

(No Model.)

2 Sheets—Sheet 1.

A. J. HULL.
GRATE.

No. 475,866.

Patented May 31, 1892.

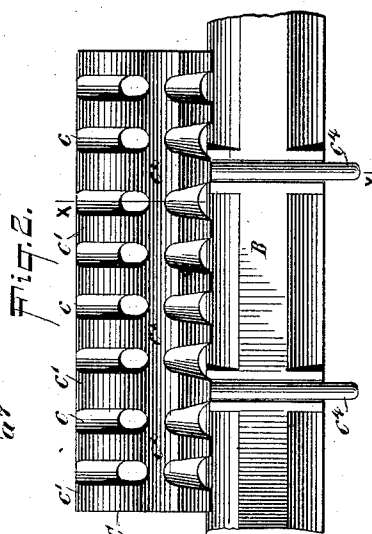
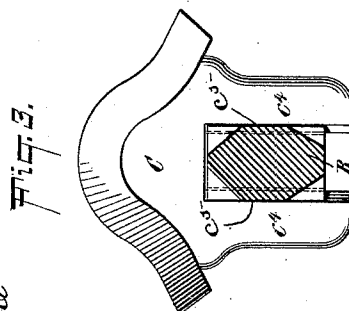
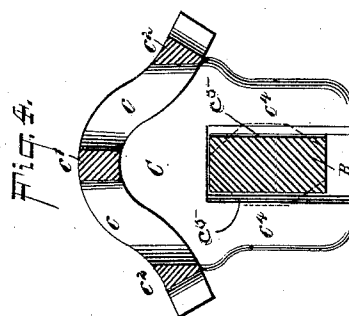
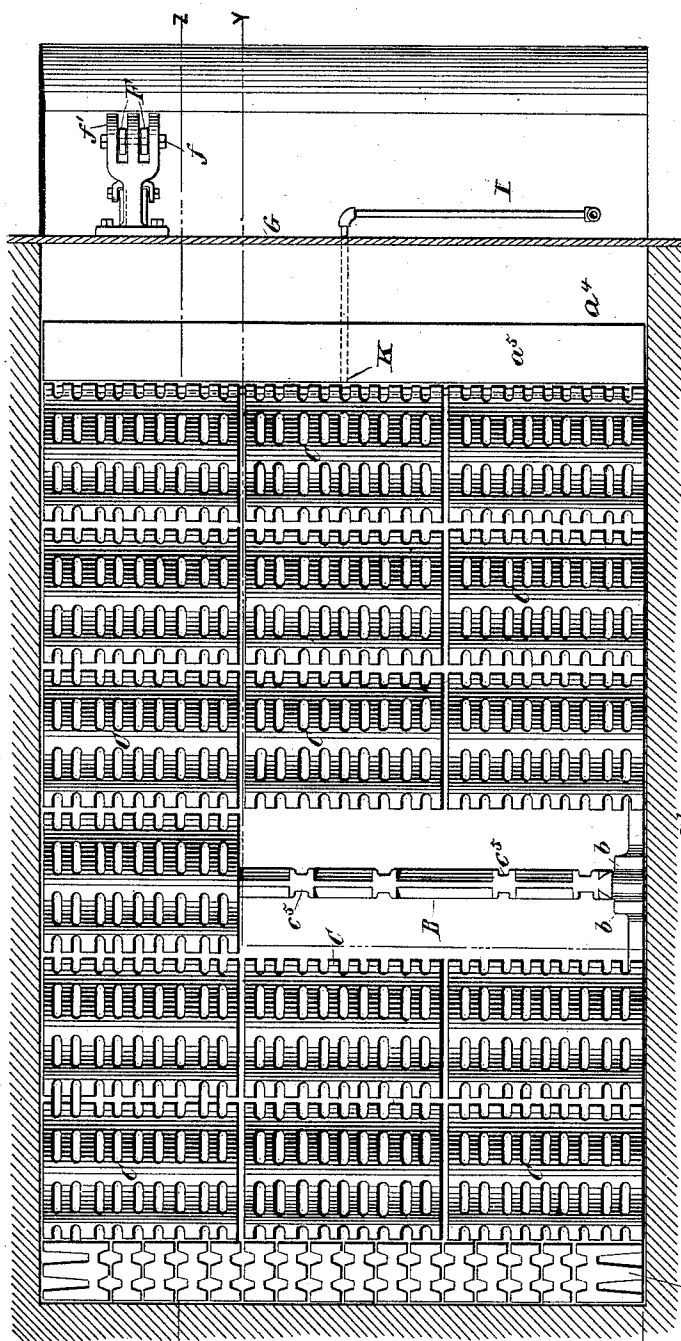
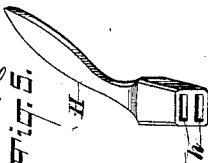


Figure 1.

WITNESSES:

William Goebel.
Richard Lips



Andrew J. Hull

BY George Cook.
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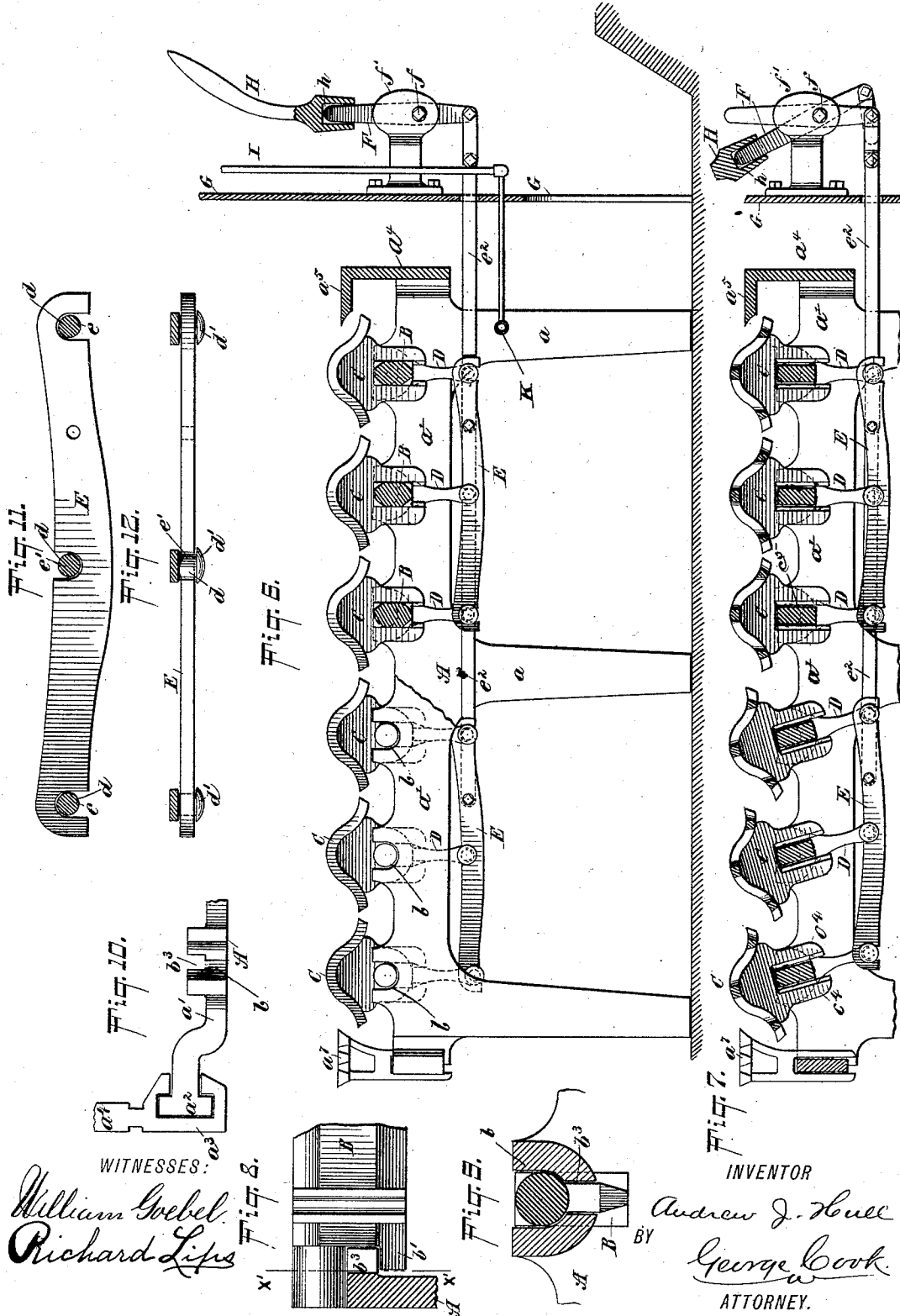
(No Model.)

2 Sheets—Sheet 2.

A. J. HULL.
GRATE.

No. 475,866.

Patented May 31, 1892.



WITNESSES:

William Geibel.
Richard Lips

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UNITED STATES PATENT OFFICE.

ANDREW J. HULL, OF NEWARK, NEW JERSEY.

GRATE.

SPECIFICATION forming part of Letters Patent No. 475,866, dated May 31, 1892.

Application filed July 25, 1891. Serial No. 400,699. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. HULL, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Grates, of which the following is a specification.

My invention relates to an improvement in grates, the object of the same being to so construct a device of this character that it may be easily and readily taken apart for repairs and readily put together.

A further object is to so construct the grate that a better result will be obtained with a given amount of coal than has heretofore been the case with other devices of like character.

A further object of my invention is to make the parts interchangeable, so that should one part—as, for instance, a leaf—become burned or damaged it may be removed and a new one substituted.

With these and other objects in view my invention consists in certain novel features of construction and combinations of parts, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved grate, several of the leaves being removed from one of the bars. Fig. 2 is a side view of one of the leaves. Fig. 3 is an end view of the same, the bar being shown in section. Fig. 4 is a sectional view of the leaf, taken on the line $x x$ of Fig. 2. Fig. 5 is a perspective view of the handle or lever with which to shake or operate the grate. Fig. 6 is a sectional view on the line $y y$ of Fig. 1. Fig. 7 is a sectional view taken on the line $z z$ of Fig. 1, the rear leaves being inclined. Fig. 8 is a detail view, partly in section and partly in elevation, showing the manner of locking the bars to the frame. Fig. 9 is a sectional view taken on the line $x' x'$ of Fig. 8. Fig. 10 is a detail plan view showing the attachment of the frame to the end bars. Fig. 11 is a side view, in elevation, of the bar or lever connecting the leaves. Fig. 12 is a top plan view of the same.

A represents the frame of the grate, supported on the legs a , and consists of two side

and two end bars, the side bars having the reference-letter a' and the end bars being denoted by a^4 . Instead of bolting these parts together, as is usually done, I construct the ends as shown in Fig. 10, the side bars a' being curved and provided with the lug or shoulder a^2 , adapted to fit in a recess formed in the enlarged end a^3 of the end bar a^4 , and thereby securely lock the parts together, the purpose of this construction and arrangement of parts being to allow the frame to be easily and readily put together or taken apart, it being simply necessary to raise the bar a^4 to release it from engagement with the side bars. The front bar a^4 , which is also secured to the side bars, as above described, is bent over, as shown at a^5 , for the purpose of forming a ledge or platform in front of the grate.

On the side bars a' are formed bearings b , in which are supported the ends of the bars B, these bearings extending inwardly toward the center of the grate and having the bottoms or lower sides thereof rounded to conform to the rounded ends of the bars and allow the latter to rock therein. On the ends of these bars are also secured or formed the projections b' , (see Fig. 8,) which, when putting the bars into place, pass down through openings b^3 , (see Fig. 10,) formed in the bearings b , the projections b' extending under the latter when the bars are rocked and prevent said bars from becoming disengaged from the frame. To remove the bars B it is only necessary to so turn them that the projections b' register with the openings b^3 , when they may be raised and released from the side bars a' . These bars B, I prefer to make diamond shape in cross-section, as shown in Fig. 3, but are grooved and provided with flat parallel sides at those points where the leaves are secured thereon, as shown in Fig. 4.

C represents the leaves of the grate, curved in cross-section, as shown in Figs. 3 and 4, and each formed with two series of transverse openings c , one on either side of the central rib c' and in parallel lines, two other ribs c^2 also running the entire length of each rib, as seen in Fig. 4. I have found from numerous experiments and practical tests that the above is a very desirable form of leaf, the compound curve given to the leaf, it being highest at the

middle and sloping toward the edges, allowing a certain amount of coal to fill the depressions between the leaves and a smaller amount on the highest parts thereof. In shaking the grate the adjacent leaves rock in the same direction, and the curved adjacent edges are caused to raise and lower the coal and separate the pieces thereof without dropping or dumping it to too great an extent and causing waste.

These leaves C are each provided with two bifurcated supports c^4 , formed near the ends, and which supports straddle the bars B, the inner sides of the arms c^4 being straight to conform to the straight sides c^5 of the bars B. These supports c^4 , as will be seen in the drawings, are made of sufficient height to elevate the leaves C a considerable distance above the frame and bars, in order to prevent them from becoming too hot, and to thus obviate all danger of the grate sagging.

On each of the bars B, and near one end thereof, is formed the crank D, the short horizontal arm D of which is flanged at its outer extreme end, as shown at d' , Fig. 12. These cranks or levers D, formed on the bars composing the forward half of the grate, are connected with the rod E, and those on the rear bars with the rod E', each of said rods E and E' being provided with the recesses e , formed therein on the lower edges and near the extremities, and with the recess e' , formed centrally on the upper edges, and into which recesses fit the arms d , the flanges d' preventing the parts from becoming disengaged.

In connecting the parts the bars having formed thereon the crank-arms which fit in the central recesses e' are slightly raised to allow the bar to be placed over and upon the crank-arms d , and after being so placed the bars are lowered, allowing the crank-arms thereon to drop into the central recesses e' . By thus connecting the bars B the leaves secured thereto will rock in the same direction.

To each of the rods E and E' is connected a pitman e^2 , linked at its forward end to the lower end of the levers F, fulcrumed at f to a support f' , bolted or secured to the front of the furnace G. By this construction and arrangement of parts it will be obvious that the forward and rear halves of the grate may be rocked separately, both at the same time, or one at a time, and either in the same or opposite directions.

H represents a handle or lever provided with two recesses h , adapted to receive the ends of the levers F and provide a greater leverage by which to operate the grate. By

means of this handle either one or both levers may be operated at one time.

I represents a steam-pipe connected with the perforated pipe K, located below or under the forward part of the grate, for the purpose of conveying steam thereto to prevent the formation of clinkers and to add to the combustion of fuel. The rear bar of the grate I prefer to have stationary, and instead of rounding the leaves, as described, I form them with flat upper faces a^7 , as shown in Figs. 1, 6, and 7.

If desired, instead of forming the grate with the ledge a^5 the front or forward bar may have attached thereto the flat leaves, as in the rear and as shown at a^7 . From this description it will be understood that the bolting of the several parts is obviated, thus allowing the grate to be easily and readily taken apart or put together or the substituting of new parts for old or damaged ones.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grate, the combination of the grate-bars supported in suitable bearings in the side bars of the main frame of the grate, the leaves having the bifurcated supports straddling the bars, the cranked projections on the bars, a connecting-rod which connects the cranks belonging to the bars that compose the forward half of the grate, another connecting-rod which connects the cranks on the bars composing the rear half of the grate, the pitmen e^2 , connected to the side rods, the double-recessed operating-handle, and the levers F, connected thereto and also to the pitmen e^2 , substantially as described.

2. In a grate, the combination of the operating-handle H, provided with recesses h , the grate-bars movably journaled in bearings in the side bars of the main frame, said grate-bars being provided with cranked projections, the rods E and E', which connect together, respectively, the members of the forward and rear parts of the grate-bars, the pitmen e^2 , connected to the rods E and E' and elongated at their forward ends, and the levers F, which are fulcrumed at f upon a support secured upon the front of the furnace.

Signed at New York, in the county of New York and State of New York, this 13th day of June, A. D. 1891.

ANDREW J. HULL.

Witnesses:

ALEXANDER MILNE,
WILLIAM GOEBEL.