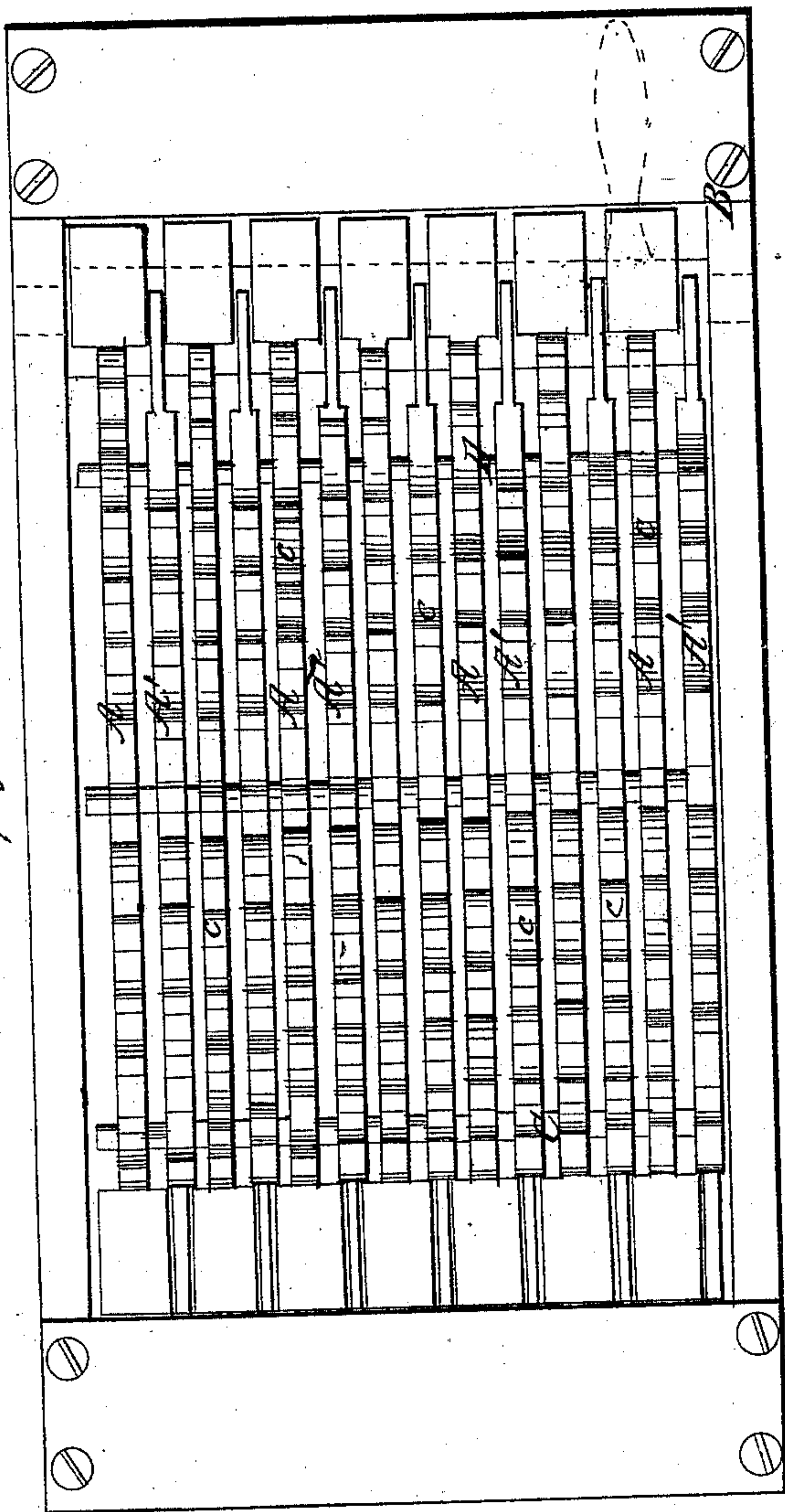


T. T. Holdsworth,

Furnace Grate.

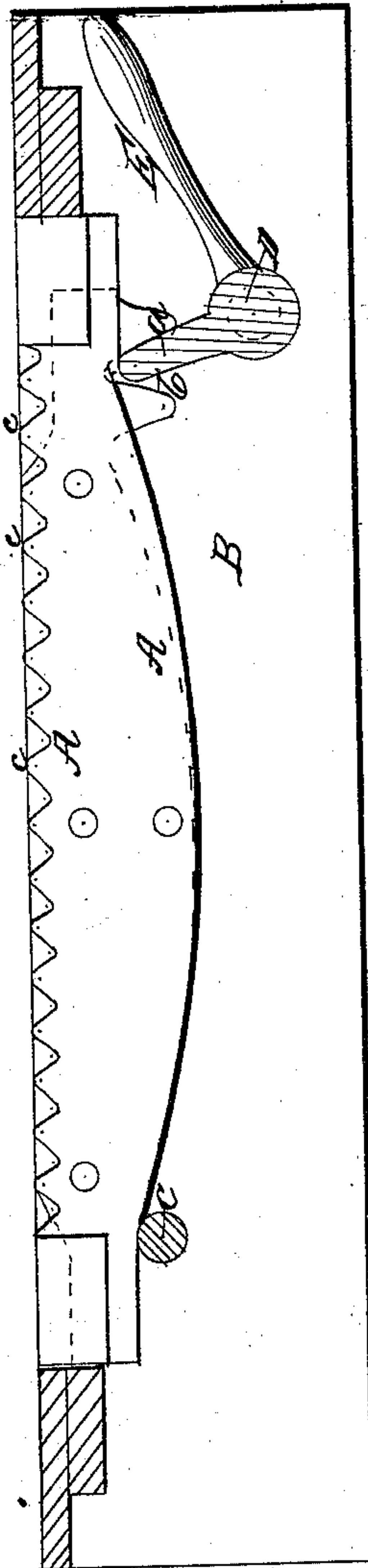
N^o 39,573. Patented Aug. 18, 1863.

Fig. 1



Witnesses:
Robt. H. Louden
M. M. Livingston

Fig. 2



Inventor:
Thos. J. Holdsworth

UNITED STATES PATENT OFFICE.

THOMAS T. HOLDSWORTH, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN GRATES FOR FURNACES.

Specification forming part of Letters Patent No. **39,573**, dated August 18, 1863.

To all whom it may concern:

Be it known that I, THOS. T. HOLDSWORTH, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Furnace Grates; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a plan or top view of my invention. Fig. 2 is a longitudinal vertical section of the same.

Similar letters of reference in the two figures indicate corresponding parts.

To enable those skilled in the art to make and use my invention, I will proceed to describe it.

A A' represent a series of grate-bars, which are placed side by side in the furnace B under a steam-boiler, or in any other place where a furnace is required. The bars A extend from one end of the furnace to the other, so that they can be lifted out in the ordinary manner whenever it is desired, but they cannot be moved in a longitudinal direction. The alternate bars A' are supported at one end of the furnace by a stationary cross-bar, C, and at the other by the rock-shaft D, from which cams *a* extend upward to catch into notches *b* at the lower edges of the said grate-bars. A hand-lever, E, serves to impart an oscillating motion to the rock-shaft D, and the cams *a* are brought in such relation to the notches *b* that they do not lift the bars, but simply impart to them a reciprocating vertilinear motion between the stationary bars A'. The ends of the bars A' are guided between the ends of the bars A, and they are made so narrow that the spaces between the ends of the bars A are equal to the air-spaces between the adjoining bars A A', and consequently no coal can get through which could not get through between the bars. The upper edges of the bars A A' are provided with teeth *c*, and the bars are made thin and wide in the middle to prevent them from warping.

When it is desired to clean the fire, a reciprocating vertilinear motion is imparted to the bars A', and by the action of the teeth the

coals are turned over and over and the fire is cleaned most effectually from all dust, ashes, and small clinkers, and thereby the most perfect combustion is produced and steam generated more rapidly and economically than with any other grate now in use. The teeth passing each other backward and forward cut any clinker that may be fast to one of the bars, and if the coal is thrown indifferently into the furnace by using the hand-lever afterward it distributes the coal to one thickness throughout the furnace, which equalizes the heat throughout the furnace and prevents the boilers from unequal expansion, which is the cause of many boilers leaking. When the grate-bars receive a lifting oscillating motion—alternately at one end, then at the other—the coals are all thrown toward the center, leaving the back and front ends bare, which would cause unequal expansion of the boilers and allow the cold air to pass through, so as cool the flue and lower the steam. Furthermore, if the bars receive a lifting motion, a clinker might get at the end or between them. The bar has then only its own weight to bring itself down again, which it could not do with a hard clinker, and its edge would thus project above the surface of the remaining grate-bars, and thereby be liable to burn off.

My bars have a positive motion both ways, and by cutting the movable bars down in a sloping direction and making the flanges of the stationary bars of such a width that the spaces between them are not larger than the air-spaces between the bars, the coals rest on these flanges and the ends of the moving bars pass under without interruption.

What I claim as new, and desire to secure by Letters Patent, is—

The arrangement of the shaft D, cams *a*, and lever E with the alternate toothed bars, in the manner herein shown and described, so as to produce the motion upon said alternate bars in connection with the teeth, all as set forth.

THOS. T. HOLDSWORTH.

Witnesses:

ROBT. H. LOUDER,
M. M. LIVINGSTON.