

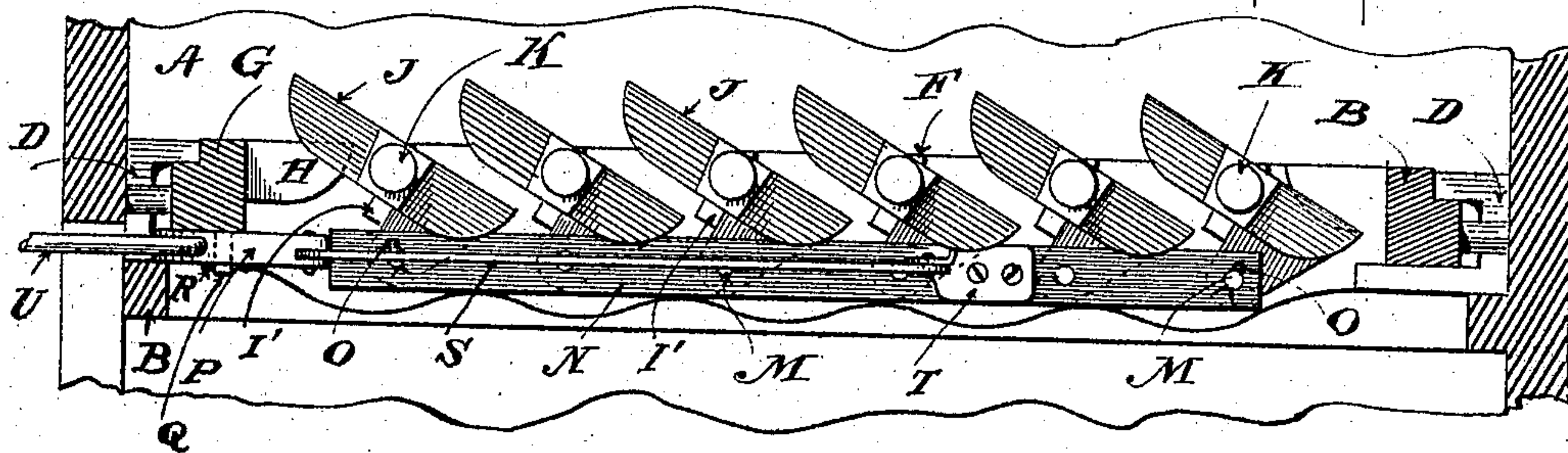
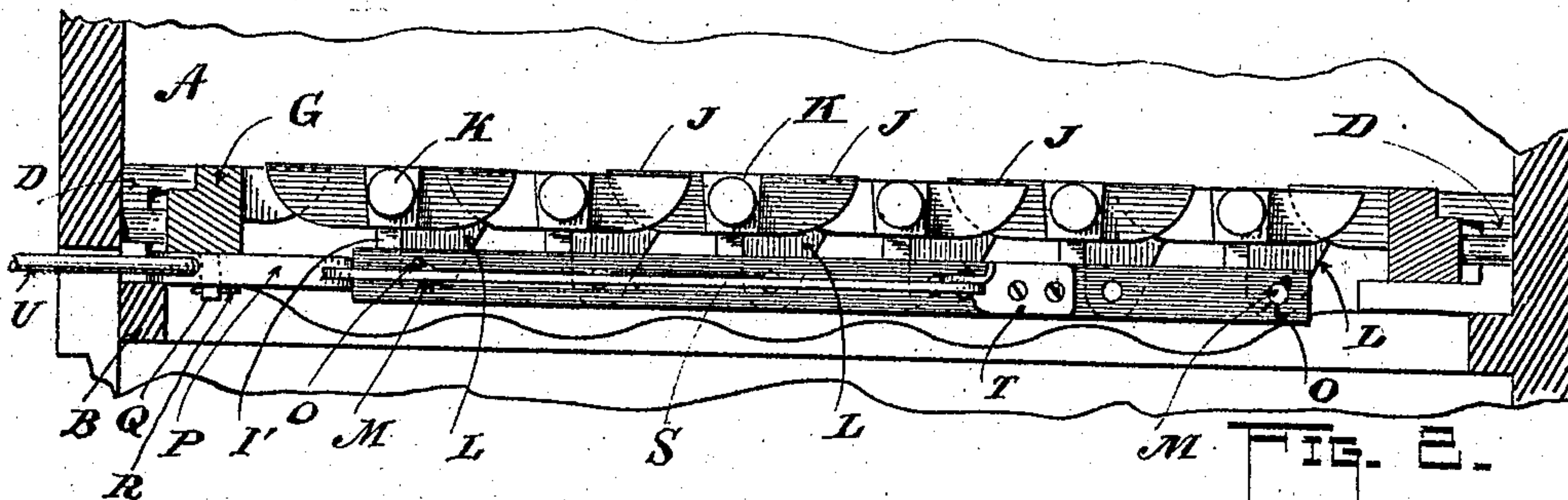
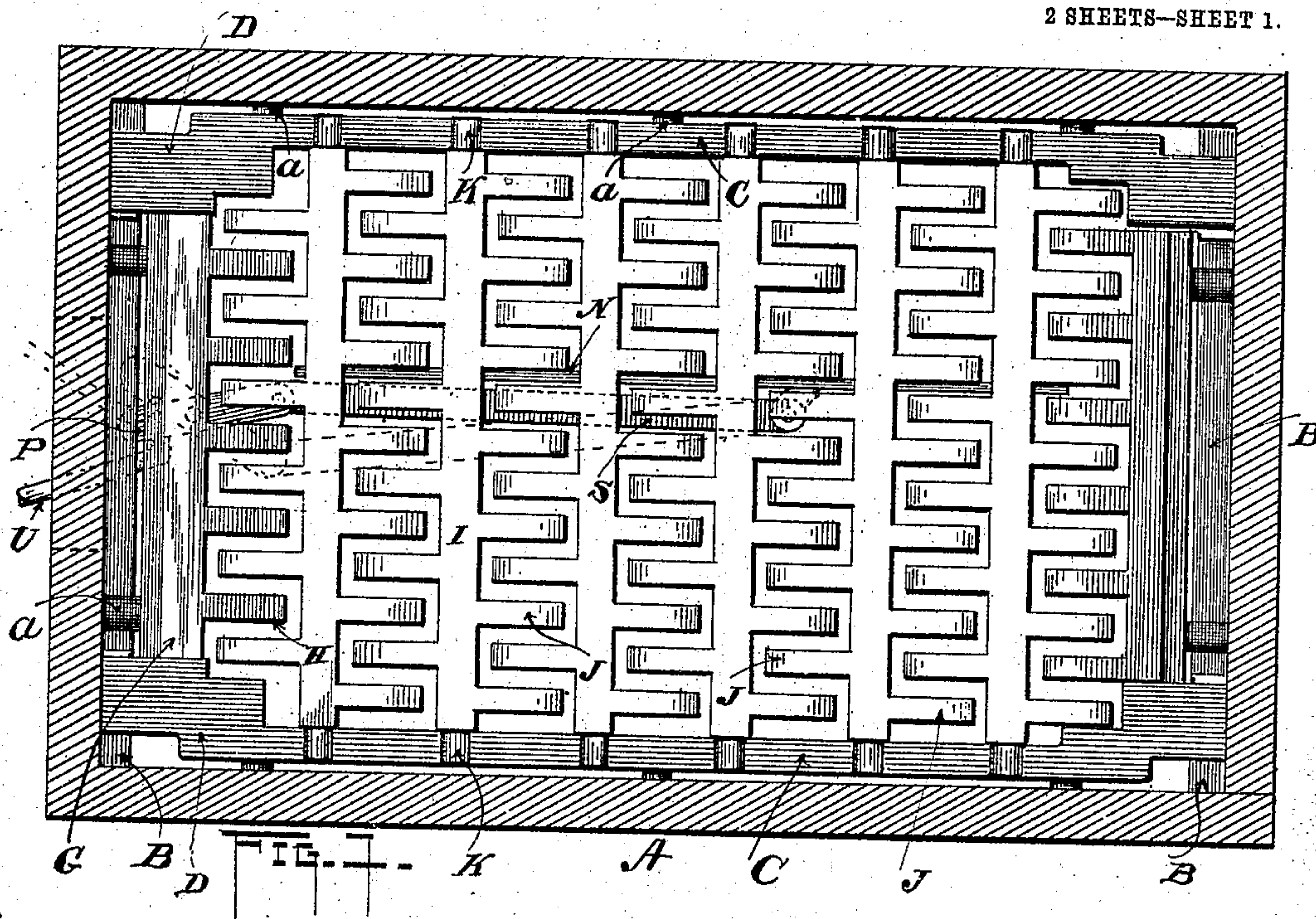
No. 814,815.

PATENTED MAR. 13, 1906.

G. E. TRAVIS.
GRATE.

APPLICATION FILED AUG. 10, 1904.

2 SHEETS--SHEET 1.



Witnesses:
mae Davis
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George E. Travis
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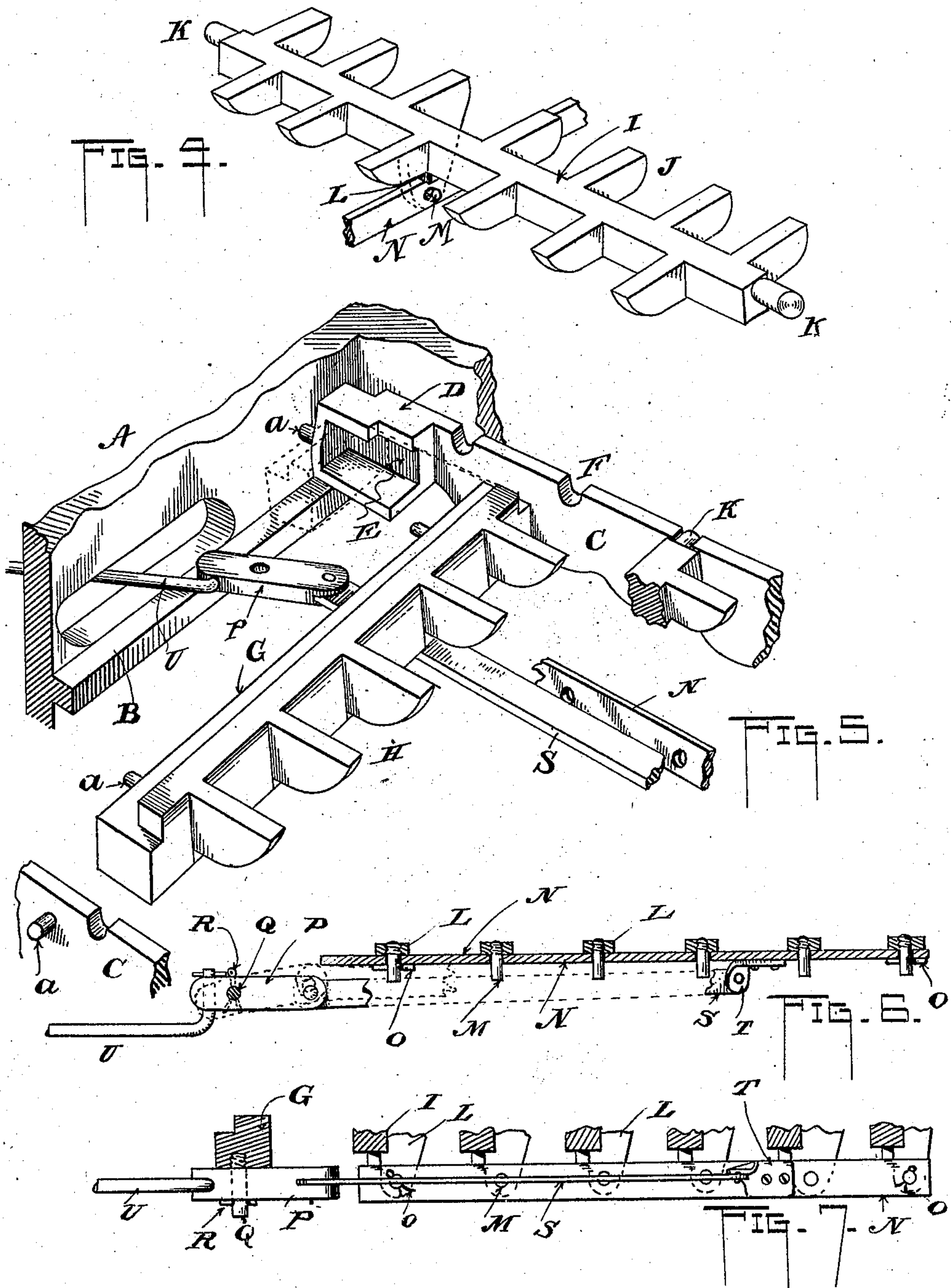
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GEORGE E. TRAVIS, OF HENRY, ILLINOIS.

GRATE.

No. 814,815.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed August 10, 1904. Serial No. 220,193.

To all whom it may concern:

Be it known that I, GEORGE E. TRAVIS, a citizen of the United States, residing at Henry, in the county of Marshall and State of Illinois, have invented certain new and useful Improvements in Grates; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

This invention pertains to improvements in fire-grates adapted for use in traction-engines, although it may be employed in locomotives and stationary boilers as well.

15 The primary object of the invention is to provide a grate that may be readily fitted to any style and size of boiler.

A further object of my invention is to produce a grate whose parts may be readily and
20 quickly removed from the fire-box for repairs and as easily replaced.

A still further object is to produce a shaking-grate that will all be contained within the fire-box, requiring no fittings for the exterior
25 of the boiler by which to shake it.

Another object of the present invention is to provide a shaking-grate requiring no machine or hand work in placing it in operative position within the boiler.

30 Furthermore, an object is to provide a grate that can be locked and prevented spilling the fire therethrough.

In the appended drawings, forming part of this application, Figure 1 is a plan view of
35 the grate placed within the fire-box, which is shown in section. Fig. 2 is a vertical section of the fire-box, showing the end bars in section and also showing the ends of rocking grate-bars. Fig. 3 is a similar view showing
40 the grate-bars rocked to the open position. Fig. 4 is a perspective view of one of the grate-bars. Fig. 5 is a perspective view of a portion of the front end of the fire-box and a ledge thereof, showing a side bar of the grate
45 resting on such ledge, likewise showing an end bar of the grate for entrance into the recess of said side bar, but removed therefrom, the dotted lines showing the position of the end bar within said recess and a portion of
50 the means for shaking the grate. Fig. 6 is a plan view of the shaking mechanism, showing part thereof in horizontal section. Fig. 7 is a side elevation of the same.

The fire-box is indicated by the letter A, each end thereof being provided with the
55 usual ledge B. Resting at both ends upon

the said ledges are two side pieces C, the form of which is shown in Fig. 5. They each consist of a straight bar set on edge and having at each end a head D, having a recess
60 E. The said heads rest upon the ledges B, and the tops of bars between the heads are provided with notches, as at F, for receiving the ends of the rocking grate-bars, one of which is shown in Fig. 4. The recessed
65 heads D of the side bars are designed to receive and carry the extremities of end bars, one of which is shown in perspective in Fig. 5 at G. This consists of the body portion
70 thereof having a number of projecting fingers H, the extremities of the body adapted to enter the recesses E, as indicated by dotted lines in said Fig. 5. When placed in position as shown by said dotted lines, the bar
75 G cannot turn, but is held stationary. The first three figures of the drawings show these bars and their fingers plainly, so that their relative positions can be readily understood.

The intermediate bars, one of which is clearly shown in Fig. 4, consists of a body portion
80 I, having teeth J at each side set in zig-zag manner, as shown—that is, with the teeth of one side opposite the spaces between those of the other side. The extremities of the bars I terminate in rounded projections K,
85 adapted to seat in the notches F of the side bars C, as clearly seen in Figs. 1 and 5. The teeth of these bars I extend into the spaces of the adjacent bars, as shown in Fig. 1, to form a substantial fire-surface, yet with sufficient
90 space for draft purposes from below, as will be understood. The said bars I are adapted to rock in the notches F, as seen in Fig. 3, all rocking in the same direction and simultaneously. The means for accomplishing this
95 movement is clearly illustrated in the drawings. Each of the bars I is provided with a depending ear or lug L, each having screwed or otherwise securely fastened therein a pin M,
100 Fig. 6, and a connecting-bar N, having holes therein corresponding with the several pins is placed upon the latter members, the pins at the extremes having split pins O there-
105 through by which the said bar N is held in place. The intermediate pins of course require no means for holding the bar, since the end ones answer every purpose. Now beneath one of the end bars G is a lever P, hung
110 upon a pin Q, secured in the under side of the said bar G, as in Figs. 2 and 3. A split pin R serves to retain the lever upon its pivot thus constituted. At one end of said lever is

pivotaly connected a link S, whose opposite end is loosely connected to the connecting-bar N by means of an ear T, secured to the latter. A movement of the lever P on its pivot will act to set up a movement of the link S in the direction of its length, which in turn will impart movement to the connecting-bar N to tilt the bars I on their pivots K. The movement of the bars is from the horizontal position to about the angle shown in Fig. 3 and only in one direction—that is to say, the bars do not tip in the opposite direction from that shown in said Fig. 3, but stop at the horizontal position, as in Fig. 2. The limit of movement of the bars and the stopping thereof at the horizontal position is determined by the meeting of the point where the link S and the lever P connect with the connecting-bar N. (See Fig. 6.) The limit in the opposite direction is determined by the amount of movement given the lever. The latter member is designed to occupy a position near the usual opening for the shaker or the ash-door, being provided with a hole in its free end, in which is inserted a shaker-bar U, having an extension bent at right angles to its greatest length, forming an L. This bar may be inserted in the lever each time it is desired to shake the grate or it may be fixed therein by any good means.

It has been stated above that the grate-bars I were limited in movement in one direction by the lever P and link S meeting the connecting-bar N, but in addition to this said bars are also limited by a lug I' on each, beneath which the connecting-bar occupies a position, and upon which bar said grate-bars seat when thrown to the horizontal position. The bars would thus be prevented passing below the horizontal position regardless of the relation of the lever P and rod S, together with the connecting-bar N.

Though not so shown, the ends of the bars G may be secured within the recesses E of the heads D in any good manner, so that they will be prevented moving toward one another.

In bringing out my improved grate I have provided the end and side bars G and C, respectively, with lugs *a a* on their surfaces adjacent to the inclosing walls of the fire-box. These are for the purpose of spacing these members from the said walls in order that a grate may be snugly fitted to any desired boiler. It is understood that it is almost impossible to find two boilers, even of the same make, whose inclosing walls are spaced apart exactly the same. In order, therefore, to permit the mechanic to fit my grate, I provide said lugs *a a* of sufficient length to go into a fire-box slightly oversized; but for slightly smaller fire-boxes the lugs are ground or filed off to fit, as may be found necessary. In boilers of larger size grates of larger dimensions are supplied, or where the boiler is

slightly wider with the same length—for instance, as shown in Fig. 1 of the drawings—the end bars shown are replaced by longer ones to separate the bars C, and then longer bars I are employed.

In placing a grate of this design in position for use the side bars C are first entered through the fire or the ash door and placed upon the end ledges B. Then the end bars G are inserted and seated within the recesses E and therein secured if found necessary. Then the rocking bars I are seated in the notches F, the depending lugs L being arranged in line ready to receive the connecting-bar N. This latter member, together with the link S and lever P, are connected together ready to insert below the grate-bars, the said bar N being placed upon the pins M and the keys or split pins O passed through the end pins to retain said bar in position. At the same time the link is raised beneath the end bar G and placed upon its pivot-pin Q and there held by its pin R. The lever U is then inserted permanently and secured by a split pin or other means, as described, or left off until needed to shake the grate. In removing the grate from the fire-box these operations are reversed.

In Fig. 5 the side bar C is shown provided with a lug *a* at the end, whereas in Fig. 1 the said bar and its companion are shown occupying the entire length of the fire-box. By having one of such lugs at each end the same advantages are had as described for the end bars G in the matter of adjustment.

When using the lever P for the purpose of locking the bars, it is seen that the connecting-point between the lever and link S must pass beyond a line drawn through the pivot Q of the lever and the point of connection of the link S with the ear T, so that while occupying that position the bars are immovable.

To those not familiar with the proper handling of fires in boilers, and especially in traction-engine use, it may be said that to use a shaker such as ordinarily employed in stoves and furnaces, where the grate is given a partial rotary movement, the fire is too much disturbed and settled down into a compact mass, the result of which is to form a molten mass which afterward forms a solid clinker and constitutes a bar to the passage of air to and through the fire. It has been found, therefore, that the proper and scientific manner of ridding a fire of ashes is merely to gently raise the bars of the grate and then lower them substantially in the manner shown in the drawings. This permits the ashes and other matter, such as small clinkers and the like, to fall away from the fire without disturbing the latter to the extent above described. The draft is thus established and proper combustion must follow without the annoying forming of clinker. By the means herein shown and described the bars are easily and properly rocked to accomplish the

end described. The advantage in the construction of my grate also is the ease with which it may be placed in any make of boiler without any work except that of filing or grinding off the lugs *a* to permit the supporting end and side bars to fit snugly, and it is seen that there is no need of drilling holes or cutting threads by which to place means on the outside of the boiler for shaking the grate.

10 By having the recess *E* in head *D* placed horizontally the ashes cannot enter, and the bar held therein cannot become burned so as to make it impossible to separate it from the bar in which the recess is formed. A bar
15 dropped into a notch from above, as in some of the older forms of grate construction, is often immovably held in the notch on account of the shrinking of the member containing the notch after heating.

20 My grate may be used in all kinds of furnaces—such, for instance, as heating-furnaces and stationary boilers when the fire is in a brick arch.

I claim—

25 1. In a grate of the character described, the combination with the fire-box of a boiler, the same having ledges therein for supporting a grate, of side bars adapted to rest at their ends upon the ledges, there being a recess
30 formed in the inner side of each end of the said bars, end bars having their ends lying within the recesses, the said ends of the end bars being covered by overhanging portions of the side bars wherein the recesses are
35 formed, a series of tilting bars parallel with the end bars and supported on the side bars, there being recesses in the top edges of the latter for receiving the tilting bars, a connecting-bar for connecting all of the tilting bars and
40 means contained within the fire-box beneath the grate for moving the connecting-bar for tilting all of the tilting bars simultaneously as set forth, said means also adapted to lock all of the tilting bars from moving when in their
45 normal positions.

2. In combination with a fire-box having a ledge therein at each end, a grate comprising two side bars resting at their ends upon said ledges, each side bar being provided at each
50 end with an enlargement, each said enlargement being offset inwardly and provided with a horizontally-disposed recess, there being lugs on the outer sides of the bars for the purposes set forth, an end bar whose ends enter the said recesses, said end bars being at
55 right angles to the side bars there being lugs on the outer faces of the said end bars for the purposes described, there also being a series of fingers on the inner surfaces of the end
60 bars, a series of rocking grate-bars resting upon the side bars parallel with the end bars and having a series of fingers at each side, the fingers of adjacent bars intermeshing, each rocking bar having a depending ear, a connecting-bar pivotally connecting all of the

ears, a link pivoted at one end to the connecting-bar, a lever pivoted between its ends to one of the end bars to swing horizontally and having the opposite end of the link pivoted to its inner end, said lever adapted to tilt the
70 rocking bars through the medium of the said link and connecting-bar, the said lever and link adapted to lock the rocking bars from moving when the latter are occupying their normal positions as set forth. 75

3. In combination with a fire-box, a grate comprising a series of tilting grate-bars, a connecting-bar for connecting all of them, a link pivotally attached at one end to the connecting-bar, and a lever pivoted between its
80 ends near the front of the fire-box and having the opposite end of the link pivoted to one end thereof, said lever and link adapted to rock the grate-bars but to lock them from movement by throwing the point of connection of the said lever and link against the connecting-bar at which time said point of connection lies between said connecting-bar and a line connecting the fulcrum of the lever and point of connection of the link with the said
85 connecting-bar. 90

4. In combination with a fire-box, a grate comprising a series of tilting grate-bars, a connecting-bar for connecting all of them, a link pivotally attached at one end to the connecting-bar, a lever pivoted between its ends at a point near the front of the fire-box and having the opposite end of the said link pivoted to one end thereof, a lug at the bottom of each grate-bar against which the said connecting-bar rests when the grate-bars are in their normal positions, the lugs preventing the grate-bars moving beyond a horizontal position, the lever and link adapted to rock the grate-bars but lock them from movement
100 when this point of connection lies between the connecting-bar and a line connecting the fulcrum of the lever and the point of connection of the link with the connecting-bar as set forth. 110

5. In a grate, the combination of the separate side and end bars, each side bar being provided at each end with an enlargement, each of said enlargements being offset inwardly and provided with a horizontally-disposed
115 recess and receiving the ends of the end bars as described, there being lugs on the outside faces of the said end bars for contacting with the walls of the fire-box, and a series of tiltable grate-bars carried on the side bars, means for tilting said grate-bars and means for locking the tilting means and the said bars substantially as set forth. 120

6. In combination with a fire-box, a grate comprising a series of tilting grate-bars, a connecting-bar for connecting all of them, a link pivotally attached at one end to the connecting-bar, and a lever pivoted between its ends near the front of the fire-box and having the opposite end of the link pivoted to
125 130

one end thereof, said lever and link adapted to rock the grate-bars but to lock them from movement in one direction by throwing the point of connection of the said lever and link against the connecting-bar at which time said point of connection lies between said connecting-bar and a line connecting the fulcrum of the lever and point of connection of the link with the said connecting-bar, and a lug on the bottom of each grate-bar for contacting with the top of the connecting-bar for preventing the said grate-bars tilting in the opposite direction.

7. In combination with a fire-box, a grate comprising a series of tilting grate-bars, a connecting-bar for connecting all of them, a link pivotally attached at one end to the connecting-bar, and a lever pivoted between its ends near the front of the fire-box and having the opposite end of the link pivoted to one end thereof, said lever and link adapted to rock the grate-bars but to lock them from movement in one direction by throwing the point of connection of the said link and lever against the connecting-bar at which time said point of connection lies between said connecting-bar and a line connecting the fulcrum of the lever and point of connection of the link with the said connecting-bar, the

grate-bars being prevented from tilting in the opposite direction by contact of the connecting-bar with the under sides thereof.

8. In combination with a fire-box, a grate comprising a series of tilting grate-bars, a connecting-bar for connecting all of them, a link pivotally attached at one end to the connecting-bar, and a lever pivoted between its ends near the front of the fire-box and having the opposite end of the link pivoted to one end thereof, said lever and link adapted to rock the grate-bars but to lock them from movement in one direction by throwing the point of connection of the said lever and link against the connecting-bar at which time said point of connection lies between said connecting-bar and a line connecting the fulcrum of the lever and point of connection of the link with the said connecting-bar, and means on the bottom of the grate-bars for preventing the said bars tilting in the opposite direction.

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

GEORGE E. TRAVIS.

Witnesses:

U. M. HOLMES,
LONNIE WARNER.