

No. 607,784.

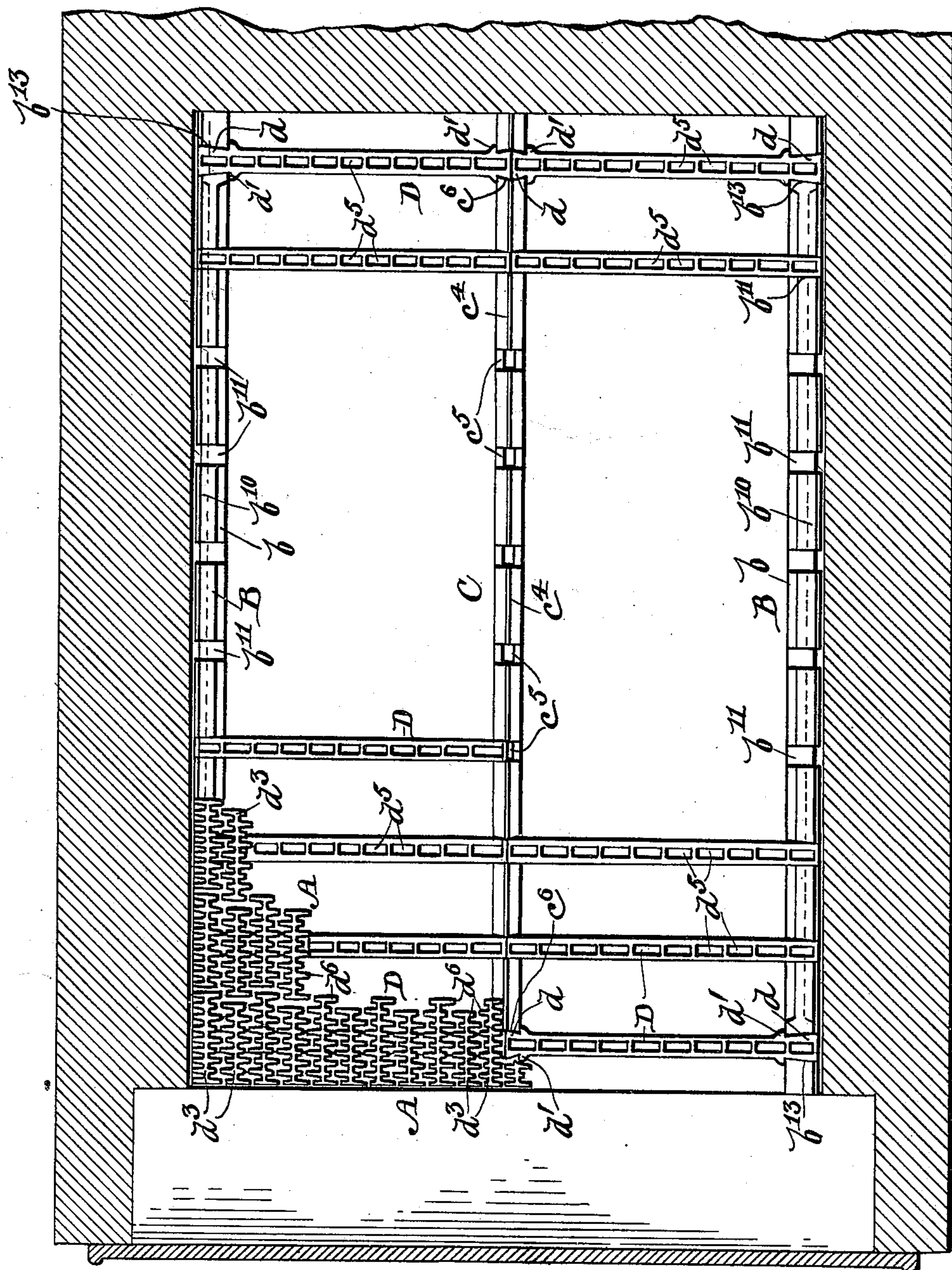
W. McCLAVE.
GRATE.

Patented July 19, 1898.

(Application filed Nov. 10, 1897.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES

Everance.
T. Reed Clift.

Fig. 1.

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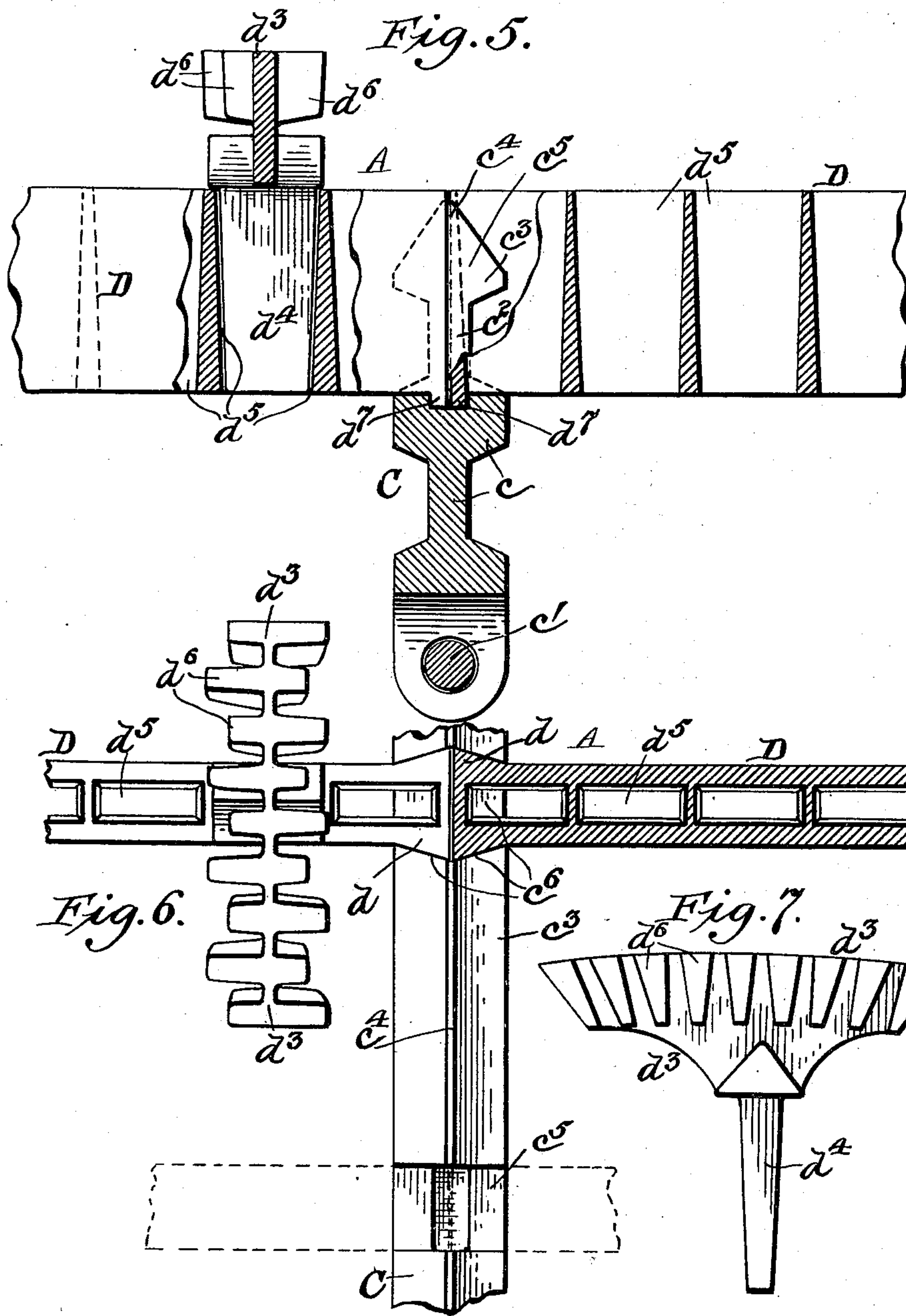
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(No Model.)

3 Sheets—Sheet 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

GRATE.

SPECIFICATION forming part of Letters Patent No. 607,784, dated July 19, 1898.

Application filed November 10, 1897. Serial No. 658,065. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in grates for steam-boilers or other kinds of furnaces, and more particularly to that class of grates known as "stationary grates," in which the grate-bars are stationary and are not capable of a rocking or other similar movement.

The invention consists in certain novel constructions, combinations, and arrangements of parts, as will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 represents a horizontal section through a fireplace of a furnace, showing my improved grate mounted therein, parts being broken away to better reveal the construction. Fig. 2 represents a vertical longitudinal section through the said grate, illustrating the construction of the carrier-bars. Fig. 3 represents a detail plan view of a portion of the framework of the grate. Fig. 4 represents a detail vertical section through one of the side carrier-bars. Fig. 5 represents a vertical section through an intermediate carrier-bar and showing the adjacent ends of grate-bars supported thereby. Fig. 6 represents a detail plan view of a portion of the grate, showing the meeting and locking ends of the grate-bars in place in a socket formed in the carrier-bar; and Fig. 7 represents a detail side elevation of a removable finger adapted to form a part of one of the grate-bars.

A in the drawings represents my improved grate; B, side carrier-bars; C, an intermediate carrier-bar, and D grate-bars adapted to be mounted upon said carrier-bars.

In carrying out my invention I provide my grate with carrier-bars to support the ends of suitable grate-bars. If the furnace to be supplied with the grate is constructed with a narrow fireplace, it might be sufficient to provide the grate with only two carrier-bars,

which would be arranged along the side of the fire place or box. Usually, however, the fireplaces of furnaces are sufficiently wide to make it preferable to employ one or more intermediate carrier-bars, so that the grate-bars connecting the same will not have to be made sufficiently long to weaken them. For the sake of illustration I have shown in the drawings a grate provided with side carrier-bars B B and an intermediate carrier-bar C. Except at the upper edge these carrier-bars are made alike. The side carrier-bars B are constructed with a main body portion b , which extends from end to end and is usually provided with bearing-lugs, as $b'b'$. The rear lugs b' are adapted to project into the brickwork of the furnace and may rest directly upon the brickwork or upon a plate or bar inserted therein, as at b^2 . The lugs upon the forward ends of the carrier-bars preferably rest upon a bearer or supporting-bar b^3 , arranged transversely of the furnace. While I have shown and described the carrier-bars as provided with the lugs $b'b'$, it is sometimes necessary and advisable to place the supporting means for the carrier-bars at different points along their body portions and dispense with the use of lugs. In order to lighten the carrier-bars, the central portion thereof may be reduced to form a comparatively thin web portion, as b^4 . This portion may also be further lightened by making perforations therein, as at $b^5 b^5$. In order to strengthen the carrier-bars, I contemplate using a truss, consisting of a truss-rod, as b^6 , adapted to extend through apertures formed in lugs $b^7 b^7$, formed on the bar near its ends, nuts being applied to the outer ends of the said rod to tighten it in place. One or more struts, as b^8 , are interposed between the body portion and the truss-rod b^6 . In constructing the carrier-bars in this way, while the cost of the same is slight, yet the strength thereof is increased.

While I have described and illustrated the truss construction, yet I may also form the carrier-bars with a strengthening-web upon its under side in the place of the truss, cast solid thereto, without departing in the least from the spirit of my invention. This latter construction will be found preferable where the carrier-bars are very short, but for long

bars the truss construction is cheaper and stronger. Above the body portion of the carrier-bar extends a web portion, as b^9 , to a considerable height, as illustrated in Fig. 4 of the drawings, and the upper edge of this web is tapered and extended to one side, as at b^{10} . The upper edge of the tapered portion b^{10} is preferably extended far enough to slightly overhang the body portion b of the carrier-bar and is thus adapted to be brought in close proximity to the side walls of the fire-box, a suitable expansion space being left between the same. This construction enables me also to place the lower body portions of the carrier-bars at a greater distance from the side walls of the furnace. Among other advantages this prevents the gathering of ashes between the body portion and the wall. At suitable intervals along the length of the carrier-bar B are formed sockets or recesses b^{11} , adapted to receive the ends of grate-bars D. These recesses preferably extend entirely through the bar transversely thereof. The web b^9 of the carrier-bar may also be lightened, if desired, by perforations, as b^{12} . As above stated, the intermediate carrier-bars C are constructed like the side carrier-bars, except on their upper edges, being provided with body portions c and a truss-strengthening portion, as c' , and an upwardly-extending web c^2 upon the upper side of the body portion. Along the upper edge of the web portion c^2 the carrier-bars are again widened, preferably to the full width of the body portion c , as at c^3 , the upper edge of this widened portion c^3 being tapered upwardly to form a ridge portion, as c^4 . The web portion c^2 and the ridge portion c^4 are also provided at suitable intervals with transverse recesses or sockets, at c^5 c^5 .

In order to bind the side carrier-bars and the intermediate carrier-bars together and to hold them from twisting, the front and rear grate-bars D are provided with tapering end portions, as d d' , which are adapted to engage correspondingly-tapering recesses. The grate-bars D extend entirely through the side carrier-bars and rest in the tapering or dovetail recesses b^{13} , formed therein. The ends of the grate-bars which rest upon the intermediate bars only extend about half-way through the same and engage the double-tapered recess c^6 , the ends of adjacent grate-bars abutting against each other in said recess. By this construction it will be seen that the carrier-bars are firmly tied together and cannot twist out of place. As an additional binding means the end grate-bars may be provided with lugs, as d' d' , adapted to bear against the vertical faces of the carrier-bars, and thus further secure a rigidity of the grate. The intermediate grate-bars D are preferably made without dovetail ends, merely resting in the recesses formed in the side and intermediate carrier-bars. I find it advisable, however, in some forms of grates to construct all the intermediate grate-bars with dovetailed ends, in

which event the bars will also be provided with lugs similar to the lugs d' d' , the portion of the carrier-bars against which the said lugs abut being formed with corresponding meeting faces, as illustrated in the drawings. The recesses b^{11} , and also the recesses c^5 in the side and intermediate carrier-bars, respectively, are preferably made slightly wider at their upper ends than at their lower ends, whereby their walls are flared slightly toward the upper edge of the bars. While I have shown and described this construction, yet I contemplate using bars made with recesses having vertical walls or of the same width throughout. I prefer to form downwardly-projecting lugs d' upon the ends of the grate-bars adapted to engage sockets or recesses formed in the bottom of the recess c^5 of the intermediate carrier-bars. These lugs will serve to hold the abutting ends of the grate-bars sufficiently close together to prevent the enlargement of the space between them. The lugs upon the outer ends of the grate-bars will overhang the body portion of the side carriers and serve as an additional safeguard for keeping the carriers straight and in place, as illustrated in Fig. 4 of the drawings.

While I contemplate using and while my grate is thoroughly adapted for using grate-bars having their fire-surfaces or finger portions cast integral with the body portion thereof, yet I prefer to use grate-bars having removable fingers, as illustrated in the drawings. The essential feature of the grate-bars used with this grate is the supporting of the said grate-bars in such a manner that the body portions thereof and the carrier-bars supporting them shall be somewhat below the upper surface of the fingers.

As will be seen from the above description and the drawings, the upper edges of the carrier-bars and the upper edges of the body portions of the grate-bars are upon about the same horizontal plane, the fingers d^3 of the said grate-bars projecting above the said framework. As seen in Fig. 1 of the drawings, the framework thus constructed may be entirely covered by the finger portions of the grate-bars, as the said finger portions can be mounted in such a frame as to come very close to the side walls of the fire-box, and thus thoroughly protect not only the body portions of the grate-bars but the carrier-bars from severe action of the heat. The finger portions d^2 are preferably provided with shanks or stems, as d^4 , adapted to be inserted in sockets, as d^5 d^5 , formed in the body portions of the grate-bars. While I prefer to use a grate-bar constructed in this manner, the precise construction of the fingers and the sockets in the body portions to receive the same forms no part of this invention, as it is the subject-matter of another application filed by me on even date herewith and duly claimed therein.

As illustrated in Fig. 1 of the drawings, I may, if desired, form fingers d^3 of the grate-bars, so as to break spaces between the ends of the fingers, the fingers being formed longer upon one side of the shank portion than upon the other and arranged alternately in the body portion of the bar, so as to break spaces with the fingers of the next adjacent bar. The teeth d^6 , formed upon the said fingers, may also be formed alternately long and short, as illustrated in Fig. 1, so that they will also break spaces with the teeth of adjacent fingers. This construction of fingers and teeth adapted to break spaces between them may be applied equally well upon grate-bars having fingers cast integral therewith, as upon grate-bars having removable fingers, and I contemplate using both forms with my improved carrier-bars. The fingers of the grate which are adjacent to the side walls are made of a length to leave the same space between them and the side walls throughout—namely, only sufficient space for expansion. The teeth on the fingers which are adjacent to the side walls are also made of a uniform length to accomplish this purpose. While, as I have above described, I preferably use bars having fingers adapted to break spaces between their ends, yet I may use bars having fingers of the same length throughout or fingers having teeth of the same length throughout, so as not to break spaces, all within the spirit of my invention.

It will be apparent from the above description that my improved grate is particularly well adapted for furnaces using stationary grates, for it is not only very simple in construction, but possessed of great strength and durability. From the shape of the carrier-bars it will be seen that all collection of ashes or cinders will be prevented by the tapering shape of the upper edges of the carrier-bars. This is an important structure, as the collection of ashes upon the carrier-bars of a grate, especially where a mixed steam and air blast is used, operates to rust out the said bars very rapidly. The liability to damage from rusting not only to grate and carrier bars, but also to boiler-plates, is particularly great in boiler-furnaces constructed upon the locomotive type, where the ashes are likely to accumulate between the carrier-bars and the said boiler-plates. It will also be perceived that my improved carrier-bars are well adapted to support any style of grate-bars which employ fingers or fire-supporting surfaces extending above the body portion of the grate-bars.

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

1. In a grate, the combination with suitable grate-bars, of carrier-bars provided with tapering edges upon their upper sides, the side carrier-bars of the said grate having their upper tapered edges extending to one side and slightly overhanging the body portion of the bar, whereby any ashes of the furnace will

not be caught and held between the body portion and the wall, the construction being such that the upper edges of the carrier-bars are considerably below the fire-bearing surface of the grate-bars, and completely covered thereby, substantially as described.

2. In a stationary grate, the combination with suitable grate-bars, of carrier-bars provided with a body portion proper, a truss for strengthening the same, a reduced web portion formed upon the upper edge of the said body portion and a tapering portion formed on the top of the said web, recesses in the said web and tapering portion for receiving grate-bars, the construction being such that the fingers or fire-supporting surfaces of the grate-bars will extend above the plane of the upper edges of the carrier and grate bars proper, so that the said carrier-bars will be protected from the severe action of the heat, substantially as described.

3. In a stationary grate, the combination with suitable grate-bars, of carrier-bars provided with a body portion, a reduced web portion formed upon the upper edge of the body portion, and a tapering portion formed on the top of the said web, the said web and the said tapering portions having recesses formed in them for receiving grate-bars, the construction being such that the fingers or fire-supporting surfaces of the grate-bars will extend above the plane of the upper edges of the carrier and grate bars proper so that the carrier-bars will be protected from the severe action of the heat, substantially as described.

4. In a stationary grate, the combination of carrier-bars having recesses formed in their upper edges extending entirely through the said bars transversely, grate-bars adapted to rest in the same, means for locking them together comprising tapered end portions formed on the grate-bars and adapted to be dovetailed in the said recesses formed upon the carrier-bars, lugs adapted to engage the surfaces of the said carrier-bars for imparting further stability to the structure, the construction being such that the fire-supporting surfaces of the grate-bars may completely cover the supporting structure beneath it, substantially as described.

5. In a grate, the combination of carrier-bars having recesses in their upper edges, the said recesses being provided with depressions or sockets in their bottom portions, grate-bars adapted to be supported by the said carrier-bars and rest in the said recesses, and lugs formed upon the said grate-bars adapted to engage the said depressions to hold the abutting ends of the grate-bars against each other, substantially as described.

6. In a grate, the combination of carrier-bars having recesses in their upper edges, the said recesses being provided with depressions or sockets in their bottom portions, grate-bars adapted to be supported by the said carrier-bars, and rest in the said recesses, and lugs formed upon the said grate-bars adapted to

engage the said depressions to hold the abut-
ting ends of the grate-bars against each other,
the lugs on the outer ends of the grate-bars
being adapted to overhang the body portion
5 of the side carrier-bars to hold them straight
and in proper position, substantially as de-
scribed.

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

WILLIAM MCCLAVE.

Witnesses:

HENRY A. KNAPP,
W. M. BUNNELL.