

(No Model.)

4 Sheets—Sheet 2.

G. L. KITSON & J. REAGAN.

GRATE BAR.

No. 391,052.

Patented Oct. 16, 1888.

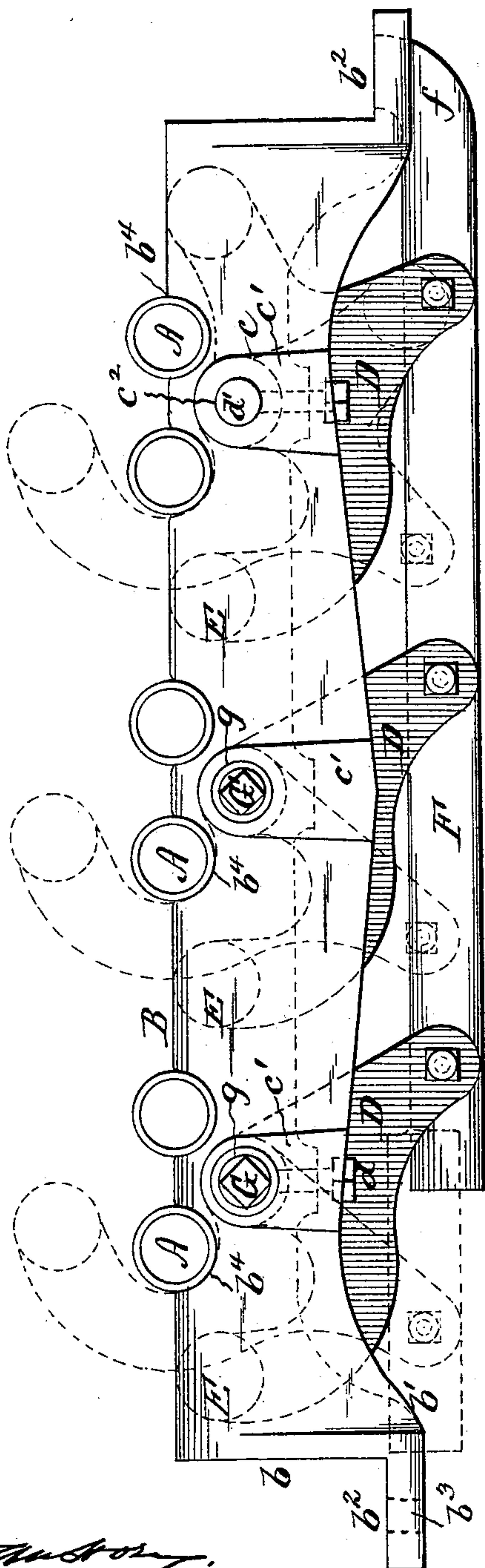


Fig. 2

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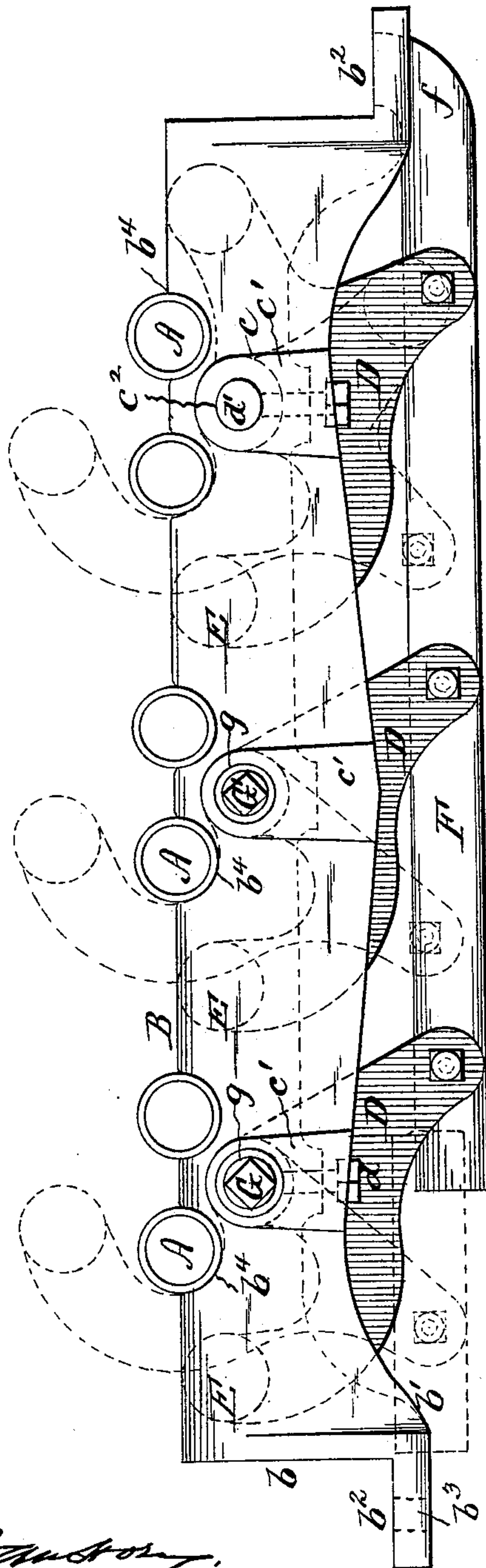


Fig. 2

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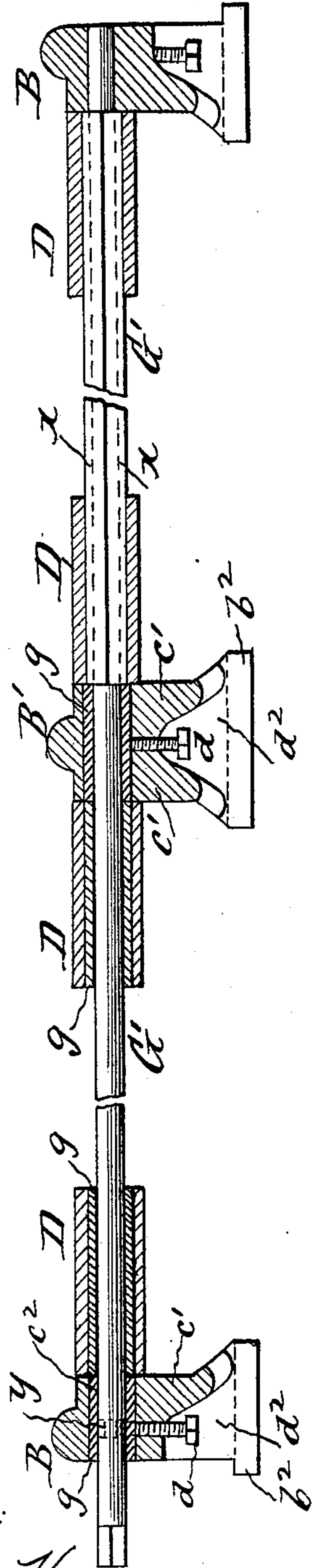
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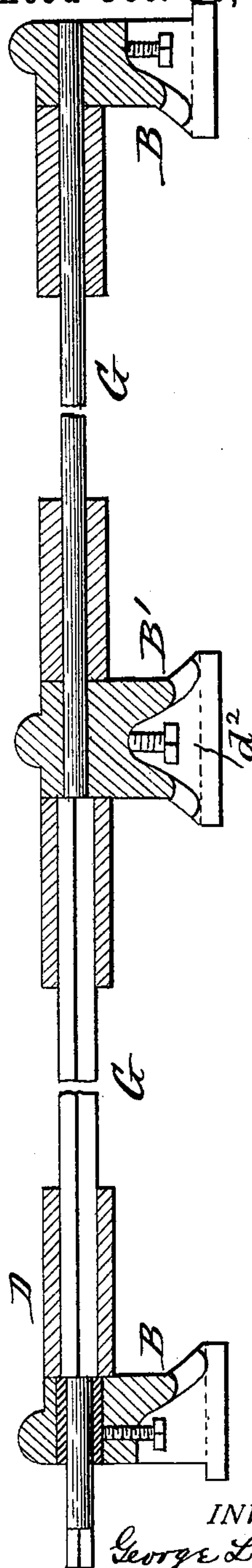
Patented Oct. 16, 1888.

Fig. 3



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Fig. 4



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(No Model.)

4 Sheets—Sheet 4.

G. L. KITSON & J. REAGAN.

GRATE BAR.

No. 391,052.

Patented Oct. 16, 1888.

Fig. 5

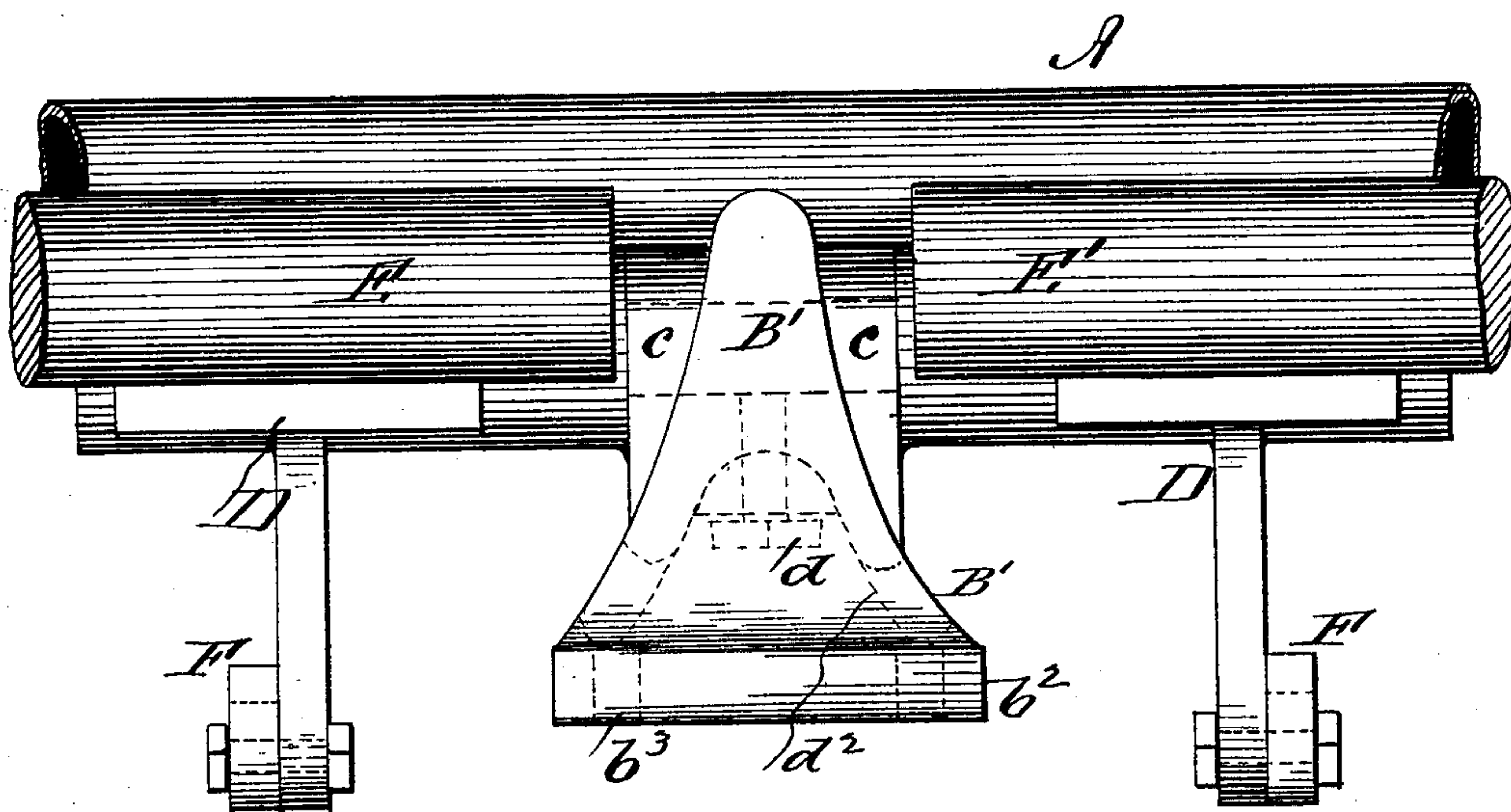
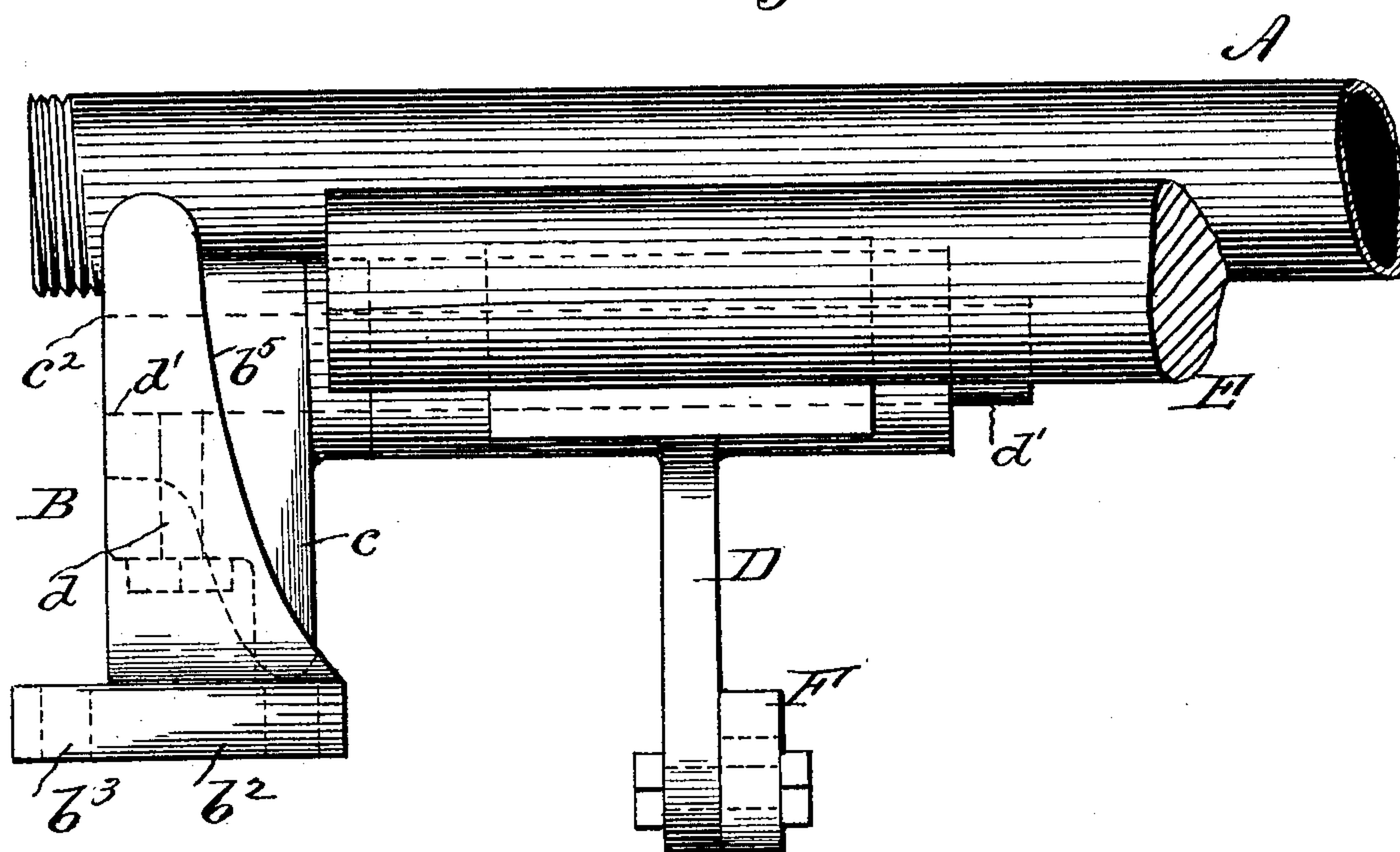


Fig. 6

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UNITED STATES PATENT OFFICE.

GEORGE L. KITSON AND JAMES REAGAN, OF PHILADELPHIA,
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GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 391,052, dated October 16, 1888.

Application filed January 28, 1888. Serial No. 262,227. (No model.)

To all whom it may concern:

Be it known that we, GEORGE L. KITSON and JAMES REAGAN, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Grate-Bars, of which the following is a specification.

Our invention has relation to that class of fire-grates for locomotive or stationary boiler fire-boxes of the form comprising water-bars and tumbler-bars located parallel with the water-bars and secured to pivoted curved dogs or levers having operating mechanism whereby the tumbler-bars are raised in curvilinear lines to remove the ashes or burned material from the bottom of the fire without injuring or weakening it, and without necessitating opening of the fire-box doors; and it has for its object simplicity of construction of the parts of the fire-grate and the location or mounting upon fixed studs or shafts and upon rocker shaft or shafts of the curved dogs or levers for the tumbler-bars, whereby an economy in the cost of construction of the parts of the fire-grate is effected, the latter is made more durable, its parts more readily attached to the fire-box and detached therefrom for repairs or other purposes, and the movable tumbler-bars act to more effectually clean the fire, thereby making this form of fire-grate commercially available for use. Our invention accordingly consists of the combinations, constructions, and arrangements of parts, having reference particularly to a fire-grate having water or other bars extending longitudinally from end to end of the grate, end and middle bearing-bars having studs or pintles for some of the tumbler-bar curved dogs or levers, and rocker shaft or shafts for the remaining tumbler-bar dogs or levers, which are connected together, so that a movement of the rock-shafts actuates the tumbler-bars, all as hereinafter pointed out in the specification and claims, reference being had to the accompanying drawings, wherein—

Figure 1 represents a plan of a fire-grate detached from the fire-box, having two series of tumbler-bars attached to curved dogs or levers, some of which are supported or mounted upon fixed shafts and the remainder upon sepa-

rate rocker-shafts on said bearing-bars in accordance with our invention; Fig. 2, an end view of same drawn to an enlarged scale, and showing the tumbler-bars and curved dogs or levers in their normal positions and in their raised positions; Figs. 3 and 4, longitudinal vertical sections showing the end and middle bearing-bars and the separate rocker or actuating shafts for two or more separate series of tumbler-bar dogs or levers; Fig. 5, a partial longitudinal side elevation drawn to an enlarged scale, showing one of the water-bars, end bearing-bar, curved dog or lever mounted on a fixed shaft on said bar, tumbler-bar secured to said lever, and link-connection for the latter; and Fig. 6, a like view of the middle bearing-bar supports for said parts.

A A represent the water or dead bars of a fire-grate, which may be connected to the fire-box in the usual manner or otherwise, as desired, and as the fire-box forms no part of our invention it is not shown in the drawings. At each end of the grate is shown a transverse bearing-bar, B, and at or near its middle is a single transverse bearing-bar, B', which bars may be of cast-iron, steel, or other suitable metal. These bars B B' have at their ends b , in line with their bottom b' , longitudinally projecting plates or flanges b^2 , provided with openings b^3 for the passage of screws for fastening said bearing-bars to the bottom edges of the fire-box, so that they may readily be secured in position and correspondingly removed for repairs or for other purposes. These bearing-bars have in their top edges segmental or semi-circular indentations b^4 for the reception of the water-bars A A, so that the latter not only have a bearing in the ends of the fire-box, but are also supported upon the end bearing-bars, B, and upon the central bearing-bar, B', to properly support the same and divide the longitudinal spaces between the water-bars into two sections, a a' , for two separate series of tumbler-bars, E and E'.

The bearing-bars B and B' are formed with lugs c c' , which are located on said bars on a line preferably corresponding or approximating to the vertical center line between the water-bars A A, as shown. Through the lugs c c' of said bars, or through the latter in line of said lugs, are tubular openings c^2 .

In the openings c^2 of lugs c of bars $B B'$ are firmly secured by screws d studs or short shafts d' , so that the end bars, B , have on one side projecting studs or fixed shafts d' , and the middle bar, B' , has said studs or shafts projecting from both sides of the same, as shown. Upon studs d' are loosely mounted dogs or curved levers D for some of the tumbler-bars of each series $E E'$. In the openings c^2 of lugs c' of bars $B B'$ are mounted rocker-shafts G and G' , separate from one another, one for each series of tumbler-bars E and E' , respectively, which rocker-shafts are preferably constructed and mounted as hereinafter described, and upon them are supported or mounted other but similar dogs or curved levers D for the remaining tumbler-bars. The dogs or levers D may support one or more tumbler-bars, as desired. The tumbler-bars of each series have free ends, as shown, and are located parallel with the water-bars $A A$ below the line of the latter, as more plainly shown by full lines in Fig. 2.

The curved levers or dogs D at each end of the tumbler-bars are connected by links F , the ends f of which are formed to abut against the bottom of one side of the fire-box when the tumbler-bars are in their normal position, as indicated in full lines, Fig. 2, to maintain the tumbler-bars in such normal position, the curvilinear movements of said bars being limited by their impingement against the water-bars, as shown by dotted lines, Fig. 2.

To admit of readily securing the studs or fixed shafts to the bars B and B' , their vertical sides flare outwardly from above downwardly, and said bars are formed on their under sides with longitudinal grooves d^2 , as more plainly shown in Figs. 3 and 4.

The separate actuating rocker-shafts G and G' pass from end to end of the fire-grate and have bearings in all the bars $B B'$. The rocker-shaft G for the front section or series of tumbler-bars, E , is made round in cross-section for corresponding bearings or openings, c^2 , in the lugs $c' c'$ on the middle and rear bars, $B B'$, and square or angular in cross-section from the lug c' on the front end bar, B , to the opposing lug c' on the middle bar, B' , the openings in the tumbler-bar dogs or curved levers mounted on said square part of shaft G being correspondingly made to fit such angular part and move therewith, so that a movement of shaft G rocks all the dogs or levers D and tumbler-rods composing the front section or series, E , without moving the rear section or series, E' , as the round part of shaft G rotates or rocks in corresponding openings in the dogs or levers D mounted thereon for the series of tumbler-bars E' . (See Fig. 4.)

To maintain the shaft G in position, or to prevent longitudinal movement of same, its square part is made larger in diameter than its round part, so that the ends of said square part abut against the opposing lugs c' on the front and middle bearing-bars, $B B'$, as shown in Fig. 4. When this is done, the opening c^2 through lug c' on the front bearing-bar, B , is

made large enough to admit of the passage through it of the enlarged or angular part of said shaft G . When the latter is inserted in place through the front end of the fire-box, a thimble, g , is inserted in said opening c^2 and retained therein by a set-screw, d . The shaft G' for the rear series of tumbler-bars is correspondingly made, but has its angular part at its rear end, or between the opposing lugs c' , on the middle bar, B' , and rear bar, B . The round part of said shaft is at its forward end, and suitable thimbles, g , are inserted in the openings c^2 in the front and middle bearing-bars, $B B'$, and also in the openings in the curved levers or dogs between said bearing-bars, through which said shaft G' passes, as plainly indicated in Fig. 3.

Instead of making the angular part of shaft G' larger in diameter or in cross-section than that of its round part, said portions may be of the same size, as indicated by dotted lines $x x$, Fig. 3, in which case the thimbles g in bearing-bars $B B'$ and in said dogs or levers D are dispensed with, and when this is done an annular groove, y , may be formed near the front end of the bar or shaft G' , within the opening c^2 therefor in bar B , for engagement with a set-screw, d , to prevent longitudinal movement of shaft G' .

The forward ends of the rocker-shafts G and G' project out beyond the front of the fire-box, so that actuating-levers (not shown) can be secured thereto in the usual or any other suitable manner.

A fire-grate constructed as above described, it will be noted, has but one central bearing-bar for two separately-actuated series of tumbler-bars, which bearing-bar, together with the end bars, B , has fixed studs or shafts for some of the tumbler-bar dogs or levers D to rock upon, and also has separate rocking shafts for each series of tumbler-bars, which rocker-shafts extend from end to end of the fire-grate and serve for bearings or supports for the remaining tumbler-bar dogs or levers D , and when actuated move the tumbler-bars of a series to clean the fire. It will also be noted that the tumbler-bars and the rocking shafts are so connected to the end and middle bearing-bars, $B B'$, and the latter so fastened to the fire-box that the bearing-bars $B B'$ can readily be removed and the tumbler-bars and rocker-shafts dismantled for repairs or replacement. The use of the rocking shafts G and G' for shaft or support bearing for some of the tumbler-rod dogs D admits of dispensing with the usual slotted connections or links for said dogs. Further, the arrangement of the end and middle bearing-bars, $B B'$, having the fixed shafts d' and the rocker-shafts G and G' for supporting the dog D , maintains said parts in due alignment and enhances the durability and effectiveness of the working or movable parts of the fire-grate. Where only one series of tumbler-bars is used for a grate of a short length, the middle bar, B' , is dispensed with.

We do not herein limit ourselves to the de-

tails of construction shown and described, as it is obvious that they may be varied without departing from the spirit of our invention; nor do we confine our improvements to water-bar fire-grates, as it is evident that the same may be employed in connection with dead-bar fire-grates.

What we claim is—

1. In a fire-grate, the combination of stationary grate-bars A A, transverse bearing-bars B B, located at or near the ends of bars A A, a central transverse bearing-bar, B', for bars A A, laterally-projecting fixed studs or shafts on bars B B B', dogs or curved levers mounted on said studs or shafts, tumbler-bars secured to the upper ends of said dogs or curved levers, one or more rocker-shafts having bearings in bars B B B', other like dogs or curved levers mounted on said rocker-shaft, tumbler-bars secured to the dogs or levers on the rocker-shaft, and link-connection between the dogs or levers on said studs and the dogs or levers on the rocker-shaft, substantially as set forth.

2. In a fire-grate, the combination, with stationary bars A A, end and middle bearing-bars, B, B, and B', laterally-projecting studs or shafts d' on said bearing-bars, openings c^2 in said bars B, B, and B', rocker-shafts G G', having bearings in openings c^2 , curved levers or dogs loosely mounted upon studs d' , other curved dogs or levers mounted on said rocker-shafts, part of the dogs on the rocker-shafts being loose thereon and the remainder secured thereto, so as to rock or move therewith, and link-connection between the dogs or levers on studs d' , and the dogs or levers on the rocker-shafts, substantially as set forth.

3. In a grate having stationary and movable grate-bars, the bearing-bars B B', having end flanges or plates, b^2 , openings c^2 , and laterally-projecting fixed studs or shafts, combined with rock-shafts having bearings in

openings c^2 , curved dogs or levers mounted on said fixed studs, other like dogs or levers on said rock-shafts, and link-connections for said dogs, substantially as set forth.

4. In a fire-grate, the combination of stationary water-bars, end and middle bearing-bars, B, B, and B', rocker-shafts having bearings on said bars B B B', dogs or curved levers having bearings on bars B B B', other curved dogs or levers mounted on said rocker-shafts, tumbler-bars supported by said dogs or levers, and link-connection for the latter, substantially as set forth.

5. In a fire-grate, the combination of stationary grate-bars, curved levers or dogs loosely mounted upon the grate, rocker-shafts, curved dogs or levers mounted on said rocker-shafts, tumbler-bars secured to said dogs or levers, and link-connections for the latter, substantially as set forth.

6. A bearing-bar for fire-grates having a longitudinal groove in its bottom surface, its sides diverging from its top to its bottom surfaces, side lugs, $c c'$, studs or shaft projecting laterally from the lugs c' , openings c^2 in lugs c , and end flanges, b^2 , substantially as set forth.

7. In a grate, the combination of stationary bars A A, bearing-bars B B B', curved levers or dogs mounted or journaled on said bars B B B', rocker-shafts G G', each having an angular part in cross-section at one end, curved levers or dogs mounted on said rocker-shafts, tumbler-bars secured to said dogs, and levers and link-connections for the latter, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE L. KITSON.
JAMES REAGAN.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.