

No. 624,979.

Patented May 16, 1899.

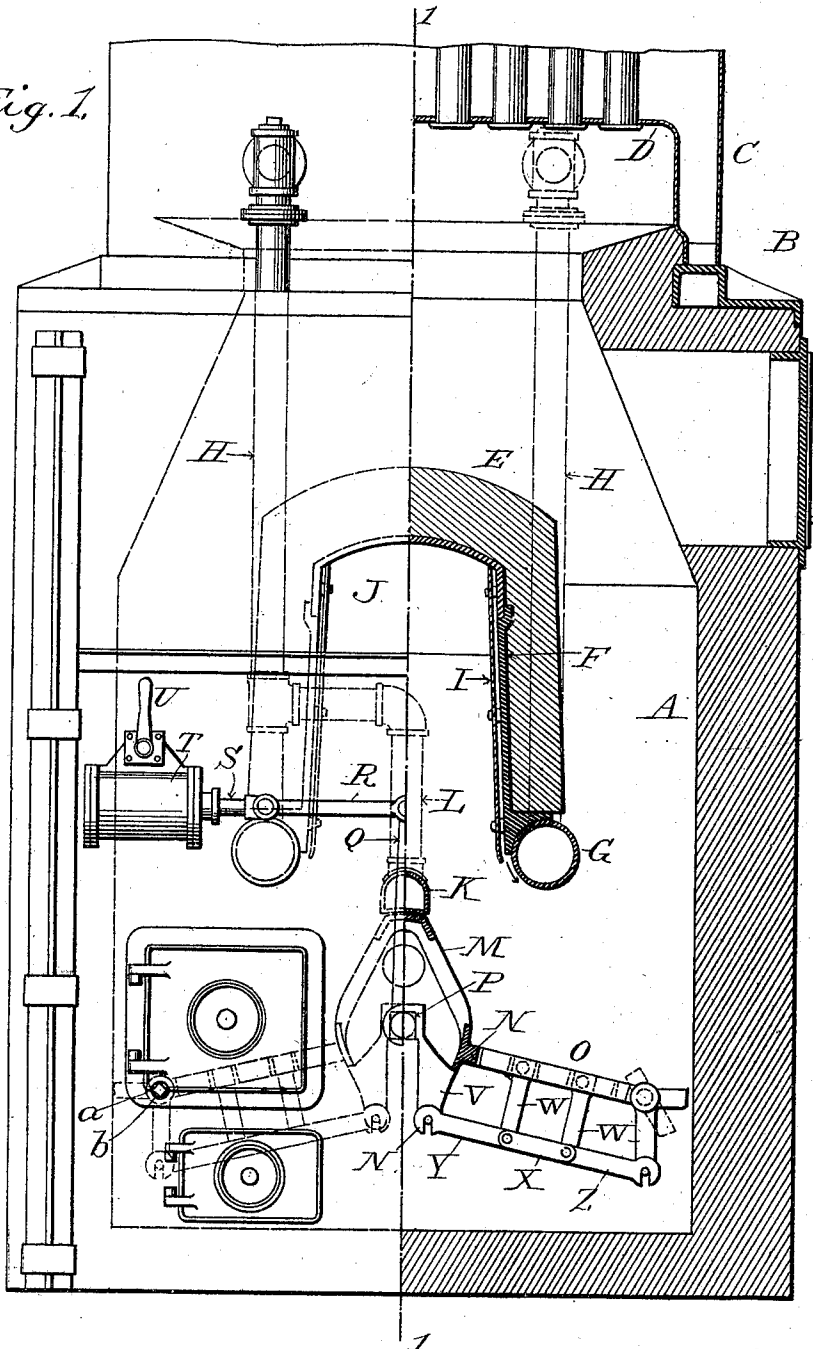
E. REYNOLDS.
FURNACE.

(No Model.)

(Application filed Sept. 6, 1898.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses
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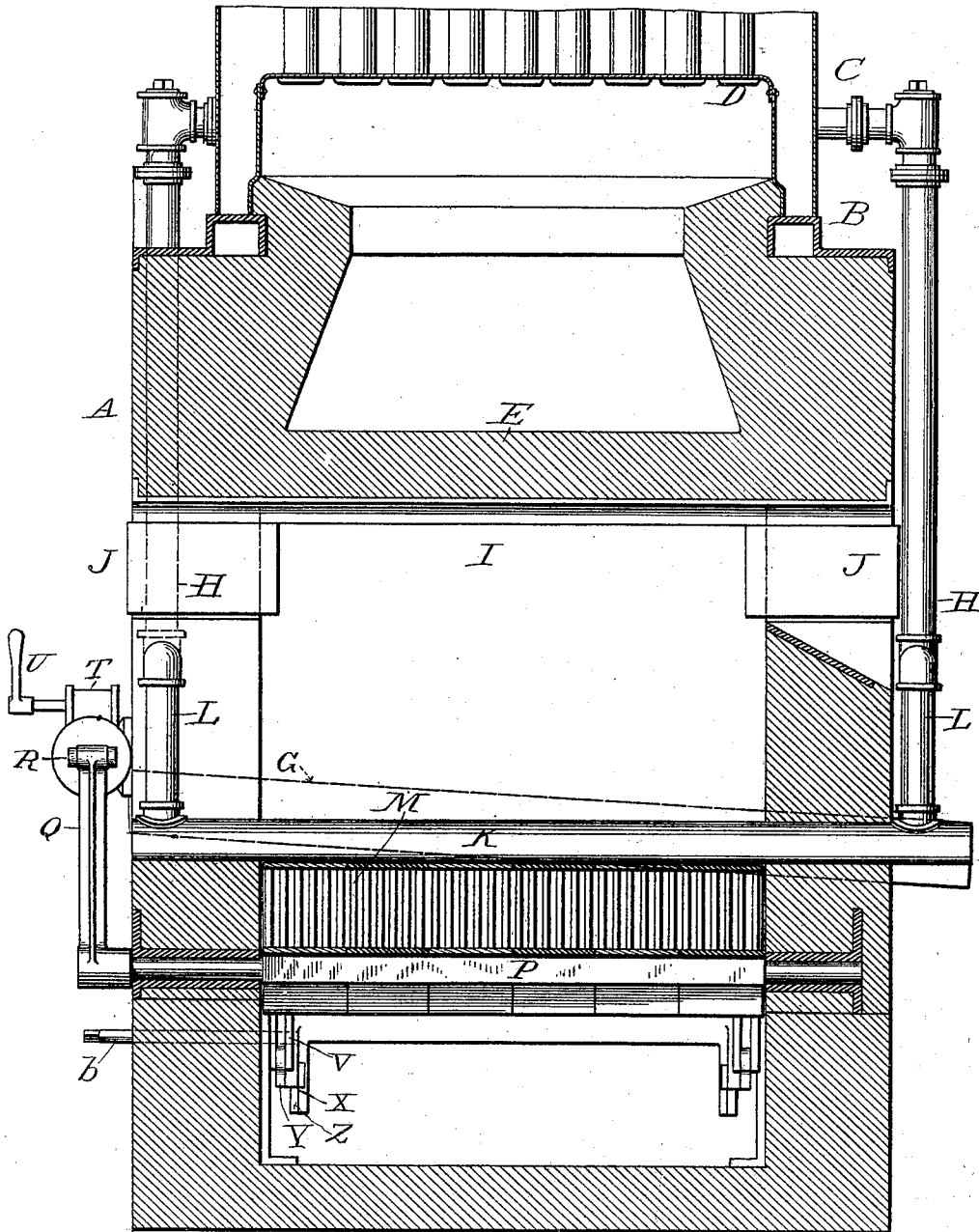
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Fig. 2.



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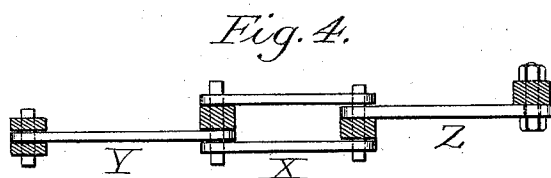
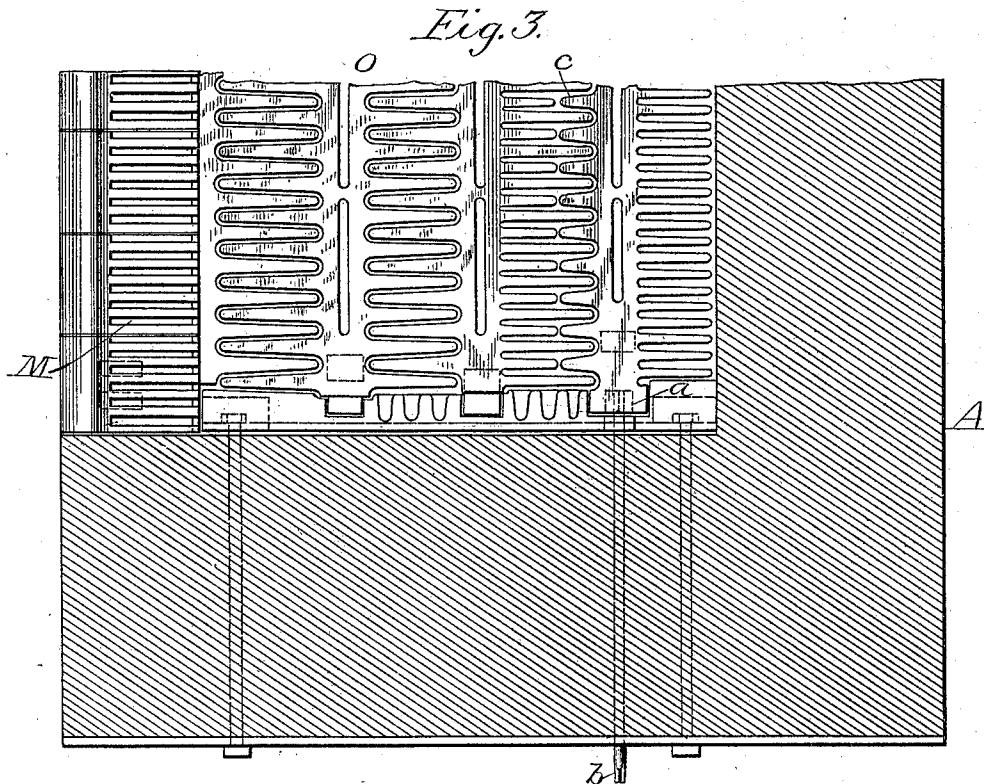
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Attest:
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UNITED STATES PATENT OFFICE.

EDWIN REYNOLDS, OF MILWAUKEE, WISCONSIN.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 624,979, dated May 16, 1899.

Application filed September 6, 1898. Serial No. 690,329. (No model.)

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My present invention pertains to improvements in furnaces, and relates more particularly to the stoking mechanism and the devices for securing perfect combustion of the fuel.

In the drawings, Figure 1 is a front elevation of the furnace, the half to the right being in section. Fig. 2 is a vertical sectional view on the line 1 1, Fig. 1; Fig. 3, an enlarged plan of a portion of the shaking and feeding grates, and Fig. 4 a detail view.

The object of my invention is to provide means of feeding the fuel to the grate in such manner that the fresh fuel will be next to the grate at all times, and the fuel which is under combustion will lie upon the fresh fuel. By so feeding the fuel into the furnace the fresh fuel is coked and the combustion takes place entirely, or practically so, upon the upper surface of the exposed mass, which has been previously deprived of its gases or a portion thereof. With this manner of feeding the fuel there is obtained a practically smokeless furnace; and the invention has for its further object the formation or production of a furnace of such structure as will bring about the above results.

Referring to the drawings, A indicates the main wall or body of the furnace, around the upper end of which passes a binding-plate B, of cast-iron or the like, and resting upon said binding-plate is the boiler-shell C, provided with an interior tube-plate D.

E indicates an arch extending longitudinally of the main body A, the arch being lined with plates or castings F, as indicated in Fig. 1, the lower ends of said plates F resting upon and being supported by water-legs G, which extend through the furnace, as indicated in Fig. 2. The ends of said legs rest upon the masonry-work or walls of the furnace, and extending therefrom are pipes H, which are connected by suitable laterals with the lower end of the boiler.

The vertical walls of the plates F have se-

cured to them at a slight distance therefrom supplemental plates I, as indicated in Fig. 1, thereby forming an air-space between said plates F and I for a purpose which will presently appear.

Extending into the upper portion of the space beneath the arch are feed-openings J, through which the fuel is introduced, and said openings may be connected with suitable chutes leading from a source of fuel-supply, or the fuel may be fed through said openings by hand, as desired. In Fig. 2 two of such openings are shown, and in practice this is the preferred construction, though it is evident that but one such opening need be employed.

K denotes a third water-leg, which is placed at a slight distance below the legs G, but directly in line with the center of the arch, said leg K being connected by a pipe L to the upright H, as indicated in Fig. 1.

The water-leg K occupies a position directly over the feeding-grate M, which grate, as shown, is provided with two inclined faces, which extend outwardly toward the side walls of the furnace, terminating in teeth or projections N, designed to mesh or pass between like sections or teeth formed upon the burning or fuel grate O.

The feeding-grate M, which extends from one side of the furnace to the other, is mounted upon a squared shaft P, the ends of which are reduced to circular form and are journaled in suitable bearings mounted in the walls of the furnace, as shown in Fig. 1. The forward end of said bar or shaft P extends out beyond the face of the furnace and has connected to it a lever Q, which in turn is connected by a link R to the piston-rod S of a suitable hydraulic cylinder T, controlled through the agency of a hand-lever U. The feeding-grate is provided with downwardly-extending arms V, while the grate-sections are likewise provided with rocker-arms W. The two sections of the grate O nearest to the feeding-grate are connected to each other by a link X, while the arm V of the feeding-grate M is connected to the arm W of that section of the grate O nearest to it by a link Y, provided with a hook N', so that the feeding-grate may, when desired, be entirely disconnected from the fuel or burning grate O.

The feeding-grate M is preferably made up of a number of sections or grates placed upon the squared shaft P for greater ease of handling and renewal.

5 As will be noted upon reference to the sectional portion of Fig. 1, that member of the grate O next to the wall is connected to the section next to it by a hooked link Z, so that said outer section may also be wholly disconnected from the other portions of the grate. 10 As will be seen upon reference to Fig. 3, the journaled end of said outer section is provided with a socket *a*, into which is inserted a rod *b*, Fig. 2, and by applying a wrench or 15 lever to the outer end of said rod *b* the outer section of the grate may be dumped independent of the others, and thus relieve the grate of the clinker and accumulated material, which would tend to work down to the 20 lowest portion.

The outermost section of the main grate is, as will be seen upon reference to Fig. 3, formed upon one side with a series of short fingers *c*, while upon that side next to the 25 wall of the furnace the fingers are somewhat elongated and narrow. By thus constructing the grate this section may be tipped or turned, as above described, into the position indicated in dotted lines, Fig. 1, without disturbing the remaining sections or the fuel 30 resting thereon.

In the operation of the furnace fuel is fed in through the openings J down between the walls of the arch upon the feeding-grate M 35 and onto the grate O. It will be noted that the space formed between the plates I and F is open to the atmosphere, so that air may pass freely in between the plates and prevent said plates from becoming heated and burned 40 out. The air which enters between these plates is drawn down around the water-legs G and enters the combustion-chamber directly above the fuel resting upon the grate O. In passing down between the plates the air 45 of necessity becomes somewhat heated, and the introduction of the warm air into the combustion-chamber assists materially in the perfect combustion of the gases arising from the fuel. The space between the walls of the arch 50 and the inclined faces of the feeding-grate M is kept filled with fuel, and as the fuel burns out upon the grate O the feeding-grate M is rocked from time to time through the agency of the hydraulic cylinder T and the connections 55 above described. This rocking motion of the feeding-grate M, together with the motion of the grate O, so acts upon the fuel resting upon it as to feed it along upon the surface of the grate O, forcing previously-coked 60 and partially-burned fuel toward the lower end of said grate O and upon the outermost section next to the furnace-wall. As the ash and clinker accumulated upon the outer section said section would be disconnected from 65 the other sections of the grate O and dumped, allowing the refuse material to fall down into the ash-pit below. It will be seen that so

long as the link Y is connected to the arms V of the feeding-grate and the arm W of the main grate O, and as the feeding-grate is reciprocated or moved upon its pivot, the motion will also be imparted to the main grate, thereby assisting in feeding the material along the grate O and breaking up the cinders and clinker, thus insuring a free burning surface 75 at all times.

The location of the auxiliary water-leg K directly above the upper portion or edge of the feeding-grate M not only keeps said feeding-grate cool to a certain extent, but it also 80 assists in securing a more perfect circulation of the water in the boiler.

Having thus described my invention, what I claim is—

1. In a furnace, the combination of a combustion-chamber; an arch mounted therein; a fuel-opening entering the upper portion of said arch; air-feeding spaces formed upon the inner sides of said arch, and opening at the lower edges thereof into the combustion-chamber; a feeding-grate located at or near the lower open side of said arch; and a main grate located to one side of said feeding-grate. 90

2. In a furnace, the combination of a combustion-chamber; an arch formed therein; water-legs extending along the lower edge of said arch; a third water-leg K extending along beneath the arch; a feeding-grate mounted below said water-leg K; combustion-grates extending from each side of said feeding-grate; and means whereby said feeding-grate and the combustion-grates may be rocked as desired. 95

3. In a furnace, the combination of a combustion-chamber; an arch formed therein; a fuel-opening entering into the upper portion of said arch; a water-leg K extending along the lower open side of said arch; a feeding-grate below said water-leg K and provided with outwardly-inclined faces; combustion-grates O extending from the lower edge of said faces and inclining down toward the outer wall of the furnace; and a dumping-section formed in said combustion-grates next to the furnace-walls, substantially as and for the purpose described. 105

4. In a furnace, the combination of a combustion-chamber; an arch formed therein; water-legs G extending along the lower edges of said arch; a third water-leg K located at the lower open side of said arch; a feeding-grate M mounted below said water-leg K; means for rocking said feeding-grate; combustion-grates O extending out from the feeding-grate; and means for connecting said combustion-grate to the feeding-grate, substantially as described. 120

5. In a furnace, the combination of a combustion-chamber; an arch formed therein; water-legs G extending along the lower edges of said arch; a third water-leg K located at or near the lower open side of said arch; a feeding-grate M mounted upon a shaft P, said shaft being journaled in suitable bearings; a 125 130

lever connected to the outer end of said shaft; a motor; connections between said motor and the lever; main grates O extending out to each side of the feeding-grate M; and removable connections between said grates O and the feeding-grate M.

6. In a furnace, the combination of a combustion-chamber; an arch formed therein; fuel-openings extending into said arch at or near its upper side; a rocking feeding-grate located at or near the lower open side of said arch; main grates extending from each side of said rocking grate; a tilting section mounted at the outside of each of the main grates O; and a rod *b* extending outwardly from said tilting section, substantially as and for the purpose described.

7. In a furnace, the combination of a combustion-chamber; an arch formed therein; a rocking feeding-grate located at the lower open side of said arch; a main grate O extending from the lower edge of said feeding-grate toward the outer wall of the furnace; and a tilting section mounted in said main grate next to the furnace-wall, said tilting section being provided with a series of short teeth or arms upon that side next to the body of the grate, and with a series of relatively

longer teeth or arms upon that side next to the furnace-wall, substantially as and for the purpose described.

8. In a furnace, the combination of a combustion-chamber; an arch E mounted therein; plates F secured upon the inner face of said arch; plates I secured to the plates F at a slight distance therefrom; fuel-feeding openings J extending into the upper portion of said arch; water-legs G extending along the lower edge of the arch; a water-leg K intermediate said water-legs G and in the open mouth of the arch; a rocking feeding-grate M provided with downwardly-inclined faces; main grates O inclining from the lower edge of said feeding-grate M toward the wall of the furnace; tilting sections formed in the outer portion of said main grates next to the wall; means for rocking said feeding-grate; and detachable connection between said feeding-grate and the main grates O.

In witness whereof I hereunto set my hand in the presence of two witnesses.

EDWIN REYNOLDS.

Witnesses:

D. M. PIERCE,
GEO. L. TIFFT.