No. 606,667. Patented July 5, 1898.

F. E. HUMPHREYS.

SMOKE CONSUMING FIREPLACE.

(Application filed Sept. 11, 1897.

(No Model.)

Fig. 1.

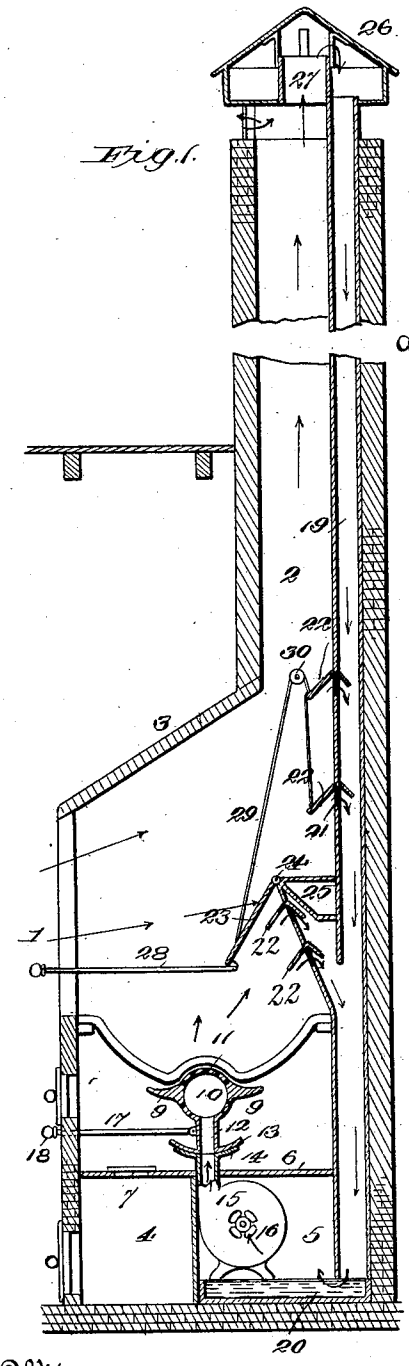


Fig. 2.

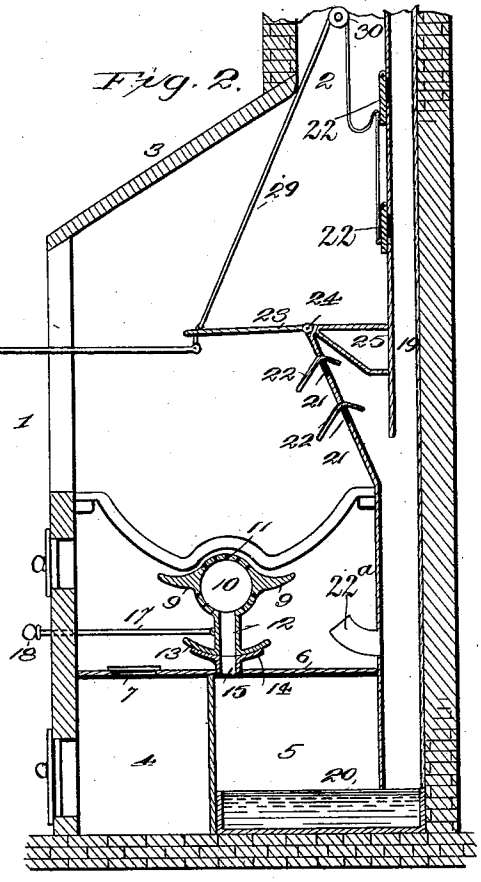
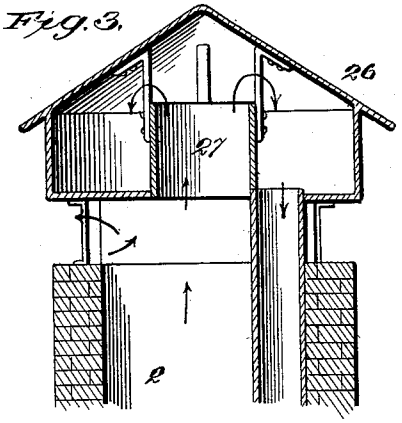


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANKLIN EMERSON HUMPHREYS, OF MASON CITY, IOWA.

SMOKE-CONSUMING FIREPLACE.

SPECIFICATION forming part of Letters Patent No. 606,667, dated July 5, 1898.

Application filed September 11, 1897. Serial No. 651,364. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN EMERSON HUMPHREYS, a citizen of the United States, residing at Mason City, in the county of Cerro Gordo and State of Iowa, have invented certain new and useful Improvements in Smoke-Consuming Fireplaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to smoke-consumers; and the object of the invention is to effect a thorough mixture or commingling of the products of combustion and gases with oxygen and to carry the same in a heated condition to the under side of the grate, where they are fed or forced through the grate, thus promoting a thorough and complete combustion of the carbon and gases, all of which are consumed, the nitrogen passing off through the smoke-flue.

While the invention relates to smoke-consumers, it is also in the nature of an improvement upon the construction set forth and illustrated in the patent granted to me March 2, 1897, No. 578,240.

The improved device has for its object to arrest the escaping carbon and gases of combustion and by mixing the same with oxygen in suitable mixing chambers or flues supplied with fresh-air inlets to carry the same to the place of combustion and by passing the same upward through the bed of coals to obtain a final and complete combustion. In carrying out the invention one or more mixing-chambers provided with suitable supply and exhaust passages may be employed. As is well known, it is impracticable to pass the smoke and gases back through the upper surface of the fireplace and downward therethrough, and it has been difficult heretofore to arrest the escaping gases and carbon and conduct the same to the lower side of the bed of coals, passing the same again through the fire as often as may be necessary in order to secure complete and thorough combustion. By the improved construction the said gases and carbon are arrested in their passage through the smoke-flue and conducted into a mixing flue or chamber, whence they are sucked downward and conducted to the lower side of the grate and again forced upward therethrough, thus securing a full view of the fuel and intensifying the heat. As a result the burning out of chimneys is prevented and consequent loss of property from defective flues. At the same time the chimney is left comparatively free from soot.

The invention is not alone limited to fireplaces, but, as will appear in the ensuing description, may be applied in various places which will suggest themselves.

With the above objects in view the invention consists in certain novel features, details of construction, and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and incorporated in the claims hereto appended.

In the accompanying drawings, Figure 1 is a vertical sectional view of a fireplace and chimney, showing the improved features of construction. Fig. 2 is a sectional view illustrating a slightly-modified arrangement of the construction shown in Fig. 1. Fig. 3 is a similar section through the upper portion of the chimney and cap.

Similar numerals of reference designate corresponding parts in all the views.

Referring to the drawings, 1 designates a fireplace, and 2 a smoke-flue leading upward therefrom, a deflector or hood 3 being arranged above the fireplace, so as to deflect the products of combustion and gases, &c., into the flue.

4 designates the ash-pit, and 5 an air-tight chamber or compartment located in rear of said ash-pit, the ash-pit and the compartment 5 being separated from the grate by means of a horizontal partition 6, which is provided with an opening 7 above the ash-pit for giving access to the latter, the said opening being closed by a suitable cover. Above the partition 6 is a grate-basket, and arranged between the bars thereof are a series of agitators 9, in the form of grate-bars arranged in two series, the bars of each series being parallel to each other and the series themselves diverging downwardly and being connected at their inner and upper ends to a horizontally-disposed tube 10, provided with perforations 11 and forming what I designate an "oxygen-burner." Communicating with the tube 10 is a vertical tube 12, extending down-

wardly from the tube 10 and provided at its lower end with a curved plate 13, which moves in the arc of a circle and bears against a second curved plate 14, secured to the upper end of a pipe 15, leading downwardly through the partition 6 and communicating with a blower 16, arranged in the air-tight chamber 5.

The burner and construction thereof, hereinbefore described, are similar to those described in my former patent referred to; but in connection with said burner I provide novel operating means consisting of a rod 17, connected at its inner end to the plate 13 and extending out through the front wall of the fireplace, where it is equipped with a suitable handle 18, by reciprocating which the plate 13 may be moved along the upper surface of the plate 14 for bringing the pipe 12 into and out of alinement with the pipe 15, thus permitting the draft from the blower 16 to pass directly to the oxygen-burner or regulating the amount of draft thereto or entirely shutting off the draft, as may be desired.

At one side of the smoke-flue 2 is a fresh-air flue 19, which leads downward from the top of the chimney to the bottom of the compartment 5. Arranged in the base of the compartment 5 and also at the lower end of the flue 19 is a liquid-pan 20, the object being to cause the fresh air commingled with the products of combustion and gases to pass through a solution contained in the pan 20, thereby freeing and precipitating any metallic gases contained in said air-current. The current is induced by the ascending column of hot air from the grate and greatly increased by the blower or fan 16, which may be revolved by any suitable means. At various intervals the fresh-air flue 19 is placed in communication with the smoke-flue 2 and fireplace 1 by ports 21, and arranged over each port is an angular deflector 22, projecting into the smoke-flue, so as to catch and arrest some of the products of combustion and gases and direct the same in the direction indicated by the arrows into the fresh-air flue, whence they are sucked downwardly by the ascending column of hot air, as above noted, and by the fan 16 carried through the pan 20 and thence forced upwardly through the grate.

Just above the grate I arrange a deflector 23 and pivot the same at its inner edge, as indicated at 24, to an oblique-faced ledge 25, extending forward from the rear wall of the fireplace partially over the fire. By pivoting the deflector 23 it may be moved into and out of position for arresting a certain proportion of the products of combustion, gases, and smoke, as may be found necessary. The deflector 23 is operated or raised and lowered by means of a pull-rod 28, extending through the front of the fireplace, the said rod having at its outer end a handle and being pivotally connected at its inner end to said deflector. Connected to the deflector is a cable or other flexible device 29, which extends upward and passes over and around a pulley or other suitable guide 30, the said connection 29 being attached to the upper pair of hinged deflectors 22, which latter are connected in any suitable manner, as by means of a rod, so that when the deflector 23 is raised the deflectors 22 will be lowered for partially closing the ports leading to the fresh-air flues. When the deflector 23 is lowered, the deflectors 22 are correspondingly elevated, and it is thus easy to regulate the extent to which the deflectors project into the space above the grate and thereby increase or diminish the amount of carbon and gases arrested and conducted to the fresh-air flues and thence back to the oxygen-burner. By this means it will also be apparent that the current of fresh oxygen mixed with the carbon and gases is placed under easy control.

At the top of the chimney I place a cap or cowl 26, slightly larger than the chimney and having a conical top, as shown. Beneath the conical top is arranged a cylindrical gatherer or concentrator 27, through which the products of combustion and gases pass. After passing through said gatherer 27 they are deflected and directed downward through the fresh-air flue 19, whence they follow the course above pointed out.

From the foregoing description it will be seen that the air mixed with smoke is carried in a heated state beneath the grate and forced upward therethrough, thereby intensifying the heat and promoting combustion, the result being that all gases, both carbonic and sulfureted, are entirely consumed, the nitrogen only passing up through the smoke-flue and escaping.

It may at times be desirable to admit air to the base of the grate without having it first pass through the lower chamber. To effect this, a modified arrangement (illustrated in Fig. 2) is employed which consists in establishing direct communication from the fresh-air flue to the chamber at the base of the grate, the air passing by way of a short tube 22^a, located in the rear of the oxygen-burner. Should the natural draft be found insufficient, any well-known artificial means, such as a blower, may be employed, as will be obvious.

It will of course be understood that the smoke and fresh-air flues may be be arranged in any convenient relation to each other, and any number of communicating ports may be provided between said flues. It will also be apparent that the improvements hereinbefore described are not limited merely to fireplaces, but may with equal advantage be employed in blacksmiths' forges and various forms of furnaces. It will also be apparent that other changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a smoke-consumer, the combination with a fireplace and its smoke-flue, of a fresh-air flue adjoining the smoke-flue and communicating therewith at one or more points above and below the fireplace, and means for controlling the air-supply for the purpose specified.

2. In a smoke-consumer, the combination with a fireplace and its smoke-flue, of a fresh-air flue adjoining and communicating with the smoke-flue at one or more points above and below the fireplace and deflectors arranged in or adjacent to the communicating ports above the fireplace, for the purpose specified.

3. In a smoke-consumer, the combination with a fireplace and smoke-flue, of a fresh-air flue extending alongside of the smoke-flue and communicating therewith by means of ports arranged at intervals, and angular deflectors arranged within and at the upper end of said ports and projecting into the smoke-flue, substantially as and for the purpose specified.

4. In a smoke-consumer, the combination with a fireplace and its smoke-flue, of a fresh-air flue adjoining and communicating with the smoke-flue at a point above the fireplace by way of a port, and a deflector pivoted adjacent the port, for the purpose specified.

5. In a smoke-consumer, the combination with a fireplace and smoke-flue leading therefrom, of a fresh-air flue at one side of the smoke-flue and communicating therewith by means of a port, an oblique-faced ledge arranged above said port and projecting over the fireplace, and a pivoted deflector connected to said ledge and made adjustable, substantially as described.

6. In a smoke-consumer, the combination with a fireplace and its smoke-flue, of an air-tight chamber arranged beneath the grate, a blower within the chamber, and a fresh-air flue adjoining and communicating with said smoke-flue and chamber, for the purpose specified.

7. In a smoke-consumer, the combination with a fireplace and smoke-flue, of a fresh-air flue extending alongside of the smoke-flue, a blower communicating with said fresh-air flue, a suitable burner adjacent to the grate and communicating with said blower, abutting pipes leading from the blower and burner and communicating with each other, curved plates secured to the adjacent ends of said pipes, and a rod connected to the pipe of the burner and extending through the front of the fireplace, substantially as and for the purpose described.

8. In a smoke-consumer, the combination with a fireplace and a smoke-flue leading upward therefrom, of a fresh-air flue extending alongside of the smoke-flue and communicating therewith at intervals, a cap covering both of said flues, and a hollow cylindrical gatherer arranged within said cap and operating, substantially in the manner and for the purpose specified.

9. In a smoke-consumer, the combination with a fireplace, and a smoke-flue leading therefrom, of a fresh-air flue at one side of the smoke-flue, a series of pivoted deflectors arranged contiguous to ports placing the smoke and fresh-air flues in communication, and means for simultaneously operating said deflectors, substantially as described.

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

FRANKLIN EMERSON HUMPHREYS.

Witnesses:

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