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FURNACE

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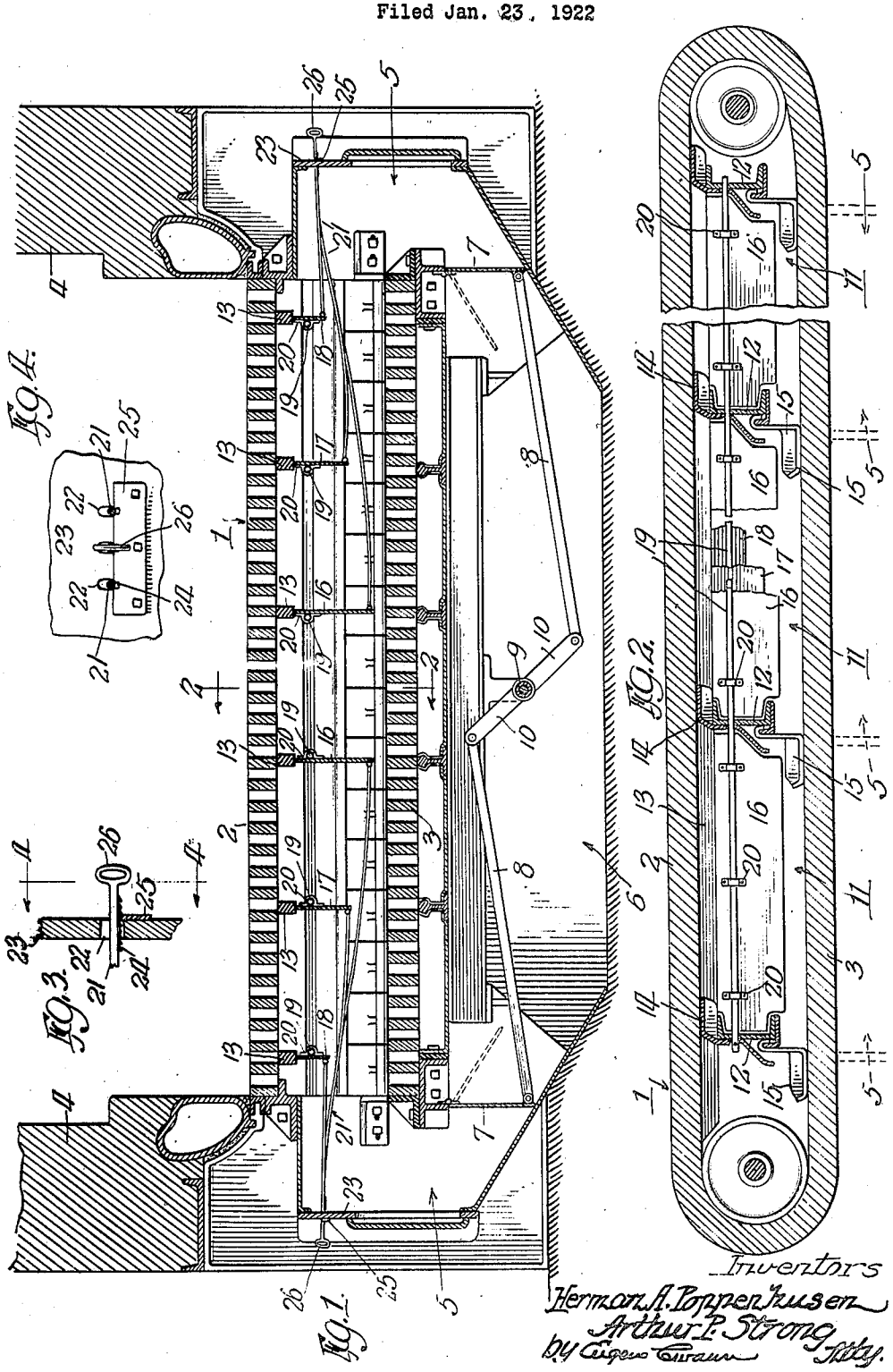

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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FURNACE.

Application filed January 23, 1922. Serial No. 531,075.

To all whom it may concern:

Be it known that we, HERMAN A. POPPENHUSEN and ARTHUR P. STRONG, both citizens of the United States, residing, respectively, at Hammond, in the county of Lake and State of Indiana, and Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces, and more particularly to furnaces equipped with mechanical stokers, such as chain grates, and provided with vertical air ducts at the sides of the grate for supplying the active grate surface from below with a forced draft delivered to the grate between the upper and lower leads thereof.

One object of our invention is to provide means beneath the active grate surface and in the path of air flow for directing the air upward toward the grate at a plurality of spaced points for placing all portions of the grate under an active and efficient draft.

Another object of our invention is to make said means adjustable so that the amount of draft delivered to the various sections of the grate may be regulated to suit the kind of fuel being handled, the rate of feed thereof through the combustion chamber on the grate, and the distance of the fuel sections from the draft inlet.

A further object of our invention is to provide said means in the form of baffle plates, vertically arranged and pivotally mounted beneath said grate surface, and also to vary the vertical height of said plates and to arrange the ones greatest in height farthest from the draft inlets.

The invention consists further in the matters hereinafter described and more particularly set forth in the appended claims.

In the accompanying drawings—

Fig. 1 is a transverse, vertical sectional view of a furnace embodying the features of our invention;

Fig. 2 is a longitudinal sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a view of a detail of construction to be hereinafter described; and

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 3.

In the drawings, there is shown a furnace of the type embodying a mechanical stoker, such as a chain grate 1 located in the combustion chamber of the furnace and having upper and lower leads 2 and 3. Said grate 1 extends into said combustion chamber through the front wall (not shown) of the furnace setting and also extends across the combustion chamber between the side walls 4, 4 thereof, as in furnaces of this general type and as illustrated in Fig. 1.

At the sides of the grate 1 are vertical air ducts 5, 5 opening into the space between the grate leads 2 and 3, as shown in Fig. 1. These ducts 5 communicate at their lower ends with a main supply conduit 6 located beneath the lower lead 3 and arranged between said ducts 5, as shown. Hinged damper plates 7, 7, one for each vertical duct 5, control the supply of draft to the vertical ducts 5 from the main supply conduit 6. The dampers 7, 7 are connected by rods 8, 8 with a rock shaft 9 through arms 10, 10 on the same, for swinging the dampers open and closed, the same as shown and described in detail in the pending application filed December 14, 1921, Serial No. 522,361, by Herman A. Poppenhusen.

The space between the grate leads 2 and 3 is divided transversely into a plurality of compartments 11, 11, as shown in Fig. 2. These compartments 11, 11 open at the sides of the grate into the associated vertical ducts 5, and receive draft from opposite sides of the grate through said ducts. The flow of air into each compartment 11 from its side ducts 5, 5 is in a plane substantially parallel to the grate leads 2 and 3. These compartments 11, 11 are formed by transverse channel members 12, 12, which fit up against the under sides of the skids 13, 13, laterally spaced apart and extending lengthwise of the grate 1. Said skids 13, 13 support the upper grate lead 2, as shown. In connection with the channel members 12, 12, there are shoes 14, 15 bearing, respectively, against the grate leads and forming air seals between the compartments 11, 11 along said channel members, as described in detail in said pending application.

Located in each compartment 11 are a plurality of vertically arranged baffle plates, one extending downward from each skid 13,

as shown in Fig. 1. This makes the plates in each compartment 11 spaced apart lengthwise of the compartment the same distance as are the skids. The plates are arranged in sets on opposite sides of the longitudinal center line of the grate 1, and in the construction shown in the drawings there are three of such plates 16, 17, and 18 on each side of such center line and with the plates decreasing in height from the center plates 16 outward toward the sides of the grate. This gives the center or innermost plate 16 of each set a vertical dimension greater than any of the rest in the set, and the outermost one 18 the shortest. The center plates 16 terminate short of the lower grate lead 3 and naturally the others do likewise only to a greater extent.

The two sets of plates 16 to 18 in each compartment 11 have a pivotal mounting therein. This is accomplished in the construction shown by the use of horizontal rods 19, 19 extending lengthwise of the grate between the upper and lower leads thereof and through the several channel members 12. The plates are secured to said rods by straps 20, 20, as shown in Figs. 1 and 2. To swing the plates about the rods 19 and thus adjust the plates for the purpose to be presently described, adjusting rods 21, 21 are provided, one for each plate and connected at its inner end thereto. The rods 21, 21 for one set of plates extend outward through one side of the furnace and the rods for the other set extend beyond the other side of the furnace, as shown in Fig. 1. These rods extend across their associated vertical ducts 5 and out through holes 22 in the door frames 23. To hold the rods 21 in any position of endwise adjustment, they have teeth 24 on their under sides at the holes 22 to engage the upper edges of plates 25 secured to the frames 23, as shown in Figs. 3 and 4. To facilitate grasping and moving said rods, they have handles 26 at their outer ends, as shown.

The supply of air to the compartments 11, 11 from the conduit 6 is around the sides of the grate 1 through the vertical ducts 5, 5. The flow of air into each compartment 11 is thus from opposite sides of the grate and toward the center thereof in a general direction substantially parallel to the grate leads 2 and 3 and between them. The plates 16 to 18 in each compartment being in the path of these air streams, intercept the air and cause it to be directed toward the upper grate lead 2 at a plurality of points before reaching the center of the grate, thus placing the upper grate lead 2 under draft through the entire width of the grate. The plates 16 to 18 arresting the motion of the air, by changing the direction of flow, produces static pressure which when released flows upward through the upper grate lead 2 and through the fuel bed carried thereon at a velocity sufficient to supply the fuel bed with an active and efficient draft. The plates 16 to 18 thus act to scoop the air from the incoming air streams and direct it toward and through the fuel bed. Thus the likelihood of the two air streams meeting at the center of the grate and being directed upward by the resultant force and there blowing through the fuel bed at a too high velocity, while the remaining portions of the grate lead 2 on opposite sides of the longitudinal center are supplied with very little draft, is avoided. The plates 16 to 18 in each set varying in vertical height as described insures a judicial distribution of the draft over the entire grate surface. By adjusting the plates, through the rods 21, the amount of draft supplied to the various grate sections over the compartment 11 may be varied and regulated to suit the actual working conditions of the furnace, depending on the kind of fuel being handled and the rate of fuel feed.

While we have shown and described herein in detail a structure embodying the features of our invention, it is of course understood that the details of construction and arrangement of parts illustrated may be variously changed and modified without departing from the spirit and scope of our invention.

We claim as our invention:

1. In a furnace, the combination of a grate, a plurality of compartments beneath the fuel supporting portion of said grate and opening upward toward the same throughout their lengths, means for supplying air to said compartments, and means in each compartment and arranged along the length thereof for directing varied amounts of draft toward different areas of said grate thereover.

2. In a furnace, the combination of a grate, means for supplying air to the under side of the fuel supporting portion of said grate from opposite sides thereof and in a plane substantially parallel thereto, and a plurality of vertically arranged baffle plates beneath said grate portion and between the air inlets at the sides thereof, said plates varying in vertical height and being arranged transverse to the incoming air streams from said inlets for directing varied amounts of draft toward different areas of said grate portion for placing the same under draft.

3. In a furnace, the combination of a grate, means for supplying air to the under side of the fuel supporting portion of said grate from opposite sides thereof and in a plane substantially parallel thereto, a plurality of vertically arranged baffle plates pivotally mounted beneath said grate portion and between the air inlets at the sides

thereof, said plates being arranged transverse to the incoming air streams from said inlets for directing the air toward different areas of said grate portions for placing the same under draft, and means for adjusting said plates independently of each other for varying the amounts of draft delivered to said grate areas.

4. In a furnace, the combination of a grate, means for supplying air to the under side of the fuel supporting portion of said grate from opposite sides thereof and in a plane substantially parallel thereto, and a plurality of vertically arranged baffle plates beneath said grate portion and between the air inlets at the sides thereof, said plates being arranged transverse to the incoming air streams from said inlets for directing the air toward different areas of said grate portion for placing the same under draft, said plates being arranged one behind the other and increasing in height from the air inlets toward the center of the grate for directing varied amounts of air to said grate areas.

5. In a furnace, the combination of a grate, means for supplying air to the under side of the fuel supporting portion of said grate from opposite sides thereof and in a plane substantially parallel thereto, a plurality of vertically arranged baffle plates pivotally mounted beneath said grate and between the air inlets at the sides thereof, said plates being arranged transverse to the incoming air stream from said inlets for directing the air toward different areas of said grate portion, said plates increasing in vertical height from the air inlets toward the center of the grate, and means for adjusting said plates independently of each other for varying the amounts of air supplied to said grate areas.

6. In a furnace, the combination of a grate, a plurality of transverse compartments beneath the fuel supporting portion of said grate and opening upwardly toward the same, means for supplying air to said compartments from one side of the grate, and a plurality of vertical baffle plates in each compartment and arranged transverse to the air flow for directing the air toward different areas of the grate portion over said compartment, said plates varying in vertical height for delivering different amounts of draft to said grate areas.

7. In a furnace, the combination of a grate, a plurality of transverse compartments beneath the fuel supporting portion of said grate and opening upwardly toward the same, means for supplying air to said compartments from one side of the grate, a plurality of vertical baffle plates pivotally mounted in each compartment and arranged transverse to the air flow for directing the air toward different areas of said grate over said compartment, and means accessible from the exterior of the furnace and connected with said plates for adjusting the same independently of each other for varying the amounts of draft supplied to the grate areas.

8. In a furnace, the combination of a grate, a plurality of transverse compartments beneath the fuel supporting portion of said grate and opening upward toward the same, means for supplying air to said compartments from opposite sides of the grate, and a plurality of vertical baffle plates in each compartment and arranged transverse to the incoming air streams from opposite sides of the grate, said plates in each compartment increasing in height from the air inlets toward the center of the grate for directing various amounts of air toward different areas of the grate portions over said compartments.

9. In a furnace, the combination of an endless chain grate having upper and lower leads, skids extending longitudinally of said grate beneath the upper lead thereof for supporting the same, means for dividing the space between said grate leads into a plurality of compartments opening upwardly toward said upper lead, baffle plates in said compartments and arranged one beneath each of said skids, said plates extending downward from said skids and terminating short of the lower grate lead, means for pivotally mounting said plates beneath said skids, means accessible from the exterior of the furnace and connected with said plates for adjusting the same about their pivots independently of each other, and means for supplying air to said compartments around the sides of the lower lead.

10. In a furnace, the combination of an endless chain grate having upper and lower leads, skids extending longitudinally of said grate beneath the upper lead thereof for supporting the same, means for dividing the space between said grate leads into a plurality of compartments opening upwardly toward said upper lead, baffle plates in said compartments and arranged one beneath each of said skids, said plates extending downward from said skids and terminating short of the lower grate lead, rods extending longitudinally of said grate through said compartments and beneath said skids, means connecting said plates to said rods, rods extending through the sides of the furnace and connected with said plates for adjusting the same independently of each other about said rods, and means for supplying air to said compartments about the sides of the lower lead.

11. In a furnace, the combination of an endless chain grate having upper and lower leads, means dividing the space between said grate leads into a plurality of trans-

verse compartments opening upwardly toward said upper lead, vertical air ducts at opposite sides of said grate for supplying air to said compartments, a main supply conduit beneath said lower lead and common to all of said vertical ducts for supplying air thereto, and means in each of said compartments for directing the air to different areas of the upper lead over said compartments.

In testimony that we claim the foregoing as our invention, we affix our signatures this 20th day of January, A. D. 1922.

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