

(No Model.)

E. B. COXE.
FURNACE.

No. 517,644.

Patented Apr. 3, 1894.

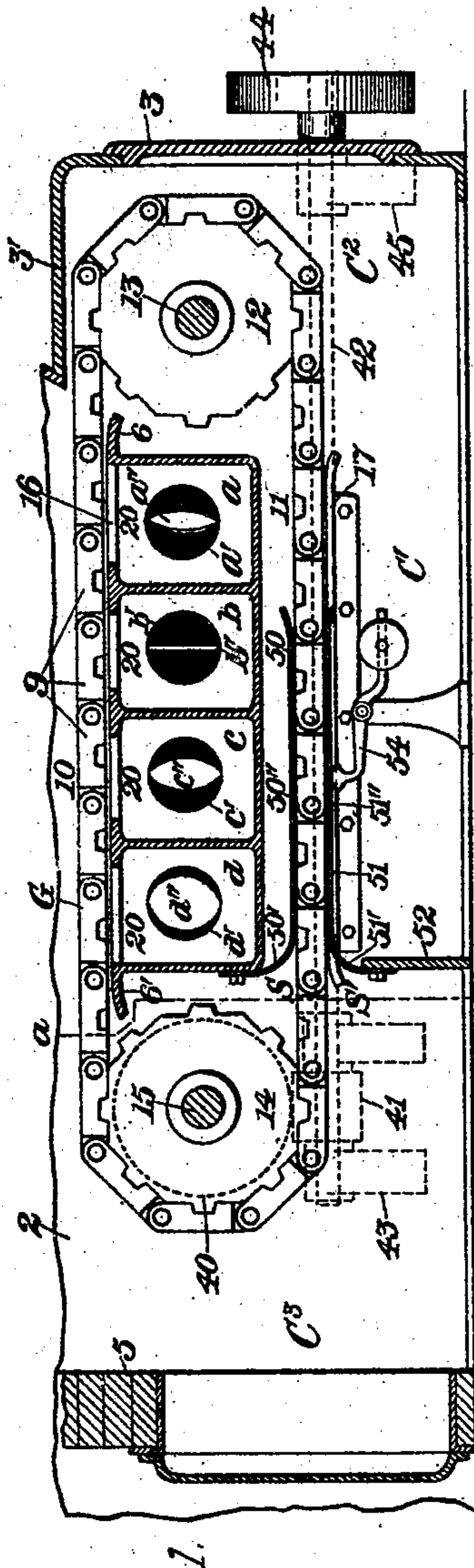


Fig. 1.

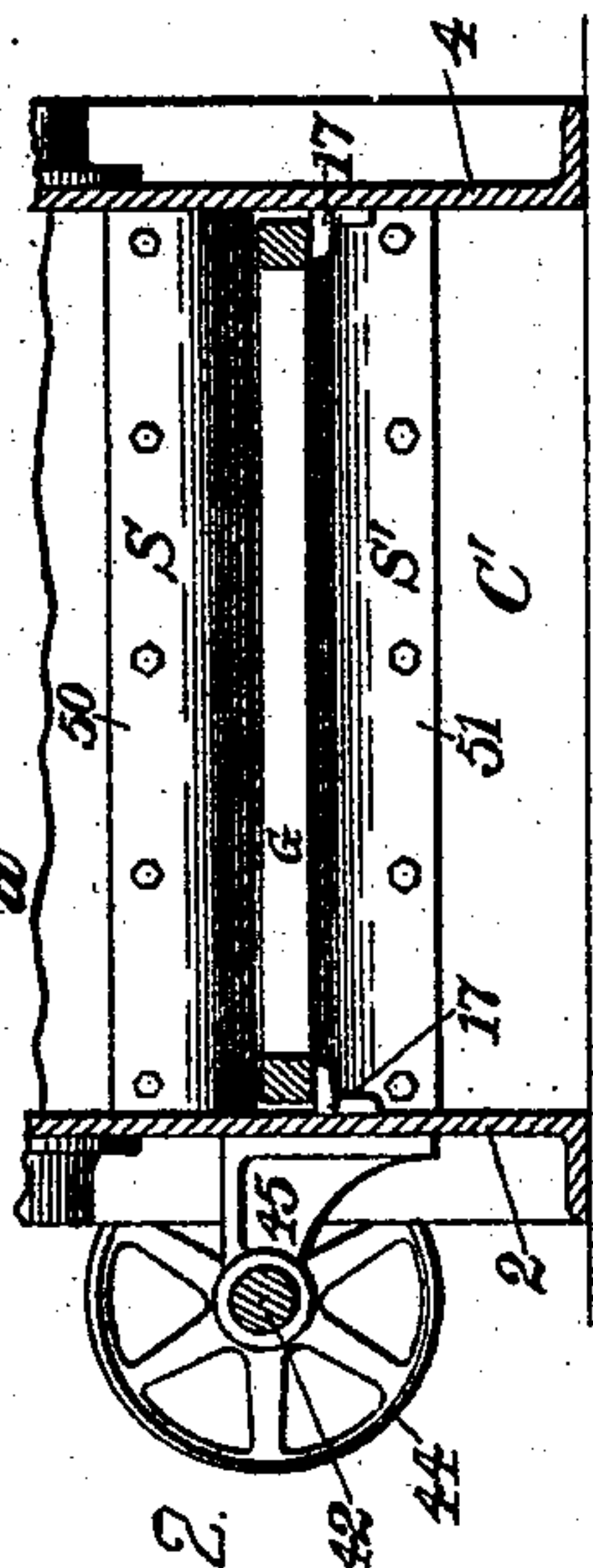


Fig. 2.

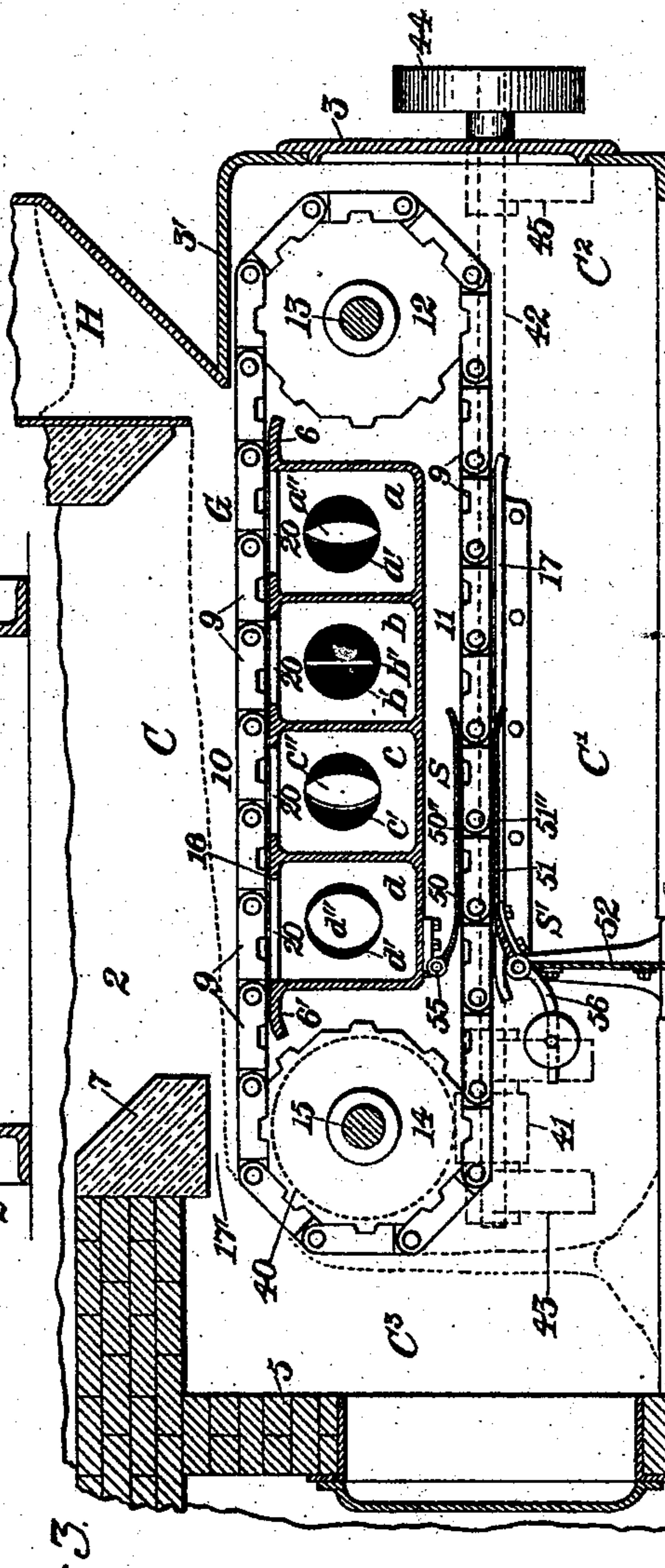


Fig. 3.

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UNITED STATES PATENT OFFICE.

ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 517,644, dated April 3, 1894.

Application filed February 20, 1894. Serial No. 500,824. (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 Furnaces, of which the following is a specification.

This invention relates to furnaces, and especially to the class of furnaces described in United States Letters Patent No. 499,716, dated June 20, 1893, in which a traveling grate is employed, and in which the fuel upon the grate is treated to successive air-blasts of varying pressures, at successive points in the travel thereof.

The chief object of my present invention is to provide an air-seal device in connection with the traveling furnace-grate for blocking the passage of air and preventing its escape through the furnace-chamber except at the desired points along the upper run of the grate.

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional side elevation of a portion of a furnace furnished with my improvements, in one form thereof. Fig. 2 is a vertical cross-sectional view of the furnace, taken in dotted lines *a-a*, Fig. 1, showing the parts at the right-hand of said line. Fig. 3 is a sectional side elevation, similar to that shown in Fig. 1, with my improvements, in a modified form thereof, applied thereto.

Similar characters designate like parts in all the figures.

The furnace in connection with which my present improvements are shown, is or may be, as to the general construction and arrangement thereof, substantially the same as the one described in my aforesaid Letters Patent No. 499,716, but it will be understood that my improvements are applicable to other furnaces than the one shown in said patent.

The furnace herein shown has the usual furnace-chamber C and grate-mechanism chamber C' inclosed in the usual manner by the side-walls 2 and 4, and end-walls 3 and 5; the roof of the furnace-chamber not being herein shown.

The grate-mechanism is placed below the furnace-chamber, the grate-bars forming a

floor therefor. The rearward end of the upper run of said furnace-floor extends underneath and in close proximity to the lower face of the bridge-wall 7, and the forward end of the upper run of said furnace-floor lies underneath and in close proximity to the top-wall 3' at the front end of the furnace, sufficient space being left between the rear end of the furnace-floor and the bridge-wall to permit the passage of the layer of ashes during the travel of the grate, all of which organization is substantially the same as the organization of like parts in the patent referred to.

The grate-mechanism herein shown consists of an endless traveling grate, designated in a general way by G, wheels and shafts for carrying said grate, and means for actuating said shafts. The endless grate is shown supported on chain-wheels, 12 and 14, fixed on the shafts 13 and 15, respectively, these shafts being supported in any suitable bearings carried by the framework of the furnace-structure. As a means for actuating the grate-mechanism, the shaft 15 is shown (in dotted lines, Figs. 1 and 3) as provided on its projecting outer end with a worm-wheel, 40, which meshes with a worm, 41, which is fixed on a shaft, 42, supported in bearings 43 and 45, and operated by means of the driving-pulley 44. This traveling grate is or may be of the same construction as the furnace-grate described in my aforesaid Letters Patent. It is shown as consisting of a number of sections or grate-bars, 9, pivotally connected together into an endless chain, or "chain-grate," which is carried by the aforesaid forward and rearward chain-wheels 12 and 14, respectively, said chain-grate being supported at each side thereof by tracks, 16 and 17, one of which is located below the upper run, 10, of said grate, and the other of which is located below the lower run, 11, of said grate.

For supplying air to the fuel upon the upper run, 10, of the grate at varying pressures at different points in the travel of said fuel, a series of air-chambers, *a, b, c, d*, are provided, which are supplied with air from pipes, *a', b', c', d'*, which are, in turn, supplied with air from some suitable apparatus,

as, for instance, a blower or air-pump located outside the furnace. In practice, said connecting-pipes, a' , b' , c' , d' , are provided with regulating-valves, a'' , b'' , c'' , d'' , after the manner described in the aforesaid Letters Patent, for the purpose of controlling the combustion according to the process described in Letters Patent No. 499,715, dated June 20, 1893. These air-chambers are open at their upper ends, as shown at 20, through which openings air is supplied to the fuel on the grate. A hopper, H, is provided at the forward end of the furnace, by means of which fuel is supplied to the traveling furnace-floor. These features, however, are not comprised in the subject-matter of my present invention, but are shown only for more fully illustrating the utility and mode of operation of my present improvements.

In furnaces of the class herein described, it is very desirable that the entire volume of air supplied under pressure should pass through the upper run of the grate to the under side of the fuel thereon, and to obviate as much as possible the waste of air by leakage around the outside of the layer of fuel contained on the grate.

In practice, in furnaces of this class, some leakage of air takes place at each end of the air-supply apparatus, but the major portion of this leakage occurs at the forward end of the apparatus, (shown at the right hand in Figs. 1 and 3,) the air passing out between the under side of the grate and the flange 6 of the air-chamber a into the forward portion, C^2 , of the grate-mechanism chamber. Some leakage of air also occurs through the mass of fuel on the chain-grate at the extreme forward end of the furnace-chamber, it passing forwardly and downwardly through the chain-grate into said forward portion, C^2 , of the grate-mechanism chamber. Also, there is a slight leakage of air from the lower-pressure air-chamber, d , through the space between the grate and the flange 6' of said air-chamber, into the rearward portion, C^3 , of said grate-mechanism chamber. But the forward leakage described is found to be, in practice, much the greatest, owing, presumably, to the high pressure used in the forward air-chambers a and b and the very much less air-pressure used in the rearward air-chamber d . If, therefore, no cut-off be provided between the forward and rearward portions, C^2 and C^3 , of the grate-mechanism chamber, the high-pressure leakage from the forward end of the air-supply apparatus would pass downward and thence rearwardly and upwardly to the space, 17', between the bridge-wall, 7, of the furnace and the rearward portion of the upper run, 10, of the traveling grate, and from thence would pass upward through the extreme rearward end of the furnace-chamber into the flue, and thus be wasted. To obviate this leakage and consequent waste of air, and to more fully insure the utilization of the entire air-blast for effecting the best possible results

in the combustion of the fuel, is, as before stated, the principal object of my present invention. As a means for accomplishing this result, I have provided a cut-off device, or air-seal, designated in a general way by S and S', which practically divides or cuts off the forward portion, C^2 , of the inclosed grate-mechanism chamber from the rearward portion, C^3 , of said chamber. This cut-off device, or air-seal, in the preferred form thereof shown in Figs. 1 and 2, consists of the upper and lower bearing-plates 50 and 51, respectively. In practice, these plates are of a width equal, or approximately so, to the width of the endless chain-grate, and of a length sufficient to cover two or more of the sections of said grate. In the form thereof shown in Figs. 1 and 2, the upper bearing-plate 50, which will, in the preferred form thereof, be of resilient or flexible metal, is bent upward at the rear end thereof, as shown at 50', and is secured at this end to the lower edge of the air-supply apparatus, and the middle portion, 50'', of said plate bears upon the upper face of the lower run, 11, of the grate, and cuts off communication between the forward end, C^2 , and rearward end, C^3 , of the mechanism-chamber above the line of the lower run of the grate. The lower bearing-plate 51 is also preferably bent downward, as shown at 51', at its rear end, and is secured to the upper end of a transverse dividing-wall or plate, 52. The middle portion, 51'', of this plate 51 is held upward in contact with the lower face of the lower run of the grate by a suitable device, such as a weighted lever, 54, as herein shown. This plate 51 bears upon the under side of the lower run of the grate opposite to the bearing-point 50'' of the upper plate 50, and, in connection with the transverse wall or plate 52, cuts off communication between the front and rear portions C^2 and C^3 , respectively, of the mechanism-chamber below the line of the lower run of the grate. This organization of mechanism, as will be understood by reference to the drawings, cuts off communication between the two portions C^2 and C^3 of the mechanism-chamber both above and below the lower run of the grate; and in consequence thereof, any air that may escape from the forward end of the air-supply apparatus will be retained in the forward end, C^2 , of the mechanism-chamber until the pressure thereof is sufficient to force the same upward through the upper run of the grate-bars. If desired, the upper plate may be hinged at its rear end to the lower edge of the air-supply apparatus, as shown at 55 in Fig. 3, and the lower plate may be hinged to the transverse wall or plate 52 and be provided with a weighted lever, 56, to retain the middle portion, 51'', thereof in contact with the lower face of the lower run of the grate.

I do not desire to limit myself to the exact construction of bearing-plate shown in the drawings, nor to the exact form of mechanism herein shown for retaining said plates in con-

tact with the upper and lower faces of the lower run of the grate, as their construction may be changed in various ways without departing from my invention.

5 The upper plate 50 and the air-supply apparatus to which it is connected, and the lower plate 51 and the transverse wall 52 to which it is connected, constitute, practically, two division-walls, the upper one of which
10 divides the grate-mechanism chamber C' into two compartments above the lower run of the grate, and the lower one of which divides said mechanism-chamber C' into two compartments below the lower run of the grate, these
15 two division-walls cutting off communication between the forward and rearward portions, C² and C³, respectively, of the mechanism-chamber C'.

Having thus described my invention, I
20 claim—

1. In a furnace, the combination with the endless traveling grate and the chamber in which it is located, of a transverse division-wall located intermediate to the ends of said
25 grate and having a flexible resilient portion in bearing-contact with the lower run of said grate, substantially as described and for the purpose set forth.

2. In a furnace of the class specified, the
30 combination with an endless traveling grate and with the chamber inclosing said grate, of a transverse partition located intermediate to the upper and lower runs of the grate, and having a flexible or resilient portion in bear-
35 ing-contact with the lower run of said grate, and a transverse partition located below the lower run of said grate and bearing against the lower face of said run, which partitions divide the grate-inclosing chamber into two
40 compartments, substantially as described and for the purpose set forth.

3. In a furnace of the class specified, the combination with the traveling grate, and with its inclosing chamber, of two trans-
45 versely-disposed bearing-plates in yielding contact with the upper and lower faces of the lower run of said grate and adapted for cutting off communication between the front and rear portions of said chamber, substan-
50 tially as described and for the purpose set forth.

4. In a furnace of the class specified, the combination with the traveling grate and with its inclosing chamber, of a transversely-disposed air-seal device located intermediate
55 to the front and rear ends and in bearing-contact with the upper and lower faces of the lower run of the grate, and means for retaining said sealing-device in close but yielding contact with said grate, substantially as de-
60 scribed and for the purpose set forth.

5. In a furnace of the class specified, the combination with the traveling grate, its inclosing chamber, and the air-supply apparatus located intermediate to the upper and
55 lower runs of said grate, of an air-seal consisting of a bearing-plate secured to the air-supply apparatus and bearing upon the upper face of the lower run of the grate, and a bearing-plate pivotally or otherwise secured to a
70 transverse wall or plate below and bearing against the lower face of said run, and means for retaining the two plates in close but yielding contact with the upper and lower faces, respectively, of said lower run, substantially
75 as described and for the purpose set forth.

6. In a furnace, the combination with the traveling furnace-grate and its inclosing chamber, of a transverse wall dividing said chamber into two compartments and having
80 a bearing-plate in connection therewith in yielding contact with and closing openings through said grate, substantially as described and for the purpose set forth.

7. The combination with a traveling fur-
85 nace-grate and its inclosing chamber, of a transverse partition or wall located intermediate to the ends of said grate and dividing the said chamber into two compartments; a bearing-plate supported by one edge thereof
90 on said wall and having a body-portion adapted for bearing against the grate and closing openings through the same, and means for normally holding the bearing-plate in close but yielding contact with the under side of
95 said grate, substantially as described and for the purpose set forth.

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Witnesses:

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