No. 662,623. Patented Nov. 27, 1900.

T. W. HEINTZELMAN.

GRATE BAR.

(Application filed Mar. 24, 1900.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

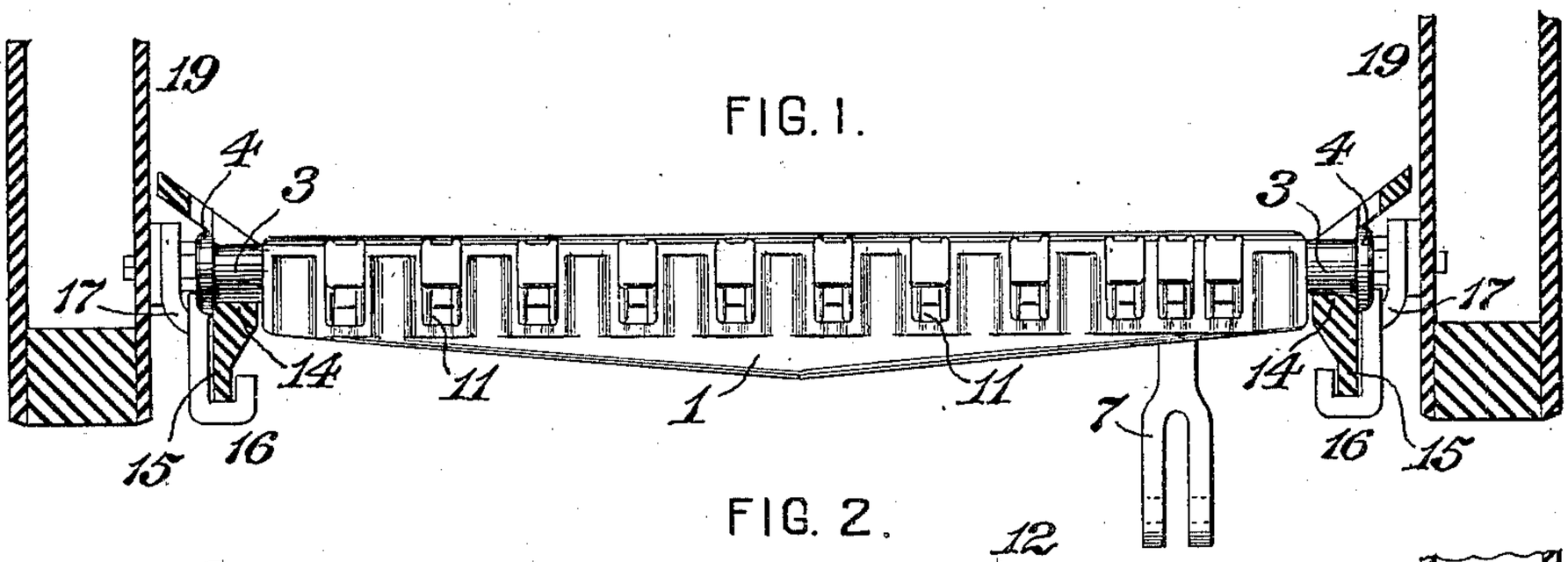


FIG. 2.

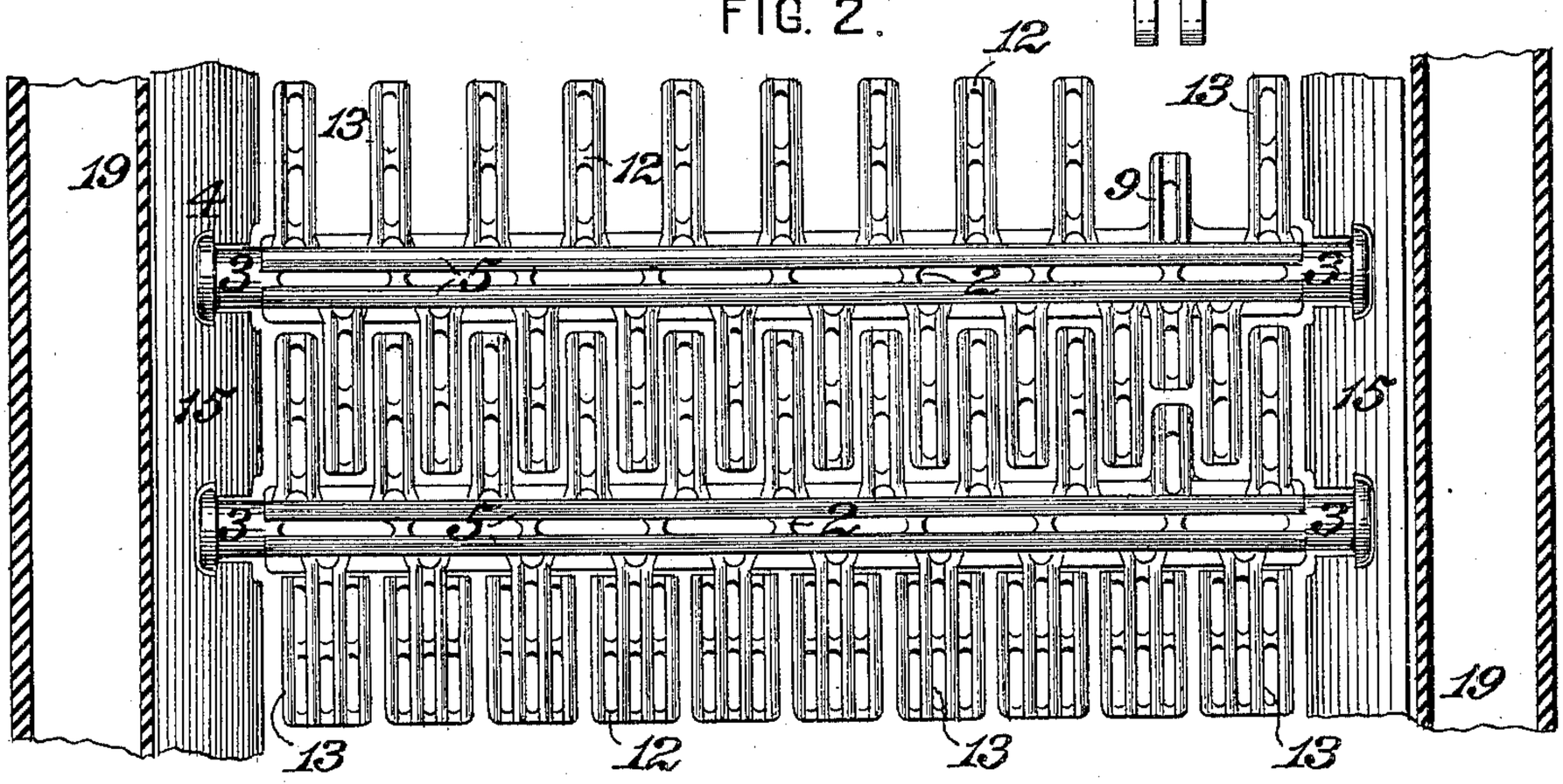


FIG. 3.

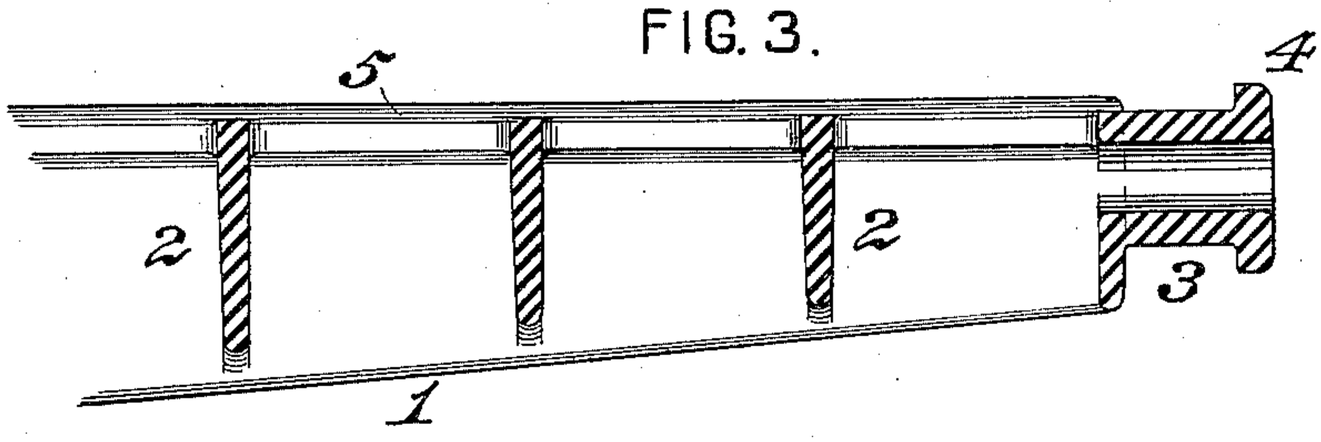
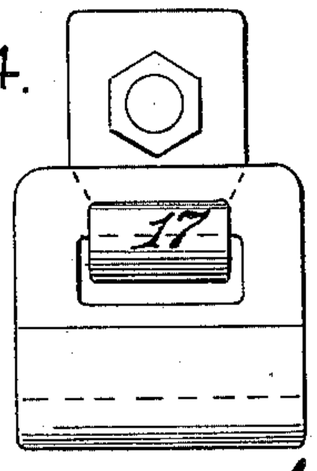


FIG. 4.



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No. 662,623. Patented Nov. 27, 1900.

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(No Model.) 2 Sheets—Sheet 2.

FIG. 5.

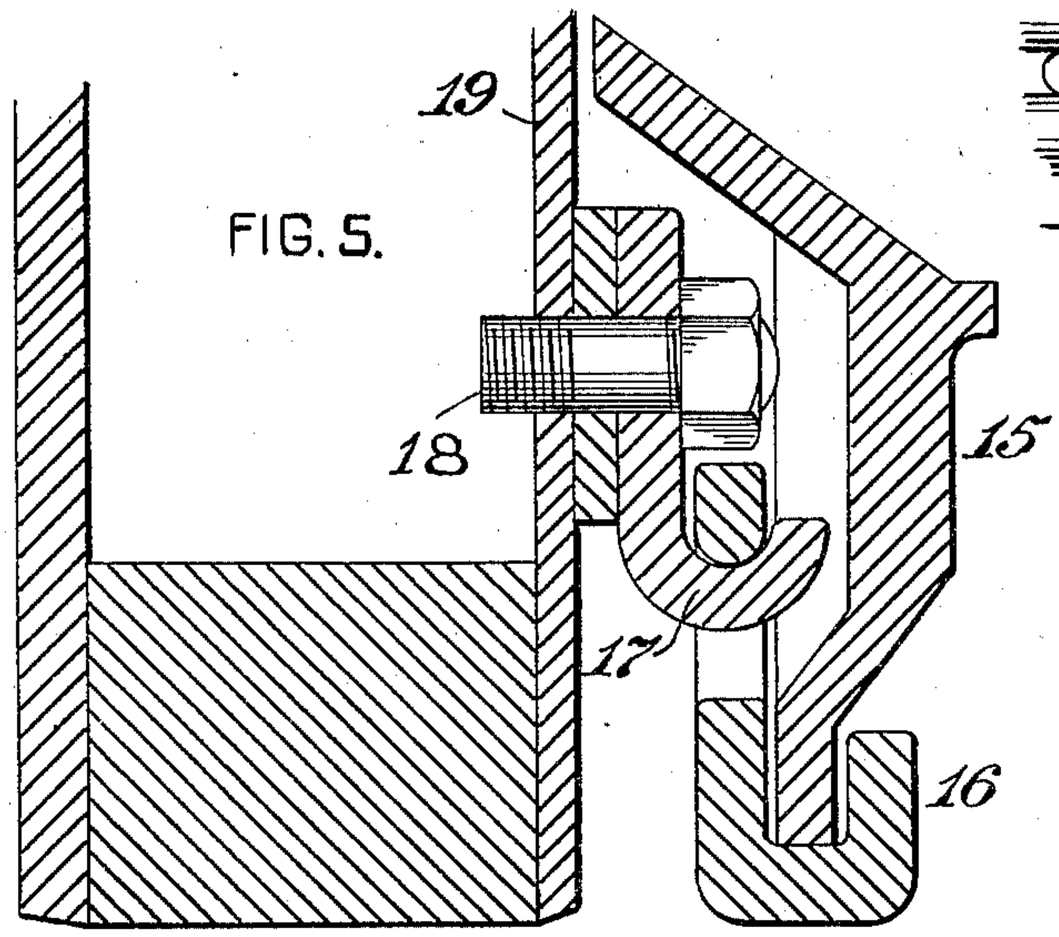


FIG. 6.

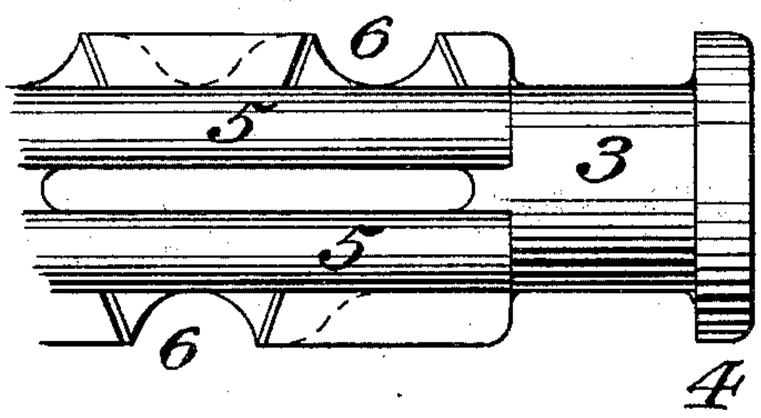


FIG. 7.

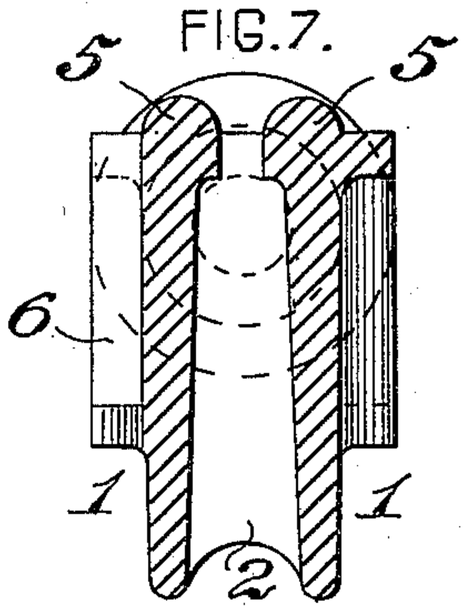


FIG. 8.

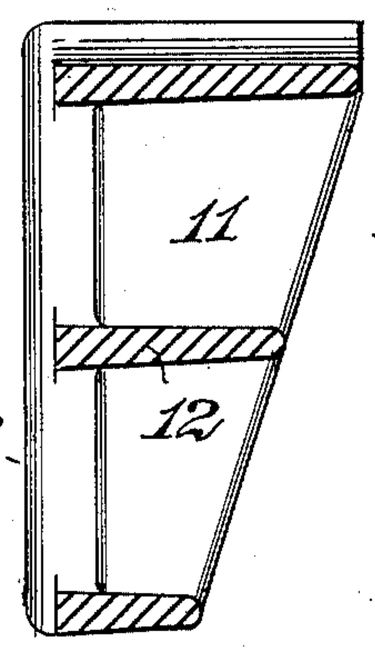


FIG. 9.

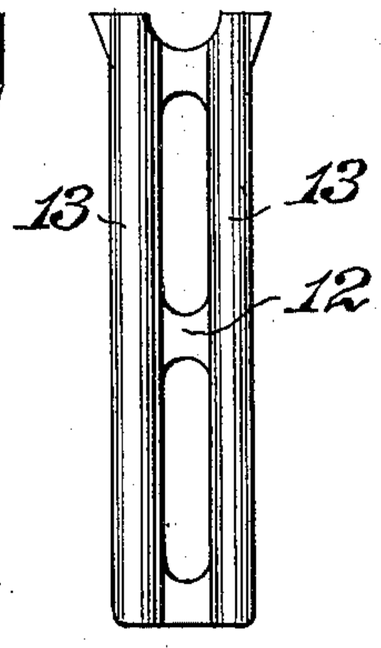


FIG. 10.

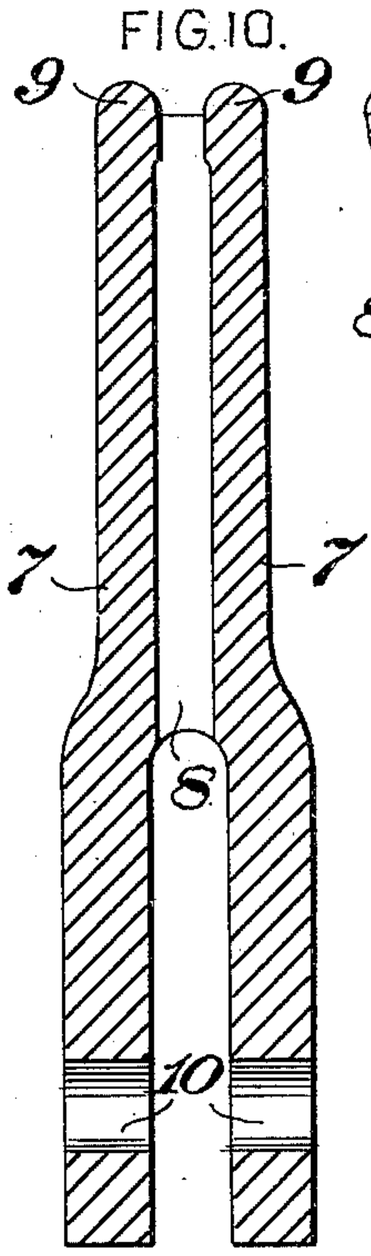
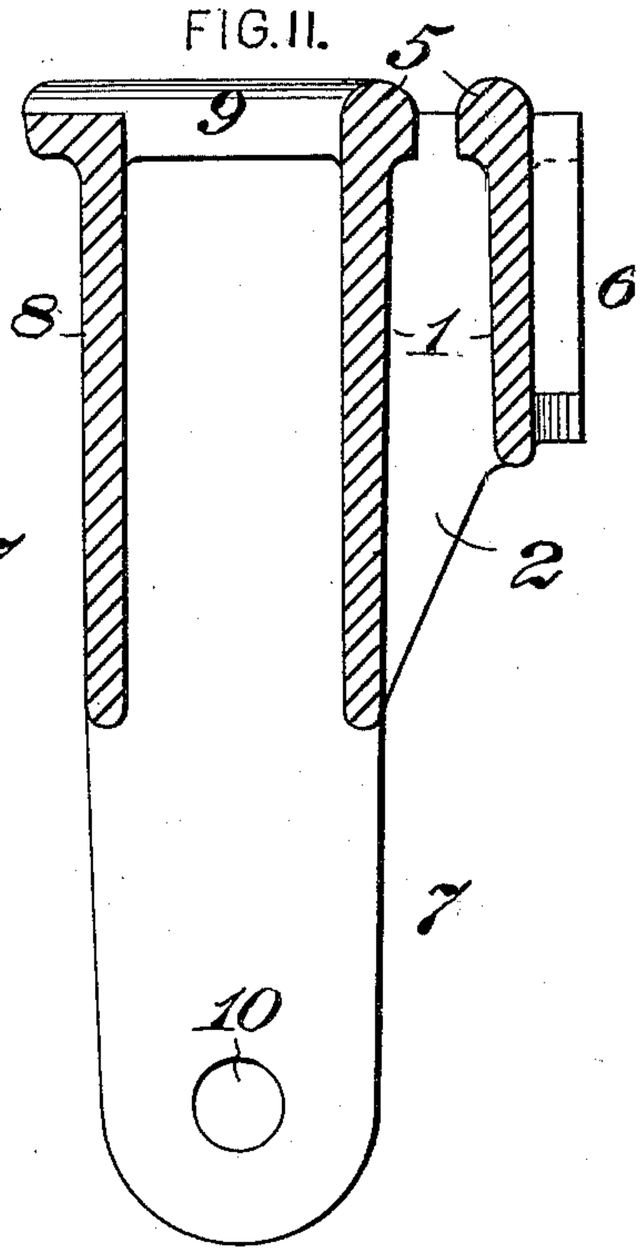


FIG. 11.



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UNITED STATES PATENT OFFICE.

TAYLOR W. HEINTZELMAN, OF SACRAMENTO, CALIFORNIA.

GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 662,623, dated November 27, 1900.

Application filed March 24, 1900. Serial No. 10,054. (No model.)

To all whom it may concern:

Be it known that I, TAYLOR W. HEINTZELMAN, of Sacramento, in the county of Sacramento and State of California, have invented a certain new and useful Improvement in Grate-Bars, of which improvement the following is a specification.

My present invention relates to grate-bars of what are known as the "finger" type, which are more particularly designed for use in locomotive-boilers, but are equally applicable in other steam generating or heating apparatus, and is an improvement on that for which Letters Patent of the United States No. 347,601 were granted and issued under date of August 17, 1886.

The object of my invention is to provide a grate-bar of the type above specified which may be readily and inexpensively formed of cast metal, which will effectively and properly support and distribute air to the fuel, and which will be exempt from liability to displacement from normal position or impairment in operation by the results of expansion and contraction.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a transverse section through a locomotive fire-box, showing a side view in elevation of a grate-bar embodying my invention; Fig. 2, a horizontal section through the same, showing a plan view of two grate-bars in operative relation; Fig. 3, a partial longitudinal central section through a grate-bar; Fig. 4, a front view of one of the side-bearer brackets and its connected hanger; Fig. 5, a transverse section, on an enlarged scale, through the same and a portion of the adjacent water-space of the fire-box; Fig. 6, a plan or top view of a portion of a grate-bar; Fig. 7, a vertical transverse central section through the same; Fig. 8, a longitudinal central section through one of the fingers; Fig. 9, a plan or top view of the same; Fig. 10, a vertical section parallel to the longitudinal central plane of a grate-bar through the fork thereof; and Fig. 11, a transverse section through a grate-bar, taken in the central plane of the fork.

In the practice of my invention I provide a grate-bar which is composed of two parallel longitudinal webs or plates 1 1, connected at intervals by transverse ribs 2 and having end journals or trunnions 3, on the outer ends of which are formed collars 4, and which are preferably hollow or tubular. The webs 1 are provided with widened tops 5, the upper faces of which are preferably semicircular or otherwise segmental, the space between the inner sides of the tops, which is provided for the admission of air to the fuel, being less than that between the webs and being of such width as may in the judgment of the constructor be best adapted to admit air freely to the particular class of fuel which is employed without permitting it to drop unconsumed into the ash-pan. A plurality of dovetailed sockets or recesses 6 is formed on the outer side of each of the webs 1 for the reception of detachable fingers, to be presently described, said sockets being alternated in position on opposite sides of the bar, so that the fingers of one grate may be interposed between those of the two adjacent bars.

In order to enable the grate-bars to be rocked or vibrated, as may from time to time be required in the management of the fire, a downwardly-projecting arm or fork is formed upon each bar at a proper distance from one of its ends, said fork being composed of two vertical plates 7 7, which project at right angles from one of the webs 1 of the bar and are connected by said web, which at that point is made of greater depth, as shown in Fig. 11, and also by a vertical rib 8 near their outer ends. The plates 7 of the forks are provided with widened tops 9, having segmental upper faces similarly to the webs of the grate-bars, and in addition to performing their normal function of providing for the rocking of the bars when required they also serve as fingers for supporting fuel and distributing air in the grate. Holes 10 are formed in the lower portions of the fork-plates 7 to admit pins by which the several forks are coupled to a connecting-bar, which is reciprocated by a rocking bar or lever in the ordinary manner.

Each of the grate-bars is provided with a plurality of detachable fingers having dovetailed ends fitting in the sockets 6 of the webs 1 of the bars. Except at points opposite to the forks and adjacent to the ends of the fire-box or to a dumping-grate, if such is employed, the fingers are analogous in construc-

tion to the bodies of the grate-bars—that is to say, they are composed of two parallel webs 11, connected by transverse ribs 12, and provided with widened tops 13, having segmental upper faces. The fingers are made of such length that when fitted in their sockets they project from each grate-bar sufficiently far to leave air-spaces between their ends and the adjacent bar or the fork of the adjacent bar of substantially the same width as those between their tops and between the tops of the grate-bar webs. The fingers which fit in the sockets opposite the forks are of similar construction to, but of shorter length than, those at other points, the forks acting, as above explained, as short fixed fingers. The fingers which are attached to the end bars of the grate on the sides thereof adjoining the ends of the fire-box or next to a dead-plate or dumping-grate, as the case may be, differ from those above described in the particular that they are provided with a greater number of webs, preferably four, as shown, being thereby so increased in width as to be separated one from another by air-spaces of substantially the same width as the space between the webs of each finger, so as to afford the same practically uniform distribution of air-spaces and fuel-supporting surfaces as is attained in other portions of the grate by the interposition of the fingers of one bar between those of an adjoining bar.

It will be seen that by the above construction the distribution of air is effected with substantial uniformity throughout the entire area of the grate and that the fuel is supported upon comparatively narrow bodies of metal, which by the access of air on all sides are protected as fully as is practicable from the destructive action of the heat of the fire. Broken fingers may be readily removed and new ones substituted, and the proportions of the air-spaces and fuel-supporting surfaces may be regulated by the constructor in accordance with the characteristics of different classes of fuel and the requirements of its thorough and economical combustion.

In the construction set forth in Letters Patent No. 347,601 aforesaid and in ordinary practice, so far as my knowledge and information extend, the grate-bars are journaled in sockets or bearings formed in side bearers supported directly by members which are rigidly connected to the fire-box sheets or mud-ring. Under my present invention and for the purpose of minimizing the injurious effects of expansion and contraction the trunnions 3 of the grate-bars are fitted in open-topped bearings 14, formed in the side bearers 15, and the side bearers rest in and are supported at intervals in their length by grooves or other suitable supporting-faces formed in the lower ends of hangers 16, which are in turn hung on and flexibly supported by brackets 17, secured by bolts 18 to the inside sheets 19 of the fire-box. The upper portions of the side bearers are upwardly and outwardly inclined, forming dead-plates adjoining the side sheets and protecting them from the undue application of heat. The flexible suspension of the side bearers and grate-bars enables expansion and contraction to be fully provided for, and the end collars on the trunnions maintain the grate-bars in the same relative positions transversely to the fire-box, thereby maintaining the fingers of the several bars in normal relation, and consequently preventing variation of the width of the air-spaces between the fingers of adjoining bars.

I claim as my invention and desire to secure by Letters Patent—

1. A grate-bar composed of two vertical, substantially parallel webs connected at intervals by transverse ribs and having inwardly-extending lips or flanges on their upper edges, the upper face of each web together with said lip or flange being segmental in cross-section, and a laterally and downwardly projecting fork the upper face of which constitutes a fuel-supporting member.

2. A grate-bar composed of two parallel webs, connected at intervals by transverse ribs and having lateral sockets for the reception of detachable fingers and a laterally and downwardly projecting fork provided with two widened tops separated by an air-space.

3. The combination of a plurality of grate-bars, each composed of two parallel webs connected at intervals by transverse ribs and provided with lateral sockets, and having a laterally and downwardly projecting fork, the upper face of which constitutes a fuel-supporting member, and a plurality of detachable fingers fitting in said sockets, each composed of parallel webs having laterally-projecting lips or flanges at their tops and connected by transverse ribs, the fingers of one grate-bar being interposed between those of an adjacent grate-bar and one of the fingers of one grate-bar projecting opposite to and in line with the fork of an adjacent grate-bar.

4. The combination of a plurality of grate-bars, side bearers supporting the ends of said grate-bars and having upwardly and outwardly inclined faces, and flexible supports by which said side bearers are suspended from the fire-box.

5. The combination of a plurality of grate-bars having end journals or trunnions, side bearers having sockets or bearings which receive the grate-bar trunnions, and means by which the side bearers are flexibly suspended from the fire-box.

6. The combination of a plurality of grate-bars having end journals or trunnions, side bearers having sockets or bearings which receive the grate-bar trunnions, brackets fixed to the fire-box, and hangers flexibly supported by said brackets and having supporting-faces which receive and suspend the side bearers.

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Witnesses:
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FRANK D. RYAN.