J. VAN BRUNT.

FURNACE GRATE.

APPLICATION FILED JULY 15, 1918.

1,435,948. Patented Nov. 21, 1922.

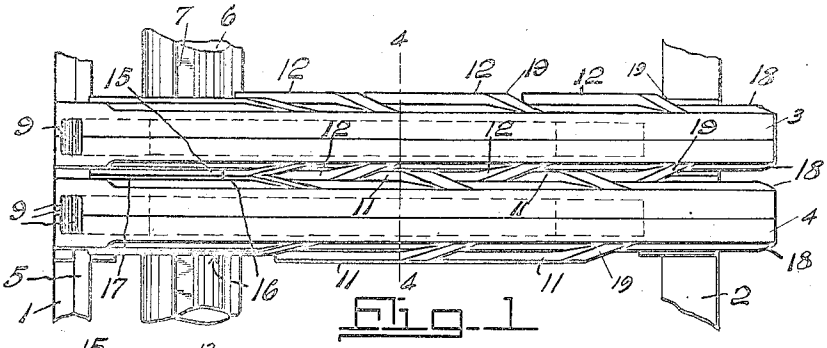


Fig. 1

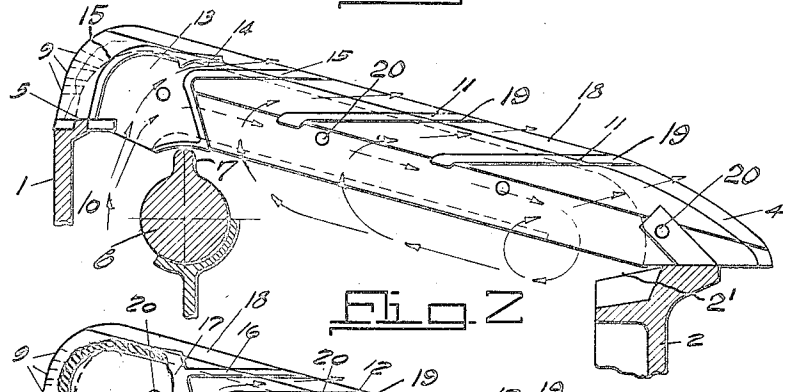


Fig. 2

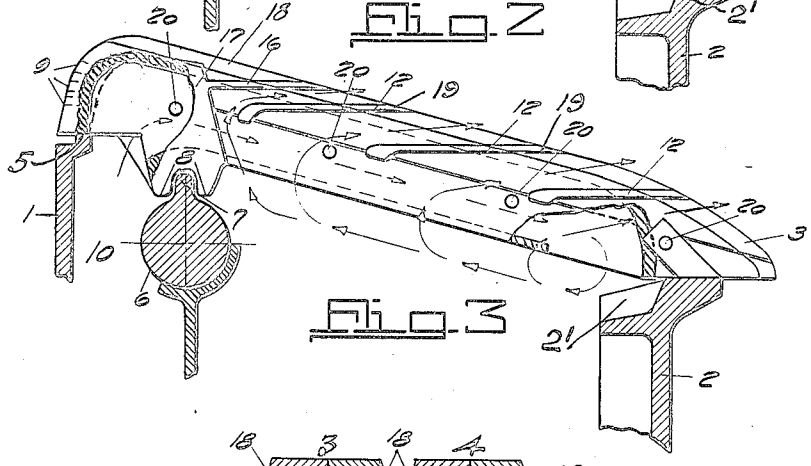


Fig. 3

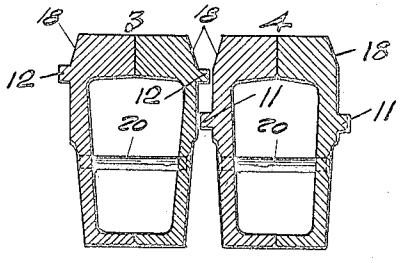


Fig. 4

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UNITED STATES PATENT OFFICE.

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FURNACE GRATE.

Application filed July 15, 1918. Serial No. 244,360.

To all whom it may concern:

Be it known that I, JOHN VAN BRUNT, a citizen of the United States, residing at city, county, and State of New York, have invented a certain new and useful Improvement in Furnace Grates, of which the following is a full, clear, and exact description.

My invention relates to improvements in furnace grates and more particularly in furnace grates in which the alternate bars can be reciprocated, such for instance as the grates used in certain classes of stokers, the bars inclining somewhat and the reciprocation of the alternate bars acting to feed the fuel.

In such grates the ashes and fuel tend to sift down between the bars, and the purpose of my invention is to prevent this sifting and at the same time not unduly check the passage of air between the bars for supporting combustion upon superimposed fuel. Another object of my invention is to provide a cooling stream of air between the upper ends of the bars so that such bars are cooled by both internal and external currents of cool air.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which,

Fig. 1 shows a plan view of a portion of a furnace grate, said portion comprising two adjacent bars constituting one of the several pairs of bars of which the grate is made up;

Fig. 2 is a side elevation of one of the bars of Fig. 1;

Fig. 3 is a side elevation of the other of said bars; and

Fig. 4 is a cross section of two adjacent bars on the line 4—4 of Fig. 1.

Referring more particularly to the drawings, 1 is a wall of the retort of a stoker furnace. 2 is the outer wall of a secondary air chamber 2′ located beneath the grate bars. 3 and 4 are two grate bars whose inner ends rest upon the wall 1 and whose outer ends rest upon the wall 2. The grate bars 4 have recesses receiving the flange 5 upon the wall 1 so as to be held stationary relatively thereto, while the grate bars 3 are free to slide upon the tops of said walls 1. Beneath the upper ends of the grate bars is a rocking bar 6 having a flange 7 engaging between lugs 8 on the bar 3 so that when the rocking bar 6 is oscillated the grate bar 3 will be reciprocated in the manner shown and described in Patent No. 818,-010 granted to W. R. Wood, April 17, 1906, its movement being in a substantially horizontal plane. The grate bars 3 and 4 are, moreover, tubular grate bars and air is passed through those tubular grate bars from a primary air chamber 10 in the manner described in the patent just mentioned.

The grate bars 4 are not engaged by the flange 7 of the rocking bar 6 and therefore, while they remain stationary, do not interfere with the action of the bar 6. The bars 3 and 4 are provided with tuyere openings 9 discharging air from their interior at points adjacent to the retort. The air supplied passes from the primary air chamber 10 to the grate bars, whence some of it enters the tubular bars, discharging in part through the tuyere openings 9, while part passes through the tubular bars as shown to the secondary air chamber 2′ and then passes up between the bars to the coal supported thereby, and some of it passes between the upper ends of the bars to the fuel. In order to prevent the sifting of the ashes and the coal down between the bars, I provide adjacent bars with projecting and overlapping flanges 11 and 12. Thus I place on the bar 4 flanges 11 and on the bar 3 flanges 12, so that when the bars are assembled the flanges 11 lie between the flanges 12 and block any direct downward discharge between the bars, thus interfering with the free falling of ashes and coal. The ashes and coal as they fall are arrested by these flanges and then to a large extent are carried forward by the draft of air passing from beneath the bars through the openings between the flanges so as to be eventually discharged from the lower end of the grate instead of dropping through the grate. The flanges 11 and 12 are confined to the upper portions of the bars, being located above a plane passing through the longitudinal axes of the bars and their interior bores. This results in making the passages formed by the flanges short and in having the tubular portion of the bar extend well below the ends of the flanges adjacent to said plane. The portions of the adjacent bars below this plane are downwardly tapered so that their exterior surfaces are spaced away from one another as shown in Fig. 4, the spaces gradually increasing in width toward the bottom of the

grate, thus permitting air to freely pass to the receiving ends of the passages between the flanges.

By using these overlapping flanges, the spacing between the flanges and the next adjacent bar may be of considerable extent so as not to produce a rubbing contact which would interfere with the movements of the movable bars. The spacing between the flanges and the next adjacent bar is such that the flanges are nearly in contact with the body portions of the adjacent bars and thus confine the passing air substantially to the passages between the flanges on adjacent bars.

At the upper ends of the grate bars I find it desirable to have a current of cool air passing between the bars directly from the source 10, and in order to provide this I form a chamber 13 as shown in Fig. 2 in at least one of each two adjacent faces and provide a discharge 14 for the air therein so that it may flow directly to the upper surface of the grate adjacent to the upper ends of said bars. The lower portion of this discharge and the right hand side wall of the chamber as shown in Fig. 2 is formed by a flange 15 which abuts upon a flange 16 carried by the grate bar 3 and upon a surface 17 carried by that bar, there being corresponding flanges 16 and surfaces 17 on both sides of the bar 3. The abutting surfaces are so close as to substantially confine the air and prevent the sifting of the ash, the horizontal portions of the flanges being in substantially abutting engagement during all parts of their movement. The flanges 11 and 12 are spaced apart from one another, and, since the movable grate bars reciprocate in a plane substantially parallel to the flanges, there is no engagement which will interfere with the reciprocating movement of the bar 3.

As will be seen from the foregoing, air from the source 10 flows into the tubular bar, partly escaping through the tuyeres 9 and partly passing through the bars to the space below them, which constitutes the secondary air chamber 21 and then up between adjacent bars through spaces between the flanges 11 and 12, and air also passes directly from the source 10 between the upper portions of the bars. In this way the upper portions of the bars are maintained relatively cool and the air which passes up between the body portions of the bars has been relatively heated before it reaches the superimposed fuel by absorbing heat from, and hence cooling, the grate bars. Furthermore, the flanges 11 and 12 arrest the downward fall of ashes between the bars and the air passing between the bars tends to carry such arrested material along so as to discharge it from the lower ends of the bars.

The bars have their upper corners beveled as at 18 and the flanges 11 and 12 have their forward ends beveled off as at 19 toward the centers of the respective bars so as to terminate in oblique surfaces at substantially the flat faces of the individual grate bars.

The grate bars are each made up of two longitudinally extending counterparts held together by bolts 20.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, said grate bars being tubular, a primary air chamber beneath the upper ends of said bars, and a secondary air chamber beneath the body portions of said bars, adjacent bars having abutting portions forming air passages at their upper ends in communication with said primary air chamber and discharging at the upper surface of said bars adjacent to said ends, the passages through said tubular bars communicating with said primary air chamber and discharging into said secondary air chamber.

2. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, said grate bars being tubular, a primary air chamber beneath the upper ends of said bars, and a secondary air chamber beneath the body portions of said bars, adjacent bars having abutting portions at their ends, the passages through said tubular bars communicating with said primary air chamber and discharging into said secondary air chamber, said bars being provided with lateral flanges, the lateral surfaces of the flanges on any one bar being closely adjacent to the body portion of an adjacent bar and lying between flanges on said adjacent bar, the flanges on two adjacent bars being separated from each other so as to form air passages from said secondary air chamber to the upper surface of the grate.

3. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, said grate bars being tubular, a primary air chamber beneath the upper ends of said bars, and a secondary air chamber beneath the body portions of said bars, adjacent bars having abutting portions at their ends, the passages through said tubular bars communicating with said primary air chamber and discharging into said secondary air chamber, said bars being provided with lateral flanges, the lateral surfaces of the flanges on any one bar being closely adjacent to the body portion of an adjacent bar and lying between flanges on said adjacent bar, the flanges on two adjacent bars being spaced away from one another so as to form

air passages from said secondary air chamber to the upper surface of the grate, the flanges being located above a plane passing substantially through the longitudinal axes of said tubular bars so that the walls of said tubular bars extend below the ends of the flanges adjacent to said plane.

4. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, said grate bars being tubular, a primary air chamber beneath the upper ends of said bars, and a secondary chamber beneath the body portions of said bars, adjacent bars having abutting portions at their ends, the passages through said tubular bars communicating with said primary air chamber and discharging into said secondary air chamber, said bars being provided with lateral flanges, the lateral surfaces of the flanges on any one bar being closely adjacent to the body portion of an adjacent bar and lying between flanges on said adjacent bar, the flanges on two adjacent bars being spaced away from one another so as to form air passages from said secondary air chamber to the upper surface of the grate, the flanges being located above a plane passing substantially through the longitudinal axes of said tubular bars so that the walls of said tubular bars extend below the ends of the flanges adjacent to said plane, the bars below said plane being tapered so as to provide a space between said bars and below said plane gradually increasing toward the bottom of said grate.

5. In a furnace, a plurality of slanting tubular grate bars arranged side by side, means for supporting the same, and primary and secondary air chambers in communication with the ends of said grate bars, the secondary air chamber extending below the body portions of said grate bars, the upper ends of adjacent grate bars having abutting portions forming between them chambers opening downwardly to the primary air chamber and upwardly to the upper surface of said bars adjacent to the upper ends of said bars.

6. In a furnace, a plurality of slanting tubular grate bars arranged side by side, and means for supporting the same, each grate bar having projecting flanges on each side, the flanges of each grate bar extending beyond the flanges of an adjacent bar so as to form overlapping flanges, separated by draft spaces, and primary and secondary air chambers communicating with the ends of said grate bars, the secondary air chamber extending below the body portions of said grate bars, the upper ends of adjacent grate bars having abutting portions forming between them chambers opening downwardly to the primary air chamber and upwardly to the upper surface of said grate bars adjacent to the upper ends of said bars.

7. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, and means for supporting same, each grate bar having substantially horizontal laterally projecting flanges on each side, the flanges of adjacent grate bars arranged in overlapping relation and separated to provide draft spaces, the ends of said flanges directed toward the fuel supporting surfaces of the bars, being beveled toward the centers of their bars.

8. In a furnace, the combination of a plurality of slanting grate bars arranged side by side, and means for supporting same, each grate bar having substantially horizontal laterally projecting flanges on each side, the flanges of each grate bar extending beyond the flanges of an adjacent grate bar so as to form overlapping flanges separated by draft spaces, the upper edges of said bars and the ends of said flanges directed toward the fuel supporting surfaces of said bars, being beveled toward the centers of their bars.

JOHN VAN BRUNT.