H. F. HAYDEN.

Furnace-Door Casing.

No. 167,665. Patented Sept. 14, 1875.

Fig. 1.

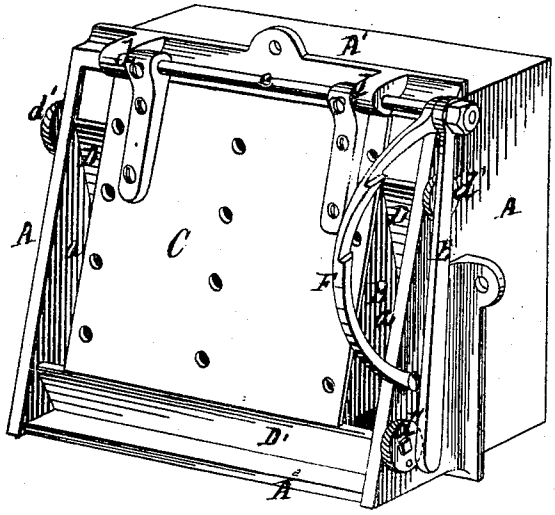


Fig. 2.

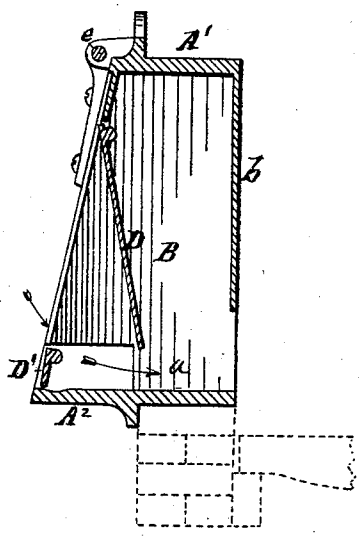


Fig. 3.

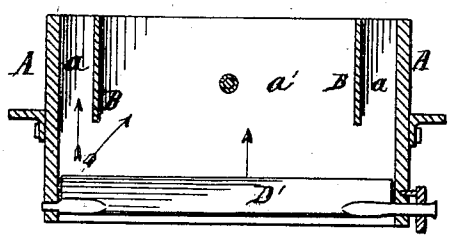
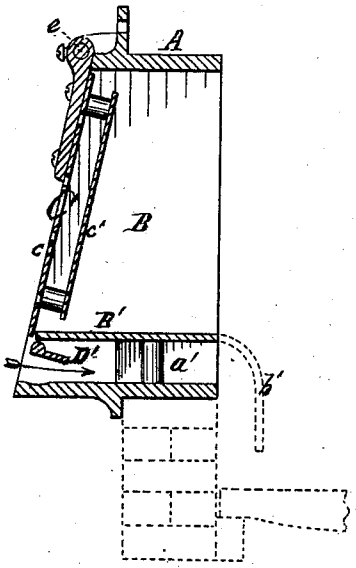


Fig. 4.



Witnesses:
A. M. Smith
John G. Center.

Inventor:
H. F. Hayden

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY F. HAYDEN, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN FURNACE-DOOR CASINGS.

Specification forming part of Letters Patent No. **167,665**, dated September 14, 1875; application filed September 2, 1875.

To all whom it may concern:

Be it known that I, HENRY F. HAYDEN, of the city and county of Washington, District of Columbia, have invented a certain new and useful Improvement in Furnace-Doors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of my improved furnace-door and door-casing. Fig. 2 represents a vertical section through one of the air-ducts at the side of the door or between the double walls at the side of the casing. Fig. 3 is a horizontal section through the air-duct below the door and coal-chute, and Fig. 4 is a vertical section through the door and casing.

Similar letters of reference denote corresponding parts in all the figures wherever used.

My invention relates to a novel construction of door designed to regulate the admission of air to the front and surface of the fire for controlling combustion; and to this end the invention consists in providing the door-casing with double walls at the sides of and below the door, forming ducts through which currents of air, controlled by valves, are admitted to the combustion-chamber at the front and sides of the fire, for regulating the combustion of the fuel, as hereinafter explained.

In the accompanying drawings, A A represent the outer side walls of the door-casing; A^1 A^2, the top and bottom of the same, and B B′ the inner side and bottom walls or plates, between which and the outer side and bottom walls A A^2 spaces are left, forming air-ducts for the admission of air at the sides of and below the furnace-door C. The spaces *a*, formed at the sides of the door, between the inner and outer walls B A, are closed at the front by pendent valves D D, pivoted at their upper ends at *d* in the casing, said valves having handles or buttons *d′* applied to the outer ends of their shafts or pivots, by means of which they may be set to close the side air-ducts *a*, or thrown back with their lower swinging ends resting against a partial rear wall, *b*, to said air-duct, or adjusted to any desired intermediate position for regulating the amount of air admitted, and for giving direction to the same. The lower horizontal duct *a′* is provided with a similar valve, D′, controlled in like manner, for regulating the admission of air through the same, these ducts being designed to admit the air along the front and at the corners of the combustion-chamber, for promoting combustion at these points, where, ordinarily, dead spaces of considerable size are found in furnaces as usually constructed. The lower duct *a′*, underneath the coal-chute B′, affords also a convenient means of access to the fire for "slicing" the same, obviating the necessity for opening the door C for that purpose, though access may be had through the door, if preferred. The door C may be of any usual construction, but it is preferred to make it of double plates or walls, as shown in Fig. 4, as by this construction the door may be made lighter, while, at the same time, "buckling" of the outer plate *c*, or door proper, is effectually prevented. The door, thus constructed, is, by preference, hinged at its upper edge, as shown in Fig. 1, the shaft or pivot *e* being extended at one end and having a pendent handle or lever, E, connected with it for controlling the door. The handle E is made elastic, to adapt it to yield slightly laterally, and is held at any desired adjustment by means of a notched rack or segment, F. The pendent valves D D, instead of being made separately adjustable, as shown, may be connected with a common through-shaft in such manner that both may be adjusted together, and, if preferred, by a lever similar to that (E) for operating the door, and held at any desired point of adjustment by a similar toothed rack or segment. The valves being adjusted inward and turning upon a hinge or pivot at their upper ends, as explained, are made to deflect the air downward upon and in front of the fuel at the extreme front corners of the combustion-chamber, the points where the process of combustion is generally the most defective, and where a supply of air is consequently most needed. The relation of the grate-bars to the furnace-door is indicated by dotted lines at *f*, Fig. 2, though, of course, any usual or preferred arrangement in this particular may be adopted. Sometimes, where the furnace is large and a

small door, relatively, is preferred, the door-casing may be made flaring inward, in which case the vertical side ducts *a* will conform in outline to such flaring sides, and the horizontal lower duct *a'* will expand in width inward, conforming to the flaring shape of the door-casing itself; but it will be understood that any usual or preferred form may be given to the door-casing, so long as the relation of the air-ducts thereto, as described, is preserved for conveying air to the fire. A flooring may be made to the side ducts *a*, separating them entirely from the lower duct and its supply-valve D', if preferred, and in some instances it may be found desirable to dispense with the lower duct *a'*. In others, where the furnace is narrow, the lower duct *a'* alone, suitably partitioned, may be found to amply meet its requirements, but these changes are such as will readily suggest themselves to the skilled manufacturer.

In Fig. 4 the door is shown by the dotted lines adapted to a locomotive boiler or furnace, or other similar furnace, in which the grate is located considerably below the coal-chute B', which in such case is extended inward and downward, as indicated by the dotted lines at *b'*, thus conducting the air downward in front of the fire to a point near the grate-bars, as shown.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The vertical air-ducts *a* at the sides of the furnace-door, and between the double walls or side plates of the casing, in combination with a valve or valves for controlling the admission of the currents of air, substantially as described.

2. The lower horizontal air-duct *a'*, underneath the door and coal-chute, and between said chute and the casing-floor A^2, in combination with a valve, D', controlling the admission of air to the front of the fire, as described.

3. The combination of the vertical ducts *a a* and horizontal duct *a'*, and the valves for controlling the admission of air through the same, with a furnace-door, substantially as and for the purpose set forth.

H. F. HAYDEN.

Witnesses:

CHAS. H. MOULTON,

JOHN G. CENTER.