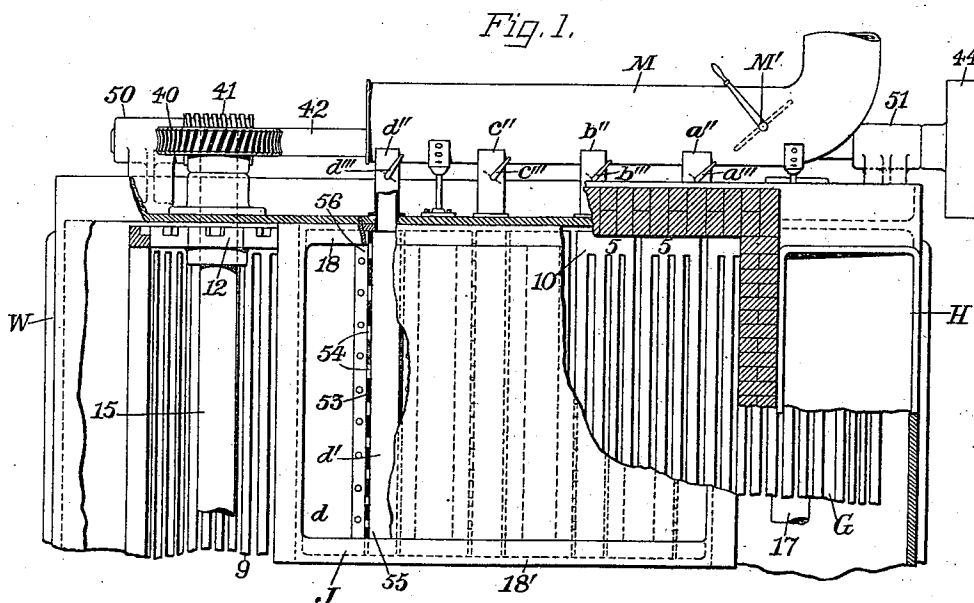
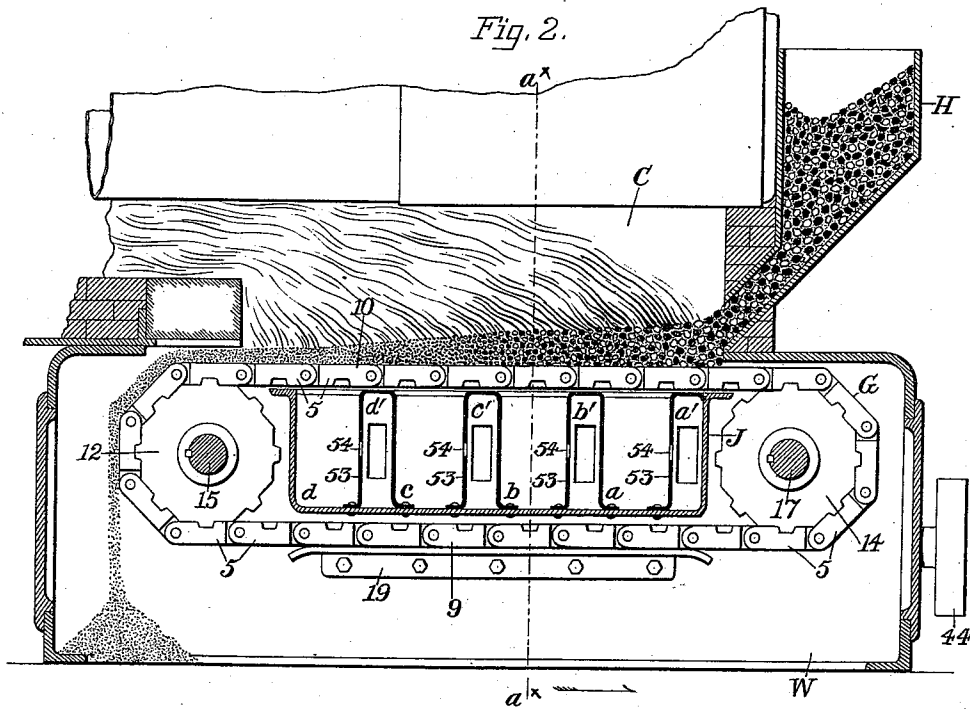


No. 510,574.

Patented Dec. 12, 1893.



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Fred. J. Dole.

Inventor:
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(No Model.)

2 Sheets—Sheet 2.

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FURNACE.

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Fig. 3.

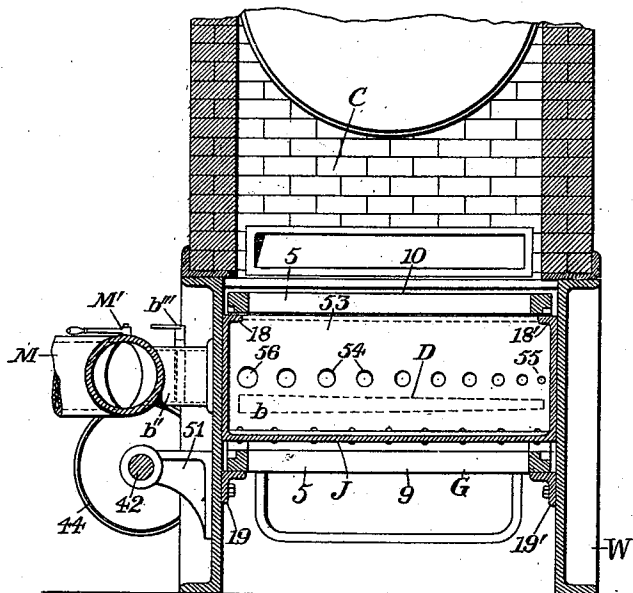


Fig. 5.

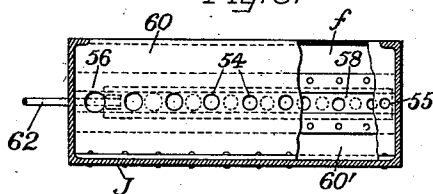
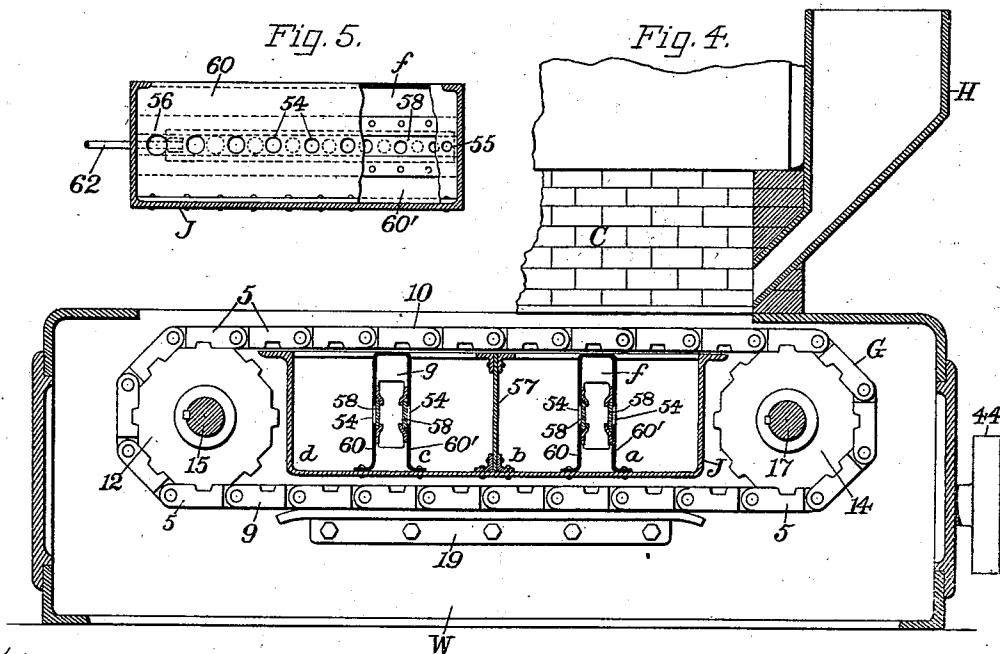


Fig. 4.



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UNITED STATES PATENT OFFICE.

ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 510,574, dated December 12, 1893.

Application filed July 12, 1893. Serial No. 480,232. (No model.)

To all whom it may concern:

Be it known that I, ECKLEY B. COXE, a citizen of the United States, residing at Drifton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Traveling-Grate Furnaces, of which the following is a specification.

This invention relates to that class of furnaces in which combustion is effected by air-blasts of varying pressures supplied to successive portions of the grate; the object being to furnish means for equalizing the air-blasts over the width of the furnace-floor, and thereby effect the uniform and complete combustion of the fuel.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of the principal portion of a furnace embodying my present invention, some parts being broken away for better showing the construction and arrangement of the details. Fig. 2 is a vertical longitudinal section of the furnace, its grate-mechanism and air-blast chambers. Fig. 3 is a vertical transverse section of the furnace taken on the line a^x-a^x of Fig. 2, showing the parts at the right-hand of said line as seen from a point at the left thereof. Fig. 4 is a view similar to Fig. 2, and illustrates a modification of certain features of the invention. Fig. 5 is a vertical transverse section of the modified air-chamber shown in Fig. 4.

Similar characters designate like parts in all of the figures.

The furnace herein shown and described is in the nature of an improvement on the one described and claimed in the Letters Patent No. 499,716, granted to me June 20, 1893, to which reference may be had; and the principal portions of this furnace being shown in said prior patent, are herein designated by the same characters.

The furnace-mechanism is carried by some suitable framework, a simple form of which is herein designated in a general way by W, and which incloses the traveling-grate, the air-blast chambers, and some portions of the driving-mechanism for actuating the grate.

The forward end of the furnace is provided, as shown in my aforesaid patent, with the fuel-supply, or hopper, H, for delivering the fuel onto the upper run 10 of the grate.

Over the furnace-chamber C may be placed any apparatus or thing to be heated, as, for instance, a steam-boiler.

The traveling-grate is or may be the same as the traveling-grate more fully described in my aforesaid Patent No. 499,716. Said grate as herein shown is composed of a series of grate-bars or sections, 5, all substantially alike in construction and suitably connected together for operation as an endless-grate.

As a means for carrying and actuating the grate, the framework of the furnace carries a pair of chain-wheel shafts, 15 and 17, each provided with a pair of chain-wheels, as 12 and 14, respectively, for engaging and actuating the endless grate, which is designated in a general way by G, and whose lower and upper runs, respectively, are designated by 9 and 10.

The upper run of the grate between the chain-wheels is shown supported by the side-guides 18 and 18', the lower run thereof being supported by similar guides, 19 and 19'. Power for revolving said grate-carrying shafts and chain-wheels may be supplied thereto by means of the driving-mechanism described in the aforesaid Patent No. 499,716, comprising the worm-wheel 40 fixed on the chain-wheel shaft 15, and the worm 41 meshing with said worm-wheel; said worm being carried by a driving-shaft, 42, that is supported in bearings 50 and 51, and driven by a band (not shown) on a driving-wheel 44 fixed on said driving-shaft. It will be understood, however, that the driving-mechanism here described is not a feature of my present invention.

The air-supply chamber, designated in a general way by J, is placed underneath the upper run 10 of the traveling-grate, between the chain-wheels, as shown best in Figs. 2 and 4, and as more fully described in said prior patent, No. 499,716.

The chamber J, referring to Figs. 1, 2 and 3, is divided into a series of air-blast chambers, a, b, c , and d , by means of transverse distribution-chambers, a', b', c' , and d' , respectively, these distribution-chambers being connected by supply-pipes, a'', b'', c'' , and d'' , respectively, with the principal air-supply-pipe M. For regulating the aggregate supply of air-blast, said pipe or conduit M

may be provided with a suitable air-valve, indicated at M', Figs. 1 and 3; and for separately regulating the supply of air to the respective distribution-chambers, said supply-pipes *a''*, *b''*, *c''*, and *d''*, may be furnished with similar air-valves, indicated in Fig. 1 by the characters *a'''*, *b'''*, *c'''*, and *d'''*, respectively. The air being first supplied to the described distribution-chambers, is delivered to the air-blast chambers *a*, *b*, *c*, and *d*, respectively, through a series of openings, 54, in the side-walls 53 of the distribution-chambers, as will be understood by a comparison, made by the aid of this description, of Figs. 1, 2, and 3.

It will be remembered that in the furnace of my aforesaid Letters Patent the supply-pipes for the several air-blast chambers *a*, *b*, *c*, and *d*, enter said chambers at one end thereof and at one side of the furnace, and that this arrangement of the supply-pipes is practically necessary owing to the limited space existing in a vertical direction between the upper and lower runs of the traveling-grate. The air-blast being in that furnace delivered as described, and entering the air-blast chambers with a considerable force due to its pressure, has a considerable momentum, so that, in practice, the air is carried violently toward the side of the furnace opposite to said supply-pipes, and thereby produces an excess of pressure under the traveling-grate on that side of the furnace; this produces an unequal burning of the fuel, and, when the furnace is "crowded" in its operation, so disturbs the fuel upon the grate by lifting and mixing the same as to become seriously objectionable. It is the principal object of my present improvements to overcome the unfavorable action described, and to equalize the air-pressure throughout the width of the grate by controlling the delivery of the air to the several air-blast chambers. This object is accomplished by means of the described distribution-chambers, into which the air is first delivered, it passing thence into said air-blast chambers through a series of openings in the side-walls of the distribution-chambers. And for further controlling the air-blast as described, the side-wall openings 54, as will be seen from Figs. 1 and 3, are sometimes made of larger size, at 56, near the end of the distribution-chamber next to the supply-pipe therefor, and of reduced size at 55, toward the opposite end of said distribution-chamber, so that the largest openings correspond in position with the region of lowest pressure in the distribution-chamber.

Instead of a series of openings of varying sizes in the side-wall of the distribution-chamber, I may use an elongated opening in said wall (located at any point in the length thereof) as indicated by the dotted lines at D, Fig. 3. This opening D is, like the series of separate holes, a graduated opening extending longitudinally of the distribution-chamber its capacity in each form thereof,

conforming, at successive points in the length thereof, to the normal pressures at such points.

The operation of the furnace as a whole need not be described herein, it being fully set forth in the aforesaid Letters Patent, in which the principal features of the same are described and claimed.

The operation of the distribution-chambers in connection with said prior improvements will be fully understood from the drawings in connection with the preceding description.

In practice, the air to each of the distribution-chambers is properly regulated by some suitable valve; or, the air may be originally supplied to such chamber at the required pressure.

In the modification illustrated in Figs. 4 and 5, the general arrangement and construction of the furnace is or may be the same as already described in connection with Figs. 1, 2 and 3. As in the previous case, the air-chamber J is divided into four air-blast chambers, *a*, *b*, *c*, and *d*, it being centrally divided by a division-wall, 57, and further divided by two distribution-chambers, *f* and *g*, which have openings in each of the side-walls thereof, the two chambers *f* and *g* thus supplying all four of the air-blast chambers through the series of openings shown in Fig. 5, and which are similar to those shown in the corresponding portion of Fig. 3. In this modification, however, sliding valves or gates, 58, are shown supported on the inner side of the walls 60 and 60' of said distribution-chambers *f* and *g*; said valves or gates are perforated with openings corresponding to those of said distribution-chamber walls, so that on the sliding of the gate it will close said openings more or less, as required for properly regulating the supply of air to the air-blast chamber. For operating the described sliding gate or valve, this may be provided with a handle, 62, Fig. 5, extending to the outside of the furnace, in a well-known manner.

Having thus described my invention, I claim—

1. The combination with a traveling-grate, of an air-blast chamber located underneath the fuel-carrying run of the grate and transversely thereof, a distribution-chamber located at the side of the air-blast chamber and communicating therewith by a graduated opening substantially as described, and an air-supply communicating with the distribution-chamber at one end thereof, substantially as described and for the purpose specified.

2. In a furnace, the combination with the grate, and with an air-blast chamber under the grate, of a distribution-chamber at one side of the air-blast chamber and having its supply-inlet at one end thereof and having in the side-walls thereof a series of openings of varying sizes arranged with the larger openings at the end near the air-supply inlet and the smaller openings toward the opposite end of said chamber, substantially as described.

3. In a furnace, the combination with the

grate and with an air-blast chamber under the grate, of a distribution-chamber at the side of the air-blast chamber and communicating therewith through a graduated opening, and a gate supported in position and operable for closing said opening, whereby the distribution of air to the air-blast chamber may be regulated, substantially as described.

4. In a furnace, the combination with the grate and with an air-blast chamber under the grate, of a distribution-chamber at the side of the air-blast chamber and communi-

cating therewith through a series of openings of varying sizes along the length thereof, with the larger-sized openings adjacent to the air- supply of the distribution-chamber, and a gate supported in position and operable for closing said openings, whereby the distribution of air to the air-blast chamber may be regulated, substantially as described.

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ELLIOTT A. OBERRENDER.