

(No Model.)

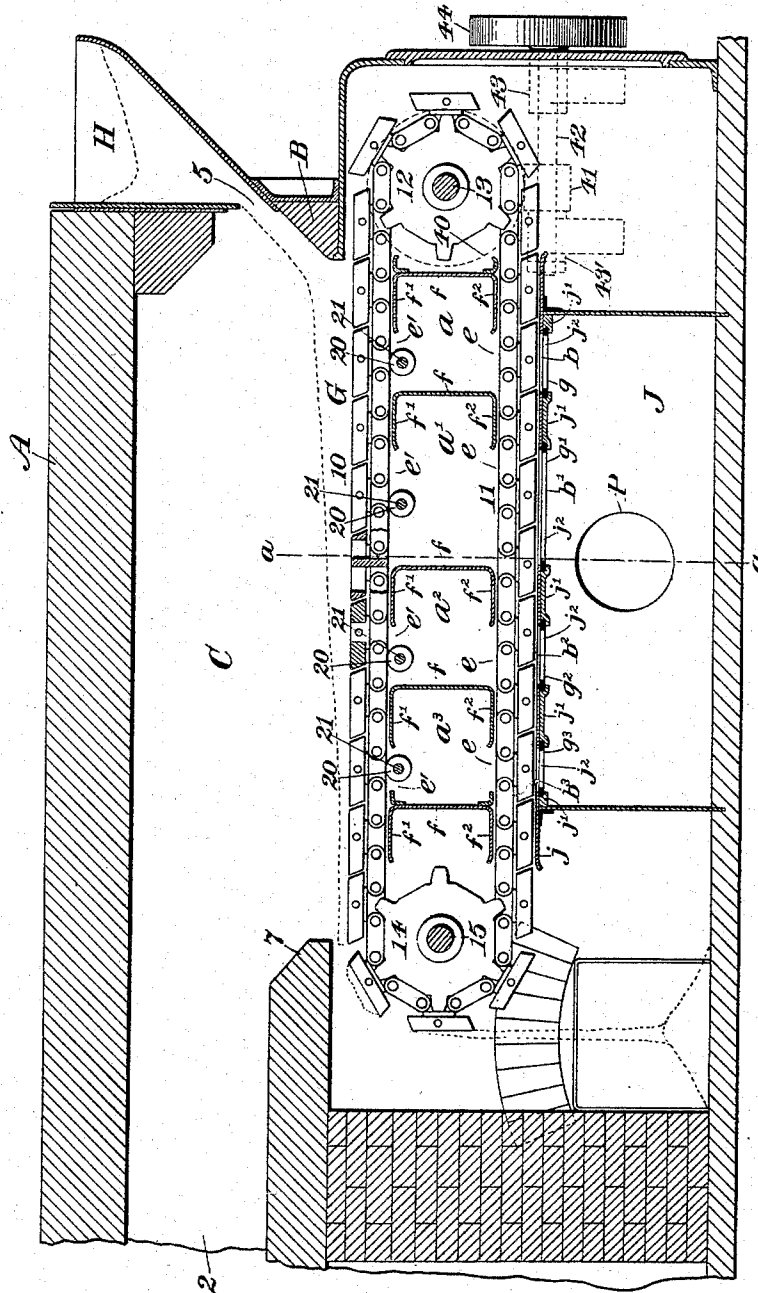
2 Sheets—Sheet 1.

F. H. RICHARDS.
TRAVELING GRATE FURNACE.

No. 527,455.

Patented Oct. 16, 1894.

Fig. 1.



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Fred. J. Dole.

Inventor:

F. H. Richards

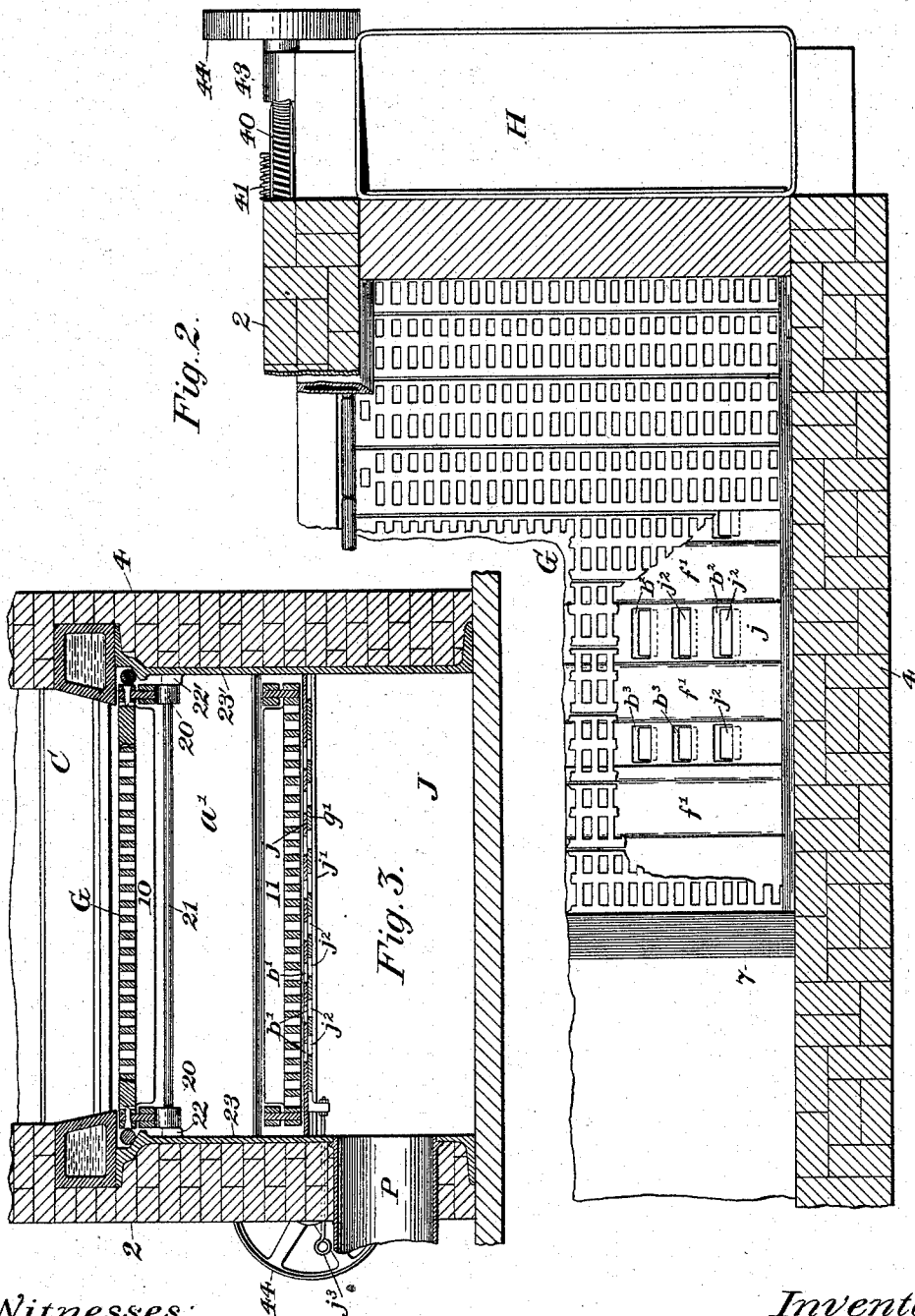
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

TRAVELING-GRATE FURNACE.

SPECIFICATION forming part of Letters Patent No. 527,455, dated October 16, 1894.

Application filed July 20, 1894. Serial No. 518,099. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Traveling-Grate Furnaces, of which the following is a specification.

This invention relates to traveling-grate furnaces of that class in which an endless traveling grate or furnace-floor is employed for supporting and imparting a continuous traveling movement to the fuel, and in which means are employed for supplying air to the fuel supported upon the upper run of the traveling grate, as shown, for instance, in United States Letters Patent No. 499,716, granted to Eckley B. Coxe, June 20, 1893, to which reference may be had.

The object of my present invention is to provide, in connection with an endless traveling furnace-floor or grate, in furnaces of the class specified, improved means for supplying air to the fuel supported upon the upper run of the grate, and for more effectively regulating the supply of air at successive or predetermined points in the length of the furnace-chamber, and whereby the cooling effects of the air supplied to the fuel upon the upper run of the grate may be utilized to reduce the normally high temperature of both the upper and lower runs of said grate.

In the drawings accompanying and forming part of this specification, Figure 1 is a sectional side elevation of a traveling-grate furnace embodying my improvement. Fig. 2 is a sectional plan view of a portion of the forward end of said furnace, parts thereof being broken away to more clearly show certain details of construction. Fig. 3 is a vertical cross-section of a portion of said furnace, taken in line *a-a*, Fig. 1, looking toward the right-hand in said figure.

Similar characters designate like parts in all the figures.

In the preferred form thereof herein shown and described, my invention consists in the combination with a furnace-chamber and its inclosing walls, of an endless traveling grate or furnace-floor, air-supply chambers supported above and below the lower run of said traveling grate and communicating with each

other through said lower run, means for supplying air to said chambers, and means for imparting a continuous traveling movement to said grate, all of which will be hereinafter more fully described.

In the furnace shown in the drawings, the furnace-chamber C extends from the usual bridge-wall 7 forwardly to the ignition-block or front-wall B; is inclosed at its sides by the usual side-walls, 2 and 4, and is covered by a roof or arch, A, which construction is somewhat similar to that shown and described in the patent hereinbefore referred to.

The endless traveling furnace-floor or grate, which may be of any suitable construction and organization, is shown carried within the furnace-chamber by chain-wheels, 12 and 14, at the opposite ends of said chamber, which chain-wheels are secured upon shafts, 13 and 15, respectively, the shaft 13 of which is shown furnished with a worm-wheel, 40, which meshes with a worm, 41, upon a driving-shaft, 42, that is supported in bearings, 43 and 43', and is driven by a pulley, 44, from some suitable source of power. (Not shown.) This endless grate, which is designated in a general way by G, comprises the upper and lower runs, 10 and 11, respectively, the upper one of which constitutes the fuel-supporting run, or the furnace-floor proper.

As a means for delivering the fuel to the grate, I have shown the furnace provided with the usual hopper, H, located at the forward end thereof; the fuel passing from said hopper through the chute or opening 5, over the ignition-block B and onto the fuel-receiving end of the upper run of the grate, in the usual manner.

As a means for supplying air to the fuel located upon the upper run of the grate through the lower run of the grate, and for regulating the supply of air to bring it to varying pressures at successive points in the length of the fuel-carrying run, I have, in the preferred form thereof herein shown, provided a series of successive air-pressure-reducing chambers, herein shown as four in number and designated by *a*, *a'*, *a''* and *a'''*, respectively, intermediate to the upper and lower runs of the traveling grate at successive points in the length of said runs, and each of which chambers has an inlet opening, *e*,

and an outlet opening, e' , contiguous to the lower run 11 and upper run 10, respectively, of the traveling grate; and I have provided in connection with said series of air-pressure chambers an air-supply or accumulating chamber, J, which is located below the lower run 11 of the grate and has successive series of outlet openings, b , b' , b^2 and b^3 , preferably in register with the inlet openings e of the pressure-chambers a , a' , a^2 and a^3 , respectively. This air-supply chamber J, which constitutes a reservoir for supplying air to the entire series of air-pressure chambers, will usually be supplied with air from a pipe, P, which in turn may receive its supply from a suitable air-pump or blower. (Not shown.) To form the air-pressure chambers a , a' , a^2 and a^3 , the space between the upper and lower runs of the grate will usually be divided by remotely-disposed transverse vertical partitions, or plates, f , preferably flanged at their upper and lower ends, as shown at f' and f^2 , respectively, to form the upper and lower walls of said chambers, the flanges of each partition preferably terminating remote from the next adjacent partition to form the inlet and outlet openings hereinbefore referred to. Located within the chambers a , a' , a^2 and a^3 , at the upper opposite ends thereof, are rollers, 20, which are carried at opposite ends of shafts, 21, supported in pockets, 22 and 22', formed upon the side-plates 23 and 23' of the furnace-chamber. These rollers support the upper run of the traveling grate. It will be obvious, however, that these rollers might be dispensed with, and the upper run of the grate be supported entirely by the flanges f' of the partitions f , as will be seen by reference to Fig. 1 of the drawings.

The traveling grate herein shown comprises a series of transversely-disposed cross-sectionally T-shaped floor-beams carried by chains at opposite ends thereof, and having air-spaces formed therethrough, and said grate is shown supported in such close proximity to the flanges f' or cut-off plates of the division-walls of the chambers a , a' , a^2 and a^3 as to prevent the passage of air from one chamber to another, as will be understood by reference to Fig. 1 of the drawings.

Supported for sliding movement contiguous to each series of outlet opening b , b' , b^2 and b^3 , are slide-valves, or gates, g , g' , g^2 and g^3 , respectively, the upper wall j of the chamber J having a series of flanges, j' , which form slide-ways for said slide-valves, as will be readily understood by reference to Fig. 1 of the drawings. These slide-valves have, each, a series of openings, j^2 , adapted for registering with the outlet openings in the upper wall j of the air-supply chamber J, and may be operated by means of operating-rods, j^3 , extending through one of the side-walls of the furnace-chamber.

It will be noticed that the aggregate areas of the successive series of outlet openings in the air-supply chamber J are varied with re-

lation to each other, and would, if their respective valves were in their open positions, permit varying volumes of air to pass through the lower run of the grate into the chambers adjacent thereto; and it will also be noticed that the outlet opening in the air-pressure chambers located between the upper and lower runs of the grate are of varying areas which will permit air to be supplied to the fuel at varying pressures at successive points in the fuel-supporting run of said grate.

By this construction and organization I not only regulate the volume of air supplied to the fuel at successive points in the length of the furnace-chamber through the medium of the air-pressure chambers, intermediate to the upper and lower runs of the grate, having the outlet openings therein of varying areas as described, but I am enabled to regulate and maintain a uniform air-pressure adjacent to the upper run of the grate at successive points in the length thereof, which pressures may be varied at successive points according to the requirements in the successive stages of combustion of the fuel, by means of the valves as hereinbefore described. Another point of advantage of this construction is, that the air passing from the air-supply chamber J into the successive pressure-chambers a , a' , a^2 and a^3 , will, in passing through the lower run of the grate, cool the same and obviate, to some extent, warping thereof.

Having thus described my invention, I claim—

1. In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, and with an endless traveling grate, of a series of air-pressure chambers located between the upper and lower runs of said grate and having outlet and inlet openings contiguous to the upper and lower runs, respectively, of said grate, an air-supply chamber located below the lower run of said grate and having outlet openings adapted for communicating with the air-pressure chambers through the inlet openings therein, valves located between the outlet openings of the air-supply chamber and inlet openings of the air-pressure chambers, and means for supplying air to the air-supply chamber, substantially as described and for the purpose set forth.

2. In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, and with an endless traveling grate and its driving mechanism, of air-chambers located respectively above and below the lower run of the traveling grate and communicating with each other through said run, means for supplying air to said chambers, and means for reducing the air-pressure in the upper chamber relatively to that in the lower chamber, substantially as described and for the purpose set forth.

3. In a furnace of the class specified, the combination with the furnace-chamber and

its inclosing walls, and with an endless traveling grate and its driving mechanism, of a plurality of variable-pressure air-chambers having outlet openings of relatively varying

5 areas contiguous to the upper run of the traveling grate and having inlet openings contiguous to the lower run of said traveling grate, an air-supply chamber located below the lower run of said grate and having out-
10 let openings in alignment with the inlet openings of the variable-pressure air-chambers and adapted for supplying air to said chambers through the lower run of the grate, and means for regulating the supply of air to
15 each pressure-chamber, substantially as described and for the purpose set forth.

4. In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, of an endless grate supported for traveling movement in said furnace-chamber, a series of pressure-reducing chambers located between the upper and lower runs of said grate and having outlet openings of varying areas contiguous to the
25 upper run of said grate, and an air-supply chamber located below the lower run of said grate and communicating with the entire series of air-chambers, substantially as described.

30 5. In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, of an endless grate supported for traveling movement within said furnace-chamber and having the space be-
35 tween the upper and lower runs thereof divided by vertical transverse partitions into a series of air-pressure-reducing chambers having outlet openings of varying areas contiguous to the upper run of said grate at successive
40 points in the length thereof, and an air-supply chamber located below the lower run of the grate and having openings in communication with the air-pressure-reducing chambers intermediate to the upper and lower
45 runs of said grate, means for supplying air

to the air-chamber below the grate, and means for imparting a traveling movement to said grate, substantially as described and for the purpose set forth.

6. In a furnace of the class specified, the
50 combination with the furnace-chamber and its inclosing walls, of an endless grate supported for traveling movement within said chamber, a plurality of air-pressure-reducing chambers located intermediate to the upper
55 and lower runs of said grate and having outlet and inlet openings contiguous to the upper and lower runs, respectively, of said grate, an air-supply chamber located below the lower run of said grate and having successive
60 series of outlet openings in communication with the successive air-pressure-reducing chambers, slide-valves supported contiguous to the outlet openings in the air-supply chamber and having openings adapted for regis-
65 tering with said outlet openings, means for supplying air to the air-supply chamber below the lower run of the grate, means for operating said valves, and means for imparting a continuous traveling movement to the end-
70 less grate, substantially as described.

7. In a furnace of the class specified, the combination with the furnace-chamber and its inclosing walls, and with an endless grate supported for traveling movement in said
75 chamber, of an accumulating air-chamber located below the lower run of said grate, and a series of air-pressure-reducing chambers located intermediate to the upper and lower runs of said grate and in communication with
80 the accumulating chamber, and having means for supplying air to the fuel supported upon the upper run of the grate, and means for varying the air-pressures at successive points in the length of the grate, substantially as de-
85 scribed.

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