

2 Sheets—Sheet 1.

No. 389,289.

Patented Sept. 11, 1888.

FIG. 1.

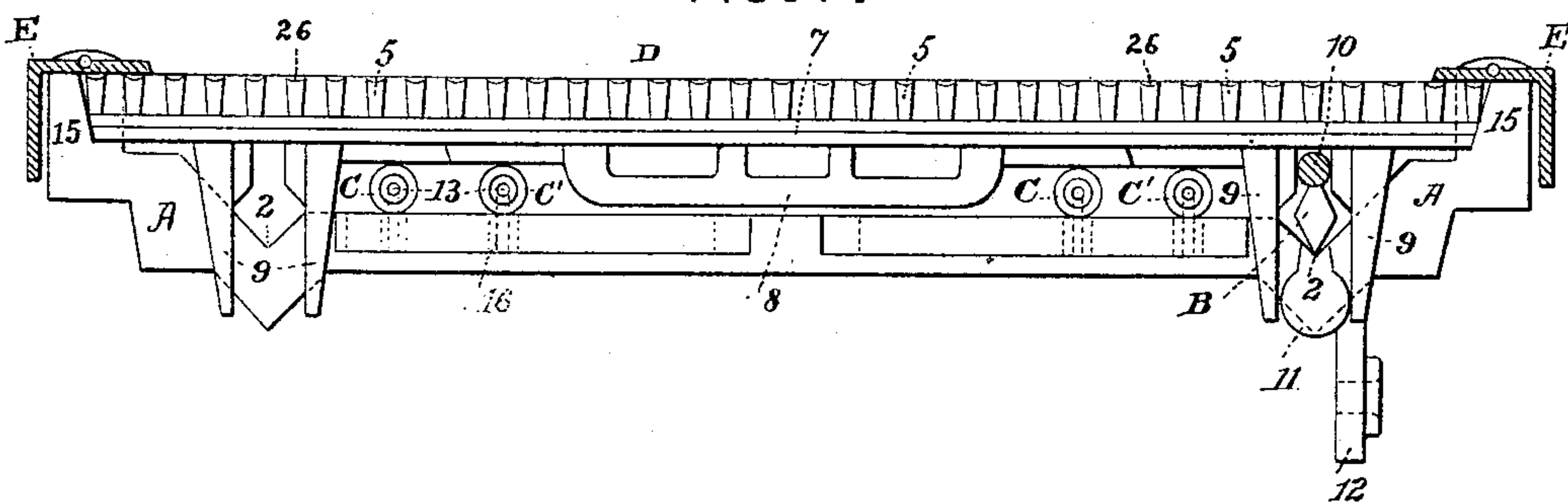


FIG. 11.

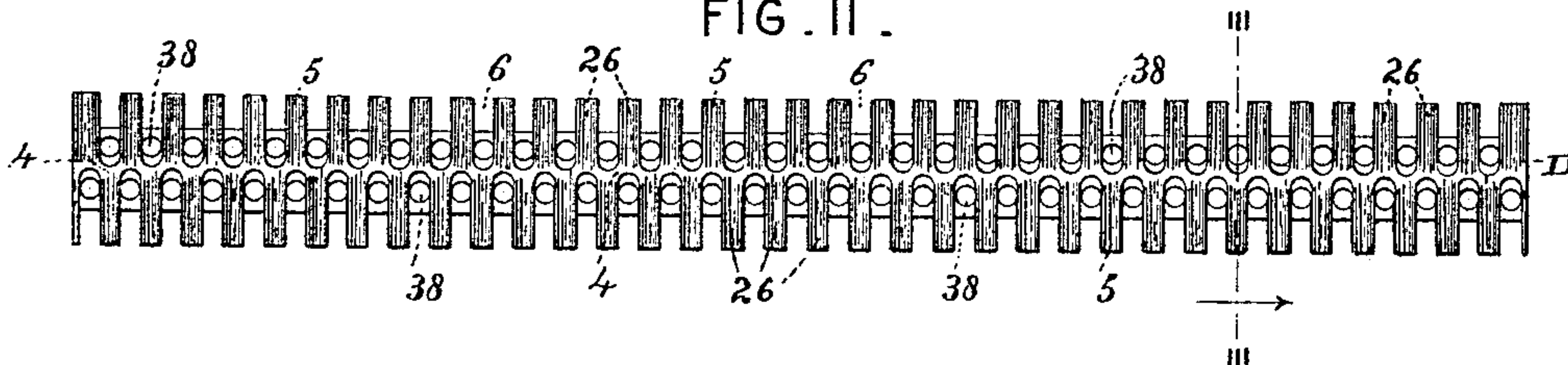


FIG. III

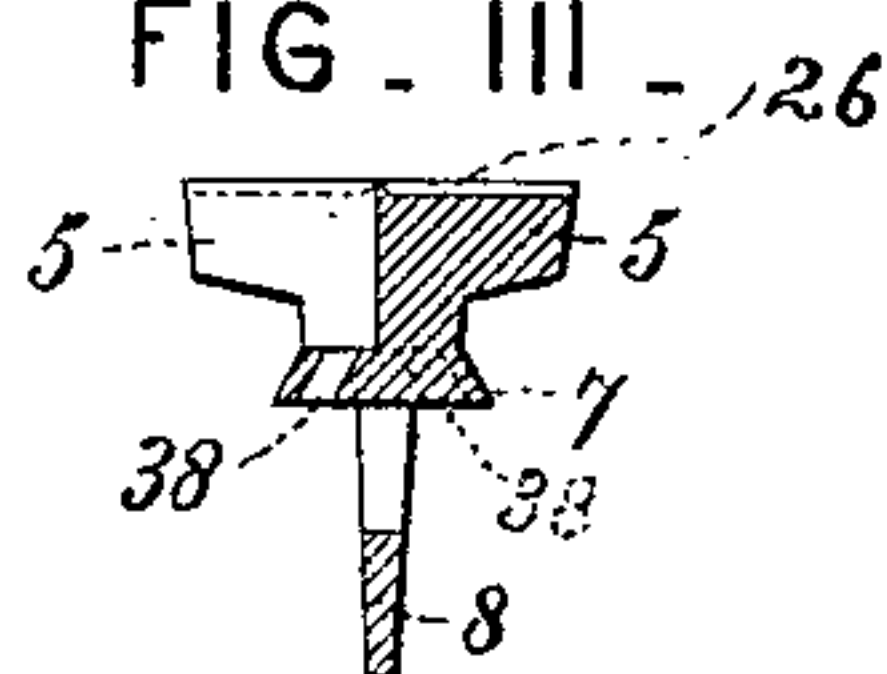
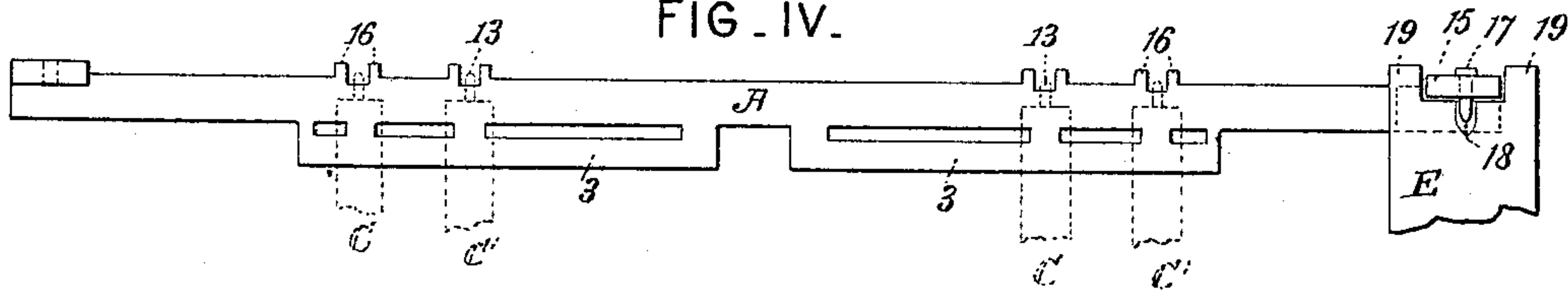


FIG. IV.



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(No Model.)

2 Sheets—Sheet 2.

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FIRE GRATE.

No. 389,289.

Patented Sept. 11, 1888.

FIG.V.

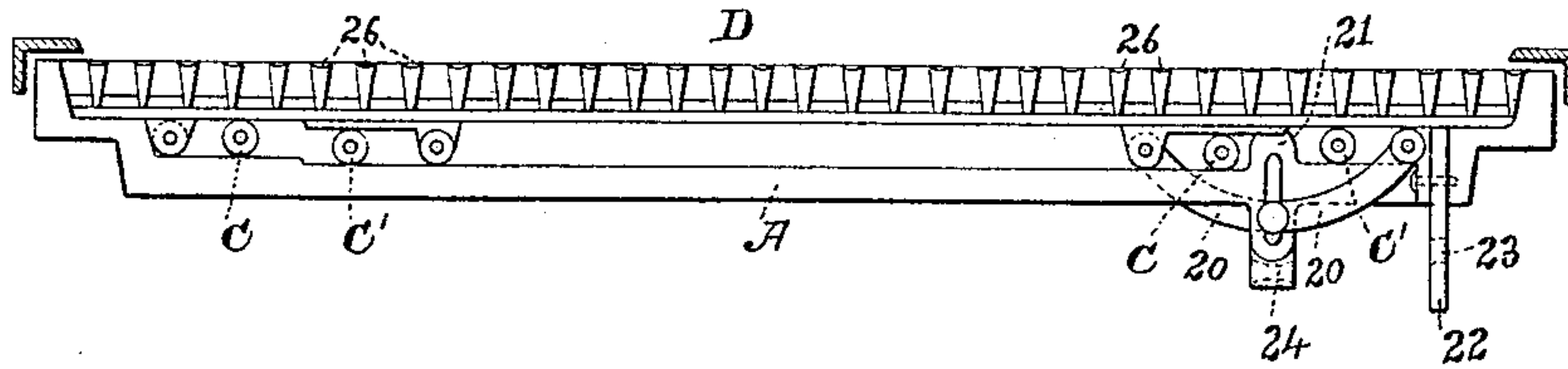
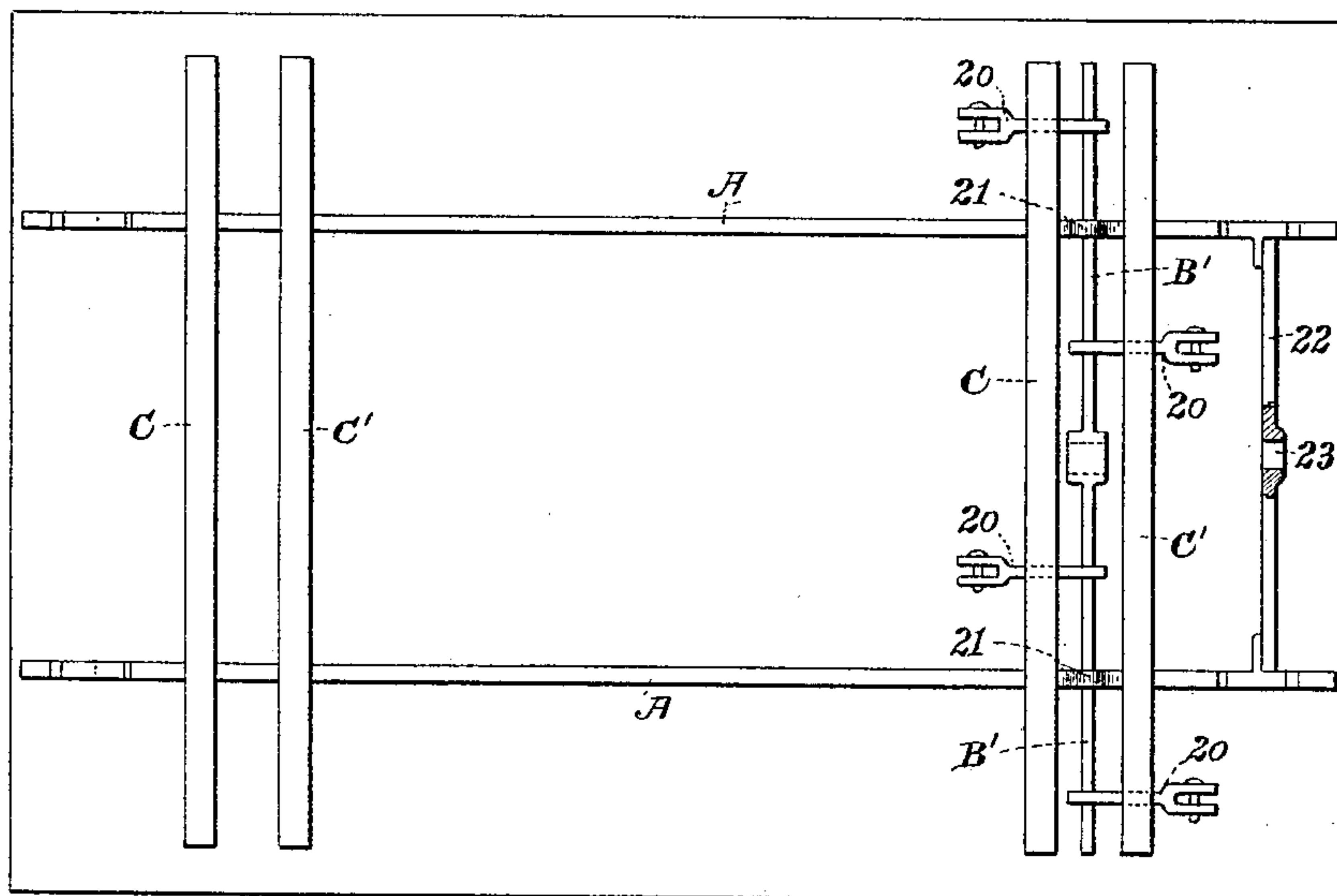


FIG. VI.



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UNITED STATES PATENT OFFICE.

JOHN COOPER, OF BOSTON, MASSACHUSETTS.

FIRE-GRATE.

SPECIFICATION forming part of Letters Patent No. 389,289, dated September 11, 1888.

Application filed August 8, 1887. Serial No. 246,384. (No model.)

To all whom it may concern:

Be it known that I, JOHN COOPER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Fire-Grates, which improvement is fully set forth in the following specification.

This invention relates to the construction of grates for stoves, ranges, or furnaces, and has particular reference to the class known as "shaking-grates," which have mechanism for sliding the grate-bars back and forth in horizontal planes, though the invention is in part applicable to dumping or even to stationary grates.

The invention comprises the particular construction of the grate-bar, which consists of longitudinally-grooved teeth on each side of a serpentine web, angular projecting ribs beneath the teeth, and a thin vertical web under the ribs, the devices for supporting and operating the same, and certain other details of construction and combinations of parts, as hereinafter set forth.

The grate-bar has a series of grooved teeth or projections on each side of a serpentine or undulating web, each tooth being opposite to an air-space on the other side of the web. The web is made thin to increase the area of the air-space, as well as to reduce the amount of iron in contact with the burning fuel, thus diminishing somewhat the expansion of the bar, and the undulating shape of the web takes up the expansion of the bar. At the base of the teeth are angular strengthening-projections, which are perforated vertically for passage of air to cool the bar as well as to supply air to the fire, and below the projections is a thin vertical web. The bars are supported and mounted on four hollow rollers extending entirely across the grate and resting on the side hanging bars. Each grate-bar rests on two of the rollers, being cut away on their under side, so as to clear the other two rollers. Alternate bars can thus be reciprocated in opposite directions. The operating mechanism may be a vertically-sliding bar with links pivoted alternately on opposite sides thereof, and at their outer ends pivoted to the grate-bars.

Grate-bars of the construction herein described may be employed in small dumping-

grates for stoves, as well as in large shaking furnace-grates.

In the accompanying drawings, which form part of this specification, Figure I is a sectional elevation of a grate constructed in accordance with the invention; Fig. II, a top view of one of the grate-bars; Fig. III, a vertical cross-section thereof; Fig. IV, a plan view of one of the side hanging bars; Fig. V, a sectional elevation showing another form of mechanism that may be employed to reciprocate the grate-bars; and Fig. VI, a top view of the same, the grate-bars being removed.

A represents the side hanging bars, which extend lengthwise of the grate, and are designed to be set in the brick-work of the furnace. They are notched at 2, to form bearings for the end of rock-bar B, which extends crosswise of the front part of the grate. The hanging bars also have projections at 3, to constitute bearing-surfaces for the supporting-rollers C C', of which there are four, one pair for each set of grate-bars.

The elements of the grate-bar D are a thin undulating or serpentine web, 4, on the top of the bar, grooved teeth 5, projecting therefrom, angular perforated projecting ribs 7, and a thin vertical web, 8. The teeth 5 are each provided with grooves 26, lengthwise of the teeth, and each tooth is separated from the next by an air-space, 6, which may be equal in width to the width of the teeth 5. Each tooth is opposite an air-space on the opposite side of web 4. Beneath the web are angular projections or ribs 7, to strengthen the bar and prevent warping, and these projections have perforations 38 for the passage of air upward to the fire, the air serving to cool the bar and prevent undue expansion.

In the middle of the bar is a thin web, 8, the interior of which is cut away to diminish the amount of heat conducted downward to the lower part of the bar.

The air-spaces 6 between the teeth 5 extend inward almost or quite to the middle of the bar and downward to the ribs 7, greatly reducing the weight of metal in the bar. The perforations 38 in the latter are coincident with or form continuations of these air-spaces, affording a free passage for the air upward to the fire, in the course of which passage the air

is heated by passing through the holes 38 and between the teeth 5.

When a fire is burning in the grate, the upper part of the bar is exposed to the direct heat of the fire; and hence the expansion is greatest in this part of the bar. This expansion produces a tendency to buckle and warp the bar out of shape; but by the provision of the thin undulating web 4 the expansion is taken up by the several curves of the web and thus the tendency to warping and the liability of fracture are diminished.

The bars D have depending arms 9, between which passes the rock-bar B. The latter has eccentric projections 10 11, alternating with each other, the former being above and the latter below the center of oscillation of the rock-bar. Consequently when the latter is rocked on its bearings, by means of a hand-lever inserted in the socket in arm 12, the bars D will be reciprocated longitudinally, each bar moving in the opposite direction to the bars on each side thereof.

The bars D are cut away on their under side, so as to make contact with two of the rollers C C' and to clear the other two. Thus one bar will rest on the rollers C and the next on the rollers C'. These rollers are hollow, and rods 13 are inserted through them, the ends of the rods being bent downward and held in place between ribs 16 on the outside of the hanging bars A. The rods 13 also serve to brace the hanging bars and hold them together.

The hangers A have on the ends upright projections 15, which pass between projections 19 on the ends of the head bars, E, as shown at the right-hand end of Fig. IV. The projection 15 is perforated near its upper end, and a pin, 17, is inserted through the perforation, its end engaging the upper side of the head bar, in which a depression, 18, is formed to receive it. These parts are thus securely held together in such way that they can readily be taken apart when desired.

The grate-bars D are shown with depending arms 9 at both ends, the object being to enable the bar to be reversed in case of any defect or irregularity in working.

The hanging bars A are also made alike at both ends, so that these bars also can be reversed, if desired, and so that one pattern serves for casting both bars, which is important as a matter of economy.

Referring to Figs. V and VI, the construction of the grate-bars D and supporting-rollers C C' is the same as before described. In these figures the hanging bars A have upright

projections 21 with vertical slots, through which passes a sliding bar B'. To the latter are pivoted curved links 20, projecting alternately from opposite sides of said bar, and at their outer ends pivoted to the several grate-bars. The bar B' can slide vertically in the slots in projections 21. In front of sliding bar B' is a fulcrum-rod, 22, which is also supported by the side bars, A. The rod 22 has an opening, 23, for the passage of a lever, the end of which is to be inserted in the socket 24 of the sliding bar B'. Rod 22 forms a fulcrum for such lever, and by it the sliding rod B' can be worked up and down, thus reciprocating the grate-bars D.

I claim—

1. A grate-bar having projections or teeth on each side of a thin undulating or serpentine web at the top of said bar, with air-spaces between the teeth, each tooth being opposite an air-space on the other side of the web, substantially as described.

2. A grate-bar having longitudinally-grooved teeth on each side of an undulating or serpentine web, with air-spaces between the teeth, and angular perforated projecting ribs beneath the teeth, substantially as described.

3. A grate-bar comprising an undulating web, grooved projections or teeth on opposite sides thereof, with air-spaces between the teeth, perforated angular projections beneath the teeth, and a thin vertical web under the projections, substantially as described.

4. The combination of the frame, the four supporting-rollers, the grate-bars resting each on two of said rollers, and mechanism comprising a vertically-sliding bar, and links pivoted on alternately-opposite sides thereof for imparting motion to said grate-bars, each bar moving in opposite directions to those adjacent to it, substantially as described.

5. The combination of the hanging bars, the four supporting-rollers resting thereon, the holding-rods passing through said rollers and connected with said hanging bars, the grate-bars resting each on two of said rollers, but cut away on the under side, so as to clear the other two, and operating mechanism for reciprocating said grate-bars, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN COOPER.

Witnesses:

FRANK R. BODWELL,
CHAS. W. CUSHING.