

W. DURYEA.
Heating Apparatus.

No. 214,376.

Patented April 15, 1879.

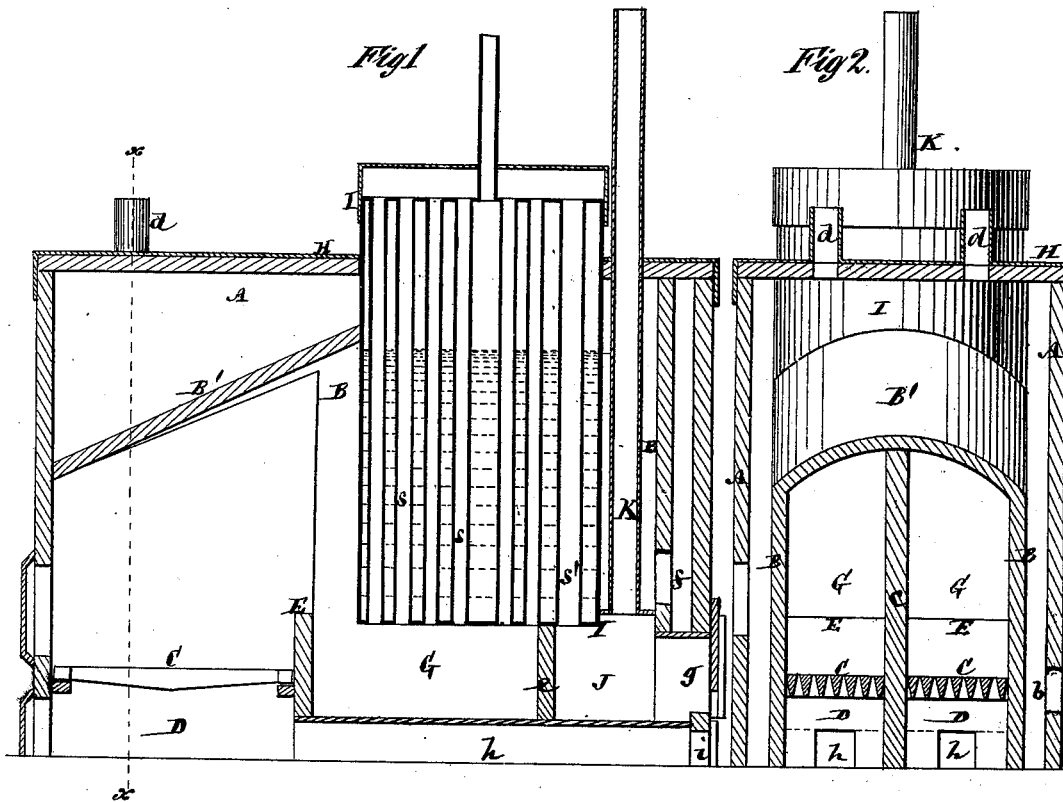
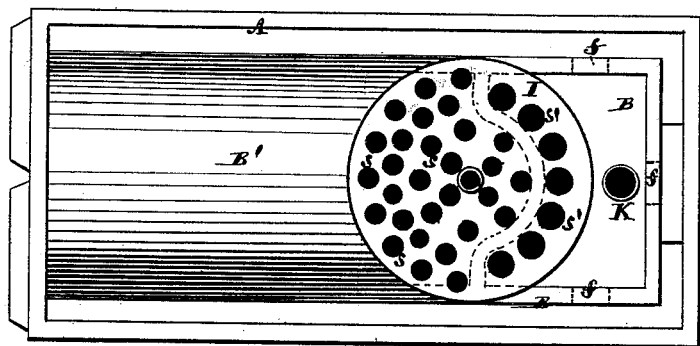


Fig 3.



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IMPROVEMENT IN HEATING APPARATUS.

Specification forming part of Letters Patent No. **214,376**, dated April 15, 1879; application filed February 24, 1879.

To all whom it may concern:

Be it known that I, WRIGHT DURYEA, of Glen Cove, in the county of Queens and State of New York, have invented certain new and useful Improvements in Apparatus for Heating and Ventilating Purposes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification.

This invention more particularly relates to apparatus for heating buildings, drying and ventilating purposes, in which a furnace operating substantially upon the principle described in Letters Patent No. 184,358, granted to William Ennis on November 14, 1876, is used—that is to say, a furnace in which the combustion of fuel is effected by simultaneously passing air in different volumes or of different pressures through different portions of the entire mass of fuel, for the purpose of generating carbonic oxide and effecting combustion of the escaping gases.

The invention consists in a furnace composed of certain combinations of inner and outer chambers, preferably built of brick, for heating air by radiation from brick surfaces, and certain flues for supplying the air to and passing off the gaseous products of combustion from the fire, with separate fire-places in said furnace, through each of which, alternately, different volumes of air are passed, a combustion-chamber common to both fire-places, and a steam-boiler within the furnace, through which the escaping gaseous products of combustion are made to circulate, all substantially as hereinafter described, and whereby the apparatus not only supplies, in a very economical manner, both hot air and steam, which may be used either separately or together, but the gaseous products of combustion are utilized to great advantage.

In the accompanying drawings, Figure 1 represents an irregular vertical longitudinal section of an apparatus constructed in accordance with my invention; Fig. 2, a transverse vertical section of the same on the line *x x*, Fig. 1; and Fig. 3, a plan with the top removed.

A is an outer chamber, built of brick, into which the air to be heated is admitted by one or more apertures, *b*; and B, an inner chamber, also built of brick, and, in connection with

a covering, B', over the fire-places, constituting the furnace proper. Said covering B' is constructed of fire-brick, and is represented of arched form, but may be made of flat slabs. C C are duplicate fire-places, arranged side by side, and separated from each other by a dividing-wall, *c*; and D D, the ash-pits of said fire-places, which latter communicate, in rear of back bridges, E, with a combustion-chamber, G, common to both fire-places.

H is the cover of the furnace, arranged to extend also over the chamber A, and provided with any desired number of outlets, *d*, for conducting the air circulating within said chamber, and around or about the furnace and over its arch B', to the place or places where the heated air is required to be utilized. This cover H may be constructed of metal plates lined with asbestos, or of iron bars with brick on top.

Arranged within the furnace, back of the bridges E, is a vertical tubular steam-boiler, I, which may extend up through the cover H, and projects down within the combustion-chamber G, and down to or within a smoke box or chamber, J, in rear of the combustion-chamber, and separated therefrom by a wall, *e*.

The air to be heated is not only free to circulate within the space circumscribed by the walls of the outer chamber, A, inner chamber, B, with its arch B', and the cover H, thus utilizing the whole, or nearly the whole, of the heat radiated from the walls of the furnace, and exposing the air to be heated mainly or wholly to brick surfaces, whereby its quality for various purposes is not impaired as it is when brought into contact with dry hot metal plates, but said air is also free to circulate, by means of apertures *f*, within the chamber B, back of the boiler I, and thus the heat radiating from said boiler is also utilized.

The boiler I is heated by the escaping gaseous products of combustion as they pass off from the combustion-chamber G to the chimney K, said escaping gases first passing up through one set of tubes, *s*, in said boiler, and down through an adjacent set, *s'*, to the smoke-box J, with which the chimney K connects. The steam generated within the boiler may either be used separately or in common with

the air heated by the apparatus, for various heating or ventilating purposes, both directly and indirectly, or may be used for motive power.

The smoke-box J may be provided with one or more openings, *g*, controlled by a door or slide, which may be automatically operated to check or control the draft when required. There is also a passage, *h*, in the base of the apparatus, having an inlet, *i*, in the rear of the latter, and connecting in front with the ash-pits D, for supplying the grates or fire-places C C with air obtained from a drying-room or other inner source of supply, the ash-pit doors then being closed.

By means of the two fire-places C C, both communicating with a combustion-chamber, G, common to both and in rear of the bridges E, the combustion may be effected by simultaneously passing air in different volumes through different portions of the entire mass of fuel, for the purpose of generating carbonic oxide, and of effecting the combustion of the escaping gases. Thus, after the fires have been started in both fire-places, the fire in either one of the latter, alternately, is allowed to coke, or a fresh charge of fuel supplied, while the other fire is allowed to burn low and bright. The supply of air will accordingly be quickened through the latter and retarded through the former, thus causing carbonic oxide to be generated in the fire-place in which the combustion is slowest, or which contains the fresh charge, and said carbonic oxide, as it passes into the combustion-chamber G, is con-

sumed by the air passed under a greater pressure or with increased volume through the ignited fuel in the other fire-place, in which the fire is brightest and lowest. By suitably opening and closing the doors or dampers controlling the supply of air to the fires in the two fire-places C C, and by suitably charging either fire-place with fresh fuel, the combustion of the escaping gases may be effectually obtained.

A heating apparatus thus constructed may not only combine with it a supply of steam, but the gaseous products of combustion are very effectually utilized and a pure quality of heated air is obtained.

A boiler of other construction may be substituted for the boiler represented.

I claim—

1. The combination, with an outer chamber, through which the air to be heated is circulated, of an inner chamber, having duplicate fire-places, a fire-brick arch or cover over said fire-places, and a combustion-chamber common to both of the latter, substantially as and for the purposes specified.

2. The combination of the outer chamber, A, the inner chamber, B, with its arch B', the fire-places C C, the combustion-chamber G, the steam-boiler I, and the smoke-box J, essentially as described.

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Witnesses:

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