No. 670,257. Patented Mar. 19, 1901.

F. R. TIBBITTS.

CHAIN GRATE FURNACE.

(Application filed Apr. 12, 1900.)

(No Model.) 2 Sheets—Sheet 1.

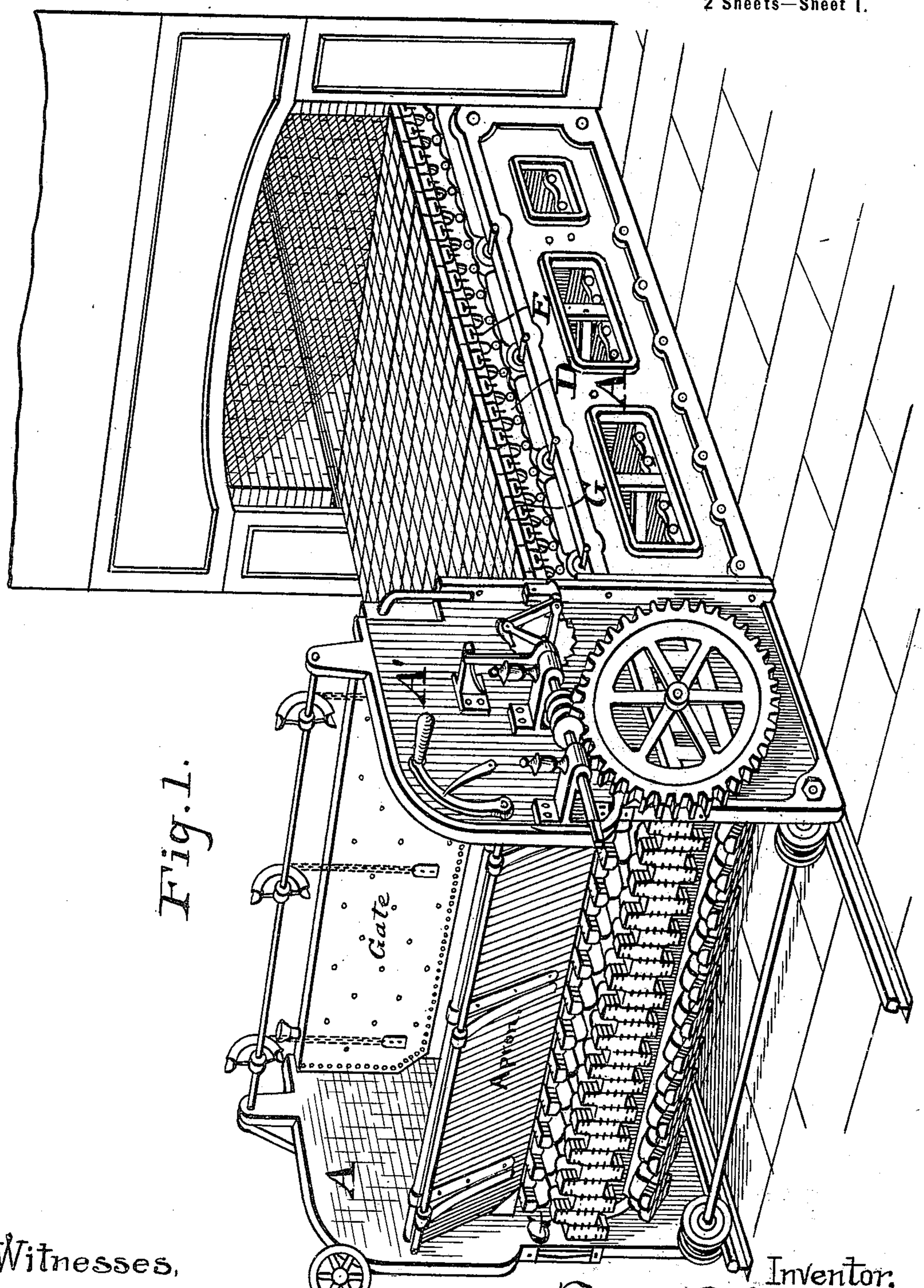

Fig. 1.

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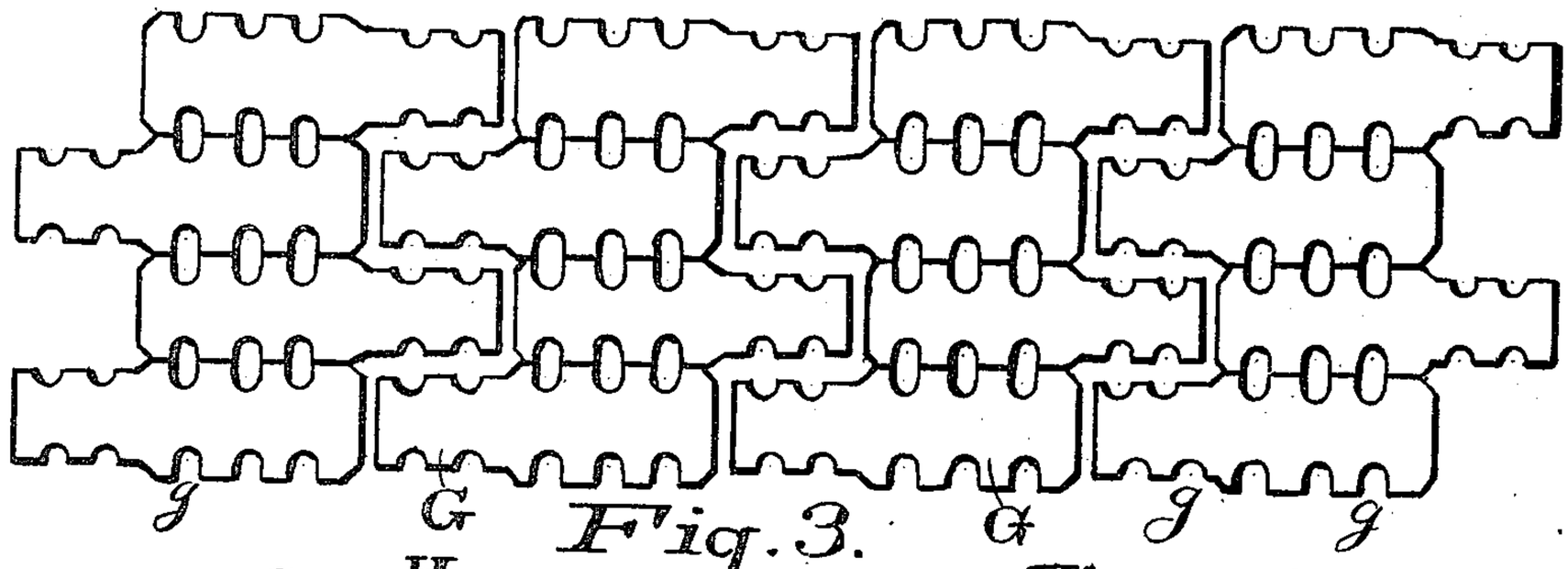


Fig. 3.

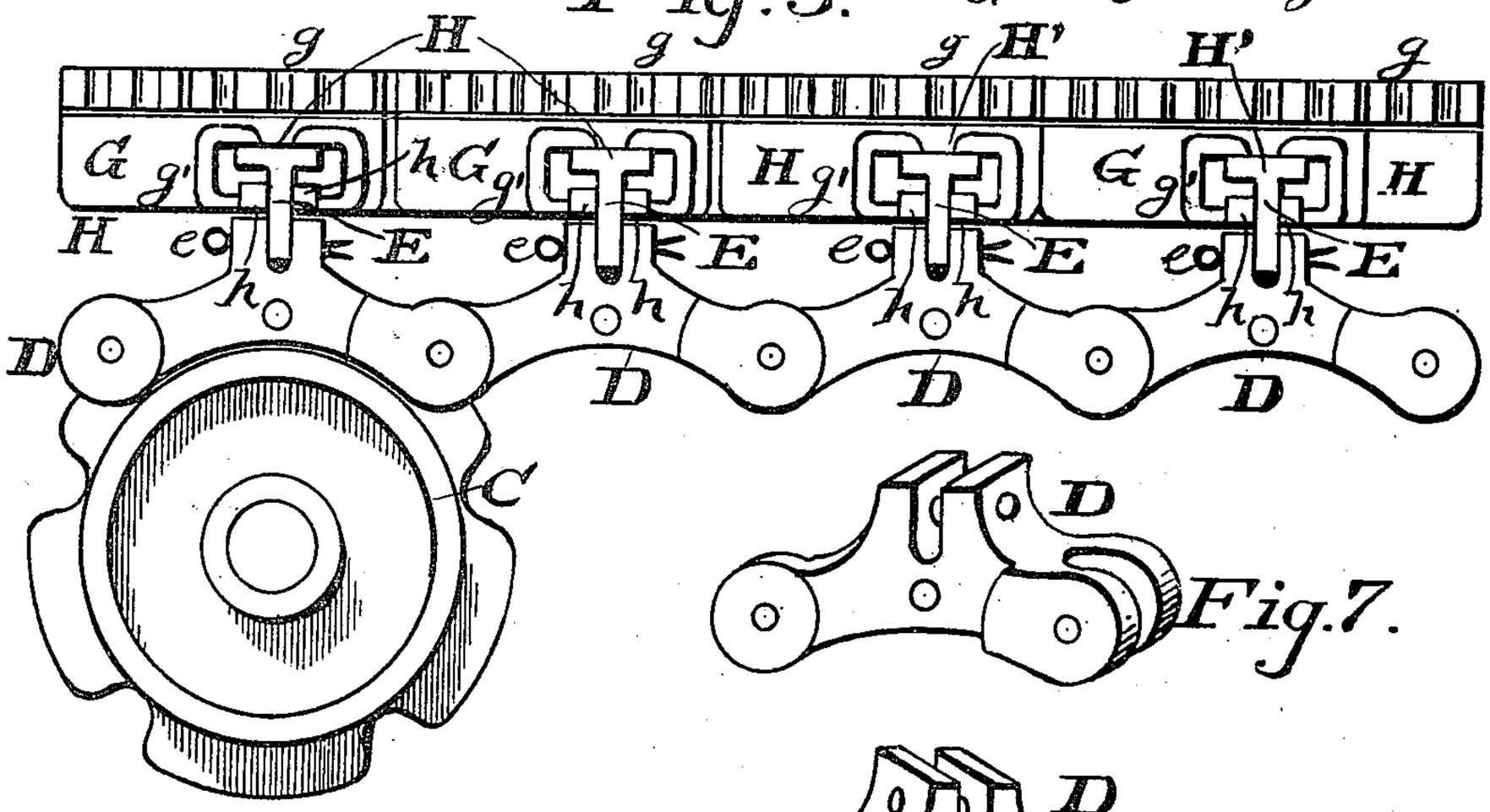


Fig. 2.

Fig. 7.

Fig. 6.

Fig. 5.

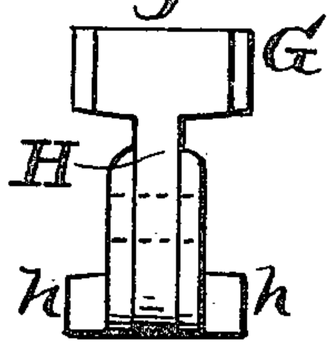
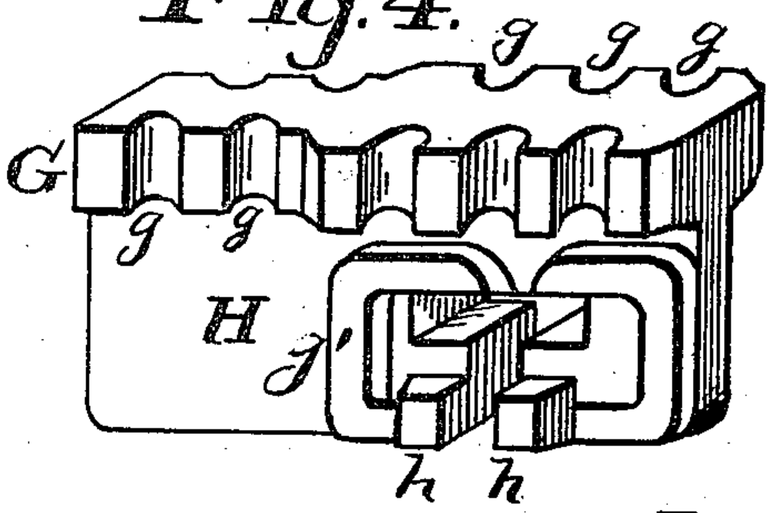


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK R. TIBBITTS, OF CLEVELAND, OHIO.

CHAIN-GRATE FURNACE.

SPECIFICATION forming part of Letters Patent No. 670,257, dated March 19, 1901.

Application filed April 12, 1900. Serial No. 12,647. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. TIBBITTS, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Chain-Grate Furnaces, of which the following is a specification.

This invention relates to endless-chain-grate furnaces; and it consists in the new constructions and combinations of mechanism substantially as hereinafter described, and pointed out in the claims.

The objects of the invention are to improve the construction of the several parts and their coöperation and to improve the facilities of management of operating the furnace.

The main features of the invention pertain to the peculiar construction of the grate-sections and their mounting, together with other features of mechanism for carrying out the useful purposes of such furnaces.

In the accompanying drawings, Figure 1 is a perspective view of the complete chain grate as seen drawn out in front of the furnace-chamber of a boiler. Fig. 2 is a side elevation of a portion of the chain grate. Fig. 3 is a top or plan view of the same, showing the peculiar construction of the fire-surface. Fig. 4 is a detached perspective view of one of the grate-surface sections. Fig. 5 is an end view of the same. Fig. 6 is a perspective view of one of the chain-links, showing the stud on the inside surface which engages with the teeth of the sprocket-wheel. Fig. 7 is a view of the opposite or outside face of the same.

A, Fig. 1, represents the carriage which supports and carries all of the working mechanism of the furnace-grate.

A′ represents the extension-plates which heretofore have been attached to the boiler-front setting, but which I have now made a component part of the carriage-frame by shortening the sides of the carriage-frame and attaching said extension-plates to their forward ends, thereby reducing the amount and weight of material used, as in the old plan. These extension-plates also support and carry the adjustable forward bearings of the driving-shaft and its sprocket-wheels which carry and propel the chain grate. These plates also support the hopper-apron and the gate, together with their operating mechanisms. The advantages derived by thus attaching these parts to the carriage are that it greatly facilitates the withdrawal and return of the carriage into and from the furnace-chamber without the necessity of detaching any of the working parts.

The endless traveling grate is composed of new and specially-adapted grate-surface sections mounted on angle-bars supported and carried by the links forming the chains, which are provided with studs adapted to engage with the sprocket-wheels, which uniformly propel the grate. The invention also embraces improvements in other features of mechanisms in combination with the said grate-sections.

C, Fig. 2, represents one of the sprocket-wheels for supporting and propelling the chain grate.

D, Figs. 1, 2, 6, and 7, represents the chain-links, having eyes on each end by which they are joined together to form the chains which support and carry the grate-surface sections. In their upward-projecting portions are made mortises or slots for receiving the ends of the angle-bars E, which are secured therein by cotter-pins *e*. On the inside faces of the links are made studs F, projecting laterally, which engage with and are carried along by the teeth of the sprockets.

G G, Figs. 1, 2, 3, 4, and 5, are the grate-surface sections, consisting of short bars, the top surfaces of which have nearly one-half of their length slightly reduced in breadth, as plainly shown in Fig. 3, and in their sides are made vertical corrugations or grooves *g g*. These bars have depending webs H, which under the wide parts of the bars have reinforcing projections *g′ g′*, and transversely through said reinforced parts are made T-shaped mortises H′, and at each side of said mortises are provided projecting lugs *h h*, which extend laterally to the full width of the upper broad faces of the said bars G, so that said lugs meet midway between the webs H H of the bars G and form a steady bearing-support for the grate-sections. As will be seen by reference to Fig. 4, these bars are supported near the ends under the wide parts. This makes the narrow parts project over the

center line when mounted on the supporting-bars, and it will also be seen that the grate-bars are placed on the supporting-bars in alternate reverse order, so that the narrow parts in one row interlap those of the adjacent row, the object and purpose of which is to provide for their self-cleaning as they go over the sprockets. It will also be observed that this interlapping, together with the vertical grooves or corrugations, affords ample air-draft space without liability of fuel falling through.

Having described my invention, what I claim is—

1. An endless-chain traveling grate consisting of grate-bars having partly wide and narrow top surfaces and vertical grooves in both sides, and webs supporting said bars, provided with supporting-mortises in the webs near one end and under the wide part, and mounted in alternate reverse order on their supporting-bars, substantially as described.

2. An endless-chain traveling grate consisting of grate-bars having partly wide and narrow top surfaces with vertical grooves or corrugations in each side, and having supporting-webs provided with reinforcements underneath the wide part, and having transverse mortises through said reinforced parts for mounting the grate-bars in alternate reverse order on their supporting-bars, substantially as described.

3. An endless-chain traveling grate consisting of grate-bars having partly wide and narrow top surfaces with vertically-grooved sides, supporting-webs for the grate-bars having reinforcements under the wide parts and provided with transverse mortises and laterally-projecting lugs on each side of said mortises, which meet each other and form steady supports for the grate-bars when mounted on their supporting-bars, substantially as described.

4. An endless-chain traveling grate consisting of grate-bars having partly wide and narrow top surfaces having vertically grooved or corrugated sides, supporting-webs for said grate-bars having reinforcements under the wide parts and transverse mortises in said reinforced parts flanked with the contacting lugs, said grate-bars mounted in alternate reverse order on angle-bars supported on the chain-links, substantially as described.

5. In an endless-chain traveling grate, a grate consisting of grate-bars having partly wide and narrow top surfaces with vertically grooved or corrugated sides and reinforced supporting-webs, and mounted in alternate reverse order on angle-bars supported in the chain-links, in combination with a driving-shaft and sprockets mounted thereon, adjustable shaft-bearings for said shaft supported in the side extension-plates forming part of the sides of the grate-carriage, substantially as described.

6. In an endless-chain traveling grate, a grate consisting of grate-bars having partly wide and narrow top surfaces with vertically grooved or corrugated sides and reinforced supporting-webs, and mounted in alternate reverse order on angle-bars supported by the chain-links, a driving-shaft having sprocket-wheels mounted thereon and carrying the chains, side extension-plates forming part of the sides of the grate-carriage, adjustable bearings supported in said side plates for said driving-shaft, and means substantially as described for operating the driving-shaft mounted on one of said extension-plates, in combination substantially as described.

Signed by me at Cleveland, Ohio, this 10th day of April, 1900.

FRANK R. TIBBITTS.

Witnesses:
GEO. W. TIBBITTS,
CHARLES L. STOCKER.