E. F. KRELL.

FURNACE STOKER.

APPLICATION FILED MAR. 11, 1911.

1,082,126.

Patented Dec. 23, 1913.

3 SHEETS—SHEET 1.

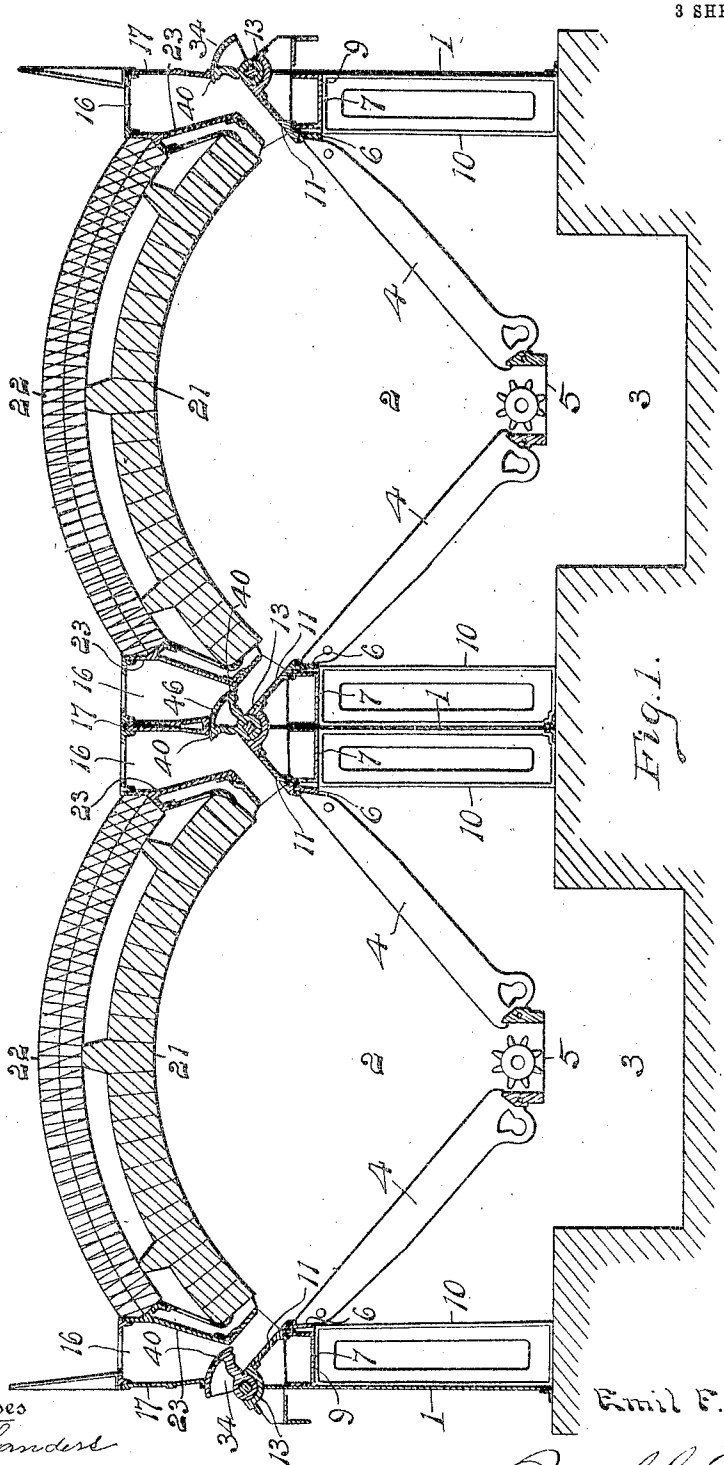


Fig. 1.

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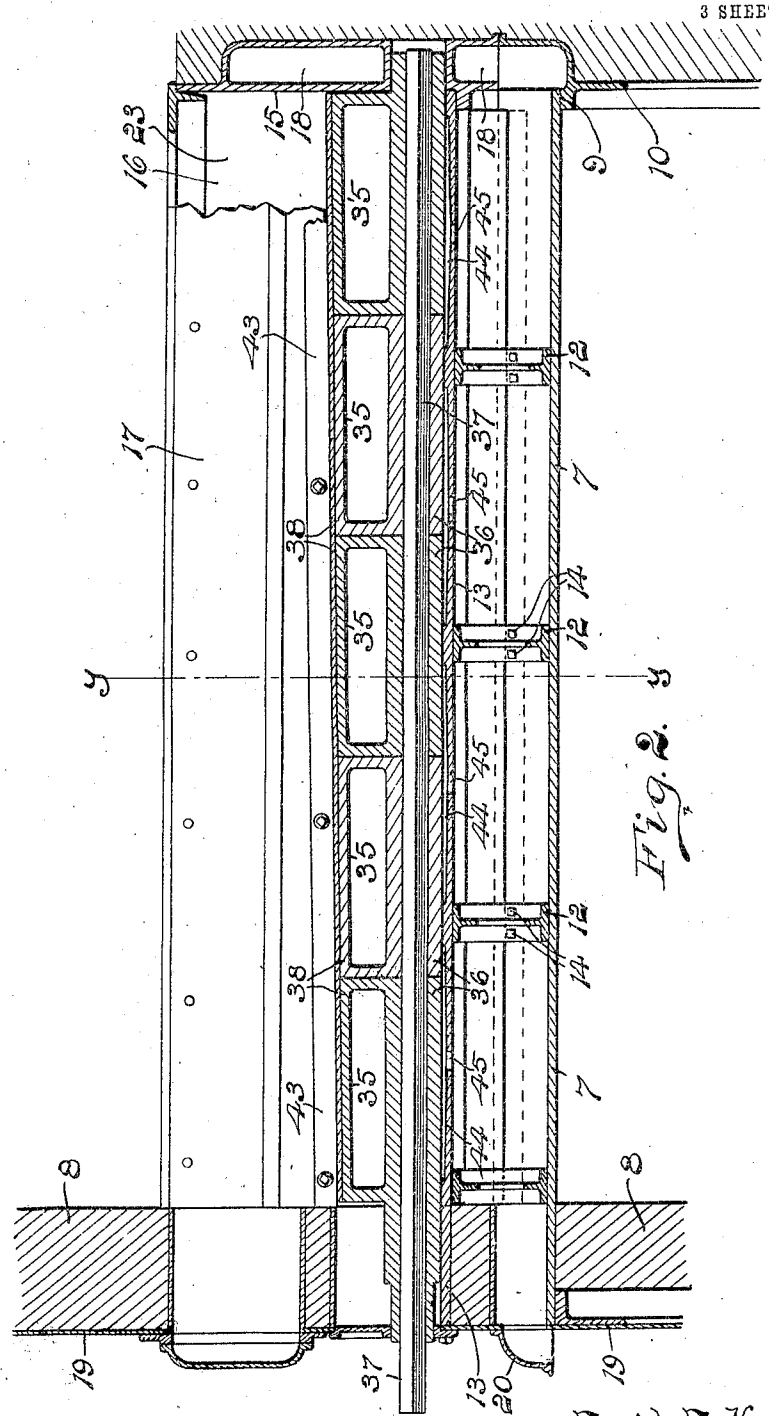


Fig. 2.

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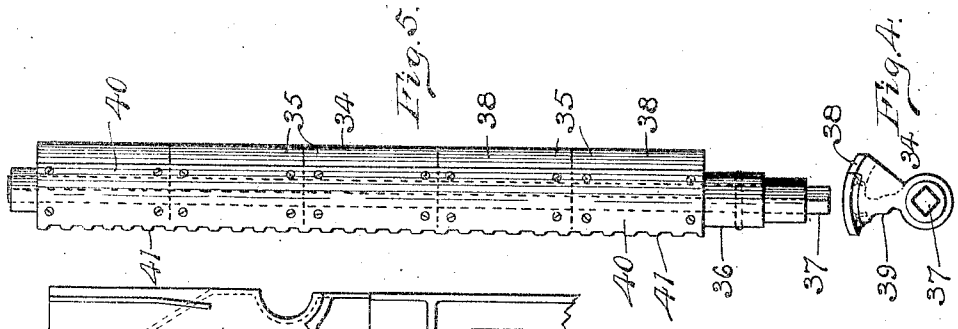


Fig. 5.

Fig. 4.

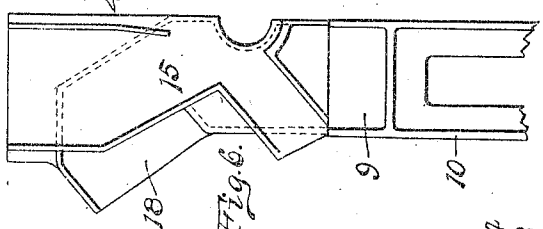


Fig. 6.

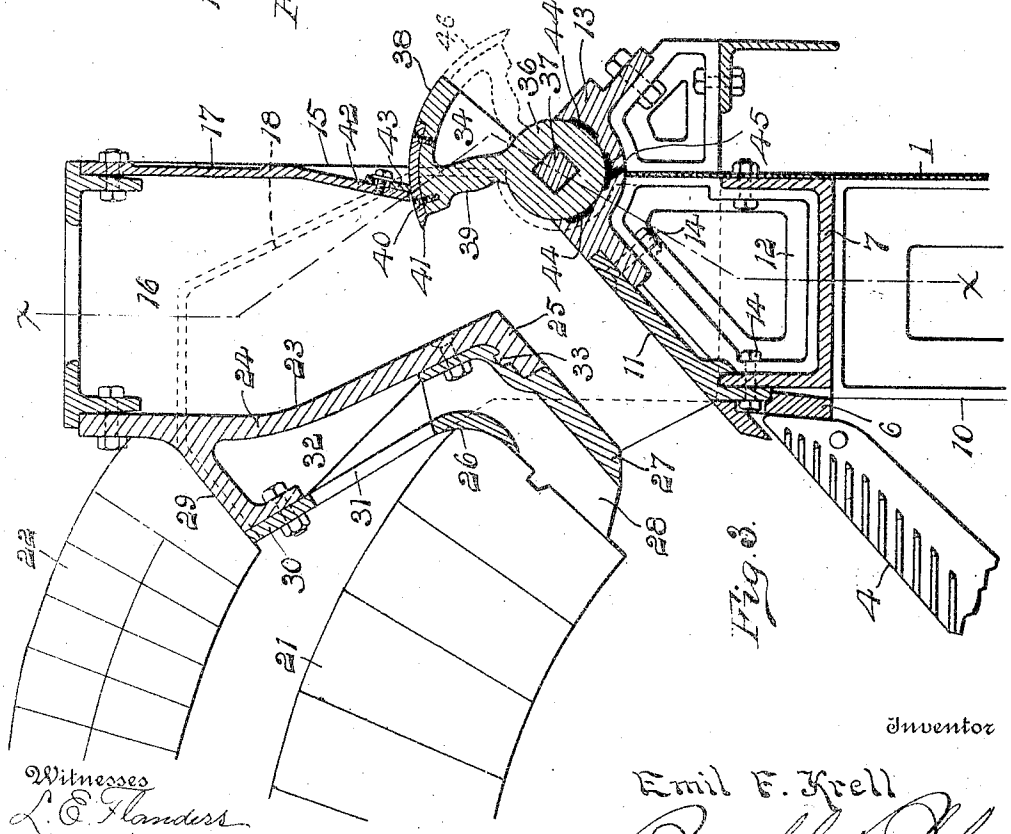


Fig. 3.

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UNITED STATES PATENT OFFICE.

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FURNACE-STOKER.

1,082,126. Specification of Letters Patent. Patented Dec. 23, 1913.

Application filed March 11, 1911. Serial No. 613,679.

To all whom it may concern:

Be it known that I, EMIL F. KRELL, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Furnace-Stokers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in furnaces and more particularly to automatic stoking furnaces in which the coal is mechanically fed from a hopper directly to the grate bars.

The object of the invention is to provide a simple and cheap construction in which a very compact arrangement of parts is secured and which is very efficient in its operation, giving a positive even feed which may be regulated at will and which may be operated by a minimum of power, the arrangement being such that the feeding of the coal is greatly assisted by gravity.

A further object of the invention is to so construct the feeding mechanism that a greater amount of coal will be fed in at one end of the furnace than at the other, and to provide certain other new and useful features in the construction and arrangement of parts, all as hereinafter more fully described, reference being had to the accompanying drawings in which,

Figure 1 is a transverse vertical section through a pair of furnaces embodying the invention; Fig. 2 is an enlarged longitudinal section through one of the magazines, substantially upon the line *x*—*x* of Fig. 3; Fig. 3 is a transverse vertical section of Fig. 2 on the line *y*—*y*; Fig. 4 is an end view of the oscillatory feed bar detached; Fig. 5 is a plan view of the same; and Fig. 6 is an elevation of a casting forming the end of the magazine.

As shown in the drawings 1, 1 are the side or division walls of the furnace, 2 the fire chamber and 3 the ash pit located respectively above and below the oppositely and upwardly inclined grate bars 4 which are supported at their lower ends upon a grate bearer 5 located above the ash pit. The upper ends of the grate bars rest against supporting bars 6 secured to channel bars 7. These channel bars are supported with their channel sides uppermost by their engagement at their forward ends with brackets on the furnace front through openings in the front wall 8 of the furnace and at their rear ends by their engagement with suitable pockets 9 provided to receive them in end supporting frames 10. These channel bars thus form horizontal air passages, the tops of which passages are formed by coking plates 11 which are supported at an inclination substantially the same as the inclination of the grate bars, by a series of open brackets 12 secured within each channel bar and by their engagement along their lower edges with the inner flanges of the channel bars. Along its upper edge each coking plate engages a suitable flange upon a bearing member or casting 13 to which it is secured by bolts 14, said bolts also passing through flanges on the brackets 12. These bearing members 13 are supported intermediate their ends by the brackets 12 and at their front ends by the front wall 8 of the furnace. The rear ends of the bearing members are supported by suitable flanges on members or castings 15, which form the rear end walls of fuel magazines 16 located directly above the coking plates with their outer walls 17 in the vertical plane of the side walls 1 of the furnace. Each of the castings 15 is formed with an air chamber 18 opening at its lower end into the pocket 9 to receive air from the air channel formed by the channel bar 7, which channel opens through the front plate 19 of the furnace and is covered by a hood 20 thereon. The upper end of each chamber opens into the space between the inner arch 21 and an outer arch 22, which arches are supported by an arch plate 23 forming the inner side of the adjacent magazine 16.

Each arch plate 23 comprises a wall 24 which is inclined inwardly of the magazine 16 toward its lower edge to narrow the opening or throat of the magazine and an outwardly inclined ledge 25 is formed along the lower edge of the wall for supporting an arch seat member 26 which is formed with an inwardly extending inclined wall 27 having a series of upwardly extending ribs 28 together forming a skew seat for the inner arch 21. A laterally extending portion or shelf 29 on the wall 24 forms a skew seat for the outer arch 22. The arch seat member 26 is formed with an upwardly extending wall 30 which is bolted along its upper edge to the inner edge of the upper arch seat 29 to secure the member in place and said wall is provided with an

opening or openings 31 through which the space between the inner and outer arches communicates with the passage 32 between said wall and the wall 24 of the arch plate. Air entering the passage 32 is discharged through the several passages formed between the ribs 28 which passages open at their lower ends along the inner edge of the lower arch seat adjacent to the inner face of the inner arch. The arch seat member 26 is held in place by suitable bolts and also by a rib 33 on the ledge 25 engaging a suitable groove in the arch seat member. The inward inclination of the wall of the arch plate gives a very rigid construction and the lower arch seat may be made detachable, as shown, without materially decreasing the strength of the arch plate as the weight of the inner arch tends to hold the arch seat member in place.

The ledge 25 and the inclined wall 27 of the lower arch seat together form a wall extending parallel with and at a distance above the coking plate 11, and thus an inclined chute or passage leading from the discharge throat of the magazine is formed, into which the coal is forced by an oscillatory feed bar 34 mounted in a bearing provided therefor in each bearing casting 13. Each of these feed bars comprises a series of sections 35, each having a circular hub portion 36 formed with an axial opening to receive a shaft 37 which is rectangular in cross section throughout its length and fits within the openings of the hubs of the several sections which are strung thereon. The several sections 35 are each formed with a segmental portion 38 connected to the hub portion by a suitable web 39 which forms one side of the feed bar. A curved face plate 40 is secured by screws or bolts within the recesses provided therefor in the peripheral faces of the several segments forming the bar and thus the sections of the bar are tied together at the periphery of their segmental portions, by the plate 40. This plate is formed with a sharpened and toothed edge 41 projecting beyond the forward edge of the segments and forming a dividing and cutting edge for the feed bar. The lower edge 42 of the outer wall 17 of each magazine 16 is inclined inwardly of the magazine a short distance and secured to this edge is an adjustable platen 43 with its edge in contact with the grooved outer face of the feed bar segments to form a tight joint between the wall of the magazine and the feed bar and prevent the escape of small particles of fuel.

Preferably the bearing members 13 are each formed with longitudinal grooves 44 in the contacting surface of its bearing for the feed bar, and a hole or holes 45 open through the bottom of the bearing from said grooves to permit any dirt or powdered coal which may work into the bearing to drop through.

As shown in Fig. 2, the segmental portion of the feed bar is tapered longitudinally throughout its length increasing in diameter toward the rear end of the bar, and thus a greater quantity of coal will be engaged and fed from the rear end of the magazine than from its forward end. This arrangement is found very desirable as the coal is more rapidly consumed upon the rear end of the grates than upon their forward ends. When the feed bar is turned to project the same across the throat of the hopper, the sharp edge of its face plate 40 divides and breaks up the coal readily and its radial side formed by the web 39 swinging forwardly, forces the coal down the discharge chute over the coking plate. When turned to forward position, the feed segment extends across the throat of the hopper and closes the same so that if it is desired to stop the feeding of the coal by closing off the hopper, it is only necessary to stop the oscillation of the feed bar with the same in forward position. The forward turning of the feed bar cuts off the column of coal flowing through the throat of the hopper as the forward edge of the bar advances toward the angle formed by the meeting of the inwardly inclined lower end of the wall 24 of the arch plate and the ledge 25, and thus measured quantities of coal are fed in and accurate operation insured. By changing the throw of the feed bar, the amount of coal fed to the grate bars may be accurately regulated, and by inclining the coking plate at an angle corresponding to the inclination of the grate bars, the weight of the coal contained in the hopper aids in the feeding of the same across the coking plates, and insures an even distribution over the grate bars preventing banking or skidding of the coal on the upper part of the bars and the formation of bare spots on the grates. The setting of the coking plates at an inclination, also brings the feed bars well up within the lower ends of the hoppers where they are protected from the extreme heat in the fire chamber, and by forming the feed bars of a plurality of separate sections, any section may be removed through the opening in the wall of the magazine in which they turn and replaced without disturbing the other sections, by pulling out the shaft 37, and the structure may be very quickly and easily assembled. The arrangement of oscillatory feed bars and inclined coking plates leading to the upper ends of the grate bars, gives a substantially continuous feed as the weight of the coal within the hopper is applied to the column of fuel passing over the coking plate during

the return or backward oscillation of the bar.

By inclining the lower end of the arch plate inward to meet the path of the feed bar, the over-all width of the furnace is lessened. When two or more furnaces are placed side by side as shown in Fig. 1 with a common side wall 1, the hoppers at the adjacent sides of the two furnaces are brought side by side, and as the feed bar is located with its axis in the plane of the wall 1, a single feed bar may be used to feed the fuel from the two hoppers by making the segmental portion 46 of said bar of greater width and providing a double web connecting it to the hub portion so that the two sides of the bar are alike. This arrangement of parts greatly cheapens the construction and the over-all width of the bank of furnaces is greatly lessened.

What I claim is:—

1. The combination of a pair of furnaces having a common dividing wall, magazines, one for each furnace having open discharge throats at their lower ends and located side by side with their adjacent side walls in the vertical plane of the dividing wall, and an oscillatory feed member supported with its axis of rotation in the vertical plane of said dividing wall and formed with a hub portion, an outer segmental portion adapted to be turned across the discharge throat of either magazine to close the same, and radial side webs connecting said hub and segmental portion to push the material down the throats.

2. In a structure of the character described, the combination of an inclined grate, a magazine having a discharge throat extending along the upper end of said grate, and an oscillatory feed member within said throat extending the entire length thereof and adapted to project across the throat when turned, said member being of varying diameter throughout its length and supported with its end of smallest diameter at the forward end of the grate to feed a greater amount of fuel to the rear portion of said grate over which portion all of the products of combustion pass than to the front portion thereof where the fuel is consumed less rapidly.

3. In a structure of the character described, the combination of a magazine having a discharge throat at its lower end, a bearing member having an open bearing extending along the magazine, an oscillatory feed member supported in said open bearing beneath one side of said magazine and adapted to be lifted from said bearing and removed laterally from beneath said side of said magazine, and means for detachably holding said feed member in its bearing and oscillating the same.

4. In a structure of the character described, the combination of a magazine having a discharge throat at its lower end, a feed member supported in the plane of the side of the magazine to be turned across said throat and feed material therefrom, said feed member comprising a series of segmental sections and means connecting said sections to cause the same to turn together, and an open bearing to support said sections and permit the lateral removal of any one thereof through said side of the magazine.

5. In a structure of the character described, the combination of a magazine having a discharge throat at its lower end, a bearing member extending along one side of the magazine adjacent to the throat and having an open bearing, a feed member comprising a series of sections each formed with a hub portion engaging the open bearing and an upwardly extending segmental portion movable across the throat of the magazine to close the same and connected to the hub portion by a web forming one side of the member to engage and feed material from the throat, and means connecting the sections to turn together

6. In a structure of the character described, the combination of a magazine having a discharge throat, a feed member supported adjacent to said throat comprising a series of sections each formed with a segmental portion adapted to close the throat when said member is turned and a facing plate secured to the peripheries of said segmental portions and connecting said sections to turn together.

7. In a structure of the character described, a coal magazine, one side of which is formed by an arch plate comprising a wall inclined inwardly of the magazine toward its lower edge and provided with a laterally extending portion on the wall near the upper end thereof forming a skew seat for an outer arch, and an arch seat member having an upwardly extending plate formed with openings and detachably secured to the outer edge of the laterally extending arch seat portion to space said plate from said wall, and provided with a laterally extending lower end portion forming a skew seat for an inner arch, and arches seated upon said arch seats.

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

EMIL F. KRELL.

Witnesses:
LEWIS E. FLANDERS,
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