

(No Model.)

4 Sheets—Sheet 1.

F. H. RICHARDS.
FURNACE.

No. 510,554.

Patented Dec. 12, 1893.

Fig. 1.

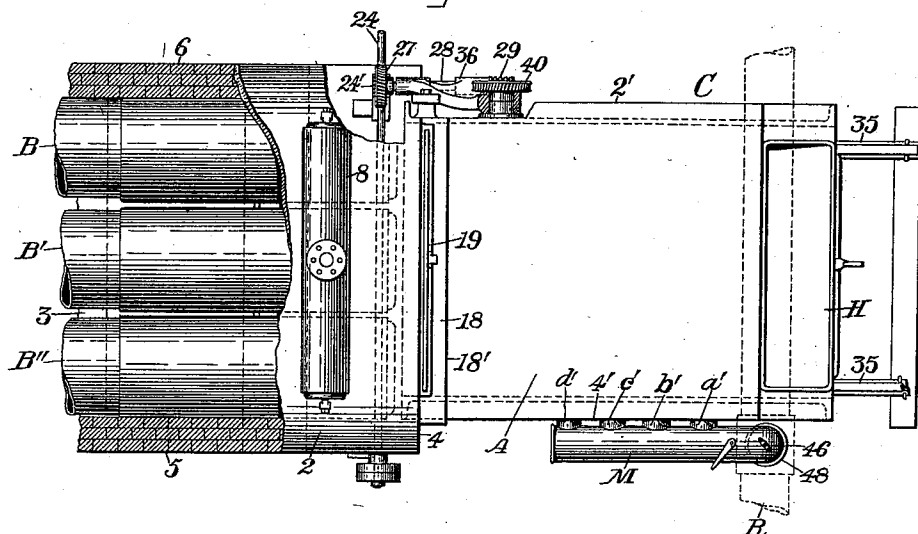
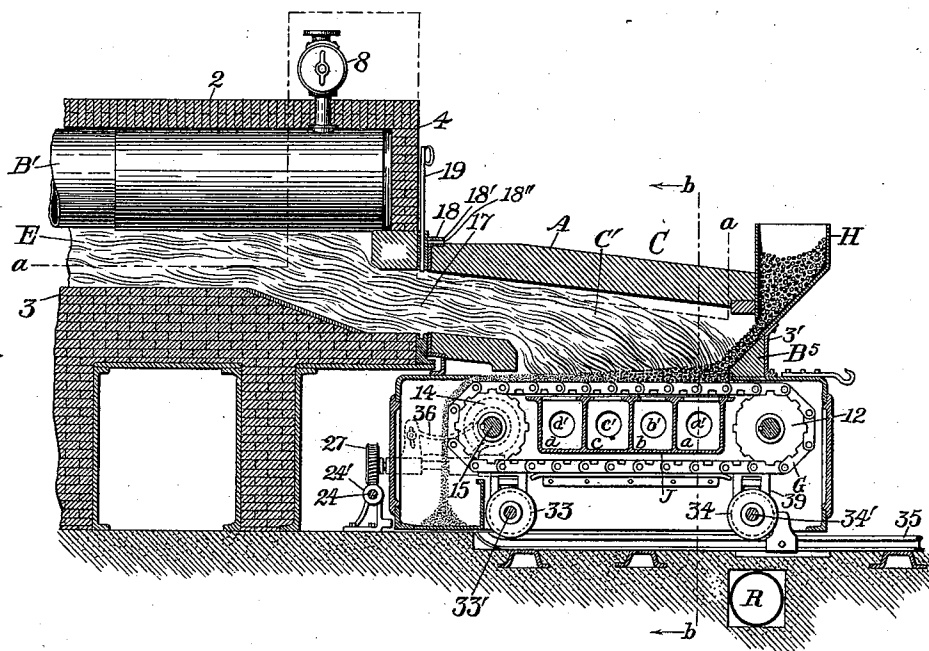


Fig. 2.



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Fig. 3.

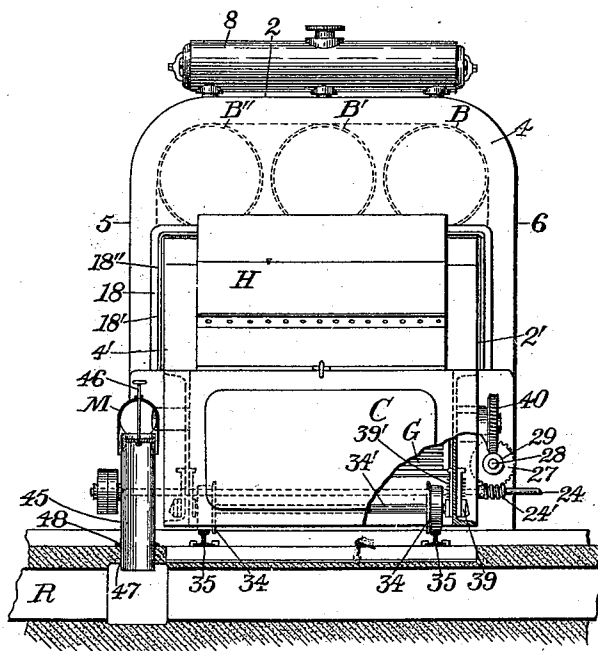
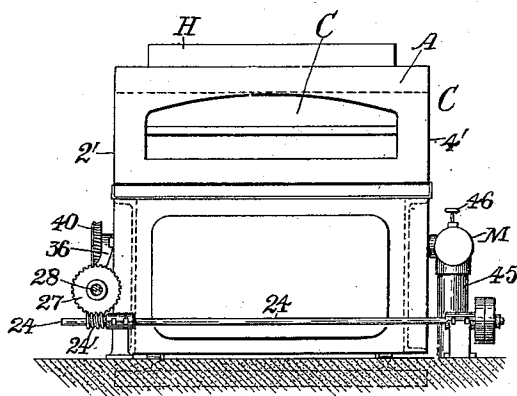


Fig. 4.



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Fig. 5.

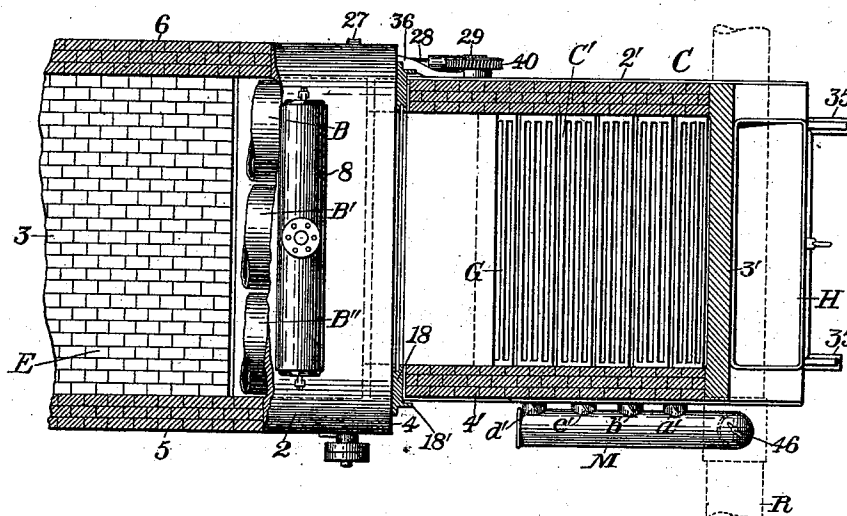


Fig. 6.

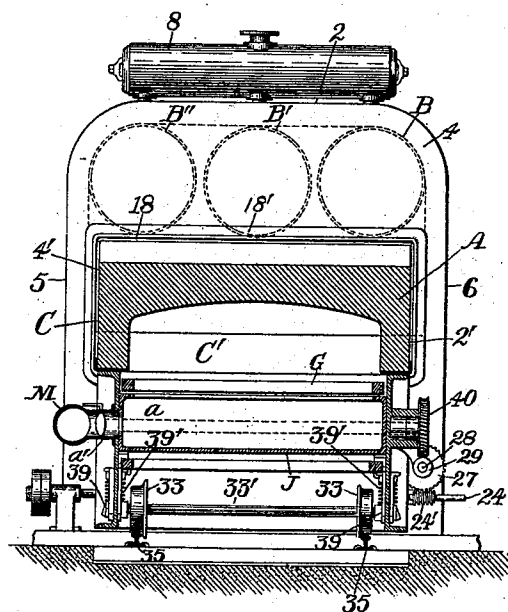
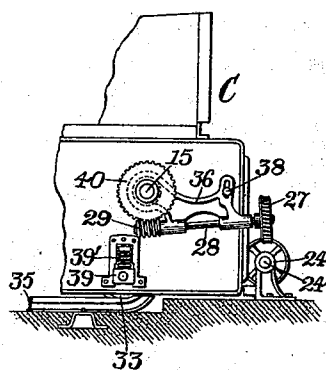


Fig. 7.



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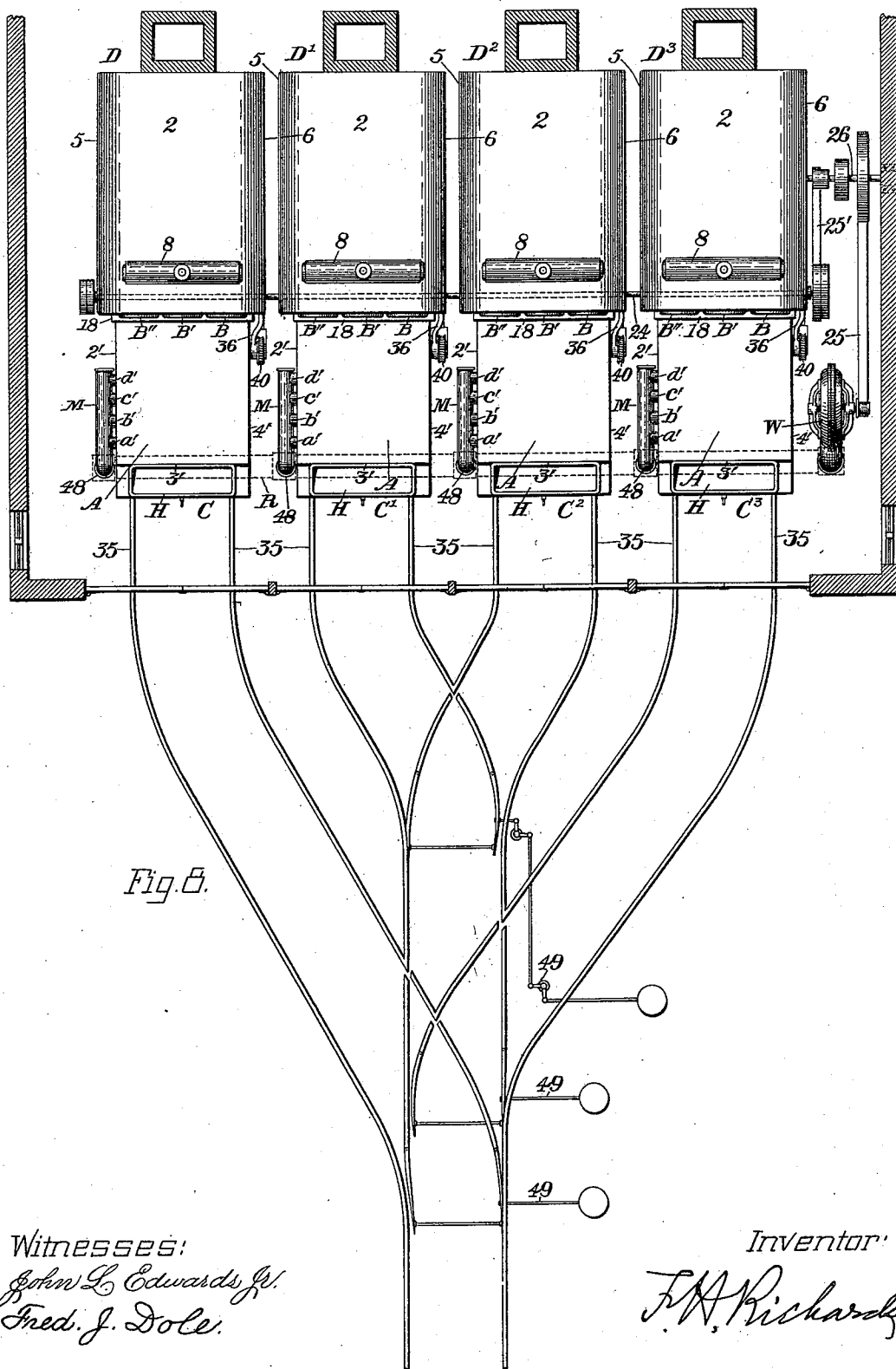
(No Model.)

4 Sheets—Sheet 4.

F. H. RICHARDS.
FURNACE.

No. 510,554.

Patented Dec. 12, 1893.



UNITED STATES PATENT OFFICE.

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

FURNACE.

SPECIFICATION forming part of Letters Patent No. 510,554, dated December 12, 1893.

Application filed September 4, 1893. Serial No. 484,701. (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 Furnaces, of which the following is a specification.

This invention relates to heating-furnaces and fuel-burning furnaces adapted for use in connection therewith; the object being to furnish a plant in which the fuel-burning furnace may be run from and into place, and one furnace substituted for another as occasion may require.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of a plant embodying my present improvements. Fig. 2 is a sectional side elevation of the same. Fig. 3 is an end elevation of the apparatus shown in Figs 1 and 2, as seen from the right-hand in those figures. Fig. 4 is an end elevation of the fuel-burning furnace only, as seen from the left-hand in Fig. 2. Fig. 5 is a sectional plan view, in line *a-a*, Fig. 2. Fig. 6 is a vertical transverse section of the movable furnace, in line *b-b*, Fig. 2. Fig. 7 is a side view of the driving-mechanism as seen from above in Figs. 1 and 5. Fig. 8 is a diagrammatic view illustrating the use of a series of fuel-burning furnaces in connection with a series of heating-furnaces.

Similar characters designate like parts in all of the figures.

My present invention is, in part, in the nature of an improvement on the furnace described and claimed in the application for Letters Patent of the United States, Serial No. 479,986, filed by Eckley B. Coxe, July 10, 1893, and to which I have permission to refer.

The heating-furnace, designated in a general way by D, may be any furnace in which it is required to use the heated gases from a fuel-burning furnace. In the present instance I have shown said heating-furnace to be a steam-boiler furnace, in which the series of three steam-boilers is designated by B, B' and B'', the brick-work covering the same by 2, the floor of the boiler-furnace by 3, and the front-wall of the same by 4.

In the diagrammatic view, Fig. 8, is shown a

series of four boiler-plants, D, D', D² and D³, located side by side at some distance apart, and each provided with a separate fuel-burning furnace, C, C', C² and C³, respectively. Each of the boiler plants comprises, as herein shown, the three horizontal boilers B, B' and B'', which are placed in the same plane and are covered by the top wall 2, end wall 4, and side-walls 5 and 6. The boilers of each set are shown provided with the usual steam-drum, 8, whereby steam may be conveyed from the boilers to be utilized. The entrance, 17, to the boiler-furnace, E, is formed by a flue, 18, which has a valve-plate, 19. The mouth of said flue is shaped to receive the discharge-flue of the furnace C, so that when this is in position as shown in Fig. 2, it will discharge the heated gases directly into the boiler-furnace. Said valve 19 is carried by an abutment-plate, 18', which has a flange surrounding the flue 18 with a space between the two at 18'', to form a luting-joint. When one fuel-burning furnace is removed and another put in place, this luted joint has to be remade, which is done by means of a suitable mixture of fire-clay and sand.

The fuel-burning furnace, designated in a general way by C, in Figs. 1 and 2, consists of the furnace-chamber C', having the side-walls 2' and 4', end-wall 3', and top-arch or roof, A; it is shown furnished with the traveling grate G described in the Letters Patent No. 499,716, granted to said Coxe June 20, 1893; and with means of operating said grate. At the forward end of this furnace is placed the ordinary fuel-hopper, H, from which the coal is fed to the traveling grate by a chute discharging over the ignition-block B³.

The traveling grate hereinbefore mentioned is composed of a series of parallel transverse grate-bars joined at their ends and connected to form a continuous traveling grate G, carried and actuated by the chain-wheels 12 and 14.

The driving power is obtained from a line-shaft, 24, placed crosswise of a series of boiler-plants, as shown in Fig. 8. The farther end of shaft 24 is shown directly connected by a belt, 25, with the counter-shafting 26, to which the main power is or may be applied; said counter-shaft is also shown connected by a

belt 25', with the blower W, for obtaining the necessary air-supply. The shaft 24 has a worm, 24', meshing with the intermediate worm-gear, 27, on the shaft 28, which carries the worm 29 meshing with worm-wheel, 40, on the chain-wheel shaft 15. Said shaft 28 is carried by a swinging frame, 36, pivotally supported on the shaft 15 and held in place by the clamp-screw 38. See Fig. 7.

The motive-power for driving the traveling grate, is disconnected from the line-shaft 24, by the swinging of the frame 36 about the shaft 15, to elevate the worm 29, shaft 28, and carry the worm-gear 27 attached thereto out of mesh with the worm 24'.

Underneath the upper run of the traveling grate, is shown placed a sub-divided air-feeder J directly connected to the main pipe M, it being fed through the intermediate or smaller pipes, *a'*, *b'*, *c'*, and *d'*; these small pipes each having a regulating valve contained therein for regulating the necessary air-pressure within each sub-divided air-chamber, *a*, *b*, *c*, and *d*, as set forth in the aforesaid Patent No.

499,716. This feature, however, is not essential to my present invention, but is deemed preferable therefor. The interchangeability of this plant is shown in the accompanying drawings and is especially illustrated in Fig. 8.

For this purpose the furnace C and its foundation casing are placed on flanged wheels, 33 and 34, running upon the track-rails, 35. Said wheels are carried by axles 33' and 34', which run in bearings, 39, under springs, 39', interposed between the bearings and frame-work.

Within the end of air-pipe M of each of the respective fuel-burning furnaces, is a vertically-sliding connecting pipe 45, operated by means of the handle, 46, shown internally connected therewith, (Fig. 3,) this pipe being loosely fitted within its opening or bearing, 47, and held closely by the lip or flange, 48. This construction permits of a slight backward, forward or sidewise movement of the furnace upon its wheels without bending or breaking said pipes. When it is found necessary to remove the furnace, the pipe 45 is lifted to its upper position by the handle 46,

to clear the surface of the ground and out of connection with the main air-supply pipe R; at the same time the gear 27 is lifted out of mesh with the driving-worm 24'. When thus made ready, the furnace C may be run back from its respective boiler, and drawn away on the track to the repair-shops, or run into position for use at another of the boiler-plants. This will be understood from Fig. 8, in which is shown a series of four pairs of furnaces, with the necessary connecting tracks and switches, together with an air-supply pipeline R, and a connecting main shaft 24. For guiding the traveling furnaces from one track to another, suitable switches, 49, are provided in said tracks.

Having thus described my invention, I claim—

1. In a fuel-burning plant, the combination with a main air-supply pipe, a line-shaft and a track, of an independent furnace mounted to run upon said track and comprising an endless grate, an air-supply pipe having a shiftable connection for connecting and disconnecting the furnace with said main pipe, and driving-mechanism operatively connected with the traveling grate and adapted to be shifted from and into engagement with the line-shaft, substantially as described and for the purpose specified.

2. In a heating-plant, the combination, with a series of heating-furnaces, of a series of interconnected tracks leading to said furnaces, a series of independent interchangeable fuel-burning furnaces mounted to run upon the said tracks and adapted to connect with said heating-furnaces, and each provided with an operative grate-mechanism and an air-supply therefor, a main air-supply pipe extending across the series of tracks and adapted for connection with the traveling furnaces, and means for communicating power to the traveling grates of the fuel-burning furnaces when these are in position for use, substantially as described and for the purpose specified.

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