G. R. HISLOP.

DOMESTIC FIRE, RANGE, AND THE LIKE.

APPLICATION FILED FEB. 16, 1909.

1,021,460. Patented Mar. 26, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

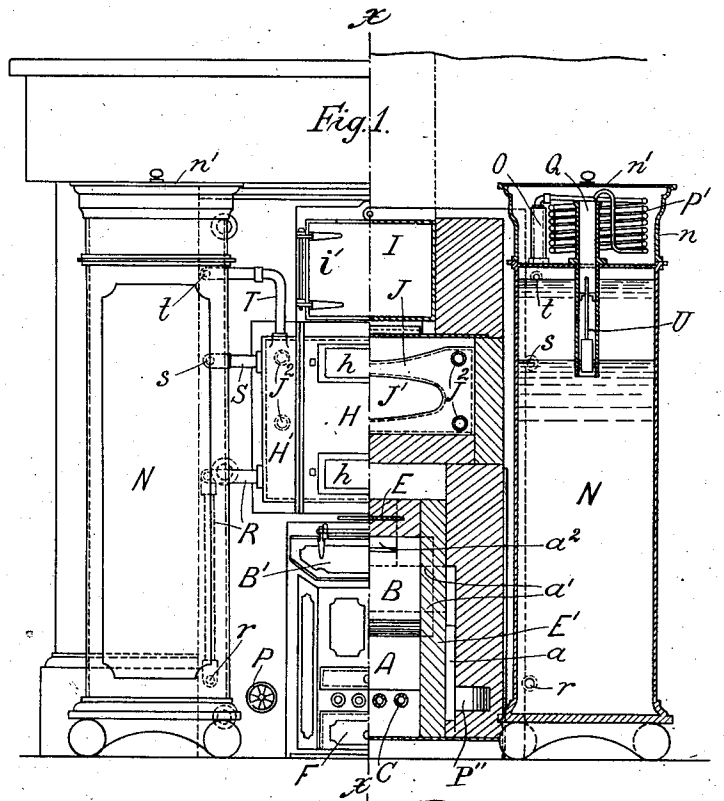
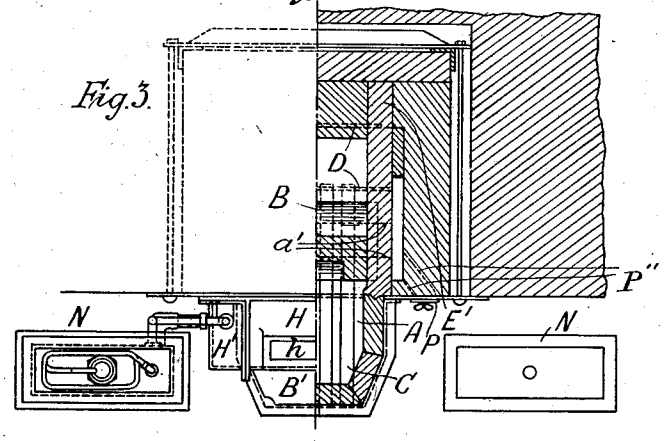


Fig. 3.



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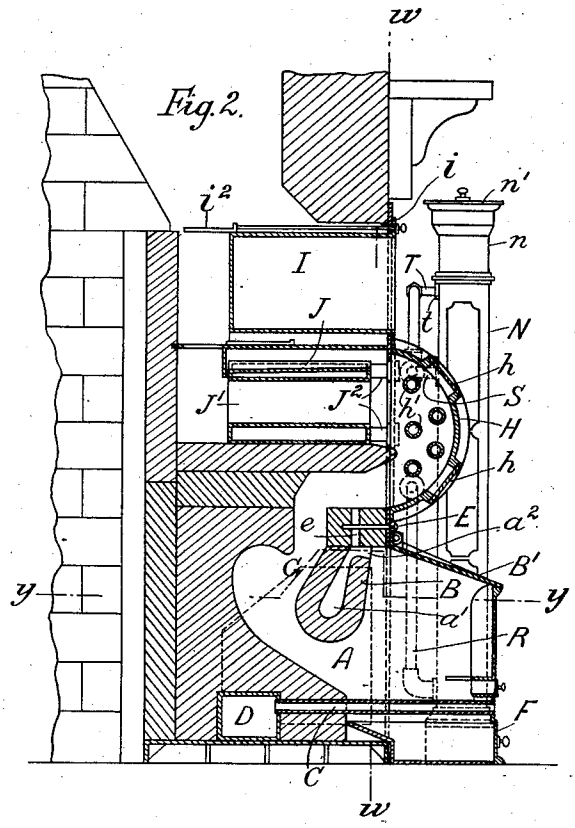
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

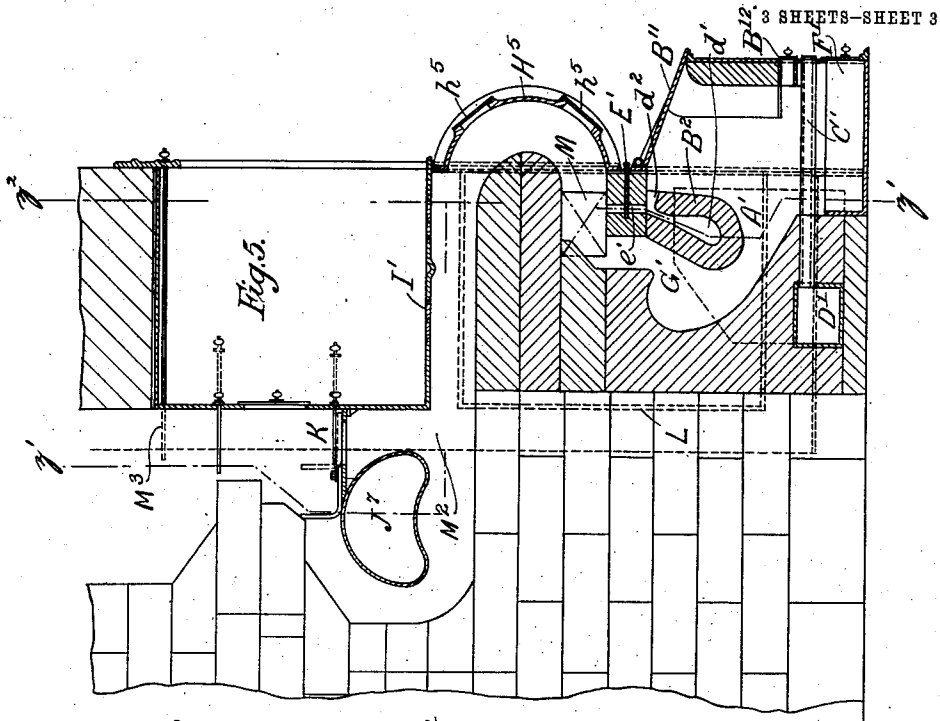

Fig. 5.

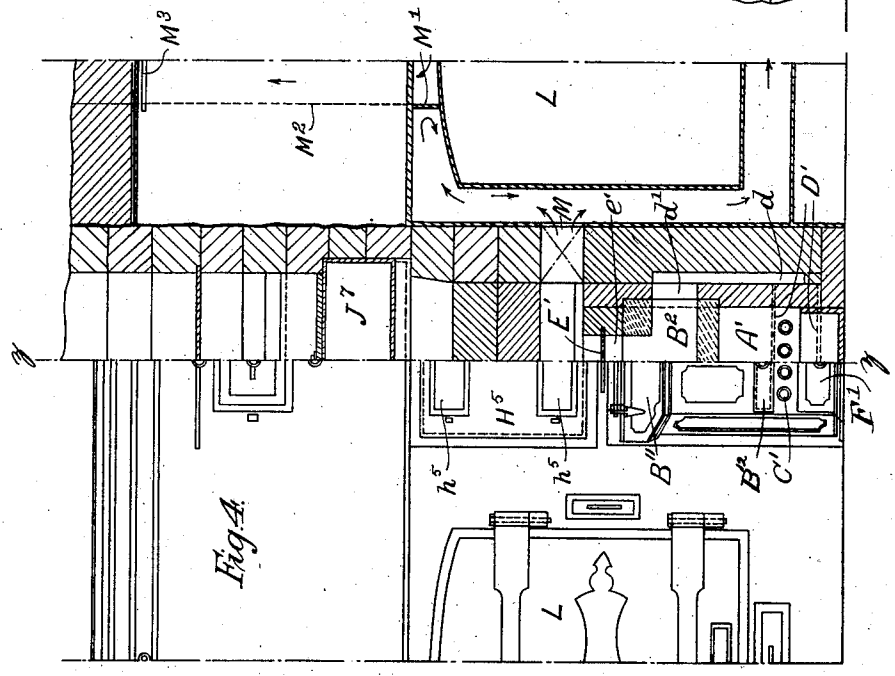

Fig. 4.

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UNITED STATES PATENT OFFICE.

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DOMESTIC FIRE, RANGE, AND THE LIKE.

1,021,460. Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed February 16, 1909. Serial No. 478,164.

To all whom it may concern:

Be it known that I, GEORGE ROBERTSON HISLOP, a subject of the King of the United Kingdom of Great Britain and Ireland, and residing at Paisley, in the county of Renfrew, Scotland, have invented a certain new and useful Improvement in Domestic Fires, Ranges, and the Like, of which the following is a specification.

This invention has for its object to insure improved combustion and reduced consumption of solid and gaseous fuel in room grates, kitchen fires and the like, and more effective utilization of the heat in the products of combustion than is possible under existing methods and conditions, and also to provide for the more economical heating of rooms or apartments.

In the accompanying drawings, Figure 1 is a part elevation, part vertical section, on the line *w—w*, Fig. 2, one of the radiators being also shown in vertical section, and Fig. 2 is a vertical section on the line *x—x*, Fig. 1, of a coal grate embodying the invention; Fig. 3 is a part plan, part horizontal section on the line *y—y*, Fig. 2. Fig. 4 is a part elevation, part vertical section on the line z'—z' and z^2—z', Fig. 5, and Fig. 5 is a vertical section on the line *z—z*, Fig. 4, of another construction.

As shown in Figs. 1 to 3, a fire or fuel chamber A, of cast iron or other suitable material is projected beyond the fire place, being preferably inclosed or provided with doors, and, if desired, of narrower proportions than usual. On the top of the fuel chamber A is provided a hinged or other door B^1, preferably inclined to the front, for the admission of fuel. The said fuel chamber A is lined with tiles of fireclay or other material, and the firebars are formed of iron or other tubes C which pass from the front of the fire chamber into a box D, of metal or clay, but preferably of iron, located adjacent the back of the fire chamber, and open at both ends, through which box the air passes in a heated condition, and whence it rises at *a* up the side walls of the fire chamber behind tiles E^1 and through openings a^1 into a hollow curved bridge or dipping tile B, hereinafter referred to, whence it passes by way of a slot or opening a^2 into the fire chamber to consume the fuel; a damper E is provided and adapted to close an opening *e* through which part of the air and gas may pass, if desired, to join the gases on their way to the chimney.

A supplementary supply of air may be admitted through a perforated disk *p* and a passage P^{11} (Figs. 1 and 3) on each side of the fire chamber: such air being heated, on its passage, for primary or secondary combustion.

At the back of the fire chamber A, I introduce a curved hollow bridge or dipping tile B of fireclay or metal which dips to a suitable distance from the bed of the fire, and the ash-pan F is adapted to prevent air from entering between the tubular bars C. The gases from the fire are caused to descend in order to pass under the said dipping tile B so that the hydrocarbon gases from the fuel will pass through the fuel area during combustion and thus help to minimize the amount of smoke: and when the ash-pan F and door B^1 are closed, fuel is consumed as in a slow combustion stove.

Immediately the flame and hot gases pass the lowest point of the dipping tile B they are made to gyrate in a reverberating chamber G and are thus thoroughly mixed, and, with a view to utilizing the heat hitherto passed into the chimney, the hot products are caused to pass through a semi-cylindrical or like projecting casing H, said casing causing a large amount of heat from the waste gases to be radiated into the room or apartment. Into said casing H are fitted one or more water heating tubes h^1, preferably of copper, and terminating in water boxes H^1 at either end of the casing H. Self-sealing doors *h* are provided for ready access to the flues, and to the tubes for cleaning purposes, and, in order to abstract and utilize the heat in the waste gases further before entering the chimney, a boiler J, preferably of copper, is inserted in the flue adjacent to the chimney and is provided with a flue J^1, through which the waste gases are passed, said boiler being connected at J^2 to the water boxes H^1.

Referring to Figs. 1 to 3, immediately over the boiler chamber and under the fire place lintel, a chamber or recess is formed and into this chamber or recess is fitted a drawer-like casing I with a flange *i* forming a joint against the face of the grate, said casing being readily removed for inspection or chimney cleaning purposes. To said casing I is fitted a suitable door i^1 (Fig. 1)

with a fastening catch. The casing may also be used for containing articles of food to be heated or cooked. The back or inner end of the casing I is formed of thin metal and the waste gases passing it, after leaving the projecting casing H and boiler J, impart to the back of the casing I a further and final portion of their heat before entering the chimney. A suitable damper i^2 (Fig. 2) is introduced for controlling the exit of the waste gases.

The water heating devices described are connected with radiators N, (Figs. 1, 2 and 3) plain or ornamental, of any suitable design and conveniently placed, preferably upon either side of the fire, and in front of the grate or tile or brick facing, as the case may be, through which radiators the water is caused to pass from the heaters by gravitation or, as shown by circulation.

In the circulating system shown in Figs. 1 to 3, pipes R are led from the radiators at r and supply water to the water boxes H^1, connected by the tubes h^1, whence the water flows by way of the lower branch connections J^2 around the water space of the boiler J, through the upper branch connections J^2 and again into the water boxes H^1, from which latter the water flows into the radiators at s by branch pipes S. Branch pipes T are also provided to lead off any steam or vapor that may be generated in the water boxes H^1, said steam or vapor passing into the radiators at t. To allow for evaporation of the water a small vessel n adapted to be partly filled with water is placed just above the crown of the apparatus. A tube O communicates with the top of each radiator N and is connected to a coil P^1 for the purpose of venting any steam that may be generated; the steam being condensed, and condensed water passing through a pipe Q into the body of the radiator.

On removal of the covers n^1, water may be supplied to the radiators through the tube Q, the level of the water being indicated by a float U within said tube. The maximum and minimum water levels within the radiators are indicated at Fig. 1 of the drawings.

Figs. 4 and 5 show the application of the invention to kitchen ranges. The fire chamber, preferably of cast iron and lined with tiles, is attached to, and projects beyond, the front of the range, and is provided with hollow bars or tubes C^1 in the bottom and with feeding and cleaning doors B^{11}, B^{12}, which doors, when closed, will prevent access of air to the fire otherwise than through the hollow fire bars or tubes C^1. The ash pan F^1 is also made a close fit so as to prevent air entering between the fire bars C^1, and when the doors B^{11}, B^{12} and ash-pan F^1 are closed, the fuel is burned or consumed as in a slow combustion stove, the supply of preheated air being passed down through the fuel. At the back of the fire chamber A^1 is introduced the hollow bridge or dipping tile B^2 which dips to within a short distance of the fire bed. The air for combustion enters through the fire bars or tubes C^1, or between the same, when the ash-pan is withdrawn, or it may be admitted above the bars C^1 through the lower or upper doors B^{11}, B^{12}, according to the condition of the fire, and thus bring the air into contact with the incandescent fuel before or while it passes under the bridge or dipping tile B^2, thus largely minimizing the amount of smoke in coal fires.

As shown in Figs. 4 and 5, the fire chamber projects beyond the face of the grate or range and the door B^{11} on the top of said chamber is preferably inclined. The fire bars may be formed of tubes C^1 through which the air for combustion is made to pass into an air box D^1 or chamber at the back from which it passes at d up the sides of the fire chamber A^1 and through openings d^1 into the bridge or dipping tile B^2 and thence to the crown of the fire by a slot or opening d^2; a damper E^1 is provided and adapted to close an opening e^1 through which part of the air and gas may pass, if desired, to join the gases on their way to the chimney.

Immediately the flame and hot gases pass the lower edge of the bridge or dipping tile B^2 they are caused to gyrate in a reverberating chamber G^1. With a view to utilizing the heat hitherto passed into the chimney, the hot products of combustion are caused to pass through a preferably semi-cylindrical casing H^5 of metal or clay or composite or other material, which casing H^5 causes a portion of the heat arising from the hot gases passing through the casing to be radiated into the apartment. Self-sealing doors h^5 are provided in the casing for ready access to the flues and tubes for cleaning purposes. Immediately the hot gases leave the said casing H^5 they pass under the usual hot cover plate I^1 with movable disks covering openings in which vessels may be inserted to receive the heat direct from the hot gases below, and the gases pass thence to and around the usual boiler J^7 for heating water for household purposes; by means of a damper K the gases may be made to partially escape the boiler when desired. When it is desired to heat cooking ovens L connected with the fire grate, the gases from the fire are passed through suitable ports M, thence around the ovens, each of which ovens is provided with a baffle plate at one side only, as at M^1, said gases passing finally to corresponding outlets M^2 leading to the chimney, each of said outlets M^2 being controlled by a damper M^3. The path of travel of the gases is indicated by arrows in Fig. 4.

Having now described my invention what I claim and desire to secure by Letters Patent of the United States is:—

The combination with the fire-place of a chimney, of a fire chamber having side walls provided with passages and including a reverberating chamber at the rear thereof, a curved hollow bridge in said chamber, said bridge being disposed in front of said reverberating chamber and provided with an outlet and means for admitting air to said bridge, said means including an air supply box located adjacent the back of said fire chamber and devices for supplying air to said box, said box being adapted to communicate with said bridge by means of said passages in the side walls of said fire chamber, substantially as described.

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

GEORGE ROBERTSON HISLOP.

Witnesses:

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JOHN MCCLEARY, Jr.