

(No Model.)

I. D. SMEAD.

FURNACE AND GRATE THEREFOR.

No. 399,294.

Patented Mar. 12, 1889.

Fig. 1.

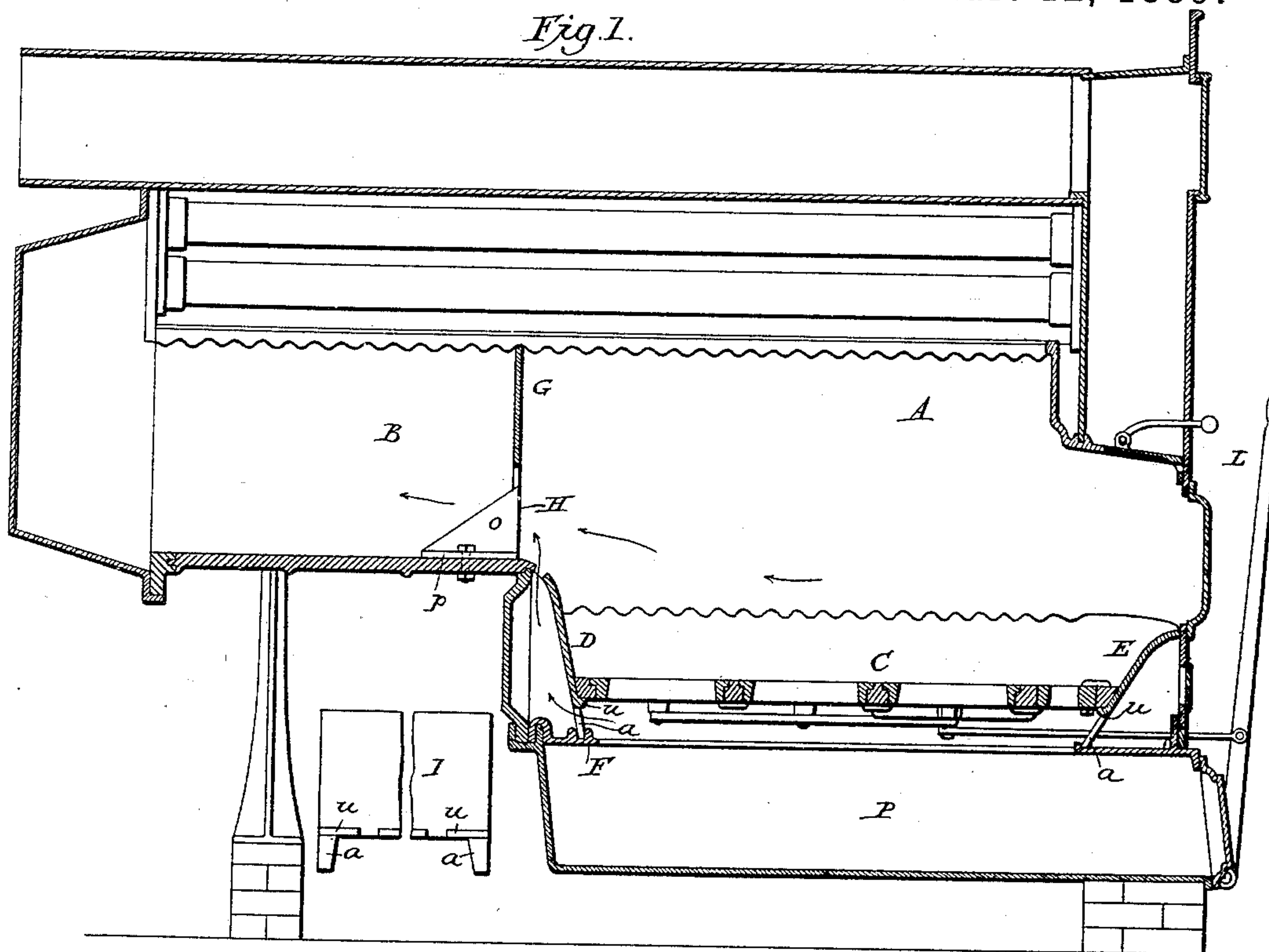
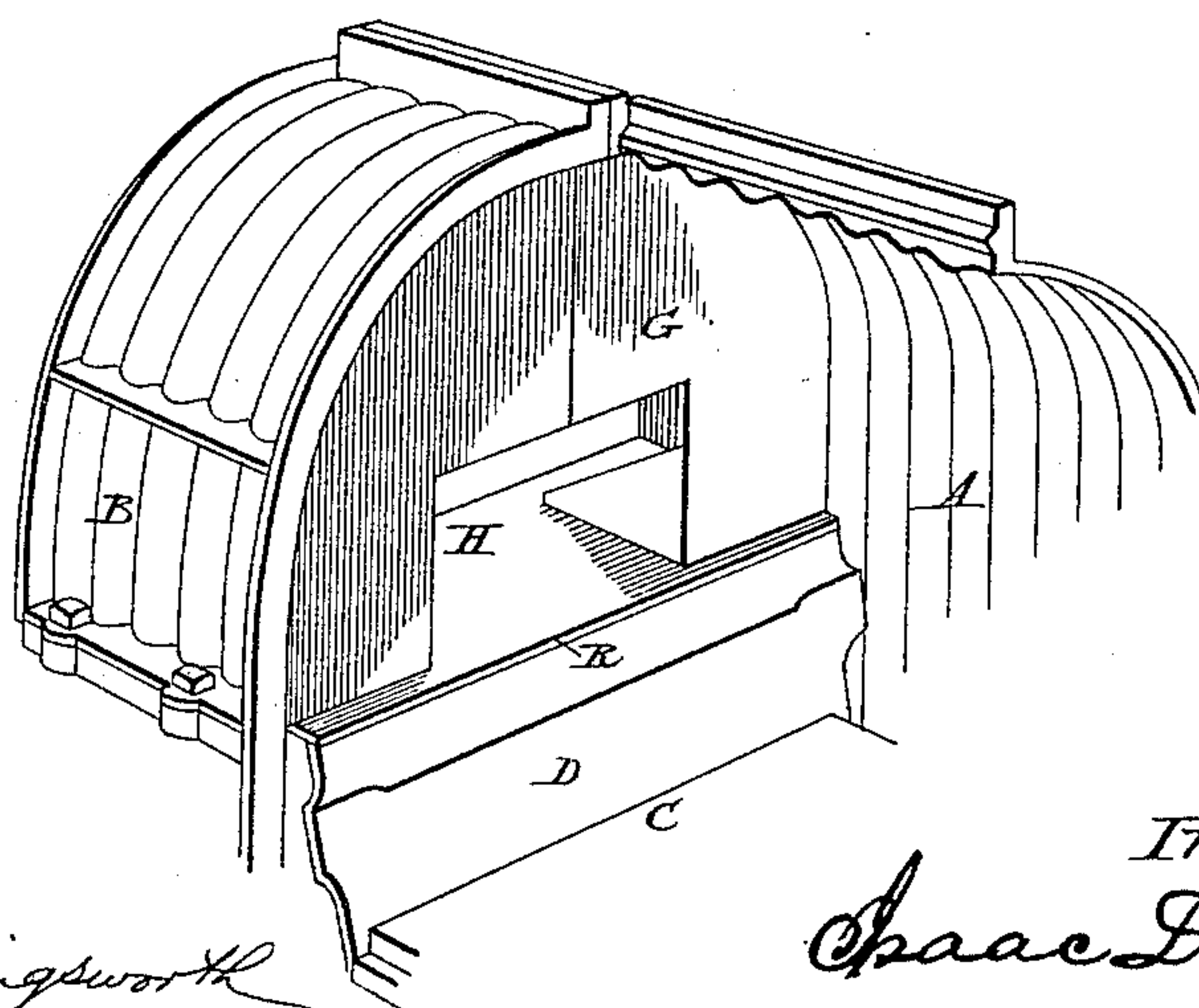


Fig. 2.



Attest:

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UNITED STATES PATENT OFFICE.

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FURNACE AND GRATE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 399,294, dated March 12, 1889.

Application filed November 12, 1887. Serial No. 254,967. (No model.)

To all whom it may concern:

Be it known that I, ISAAC D. SMEAD, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Furnaces and Grates Therefor, of which the following is a specification.

My present invention consists of certain improvements in hot-air furnaces designed for burning soft coal, whereby they are adapted to burn hard coal, as hereinafter more fully described.

Figure 1 is a longitudinal vertical section of the furnace with my improvements applied thereto, and also showing the rear grate-supporting plates detached. Fig. 2 is a perspective view of the rear portion of the furnace, shown in section to more clearly illustrate the diaphragm.

The improvements herein described are designed for application to that class of furnaces known as the "Ruttan-Smead air-warmers," which are used for warming and ventilating public buildings, such as school-buildings, court-houses, churches, and the like. As heretofore constructed, these furnaces were designed for burning soft coal, and the object of my present improvements is to enable anthracite or hard coal to be used in said furnaces when desired. The body of the furnace is not changed, but consists of the fire-box A and extension or combustion chamber B, with the other parts as usual, and as shown in Patent No. 315,040.

In burning soft coal, which produces much more flame and smoke than hard coal does, the furnace with the extension-chamber B was found to work well, the chamber being filled with the mingled flame, air, and gases; but when it was attempted to burn hard coal in such a furnace it proved a failure, apparently, because the draft was not sufficiently concentrated. To remedy that difficulty, I now insert a vertical partition or diaphragm, G, at the front end of the extension-chamber B, as shown in Figs. 1 and 2, it having an opening, H, as shown in Fig. 2, at its lower portion for the passage of the smoke and gases. This partition or diaphragm may be made of fire-brick or of cast-iron, it being preferably made of two pieces, so they can be readily set in

place without dismounting any part of the furnace, each part being provided at its bottom with a rearwardly-projecting flange, *p*, of such width as to rest securely on the bottom wall of the extension-chamber B and hold the parts in position, as shown in Fig. 1, this flange *p*, if desired, being connected to the upright portion by a vertical flange, *o*, arranged at right angles thereto, as shown in Figs. 1 and 2.

If desired, the flange *p* may be provided with holes for the insertion of bolts to project through holes to be drilled through the bottom of chamber B, and which can be readily done from the inside or outside before putting the partition in place, the size of these furnaces being such that a workman can enter them without difficulty. By the use of this partition I concentrate the draft, as all the smoke, gases, &c., are compelled to enter the chamber B through the opening-H, and by its use, in connection with the raised grate, as hereinafter described, I am enabled to burn hard coal in these furnaces as readily as they before burned soft coal. When using soft coal in these furnaces, the grate is usually set down to or at the point indicated by the line *m* in Fig. 1; but when it is desired to burn hard coal the original grate is removed and another grate, C, is substituted, it being raised up to the position shown in Fig. 1, in which C represents the grate in position. In order to support the grate at the desired height, I provide a new lining-plate, D, (shown detached in Fig. 1,) at the rear end of the fire-box, and a new plate, E, at the front end, each being provided with a transverse rib or lugs, *u*, for the ends of the grate to rest on, as shown in Fig. 1, though the inclination of the front plate, E, is sufficient to support the grate at that end without the rib, and which may therefore be dispensed with, if desired. At their outer edges these plates have feet or extensions *a*, projecting below the grate to rest on brackets or on the ledges at the sides of the ash-pit, as shown in Fig. 1, the open space between the feet *a* of plate D serving to admit air from the ash-pit to the space in rear of said plate, from whence it passes upward and mingles with the flame and gases at the point where they leave the fire-box A to enter the

combustion or extension chamber B, as indicated by the arrows in Fig. 1.

The construction of the plate D will be readily understood by an examination of Fig. 1, where it is shown detached and reduced in size, and also in position supporting the rear end of the grate, the front plate, E, being the same, except that its upper edge is curved more, in order to fit tightly against the front wall of the furnace, as shown.

Any suitable form of grate may be used in the furnace thus altered; but I prefer to use the style of grate shown in the drawings.

By these improvements I am enabled to convert these furnaces from a soft-coal to a hard-coal burner without removing the brick-work which surrounds the furnace, or in any manner dismounting or disturbing the body of the furnace, it only being necessary to remove the soft-coal grate and the front and rear lining-plates and substitute those described and apply the lever, and this is an important feature, inasmuch as there are now thousands of these furnaces in use in various sections of the country, and while at the West soft coal is generally used, at the East in many places it is desired to use hard coal, and by these means the same furnace is adapted for use with either, and works equally well.

What I claim is—

1. In combination with a furnace provided with the fire-box A and the combustion-chamber B, and provided with suitable grate-supports and a grate, the removable diaphragm G, provided with an opening, H, all arranged substantially as shown and described, whereby the furnace can be adapted to burn either hard or soft coal at will.

2. In combination with the furnace having the fire-box A, provided with supports for a low-down grate to burn soft coal, the removable grate supports or plates E D, adapted to support the grate at a higher elevation, substantially as shown and described.

3. In combination with a furnace, substantially such as described, constructed to burn soft coal, the removable perforated diaphragm G, the removable grate-supports E D, and a grate adapted to be supported thereby, all constructed for joint operation, substantially as shown and described.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ISAAC D. SMEAD.

Witnesses:

A. C. KOEHLER,
FRANK L. STEVENS.