

(No Model.)

S. E. BURKE.

FURNACE GRATE.

No. 360,849.

Patented Apr. 12, 1887.

Fig. 1.

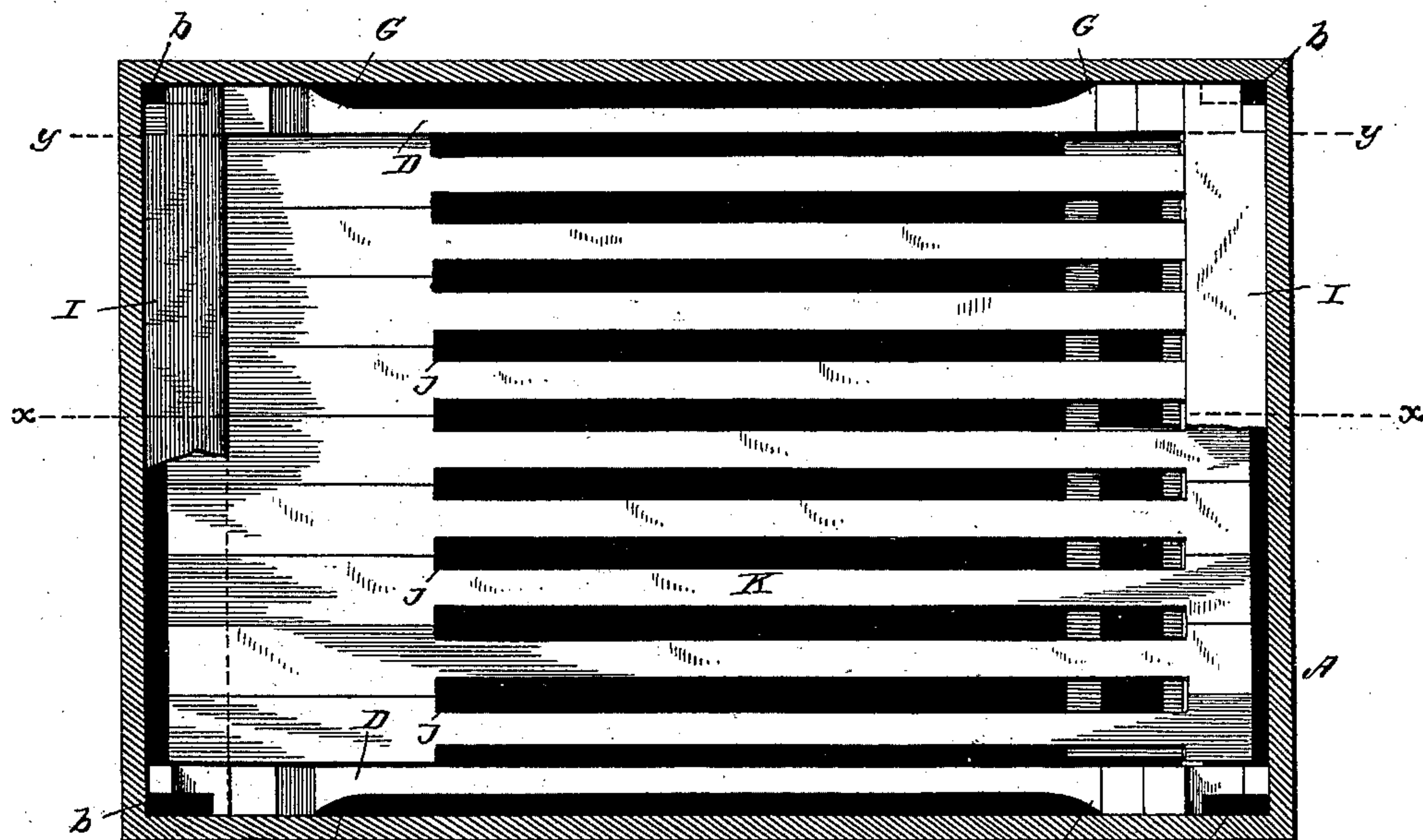


Fig. 2.

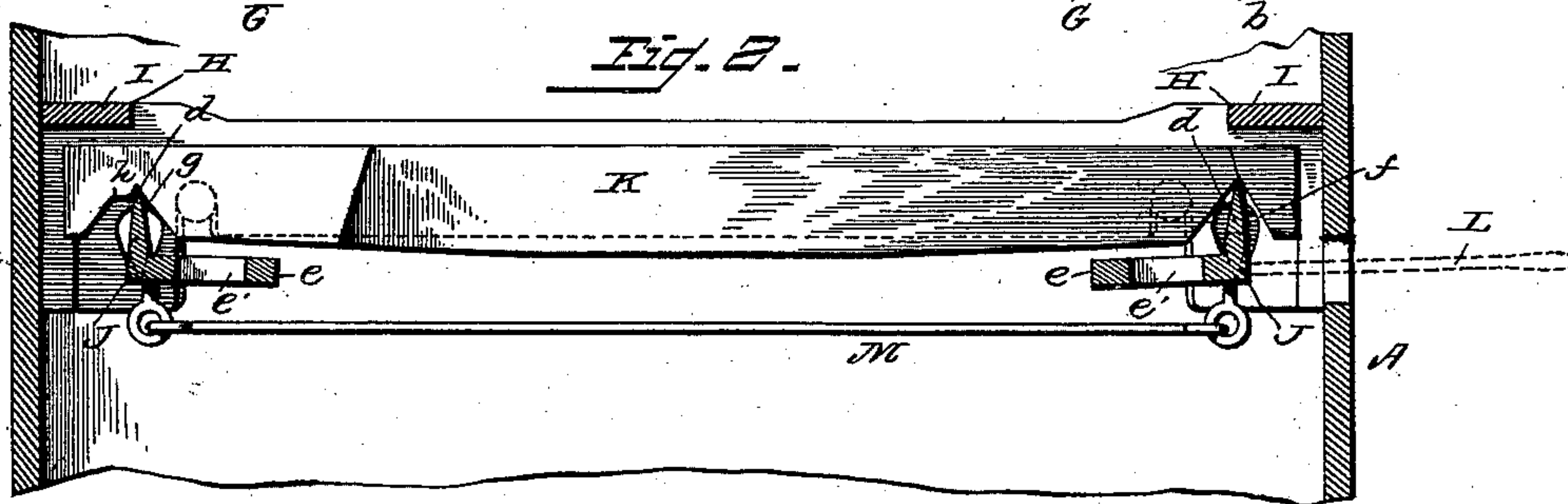


Fig. 3.

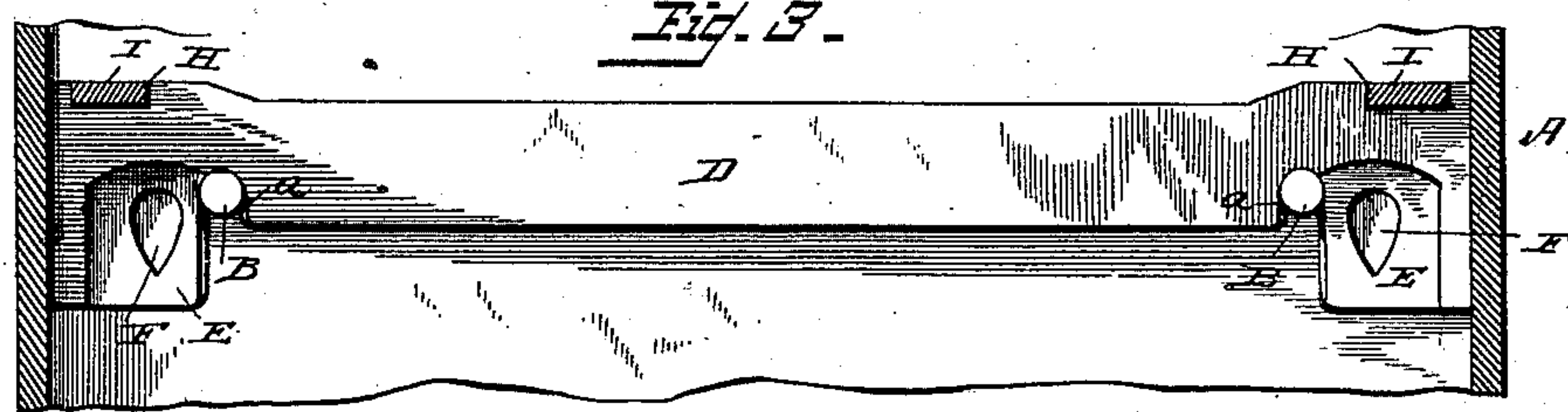
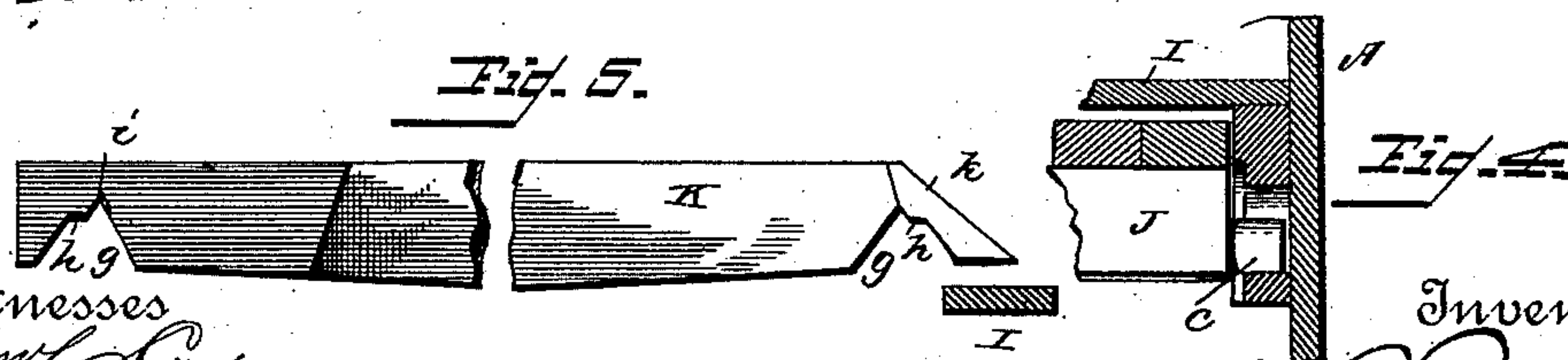


Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

STEPHEN E. BURKE, OF EDON, OHIO.

## FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 360,849, dated April 12, 1887.

Application filed August 12, 1886. Serial No. 210,694. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN E. BURKE, a citizen of the United States, residing at Edon, in the county of Williams and State of Ohio, have invented certain new and useful Improvements in Boiler-Furnace Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to furnace-grates and grate-bars, and has for its object to provide for the sagging of the bars from heat, so that when they sag the reciprocation and jarring of the bars will not be seriously interfered with.

Another object is to form the grate-bars close enough together to retain all coal and fuel of such size as will be of use, and at the same time by the movement of the bars, to permit the ashes to pass through, and thus free them from ashes.

It has further for its object to improve the general construction and efficiency of the grates; and to such ends the invention consists in the construction and the combination of parts, hereinafter particularly described and claimed, reference being had to the accompanying drawings, forming a part of this description, in which—

Figure 1 is a horizontal section through a fire-box, with parts broken away, showing the application of my improved grate. Fig. 2 is a vertical section on line *xx* of Fig. 1. Fig. 3 is a vertical section on line *yy* of Fig. 1. Fig. 4 is a cross section through one corner of the box, showing journal resting in side bar; Fig. 5, a side view, with parts broken and in section, showing one form of grate-bar and manner of applying cross-bar.

In the drawings the letter A designates the walls of the fire-box, provided on opposite sides with inwardly-projecting pins B. The pins support side bars, D, formed on their under faces with notches or recesses *a*, into which the pins fit, so that the side bars are held against longitudinal movement and the pins will support the grate, and the said pins may be formed with heads, to prevent the bars from accidentally moving off of them sidewise. The bars are further formed at each end with pendent arms or ears E, through which are made the

openings F, the tops of which are curved and the bottoms V-shaped, preferably, while the face of the ears above the openings may be recessed on the arc of a circle, as shown, so as to permit the free rotation of the shaking and jarring shafts, hereinafter described, without their binding against the faces of the ears, also for convenience in putting grates in furnaces. The side bars are also formed on their outer faces with shoulders G, which hold the bars from the side walls, so as to leave spaces between the two parts for the passage of air and dropping of ashes, and at their ends are recessed, as shown at *b*, so that the flue-sheets may be turned and riveted to the box. The tops of the side bars are formed near their ends with stops H, which hold cross-bars I in place. The object of these cross-bars is to prevent ashes and cinders from dropping at opposite ends of the grate-bars next to the walls of the furnace.

The shafts for supporting and moving the grate-bars, which move independently of each other, are designated by the letter J, and are each formed with journals *c*, preferably of an inverted-V-shaped form, which fit in the V-shaped bearings or openings of the side bars, and also with projections *d*, preferably wedge-shaped, and which fit into the notches formed in the grate-bars, and with knockers *e*, which strike against the bottom of the grate-bars to jar the bars, and which are preferably formed with openings *e'* for the passage of ashes.

The parts so far described constitute the frame and support for the grate-bars, and are easily applied to and taken from their place, are strong and durable, and if any one part becomes broken or worn out it can be readily replaced by another.

The grate-bars are designated by the letter K, and are formed with notches *f* and *g* at each end in their under faces. The notches have inclined faces or sides, and those in the rear end are substantially of the form shown—that is, the notch is formed with oppositely-inclined walls or sides—and the two sides or walls separated by a plane surface or shoulder, *h*, which lies in a lower plane than the upper end of the inside wall, *i*, as shown, thus forming practically a double notch. The effect of this is that when the grate-bars sag in the middle the pro-



jection *d*, which fits in the notch and supports the grate-bars, passes from the inner wall or notch to the outer one, so that it will continue to act as before the bar sagged, and thus the sagging is compensated for. If found desirable; both ends of the bar might be formed as the rear end has been described, and the change not be a departure from my invention.

The projections of both shafts enter the notches *f* and *g* of the grate-bars and support the bars, but only one knocker at a time is in contact with the bars, so that when the front shaft is oscillated by means of a lever, *L*, temporarily inserted through an opening in the furnace and engaged in any suitable way with the shaft *J*, the grate-bars are moved back and forth and struck by the knocker, first at one end and then at the other, alternately, so as to be raised and lowered and jarred.

The front and rear shafts or knockers are preferably, though not necessarily, connected by a rod, *M*, so that the movement of one knocker downwardly will throw up the other knocker.

In a portable furnace I prefer to have the spaces *j* between the grate-bars begin at a distance of about one-fourth of the length of the bars from the rear end of the grate, so that cold air will not pass up between them into the furnace-flues.

The grate-bars may have one or both ends beveled, as shown at *k*, Fig. 5, so as to move under what ashes may collect at the ends of the grate. This form is particularly well adapted to stationary furnaces, although it may be used in the portable furnaces; and instead of having the bars *I* across the top of the grate-bars, they may lie beneath the bars, as shown in Fig. 5, in which event they may be supported upon any suitable projection on the side walls of the fire-box. When they so lie under the grate bars, they do not so soon burn out.

In large furnaces, a bar similar to the bar *D* may be introduced between the two side bars, so as to permit the grate to be made in sections. In such event the central bar would have notches, as in the side bars, for the journals of the knocker-shafts, and would be heavier than the side bars, because it would have to support one side of both sections of the grate.

If desired, the rear plate, *I*, may be extended forward to about one-fourth of the length of

the fire-box. In such event the oscillating bar *J* would be moved forward and the grate or grate-bars would continue from about such point to the forward part of the box.

Having thus described my invention and set forth its merits, what I claim is—

1. The grate-bars formed with the double notch, in combination with the oscillating shaft having a projection fitting in said notch, substantially as described.

2. The combination of the grate-bars formed with a V-shaped notch at one end and a double notch at the other, the oscillating shafts having projections fitting in said notches and provided with knockers to strike and jar the bars, substantially as and for the purposes specified.

3. The combination of the fire-box, the side bars formed with journal-bearings, the oscillating shafts journaled in said bearings and formed with grate-bar-supporting projections and knockers, independently-moving grate-bars formed with notches, in which said projections fit, and removable bars *I* at the ends of the grate supported transversely to the grate-bars, substantially as and for the purposes specified.

4. The combination of the fire-box, the grate composed of a series of grate-bars formed with a notch at one end and a double notch at the opposite end, shafts formed with projections fitting in said notches and provided with knockers, and a rod connecting said shafts, substantially as and for the purposes set forth.

5. The combination, with a fire-box, of a grate composed of a series of grate-bars formed with double notches at their ends to receive oscillating projections and having the upper edge beveled, substantially as and for the purposes set forth.

6. The combination, with a fire-box, of a grate composed of a series of grate-bars having beveled or inclined ends *k*, and notches in the ends, at least one of which shall be a double notch, oscillating shafts having upward projections entering said notches, and a cross-bar, *I*, located, as shown, adjacent to said grate-bars, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHEN E. BURKE.

Witnesses:

C. A. BOWERSOX,  
HORACE GINTER.