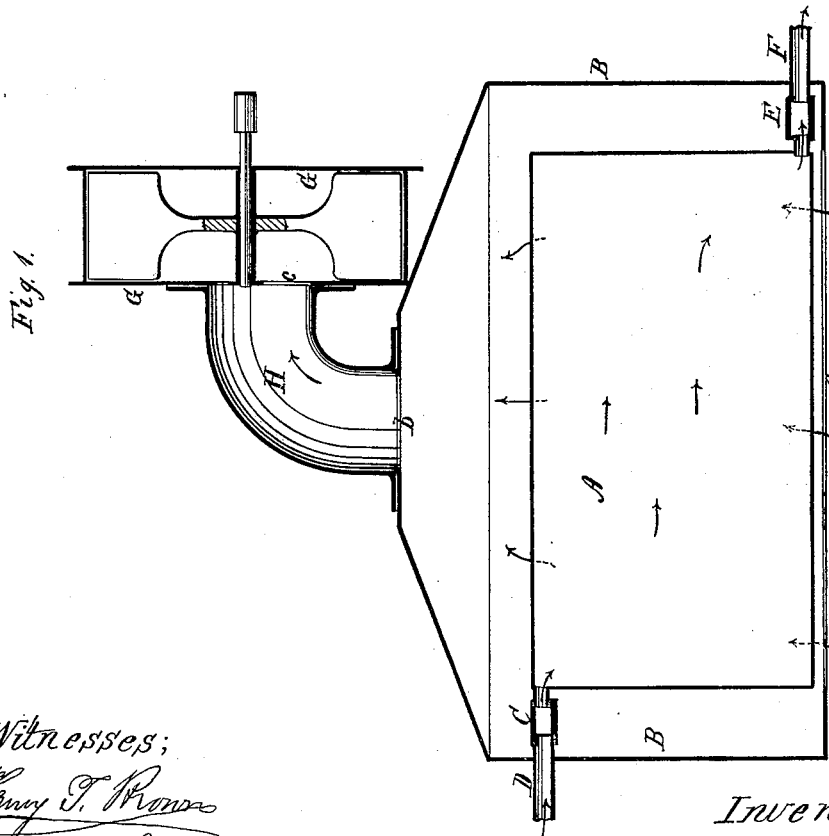
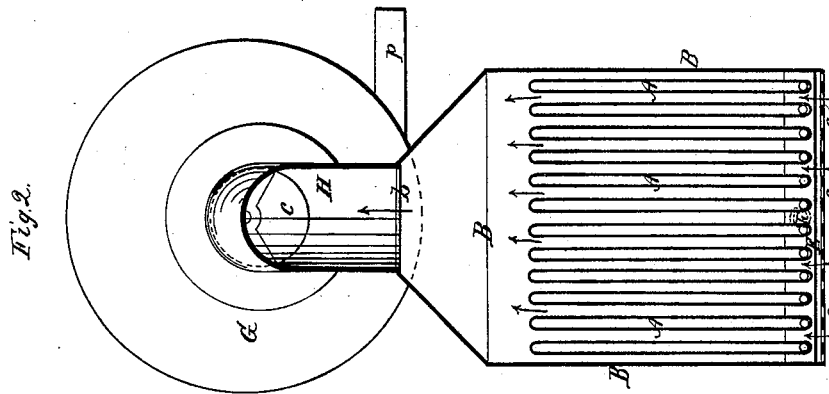


*A. C. Fletcher,*  
*Steam-Boiler Condenser.*  
*N<sup>o</sup> 48,710.                      Patented July 11, 1865.*



Witnesses;  
*Henry T. Rhodes*  
*J. W. Coombs*

Inventor;  
*Adison C. Fletcher*

# UNITED STATES PATENT OFFICE.

ADDISON C. FLETCHER, OF NEW YORK, N. Y.

## IMPROVEMENT IN CONDENSERS.

Specification forming part of Letters Patent No. 48,710, dated July 11, 1865.

*To all whom it may concern:*

Be it known that I, ADDISON C. FLETCHER, of the city, county, and State of New York, have invented a new and useful improvement in apparatus for reclaiming the heat of exhaust-steam and effecting the condensation of such steam for the return of its water to the boiler; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are vertical sections at right angles to each other of an apparatus constructed according to my invention.

Similar letters of reference indicate corresponding parts in both figures.

This invention relates to apparatus in which the heat is abstracted from the exhaust-steam escaping from an engine by means of a forced circulation of air over the surfaces of radiators into which the steam is introduced, the object being to condense the steam for the return of its water to the boiler and to utilize the heat abstracted in effecting such condensation as a means of heating air to be supplied to the boiler-furnace to promote the combustion of the fuel, or for any other purpose for which heated air may be required or desired.

In carrying out my invention I use a series of upright sheet-radiators connected with one common inlet-pipe for the steam and one common outlet-pipe for the water of condensation and inclosed within a box or case through which the air is drawn by means of a fan or other blowing device, which also drives it to the ash-pit or fire-chamber of the furnace, or to where it is required to be used; and my invention consists in a novel arrangement of the connection of the fan or blowing apparatus, and of the air-inlet openings, whereby a more rapid and better distributed circulation of air over the surface of the radiators is obtained.

To enable others to construct and use my invention, I will proceed to describe it with reference to the drawings.

A A are sheet-iron radiators, made of flat form, placed upright side by side, and very near together, within an oblong box or case, B, which may be made of iron, wood, or brick-work. These radiators are severally connected at one end, near the top, to a steam-box,

C, into which the exhaust-steam is delivered through the pipe D, and connected at the other end, near the bottom, to the water-box E, in which the water of condensation is collected from the several radiators, to be carried through a pipe, F, to any suitable receptacle, from which it is returned to the boiler at as high a temperature as practicable. The bottom of the box B is provided with a sufficient number of openings, *a a*, arranged parallel with the radiators, for the ingress of the cold air, which is drawn into the box by a fan-blower, G, the inlet-opening C of which is connected by a pipe, H, with an outlet-opening, *b*, in the center of the top of the box, and the outlet-opening *p* of which leads to the furnace or other place where the heated air is to be used. The steam circulates within the radiators, as indicated by red arrows in Fig. 1, and the air, circulating upward, as indicated by black arrows, all over the surfaces of the radiators, abstracts the heat from and condenses the steam and becomes heated by the heat so abstracted as it rises toward the outlet *b* of the box.

It is desirable, in order to condense steam successfully by means of air, to have an extremely rapid circulation of air over the surfaces of the radiators, and by the arrangement of the inlet air-openings *a* in the bottom of the box and the outlet air-openings *b* at the top thereof the natural tendency to upward circulation to which the air is subject by becoming heated is taken advantage of and made to accelerate the velocity of its upward transit through the box and the blowing apparatus, rendering the apparatus having such an arrangement of inlet and outlet air-openings much more effective than an apparatus on a similar principle having the openings at the ends and a horizontal circulation of the air.

It is not absolutely necessary that the upright radiators be arranged side by side and parallel with each other, as represented in the drawings, as the same results might be obtained by radiators arranged in vertical positions having a different horizontal relation to each other when such radiators are arranged as described in relation to the air inlets and outlets of their inclosing box or case.

The air heated by this apparatus may be forced into the furnace either below the grate, to promote the combustion of fuel, or above

the grate, to mix with and inflame the gaseous and volatile products of combustion, and so prevent the formation of smoke.

What I claim as my invention, and desire to secure by Letters Patent, is—

The arrangement of the fan *G* or its equivalent and the inlet-openings *a a* of the air-box *B*, substantially as herein described, in relation to the upright steam-radiators *A A* of an apparatus for condensing steam and heat-

ing air, whereby there is produced over the surfaces of the said radiators an artificial upward circulation in which the natural upward circulation is taken advantage of, substantially as herein set forth.

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Witnesses:

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