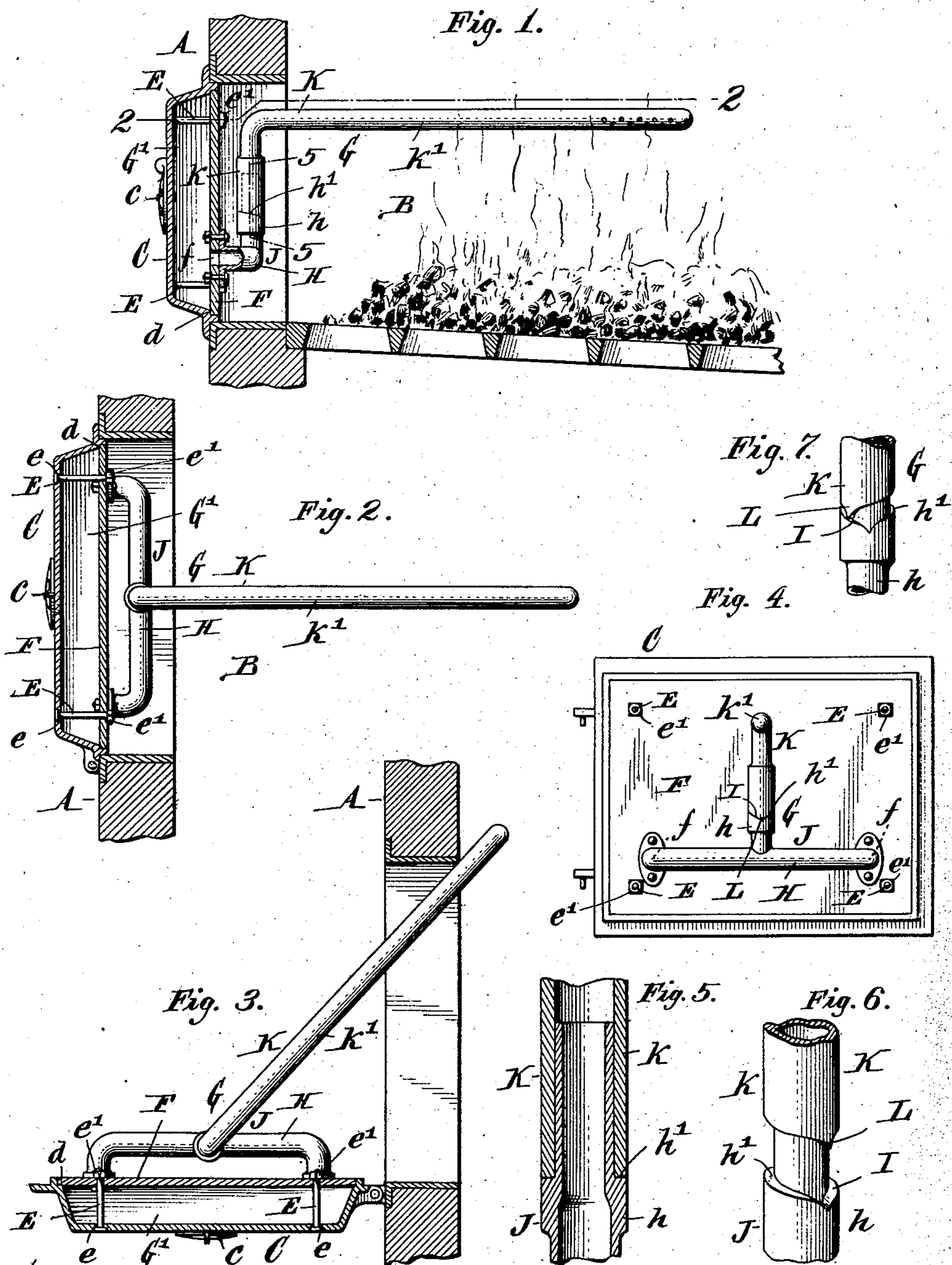


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PATENTED MAY 1, 1906.

G. R. BARNES.
APPARATUS FOR PROMOTING COMBUSTION.

APPLICATION FILED JULY 20, 1905.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PROMOTING COMBUSTION.

No. 819,400.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed July 20, 1905. Serial No. 270,479.

To all whom it may concern:

Be it known that I, GEORGE R. BARNES, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Apparatus for Promoting Combustion, of which the following is a specification.

This invention relates to a device for promoting combustion in furnaces by induction of air into the combustion-chamber heated in transit thereto.

The objects of my invention are to provide a simple, inexpensive, and effective device of this character which can be conveniently and quickly applied to any furnace, to so construct the device that it can be easily removed from one furnace and applied to any other furnace, and to provide a device which can be attached to the fire-door of the furnace, thus avoiding the boring of holes in the wall of the latter.

Other objects are to provide the device with a perforated discharge end and to so attach the same to the fire-door that the said discharge end is held directly over the center of the fire-bars, whereby the device is rendered equally effective with a small fire as with a large fire; to provide means whereby the device automatically assumes its normal position when the fire-door is closed, and to otherwise improve on air-induction devices now in use.

To these ends the invention consists in the construction, arrangement, and combination of parts to be hereinafter described, and more particularly pointed out in the subjoined claims.

In the drawings, Figure 1 is a vertical section through a portion of a furnace, showing my invention applied to the fire-door with the discharge end of the same projecting into the combustion-chamber. Fig. 2 is a horizontal section, taken on line 2 2, Fig. 1, showing the fire-door closed and the device in its normal position. Fig. 3 is a similar section showing the inwardly-projecting portion of the conduit in contact with the wall of the furnace and the fire-door open. Fig. 4 is an elevation of the fire-door detached, showing my improved device attached thereto. Fig. 5 is an enlarged vertical section taken on line 5 5, Fig. 1. Fig. 6 is a perspective view of a portion of the air-conduit, the portion of the swivel-section shown being partly elevated

on the fixed section to show the reduced upper end of the latter. Fig. 7 is a perspective view of the vertical portion of the air-conduit, showing the swivel portion turned on the fixed portion, which position it assumes when the fire-door is opened.

Referring to the drawings in detail, like letters of reference refer to like parts in the several figures.

The letter A designates the wall of the furnace, B the combustion-chamber, and C the fire-door, to which my improved device is attached.

Ordinarily fire-doors for furnaces are provided with dampers *c*, by means of which the cold air is introduced to the combustion-chamber to check the fire. In my invention this damper is utilized to promote combustion, and this is done by using it for the induction of air to the combustion-chamber, which in transit thereto is heated, and when delivered to the fire in a series of jets promotes combustion and greatly intensifies the heat.

Fire-doors of ordinary construction have a ledge *d*, against which a slotted or a perforated plate is held by four bolts E, passing through bolt-holes *e* at the four corners of the fire-door. My device is similarly applied and comprises a plate F, held against the ledge *d* by the bolts E, passing through the bolt-holes *e* in the fire-door and coinciding bolt-holes in the plate, through which latter the threaded ends of the bolts project and have nuts *e'* applied thereto, whereby said plate is firmly held, and an air-conduit G, secured to the plate F and terminating, preferably, in the center of the combustion-chamber. In this manner the fire-door is converted into an air-heating chamber, (designated by the letter G',) into which the proper flow of air can be induced by regulating the damper *c*. The plate F forms the inner wall of the air-chamber and is preferably made of iron in order to radiate the heat to the air within the chamber, it being of course subjected to the heat in the combustion-chamber.

On opposite sides of the vertical center the plate F is provided with air openings or outlets *f*, which are connected by a horizontally-disposed tube H, bolted or otherwise affixed to said plate and having connected therewith centrally between its ends a vertical tube *h*, reduced in diameter at its upper

end to form a shoulder h' , provided with a V-shaped notch or otherwise formed to provide an incline I , as shown in Figs. 4, 6, and 7. The horizontal tube H and the vertical tube h form the fixed section J of the air-conduit. On said fixed section is mounted an oscillating or swivel section K , comprising a vertical tube k , fitting over the reduced upper end of the fixed section and having at its lower edge an oppositely-inclined projection L , adapted for coaction with the incline I on the fixed section, and a horizontal tube k' , closed at its free end and provided at its under side near said end with a series of perforations, through which the heated air passes and is directed against the fire in a series of jets.

Normally the inwardly-projecting portion of the swivel-section extends into the combustion-chamber in a line perpendicular to the fire-door, so as to bring the perforations at the inner end thereof over the fire, and therefore when the fire-door is being opened said swivel-section is carried with the same and comes in contact with the sides of the fire-door opening, as shown in Fig. 3, which checks its further swinging movement with the door and compels the said swivel-section to turn on the upper reduced end of the fixed section. During this action said swivel-section is raised on the fixed section by reason of its inclined lower end riding up the incline on the shoulder of the fixed section. This permits the fire-door to be opened to any extent desired without offering the least obstruction, and as the inwardly-extending portion of said swivel-section lies in a plane slightly below the upper edge of the door the fire-door opening is but slightly restricted and no inconvenience in supplying the combustion-chamber with coal is produced thereby. On closing the fire-door the fixed section J necessarily moves with the door and allows the swivel-section to turn and the inclined lower end thereof to ride down the inclined shoulder on the fixed section until the inwardly-projecting portion of the swivel-section is again perpendicular to the fire-door, which position it assumes when the incline on the lower end of the swivel-section is in proper and corresponding relation to the incline on the fixed section, after which said swivel-section is moved bodily with the door, while retaining its perpendicular relation to the same.

From the foregoing it is apparent that absolutely no change is required in the furnace to apply my improved device thereto, and, furthermore, experienced labor is not necessary in applying the device, since it requires the mere substitution of the plate F and parts supported thereon for the slotted or perforated plate, as the case may be, which ordinarily forms part of the fire-door.

This invention is susceptible to many changes in form, arrangement, and construc-

tion without departing from the spirit of my invention or sacrificing any advantages thereof.

Having thus described my invention, what I claim is—

1. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, of a door closing said opening and having an air-chamber therein and an air-inlet for said chamber, and an air-conduit comprising a fixed section secured to said door and a movable section carried by said fixed section and projecting into the combustion-chamber to direct the air to the fuel within said combustion-chamber.

2. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, of a door hinged to said wall to close said opening and having an air-chamber and an air-inlet for said chamber, and an air-conduit comprising a fixed section secured to said door and a swivel-section mounted on said fixed section and projecting into the combustion-chamber to direct the air against the fuel therein.

3. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, a door hinged to said wall to close said opening and having an air-chamber provided with an air-inlet and an air-outlet, an air-conduit comprising a fixed section secured to said door in communication with the chamber therein, and a movable section carried by said fixed section and having an inwardly-projecting portion lying normally perpendicular to the door, said movable section on opening the door being swung out of its normal position by contact with the wall of the combustion-chamber, and means to cause said movable section to automatically return to its normal position when closing the door.

4. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, a door hinged to said wall to close said opening and having an air-chamber provided with an air-inlet and two air-outlets, an air-conduit comprising a fixed section having a horizontal portion connecting said air-outlets and a vertical portion extending upward from the center of said horizontal portion, and a movable section carried on said fixed section and projecting into the combustion-chamber.

5. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, a door hinged to said wall to close said opening and having an air-chamber provided with an air-inlet and two air-outlets, an air-conduit comprising a fixed section having a horizontal portion connecting said air-outlets

and a vertical portion extending upward from the center of said horizontal portion, a movable section normally held perpendicular to said door and on opening the latter being swung out of its normal position by contact with the wall of the combustion-chamber, and means to cause the movable section to automatically return to its normal position when closing said door.

6. In an apparatus for promoting combustion, the combination with a combustion-chamber having an opening in one of its walls, a door hinged to said wall to close said opening and having an air-chamber provided with an air-inlet and two air-outlets, an air-conduit comprising a fixed section having a horizontal portion connecting said air-outlets and a vertical portion extending upward from the center of the horizontal portion and having a reduced upper end to form an inclined shoulder, and a movable section having a vertical portion fitting onto the reduced upper end of the fixed section and provided with an inclined end cooperating with said inclined shoulder and a horizontal portion extending into the combustion-chamber and having a series of openings to direct jets of air against the fuel.

7. An apparatus for promoting combustion, comprising a plate adapted to be secured to a fire-door to form an air-chamber, an air-conduit affixed to said plate and extending therefrom into the combustion-chamber, said conduit communicating with the air-chamber formed in the door and having a series of air-openings at its free end to direct jets of air to the fuel.

8. An apparatus for promoting combustion comprising a hollow fire-door to form an

air-chamber and having an air-inlet and an air-outlet, an air-conduit comprising a vertical portion and a horizontal portion lying in a plane slightly below the top of the fire-door, said horizontal member extending into the combustion-chamber and having means at its free end to direct jets of air to the fuel within the combustion-chamber.

9. An apparatus for promoting combustion, comprising a fire-door having an air-chamber therein provided with an air-inlet and an air-outlet, an air-conduit leading to a point approximately central in the combustion-chamber and comprising a fixed section and an oscillating section, said fixed section having a vertical tube reduced at its upper end to form a shoulder and having a depression in said shoulder formed by opposite inclines, and said oscillating section having a vertical tube fitting the reduced upper end of the fixed section and provided with a complementary inclined end for coaction with the depression in the shoulder of the fixed section.

10. In an apparatus for promoting combustion, the combination with the usual fire-door having an air-opening and a damper for said opening, of a plate secured to said door and separated from the front wall thereof to form an air-heating chamber, and an air-conduit leading from said chamber into the combustion-chamber to direct the heated air against the fuel.

In testimony whereof I have affixed my signature in the presence of two subscribing witnesses.

GEORGE R. BARNES.

Witnesses:

MAY F. SEWERT,
EMIL NEUHART.