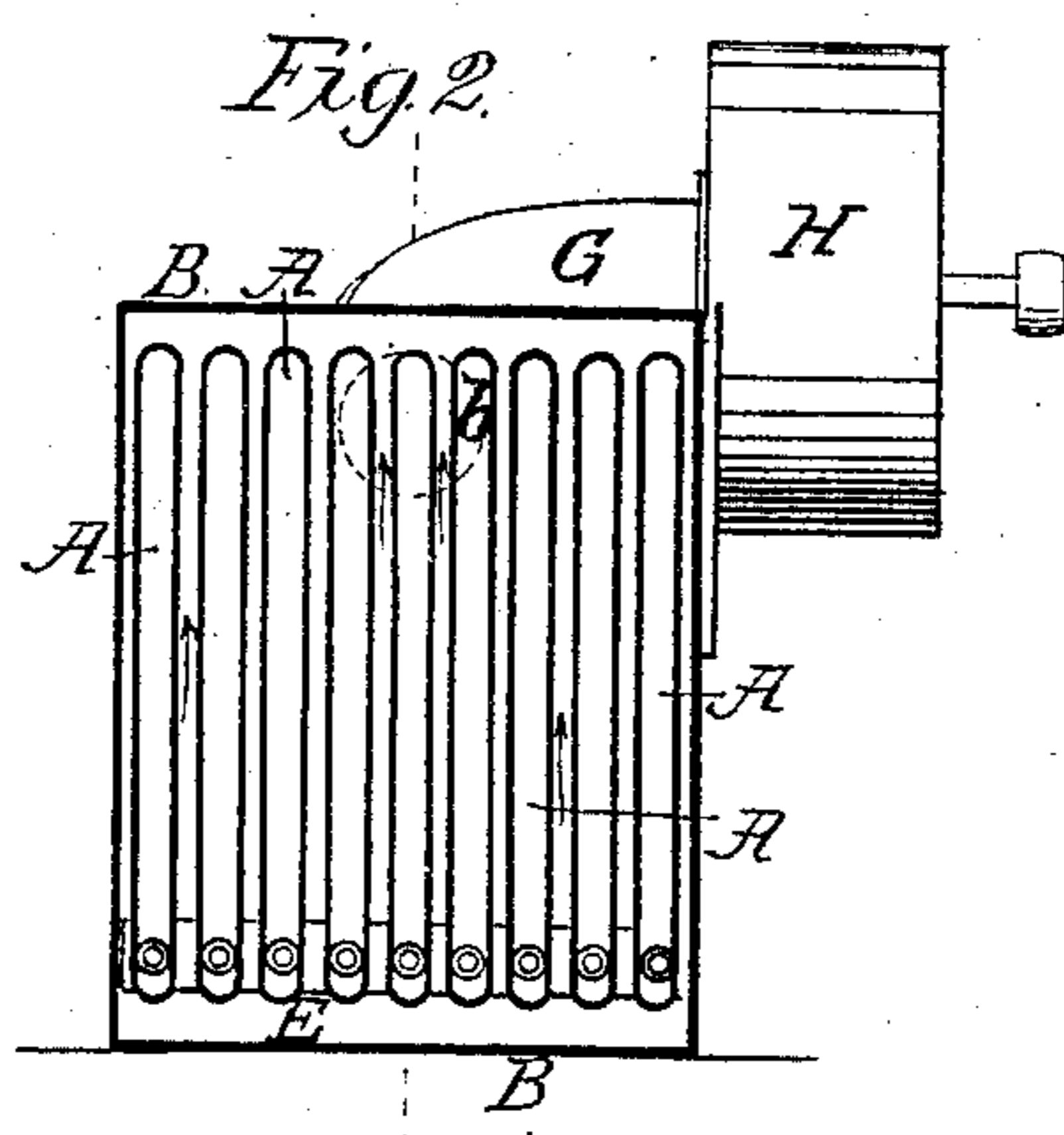
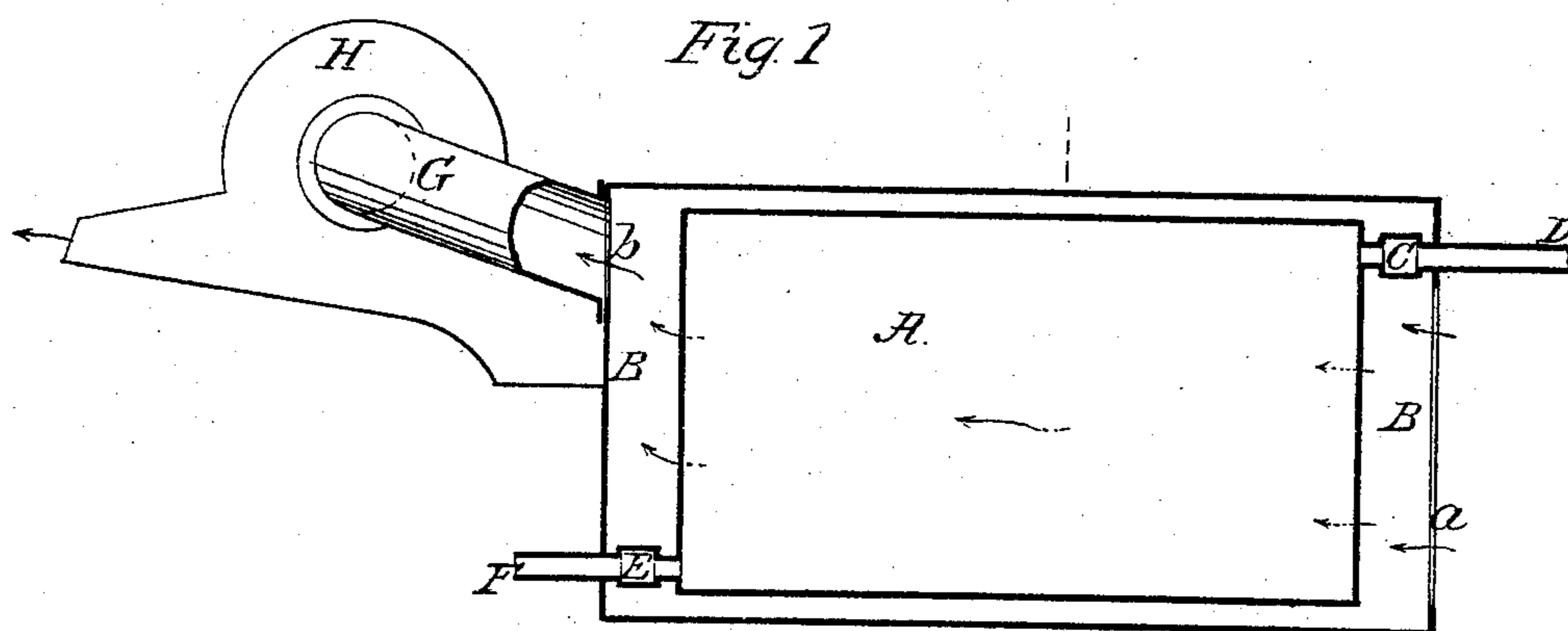


*A. C. Fletcher,*  
*Steam-Boiler Condenser.*  
*No 38,637.                      Patented May 19, 1863.*



*Witnesses:*  
*Wm. S. Partridge*  
*Daniel Robertsby*

*Inventor:*  
*Adison C Fletcher*

# UNITED STATES PATENT OFFICE.

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

## IMPROVED METHOD OF HEATING AIR BY EXHAUST-STEAM.

Specification forming part of Letters Patent No. 38,637, dated May 19, 1863.

*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 the Heating of Air and Condensation of Exhaust-Steam; 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, 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 the two figures.

This improvement relates to the heating of air for the supply of furnaces by means of the exhaust-steam from a steam-engine, and the condensation of such steam by its consequent loss of heat, to enable its water to be returned to the boiler.

It consists in the employment for the above purpose of an apparatus composed of a series of flat vertical and parallel radiators, connected at one end with a steam-box, which receives the exhaust-steam from an engine, and at the other with a box for the reception of the water of condensation, and inclosed within a box or casing at one end of which there are one or more inlets for air, and at the other end of which there is a pipe connected with a fan, by which a current of air is drawn through the box between and in contact with the radiators, and after being heated by the exhaust-steam is driven into a furnace for the purpose of accelerating combustion, thereby utilizing the waste heat of the steam, while the water obtained by condensation in the radiators is collected to be returned to the boiler by the force pump.

To enable others to make and use my invention, I will proceed to describe its construction and operation.

A are the flat vertical radiators, of sheet or cast iron, and of which any suitable number are arranged side by side within the casing B, being severally connected at one end near the top with the horizontal steam-box C, with which the exhaust-steam pipe D is connected,

and at the other end, near the bottom, with the horizontal water-box E, from which a pipe, F, leads to the hot-well for the escape of the water of condensation, which is to be returned to the boiler by the feed-pump at a temperature as near the boiling-point as possible. The boxes C and D may be both within the casing B. The said casing may be of iron, covered with wood or other non-conducting material, or entirely of wood or of brick-work. The inlet-openings *a*, provided in one end of the box or casing B, may be upright and narrow, to admit the air directly between the radiators, and may extend nearly from the bottom to the top of the casing. The outlet-opening *b* is near the top of the opposite end, and connected by a pipe, G, with the blower H, the spout of which leads to the furnace to convey to the fire the air which has been heated by its passage between and in contact with the surfaces of the radiators.

The advantages of employing the waste heat of the exhaust-steam from an engine to heat air to supply the furnace, and of returning to the boiler at a high temperature the water resulting from the condensation of the exhaust-steam of an engine, are too well known to require comment here.

The apparatus represented is much simpler and more cheaply constructed than the apparatus heretofore adopted for the purpose, while it is equally effective, and in this consists its advantage over those heretofore used.

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

The employment, for the heating of air for the supply of a furnace and the condensation of exhaust-steam for the return of its water of condensation to a steam-boiler, of an apparatus composed of a series of flat, vertical, and parallel radiators, A, combined with steam and water boxes C D, a casing, B, and a blower, H, the whole arranged as herein specified.

ADDISON C. FLETCHER.

Witnesses:

M. S. PARTRIDGE,  
DANIEL ROBERTSON.