having chambered side walls provided with openings H and J, in combination with a series of  
30 vertical tubes, M, located on each side of the center thereof and provided with vertical elongated openings R in the sides and open at the top and bottom, substantially as described.

In testimony whereof I have hereunto set  
35 my hand in the presence of two subscribing witnesses.

DAVID E BANGS.

Witnesses:

EDWIN W. BROWN,  
PERCY BRYANT.