Sheet 1 - 2 Sheets

S. E. Foster,

Furnace,

No. 44,835, Patented Oct. 25, 1864.

Fig. 1.

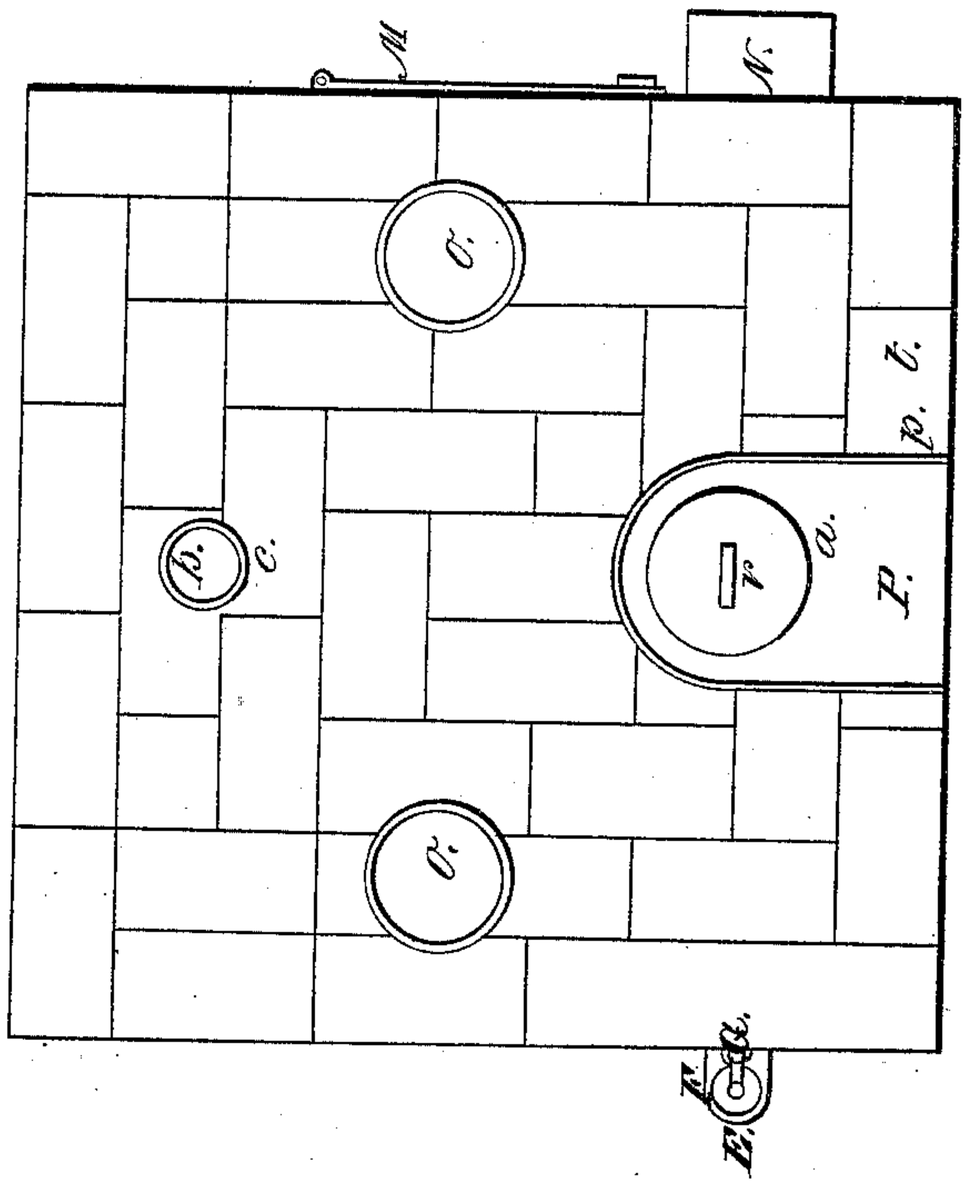
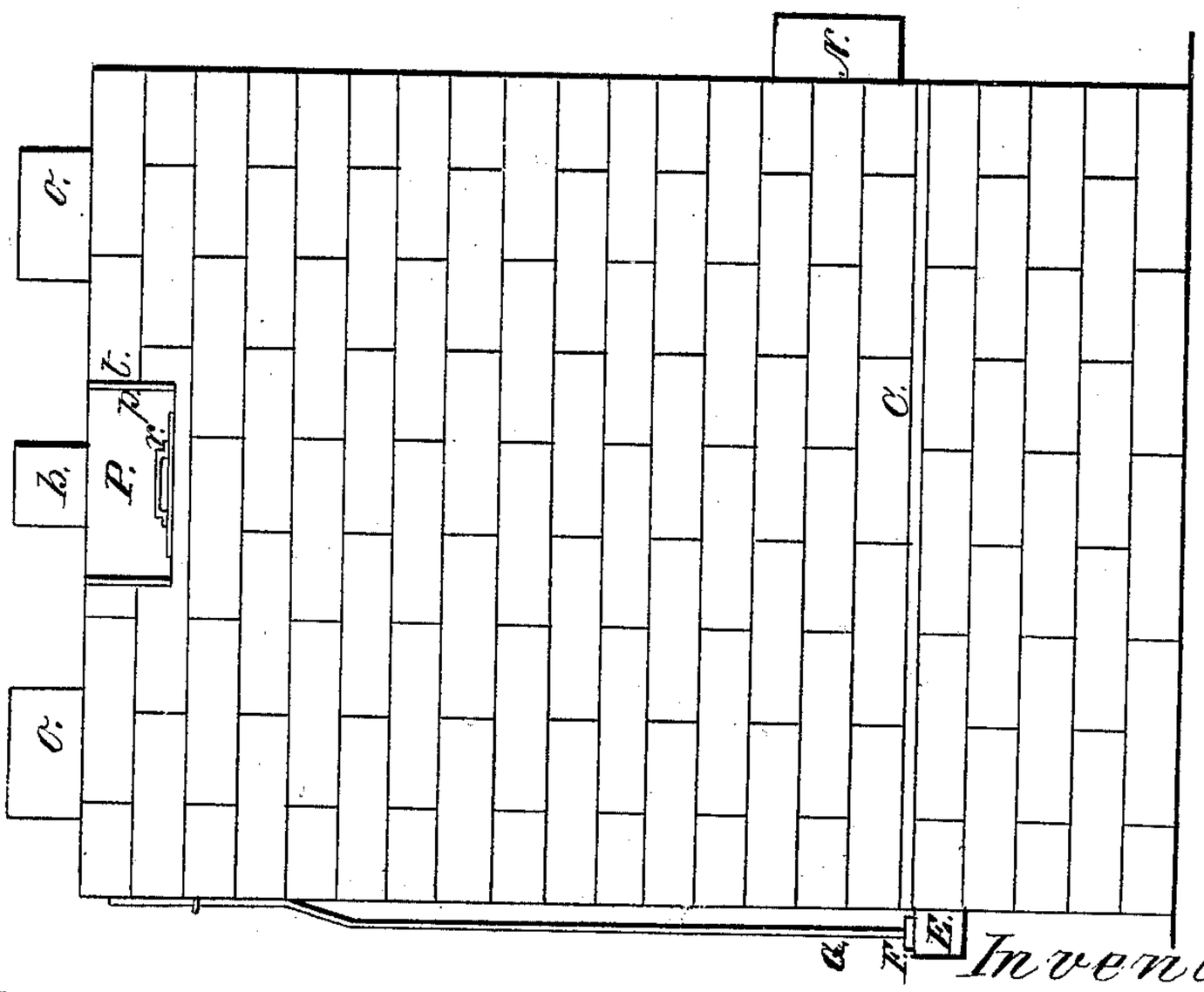


Fig. 2.



Witnesses.
A. R. Dale Jr
Frederick Curtis

Inventor.
Saml. E. Foster
R H Eddy.
Atty

Sheet 2 - 2 Sheets

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Fig. 3.

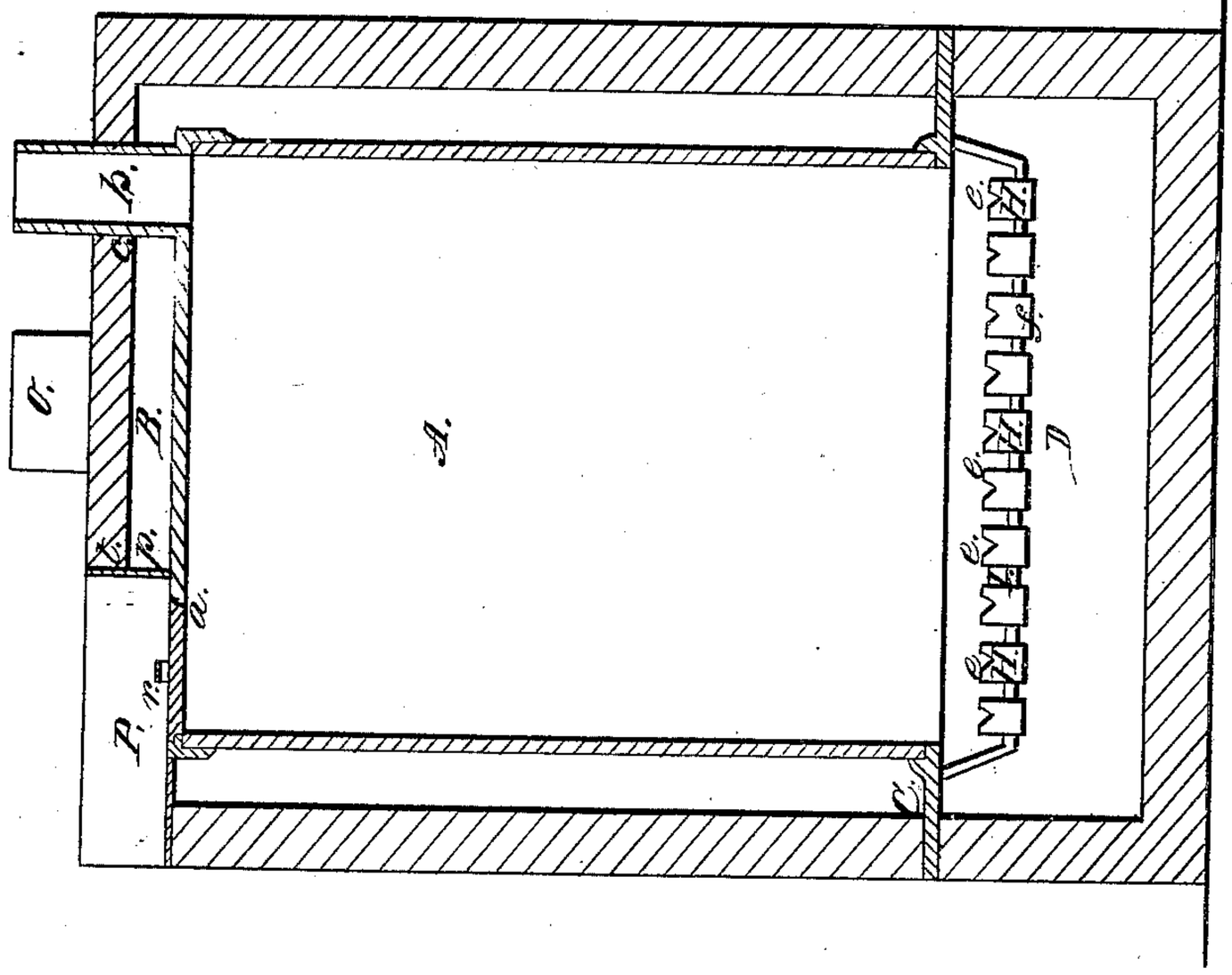

Fig. 4.

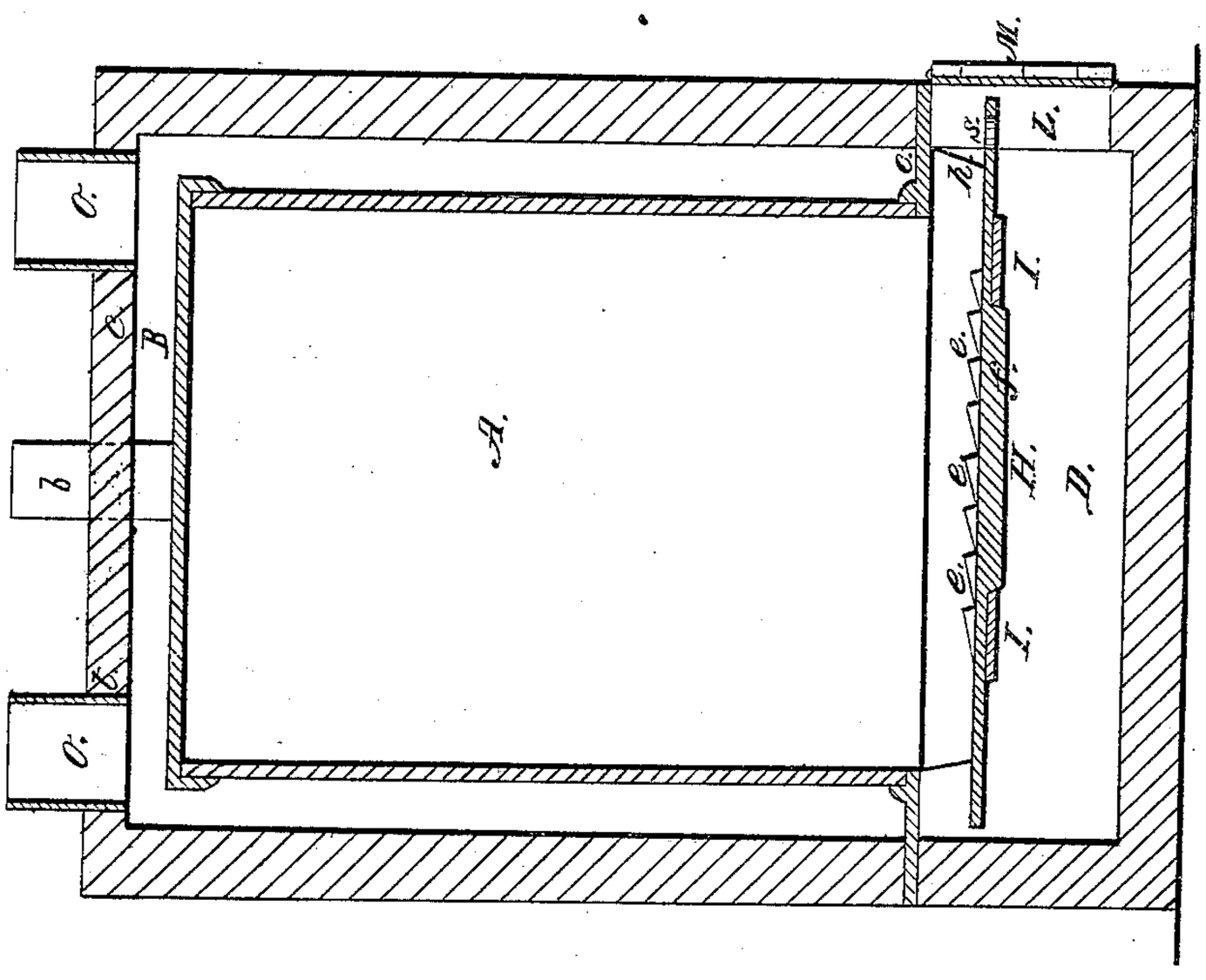

Fig. 5.

Fig. 6.

Witnesses.

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UNITED STATES PATENT OFFICE.

SAMUEL E. FOSTER, OF FITCHBURG, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND HENRY F. COGGSHALL, OF SAME PLACE.

FURNACE.

Specification forming part of Letters Patent No. **44,835**, dated October 25, 1864.

To all whom it may concern:

Be it known that I, SAMUEL E. FOSTER, a resident of Fitchburg, in the county of Worcester and State of Massachusetts, have invented an Improved Air-Heating Furnace; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a front elevation, and Fig. 3 is a vertical section, of it taken through the fuel-supplying throat and opening. Fig. 4 is a vertical section taken through the ash pit door.

My improved air-heating furnace is not only constructed with a close fire-chamber arranged within an air-heating chamber, but has the fuel-throat arranged within the upper part of the air chamber and fire-pot, such fire-pot being provided with an air-induction pipe and an adjustable valve applied to such pipe, such valve being for the purpose of regulating the admission of air into the fuel, in order to control its combustion. The said furnace also has its grate-bars constructed with teeth or projections within their upper surfaces or thereon, and on the sides of such grate-bars, the same being to enable the grate-bars, when moved to and fro longitudinally or laterally, or otherwise, for the purpose of causing ashes to fall between them and into the ash-pit, to catch and break or move more or less the coals or clinkers which may rest on the said bars or get between them so as to impede the discharge of ashes from the fire-pot. Furthermore, in the said furnace the series of grate-bars is arranged in a plane below the top of the ash-pit entrance or throat, and so as to enable a bar or poker, when passed into such throat to be introduced into the lower part of the fire chamber or space directly over the grate. Each grate-bar is also constructed with a projection from its lower side to extend down between the two supporting-bars of the system of grate-bars, such projection being of a length less than the distance between the said two supporting-bars, in order that each grate-bar may be moved lengthwise on its supports and be preserved in position on them. In this furnace the fire-pot or chamber, as well as the charge of fuel therein, is to be very large, the fuel, while the furnace may be in use, being consumed by slow combustion, and serving to heat a very extensive surface of metal to a degree calculated to warm without injuring the surrounding air or rendering it unfit for respiration.

In the drawings A denotes the fire chamber or cylinder for holding the fuel. This cylinder is to be a large upright drum of cast-iron, open at bottom and closed at top, excepting in having in such top a fuel supply opening, *a*, and a smoke or spent-gas eduction pipe, *b*, the latter being made to lead out of the interior of the cylinder or fire-chamber, and through the top *c* of the descending air-chamber, B, which, with its top, may be made of brick-work raised on a metallic plate, C, which supports the fire-drum, and separates the air-heating chamber from an ash-pit or chamber, D, arranged below the said drum in manner as shown in the drawings. An air-induction pipe, E, leads into the fire-drum or the ash-pit, and at its outer end is provided with a valve-seat and valve, F, the stem G of such valve being extended to any convenient position or place for enabling a person to regulate at any time the distance of the valve from the seat, and, of course, the amount of air passing into the fire drum.

The grate-bars of the fire-drum are represented at H H as arranged parallel to each other and supported on two horizontal cross-bars, I I, arranged relatively to one another, as shown in Figs. 3 and 4. Fig. 5 is a top view, and Fig. 6 a side view, of one of these grate-bars. It has teeth *e e e* projecting from its upper side or surface, as well as from each of its sides; and, furthermore, it has a projection, *f*, extending down from it, which, when the bar is in place on its supporting-bars, I I, goes between the bars, and is of a length somewhat less than the distance between such bars. While this projection will allow of the grate-bars being moved quickly lengthwise on its supports, I I, it will operate to preserve it in place thereon. The purpose of the teeth of the bars has been hereinbefore mentioned.

The series of grate-bars is so arranged with respect to the ash-pit opening L, which is to be provided with a door, M, that the plane of the top surfaces of the several bars shall be somewhat below the top of the said opening L, the arrangement being such as to create an en-

trance, *h*, into the lower part of the fuel-space of the fire-drum, through which entrance a bar or a poker may be introduced for the purpose of stirring up the fuel whenever such may be required. This entrance to the fire chamber or drum is also useful for other purposes.

Air to be warmed in the air-heating chamber is to be led into it by a conduit, N, opening into its lower part, and such air, after having been heated by contact with the outer surface of the fire-drum, or by heat radiated therefrom, will be discharged from the air-chamber by means of one or more eduction-pipes *o o*, leading out of its upper part, such eduction pipe or pipes being carried to such room or apartment in which it may be desira ble to introduce the heated air.

The fuel supplying opening *a* of this furnace leads out of a sunken space or throat, P, made in the top of the brick-work or case *t* of the air-chamber, and bounded, except on the front, by a surrounding partition, *p*, which goes down to the top of the fire-drum. The said throat enables the fuel to be guided to advantage into the opening of the fire-drum. The said opening, except while the process of charging the fire-drum with fuel may be going on, is to be closed by a cover, *r*.

While the furnace may be in operation it should be kept nearly, if not quite, full of fuel, the amount thereof periodically consumed being compensated for by a like amount of fresh fuel, subsequently introduced into the opening at the top of the furnace.

Each of the grate bars has a hole, *s*, made through it near its front end, the same being to admit a hooked rod to be inserted within such hole for the purpose of enabling a person, by means of such rod, to so move the grate-bar on its supports as to effect the discharge of ashes from the fire-drum into the ash-pit.

I claim as my invention—

1. In the air-heating furnace or fire-drum and the surrounding air-heating chamber having the fuel-throat arranged within the top of the air chamber, and with respect to the fuel-opening of the top of the fire-drum, substantially as specified, and the ash-pit or fire drum provided with an air-induction pipe and a valve thereto, as explained.

2. The described arrangement of the grade with respect to the doorway or throat of the ash pit or chamber.

3. The construction of each grate-bar with a bottom projection, *f*, having a length so much less than the distance between the supporting-bars as may be necessary to allow of the grate-bar being moved longitudinally back and forth on its supports sufficiently for the purpose of causing the ashes to be discharged from the fire drum and between the grate bars.

Witnesses: SAMUEL E. FOSTER.

R. H. EDDY,

F. P. HALE, Jr.