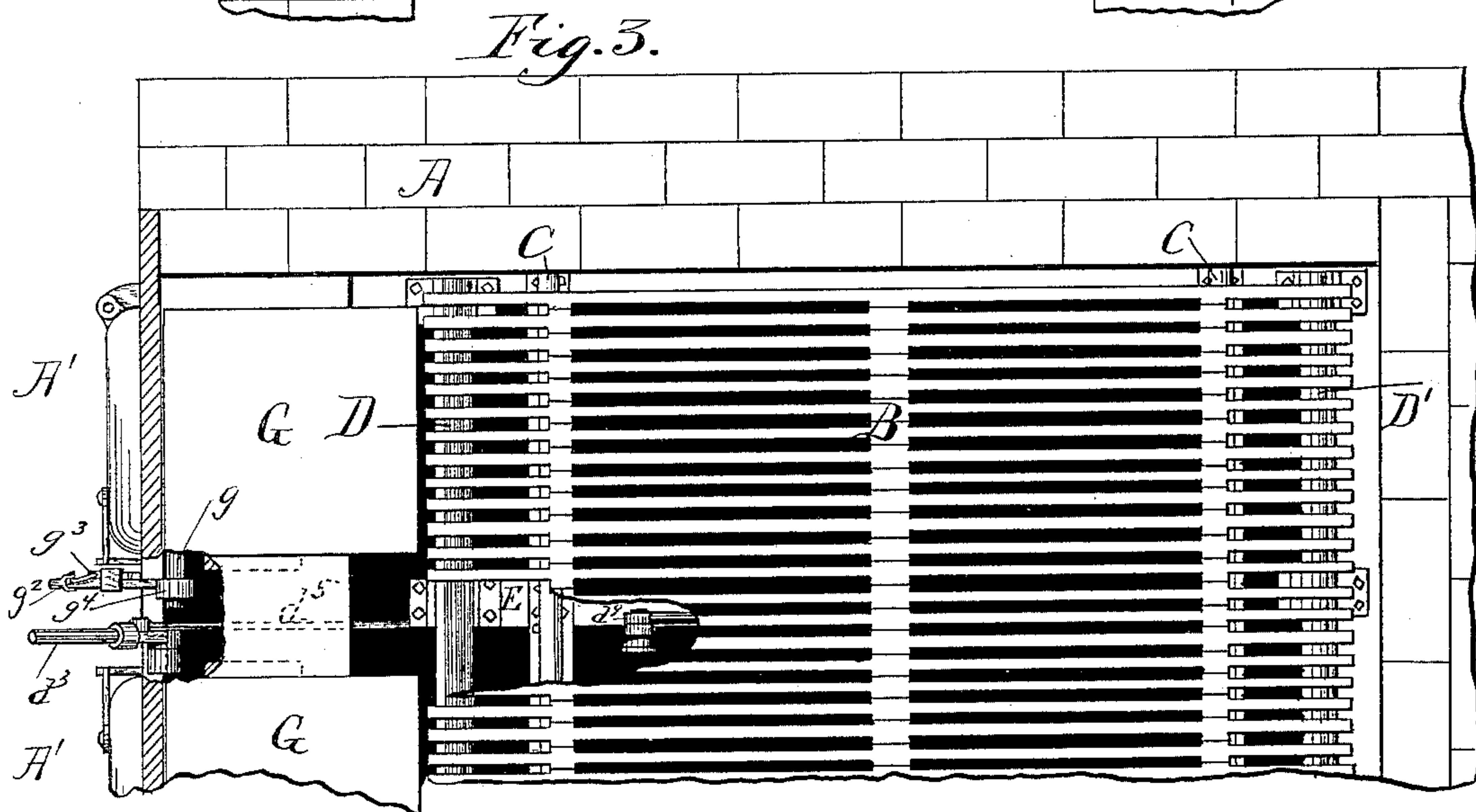
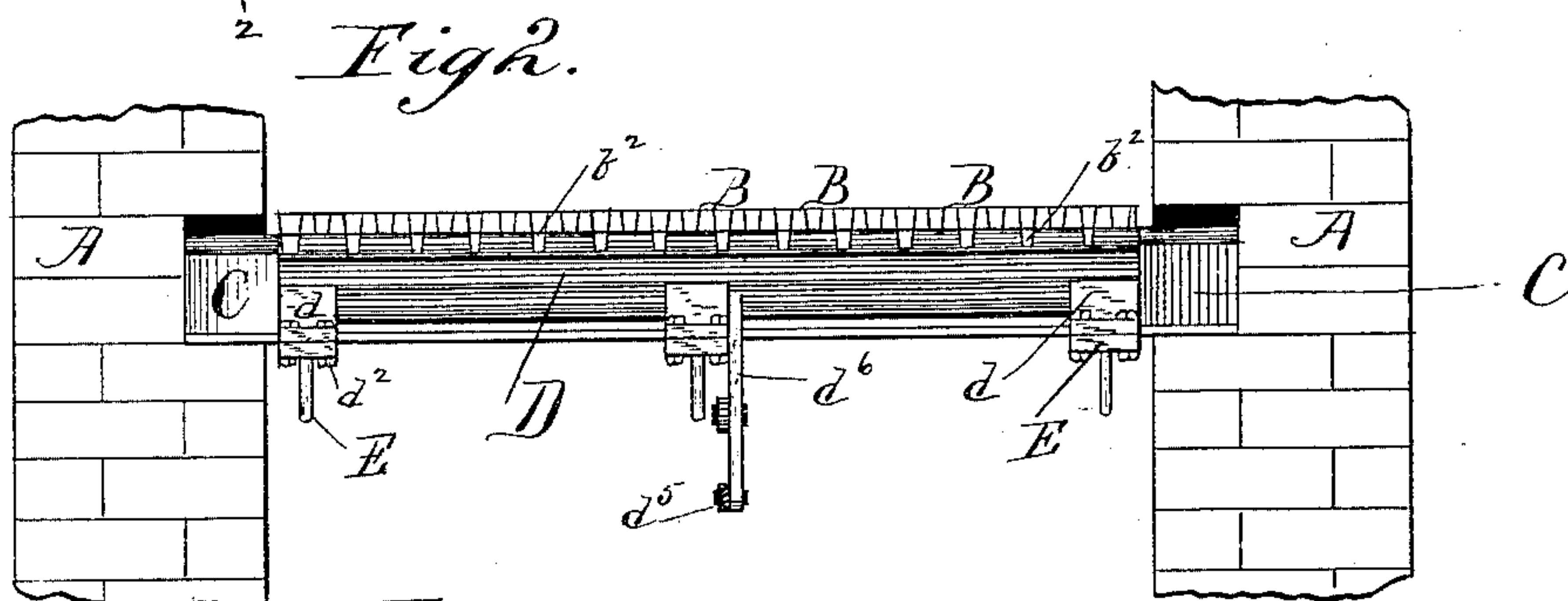
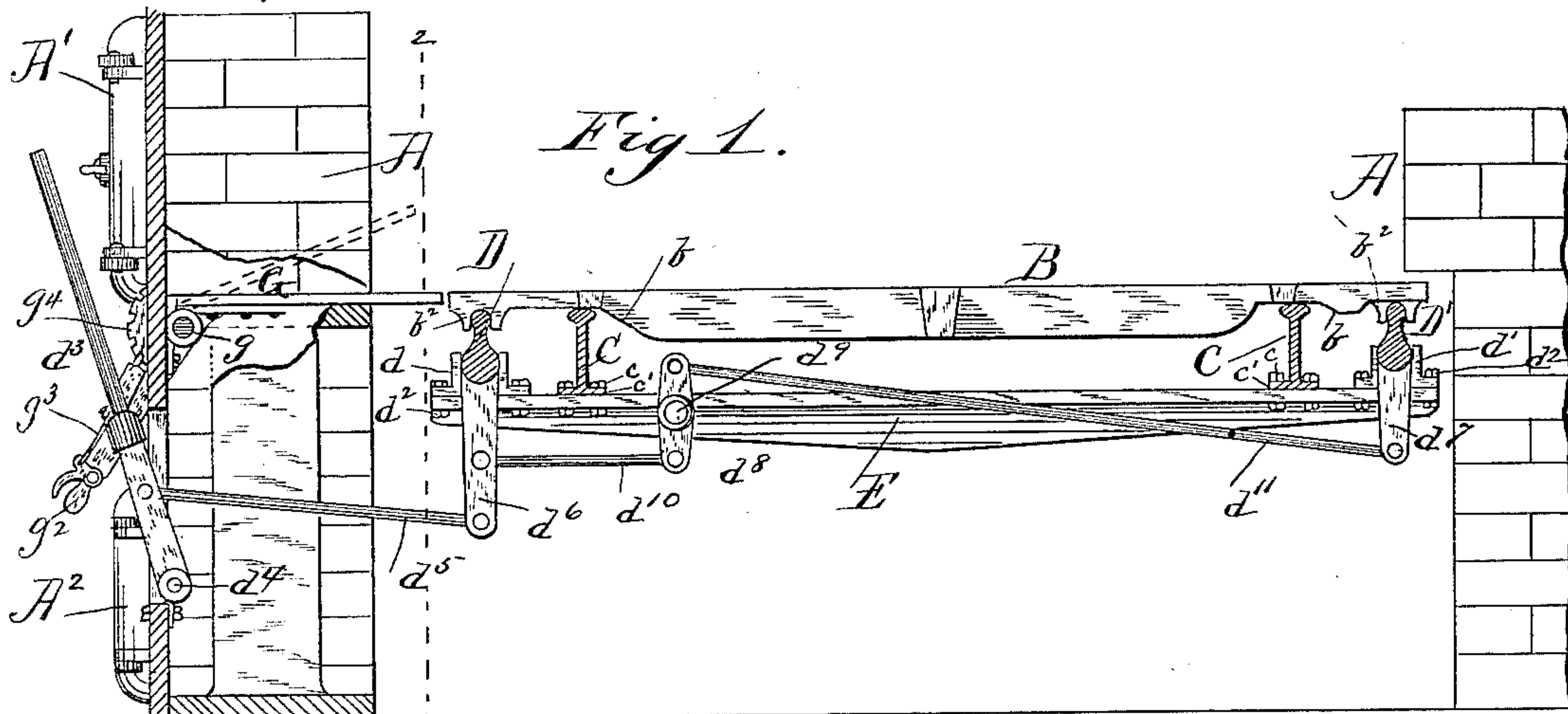


(No Model.)

G. GULICKSON.  
GRATE FOR FURNACES.

No. 318,467.

Patented May 26, 1885.



Witnesses:

Taylor E. Brown  
Lewis E. Curtis

Inventor:

George Gulickson  
By Monday, Evans & Adcock  
his Attorneys.



# UNITED STATES PATENT OFFICE.

GEORGE GULICKSON, OF CHICAGO, ILLINOIS.

## GRATE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 318,467, dated May 26, 1885.

Application filed May 6, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE GULICKSON, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Grates for Furnaces, of which the following is a specification.

My invention relates to grates having shaking grate-bars.

Heretofore in furnaces having shaking or sliding grate-bars the grate-bars have usually been supported by allowing the end of the bar to project over a ledge or supporting-rail formed or embedded in the masonry or iron frame of the furnace, and considerable difficulty is frequently experienced in operating the rocker-bars and shaking the grate, owing to ashes, clinkers, or other obstructions getting into the confined space on the supporting rail or ledge behind the ends of the grate-bars.

The object of my improvement is to obviate this difficulty, and to produce a shaking-grate for furnaces of simple and durable construction, and which will be easy and perfect in its operation; and the same consists in providing bearing-bars to support the grate-bars some little distance from their ends, so that the ends of said grate-bars may be free and clear, and have an open space beneath into or through which the ashes or clinkers may fall, and thus prevent their obstructing the operation of the grate.

The invention also consists, in connection with the grate-bars and their bearing-bars, in providing cams or projections on the under surface of the grate-bars, for the purpose of slightly raising each alternate grate-bar as the same are reciprocated; and it also consists in the novel devices and novel combinations of devices herein shown and described.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a side elevation of a grate embodying my invention. Fig. 2 is a cross-section on line 2 2 of Fig. 1, and Fig. 3 is a plan view showing the grate partially broken away.

In said drawings, A represents the wall or frame of a furnace; A', the doors, and A<sup>2</sup> the door leading into the ash-pit below the grate.

The grate-bars B are supported upon the transverse bearing-bars C, which are located

some little distance—six or eight inches, for example—from the ends of the grate-bars, so that the ends of the grate-bars project over their supports, and are thus left free and clear with an open space beneath them.

The bearing-bars C may preferably be of T-rail shape in cross-section, and are supported at each end by the wall or frame A of the furnace, in which their ends are embedded, or rest upon suitable ledges or projections prepared for the purpose.

The grate-bars B are each provided with a cam or inclined projection, *b*, on their lower edge—one near each end—which, impinging against the bearing-bars C, causes the end to be slightly elevated when the grate-bar is reciprocated in one direction, but not when reciprocated in the opposite direction. The contiguous grate-bars are reciprocated in opposite directions at the same time, and the cams *b* on their under surfaces are all faced in the same direction, so that only each alternate grate-bar will be elevated by the cams at one time.

D and D' are the rock-bars by which the grate-bars B are reciprocated. These rock-bars are mounted in suitable bearings, *d* and *d'*, which bearings are secured by suitable bolts, *d*<sup>2</sup>, to the beams E E E, which support the rock-bars. The beams E are secured to the bearing-bar C by bolts *c*, passing through the flanges *c'* of said bearing-bars. Each grate-bar B is provided at one end with a U-shaped saddle or bearing, *b*<sup>2</sup>, for its rock-bar. Each alternate grate-bar is connected by its saddle *b*<sup>2</sup> with the rock-bar D, and the remaining grate-bars with rock-bar D', so that by rocking the bars D and D' in opposite directions the contiguous grate-bars will be reciprocated in opposite directions. The rock-bars D and D' are thus operated by means of a lever, *d*<sup>3</sup>, which is pivoted to the frame or casing A at *d*<sup>4</sup>, and connected by a rod, *d*<sup>5</sup>, to the arm *d*<sup>6</sup>, rigidly secured to and preferably cast integral with the rock-bar D. The rock-bar D' is provided with a similar arm, *d*<sup>7</sup>. The shaker-arm *d*<sup>7</sup> is connected to and operated from the arms *d*<sup>6</sup> by means of the intermediate lever, *d*<sup>8</sup>, pivoted to one of the beams E at *d*<sup>9</sup>, and connected with the arm *d*<sup>6</sup> by the rod *d*<sup>10</sup> at one end, and with the arm *d*<sup>7</sup> by the rod *d*<sup>11</sup> at the other end. By this means it will be seen that the bars D and D' will be rocked in opposite di-



rections at the same time, and that each alternate grate-bar B will be raised at both ends by its cams *b* when moving in one direction, while the intermediate grate-bars, when moving in the opposite direction, are simply reciprocated without being thus elevated. The cams *b* at the ends of the grate-bars serve to raise both ends of each grate-bar simultaneously when the same is reciprocated to the left. As only the alternate bars are reciprocated to the left at the same time, half the grate-bars will rise, while the other half fall, being reciprocated in the opposite direction.

G is a dump-plate extending on a line with the upper surface of the grate, and pivoted at its back edge to the casing at *g*. The front edge of this plate projects out a few inches beyond the wall of the furnace, and by dumping or dropping the plate down the attendant may easily remove any clinkers or obstructions at the end of the grate-bars, which might otherwise interfere with the free operation of the grate. By elevating the front edge of this plate so that it projects above the surface of the grate-bars, additional air may be admitted to the fire, and it thus serves also as a means of regulating the draft. The dump-plate G is provided with an actuating-lever, *g*<sup>2</sup>, having a spring-pawl, *g*<sup>3</sup>, which engages with the teeth of the fixed ratchet *g*<sup>4</sup>, by which means the dump-plate may be fixed in any position desired.

In the drawings I have shown the rock-bars D and D' located one near each end of the grate-bars; but they may of course be located differently without departing from the principle of my invention, and they may, if preferred, be located both near the same end of the grate-bars; but I prefer to arrange them about as shown in the drawings. By locating them one at each end of the grate-bars I am enabled to make all the grate-bars from the same pattern, as the saddles or bearings *b*<sup>2</sup> for the rock-bars come in the same place.

I claim—

1. The combination of grate-bars B, having saddles *b*<sup>2</sup>, with rocker-bars D and D', each

engaging the saddles on alternate grate-bars, shaker-arms *d*<sup>6</sup> and *d*<sup>7</sup>, intermediate lever, *d*<sup>8</sup>, connecting-rods *d*<sup>10</sup> and *d*<sup>11</sup>, operating-lever *d*<sup>3</sup>, and connecting-rod *d*<sup>5</sup>, substantially as specified.

2. The combination of reciprocating grate-bars B with a pivoted or hinged dump-plate G, lever *g*<sup>2</sup>, pawl *g*<sup>3</sup>, and ratchet *g*<sup>4</sup>, substantially as specified.

3. The combination, with bearing-bars C, of beams E, secured to said bearing-bars and supported thereby, rocker-bars D and D', mounted in suitable bearings on said beams E, and grate-bars B, having their ends projecting over said bars C and provided with cams *b* to engage said bearing-bars, and saddles *b*<sup>2</sup>, engaging alternately with rocker-bars D and D', substantially as specified.

4. The combination, with bearing-bars C, of beams E, secured to said bearing-bars, rocker-bars D and D', mounted in suitable bearings on said beams E and provided with shaker-arms *d*<sup>6</sup> *d*<sup>7</sup>, grate-bars B, having their ends projecting over said bars C and provided with cams *b* and saddles *b*<sup>2</sup>, intermediate lever, *d*<sup>8</sup>, and rods *d*<sup>10</sup> and *d*<sup>11</sup>, connecting said shaker-arms *d*<sup>6</sup> *d*<sup>7</sup> and operating-lever *d*<sup>3</sup>, and rod *d*<sup>5</sup>, connecting said lever *d*<sup>3</sup> with shaker-arm *d*<sup>6</sup>, substantially as specified.

5. The combination, with bearing-bars C, of grate-bars B, having their ends projecting over said bearing-bars and provided with saddles *b*<sup>2</sup>, rocker-bars D and D', engaging with said saddles on alternate grate-bars and provided with shaker-arms *d*<sup>6</sup> *d*<sup>7</sup>, intermediate lever, *d*<sup>8</sup>, and rods *d*<sup>10</sup> and *d*<sup>11</sup>, connecting said shaker-arms *d*<sup>6</sup> and *d*<sup>7</sup> and operating-lever *d*<sup>3</sup>, and rod *d*<sup>5</sup>, connected to said shaker-arm *d*<sup>6</sup>, substantially as specified.

6. The combination, with the grate-bars, of a pivoted dump-plate, G, at the front end thereof to regulate the draft, substantially as specified.

GEORGE GULICKSON.

Witnesses:

EDMUND ADCOCK,  
H. M. MUNDAY.