W. C. ARMSTRONG.

GRATE.

APPLICATION FILED DEC. 10, 1914.

1,178,698.

Patented Apr. 11, 1916.

2 SHEETS—SHEET 1.

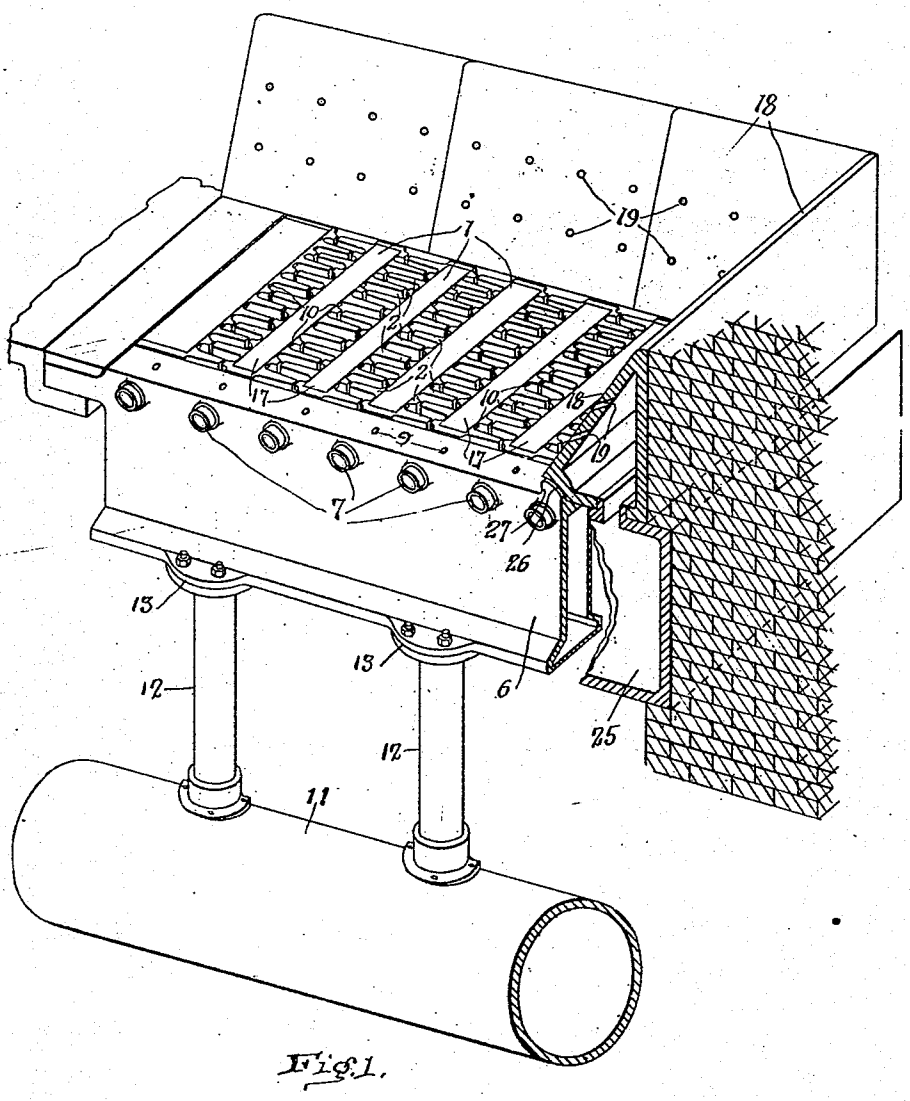


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

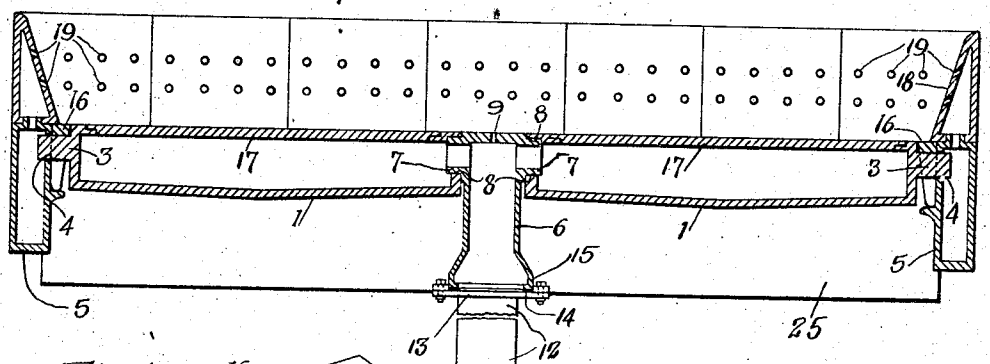


Fig. 4.

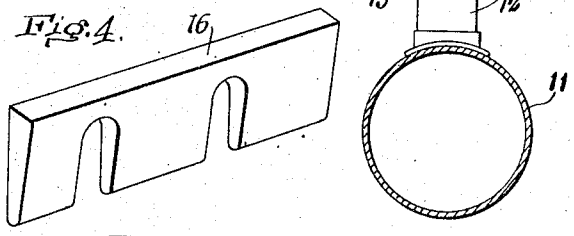


Fig. 3.

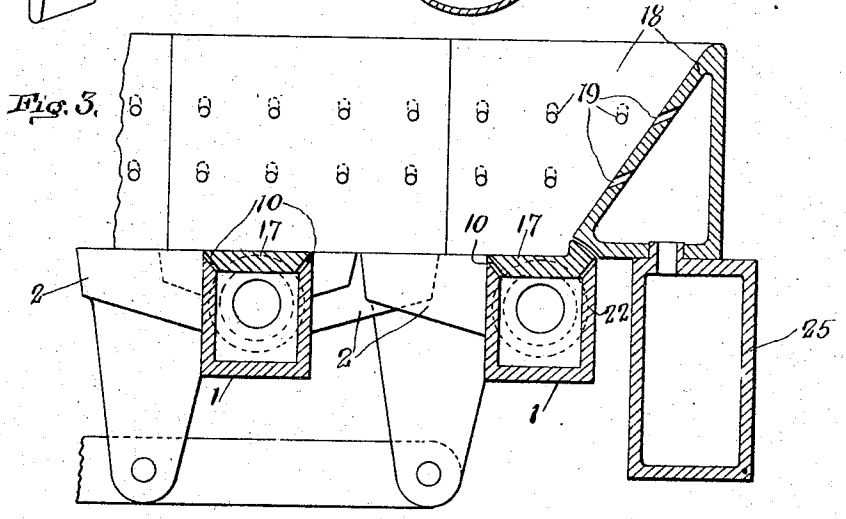
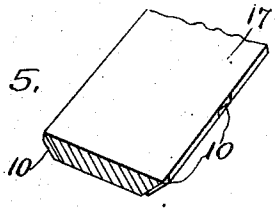


Fig. 5.



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UNITED STATES PATENT OFFICE.

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GRATE.

1,178,698. Specification of Letters Patent. Patented Apr. 11, 1916.

Application filed December 10, 1914. Serial No. 876,436.

To all whom it may concern:

Be it known that I, WILLIAM C. ARMSTRONG, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Grates, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to grates and while it is designed more particularly for furnace grates it is applicable to grates of various kinds.

The object of the invention is to provide a shaking grate with an air blast, and, to this end, it is a further object of the invention to so construct the grate bars and the supports therefor that a blast of air can be forced through the grate bars into the fuel without in any way interfering with the shaking or rocking operation of the grate bars.

Further, it is an object of the invention to so construct the grates that all the bars including the end bars, can be rocked, thus preventing the accumulation of cinders at the end of the grate.

It is also an object of the invention to provide a protecting wall about the edge of the grate which will be interposed between the fire on the grate and the furnace walls and will be hollow to permit a blast of air to pass through the same and will be so shaped as to cause the ashes and cinders to collect on the rocking grate bars and prevent their accumulating on a fixed surface.

In the accompanying drawings, Figure 1 is a perspective view of a portion of a furnace grate embodying my invention; Fig. 2 is a transverse, sectional view of such a grate, showing the grate bars in longitudinal section; Fig. 3 is a longitudinal, sectional view of a portion of such a grate showing the grate bars in transverse section; Fig. 4 is a detail view of the retaining block; and Fig. 5 is a sectional detail view of the top plate of one of the grate bars.

In carrying out my invention I so mount the grate bars that they are movable about longitudinal axes. Each grate bar is provided with a longitudinal conduit and is further provided with openings to permit air, steam or the like to pass from the conduit through the fuel on the grate. The grate bars are supported by a hollow frame member which communicates with the longitudinal conduits of the grate bars through the bearings thereof. This arrangement is such that the air blast can be used without in any way interfering with the rocking motion of the grate bars.

In the accompanying drawings, I have illustrated one embodiment of my invention and have shown the same as applied to a double grate, that is, a grate comprising two series of grate bars, the bars of the two series being independently movable. Each grate bar comprises a hollow body portion 1 and, as here shown, is in the form of a shell hollow throughout its entire length and is provided on each side with a series of laterally extending fingers 2, the fingers on the adjacent grate bars interlocking. It will be understood, however, that the fingers are not an essential part of the invention and in grates for use with some types of furnaces they are omitted. Each grate bar is provided with means for supporting the same for movement about a longitudinal axis. In the present instance the grate bars are provided at their outer ends with trunnions 3 journaled in bearings 4 formed in the hollow frame members 5. The inner ends of the grate bars of both series are supported by a single hollow frame member 6 which not only supports the grate bars but forms a conduit for the air and is connected with the side frame members 5 by means of a hollow frame member 25 extending across the rear of the grate and connected to and in open communication with the hollow frame members 6. The hollow grate bars are so journaled on the frame member 6 that they will be in open communication with said hollow frame member. To this end one of the parts is provided with a hollow trunnion and the other with a bearing to receive that trunnion. In the present arrangement the hollow frame member 6 is provided on its opposite sides with a series of hollow trunnions 7, one for each grate bar, and the inner ends of the grate bars have bearings 8 formed in the end walls thereof to receive the trunnion and rotatably support the grate bar thereon. The top wall of the hollow frame member 6 is preferably provided with a series of openings 9 to permit of the escape of the air through the

same into the fuel and each of the hollow grate bars 1 is provided with a series of openings 10 for this same purpose. In the present instance these openings extend through the lateral edges of the top walls 17 of the grate bars and are arranged between adjacent teeth so that the air is permitted to pass from the conduits in the grate bars into the fuel that rests upon the grate bars. Preferably, these top walls are removable and have their lateral edges beveled to enable the plate or top wall to seat upon the beveled upper edges of the side walls of the grate bar. In the present instance the openings or air ports are provided by forming notches in the beveled edges of the top plates. The bevels do not extend to the top surface of the plate and, consequently, the ports may be formed therein entirely beneath the top surface of the grate.

By arranging the outlet ports 10 slightly below the surface of the grate the liability of cinders or ashes entering the openings is materially reduced without in any way reducing the efficiency of the blast, and by forming the ports in the removable top plate of the grate bar it is possible by changing these plates to provide the grate bars with openings or ports of different sizes to accommodate the same to different kinds of fuel or for other purposes. The air blast may be delivered to the hollow frame member 6 from any suitable source. In the present instance an air blast pipe 11 of suitable proportions extends lengthwise of the frame member beneath the same and preferably beneath the floor of the ash-pit and is connected with the bottom wall of the frame member by a series of connecting pipes 12. The connection between the pipe 12 and the frame member is preferably formed by means of a sliding collar 13 mounted about the pipe 12 and adapted to be drawn upward and to clamp a packing 14 against an annular surface 15 surrounding the inlet opening for the frame member, thereby providing a joint which is very quickly made and which will be tight.

In order that the grate bars may be removed and reassembled without difficulty I have elongated the trunnion 3 at the outer ends of the grate bars and have spaced the outer ends of the grate bars away from their supporting frame members a distance equal to or greater than the length of the trunnions 7 which support the inner ends of the grate bars. Thus, each grate bar can be moved lengthwise a distance sufficient to disengage the inner end thereof from its supporting member and then moved in the opposite direction to withdraw the trunnion 3 from its bearing. To retain the grate bars normally against longitudinal movement and prevent the accidental separation of the bearings I have provided a retaining block in the form of a U-shaped collar 16 which fits between the end of the bearing in the supporting frame 5 and the adjacent end of the grate bar, thus effectually preventing the removal of the grate bar while the retaining block is in position. In the construction here shown I have formed these retaining blocks in integral groups, thus preventing any turning of the individual blocks which might cause them to be displaced. In the present instance I have provided above the side and end frame members, 5 and 25, a tubular box-like member 18 which is hollow and is provided with air ports 19, whereby a blast of air can be caused to circulate through the same and into the space above the grate. This device constitutes a protector for the brick walls of the furnace about the sides of the fire box and is connected at one or more points with the hollow frame members, which form conduits and are connected with the central frame member or conduit 6. Preferably, the inner wall of the hollow protector is inclined so as to cause the ashes or cinders which may come in contact therewith to gravitate onto the grate bars, it being noted that the lower edge of this inner wall projects over the retaining block 16 and is close to the ends of the several grate bars. This hollow protector preferably is formed of separately removable sections and extends on three sides of the grate, although, of course, the spacing blocks are provided only at the ends of the grate bars.

It will be noted that the frame members 5 are tied together at their rear ends by the hollow bar 25 upon which the rear portion of the protector 18 rests. This enables me to mount the rear grate bar, as shown at 22, for rotation in the same manner as the other grate bars are mounted. In ordinary shaking furnaces this grate bar is rigid and does not dump the cinders when the grate is rocked. By the construction herein shown all the grate bars are movable and inasmuch as the inclined wall of the protector 18 prevents the accumulation of ashes or cinders upon any fixed part at the edges of the grate it will be apparent that the rocking of the grates will effectually remove all the ashes and cinders. Preferably, the lower edge of the inner wall of the rear protector extends forward over the rear edge of the rear grate bar and to permit the movement of the grate bar and at the same time to keep the space at the rear edge thereof closed so that cinders will not accumulate between the grate bar and the fixed wall, either when the grate bar is in its normal position or is in its dumping position, I have provided the inner edge of the protector with a curved recess 26 within which fits a projection 27 extending longitudinally of the grate bar and arranged at the rear edge

thereof. It will also be apparent that while I have shown the invention as applied to a double grate and have utilized a single hollow supporting frame member for the adjacent ends of the two sets of grate bars, a separate hollow supporting frame may be used for each set of grate bars, whether the grate consists of one set or a series of sets, the essential feature being the provision of a hollow supporting frame which will form a conduit through which the air may be carried to the hollow grate bars. Further, it will be apparent that while I have shown the trunnions as secured to the hollow frame member and the bearings as formed in the ends of the grate bars, this arrangement can be reversed or otherwise modified without departing from the invention.

While I have shown and described one embodiment of my invention it will be understood that this has been chosen for the purposes of illustration only and that I do not desire to be limited to the details of construction shown and described, for obvious modifications will occur to a person skilled in the art. Further, it will be understood that while I have referred to the conduits as being used for air they are equally useful for steam or any other fluid which may be used for a similar purpose.

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

1. In a grate, a series of parallel grate bars, frame members arranged along the respective ends of said grate bars to support the same, said grate bars being capable of longitudinal movement, whereby the same can be removed, a removable retaining block located between one of said frame members and the adjacent ends of said grate bars, and a removable wall located above and overlapping said retaining block to hold the same in place.

2. In a grate, a hollow frame member communicating with a source of air supply, hollow grate bars supported by said hollow frame member and communicating therewith, and a hollow box-like protector mounted on said hollow frame member and communicating therewith, said grate bars and the inner wall of said protector having openings therein, whereby air is admitted to the grate.

3. In a shaking grate, a series of parallel grate bars, frame members arranged along the respective ends of said grate bars to support the same, said grate bars and said frame members having coöperating bearings and trunnions, said grate bars being capable of longitudinal movement to separate said bearings and said trunnions, retaining blocks extending between one of said frame members and said grate bars to hold the same against lengthwise movement, a removable protector supported on said frame member, having an upwardly extending hollow body portion communicating with a source of air supply and projecting over said retaining blocks.

4. In a shaking grate, the combination, with a grate bar movable about a longitudinal axis, and a frame member extending parallel with said grate bar, of a protector mounted on said frame member, the lower inner corner of said protector and the rear edge of said grate bar having a coöperating longitudinally extending projection and recess to close the space between said grate bar and said protector.

5. In a grate, a hollow frame member communicating with a source of air supply, a plurality of hollow grate bars supported by said hollow frame member and communicating therewith, and a hollow-box-like protector mounted on said hollow frame member and communicating with the interior thereof, said hollow protector having an inner wall inclined upwardly and away from said grate, said grate bars and said hollow box-like protector having openings therein to communicate air to said grate.

6. In a grate, a hollow frame member communicating with a source of air supply, grate bars supported by said hollow frame member, and a hollow box-like protector inclosed on all sides and mounted on and supported by said hollow frame member and extending upwardly therefrom, said protector and said frame member having communicating portions, the inner face of said protector being provided with openings therein to allow air to be supplied above the grate.

7. In a grate, a hollow frame member communicating with a source of air supply, grate bars supported by said hollow frame member, a hollow box-like protector mounted on said hollow frame member and communicating with the interior thereof, said hollow protector having its inner wall inclined upwardly and away from said grate, said inner wall having openings therein to allow air to be supplied above the grate.

8. In a shaking grate, the combination, with a grate bar movable about a longitudinal axis, and a frame member extending parallel with said grate bar, of a hollow protector mounted on said frame member and communicating with a source of air supply, having an inclined inner wall and provided at its lower inner corner with a recess, said grate bar having a longitudinal projection along its rear edge extending into said recess to close the space between said grate bar and said protector.

9. In a grate, a frame member, grate bars mounted on said frame member, and a hollow box-like protector inclosed on all sides supported by said frame member, extending

upwardly therefrom and communicating with a source of air supply, said protector having its inner lower corner projecting inwardly to a point near said grate bars and having its inner face provided with openings whereby air may be supplied above the grate.

In testimony whereof, I affix my signature in presence of two witnesses.

WILLIAM C. ARMSTRONG.

Witnesses:
F. W. SCHAEFER,
H. L. HAMMAKER.