J. S. SKELLY.

FURNACE AND GRATE BAR THEREFOR.

APPLICATION FILED OCT. 16, 1919.

1,354,346. Patented Sept. 28, 1920.

Fig. 1.

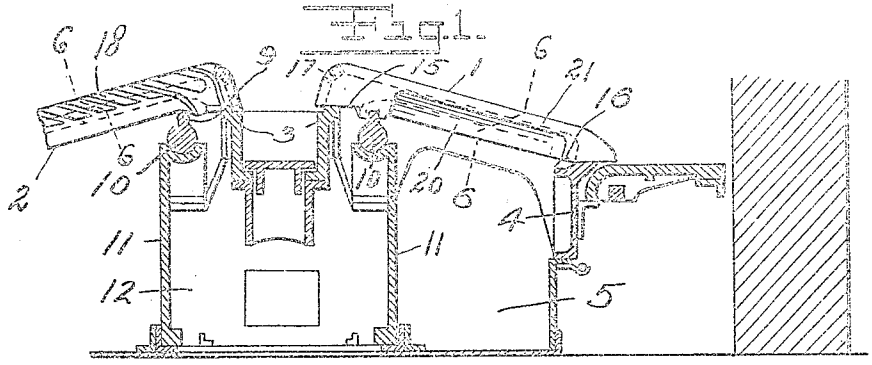


Fig. 2.

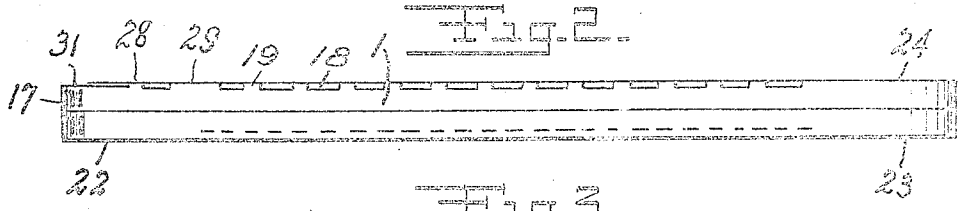


Fig. 3.

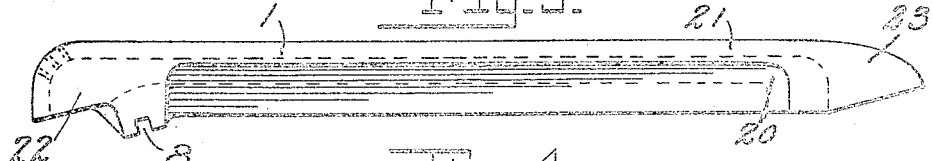


Fig. 4.

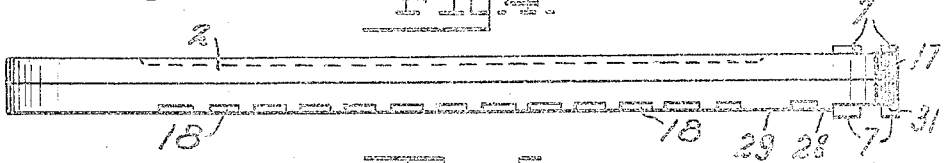


Fig. 5.

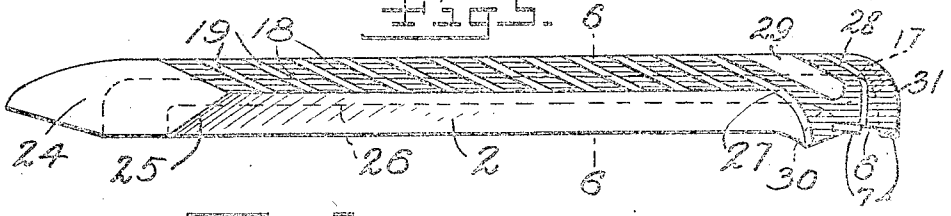
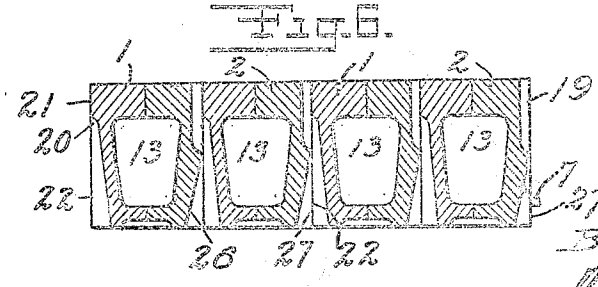


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FURNACE AND GRATE-BAR THEREFOR.

1,354,346. Specification of Letters Patent. Patented Sept. 28, 1920.

Application filed October 16, 1919. Serial No. 330,952.

To all whom it may concern:

Be it known that I, JOHN S. SKELLY, a citizen of the United States, residing at Monongahela, Washington county, State of Pennsylvania, have invented a certain new and useful Improvement in Furnaces and Grate-Bars Therefor, of which the following is a full, clear, and exact description.

My invention relates to a new and improved under-feed stoker furnace and grate bars therefor and has for its object to provide a grate having movable and stationary grate bars so closely adjacent as to prevent substantial downward sifting of fine coal and ashes and yet so constructed as to permit air to pass through the grate from bottom to top. It further has for its object to produce a non-sifting grate through which the air can pass freely and from which bars can be removed and replaced without disturbing the others. Heretofore grate bars have been spaced so as to permit air to freely pass upward between the bars at all points. This free passage made the spacing such as to permit considerable ashes and fine coal to fall downward. In order to prevent this falling, overlapping flanges have been placed between adjacent bars tending to retard the downward sifting of ashes and coal. Such flanges or ribs, however, produce a needlessly heavy and bulky grate element, and, furthermore, make it difficult to remove and replace bars when necessary or desired, and impossible to remove any bar without disturbing others.

One feature of my invention consists in forming recesses in one of each two opposing faces of adjacent bars, the lower ends of which recesses are in communication with the air chamber below the grate. Another feature consists in cutting away the lower portion of the other opposing face so as to secure the communication above referred to. Another feature consists in placing the bars so close together as to substantially prevent sifting of ashes and fine coal, this being possible because the spaces between the bars are not relied on for the passage of air.

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

Figure 1 shows in plan a section of a furnace having a grate embodying my invention, the embodiment being shown for convenience in connection with a central retort having grate bars on each side;

Fig. 2 shows a plan view of one of the movable grate bars of the grate of Fig. 1;

Fig. 3 shows an elevation of one side of said bar;

Fig. 4 shows a plan view of one of the stationary bars of the grate;

Fig. 5 shows an elevation of one side of the same, and

Fig. 6 shows a transverse section of a plurality of movable and stationary bars on the line 6—6, Fig. 1.

Referring more particularly to the drawings, 1 are movable grate bars which alternate with stationary grate bars 2, there being as many such movable and stationary bars as are necessary to make up a grate of the desired length. The stationary bars 2 are supported at their upper ends by the side walls 3 of a retort, while the lower ends of both the stationary and movable bars are supported by the wall 4 of an air chamber 5. The stationary bars are provided with notches 6 into which the upper edge of the retort wall 3 fits so as to hold the stationary bars in fixed position. Adjacent to these notches are lateral projections 7, whose upper surfaces lie in the plane of the top of the retort wall so that they serve to support the upper ends of the movable grate bars and relieve the relatively thin upper wall of the retort from wear due to the movement of such movable bars. The movable bars are provided with downward extensions forming notches 8, into which extends the flange 9 of a rocker bar 10 supported by the wall 11 separating the air chamber 5 from the air chamber 12. The grate bars 1 and 2 are tubular, having longitudinal passages 13, as shown in Fig. 6, and being provided in their bottoms with ports at 15 and 16 so that, in the furnace shown, they receive at the ports 15 air from the chamber 12, some of which is discharged to fuel above the retort through twyers 17, while the balance passes through the tubular passages 13 and is discharged through the ports 16 into the air chamber 5 from which it passes upward through the grate to the superimposed fuel. The rocker bars 10 are caused to oscillate by suitable means in a well known manner, causing the movable bars to reciprocate. The construction

as thus far described is substantially the construction of the furnace of the patent to W. R. Wood, No. 818,010, dated April 17, 1906, which shows one of the types of stoker furnaces in which my invention can be embodied.

In embodying my invention, I construct the grate bars so that when they are assembled one of each pair of opposing faces is provided with elongated recesses 18, which extend from the top surface of the bars in which they are located to at least the medial portion of their sides, these recesses being so disposed that their longitudinal axes are approximately horizontal when the grate bars are installed, as shown in Fig. 1, the partitions 19 between the recesses being also approximately horizontal. The other opposing face has its lower portion cut away from a point near its top downward so as to form a longitudinal recess 20 substantially parallel to the axis of its bar and leave at the upper portion a laterally projecting longitudinal flange 21, which is also parallel to the axis of its bar. The flanges 21 when the bars are assembled are in close proximity to the vertical faces of the partitions 19, but engage the upper portions of those partitions only so that the lower portions of the recesses 18 are in direct communication with the recesses 20 formed in adjacent bars below the flange 21, and through them with the air chamber 5.

In practice I prefer to have the bars so constructed that of a given series of bars all the sides facing in one direction shall be provided with recesses 18, while the other sides of the bars are provided with recesses 20 and flanges 21. As a result the bodies of both the movable and stationary bars will have the same configuration, the differences being at their upper ends, said differences consisting in the means for providing the notch 8 on the movable bars, the projections 7 on the stationary bars and the notch 6.

The faces containing the cut-away portions 20 and flanges 21 have at their respective ends two surfaces 22 and 23, which are vertical and extend from top to bottom. The surfaces containing the recesses 18 have at their lower ends portions 24 which lie in vertical planes extending upwardly from the bottom on the several bars and beginning at the ends 25 of inclined portions 26 upon the lower parts of the central portions of the faces containing the recesses 18. The upper end of each bar is provided on the side containing the recesses 18 with two ribs 27 and 28, extending upwardly from the bottom and whose faces lie in a vertical plane corresponding to the vertical plane of the partitions 19 and surface 24. Between these ribs is a projection 29 whose face is in the same plane as the faces of ribs 27 and 28, thus forming a bifurcated passage 30 the lower end of which connects with the air chamber 12 so that some air passes directly from that chamber between the upper ends of the bars to the fuel above said ends, thus reducing the tendency of the air to pass between the bars from the chamber 12 to the chamber 5. The portion 31 of the face beyond the rib 28 is slightly cut away, as shown in Figs. 2 and 4, so that two adjacent bars do not contact at their extreme upper ends, this provision being for the sake of reducing the lateral friction.

In the operation of the furnace as shown air under pressure is fed to the air chamber 12, from whence some of it passes through the passages 30 between the bars, while the remainder passes into the ports at 15. Of the air which passes into the ports 15 some is discharged through the twyers 17, while the rest traverses the passages 13 in the bars and is discharged through the ports 16 into the air chamber 5, from whence it passes upward through the spaces provided by the longitudinal recesses 20 and the elongated recesses 18 to the superimposed fuel. The bars 1 and 2 are placed so close together as not to permit any considerable amount of ashes or fine coal to fall between them and each movable bar is independently removable and replaceable without disturbing any others, while the stationary bars 2 are removable upon the removal of a movable adjacent bar 1. Since one of any two opposing faces of adjacent bars is provided with a series of elongated recesses 18 extending from the top of their bar approximately to the medial line, while the lower portion of the other opposing face is cut away as at 20 so as to uncover the lower ends of said elongated recesses, those lower ends are in communication with the air chamber 5, with the result that although the bars 1 and 2 may be closer together than was permissible in the grate of Wood Patent No. 818,010 above referred to, air can pass freely through the grate which they compose to the superimposed fuel.

From the foregoing it will be seen that I rely on the closeness of the opposing sides of two adjacent bars to prevent the sifting of ashes and coal, and secure the free passage of air through the grate by means of recesses in said sides. The air which passes through said recesses tends to blow to the top of the grate any ashes or fine coal which may sift part way between the bars and the fact that the air in passing from the chamber 5 and through the recesses 18 follows a somewhat tortuous path results in its swirling, so that it is more apt to pick up and carry along such sifting ashes or coal.

The dimensions of the grate bars hereinabove described can be kept the same as those of the grate of Patent No. 818,010, and yet sifting can be substantially pre-

vented and a free passage of air through the grate permitted without interfering with their removability.

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. A tubular grate bar provided with inlet and outlet openings in its bottom and having in the upper portion of one side a plurality of elongated recesses arranged at acute angles to the longitudinal axis of the bar and on the other side adjacent to the bottom of the bar a longitudinal recess parallel to the longitudinal axis of the bar, and adapted to communicate with the elongated recesses of a similar bar when placed adjacent thereto.

2. A tubular grate bar provided with inlet and outlet openings in its bottom and having in the upper portion of one side a plurality of elongated recesses arranged at acute angles to the longitudinal axis of the bar, and having on its other side a longitudinal recess adjacent to its lower edge and substantially parallel with the longitudinal axis of said bar, said elongated recesses extending to approximately the central portion of the side of the bar in which they are formed, and adapted to communicate with the longitudinal recess of a similar bar when placed adjacent thereto.

3. In a furnace, a plurality of inclined bars arranged adjacent to one another, the sides of said bars facing in one direction having a plurality of approximately horizontal elongated recesses arranged at acute angles to the longitudinal axes of said bars, the other sides of said bars having adjacent to their lower edges longitudinal recesses communicating with elongated recesses of adjacent bars, and means for directing air through said longitudinal and elongated recesses.

4. In a furnace, the combination of a retort, a plurality of grate bars supported adjacent thereto and inclined downwardly away from said retort, one of each two opposing faces of adjacent bars being provided with approximately horizontal elongated recesses at an angle to the longitudinal axis of their bar and one opposing face having adjacent to its lower edge a longitudinal recess parallel to the longitudinal axis of its bar and communicating with the elongated recesses, the ends of said bars having contacting vertical faces, and means for directing air through said longitudinal and elongated recesses.

5. In a furnace, a plurality of inclined grate bars arranged adjacent to one another, an air chamber beneath them, the opposing faces of said bars being so close as to prevent the substantial downward sifting of fine coal and ashes, one of each pair of opposing faces having approximately horizontal elongated recesses formed in its upper portion at an acute angle to the axis of said bar and the lower part of the other of each pair of opposing faces being cut away so that said recesses are connected with the air space beneath the grate so as to permit the free passage of air through said grate, the upper and lower end portions of said bars being provided with vertical side faces extending upward from the bottoms of said bars.

JOHN S. SKELLY.