

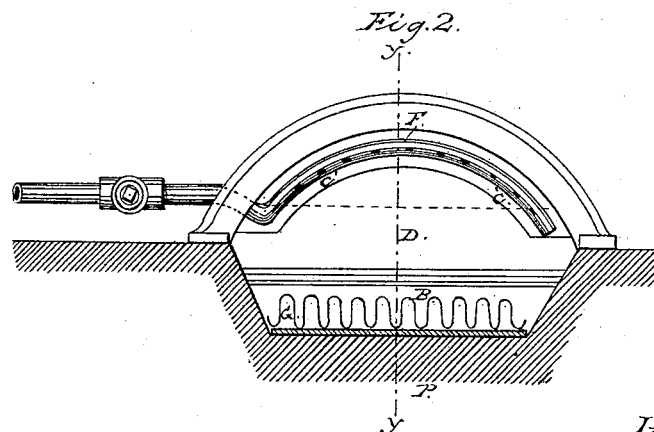
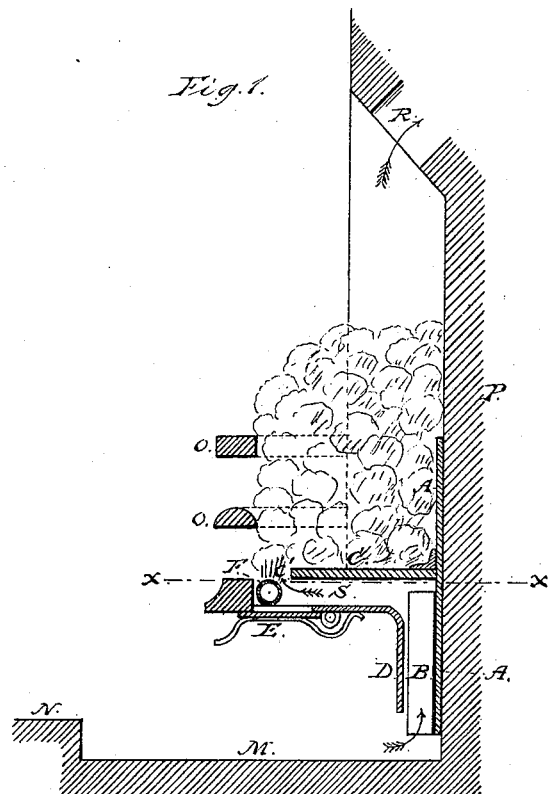
(No Model.)

4 Sheets—Sheet 1.

C. W. SIEMENS.
DOMESTIC GRATE OR FIRE PLACE.

No. 266,213.

Patented Oct. 17, 1882.



Attest,
F. W. Howard
C. H. Downes.

Inventor,
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att'y

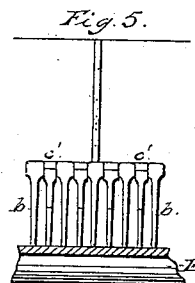
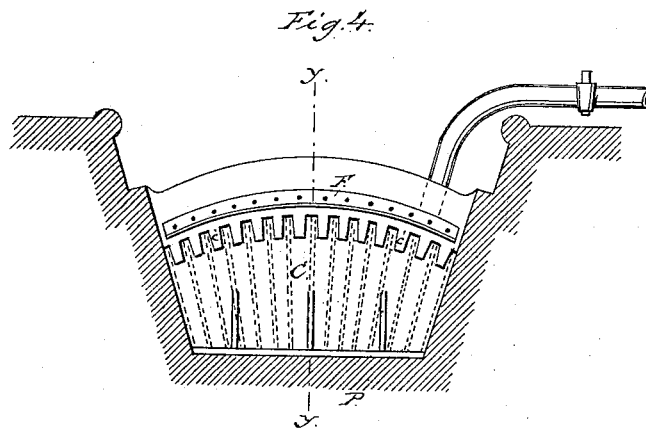
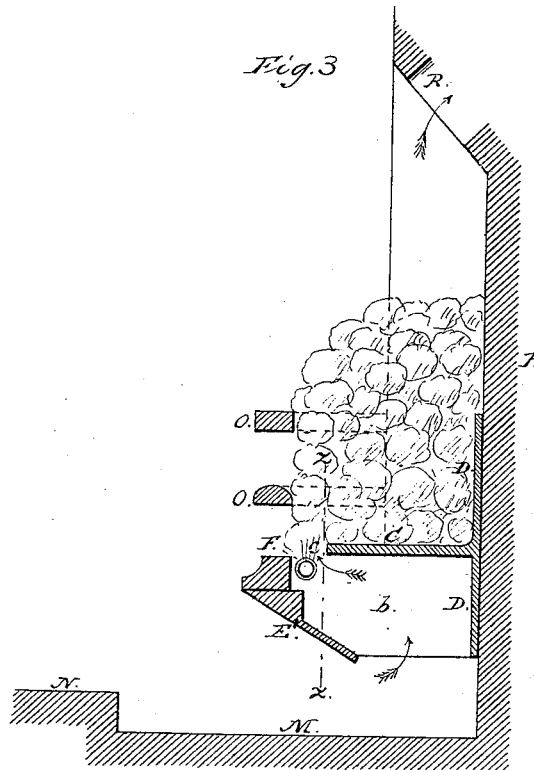
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(No Model.)

4 Sheets—Sheet 3.

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Fig. 6.

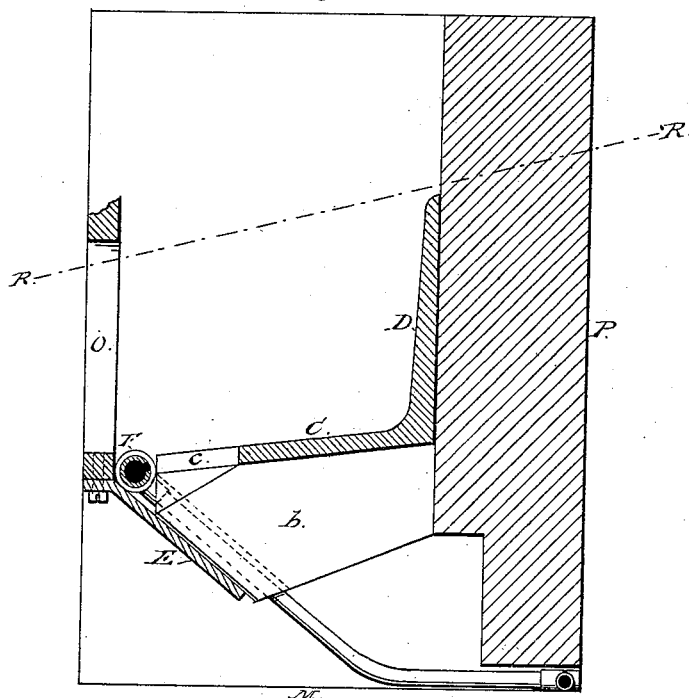


Fig. 7.

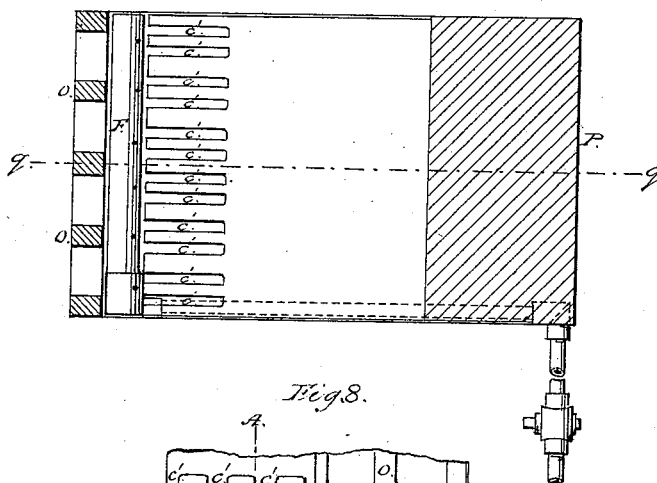
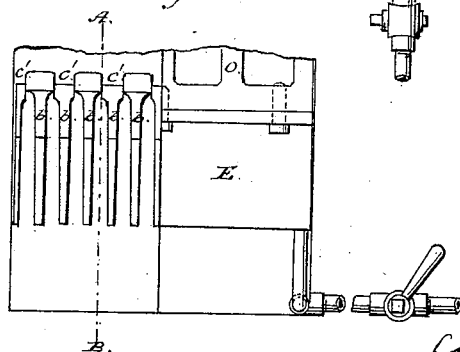


Fig. 8.



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C. W. SIEMENS.
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Fig. 9.

Patented Oct. 17, 1882.

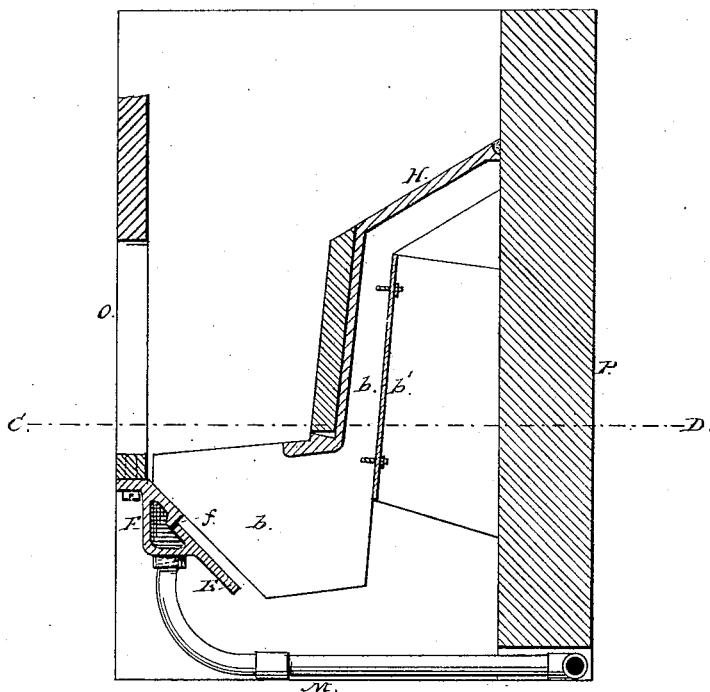


Fig. 10.

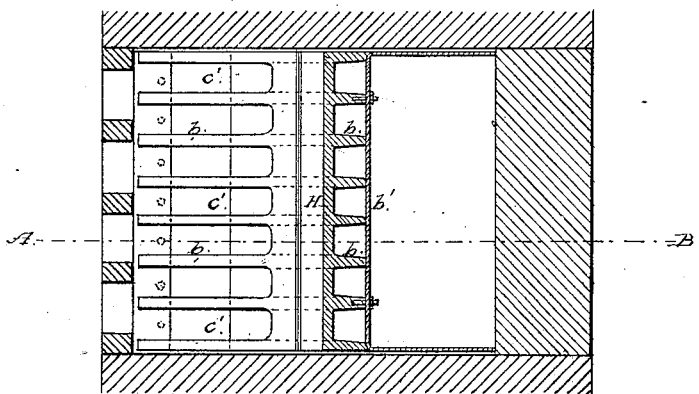
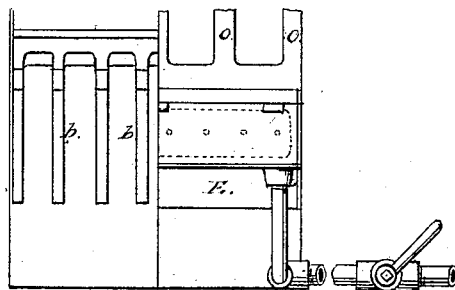


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES WILLIAM SIEMENS, OF WESTMINSTER, COUNTY OF MIDDLESEX,
ENGLAND.

DOMESTIC GRATE OR FIRE-PLACE.

SPECIFICATION forming part of Letters Patent No. 266,213, dated October 17, 1882.

Application filed April 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WILLIAM SIEMENS, of Westminster, in the county of Middlesex, England, have made a new and useful
5 Improvement in the Construction of Domestic Grates or Fire-Places; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of
10 the specification herein.

My invention consists in the application of regenerators to domestic grates or fire-places, whereby heat from the back and bottom of such grates or fire-places is communicated to
15 air supporting the combustion at the front.

It also consists in combining with the grate a perforated pipe or channel, whereby a gas-flame is caused to impinge upon the substance placed in the front of the grate, whereby if
20 fuel be used it is lighted and maintained incandescent without the use of wood or other kindling materials; and it finally consists in substituting for the fire-grate below a solid plate having an opening or openings at the
25 front, or a hollow casting having air-channels at the rear, communicating with the opening at the front, so as to exclude all communication with the atmosphere except through such openings and the front bars.

In the accompanying drawings, Figures 1 to 11, corresponding parts are designated by similar letters.

Fig. 1 represents a vertical section on line *yy*, Fig. 2, which is a horizontal section on line *xx*,
35 Fig. 1, of a fire-place having my improvements applied thereto. The slab and hearth at M, coping N, throat R, back P, and front grate-bars, O, may be of any size or form which may be deemed most advantageous. Instead of the
40 under grate-bars in general use, an iron dead-plate, C, is riveted to a stout copper plate, A, which copper plate faces the back of the fire-grate and extends both upward and downward from the point of junction. The dead-plate C
45 stops short at some distance behind the bottom bar of the grate-front to leave room for an airway and a gas-pipe, F, which is perforated with holes placed at equal distances

apart along the inner side of its upper surface at an angle from the vertical. Under this pipe
50 a lower plate, D, is fixed, bent downward toward the back, so as to provide a vertical and horizontal channel between the two plates A and C. A trap-door, E, held by a spring or other means, is provided for the discharge of
55 ashes falling into the horizontal channel. The vertical channel is occupied by a strip of sheet-copper, B, bent in and out in such a manner as to present as large a conductive area as possible, and riveted to the lower part of the cop-
60 per back piece, A. Copper being an excellent conductor of heat, the said strip of sheet-copper or regenerative plate B transfers the heat from the back of the grate to the vertical chan-
65 nels G. An air-current is set up by this heat, which, after passing up the vertical channels G and along the horizontal channel S, as shown by the arrows, impinges on the fuel in the front of the grate, greatly increasing the combustion at that point. The abstraction of heat from
70 the back of the fire and its transfer to the front present the advantage of retarding the combustion of the fuel at the back, while promoting it in front of the grate where it is required.

Fig. 3 is a vertical section on line *yy*, Fig. 4, which is a plan of an empty domestic grate,
75 and Fig. 5 is a transverse section on line *zz*, Fig. 3, of a modified construction of my invention, which is more economical as regards first cost than that hereinbefore described. The
80 slab and hearth at M, coping N, back P, and front grate-bars, O, may be of substantially the same construction as that hereinbefore described with reference to Figs. 1 and 2, or such as are used in other fire-places now in use. The
85 improvements in this case are, first, the gas-pipe F, having a row of holes along the upper side inclining inward, each hole facing an indentation in the plate C; and, second, an angular plate, C D, of cast copper or iron, forming the bottom and back plates, with a series
90 of projecting ribs, *b*, extending from front to back on its under side, which serve the purpose of regenerative surfaces—that is to say, they transfer the heat from the back of the
95 grate to the air-channels below it, and thus en-

gender air-currents which impinge in front of the grate, being conducted thereto through the indentations above referred to, and greatly assist the combustion of the fuel at that point.

5 If iron be used, instead of copper, to form a regenerative chamber or channels, it is necessary to increase the thickness of the plates and ribs in the inverse ratio of the conductivity of the two metals. In order to reduce the thickness
10 of the regenerative plates or ribs *b*, they may be allowed to extend in a horizontal rather than a vertical direction. An inclined plate, *E'*, fastened to the lower grate-bar, directs the incoming air upon the heating-surfaces, and
15 provides at the same time a support for the angular and ribbed plate *C D*, which is simply dropped into its firm position between it and the back of the grate. The front edge of the horizontal part of the angular plate *C D* has
20 indentations or vandyked openings *e'*, forming a narrow grating, through which the hot air reaches the fuel, and the ashes produced by combustion in the front part of the grate discharge themselves down the incline toward the
25 back of the hearth, where an open ash-pan may be placed for their reception.

Fig. 6 is a vertical section on line *Q Q* of Fig. 7, which is a horizontal section on line *R R* of Fig. 6, and Fig. 8 is a half front elevation of
30 the lower part and a half front elevation of the regenerator-plates, of a domestic grate, such as a kitchener or stove. The hearth *M*, back *P*, and front grate-bars, *O*, may be of any usual form. The construction of this grate is substantially the same as that described with reference to Figs. 3, 4, and 5, which apply to it,
35 with these variations, that each alternate rib *b* is cut off below the gas-pipe *F*, so that a hot-air channel is provided on each side of every
40 gas-jet, and the angular bottom back plate, *C D*, is not in this case extended downward, the ribs *b* being of sufficient thickness for conducting the heat to be communicated to the incoming air.

45 Fig. 9 is a vertical section on line *A B* of Fig. 10, which is a horizontal section on line *C D* of Fig. 9, and Fig. 11 is a half front elevation of the lower part and a half front elevation of the bed and regenerator plates, of another
50 kitchener or stove. The construction of this grate is similar to that described with reference to Figs. 6, 7, and 8; but instead of the angular plate *C D* a hollow casting, *H*, is provided, having ribs *b* at the rear, which are extended forward at the bottom to form the narrow grating required for the slow combustion
55 of the fuel. The whole or the lower part only of the hollow casting *H* may be faced with refractory material—such as fire-bricks—and the
60 ribs *b* may project to the back wall; but I prefer to stop them about midway, and to cover them partially with another plate, *b'*, as shown, whereby the channels for heating the air destined to support combustion at the front of
65 the grate are considerably extended, and a more active circulation and thorough heating

of the air-currents will result. Instead of the perforated gas-pipe shown in the previously-described figures, a gas-channel, *F*, is substituted, through which holes are made just below a projection or lip, *f*, intended to protect
70 these holes from falling ashes.

In using the grate with fuel it should be well filled, preferably with pieces of the size of apples. The gas is then turned on full and lighted.
75 In the course of an hour the gas may be turned down to one-half or less, and the fire may be left without further attention, except when it is intended to improve its appearance, when a touch with a small poker near the bottom grate-bar to clear away ashes and an increased admission of gas will be desirable. In the course of five or six hours the fuel will have been consumed to some extent in front of the fire-place and must be replenished. The
80 grate should be completely cleaned out from time to time to prevent accumulation of ashes toward the back, where a dead-plate on which part of the fuel rests is employed. In this way a cheerful fire can be kindled at any time
85 by opening the gas-tap and putting a lighted match to the grate. The gas-flames, acting only in front of the grate, soon cause the surface of the fuel to glow without depriving the beholder of the cheerful appearance of the
90 flame. In the course of half an hour the surface of the heap of fuel will be fairly red-hot, throwing out its full heat; and if anthracite or other non-bituminous coal, coke, or charcoal be used not a particle of flame or smoke will
95 reach the chimney. The reducing-flame of the gas prevents the rapid consumption of fuel in front, and the absence of air its consumption toward the back of the fire. When fairly ignited the gas may be turned off, because the
100 fuel, once well heated, will continue to glow by slow combustion at the front of the grate, with the hot air coming from the regenerator. This construction of regenerative grate is also applicable to gas-stoves which are filled with
105 non-combustible substances—such as asbestos—and in which gas alone is the fuel used. In this case, however, gas will have to be kept burning as long as the fire is required, and it is preferable to supply the pipe *F* with a mixture of gas and air instead of pure gas.
110

115 Either form of grate may be used for fuel or for a gas-fire; or a grate combining parts taken from one and parts taken from another drawing may be adopted, and instead of town gas, as supplied for gas-lights, a gas composed of carbonic oxide, hydrocarbons, and nitrogen—such as is formed by the decomposition of fuel in a gas-producer—may be used; but for gas-fires with asbestos lumps I prefer to employ
120 the form of grate described with reference to Figs. 9, 10, and 11.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

130 1. The combination, in a domestic fire-place, of a back and bottom entirely closed to pre-

vent the admission of air, whereby the rapid combustion of fuel is prevented at the bottom and back of the grate, and a perforated gas-supply pipe.

5 2. The combination of the back and bottom of the grate with a perforated gas-supply pipe or channel in front of the close bottom of the grate and behind the bottom bar of the grate, as and for the purposes described.

10 3. In a domestic grate, the combination of a metallic plate, upon which the fuel or non-combustible material rests or partly rests, and a gas-supply pipe arranged between the metallic plate and front bars of the grate, as and
15 for the purposes described.

4. In a domestic grate, a conducting plate or plates, constructed as described, and adjacent air-conduit, whereby the heat from the back of the ash-pit is extracted and imparted to air flowing in to support combustion.

In witness whereof I have affixed my signature hereto, in the presence of two witnesses, this 17th day of March, 1882.

CHARLES WILLIAM SIEMENS.

Witnesses:

CHAS. ROCHE,

GEO. WOOLLETT,

*Both of 2 Waterloo Place, Pall Mall, London,
Notary's Clerks.*