

H. E. WILLIAMS.  
Furnace-Grates.

No. 223,087.

Patented Dec. 30, 1879.

Fig. 1.

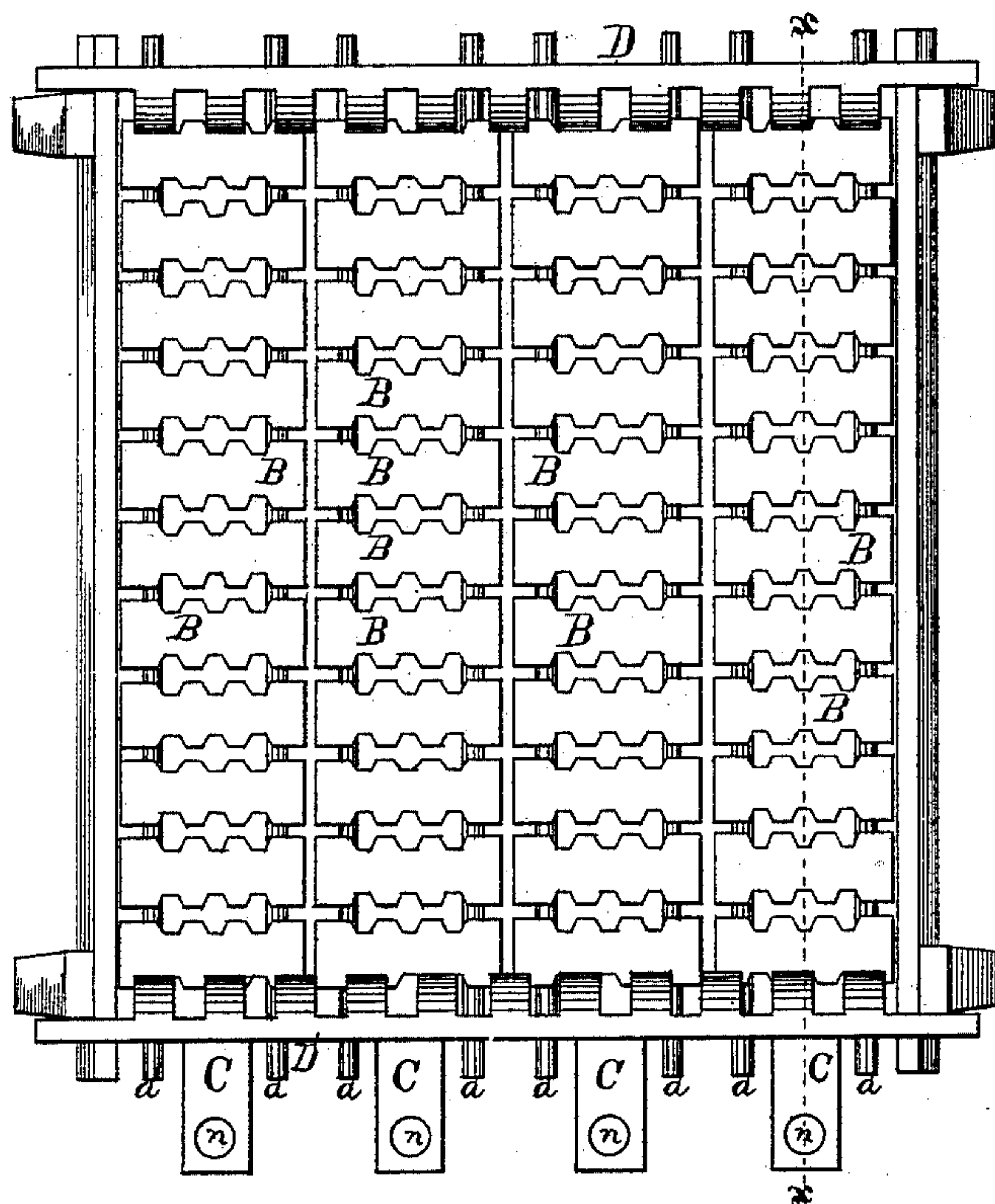


Fig. 2.

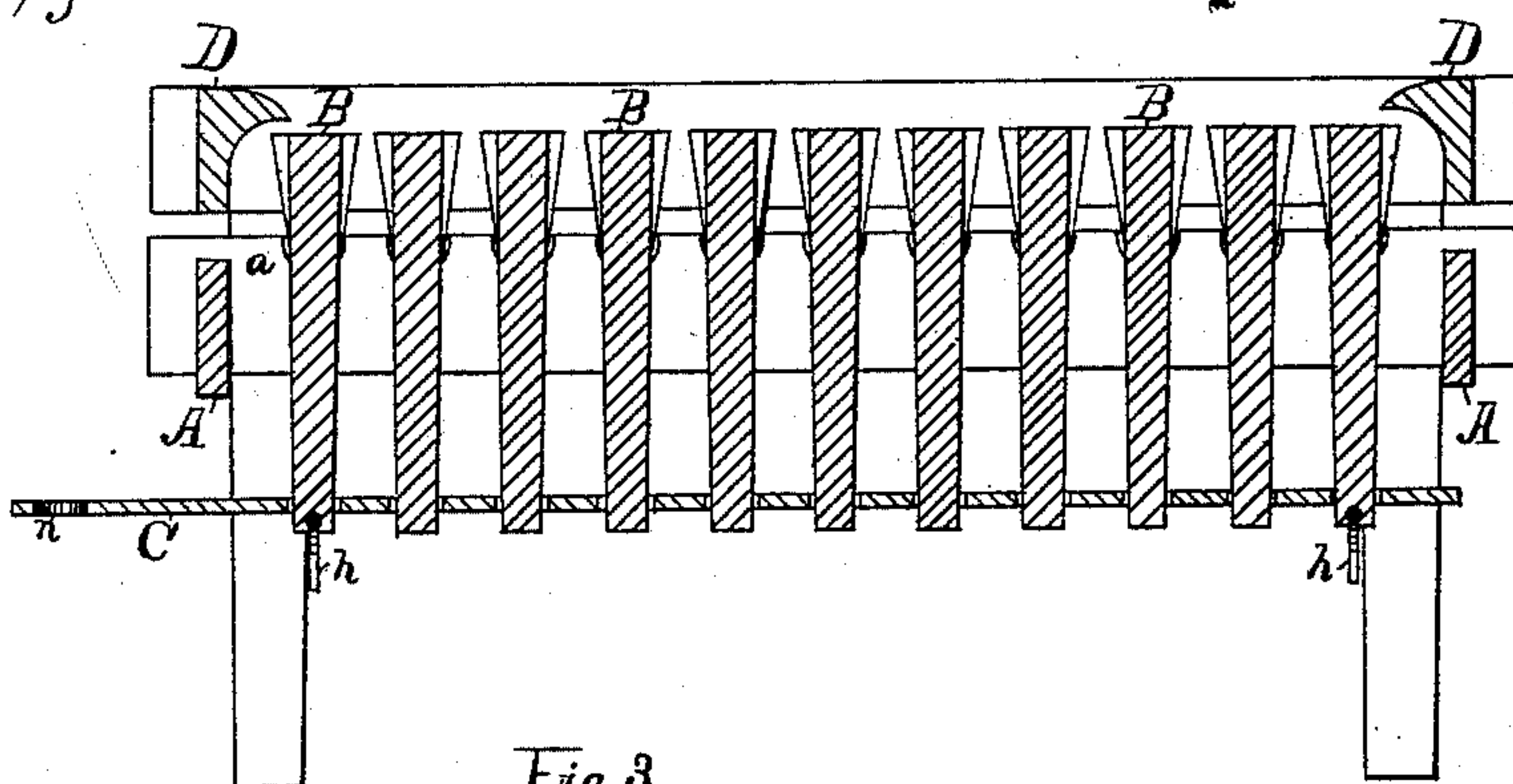


Fig. 3.

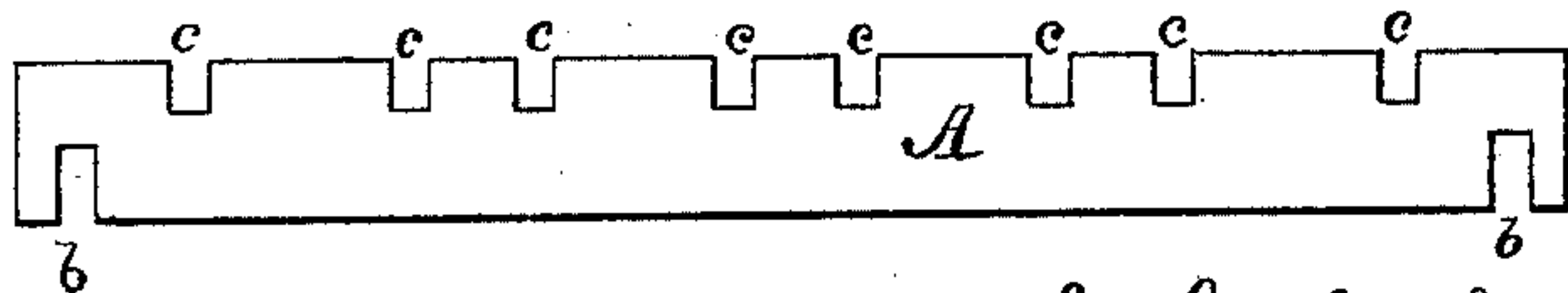


Fig. 4.

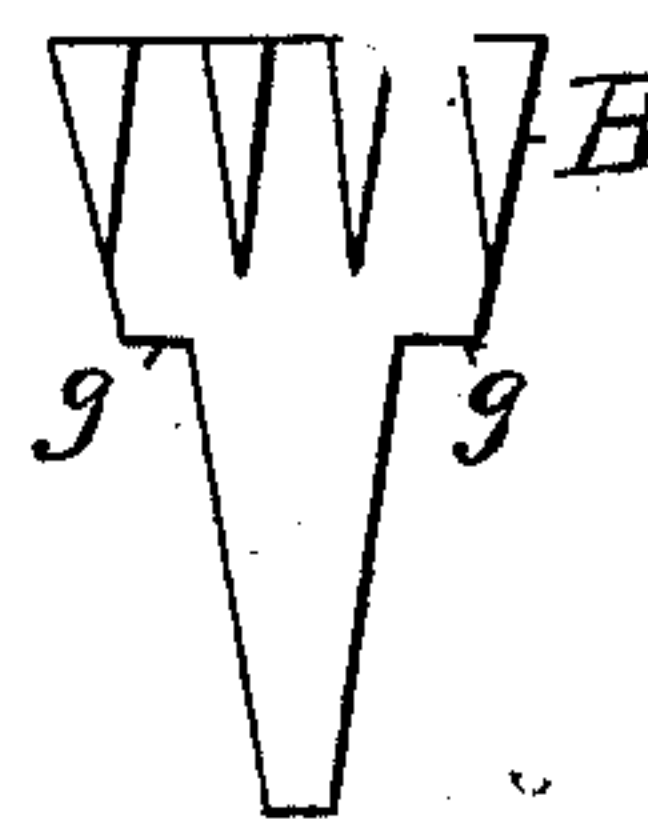
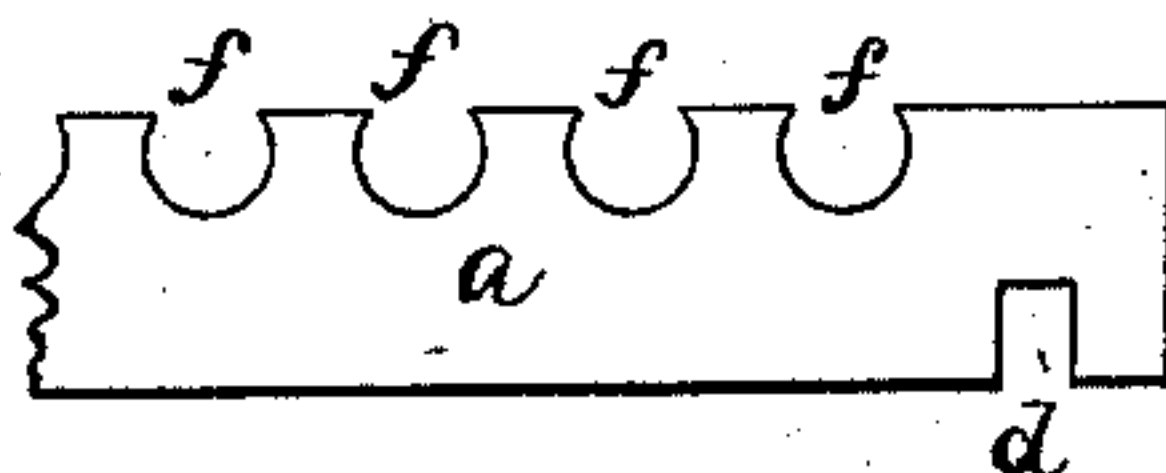


Fig. 5.



Witnesses.

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# UNITED STATES PATENT OFFICE.

HENRY E. WILLIAMS, OF NEW BRITAIN, CONNECTICUT.

## IMPROVEMENT IN FURNACE-GRATES.

Specification forming part of Letters Patent No. **223,087**, dated December 30, 1879; application filed July 31, 1879.

*To all whom it may concern:*

Be it known that I, HENRY E. WILLIAMS, of the city of New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Furnace-Grates, of which the following is a specification.

The object of my invention is to produce a grate which may be shaken by moving different sections separately, thereby more effectually breaking the clinkers and clearing the grate; also, to produce a grate of which any individual bar is so light and small, and is so placed, that it may be readily removed and replaced by a new one without removing the other parts; and, further, to greatly increase the amount of air-spaces on the working-surface of the grate, to insure better combustion and economy of fuel, and to prevent the grate from becoming overheated, and also to make the working-surface of the bars so short, stout, and stubbed that they cannot warp to any great extent; and the invention consists in the peculiar construction of parts and in the combination of devices, all as hereinafter more fully described.

In the accompanying drawings, Figure 1 is a plan view of a grate which embodies my invention. Fig. 2 is a vertical section of the same on line *x x* of Fig. 1; and Figs. 3, 4, and 5 are side elevations of detached parts thereof, hereinafter more specifically described.

The complete device is mounted on a suitable frame, the shape and dimensions of which may vary to conform to the furnace or other fire-box in which the grate is designed for use. The individual bars of the grate are grouped into series or sections extending from front to rear of the furnace-bottom, and each section is supported upon two longitudinal bars, *a a*, of the frame. These bars are supported upon cross-bars *A A*, one at each end of the frame; and for convenience of ready removal for purposes of repairs I make said cross-bars with a notch, *b*, at each end, as shown by the side elevation of one of said bars in Fig. 3. These cross-bars are merely hooked upon suitable lugs or projections on the front end of the frame. Said cross-bars are also notched, as at *c*, Fig. 3, on their upper edge, for the purpose of receiving the ends of the longitudinal

bars *a a*, the notches in the cross-bars holding the longitudinal bars from moving sidewise out of place, while the notches *d*, Fig. 5, in the ends of the bars *a a* take over the cross-bars, and thereby prevent longitudinal displacement, all in a well-known manner of putting bars together in frames for various devices.

Fig. 5 represents a side view of one end of the bars *a*, the sockets *f* therein being for the purpose of receiving the bearings of the individual rocking grate-bars *B*. These bars *B* are substantially of a T-shaped form, as fully shown by the side elevation, Fig. 4, and when set in position their greatest length extends in a vertical direction and their upper ends form the top surface of the grate. Their upper ends, which form the top or working surface of the complete grate, are made quite stout and stubbed, while the whole bar is made so small that in a full-sized furnace or boiler grate it will weigh only about fourteen pounds, thereby being so light that it can be conveniently lifted with one hand for removal or insertion, and, further, being so short and stubbed on the part exposed to the fire that it is impossible for it to warp to any great extent. The sides of these bars at the upper end are ribbed, as shown, and at the junction of the upright and top of the T there are shoulders *g g*, Fig. 4.

The lower end of the upright of the bars *B* is narrow, as shown. These individual bars *B* are placed with their shoulders *g g* resting in the sockets *f* of the bars *a a*, and with their lower ends passing through holes in the shaking racks *C*. Two or more of these bars *B* in each section, group, or series have holes through their lower ends, through which pins or staples *h h*, Fig. 2, are passed to hold the racks *C* in position. Each of the four series of individual bars is mounted in like manner, with a space between each series of bars, there being also a space between each bar. The bars thus resting upon shoulders located immediately at the upper ends of the upright member of the T, the whole horizontal member thereof is elevated above the bearings upon which it rests, and substantially the whole of said member in each bar is elevated above the supporting-frame and all other parts



excepting those surrounding the outer edge of the entire grate. The bars being thus elevated and cut up into short members, with a surrounding air-space on all sides, (and with no intermediate object rising into the same plane as the upper surface of said bars,) it will be seen that a greatly-increased amount of air is admitted to the furnace, which not only causes a more perfect combustion, and consequent economy of fuel, but it effectually prevents the grate from becoming overheated, so that even if these bars could warp the natural tendency to warp them is greatly overcome.

By arranging the series of bars from front to rear I am enabled to shake the grate by direct connection with the rack-bars C in front of the furnace, instead of through intermediate mechanism, as would be required if this style of grate were placed in series extending from side to side.

At each end of the frame I place a removable bar, D, having inward projections, which extend partially over the end bars, B, of each series, and prevent coal, clinkers, &c., from passing down and clogging the grate at the ends. The front ends of the racks C project or extend forward a short distance, (see Figs. 1 and 2,) and are provided with wrench-holes to receive prongs formed on the ends of the head of a T-shaped wrench. By shaking the handle of said wrench from side to side two sections of the bars B will be shaken and moved in opposite directions, the bars swinging in the sockets *f* on their shoulders *g g*. An endwise movement of said wrench-handle will move both sections simultaneously in the same direction, but of course requiring more power.

If desired, a simple hook may be inserted in the wrench-hole of the racks C, and only one series of bars shaken at one time.

If desired, a pin or other locking device may be employed to lock the racks C against any longitudinal movement, except at such times as it is desired to shake down the fire, when the racks may be unlocked for that purpose.

In case any of the individual bars B shall become broken or otherwise disabled, they can be conveniently lifted out of place, and new ones be substituted therefor, without removing any of the other bars or parts; and by removing the end bars, D, and individual or separately-detachable bars B, the bars A and *a* may also be readily removed and replaced as occasion may require.

I am aware that a frame quite similar to the one herein described, and upon which, in connection with a shaking rack, series of long

and separately-detachable bars are placed, which series extend from side to side instead of from front to rear, is shown and described in prior patents, and I hereby disclaim the same, and particularly the device shown in English Patent No. 6,703 of 1834; but the bars in these prior grates cannot properly be styled T-shaped, nor be said to be placed with their ends upward. They are longest in a horizontal direction, and not only so long and large as to be of great weight, and consequently very inconvenient to remove, but also so long as to be very liable to warp to a serious extent.

I am also aware that prior patents show short bars secured rigidly to a rocking bar in series, so that the whole series rock with the one rocking bar; and in some cases these have been set up endwise with longer bars between them, the upper surface of which was in the same plane and formed a part of the top surface of the grate.

In my grate the upper ends of the bars form the entire upper or working surface of the grate.

I claim as my invention—

1. In a grate, the stout short bars B B, of T-shaped form, with their greatest length extending in the direction of the upright member of the T, and with the supporting-shoulders *g g* formed in immediate conjunction with the respective sides of said upright member, substantially as described, and for the purpose specified.

2. The combination, in a grate, of suitable supporting mechanism, and two or more series of shouldered T-shaped bars, whose greatest length is in a vertical direction, said bars being placed side by side, with their ends forming the fuel-surface of the grate, and also loosely resting upon the shoulders in immediate conjunction with the sides of the upright member, substantially as described, and for the purpose specified.

3. The combination, in a grate, of a suitable supporting-frame, with two or more series of short separate and detachable bars extending from front to rear of the fire-box, said bars placed side by side, with their greatest length standing in a vertical direction, and their upper ends forming the entire top surface of the grate, each bar in each series being completely surrounded by an unbroken air-space, substantially as and for the purpose set forth.

HENRY E. WILLIAMS.

Witnesses:

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