(No Model.)

2 Sheets—Sheet 1.

E. J. STORY.

FIRE GRATE.

No. 398,007. Patented Feb. 19, 1889.

Fig. 1.

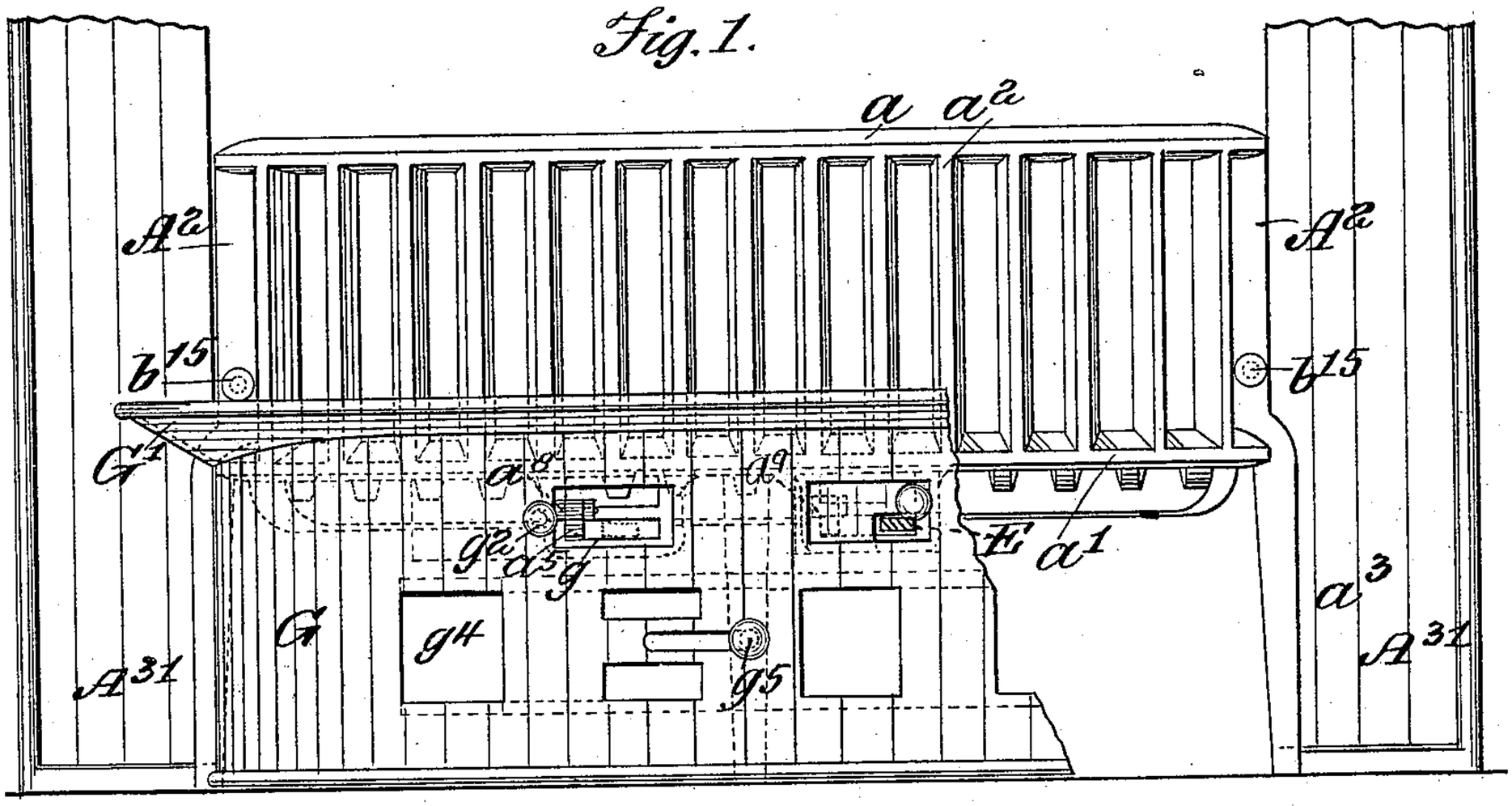
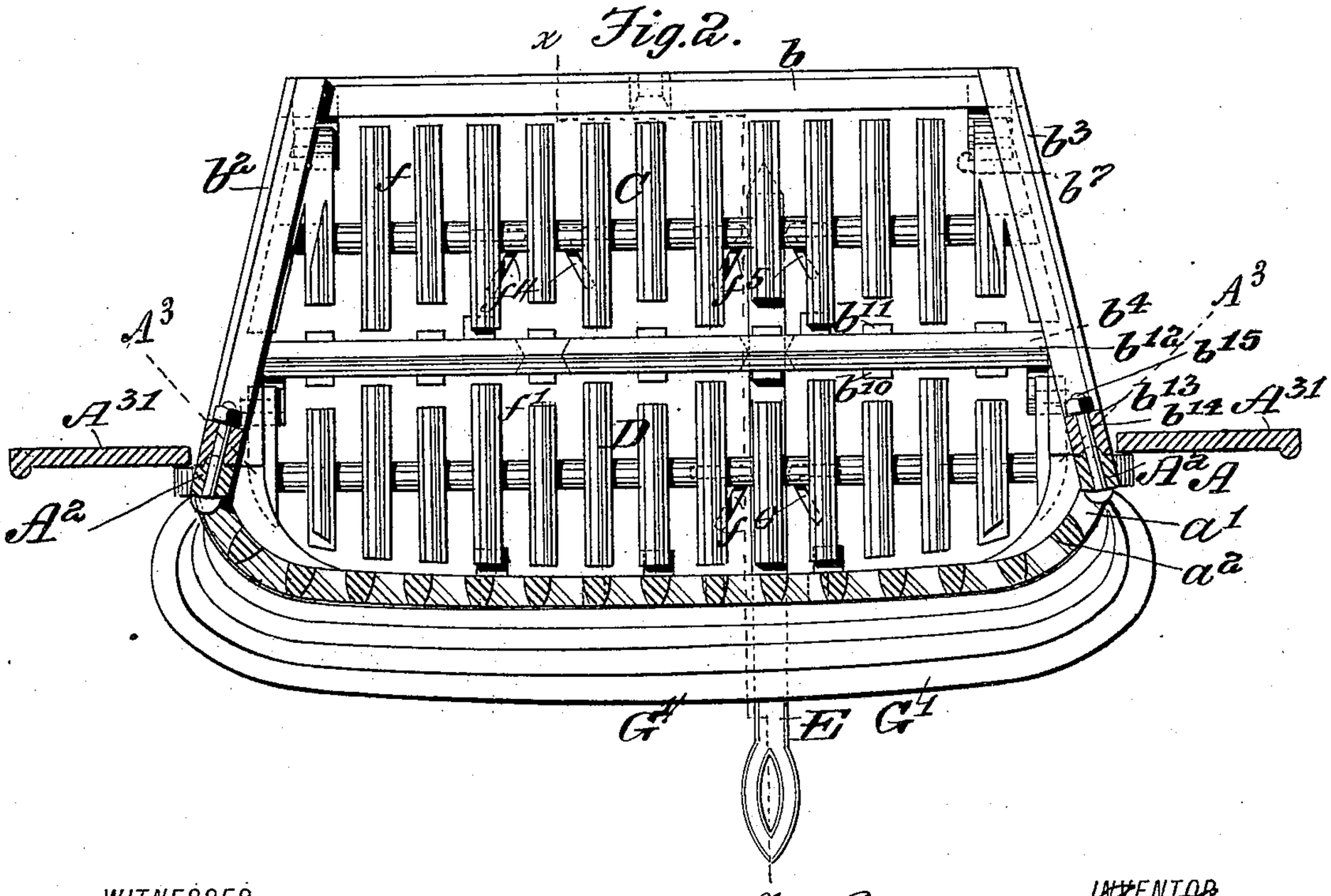


Fig. 2.



WITNESSES.

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(No Model.) 2 Sheets—Sheet 2.

E. J. STORY.

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Fig. 6.

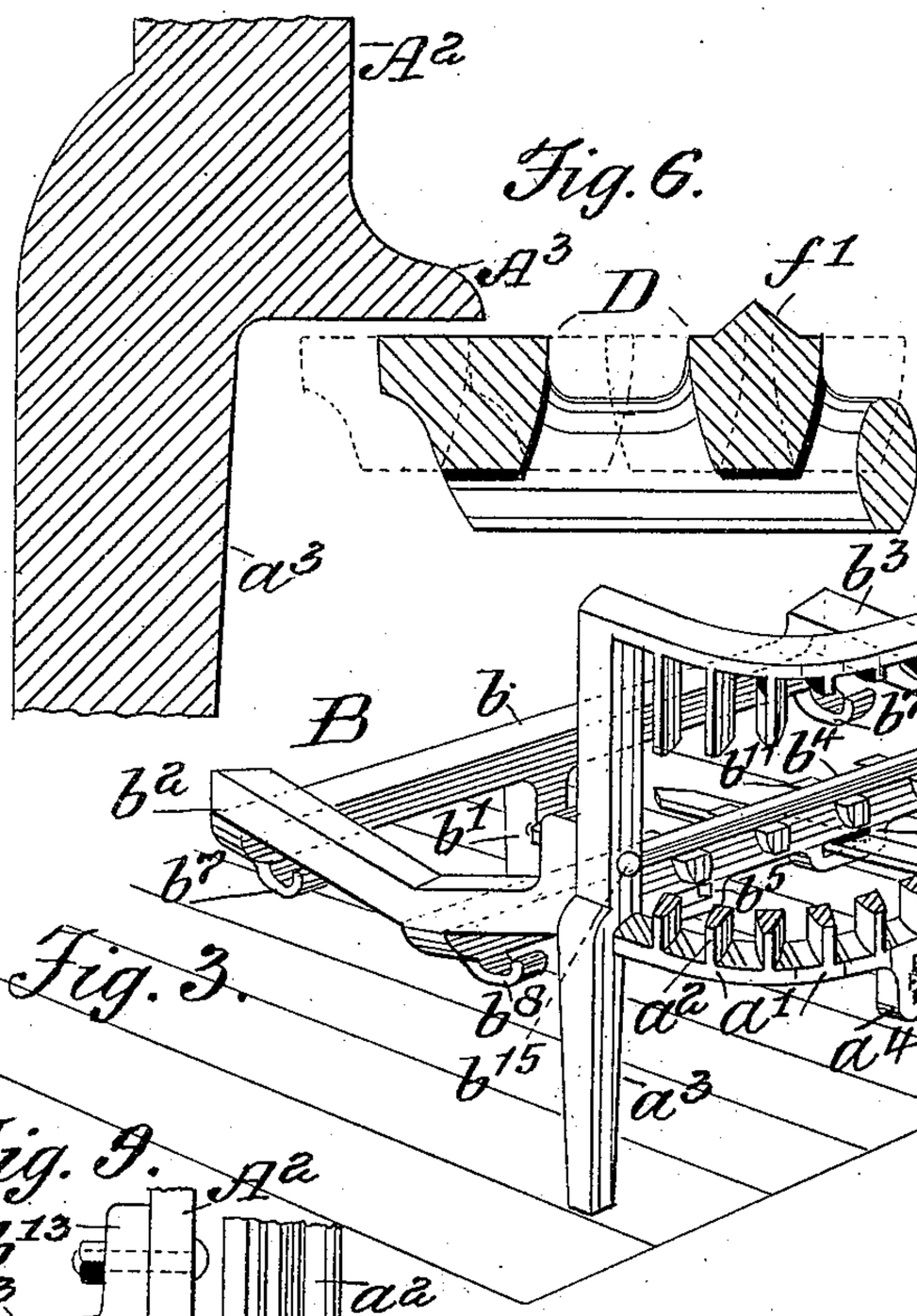


Fig. 7.

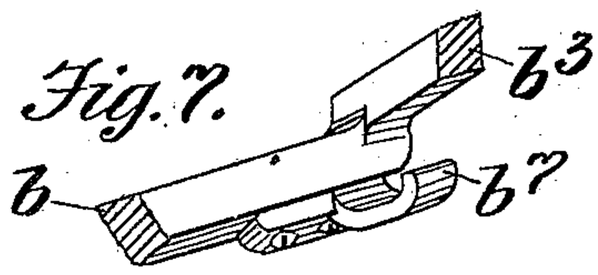


Fig. 3.

Fig. 9.

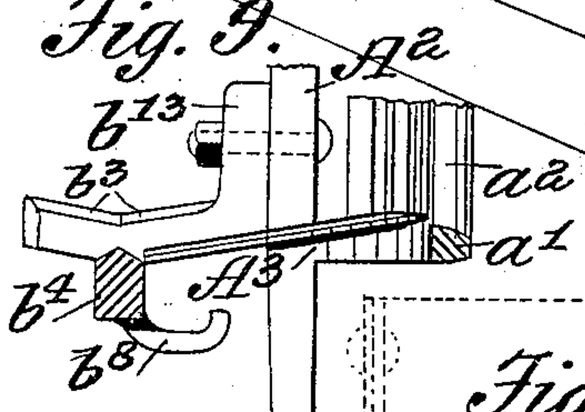


Fig. 4.

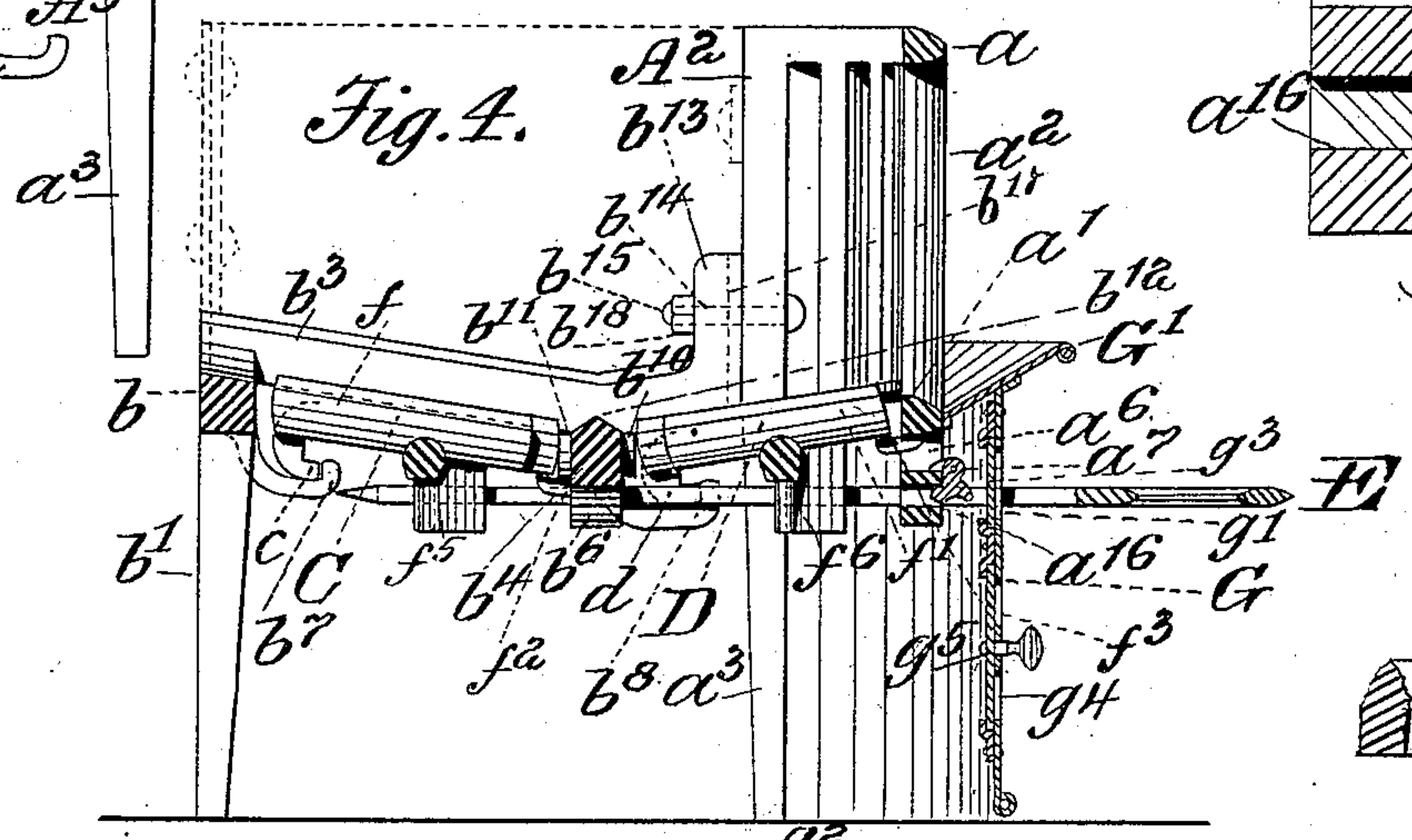


Fig. 5.

Fig. 10.

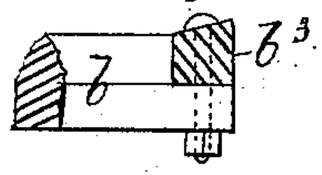
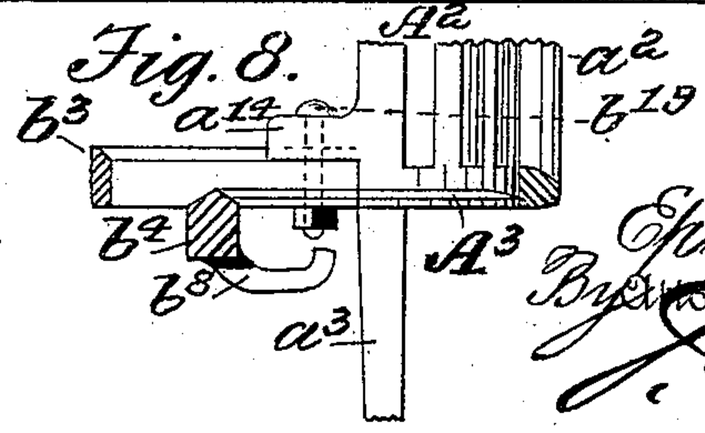


Fig. 8.



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UNITED STATES PATENT OFFICE.

EPHRAIM J. STORY, OF WASHINGTON, DISTRICT OF COLUMBIA.

FIRE-GRATE.

SPECIFICATION forming part of Letters Patent No. 398,007, dated February 19, 1889.

Application filed August 6, 1885. Serial No. 173,699. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIM J. STORY, a citizen of the United States, residing in Washington, in the District of Columbia, have invented certain new and useful Improvements in Fire-Grates, of which the following is a description.

The invention relates particularly to a grate which is adapted to be applied to use in a fire-place or in a fire-place stove.

In the drawings, Figure 1 is a front elevation of my improved grate as applied in a fire-place, the covering-screen and draft-regulator being broken out. Fig. 2 is a horizontal sectional plan view on the line *w w* of Fig. 1. Fig. 3 is a perspective view showing the grate-frame, the grate-sections being removed and the vertical front bars being broken away. Fig. 4 is a vertical transverse section from front to rear on the line *x x* of Fig. 2. Fig. 5 is a vertical section, drawn to an enlarged scale, of a portion of the parts which are represented in Figs. 3 and 4. Fig. 6 is a vertical section, drawn to an enlarged scale, on the line *y y* of Fig. 2. Fig. 7 is a detail perspective view, enlarged, of a portion of the grate-frame detached. Fig. 8 is a detail elevation of the front and rear grate-frames, showing a modification in the construction of the securing arm or knee. Fig. 9 is a detail elevation showing the interior overhanging grate-clearing projection upon the two sections of the grate-frame. Fig. 10 is a detail showing the central or intermediate longitudinal bar as cast separately and subsequently attached to the end bars.

The invention consists in certain novel elements and combinations of elements, as will clearly appear from the following description and claims.

A is the front section of the grate-frame, consisting of vertical end supports or standards, A^2, which terminate downwardly in legs a^3, an upper curved horizontal connecting-bar, *a*, a coincident lower curved horizontal connecting-bar, *a'*, downwardly-projecting guide-loops a^4 and a^6, pivoted and weighted stops a^5 and a^7, lugs a^8 a^8 and a^9 a^9, bearings a^{10} and a^{16}, and a series of vertical bars, a^2, which latter, in connection with the connecting-bars *a* and *a'* and the standards A^2, constitute the basket portion of the grate-front.

The rear section, B, of the grate-frame is composed of a rear longitudinal horizontal supporting-bar, *b*, which is provided, preferably at its mid-length, with a leg, *b'*, and with end bottom supporting hooks or sockets, b^7 b^7, transverse overlapping end bars, b^2 and b^3, each, preferably, oppositely inclined from its ends downward toward the center, as shown, and a central or intermediate longitudinal horizontal supporting-bar, b^4, opposite to and parallel with the rear bar, *b*, and which is provided with bottom operating-loops, b^5 and b^6, bottom hooks or sockets, b^8 b^8, front agitating-fingers, b^{10}, rear agitating-fingers, b^{11}, rear supporting-lugs, f^2, and an upwardly-projecting longitudinal ridge, b^{12}.

At their front extremities the overlapping end bars, b^2 and b^3, are provided with upwardly-extending knees or arms b^{13}, in each of which is a perforation, b^{14}, to receive a bolt, b^{15}, which extends rearwardly through the end supports, A^2, of the front section, and is secured by a nut, b^{18}.

The intermediate longitudinal supporting-bar, b^4, is preferably cast in one with the transverse overlying end bars, b^2 and b^3; but it may be cast separately and then attached by any suitable means, and the supporting hooks or sockets b^7 and b^8, instead of being cast upon the bottom of this rear section of the grate-frame, may be formed separately and subsequently applied in the manner indicated in Fig. 7, or in any other suitable way.

The rear grate-section, C, and the front grate-section, D, rest by their bottom hooks, *e* and *d*, respectively, in the supporting hooks or sockets b^7 b^7 and b^8 b^8, the vertical extent of the grate-sections and their hooks being slightly less than the space between the upper surface of the supporting hooks or sockets and the bottom surface of the transverse end bars, so that when the grate-sections are reciprocated their ends will extend beneath the end bars and be cleared thereby of any accumulations of coals, clinkers, or cinders. The grate-sections C and D are reciprocated by means of the operating-rod E, which, being inserted within the loop a^6, engages the loop b^6 upon the central longitudinal bearing or supporting bar, and the depending lugs f^4, f^5, and f^6 upon the section C and upon the section D, respectively. The pivoted stop a^7 be-

ing in its locking position, as seen in full lines in Figs. 1, 3, 4, and 5, the movement of the operating-rod will be insufficient to pass the cross-bars f or f' of the grate-sections beyond the vertical plane of their front supporting-lugs, f^2 and f^3. When it is desired to dump the front grate-section, the stop a^7 will be lifted and the operating-rod will be moved to the left extremity of its slot, thus carrying the ends of the cross-bars f' beyond the edge of the supporting-lugs f^3 and permitting the grate to fall. By a similar operation of the operating-rod in connection with the loop a^4 the rear grate-section may be dumped in the same manner.

The air casing or screen G, detachable, as shown, has at its upper extremity an inwardly and downwardly inclined chute, G', and it is provided also with operating-openings g and g' for the rod E, which are coincident, respectively, with the loops a^4 and a^6 upon the front section, A, of the grate-frame, and are closable by means of covering-plates g^2 and g^3.

Below the operating-openings g and g' are openings g^4, in any desired number, for the admission of draft-air, and a slidable register-plate, g^5, is applied to regulate such admission. Ordinarily this air-casing and dust-screen G will be placed in close contact with the front of the grate, so that the draft may be effectually controlled; but when in the process of combustion ashes and cinders have accumulated upon the chute the casing will be withdrawn to such extent as to permit the accumulation to be discharged into the space below.

The provision of the outward bend or enlargement in the front supports, A^2, of the grate-frame, formed, as it is, in the plane of the front grate-section, affords space within the grate-frame and beneath the projections A^3 for the reciprocation of the grate-sections without uncovering the ends thereof, so as to permit clinkers or other substances to become engaged between the section and the projection, the limit of movement being such, as clearly indicated in Figs. 2 and 6, that a vertical opening is under no circumstances produced between these parts. This construction also affords space for the insertion and withdrawal of an ash-pan of an area greater than the area of the grate-sections, so that no portion of the waste products of combustion will fall outside such ash-pan.

As best seen in Figs. 2, 3, 6, and 9, the front section, A, of the grate-frame and its vertical supports A^2 are provided with an overhanging projection, A^3, which is coincident with the under surface of the transverse end bars, b^2 and b^3, and which in the reciprocation of the grate-sections C and D acts in conjunction with such end bars to clear the fuel-surface of the front grate-section, D, of refuse matter and of coals or other substances.

In Fig. 2, f^4 and f^5 are lugs which project from the bottom of the grate-section C, and f^6 are similar lugs upon the grate-section D. These lugs are coincident with the loops upon the horizontal bars b^4 and a' and with the operating-openings in the screen or air-casing G.

It will be understood that in the practical use of this grate a suitable casing or fire-basket may be placed upon the rear section thereof and attached to the front section, as indicated in dotted lines in Fig. 4, or that the rear section may be placed directly in contact with the masonry of the fire-place, so that the fire-back and jambs of the fire-place will constitute the rear and end walls of the fire-chamber.

Preferably the front vertical face of the arm or knee b^{13} is provided with a groove or recess, b^{17}, and the rear face of the vertical standards A^2 is provided with a corresponding tongue, insuring a secure connection of the front and rear sections of the grate-frame.

It is apparent that instead of the arm or knee b^{13} extending upwardly from the parts b^2 and b^3 of the grate-frame an arm, a^{14}, might extend rearwardly from the standards A^2, as seen in Fig. 8, along the upper surface of the frame, and be secured to the same by vertically-placed bolts b^{19}; but I prefer the construction first described.

The upper surface of the central or intermediate longitudinal supporting-bar, b^4, is in Figs. 2 and 4 represented as substantially in the same horizontal plane as the adjacent grate-sections; but it is apparent that the character of the invention would not be changed, while the strength of the bar would be greatly increased, if it were made to extend upwardly somewhat farther, and in some cases it may, as seen in Fig. 10, terminate upwardly at the top instead of at the bottom of the transverse end bars.

In Figs. 1 and 2, A^{31} designates the facings or pilasters of the fire-place "front."

I do not herein broadly claim a grate which is composed of a front section and a rear section which are secured together, nor an air-casing or dust-screen which is provided with registered draft-openings and is applied to the front of a fire-place grate, for I am aware that these constructions are old.

I do not herein broadly claim two grate-sections which are each pivoted at the rear, so as to discharge their contents toward the front; nor a central or intermediate longitudinal bearing-bar which is provided with a perforation for the reception of an operating-rod; nor grate-sections which are provided with depending engaging-lugs and with downwardly-projecting hooks; nor two forwardly-discharging grate-sections which in the operation of dumping are actuated successively through different operating-openings; nor a grate the ends of which are overhung by a projection which in the operation of the grate clears the ends of coals, ashes, and clinkers,

such constructions being shown and described in United States Patent No. 346,830, issued to me August 3, 1886.

Having described my invention, I claim—

1. The combination, in a grate, of a rear longitudinal supporting-bar, a longitudinal supporting-bar opposite to and parallel with the rear longitudinal supporting-bar, transverse end bars which overlap such longitudinal supporting-bars and are rigidly connected thereto, and a grate-section which at its ends is overlapped by the transverse end bars.

2. The combination of the rear longitudinal supporting-bar, b, the central longitudinal supporting-bar, b^4, the end bars, b^2 and b^3, extending across and rigidly connected to the upper surface of the longitudinal bars, and a grate-section, C, the upper surface of which at its ends is overhung by the end bars, substantially as and for the purposes set forth.

3. A grate-frame which consists of a front longitudinal bar, a rear longitudinal bar, an intermediate longitudinal bar, and end bars which extend across such rear and intermediate longitudinal bars, in combination with grate-sections which are supported by bottom projections upon the rear and intermediate longitudinal bars and by rear projections upon the front and intermediate longitudinal bars, whereby when the grate-sections are reciprocated coals, clinkers, and ashes are cleared from the sections at their ends.

4. The combination of the grate-frame embracing bar a', having a support, f^3, bar b, having support b^7, bar b^4, having supports b^8 and b^8, and end bars, b^2 and b^3, with the grate-sections C and D, provided, respectively, with the bottom hooks, c and d, for the purposes specified.

5. A rear longitudinal supporting-bar, transverse end bars which rest upon and are rigidly connected to the rear longitudinal supporting-bar, a longitudinal supporting-bar which at each end is connected to the under surface of the transverse end bars, hooks or sockets which project from the under surface of the longitudinal supporting-bars, and a grate-section having engaging-hooks, in combination, substantially as described.

6. A fire-place grate the frame of which embraces a longitudinal supporting-bar, b, transverse end bars, b^2 and b^3, which rest upon and are rigidly connected to the longitudinal supporting-bar, a longitudinal supporting-bar, b^4, which at each end is connected to the under surface of the transverse end bars, b^2 and b^3, and downwardly and upwardly turned hooks or sockets b^7 b^7, which project from the under surface of the longitudinal supporting-bars b and b^4, as and for the purposes set forth.

7. A front grate-section which consists of end vertical standards the lower portions of which are curved outwardly, as described, an upper curved horizontal connecting-bar, and a series of vertical bars which extend from the upper horizontal connecting-bar to the lower horizontal connecting-bar, in combination with a rear grate-frame which embraces two lower longitudinal supporting-bars and two upper transverse bars, the rear longitudinal supporting-bar having a single bottom support placed at about its mid-length, as described.

8. The front grate frame or section, A, which consists of the standards A^2, curved outwardly, as shown, the upper connecting-bar, a, the lower connecting-bar, a', and the series of vertical bars a^2, in combination with the rear grate-frame, B, which embraces the two longitudinal supporting-bars b and b^4, the transverse superposed bars b^2 and b^3, and the single bottom support, b', upon the longitudinal supporting-bar b, substantially as set forth.

9. The combination of a front grate-frame and grate-section embracing a vertical basket portion and vertical outwardly-bent end standards, and a rear horizontal grate-frame, the front vertical grate-frame and grate-section and the rear horizontal grate-frame being secured together, substantially as described.

10. The combination, with the rear horizontal grate-frame and grate-section, of the front vertical grate-frame or basket-section provided with the left and right operating-loops, a^4 and a^6, substantially as and for the purposes set forth.

11. A fire-place grate which embraces a rear horizontal grate-frame and grate-section and a front vertical grate-frame or basket-section which is provided with the right operating-loop, a^6, and with left operating-loop, a^4, whereby the grate-section upon such rear horizontal grate-frame may be dumped, as described.

12. In a fire-place grate, a front vertical grate-frame or basket-section, A, which is provided with left and right operating-loops, a^4 and a^6, as and for the purposes described.

13. The combination of the front section, A, having vertical portions a^2, longitudinal portions a and a', and operating-loops a^4 and a^6, with the rear section, B, having grate-supporting hooks and connected to the front section, substantially as described.

14. The front section, A, having vertical bars a^2, longitudinal bars a and a', and loops a^4 and a^6, in combination with the rear frame, B, and with the rear and front grate-sections, C and D, substantially as and for the purposes specified.

15. A fire-place grate which embraces a front section, A, which has vertical portions a^2, longitudinal portions a and a', and operating-loops a^4 and a^6, a rear grate-supporting frame, B, and rear and front grate-sections, C and D, which are provided with engaging-lugs.

16. The combination, with the front frame and section, A, having the loops a^4 and a^6, of the pivoted locking-stops a^5 and a^7, whereby the limit of movement of the operating-lever may be either enlarged or restricted at the will of the operator, substantially as and for the purposes specified.

17. The combination, with the front section, A, of the grate-frame, of the outwardly-bent supports or standards A^2, located at the extremities of the grate, as described, and curved beyond the planes of such extremities, whereby space is afforded in a self-supporting grate for the insertion and removal of an ash-pan which has greater width than the grate.

18. The front A, having connecting-bar a', provided with loops a^4 a^6, the casing G, having openings g and g', and the grate having bottom lugs, in combination, as set forth.

19. The combination, with a fire-place grate, of a detachable air-casing, G, provided with an ash receiving and discharging chute, G', and resting upon the hearth or floor, substantially as shown and set forth.

20. The combination, with a fire-place grate, of a detachable air-casing, G, having at the top a chute, G', for receiving and discharging ashes, and having also a series of registered openings, g^4, for the admission of draft-air.

21. The combination, with a fire-place grate, of the detachable air-casing or dust-screen G, provided with ash-chute G', operating-openings g and g', and registered draft-openings g^4, substantially as and for the purposes specified.

22. The combination, with the front section, A, having connecting-bar a' and loops a^4 and a^6, of the dust-screen or air-casing G, having operating-openings g and g', provided with closing-plates g^2 and g^3 and corresponding with the loops a^4 and a^6, substantially as set forth.

23. The combination, with the grate consisting of the self-supporting frame-sections and the front and rear grate-sections, of the detachable air-casing G, having openings g, g', and g^4, and closing-plates g^2, g^3, and g^5, substantially as and for the purposes specified.

24. The combination, in a fire-place grate, of a front vertical grate-frame and a rear horizontal grate-frame which is fitted to the front grate-frame, an arm or knee upon one of the grate-frames extending along the other grate-frame, and a securing-bolt extending through one of the grate-frames and through the arm or knee upon the other grate-frame.

25. The combination of the front grate-frame and basket-section, A, the rear grate-frame, B, having upwardly-extending arm or knee b^{13}, and the securing-bolt b^{14}.

26. The combination, with the grate, of the grate-frame having the outward bend in the plane of the grate and the inward projection extending over the ends of the grate, substantially as shown and described, and for the purposes set forth.

27. The combination, with the grate, of the rear grate-frame having end bars, b^3, overhanging the rear grate-section and a portion of the front grate-section, and the front grate-frame having projection A^3, overhanging a portion of the front grate-section, substantially as and for the purposes specified.

28. The front grate-frame having the outward bend and the inward projection, in combination with the rear grate-frame having overhanging end bars in continuation of the inward projection upon the front grate-frame, the rear grate-section supported upon the rear grate-frame, and the front grate-section supported in part upon the rear and in part upon the front grate-frame.

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