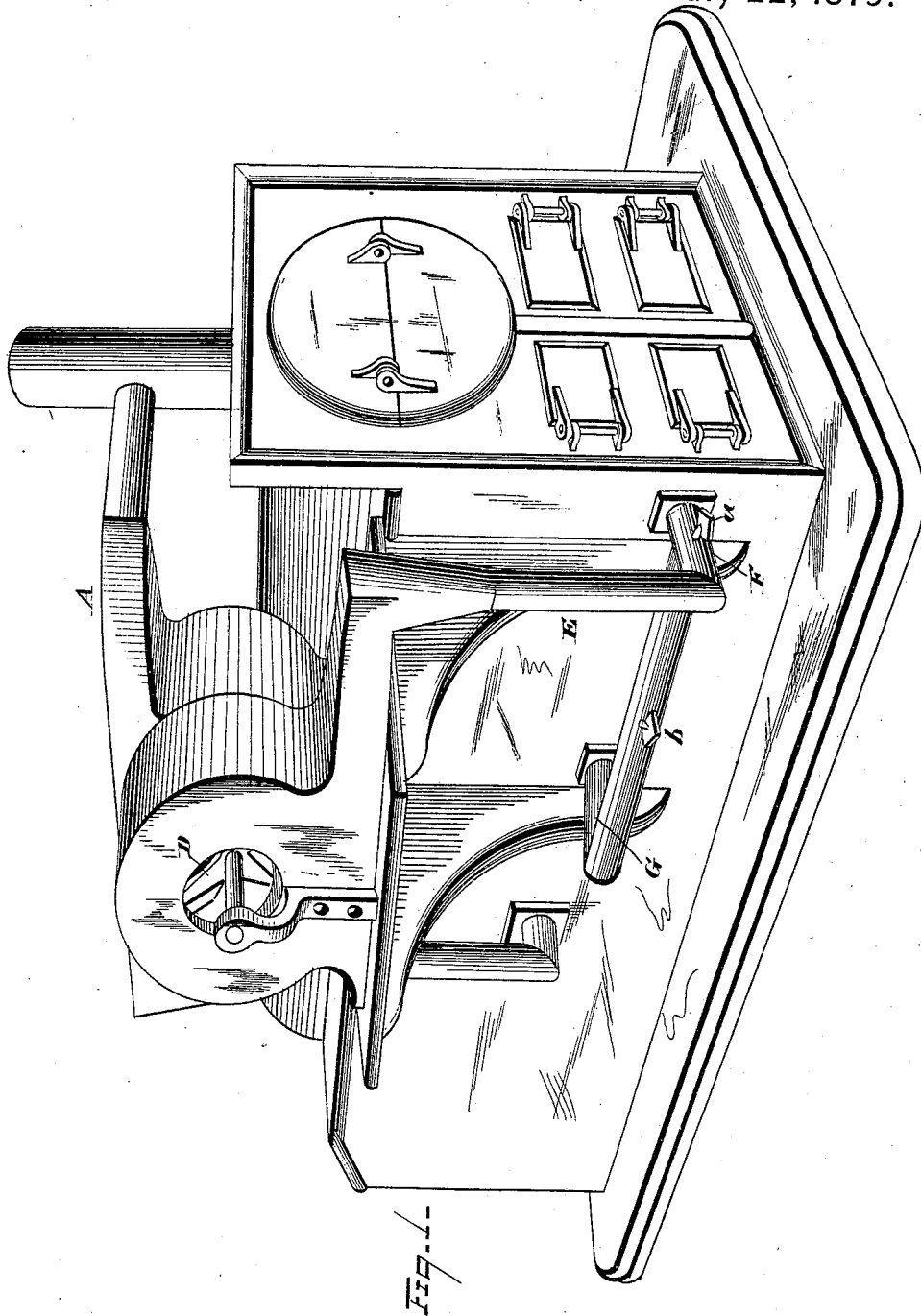


3 Sheets—Sheet 1.
F. P. EVERHART & C. M. KINGSBURY.
Boiler-Furnace.

No. 217,786.

Patented July 22, 1879.



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3 Sheets—Sheet 2.
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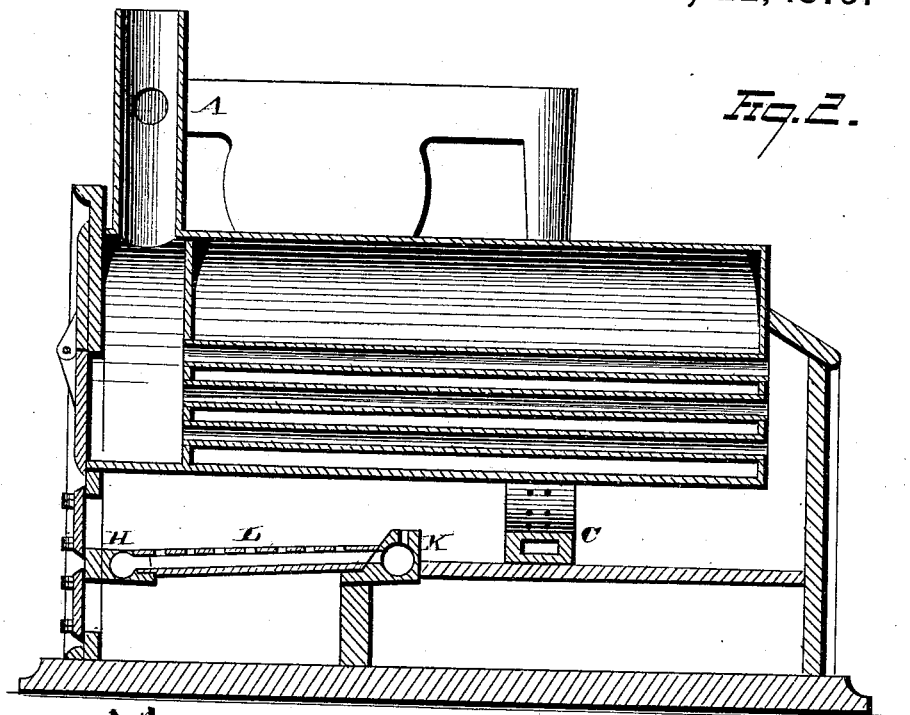


Fig. 2.

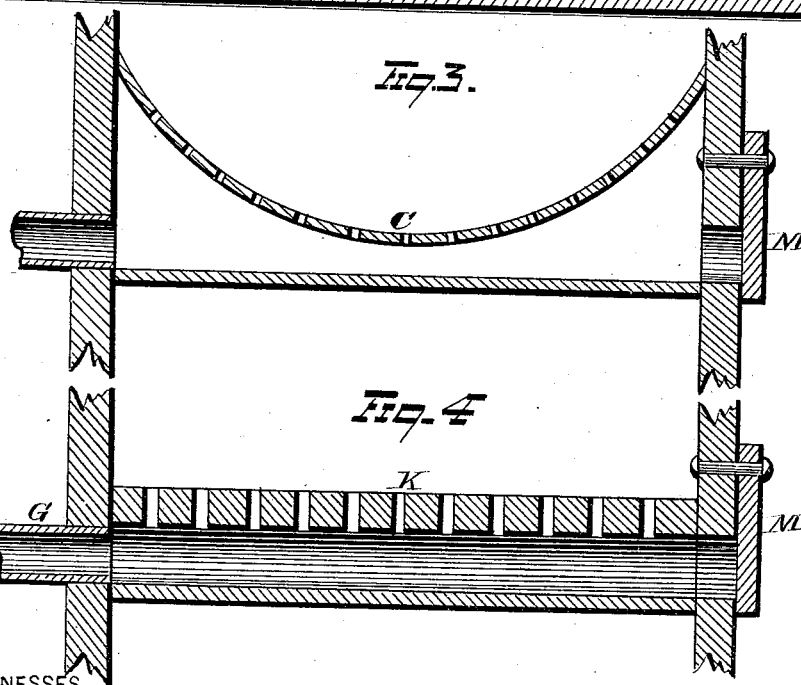


Fig. 3.

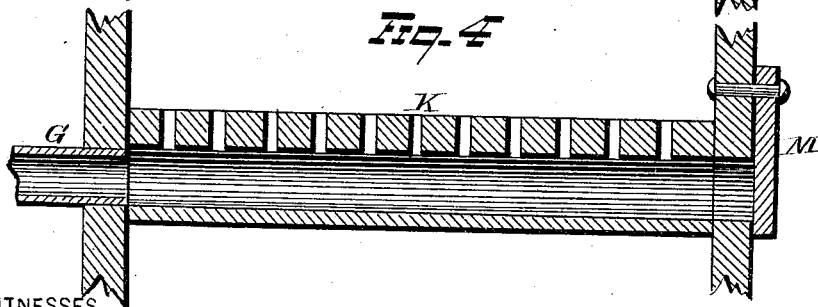


Fig. 4.

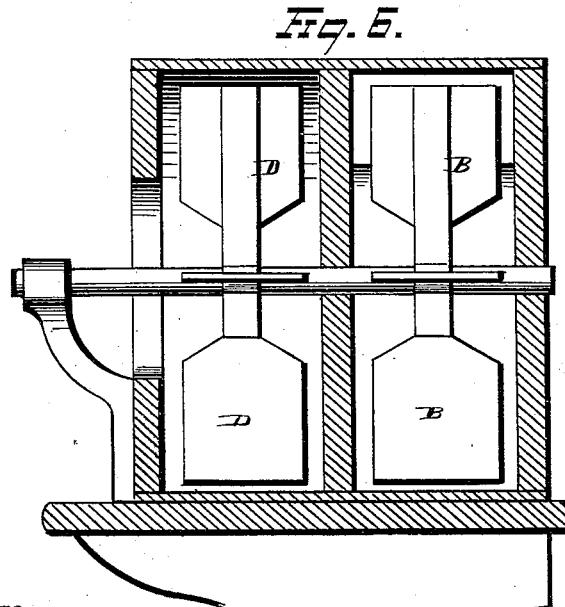
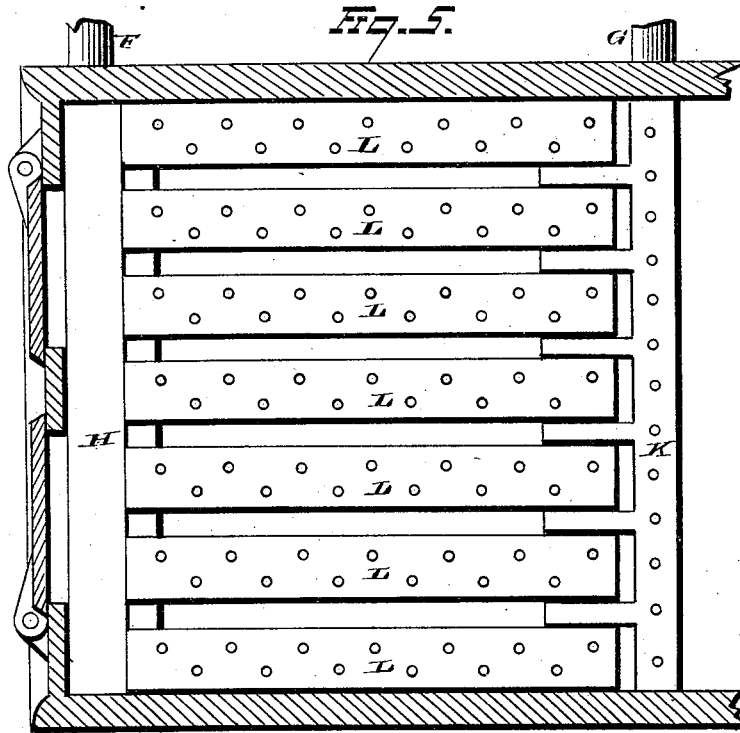
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UNITED STATES PATENT OFFICE.

FRANKLIN P. EVERHART AND CHARLES M. KINGSBURY, OF TAMA CITY,
IOWA.

IMPROVEMENT IN BOILER-FURNACES.

Specification forming part of Letters Patent No. **217,786**, dated July 22, 1879; application filed
May 12, 1879.

To all whom it may concern:

Be it known that we, FRANKLIN P. EVERHART and CHARLES M. KINGSBURY, of Tama City, in the county of Tama and State of Iowa, have invented certain new and useful Improvements in Boiler-Furnaces; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our invention relates to boiler-furnaces; and is designed to provide improved means for the introduction of air into the furnace, so as to increase the heating capacity of the latter without adding to its fuel expense. Hot air is taken after its usual passage through the boiler and returned beneath the latter, so as to consume whatever products of combustion may have escaped the furnace-fire and been only partially consumed therein. Cold air is forced into the furnace at various points thereof, so as to add to the combustion at either the forward or the rearward portions of the fire, or throughout the entire length thereof, as desired.

Our invention consists in the construction hereinafter described and claimed.

Referring to the drawings, Figure 1 is a view, in side perspective, of one form of furnace embodying our improvements. Fig. 2 is a longitudinal vertical section of the furnace. Fig. 3 is a detail sectional view through the hot-air chamber. Fig. 4 is a similar view of the rear cold-air chamber. Fig. 5 is a detail plan view of the grate-bed. Fig. 6 is a detail transverse sectional view of the double fan-box.

The suction-pipe A, which takes the hot-air after its passage through the boiler, may be connected with the stack, as shown, or it may be connected directly with the front end of the boiler. The fan B drives the air down into the hot-air chamber C, which is located transversely beneath the boiler and in the rear of the grate-bed, the upper surface of the chamber being perforated, so that the hot air may be discharged therefrom and act upon the partially-consumed products of combustion as the

latter fly rearwardly from the furnace-fire. This perforated top of the air-chamber is formed longitudinally concave, whereby it is adapted to discharge the heated air centrally into the combustion-chamber.

The blast-fan D drives cold atmospheric air down through pipe E, which branches off into pipes F and G. These latter pipes communicate, respectively, with the front and rear transverse air-chambers, H and K, and are provided with dampers *a* and *b*, so that the cold air may be forced only into one of said branch pipes, or simultaneously into them both, as may be at any time desired.

The front cold-air chamber, H, preferably has an imperforate upper surface, while the rear chamber, K, has its upper surface perforated, and serves both as a bridge-wall and as a means to consume the partially-burned products of combustion. The hollow grate-bars L are secured to both said cold-air chambers, and their opposite extremities communicate respectively with the same. Their upper surfaces are perforated, so as to permit the air to be passed up directly from the base into the midst of the fire. Dampers or doors M are provided, which open into the end of each of the two chambers C and K at their respective ends opposite to their connection with the air-supply pipes, and by means of them said chambers may be readily cleaned as desired. If wished, chamber H may be similarly provided.

It is apparent that the special style of boiler herein shown does not restrict the invention, and that the same principle is applicable to furnaces having any manner of steam-boiler.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a boiler-furnace, the combination, with a double-compartment fan-chamber, and a rotary shaft having fans which work therein, of independent pipes adapted to convey hot and cold air, respectively, from said compartments into the combustion-chamber, substantially as set forth.

2. In a boiler-furnace, the combination, with a fan and cold-air pipes, of front and rear air-chambers, with which the latter respect-

ively connect, together with hollow grate-bars communicating with said air-chambers and having perforated tops, substantially as set forth.

3. In a boiler-furnace, the combination, with a fan and cold-air pipes, of front and rear air-chambers connecting with the latter, and one or both of the same made with a perforated top, together with hollow perforated grate-bars whose opposite extremities respectively communicate with said air-chambers, substantially as set forth.

4. In a boiler-furnace, the combination, with the double-compartment fan-chamber provided with the double fan, of the suction pipe which leads air after passage through the boiler into

one of said compartments, and the force-pipe which conducts the air therefrom into the combustion-chamber in rear of the fire-bed, together with the pipe which conducts atmospheric air from the other compartment into the fire-bed portion of the combustion-chamber, substantially as set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 29th day of April, 1879.

FRANKLIN P. EVERHART.
CHARLES M. KINGSBURY.

Witnesses:

A. W. GUERNSEY,
O. H. MILLS.