

(No Model.)

C. H. GADEY.
GRATE.

No. 576,363.

Patented Feb. 2, 1897.

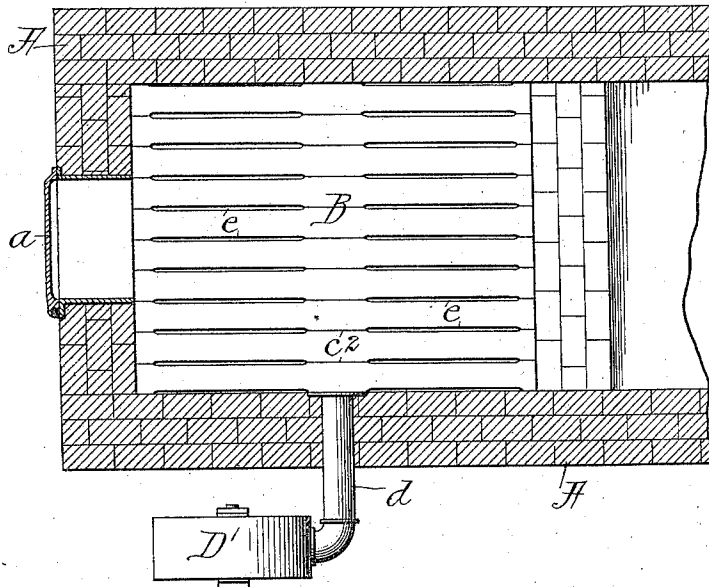


Fig. 1

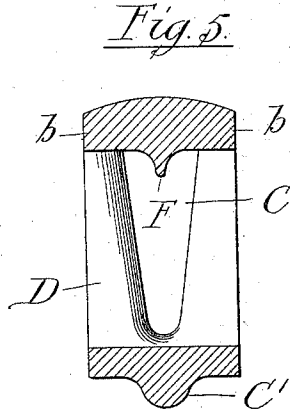


Fig. 5.

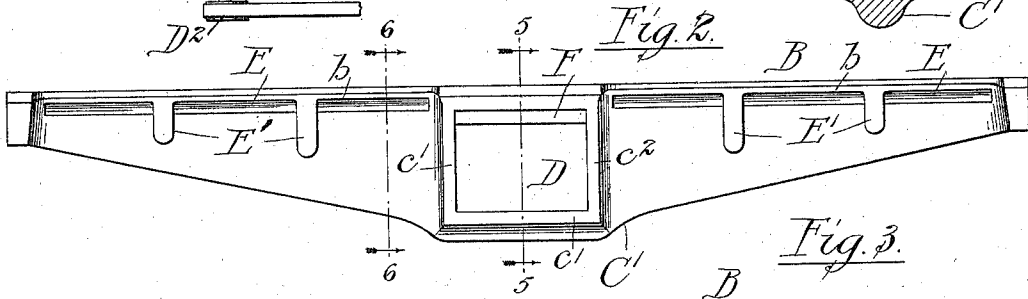


Fig. 2.

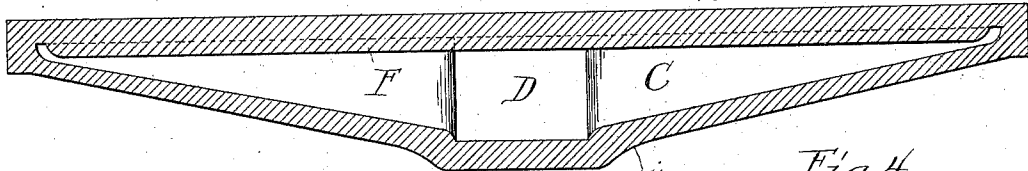


Fig. 3.

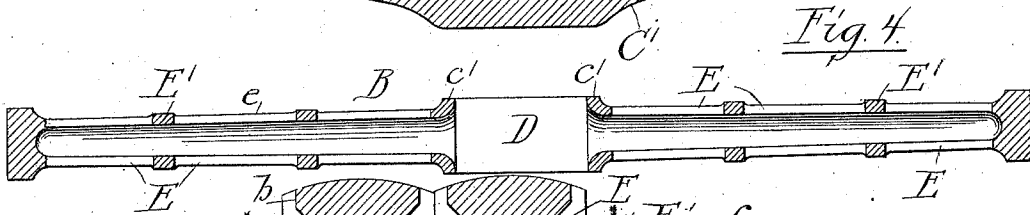


Fig. 4.

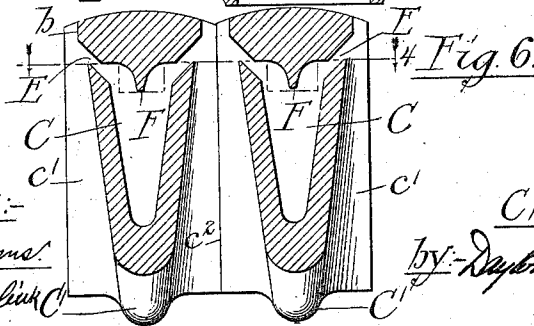


Fig. 6.

Witnesses:-

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UNITED STATES PATENT OFFICE.

CHARLES H. GADEY, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO THE BROWN BROTHERS MANUFACTURING COMPANY, OF SAME PLACE.

GRATE.

SPECIFICATION forming part of Letters Patent No. 576,363, dated February 2, 1897.

Application filed October 14, 1895. Serial No. 565,558. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. GADEY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grates; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in grate-bars, and particularly to that class wherein the separate grate-bars are made hollow and are provided with longitudinal exit slots or apertures, through which air supplied to the interior of the bars from a source of air-supply is delivered to the fuel resting on the grate for the purpose of producing a more uniform and complete combustion thereof. A grate of this kind is shown in my prior patent, No. 513,565, the present invention embracing improvements in the grate-bar therein shown in several particulars, as will hereinafter appear.

The invention will be more fully understood by reference to the subjoined description, and pointed out in the appended claims.

Referring to the drawings, Figure 1 is a horizontal sectional view of a furnace, showing my improved grate-bars placed therein. Fig. 2 is a side view or elevation, enlarged, of one of the grate-bars. Fig. 3 is a central vertical longitudinal sectional view of one of the grate-bars. Fig. 4 is a longitudinal sectional view of the grate-bar, taken on line 4 4 of Fig. 6, looking in the direction of the arrow. Fig. 5 is a transverse vertical section through one of the grate-bars, taken upon the line 5 5 of Fig. 2. Fig. 6 is a transverse vertical sectional view, taken on line 6 6 of Fig. 2, looking in the direction indicated by the arrow and enlarged to more clearly illustrate the parts.

Referring to the drawings, A represents the wall of an ordinary boiler-furnace, having a door *a* and a grate composed of a plurality of my improved grate-bars B B. The several grate-bars are made of considerable depth and each bar is hollow or provided with an air-chamber C, extending throughout practically its full length. In each side of the bar is formed a longitudinal slot or exit-opening

E, leading from the top of the air-chamber to the side face of the bar near its top, said openings being for the purpose of affording exit of air from the interior of the bar to the fire.

In the preferred form of bar illustrated the same is provided with a curved or convex top or fire-supporting surface, as clearly shown in Figs. 5 and 6, while the lower part of the bar is tapered downwardly or made of V shape, so as to form in effect a strengthening rib or flange C. Moreover, to give longitudinal strength or stiffness and to equalize the air-supply the bar is made thicker vertically at its middle than at its ends, the lower edge of the rib C being inclined downwardly from each end of the bar toward its middle.

At or near the center of the bar is formed a transverse aperture D, extending entirely through the rib C and surrounded at each side of the bar with outwardly-extending flanges *c' c'*. The aperture D is shown as made of rectangular form and of nearly the full depth of the bar, the upper horizontal parts of said flanges being located at the sides of the top surface and the lower horizontal parts being at or near the deepest part of the rib C.

When several of the grate-bars B B are placed side by side, the outer surfaces *c²* of the flanges *c'* will bear against each other, and thus each aperture D will register with the corresponding aperture D in the adjacent grate-bar, whereby a conduit is formed centrally of the grate-bars across the entire grate. Extending at some convenient point through the wall of the furnace is a pipe *d*, one end of which is connected with one of the apertures D in the outermost grate-bar and the other end of which pipe is connected with a suitable air-blower, (illustrated at *D'*), and which air-blower may be operated from a belt and pulley *D²* in a familiar manner. By this construction it will be manifest that air for supporting combustion may be forced into the chambers C of the several grate-bars and will pass therefrom through the slots E to the fire.

The grate-bars are made somewhat wider at their top or fire-supporting surface than at any point below the same, and said top surface on either side of the opening D is sup-

ported at its ends above the side members of the bar so as to form slots E open adjacent to and beneath the fire-supporting surface, thereby forming continuous slots on either side of the bar, through which an uninter-
 5 rupted current of air may be forced. In a short bar the only point of attachment between the fire-supporting surface and the main body of the bar will be, as stated, at
 10 each end thereof, and in order to stiffen said part and thus prevent it from warping under the influence of the intense heat to which it is subjected said part is provided along its under side the full length of the bar with an
 15 integral depending tapered flange F, preferably of a depth sufficient to extend below the plane of the slots E. Said flange also serves to divide the air-current directed against it and deflect it equally through the opposite
 20 slots.

In grate-bars of considerable length it will be found desirable to support the top of the bar at one or more points intermediate its length, and I have shown in the drawings my
 25 invention applied to a bar provided with such supporting means, consisting of integral connecting-ribs E', extending from the top of the bar downwardly below the slots, and which ribs serve as additional stiffening means to
 30 prevent the bar from warping. The drawings illustrate four of these connecting-ribs, but it will be understood that their presence or number depend entirely upon the length of the bar. Said ribs E' will be made of considerable thickness, so as to provide ample
 35 strength without making them of such width as would seriously obstruct the current of air directed through the slots E. Said slots are inclined in a direction upwardly and out-
 40 wardly, as shown more clearly in Fig. 6, so that the air escaping therefrom will be forced from each slot upwardly toward the fuel resting on the grate and also toward the adjacent grate-bar. It follows that air escaping from
 45 opposite slots in adjacent grate-bars will meet and will be forced upward through the spaces *e* between adjacent grate-bars. Said upward flow of air action will manifestly tend to cause a vacuum in the spaces beneath the slots E,
 50 formed by the proximate sides of the grate-bars, whereby a suction will be produced tending to draw the air from beneath the grate-bar upwardly through the space *e* and thereby afford a more abundant supply of oxygen to
 55 the fire upon the grate than comes from the blower. It will be observed that the said margins of the grate-surface *b* project beyond or overhang the openings of the slots E, whereby dust or slack falling through the apertures *e* will be prevented from entering the
 60 air-exit slots E and will drop directly through the grate into the ash-pit.

The flange F, which depends from the top wall of the hollow grate-bar, as above described, is a highly-advantageous feature of the device illustrated and constitutes an important part of my invention. One impor-

tant advantage of such flange is that it greatly stiffens and strengthens the top wall of the bar and prevents the latter from becoming
 70 distorted or curling up under the action of the heat, which acts most intensely on the said top wall of the bar. Another important advantage derived from the use of such flange is that by extending across the transverse air
 75 conduit or opening of the grate it serves to break up the air-current passing through the same from the air-supply pipe and at the same time direct or deflect a part of the air into the hollow end portions of the grate-bars at
 80 either side of said central passage. In this connection it is to be observed that the tendency of the air-current delivered to the cross-passage referred to is to pass directly through the passage and give the greatest pressure
 85 and air-supply in the bars which are farthest away from the supply-pipe, the air tending to pass directly through the passage and accumulate at the closed end of the same. The presence of the ribs F where they extend
 90 across the said passage, as clearly shown in Figs. 2 and 3, insures that the current will be broken up and deflected into the bars nearest the supply-pipe, so that it will enter the same to practically the same extent that it
 95 enters those which are remote from the supply-pipe. A further purpose of the said flange F is to divide the rising air-current and direct it toward the opposite slots of the grate-bars, as hereinbefore mentioned. For
 100 this latter purpose the flange is shown as inclined and oppositely curved at its side faces; but this particular shape of a flange is not essential, and its opposite side may be flat and slightly inclined, or even vertical, if desired,
 105 the general result being the same in either case, namely, to strengthen the top wall of the bar and to divide the current rising toward the exit-slots.

The apertures D in the several bars may be
 110 located elsewhere than at the center thereof, as set forth in said prior patent hereinbefore referred to.

While I have shown what I deem to be a preferred embodiment of my invention, it
 115 will be obvious that many changes in the details thereof may be made without departing from the spirit of the invention or without involving more than ordinary mechanical skill.
 120

I claim as my invention—

1. A hollow grate-bar consisting of an integral casting comprising a top wall or fire-supporting surface and downwardly-extending side walls, said top wall being supported
 125 above the side walls by connections at either end thereof, so as to form between the same and the side walls on either side a continuous slot for the exit of air, a stiffening-rib depending from the lower side of the top wall
 130 between the side walls, and an opening in said bar through which air may be directed to the hollow interior thereof.

2. A hollow grate-bar consisting of an in-

tegral casting, comprising a top wall or fire-supporting surface and downwardly-extending side walls, said top wall being supported above the side walls by connections at either
5 end thereof, so as to form between the same and the side walls on either side a continuous slot for the exit of air, vertical ribs connecting the top and side walls, a stiffening-rib extending from the lower side of the top wall
10 between the side walls, and an opening in said bar through which air may be directed to the hollow interior thereof.

3. In combination with a grate composed of a plurality of hollow grate-bars arranged
15 side by side, and provided with apertures in their sides adjacent to the top for the exit

of air, openings in each bar registering with those of the other bars and arranged to form a conduit extending transversely through the grate, and means for supplying air to said
20 conduit, of central depending ribs in the interior of said bars arranged to obstruct a current of air directed into said conduit to break it up and deflect it to the several bars.

In testimony that I claim the foregoing as
25 my invention I affix my signature, in presence of two witnesses, this 30th day of September, A. D. 1895.

CHARLES H. GADEY.

Witnesses:

C. CLARENCE POOLE,
ALBERT H. GRAVES.