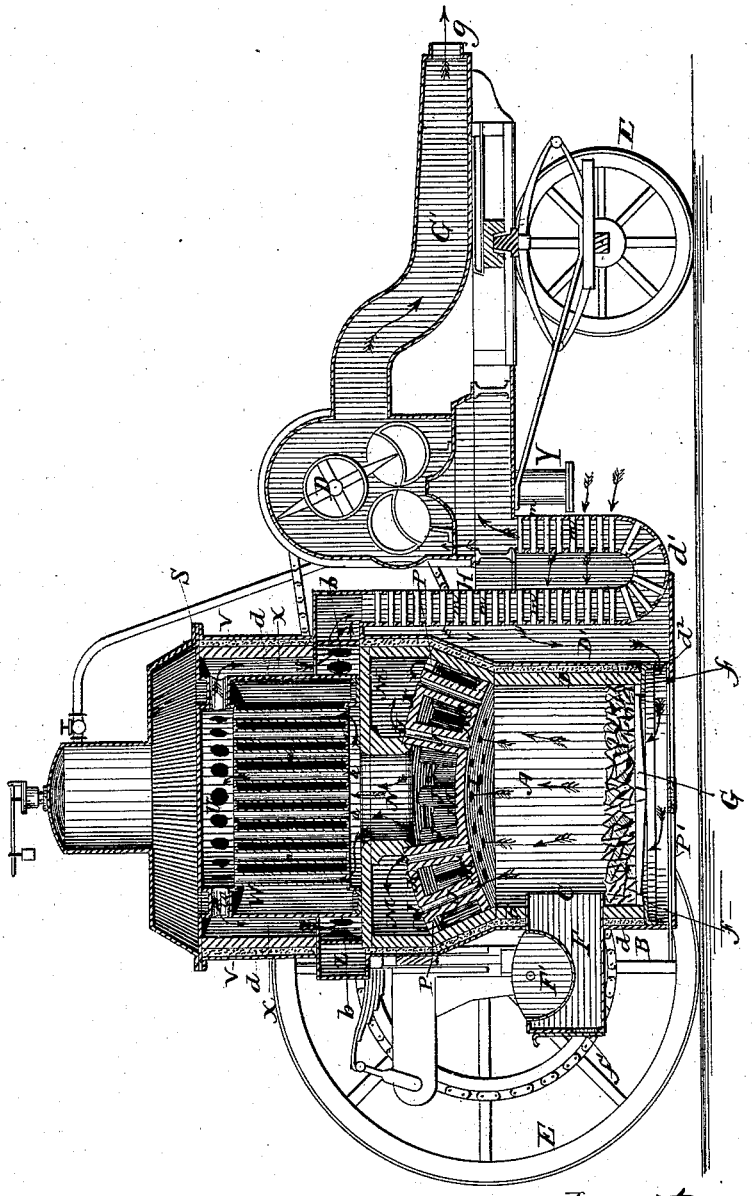
J. PATTISON.

Fire-Extinguishing Engine.

No. 217,477. Patented July 15, 1879.



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IMPROVEMENT IN FIRE-EXTINGUISHING ENGINES.

Specification forming part of Letters Patent No. **217,477**, dated July 15, 1879; application filed June 10, 1878.

To all whom it may concern:

Be it known that I, JUAN PATTISON, civil engineer, of the city, county, and State of New York, have invented a certain new and Improved Fire-Extinguishing Engine; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which the figure represents a longitudinal vertical section of my invention mounted upon transporting-wheels, and adapted to be drawn by horses.

This invention relates to that class of fire-extinguishers in which gases are employed as the extinguishing agents in contradistinction to liquids, and it is designed particularly as an improvement upon and supplementary to the apparatus for effecting the disengagement of atmospheric air for which Letters Patent of the United States No. 184,857 were granted to Charles L. Garfield, of Albany, New York, dated November 28, 1876.

The invention consists in a novel construction of the various parts of the apparatus and their various combinations with each other, which I will now proceed to describe.

In the accompanying drawing, A represents a furnace in which the deoxygenation of the air is effected. It is preferably constructed of sheet metal, with a lining of fire-brick, B, and provided with a grate, G, of ordinary form, and supported, as is also the fire-brick lining, on an angle-iron flange, *f*, extending entirely around the shell V and riveted thereto.

The furnace is further provided with an aperture feed-opening, C, through which fuel may be supplied from time to time, as required. The space *d* between the fire-brick lining and the shell is compactly filled with fine sand or other non-conducting material, to act as a cushion for said lining, and keep it in proper position when the apparatus is drawn over rough roads. The fire-brick lining thus cushioned extends from the angle-iron support *f* at the bottom to the point S, as shown.

Above the furnace proper or combustion-chamber A a perforated fire-brick crown-piece, I, is arranged, and above and parallel with said piece I is another similar piece, K, the two being connected and held in their relative positions by conical conducting pipes or flues J, also made of fire-brick, let into the upper or convex side of the crown-piece I and into the concave side of the piece K, the joints being covered with refractory clay to render them perfectly tight. The gases evolved in the furnace A pass up through the conducting-pipes J into a space or chamber, M, and thence descend through passages P into the space or chamber M′, which I term the "retort."

The conducting-tubes are so arranged and disposed as to admit of the free and uninterrupted passage of the gases between them without choking.

From the retort the gases ascend a passage, N, in a body, and spreading out or becoming diffused pass up through the flues or tubes *a* of a steam-boiler into another chamber, U, formed by the plate S of the steam-space and the walls of the water-space W. From the chamber U they pass out through radial tubes or flues *w* in the walls of the water-space W, and, descending through the space X between the outer shell of the boiler and the fire-brick lining B of the furnace, enter the conductor Z, and are thereby directed into the cooler or condenser H, through which they descend to the turning-point d^1, and thence ascend again to the exhaust-fan D, and are finally, by the latter, forced out through the conductor G′ to the point of delivery *g*.

The conductor Z is preferably made of four pieces of thin sheet metal riveted together to form a channel or passage rectangular in cross-section; and in order to facilitate and expedite the passage of the gases into said conductor the apertures *b* in the shell V are made as numerous as is possible without materially weakening said shell.

The cooler H is also preferably made rectangular in cross-section, and it is provided with numerous thin transverse metallic tubes *m* throughout its entire extent, which are fitted tightly and set like the tubes of an ordinary steam-boiler. The tubes *m* are placed at proper distances from each other to allow of the passage of the gases around and among them in a zigzag direction.

The diametrical fans D are operated by a

suitable engine, Y, deriving its motive power from the steam-boiler before mentioned, and performs the twofold function of exhausting the gases from the deoxygenating-furnace through the various passages and chambers, and in forcing said gases with great velocity and no inconsiderable force out through the nozzle *g* of the conductor G and into pipes to the place for use.

Having described the general construction of the apparatus and the course which the gases pursue from the time of their liberation to their point of delivery for use, I will now proceed to explain briefly the manner in which the atmospheric air is deoxygenated and rendered available as a fire-extinguishing agent, and consequently point out novelty in certain details of the apparatus which it might seem out of place to refer to at present.

A fire is built in the furnace, and a register-plate, P′, arranged beneath the grate, is opened to give the proper draft. When steam has been made in the boiler the engine is started, and the fans caused to revolve at a high rate of speed. The damper or register-plate is then closed, and cold atmospheric air rushes in through the tubes *m* in the cooler into a chamber or trunk, D′, and from thence is conducted through an opening, d^2, beneath the fire-grate and up through the fire-bed into the chamber A of the furnace, where the processes of combustion, combination, and separation are effected.

The combination of the oxygen of the atmospheric air with the carbon of the burning fuel produces carbonic acid and eliminates or disengages the nitrogen—an element without any affinity—and the latter, together with the carbonic oxide, (smoke,) hydrogen vapor, and other products of the combustion, pass into the retort M′, each preserving its identity until the intense heat of the retort on the hydrogen and oxygen that formed the vapor so greatly attenuates each that the molecules of which they are composed expand beyond the radius of their affinity or mutual attracting power. To keep them in this condition a sudden reduction of temperature is required, and this is effected by their sudden liberation and dispersion through the tubes of the boiler, which causes a large portion of their heat to be absorbed by the water therein in its conversion to steam. Thus vapor is disposed of; but the disunited oxygen, not being inactive, combines with whatever carbonic oxide (smoke) entered the retort, and forms carbonic acid, while the hydrogen passes off mixed with the extinguishing element, (nitrogen,) but in so unimportant a quantity and so highly attenuated in condition as to exert no influence.

The further cooling of the gases is effected by radiation from the sides of the shell in their descent to the conductor Z, and also by the latter while passing to the cooler H. Here the heat is radiated from the exposed sides and taken up by the cold air passing through the lateral tubes *m* on its way to the furnace.

It will be observed, therefore, that the tubes *m* serve the double purpose of heating the air prior to its entrance into the furnace and to cool it after deoxygenation.

It will also be observed that by the arrangement of the steam-boiler I am enabled to properly reduce the heat of the gases, and at the same time utilize said heat so parted with in the generation of steam to drive the engine which operates the fan.

Another novel feature of the invention consists in an arrangement for supplying the fuel to the fire as required.

Referring to the drawing, F represents a metallic box located at the rear of the furnace and opposite the feed-aperture C. Said box is provided with an opening at its top, in which a tilting holder, F′, is arranged to operate. The holder is pivoted above its center, so that it will normally hang in the position represented and effectually close the opening. A charge of fuel is kept in the holder, and when the fire needs replenishing the holder is tilted or turned over by means of a crank on one of its journals, and after depositing its contents into the box below returns automatically to its first position.

A poke-hole, *f′*, closed by a slide, is provided at the outer end of the box, through which the operator may insert a suitable instrument and evenly distribute the fuel upon the fire. This improvement is applicable to all kinds of furnaces.

The whole apparatus is intended to be mounted upon suitable transporting-wheels E E and to be drawn by horses like the ordinary steam fire-engines in general use. If desired, a connection may be made between one of the transporting-wheels and the fans by means of a belt or endless chain, whereby the fans may be set into motion and the apparatus put in working operation while on the way to the scene of the fire, and thus adapt it for immediate use after its arrival there.

Instead of the cooler H any other arrangement of cooler or condenser may be employed that will properly reduce the temperature of the extinguishing agent before it passes out of the apparatus for use.

Among the many advantages incident to the use of my invention may be mentioned the rapidity with which the deoxygenation of the air is effected, the comparatively small cost of production, and the extreme portability of the apparatus.

The deoxygenated air can be forced into places where water cannot reach—into holds of ships without damage to the cargoes, into stores and warehouses containing the most delicate fabrics, in short, into any place whatsoever without doing the slightest injury. It may also be stored in large reservoirs or tanks under considerable pressure, and supplied to dwellings, &c., in the same manner as gas and water.

I claim as my invention—

1. The combination of a furnace for deoxy-

genating air, a fan and pipe for forcing the deoxygenated air to the point where it is to be used, and a steam boiler and engine for driving the fan and reducing the temperature of the deoxygenated air, substantially as described.

2. The combination of the deoxygenating-furnace, the steam-boiler heated by the deoxygenated air to furnish motive power to the engine, the fan driven by the steam-engine, and the pipe through which the deoxygenated air is delivered whenever required, substantially as described.

3. A portable engine mounted on wheels, and having a deoxygenating-furnace, a steam-boiler heated therefrom and furnishing the motive power for an engine, and a fan driven by the engine to blow the deoxygenated air through a pipe or pipes to the point where required for use, substantially as described.

4. The combination of a deoxygenating-furnace, a boiler, an engine, a cooler to cool the deoxygenated air between the boiler and the fan, and a fan to blow the deoxygenated air through a pipe to the place where required for storage or use, substantially as described.

5. In combination with a deoxygenating-furnace, a series of pipes or passages through which the air passes to the furnace, and around which it passes from the furnace, whereby the same pipes or passages serve to heat the air for combustion and cool it after combustion for use, substantially as described.

6. The combination, with the furnace A, of the retort M′, consisting of the crown-pieces I K, pipes J, and chamber M, whereby the deoxygenation of the air is effected, substantially as described.

7. The combination of the furnace A, retort M′, and steam-boiler, all arranged in the manner described, and for the purpose specified.

8. The fuel-holder F′, combined with the feed-box F, having the poke-hole *f*, closed by a door, substantially as described, for the purpose specified.

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