2 Sheets—Sheet 1.

J. ADAIR.

Fire Place.

No. 230,389. **Patented July 27, 1880.**

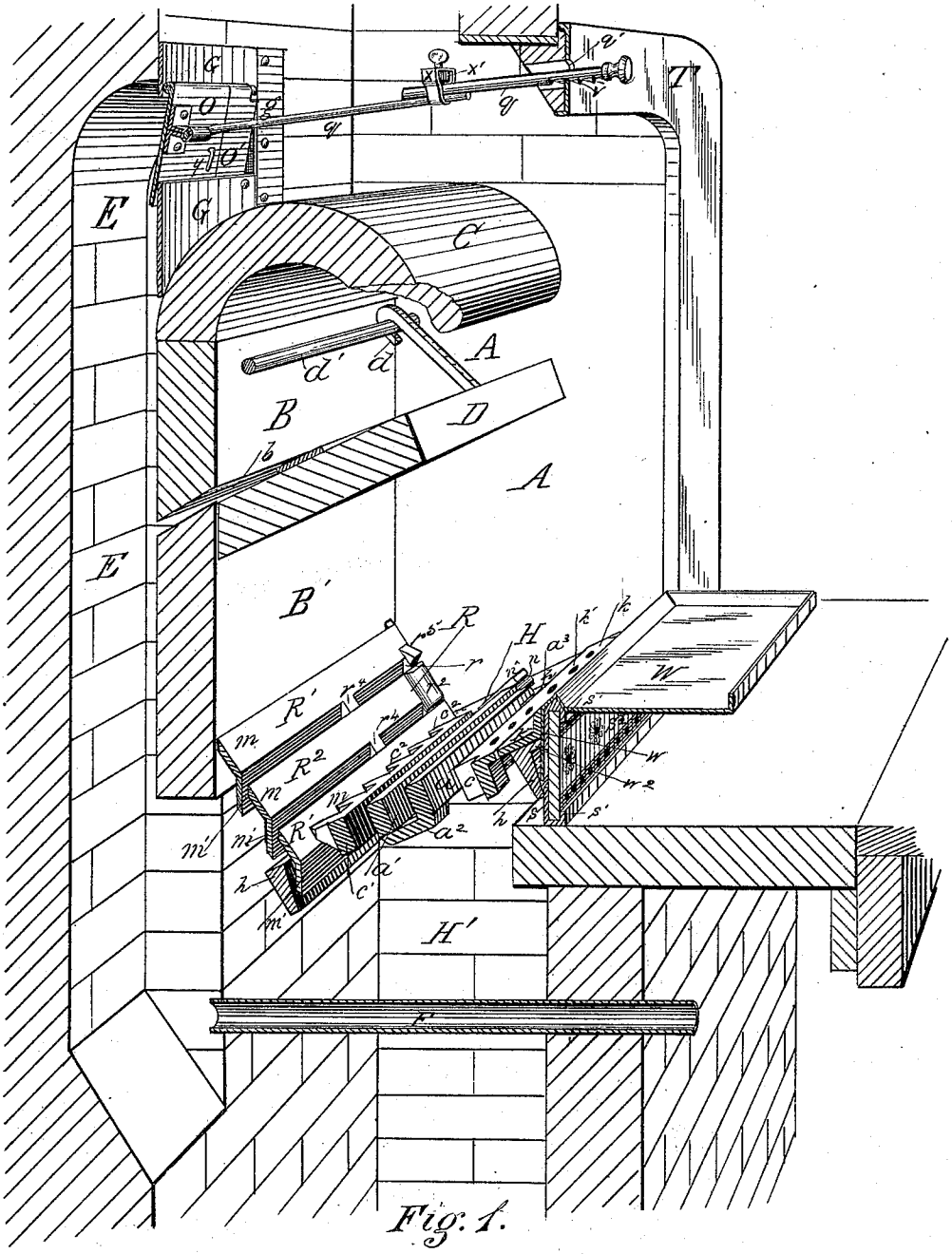


Fig. 1.

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2 Sheets—Sheet 2.

J. ADAIR.
Fire Place.

No. 230,389. **Patented July 27, 1880.**

Fig. 2.

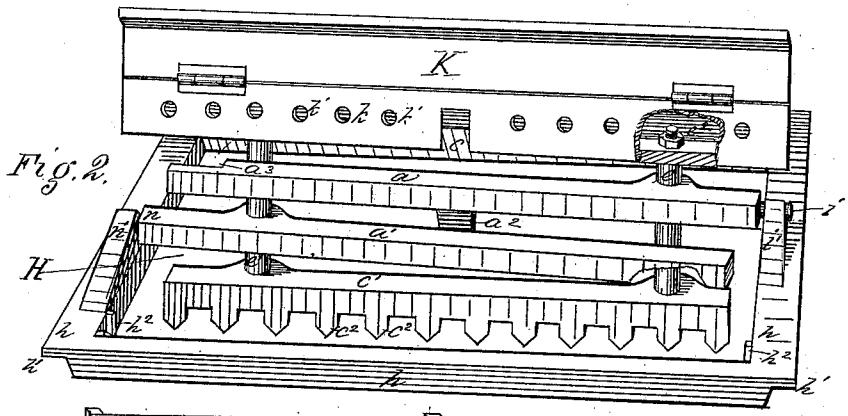
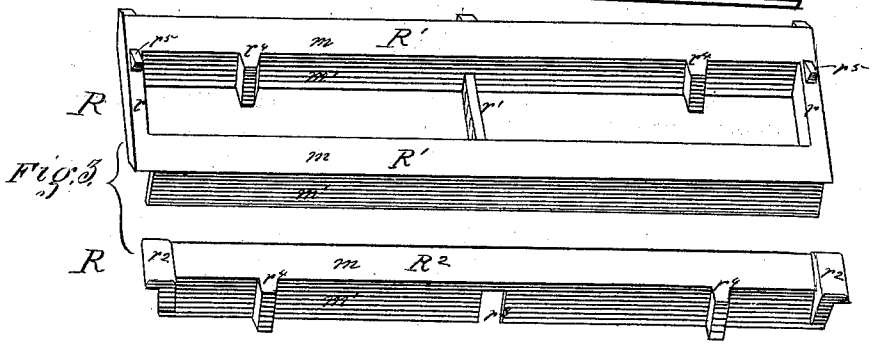


Fig. 3.



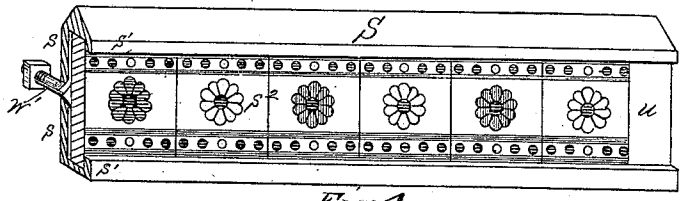


Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES ADAIR, OF ALEPPO TOWNSHIP, (PITTSBURG P. O.,) ALLEGHENY COUNTY, PENNSYLVANIA.

FIRE-PLACE.

SPECIFICATION forming part of Letters Patent No. 230,389, dated July 27, 1880.

Application filed October 22, 1879.

To all whom it may concern:

Be it known that I, JAMES ADAIR, of Aleppo township, (Pittsburg P. O.,) county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Fire-Places; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a vertical sectional perspective view of my improved fire-place. Fig. 2, Sheet 2, is a perspective view, looking from the back, of the front grate and frame, and showing the grate in position for dumping the contents of the fire-basket. Fig. 3 is a perspective view. from the front, of the rear Venetian-shutter grate, and Fig. 4 is an enlarged perspective view of a part of the ash-screen forming a part of my invention.

My present invention relates to fire-places; and it consists in the construction and arrangement of parts, as hereinafter described and claimed, whereby I combine in one fire-place an oven or chamber for coking, drying, or storing the fuel preparatory to burning the same, an improved construction of fire-basket with its attachments for burning such fuel, and an improved device or apparatus for controlling the air-draft and dust through or past the fire.

In the drawings, A represents the side walls of the fire-place, which may be of tile or brick, as preferred.

B′ is the lower, and B the upper, back tile. These latter may, however, be made in one tile, if preferred.

C represents the upper, crown, or roof tile, and D the lower or sub-roof tile.

The tiles B, C, and D, with side walls, A, constitute an oven, or a drying, coking, or storing chamber, within which fine coal, slack, &c., may be prepared for burning in the fire-basket below by the action of slow combustion or outside heat thereon. To this end I arch the tile C upward, as shown, and thereby secure an enlarged dome-shaped oven or chamber for receiving the fuel, the depression of the front edge of the tile serving to retain or delay the heated gases within the chamber, and thereby secure their full effect upon the fuel, while the upper curved surface of C facilitates the ascent or escape of the waste gases of combustion.

Below the tile C and over the fire-basket I arrange the sub-roof tile D, which is, by preference, flat, and has an upward slope toward the front, the front edge being separated from tile C by a space of sufficient area to admit of charging the fuel through it into the oven or chamber. This tile D is suspended by hooks *d*, which are rigidly secured to the upper surface of the tile near either end, and by rod *d′*, which has end bearings in the walls A. The adjustment and relation of these parts are such that D will tend to bear its rear edge against the back tile, B′; but when desired tile D may be swung forward, the hooks *d* turning upon rod *d′*, so as to dump or discharge the contents of the oven above into the fire-basket below.

I provide air in limited quantities for the oven, so as to support slow combustion therein, by making a narrow passage, *b*, through or between tiles B B′, which opens into the air and dust flue E; and, if so desired, additional air flues or passages may be added at any desired points with reference to supplying the necessary oxygen for the coking or other preparation of the fuel in the upper chamber; also, the tile D may be held away from B′ a little way, so as to afford a passage between them, through which the hot gases may pass from the fire below to the oven above. The heat obtained from such hot gases, together with that conducted through tile D, will, in ordinary use, be sufficient to properly prepare the fuel in the oven for burning in the fire-basket below, either by drying such fuel or by coking it, by maintaining slow combustion of the same in the oven.

If it be desired to burn fuel without previous coking or drying, the tile D may be removed by unhooking it from rod *d′*, in which case the arched tile C will form the roof over the fire-basket. By making this sub-roof tile D removable I can at pleasure form a coking or

drying oven above the fire-basket, or dispense with the same.

While I prefer to use the air-passage *b*, as described, still advantageous results may be obtained in the use of my improvement without such passage.

I will now describe the grate, with its attachments, which I employ in my improved fire-basket. This grate is of the class known as "low-down" grates, and is mounted above the cellar ash-pit H′, whence it receives its supply of air. It consists of front and rear parts, H and R. (Shown in Figs. 2 and 3, respectively, by detached views.) The front part, H, is constructed as follows: A rectangular rest-frame, *h*, is secured by means of end flanges, *h′*, or in other convenient way, to the side walls, A, in a plane sloping from the front of the basket downward toward the back B′. If desired, the flanges *h′* may rest in suitable grooves made in the side walls, and be arranged to be slipped into or out of the grooves at pleasure, so as to remove or replace the frame. Lengthwise within and upon this frame are arranged the grate-bars *c c′ a a′*, which are bound together by rods or journals *e e′* and nuts e^2, and they may be spaced at the desired intervals apart by means of intermediate ferrules or sleeves arranged on the journals, or in other convenient way.

The journals *e e′* have, by preference, loose bearings in the bars *c c′*, near the ends of the latter, so as to allow freedom of motion, and also permit the lower bar, *c′*, to be raised a little without necessarily raising the bar *c*, as presently explained.

The intermediate lever-bar, *a*, is pivoted near one end to journal *e*, and its opposite end rests upon journal *e′*, while, on the other hand, the lever-bar *a′* is pivoted near one end to *e′*, and rests upon *e*.

A lug or arm, a^2, extends from bar *a* to the under side of *a′*, and serves to communicate the upward motion of *a* to *a′*, though for this purpose any suitable form of coupling may be employed.

The fulcrum end *i* of lever-bar *a* has a pivotal bearing upon the adjacent part of rest-frame *h*, such pivot resting in an open-sided seat or bearing formed by the lug or projection *i′*. In like manner the lever-bar *a′* has a pivotal bearing at its fulcrum end *n* in an open-sided seat, *n′*. Such open-sided bearings admit of removing and replacing the connected bars at pleasure.

The lower bar, *c′*, is not directly connected with the rest-frame *h*, while the upper bar, *c*, has end bearings thereon, either directly or by means of plate *k*, which is attached to bar *c*.

It will be seen that the combined bars *a a′ c c′* are free to turn within the frame *h* upon their pivots, as illustrated in Fig. 2, so as to dump or discharge the contents of the basket.

It will also be observed that the pivots *i* and *n* are not in a line parallel with the bar *c′*, or the inner side of the rest-frame. Consequently, as the bars are dumped a wider dumping-opening is made at one end of the grate than at the other; or, in other words, the bars, when in position for dumping, assume a position diagonal to the rest-frame.

The advantages resulting from such construction are important—as, for example, a practically large dumping-opening is secured, while at the same time the weight of the connected grate-bars is nearly divided by a line joining *i* and *n*, the plate *k* and other attachments, presently to be described, giving the requisite preponderance of weight on that side to keep the grate in position in the plane of the frame, except when intentionally dumped.

Any convenient instrument, as a poker or tongs, may be used for dumping the grate, and it may be inserted between the bars for this purpose, or notches or sockets may be made in the grate in which to insert the instrument. I also make comb-teeth projections c^2 on the bar *c′*, which enable me to bring the pivots *i n* nearer the front of the grate, and thus obtain a larger dumping-opening.

In order to agitate the bars without dumping I insert a poker under the free end of *a*, which may be notched, as at a^3, for that purpose. Then, by using plate *k* as a poker-fulcrum, the lever-bars *a a′* may be raised on their pivoted fulcrum ends, thus raising the inner ends of journals *e e′*, and through them the bar *c′* is raised bodily through its whole length, all moving simultaneously in the same direction. The poker bearing upon *k* will hold the bar *c* practically stationary, the loose pivots of journals *e e′* allowing the other bars to move as described.

It will be observed that while these bars *a*, *a′*, and *c′* move simultaneously in the same general direction—that is, upward into the fire-basket—yet their several movements differ in such way as to give them a shear motion with relation to each other—that is, the opposite free ends of bars *a* and *a′* rise most, while the bar *c′* is raised bodily, but less than such free ends. The weight of these parts, plus the weight of the suspended load in the fire-basket, is therefore operative over the entire extent of such parts, to cause them to return to their normal position when the poker is released. Also, the shear motion of the movable bars, above described, will more effectually stir or agitate the contents of the fire-basket than could be done without such motion. This I consider a very important improvement in the operation of the bars. As their proper return is made more certain, the possibility is reduced to a minimum of their becoming locked in a raised or partially raised position by pieces of coal or clinkers.

The agitation of the bars is very easy, and the whole arrangement is very simple and efficient. If desired, the grate may be drawn toward the front, in connection with the dumping operation, and a larger dumping-opening be thereby secured.

Instead of notch a^3, any convenient method or means of connecting the poker with the lever-bar a may be employed. Also, the lever-bars $a\,a'$, and their respective journals $e\,e'$, may be rigidly connected or cast solid, if preferred. Also, comb-teeth stubs may be arranged on any or all of the bars, similar to those on c', and the grate may thus be made to cover a larger surface with the same number of members or elements.

Back of the front part, H, of the grate I arrange the stationary rear part, R. (Shown in detached view, Fig. 3.) It is constructed as follows: The upper and lower angular-shaped longitudinal bars, R′, are bound together by end stringers, r, and one or more intermediate cross-braces, r', all of which may be cast in one piece. The space between bars R′ is divided up by one or more similarly-shaped removable or separate bars, R^2, which may be supported on the cross stringers and braces $r\,r'$ by riveting, or by end caps, r^2, and notches r^3, which engage the stringers and braces: and in the latter case they may be held practically stationary and properly separated by lugs r^4 and r^5. This grate is supported by back tile, B′, at its rear, and at its front by resting in V-shaped seats h^2, made in the sloping sides of frame h. It may be supported upon this frame in other ways, however, if preferred. The arrangement of these parts is such, by preference, as to give an obtuse angle between the planes of the faces of grates H and R.

The bars R′ R^2 are made with two plates or faces, m and m', giving them the form of angle-irons in cross-section. The upper plate, m, is in the plane of the face of the grate, and gives such face, in effect, a uniform slope from the back toward the center of the fire-basket. The lower part, m', of the bars is in a vertical plane, or nearly so. These vertical plates strengthen the bars without adding materially to the weight of the grate. In connection with the upper or face plates, m, they give a backward direction to the draft of air which is supplied by pipe F, as presently described, and thus prevent the blowing or puffing of smoke and ashes into the room, which would otherwise occur, by lapping past each other in their arrangement. They form, in effect, a thick shield or plate to arrest heat in that direction, and prevent the base of the chimney from becoming heated, which is a very important consideration; and, also, the recessed form of the bars on their under side gives free passage for ashes, which are passed to the ash-pit below at the extreme back of the fire.

The form and arrangement of the face-plates m prevent loading of ashes thereon, and at the same time afford a practically smooth sloping surface, over or up which the contents of the fire-basket may move as the front grate is agitated.

I have termed this grate R a "Venetian-shutter" grate, on account of its resemblance, in part, to window-shutters of that name. By making the intermediate bars, R^2, in separate parts I avoid difficulties in casting, which would otherwise exist.

To the perforated plate k, at either edge, as preferred, I hinge a flanged fore-plate, K, which rests upon the front bar of rest-frame h, as seen in Fig. 1. By turning this plate upon its hinges coal or ashes which may have collected thereon will be emptied into the fire-basket.

The holes k' in plate k are intended for air-passages and to clear the plate of ashes.

In making the ash-screen or front S, I use a practically continuous metal back, s, having upper and lower channeled or grooved flanges, s', on its edges, which are adapted to receive and hold Minton tile, or equivalent tile, s^2. These tile are passed into place from the ends of screen-plate s, the number used depending upon the width of the fire-place. These tile are made and sold to the trade of standard sizes, and in order to adapt such sizes to grates of different widths, and also as a means of securing the tile in place, I make use of metallic strips or plates u, which are arranged at either end of S, as illustrated at one end of Fig. 4, and also, if desired, at intervals between the tile s^2. These plates u are held in front by channels s', and the spaces between them and plate s are filled with hydraulic cement, iron-filings, or other equivalent filling, which serves to hold plates u and tile s^2 in place. These plates u are made of such width as to supplement the tile and fill or cover the whole length of S, whatever that may be.

The tile s^2 may be ornamented as desired, and a very attractive appearance be thus given to the fire-place.

The continuous back s protects the tile from heat and prevents their being pushed backward into the ash-pit and lost, as frequently happens in the ordinary method of setting such tile. The upper edge of S is given, by preference, a sloping or pitched form, to prevent loading of ashes thereon, and this edge, as well as other exposed metallic surfaces, may be polished or plated, as desired. This screen S is secured in place by bolts w', which pass through the front bar of rest-frame h. Bearing-points to keep the screen in proper place are secured by flange w^2, which projects forward from the front bar of h, (see Fig. 1,) and by this bar itself.

If preferred, rest-lugs may be cast on the front of frame h or back of plate s, or both, which will give the desired rear support to screen S; or such lugs may be made interlocking, and the screen be thus held more securely.

By arranging tile s^2 and plates u as described I secure a smooth even surface on their front face, which is easily cleaned and polished. I also make use of a flanged or dished fender-plate, W, which rests upon the upper or peaked edge of S, while a flange, w, on its inner side, is clamped between S and frame h, and the

fender is thereby held in place. The fender is thus rigidly secured to screen S; or it may be removed, if desired, and the fire-place used without it. The object of its use is to prevent ashes from falling over the front onto the screen and hearth, which it will effectually do provided it extends across the whole width of the screen, as illustrated in Fig. 1. The floor of this fender may be paved with tile or otherwise ornamented, and it may be secured or attached to the upper edge of S, and be supported thereon in other ways, if preferred. By this construction I secure a tight and well-protected ash-screen front, which will effectually prevent ashes from sifting into the room from pit H′, which has been an objection to low-down grates having a cellar-dump or ash-pit as the same have heretofore been made.

In order to regulate the draft or supply of air to the fire, and also prevent dust from coming into the room, I make use of a dust-flue, E, built in or against the back wall of the chimney, and leading from the ash-pit opening below the grate to an opening into the escape-flue above the roof-tile C. A continuous stream of air is supplied through a pipe, F, leading from the outer air, and discharging under the back of the fire-basket at the lower entrance to dust-flue E. The air thus supplied passes either through the grates to the fire-basket, as before described, or up the dust-flue, according as the upper opening of this flue is opened or closed. Such opening and closing are effected by means of an air switch or damper, O O′, of any suitable construction. The one shown is hinged to the upper bar of its frame, and is operated by a rod, *q*, which extends forward through an opening, *q′*, in the grate-front T. Ratchet-teeth or notches *v*, acting against the edge of opening *q′*, will hold the switch or damper wholly or partly open. The particular construction of this switch and the mechanism for operating the same are not claimed herein, but will be included in the subject-matter of a separate application for patent.

I claim herein as my invention—

1. In combination with the fire-basket of a fire-place, a coking or drying oven arranged over such fire-basket and having inclosing end walls, A, arched or equivalent roof-tile C, swinging or pivoted sub-roof tile D, and rear tile, B B′, having a passage through the same for admitting a limited quantity of air to the oven, substantially as set forth.

2. In combination with the fire-basket and coking or drying oven of a fire-place, a tile, D, pivoted by a rigid connection to a center of motion above the tile, on which it is movable to and from the back wall, whereby to open and close direct communication between the oven and basket, substantially as set forth.

3. In a fire-place, and in combination therewith, a detachable tile or plate, D, adapted, substantially as described, to divide the space between the fire-basket and roof-tile, whereby an oven or chamber is formed, at pleasure, above the fire-basket for preparing the fuel to be burned in the basket.

4. In combination with the fire-basket of a fire-place, an agitating-grate, the movable bars of which have a shear motion with relation to each other, produced by means substantially as described, and arranged, substantially as shown, to move through their length simultaneously upward into the basket, substantially as and for the purposes described.

5. In an agitating-grate, the combination of rest-frame *h*, bars *c c′*, connected at either end by journals *e e′* and lever-bars *a a′*, coupled centrally by arms a^2, pivoted at their outer ends to frame *h*, and each connected to the journal *e* or *e′*, adjacent to its pivoted end, substantially as set forth.

6. In a fire-basket, the combination of a supporting-frame and a rectangular grate pivoted to the end bars of the frame, such pivots being located at different distances from the line of the inner edge of the grate, substantially as set forth, whereby the grate is adapted to turn for dumping in a line inclined to such inner edge and give a wider dumping-opening at one end of the grate than at the other.

7. The combination of front grate, H, having rest-frame *h* and agitating grate-bars arranged thereon, as described, and stationary grate R, arranged in rear of and upwardly inclined from grate H, substantially as set forth.

8. In a fire-basket, and in combination therewith, a rear stationary grate arranged with its upper face inclined to the back wall of the basket, and having longitudinal bars R′ R^2, parallel with the back wall, such bars having each two plates or surface-extensions, *m m′*, one of which is arranged in the plane of the face of the grate and the other in a vertical plane, substantially as set forth.

9. In the fire-basket of a fire-place, the Venetian grate R, arranged at the rear and bottom of the basket, adapted to deflect a current of air backward, as described, in combination with air-pipe F, leading from the open air outside the ash-pit, and arranged to discharge air under the rear wall of the basket, substantially as set forth.

10. The grate R, having outside bars, R′, rigidly connected by stringers and braces *r r′*, and separate intermediate bars, R^2, one or more in number, spaced and held in place by lugs r^4 r^5, such parts being arranged and combined substantially as set forth.

11. In a fire-place, and in combination therewith, the ash-screen S, having metallic back *s*, Minton-tile front s^2, and two or more supplemental metallic front plates, *u*, all being arranged and secured substantially as set forth.

12. The combination of ash-screen S, bolts *w′*, and rest-frame *h*, having projection or flange w^2 on its front bar, adapted to form

with such bar a rear rest or support for the screen, substantially as set forth.

13. The combination of ash-screen S, frame *h*, and fender W, the latter being supported on and arranged to cover the whole length of the screen, substantially as set forth.

14. In a fire-place, the combination of rear grate, R, a dust-flue, E, having openings above and below the fire-place, an air-supply pipe, F, leading from the open air outside the ash-pit and arranged to discharge at the lower opening of E, and under the fire-place, and an air-switch adapted to open and close passage through E, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand.

JAMES ADAIR.

Witnesses:
R. H. WHITTLESEY,
C. L. PARKER.