

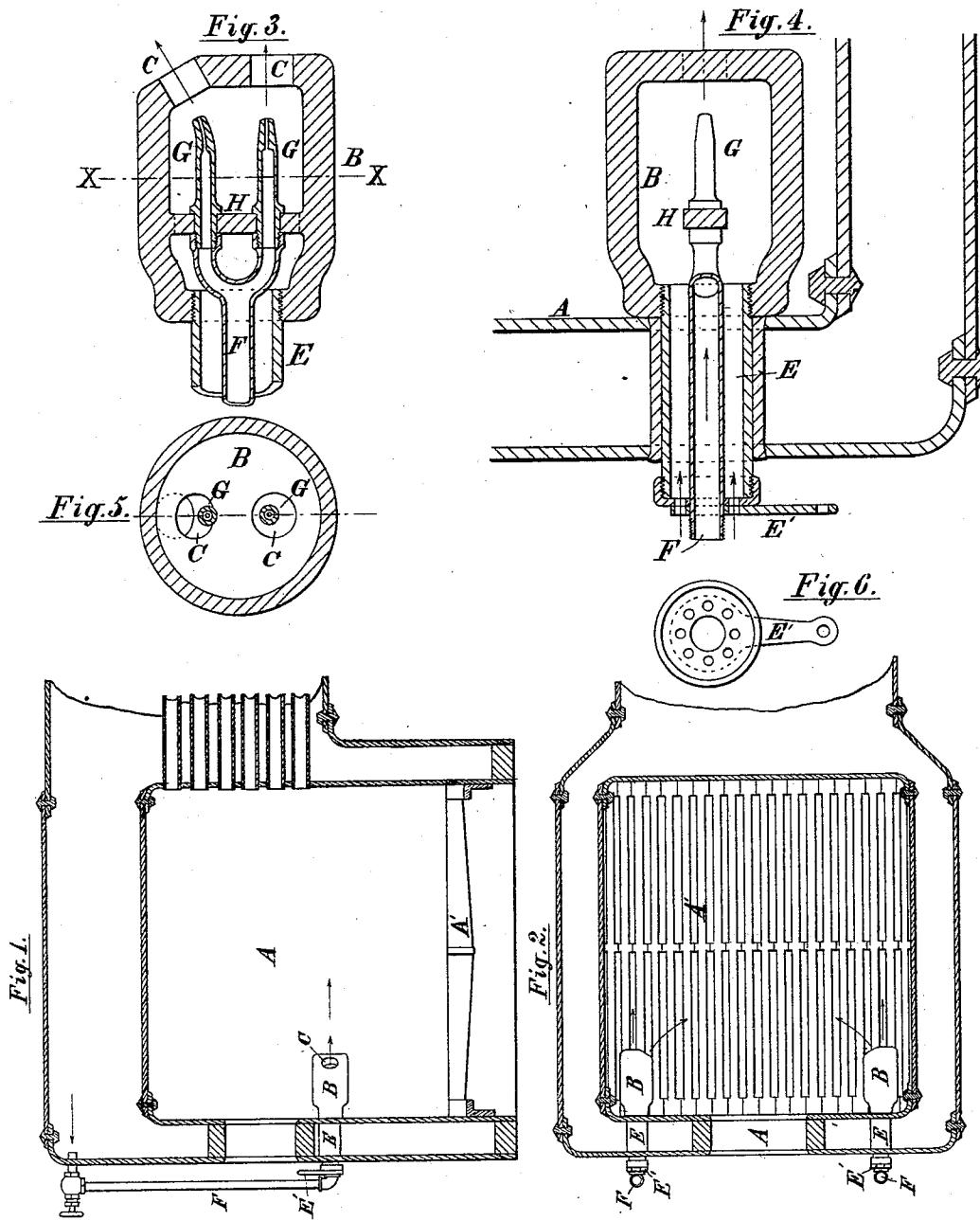
(No Model.)

E. CLARK.

STEAM BOILER FURNACE.

No. 282,845.

Patented Aug. 7, 1883.



WITNESSES:

*W. G. Hubbard.  
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# UNITED STATES PATENT OFFICE.

EDWARD CLARK, OF NEW YORK, N. Y.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 282,845, dated August 7, 1883.

Application filed May 25, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD CLARK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention is especially adapted to the furnaces of steam-boilers, and especially that class of furnaces in which steam and air combined are injected into the fire-chamber above the burning fuel for the purpose of promoting combustion. In practice it has been found that the best result is attained by heating the air before it is combined with the steam, and prior to my invention various contrivances have been devised for effecting this purpose. All such devices, however, which are known to me are too complicated in construction and operation for adapting the same to general use; and the object of my invention is to produce a device which shall be simple in its construction, and not only simple, but also economical in its operation, to which end it consists in the novel means hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 shows a furnace in longitudinal vertical section containing my improvement. Fig. 2 is a horizontal section thereof. Fig. 3 is a horizontal section of a portion of a vacuum-chamber, forming the essential feature of my improvement. Fig. 4 is a vertical section thereof, showing also a portion of the furnace. Fig. 5 is a cross-section on the line  $xx$ , Fig. 3. Fig. 6 is an end view.

Similar letters indicate similar parts.

The letter A designates the furnace of a steam-boiler, on the interior of which is arranged, above the fire-grate A', a chamber, B, of cast-iron or other suitable material. This chamber B is constructed with outlet-orifices C, two (more or less) in number at the inner end, and it is supported at the required place by a hollow stem or neck, E, which extends through the front wall of the furnace, it being suitably fastened therein, and opens on the exterior of the furnace, where it is preferably furnished with a damper or valve, E', so that air may be admitted to the chamber B through said stem.

Through the hollow stem E extends a steam-pipe, F, into the chamber B. This pipe F terminates in jets G, which are opposite to the outlet-orifices C of the chamber B, they being equal in number to said orifices, and being, moreover, supported by a bridge, H, in the chamber.

In applying the apparatus to use the steam-pipe F is connected with the boiler or any other steam-supply source, and as the steam issues from the jets G a partial vacuum is thereby produced in the chamber B, causing the air to rush in through the hollow stem, so that currents of combined and hot air are injected into the furnace through the outlet-orifices C of the chamber in the required manner to commingle with the products of combustion in the furnace. It will be seen that as the air passes through the vacuum-chamber B it absorbs heat therefrom, due to the position of said chamber, while, owing to the natural expansion of the air in the chamber and the ensuing interruption to the passage thereof, it is stored in the chamber a sufficient length of time to raise the temperature to the required point for insuring the consumption of the gases in the furnace.

I am aware that a superheating-chamber has heretofore been arranged on the interior of a furnace, and also that steam-jets have been used in a vacuum-chamber arranged on the exterior of a furnace. With this vacuum-chamber, however, a separate heating medium for the air must be used, whereas in my apparatus the vacuum-chamber itself is utilized for this purpose, an advantage of which is, aside from economy, that a direct and entirely unobstructed inflow of air from the exterior of the furnace may be obtained.

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

The combination, in a furnace, of the vacuum-chamber B, arranged on the interior of the furnace, above the fire-grate, and consisting of a hollow cast-iron chamber having inclined outlet-orifices C at one end and a hollow stem, E, at the other, and provided with a bridge, H, near its middle, said bridge being cast in one piece with the chamber B, said chamber being supported in place by the hollow stem E, passing through the front wall of the furnace and secured thereto, and opening

into the external air, and provided with a valve, E', formed substantially as shown, for regulating the supply of air, of the steam-pipe F, passing through the hollow stem E, and terminating in two or more separate and distinct nozzle-pipes opposite the orifices C C, said nozzle-pipes being securely supported in place by the bridge H, all constructed and operating substantially in the manner described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD CLARK.

Witnesses:

GEO. B. MORRIS,  
J. F. LUDEWIG.