

Fig. 1.

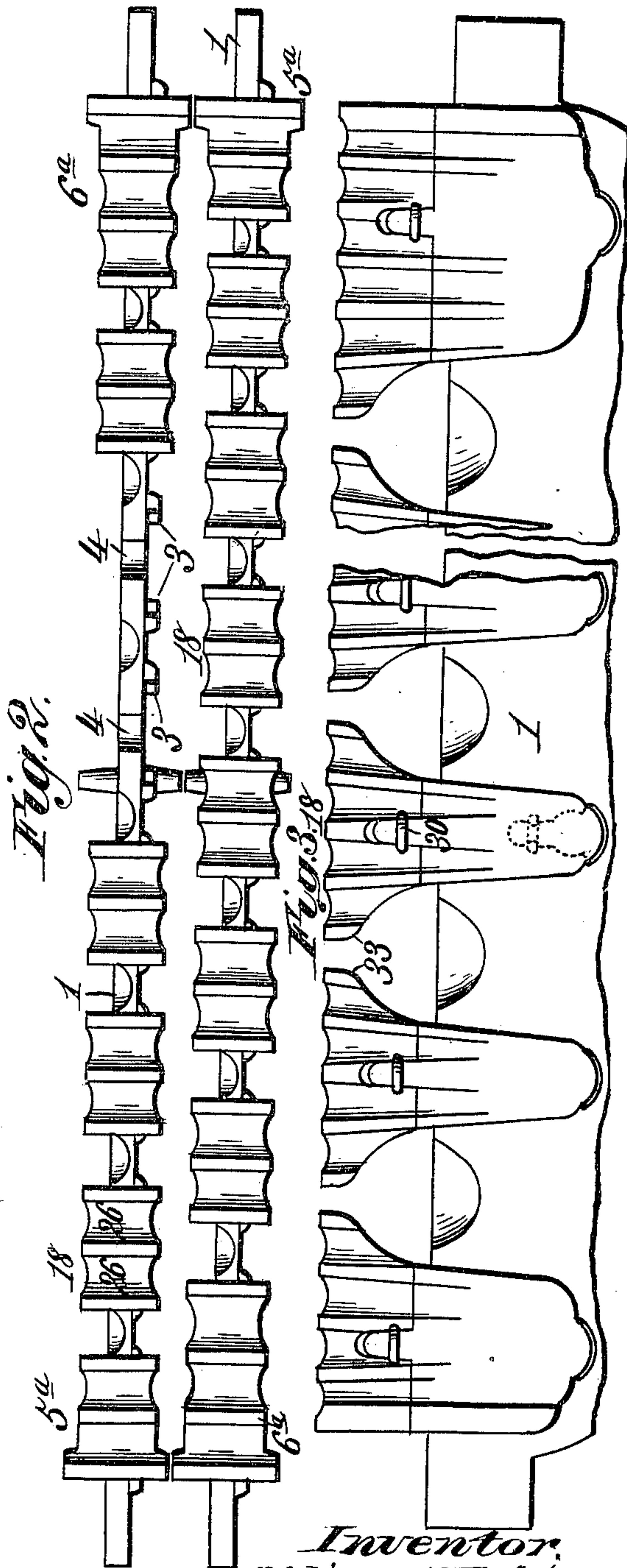


Fig. 2.

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A. C. FLETCHER.
GRATE.

(Application filed Sept. 13, 1900.)

(No Model.)

2 Sheets—Sheet 2.

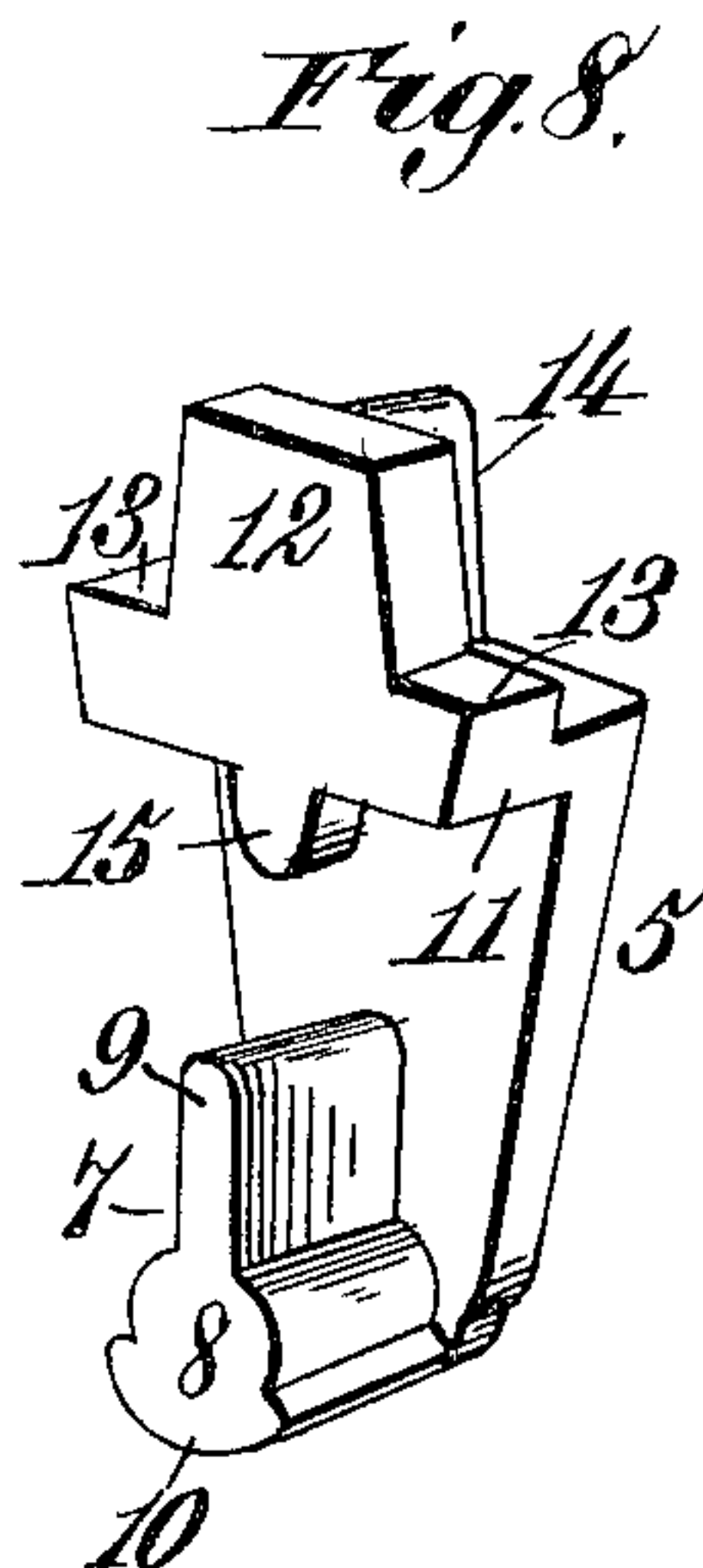
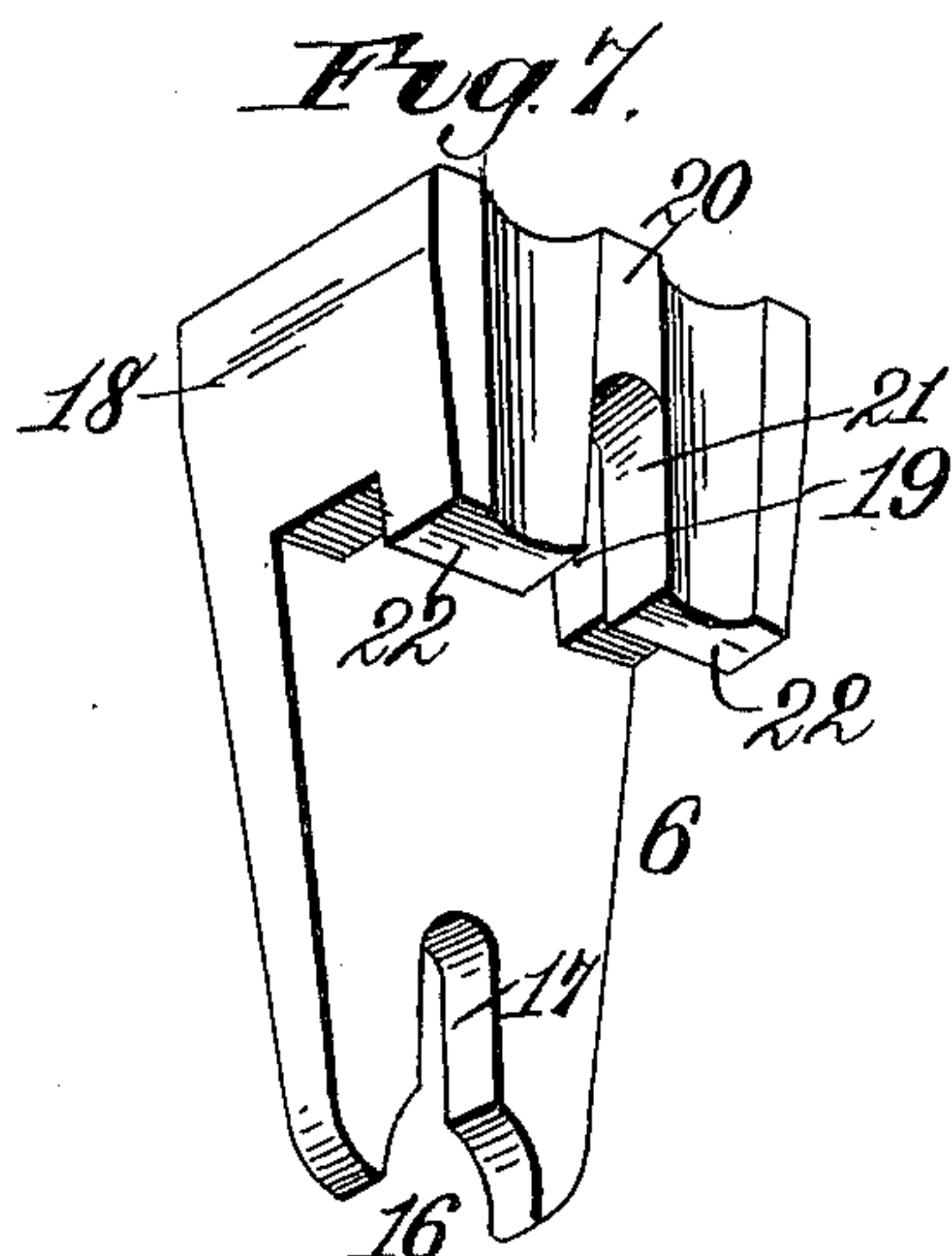
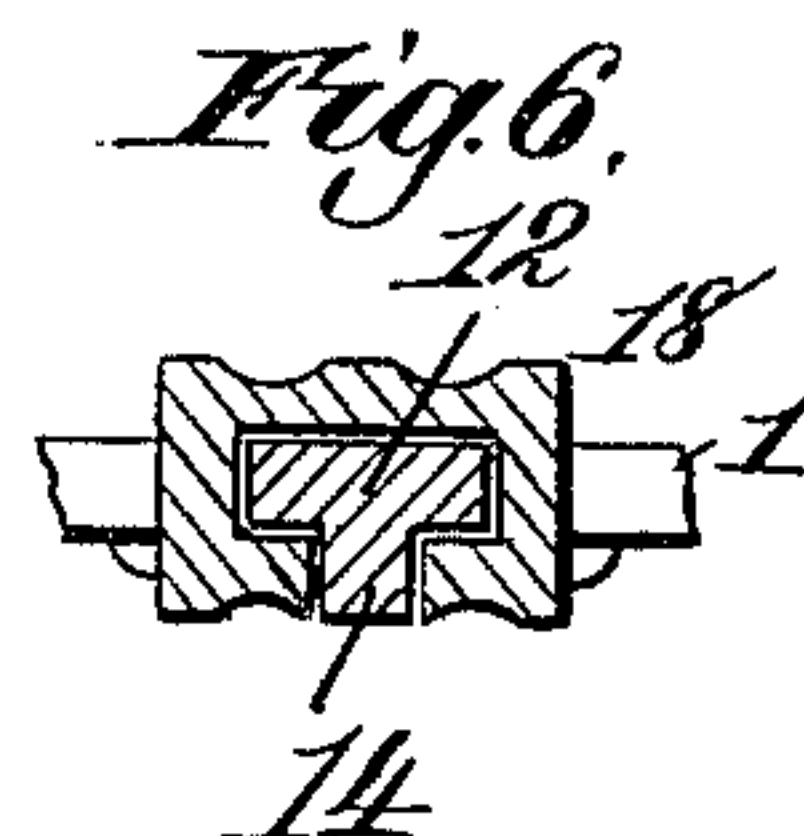
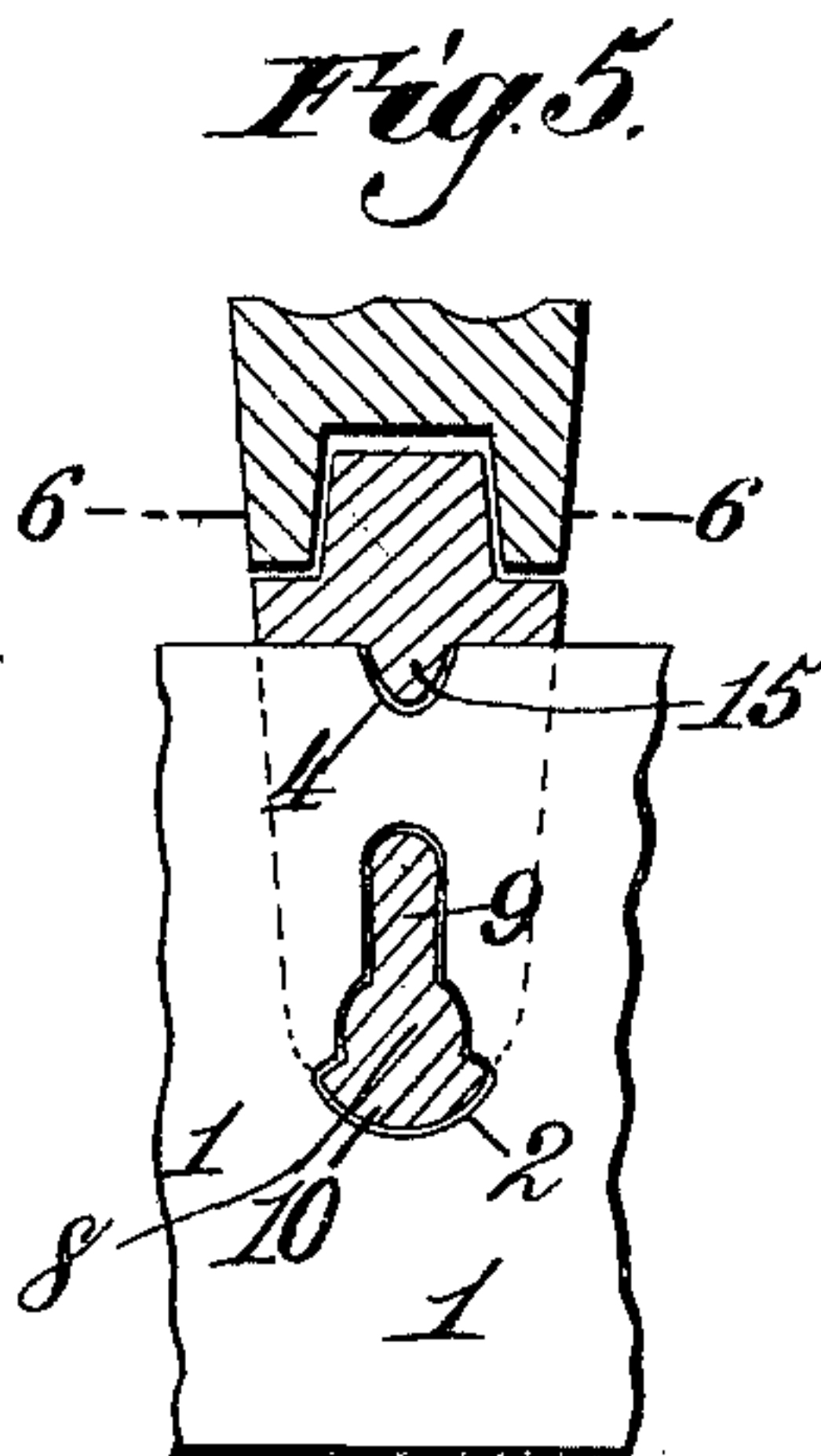
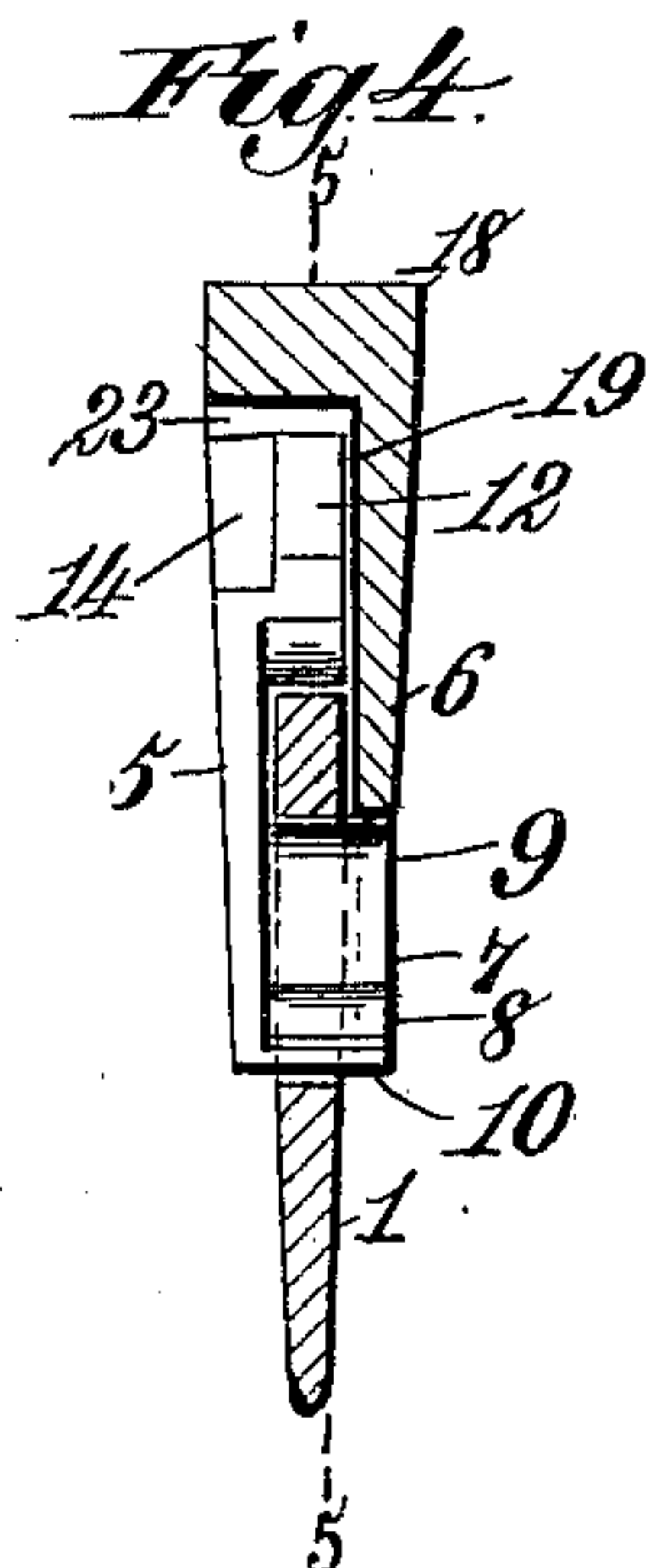
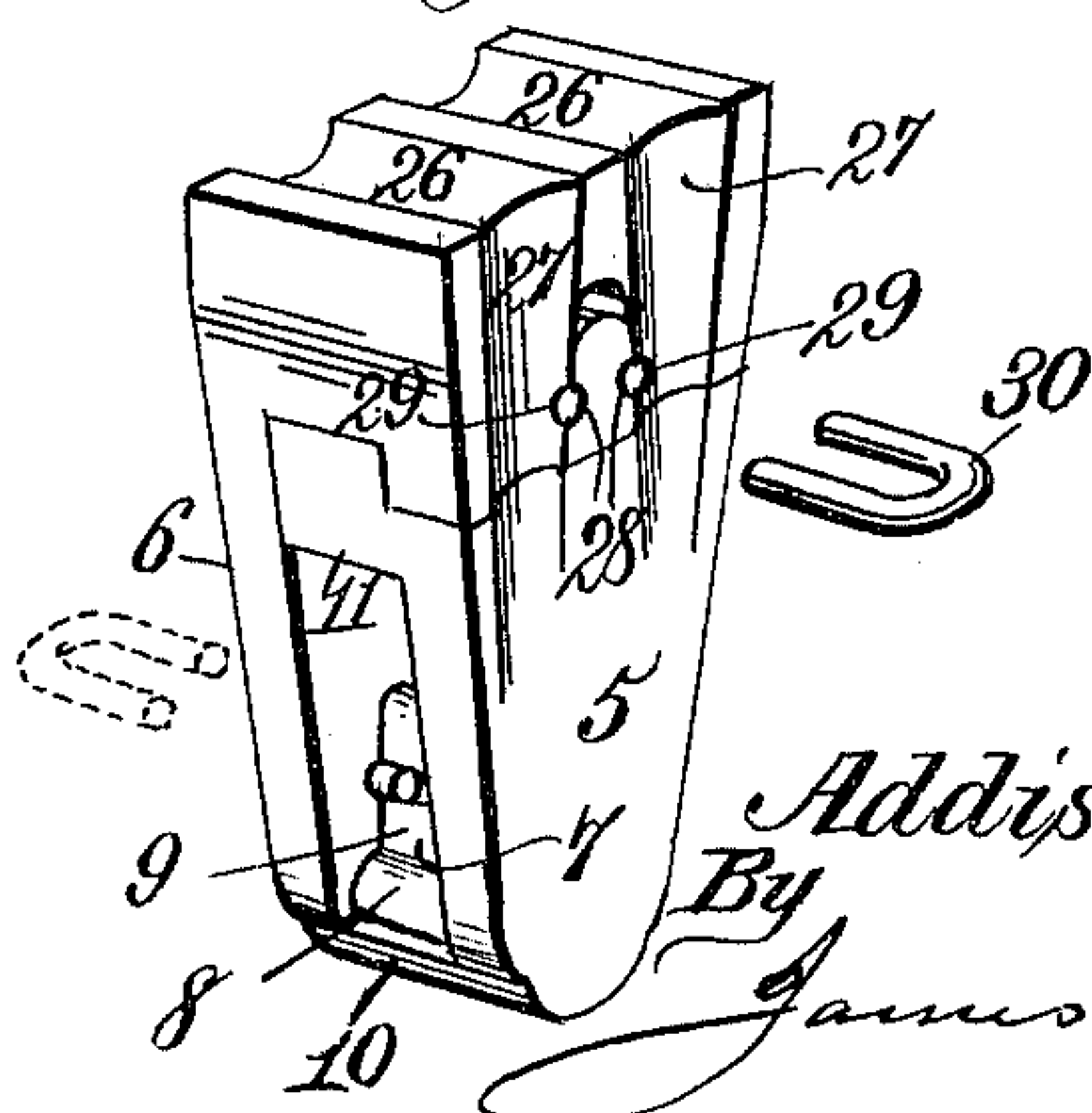


Fig. 9.



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UNITED STATES PATENT OFFICE.

ADDISON C. FLETCHER, OF NEW YORK, N. Y.

GRATE.

SPECIFICATION forming part of Letters Patent No. 672,669, dated April 23, 1901.

Application filed September 13, 1900. Serial No. 29,948. (No model.)

To all whom it may concern:

Be it known that I, ADDISON C. FLETCHER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Grates, of which the following is a specification.

This invention relates to grates, and more especially to furnace-grates; but it may be employed in heaters of all kinds burning coal and similar fuel.

My present invention is in the nature of an improvement on the grate for which I obtained United States Letters Patent No. 432,394 on the 15th day of July, 1890. In the patented grate referred to I provided a plurality of removable or detachable fuel-bearing points, each composed of two connected sections combined with the grate-bars in such manner as to provide a broad base of support for the coal and to also afford an increased draft of air, a more complete combustion, a more rapid generation of steam or heat, and a more perfect control of the temperature produced. In said grate I also provided a grate-bar of simple and economical construction wherein the sectional fuel-bearing points were capable at any time of ready attachment to and detachment from the grate-bars and wherein said points were positively interlocked with the grate-bars and rendered readily separable therefrom in the event of injury or burning in order that other points might be substituted.

It is the object of the present invention to so improve said grate as to make it stronger and more durable, to more firmly and securely lock the sectional fuel-bearing points in place on the grate-bars and at the same time to facilitate their detachment and removal therefrom, to guard against accidental breakage of the fuel-bearing points, and, finally, to improve and simplify the construction and render more efficient and satisfactory the operation generally of this class of grates.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of one of my improved grate-bars having a plurality of fuel-bearing points detachably and removably supported thereon. Fig. 2 is a plan view of a portion of the grate, two of the fuel-bearing points being removed. Fig. 3 is a view in side elevation, illustrating a slight modification. Fig. 4 is a transverse sectional view of a single grate-bar, showing the connection of the fuel-bearing and supporting points and the manner of mounting the same upon the grate-bars. Fig. 5 is a sectional view taken on the line 5 5 of Fig. 4. Fig. 6 is a horizontal sectional view taken on the line 6 6 of Fig. 5. Figs. 7 and 8 are detail perspective views of the two sections of one of the fuel-bearing points detached from one another, and Fig. 9 is a perspective view of one of the fuel-bearing points, the two sections being shown assembled together in operative position and secured together by staples.

Referring to the drawings, wherein like parts are indicated by like numerals of reference, the numeral 1 indicates the grate-bars, which are arranged parallel with one another, are of any suitable thickness, and of such width as to accommodate the construction hereinafter described. In each grate-bar is formed a series of apertures 2, and above each of said apertures are disposed two ribs 3. The ribs 3 are formed in pairs, as shown, the ribs of each pair inclining toward one another or converging from their tops toward their bottoms, all the ribs being formed on the same side of the grate-bar and preferably cast integrally with the latter and projecting laterally therefrom. Formed in the upper edge of the grate-bar immediately above the apertures 2 are transverse grooves or notches 4 for the purpose hereinafter made apparent.

Each of the fuel-bearing points comprises two sections 5 and 6, arranged to be detachably connected to each other and to the grate-bar and constructed as follows: The numeral 5 indicates a flat and preferably downwardly tapered metallic casting adapted to lie against one side of the grate-bar and provided on the inner side of its lower end with a laterally-projecting lug 7. The lug 7 consists of a partially-cylindrical body 8, provided on its upper side with an elongated flange or rib 9 and

on its under side with a circumferential segment-shaped enlargement 10. The upper end of the flat casting 5 is provided with an inwardly horizontally projecting flange 11, from the upper side of which projects a vertical tenon 12, and the flange 11 on either side of the tenon 12 is extended upward to form shoulders 13. A vertical rib 14 projects upward from the upper edge of the flat casting 5 and along the outer side of the tenon 12, said rib and tenon being tapered from the base upwardly, as shown. When the section 5 is in place on the grate-bar, the lug 7 extends through one of the apertures 2 and beyond the side of the grate-bar, the said apertures conforming in shape to the cross-sectional configuration of the lugs 7. Formed centrally on the lower side of the flange 11 is a downwardly projecting or depending tooth 15, which when the casting is in place on the grate-bar fits in the notch or recess 4, formed in the upper edge of the grate-bar immediately above the aperture 2. The sections 5 are inserted in the grate-bar from the smooth side of the latter, or, in other words, from the side opposite to that on which the ribs 3 are formed. The sections 6 each comprise a flat tapered casting similar in shape to the castings 5, but slightly longer than the latter, said casting 6 being arranged to lie against the grate-bar on the side opposite to the casting 5 and between the converging ribs 3. Formed centrally in the lower end of each of the flat castings 6 is an approximately semi-circular notch or recess 16, which terminates at its top in an elongated vertical slot 17, the notch or recess 16 corresponding in shape to the shape of the partially-cylindrical body 8 of the lug 7 and the slot 17 in similar manner corresponding in shape to the elongated rib 9. When the casting 6 is placed in position on the grate-bar, it fits between one of the pairs of ribs 3, and the slotted portion 17 and notched portion 16 straddle and fit over that portion of the elongated rib 9 and partially-cylindrical portion 8 of the lug 7 that projects through the aperture 2 in the grate-bar. Projecting laterally from the inner side of the upper end of the casting 6 is a hollow crown or cap-piece 18, comprising an inverted box-like casting having an imperforate top and side walls and open at its bottom, as shown. When the two sections 5 and 6 are fitted together and in place on the grate-bar, the hollow crown or cap-piece 18 fits over the tenon 12, the relative sizes of the two being such that the top of the tenon 12 does not quite reach to the top of the hollow portion of the crown or cap-piece, thereby forming an air-space, as most clearly indicated at 19 in Fig. 5 of the drawings. The inner wall 20 of the crown or cap-piece is provided centrally with a vertical tapered slot 21, that is adapted to fit over the rib 14 of the opposed section, and on its lower edge is provided with depending flanges 22, that

are arranged to fit over and behind or outside of the shoulders 13.

To secure the sectional bearing-point in place on the grate-bar, the lug 8 of the section 5 is passed through one of the apertures 2, the flange 11 resting on the upper edge of the grate-bar and the tooth 15 seating itself in the groove 4 above the said aperture. The section 6 is next placed in position by slipping the same down between the proper pair of converging ribs 3 until its lower notched and slotted end straddles the lug 7, the said ribs serving as guides to guide the section to place. When in place, as described, the crown or cap-piece 18 fits over the tenon 12, the rib 14 fits in the slot 21, and the depending flanges 22 hook behind the shoulders 13, as before described. The two sections are thus securely and firmly locked together and to the grate-bar and can only be detached or removed by manipulating them in a particular manner, for the lug 7 being inserted in the aperture 2 the section 5 cannot be moved either vertically or longitudinally relatively to the grate-bar and cannot be moved laterally away from the latter owing to the flanges 22 hooking behind the shoulders 13. Hence as long as both sections are in place the section 5 is absolutely immovable in every direction. The section 6 is likewise immovably held against either lateral or longitudinal movement relatively to the grate-bar, as the flat casting 18, the depending flanges 22, and the tenon 12 hold it against lateral movement in either direction, while the lug 7, tenon 12, rib 14, tooth 15, and the ribs 3 hold it against longitudinal movement on the grate-bar. The section 6, it will thus be seen, cannot be moved in any direction excepting vertically, and hence the fuel-bearing point cannot be detached or removed from the bar excepting by first lifting the section 6 upward and removing it and then detaching the section 5.

The ribs 3, while serving as guides to guide the sections 6 into place when securing the fuel-bearing points to the grate-bar, perform a more important function in holding the sections 6 rigidly in place on the grate-bar, for if one of the fuel-bearing points be struck with a rod, poker, or other fuel-mending implement in a direction lengthwise of the grate-bar there is a tendency to break off the lug 7 by a torsional twist; but this is prevented by the ribs 3, which form a support or abutment for each edge of the castings 6 and prevent any torsional strain being exerted on the lugs 7 in the manner described. This is also prevented in a measure by the teeth 15, which engage and fit in the notches 4 of the grate-bars, and by the firm seat or bearing which the flanges 11 have on the upper edges of the grate-bars. The segmental enlargements 10 of the lugs 7 form rounded terminations or extensions of the lower ends of the castings 6, so that should they be violently struck by a slicer-bar or poker in raking and

mending the fire the implement will be deflected off without liability of breaking the casting. The elongated flanges or ribs 9, fitting in corresponding elongated slots 17 in the castings 6, constitute firm, extended, and strong bearings for the interlocking sections at these points and also necessitate the section 6 being bodily lifted for a considerable distance before it can be removed, thus guarding against accidental disengagement of the two sections. In practice I find that the two sections composing the fuel-bearing point are apt, owing to the intense heat to which they are subjected, to warp and stick together, rendering their detachment and removal difficult, and to avoid such result I construct the hollow crown or cap-piece 18 and the tenon 12 in such manner that there will be left an air-space 19, as before explained. The air gains access to such space through the spaces or crevices between the meeting or abutting edges or faces of the sections and escapes therefrom through a port or passage 23 in the side of the crown or cap-piece formed therein by making the rib 14 shorter than the slot 21, whereby when the two sections are fitted together the rib will be too short to completely fill the slot 21, thereby forming the port or passage 23, which is in communication with the space 19, and thus permits of the escape of the heated air therefrom. In this manner a circulation of air is maintained between the two sections comprising the bearing-point and prevents said sections from becoming inseparable.

As before stated, the grate-bars are arranged at suitable distances apart parallel to one another, and in order to effect their proper separation I form the end bearing-points 5^a and 6^a with vertical flanges 24, which operate to maintain the ends of the grate-bars at uniform distances apart. In like manner the grate-bars are provided centrally on their opposite sides with ribs 25, which operate similarly to the flanges 24. As most clearly shown in Fig. 2 of the drawings, the fuel-bearing points are arranged so that they will break joints—that is to say, so that the bearing-points on one grate-bar will be disposed opposite the spaces between the bearing-points on the adjacent grate-bars—and in order that this result may be successfully accomplished the bearing-points 5^a and 6^a at the ends of the grate-bars are formed of different lengths, as shown in Figs. 1 and 2, and, as shown and described in my said former Letters Patent, the bearing-points 5^a and 6^a being alternately arranged throughout the series of grate-bars. The top and sides of the crowns or cap-pieces 18 are provided with parallel grooves 26 in the usual manner and for a well-known purpose, and the grate-bars are also provided on their upper edges between the fuel-bearing points with vertical grooves 27 to increase the circulation of air between the fuel-bearing points and facilitate the dropping of cinders and ashes between the grate-bars.

In some instances it may be found desirable to provide means for locking the sections 6 of the fuel-bearing points, so that they cannot be moved vertically without first unfastening or detaching the locking devices, and this may be conveniently effected by the means shown in Fig. 9 of the drawings. As shown in said figure, two semicircular grooves 28 are formed on the opposite sides of the rib 14, and similar grooves 29 are formed in the opposite side walls of the slot 21, said grooves 28 and 29 registering with one another. Similarly two semicircular grooves 31 are formed in the opposite sides of the elongated rib or flange 9 of the lug 7, and two corresponding grooves 32 are formed in the opposite side walls of the elongated slot 17. After the two sections of the fuel-bearing point have been interlocked in place on the grate-bar staples 30 are inserted in the registering grooves, thereby securely locking the two sections together in such manner that the section 6 cannot be raised vertically to detach it from the section 5 without first withdrawing the staples 30, which can be readily effected by inserting a pointed tool of any suitable description underneath or inside the looped end of the staples and prying them from their places. The arrangement immediately above described is of great utility in shaking and rocking grates and is especially valuable in locomotive-furnaces, as the shaking and rocking movement of the grate-bars or the jarring and vibration of the grate might in some cases displace the sections 6 of the bearing-points; but this is rendered impossible by means of the locking devices described.

If the grate is designed for burning fine fuel, it is necessary that the crowns or cap-pieces be arranged closer together to prevent the fine fuel from dropping between them before being reduced to ashes, and this may be effected by making the crowns or cap-pieces larger, as shown in Fig. 3, wherein I have shown the crowns or cap-pieces provided on each side with an extension or overhang 33, whereby the adjacent edges of the fuel-bearing points are brought into proximity.

Having described my invention, what I claim is—

1. A grate-bar provided with removable fuel-bearing points, each composed of two detachably-connected sections one of said sections being removably seated on the other section and having downwardly-tapered sides or edges, and ribs arranged in pairs on one side of the grate-bar, each pair of said ribs converging toward their lower ends and engaging the tapered edges of the said sections to guide the latter to their seats on the corresponding sections, substantially as described.

2. A grate-bar provided with a series of notches or recesses on its upper edge and having fuel-bearing points each composed of two sections, one of said sections resting on the upper edge of the bar and having a depending tooth engaging one of said notches or re-

cesses and provided with a lug extending through an aperture in the grate-bar, and the other section resting on said lug and interlocked with the lug-carrying section, substantially as described.

3. A grate-bar provided with a series of apertures and having fuel-bearing points each composed of two sections, one of said sections resting on the upper edge of the bar and provided with a laterally-projecting lug extending through one of the apertures in the grate-bar, said lug comprising a partially-cylindrical body portion provided on its under side with a segmental enlargement, and the other section interlocked with the lug-carrying section and recessed at its lower end to conform to and straddle said lug, substantially as shown and described.

4. A grate-bar provided with a series of apertures and having fuel-bearing points each composed of two sections, one of said sections resting on the upper edge of the bar and provided with a laterally-projecting lug extending through one of the apertures in the grate-bar, said lug comprising a partially-cylindrical body portion provided on its under side with a segmental enlargement and on its upper side with an elongated rib or flange, and the other section interlocked with the lug-carrying section and recessed at its lower end to conform to and straddle said lug, the apertures in the grate-bar corresponding in shape to the cross-sectional shape of the lugs which pass therethrough, substantially as shown and described.

5. A grate-bar provided with a series of apertures and having fuel-bearing points each composed of two sections, one of said sections resting on the upper edge of the bar and provided with an upwardly-projecting tenon, and provided on its lower end with a laterally-projecting lug extending through one of the apertures in the grate-bar, and the other section straddling and resting on the said lug at its lower end and provided at its upper end with a hollow crown or cap-piece having an imperforate top and fitting over the tenon of the other section, said tenon terminating at a point below the inner wall of the top of

the crown to form an air-space and the crown having a port or passage formed in its outer side communicating with the air-space, substantially as described and for the purpose specified.

6. A grate-bar provided with a series of apertures and having fuel-bearing points each composed of two sections, one of said sections resting on the upper edge of the bar and provided on its upper end with an upwardly-projecting tenon having shoulders on its opposite edges near its base and a vertical rib on its outer side, and provided on its lower end with a laterally-projecting lug extending through one of the apertures in the grate-bar, and the other section recessed at its lower end to conform to and straddle said lug and provided at its upper end with a hollow crown or cap-piece having an imperforate top and fitting over the tenon of the other section, said crown or cap-piece having two vertically-depending lugs arranged to straddle the said rib and hook over and behind said shoulders and interlock the two sections, substantially as described.

7. A grate-bar having fuel-bearing points each composed of two sections arranged on opposite sides of the grate-bar, one of said sections resting on the upper edge of the bar and provided with a laterally-projecting lug extending through said bar, and the other section straddling and resting at its lower end on said lug, one of said sections being provided with a rib or flange having grooves formed in its opposite edges and fitting in a corresponding slot in the adjacent section, said slot having grooves formed in its opposite walls that register with the grooves formed in the opposite edges of said rib, and staples removably fitted in said grooves, substantially as shown and described and for the purpose specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ADDISON C. FLETCHER.

Witnesses:

JAMES L. NORRIS,
F. B. KEEFER.