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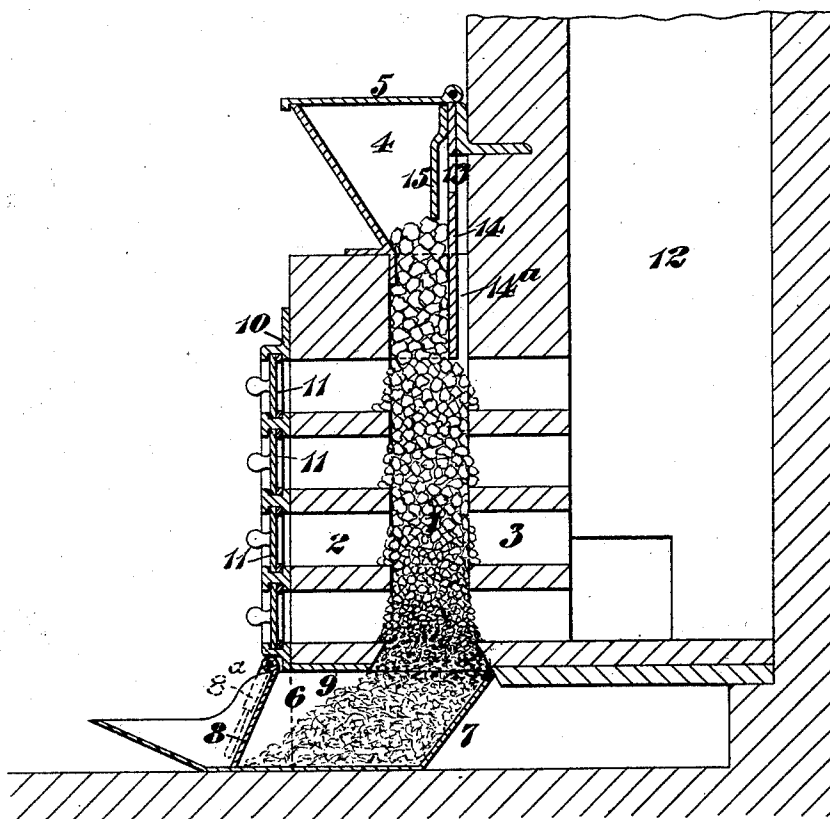
7 Sheets—Sheet 1.

H. C. PLATTS.
FURNACE.

No. 483,863.

Patented Oct. 4, 1892.

Fig. 1.



Witnesses
W. Cross.
H. W. Wm. Ham

Inventor.
Hervyhus Platts

H. C. PLATTS.
FURNACE.

No. 483,863.

Patented Oct. 4, 1892.

Fig. 2.

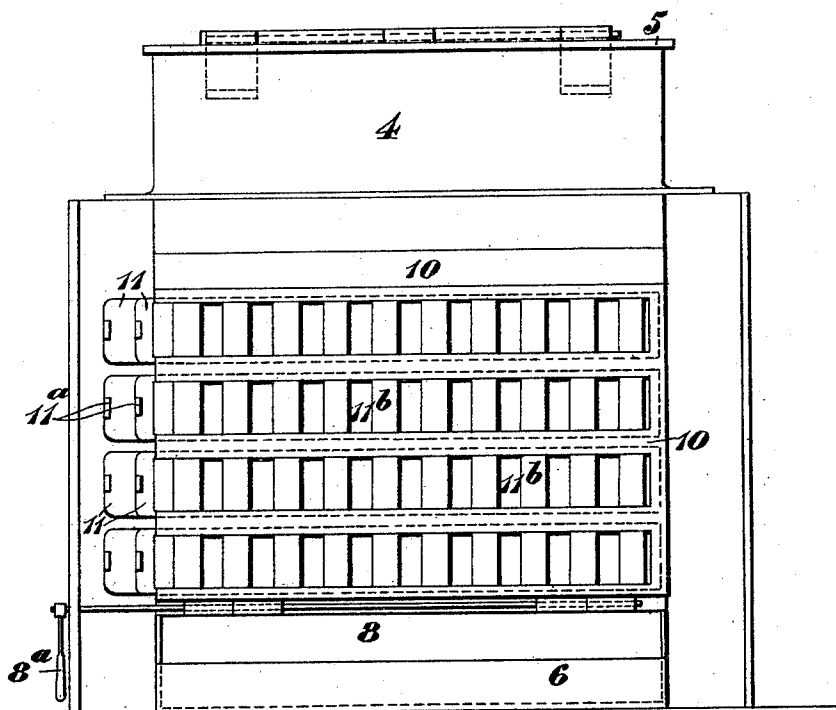
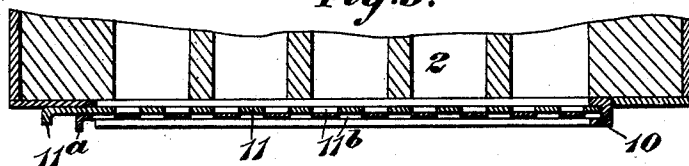


Fig. 3.



Witnesses
W. Cross.
Wm. H. Hain

Inventor
Hewyphas Platts

(No Model.)

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Fig. 4.

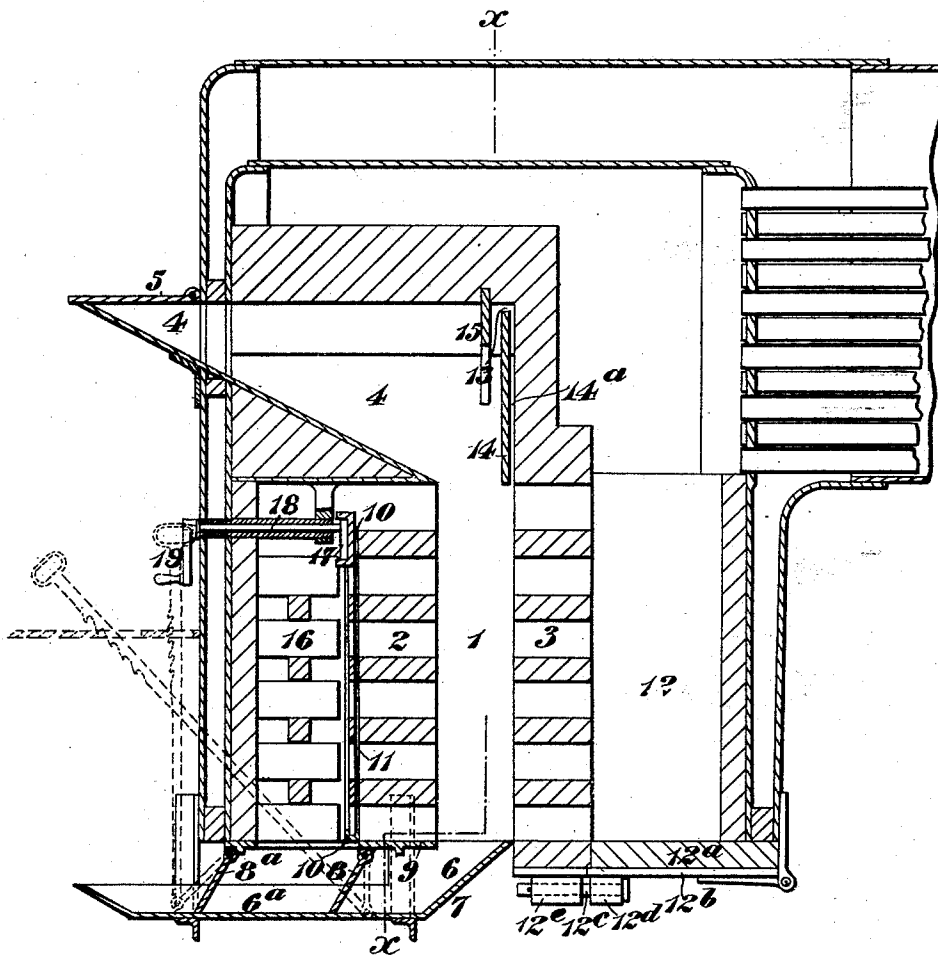


Fig. 4a.

Witnesses
W. Cross
Wm. H. H. H.

Inventor.
Henry H. Platts

(No Model.)

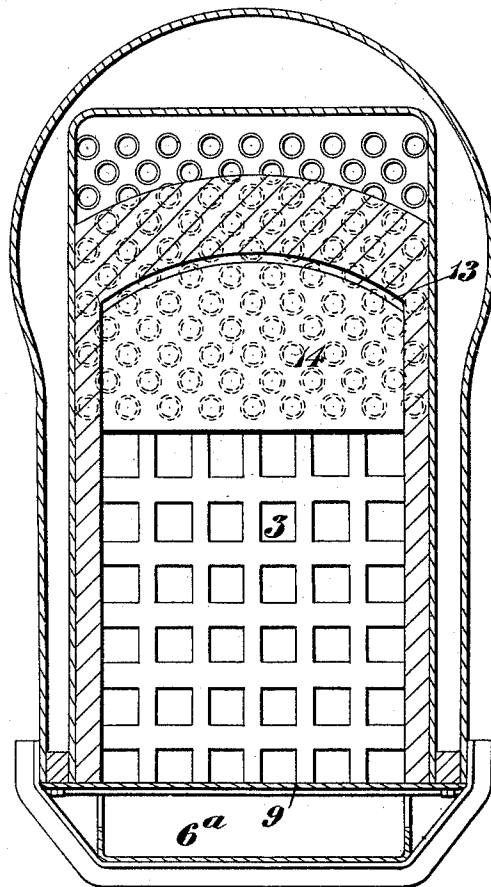
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Fig. 5.



Witnesses
W. Cross.
Wm. H. Cross

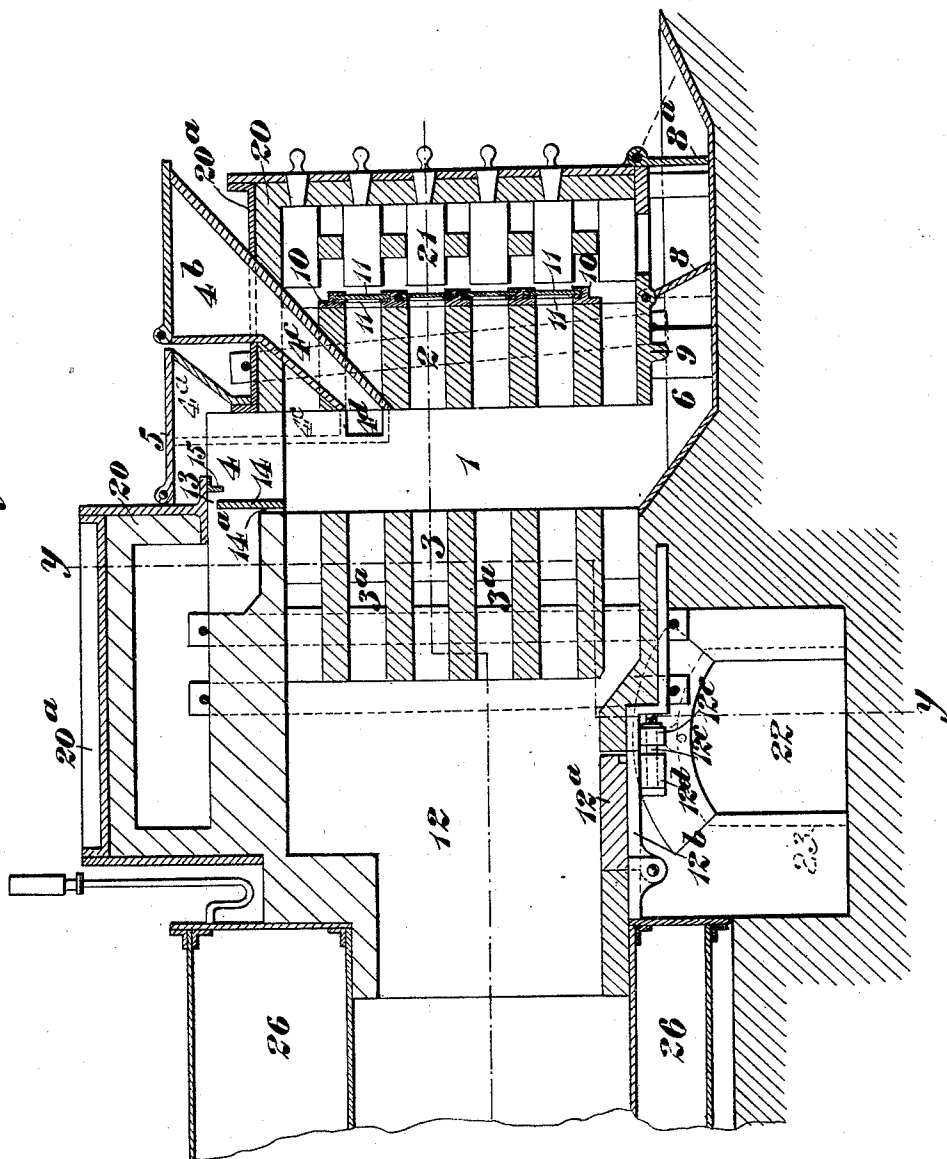
Inventor.
Henry Platts

H. C. PLATTS.
FURNACE.

No. 483,863.

Patented Oct. 4, 1892.

Fig. 6.



Witnesses
W. Cross
M. H. Hagan

Inventor
H. C. Platts

(No Model.)

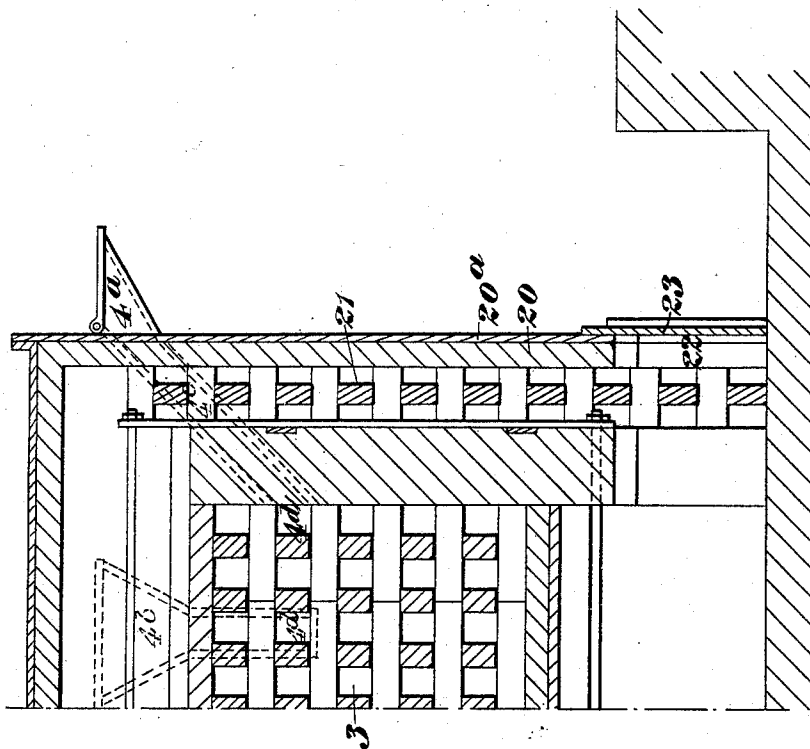
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Patented Oct. 4, 1892.

Fig. 7.



Witnesses
W. Cross
J. M. H. H.

Inventor
Henry H. Platts

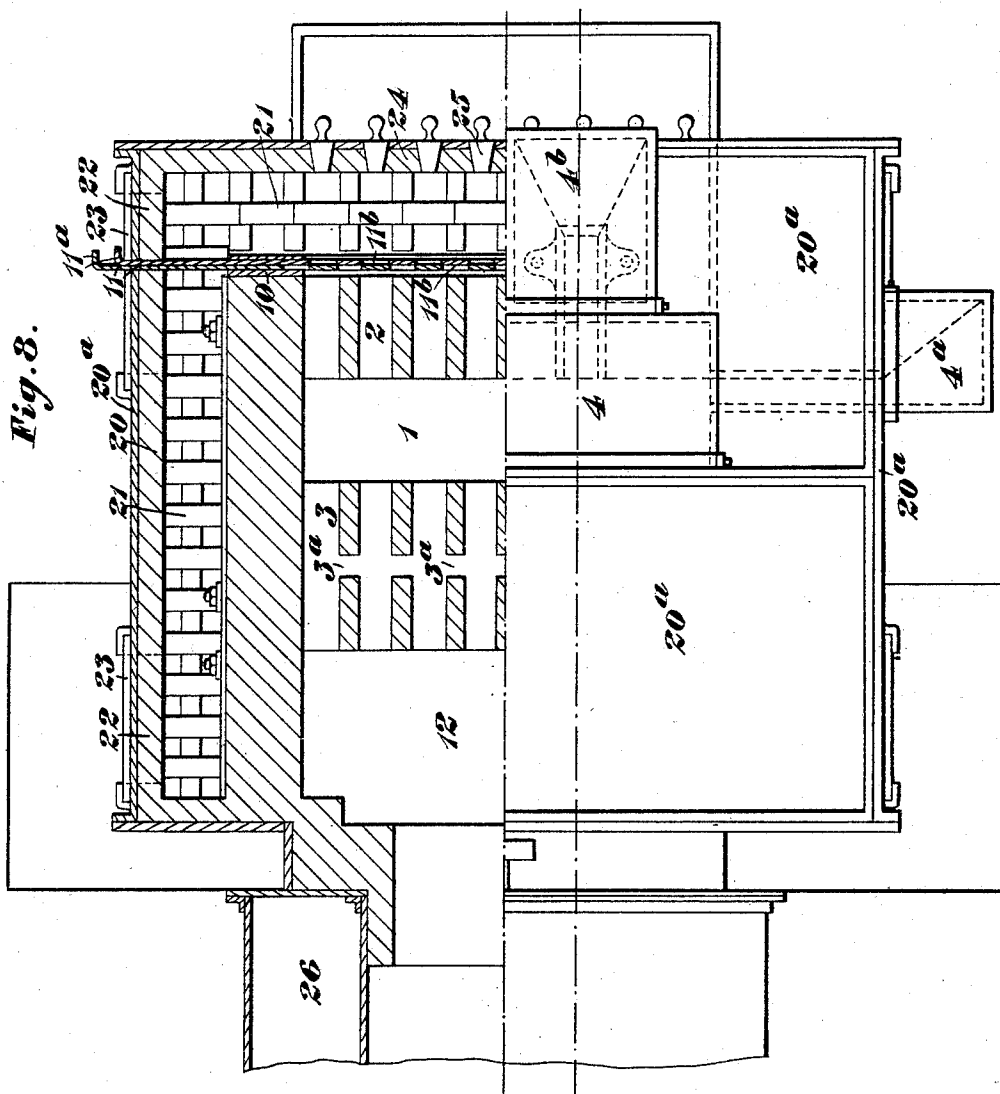
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H. C. PLATTS.
FURNACE.

No. 483,863.

Patented Oct. 4, 1892.



Witnesses

W. Cross.
H. S. S. S. S.

Inventor

Henry C. Platts

UNITED STATES PATENT OFFICE.

HENRY CHAS. PLATTS, OF LONDON, ENGLAND.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 483,863, dated October 4, 1892.

Application filed October 16, 1891. Serial No. 408,919. (No model.) Patented in France October 6, 1891, No. 216,572, and in Belgium October 16, 1891, No. 96,686.

To all whom it may concern:

Be it known that I, HENRY CHARLES PLATTS, a subject of the Queen of Great Britain and Ireland, residing at Notting Hill, in the city of London, England, have invented Improvements in Furnaces, (for which patents have been granted in France, dated October 6, 1891, No. 216,572, and in Belgium, dated October 16, 1891, No. 96,686,) of which the following is a specification.

This invention has reference to improvements in fire-grates or furnaces for the combustion of solid fuel for steam-generating, metallurgical, domestic, and other purposes, and has for its objects to enable the feeding and combustion of the fuel and the admission of atmospheric air necessary for combustion to take place in a convenient, economical, and advantageous manner, one of my principal objects being to insure that only sufficient air to support combustion efficiently shall be allowed to enter the furnace, thus overcoming a serious drawback to which furnaces as heretofore constructed have been liable. For this purpose the fire-grate, or that part of the furnace in which the solid fuel is held while being burned, is constructed with outer and inner perforated or grid-like walls arranged vertically or at such an inclination that fuel fed to the space between them from a hopper or hoppers at the top and sides will readily descend by the action of gravity. The perforated outer wall may be of refractory brickwork or of metal, and through it atmospheric air or other supporter or combustion is admitted to the fuel. This wall may be built into or otherwise secured to the sides of the apparatus and be carried by a metal plate or support, beneath which is an opening, through which clinker-slag and ash may be withdrawn from the lower part of the fire-grate, and which opening is normally closed by a lid worked by a suitable handle. The outer wall is provided with one or preferably with a series of external adjustable air-regulators, each consisting of a grating or perforated screen working in suitable guides for the purpose of regulating the admission of air to any part of the fuel contained between the two walls, and thus controlling the combustion of the fuel to suit requirement. The

perforated inner wall is constructed of refractory material, such as fire-bricks, and through it the products of combustion and distillation pass into a combustion-chamber, whence they pass to the object to be heated or operated upon and eventually to a chimney or uptake. Part of the combustion-chamber may be carried by a hinged plate or be otherwise so constructed as to admit of ready access to the interior of the combustion-chamber.

At or near the top of the fire-grate is an air-passage, through which air can flow, when necessary, to the fuel near the top of the outer and inner perforated walls and be mixed with the gases in process of distillation for the purpose of effecting their complete combustion. This air-passage may conveniently be formed by arranging a metal plate opposite a non-perforated portion of the top of the inner wall, the inlet to the air-passage thus formed being guarded by a baffle-plate to prevent entrance of fuel thereto. At the lower end of the fire-grate is a water-trough that serves to cool the slag and ash formed during combustion, to form steam to assist the process of combustion, and to cool the metal plate or support carrying the outer wall.

A fireplace or furnace constructed as described may be placed in any convenient position relatively to the steam generator or generators or other apparatus to be heated, suitable ducts of refractory material being provided to conduct the flame and heat to the desired place. It may also be placed either wholly or partially within a steam-generator or other apparatus or entirely outside of the same.

In the case of steam-generators of the locomotive or portable engine type the improved fireplace or furnace may be placed either wholly or partially within the fire-box thereof.

In some cases part or all of the fireplace or furnace is surrounded by a casing of refractory material provided with fire-brick or checker-work that will absorb the waste heat radiated from the apparatus when the same is in use and act as an air-regenerator for heating the atmospheric air required for the combustion of the fuel. This air after passing through the regenerator thus formed

passes partly through the outer wall and partly through the air-passage at the top of the fire-grate to the fuel. Means—such as air-regulating dampers—are provided for regulating the admission of air to the casing.

The regenerator-casing may be formed with a series of peep-holes, through which the process of combustion may be observed and the fuel stirred from time to time, if necessary.

In the case of steam-generators of the locomotive or portable engine type, where the fire-grate or furnace is placed inside the fire-box, as also in the case of domestic fireplaces, the air-regenerator is dispensed with, as the radiation is in itself a means of heating the steam-generator in the first case and the apartment in the second case.

In the accompanying drawings, Figure 1 is a vertical section through a fire-grate or furnace according to this invention. Fig. 2 is a front elevation of the same, and Fig. 3 is a horizontal section through one row of air-inlets. Fig. 4^a is a detailed view of the cam to slide the regulator. Fig. 4 is a vertical longitudinal section through a furnace according to this invention applied to a steam-generator of the locomotive type. Fig. 5 is a cross-section on the line *xx* of Fig. 4. Fig. 6 is a vertical longitudinal section through a furnace according to this invention applied to a steam-generator of the Cornish type and provided with an air-regenerator casing. Fig. 7 is a half-section on the line *yy* of Fig. 6, and Fig. 8 shows one half of the furnace in horizontal section and the other half in plan.

In Figs. 1 to 3 the fuel 1 is confined between an outer perforated wall 2 and an inner wall 3 of the same description. The fuel is fed through a hopper 4, furnished with a lid 5, while it descends toward an ash-pit 6, having an inclined back 7, which throws the ashes and clinkers toward the door 8, through which they are from time to time removed. This ash-pit may contain water for the purpose hereinbefore mentioned. 8^a is a handle for operating the door 8. The outer wall 2 is carried on a metal plate 9 and is furnished on its face with a frame 10, in which there slide perforated plates 11, which serve as air-regulators. These plates are arranged in pairs, one for each of the horizontal rows of air-holes in the outer wall 2. The plates are provided with handles 11^a, by which they can be so arranged relatively to one another as to vary the sizes of the air-admission holes 11^b or to completely close these holes, if necessary, as shown in Fig. 3. By means of these regulators the combustion at various parts of the fireplace can be independently and effectually controlled to suit varying requirements. Air passing through the holes 11^b and outer wall passes into and through the fuel, supporting its combustion and its conversion into gas. The gas passes through the perforations in the inner wall and into the combustion-chamber 12, whence the flames and heated products of combustion are led to

where they are required. To facilitate complete combustion of the products of distillation from the fuel, there is an air-inlet 13 formed in a plate 14, between which and the wall 3 there is a passage 14^a for the circulation of air. This passage may be in direct communication laterally with the external atmosphere near its upper part. The air-inlet 13 is protected from being choked by fuel by the plate 15. Air descending the passage 14^a mixes with the products of distillation and passes with them into the combustion-chamber, where they are burned.

The furnace shown in Figs. 4 and 5 is practically the same as that shown in Figs. 1 to 3, with the slight modifications required to adapt it to be placed and worked in the inside of the fire-box of a locomotive-boiler. As air cannot be admitted directly to the perforations in the front wall 2, it is led through the ash-pit past a door 8^a, and thence upward, it may be, between heated fire-bricks 16, arranged in front of the air-regulator 10. This regulator is arranged to slide vertically and is operated by a cam 17, (see Fig. 4^a), fixed upon a shaft 18, provided with an external handle 19. The ash-pit 6 forms a part of a water-trough 6^a to contain water for the purposes hereinbefore mentioned. The bottom 12^a of the combustion-chamber is carried by a hinged plate 12^b. This plate can be turned downward to allow the bottom 12^a to be removed to permit access to the combustion-chamber. It is fastened in its closed position by a pin 12^c, which is passed through a lug 12^d on the plate and enters a fixed lug 12^e.

In Figs. 6, 7, and 8 a furnace according to this invention is shown partly inclosed within a brickwork casing 20, strengthened by iron plates 20^a and filled with fire-bricks 21, arranged in the ordinary manner to present a large heating-surface to air flowing over and between them. 22 22 are passages provided with dampers 23 for controlling the admission of air to the casing 20. The door 8^a also serves to admit air direct to the space in front of the outer wall 2 when necessary. The front of the casing is formed with peep-holes 24, normally closed by plugs 25. The inner perforated wall 3 may be formed with a number of lateral passages 3^a, as shown in Figs. 6 and 8, with a view of effecting an intimate mingling of the air and products of incomplete combustion passing through this wall. Hoppers 4^a and 4^b at the sides and top, respectively, of the fireplace serve to feed fuel to inclined passages 4^c, the lower or outlet ends 4^d of which are below the top of the walls 2 and 3. With this arrangement should cavities be formed in the fuel introduced into the space between the walls 2 and 3 from the top hopper 4 they can be readily filled by introducing fuel through one or more of the inclined passages 4^c, thus insuring the regular working of the furnace.

The fire-grate is shown applied to heat a Cornish boiler 26; but it may obviously be ap-

plied to heat any other required object. For instance, the combustion-chamber 12 may be placed in direct communication with the heating-chamber of a melting, reducing, or other furnace.

What I claim is—

1. A fireplace or furnace comprising perforated or grid-like walls arranged to form between them a fuel-space closed at the sides and bottom and through which solid fuel can descend by gravity from a hopper above and air-regulators consisting of perforated plates mounted to slide in suitable guides on one of said walls and each adapted to control the passage of air through a part of said wall, substantially as herein described, for the purposes specified.

2. A fireplace or furnace comprising the two perforated or grid-like walls arranged to form between them a fuel-space closed at the sides and through which solid fuel can descend by gravity, air-regulating devices for independently controlling the flow of air through various parts of one of said walls, a hopper located directly above the said fuel-space, an ash-pit arranged at the lower end of said fuel-space and normally closed by a door, and an air-inlet passage having its outlet end arranged near the top of and between said walls and below said hopper, substantially as described and shown, for the purpose specified.

3. A fireplace or furnace comprising two perforated or grid-like walls arranged to form between them a fuel-space closed at the sides and through which solid fuel can descend by gravity, a hopper for introducing fuel to the top of the space between said walls, and fuel-charging passages having their discharging ends terminating in said fuel-space at a point below the top of said walls, substantially as herein described, for the purpose specified.

4. A fireplace or furnace comprising two per-

forated or grid-like walls arranged to form between them a fuel-space closed at the sides and through which solid fuel can descend by gravity and a number of separate air-regulators arranged in front of one of said walls and whereby the admission of air to each horizontal row of perforations in said wall can be regulated independently of the admission to the other rows of perforations, substantially as herein described.

5. A fireplace or furnace comprising two perforated or grid-like walls arranged to form between them a fuel-space closed at the sides and through which solid fuel can descend by gravity and a casing containing refractory brickwork arranged to form an air-regenerator external to and so as to be heated by waste or radiant heat from said fire-grate or furnace, substantially as herein described.

6. A fireplace or furnace comprising perforated or grid-like inner and outer walls 2 and 3, arranged vertically and so as to form between them a fuel-space closed at the ends, independent air-regulators 11, arranged in front of each horizontal row of perforations in said outer wall, a combustion-chamber 12 at the rear of said inner wall, a fuel-charging hopper 4 above said fuel-space, a normally-closed ash-pit 6 below said fuel-space, and an air-passage 14^a, having its lower end terminating at a point below the top of the fuel between said walls, substantially as herein described, for the purposes specified.

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

HENRY CHAS. PLATTS.

Witnesses:

WM. THOS. MARSHALL,

PERCY G. MATTOCKS,

Gentn., both of 2 Pope's Head Alley, Cornhill, London.