

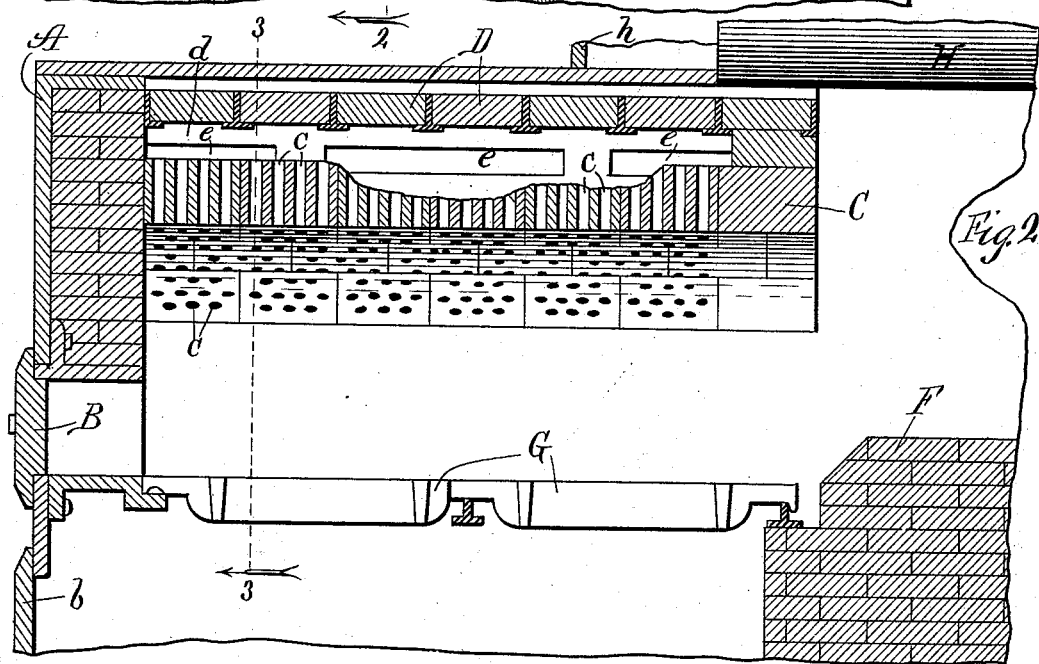
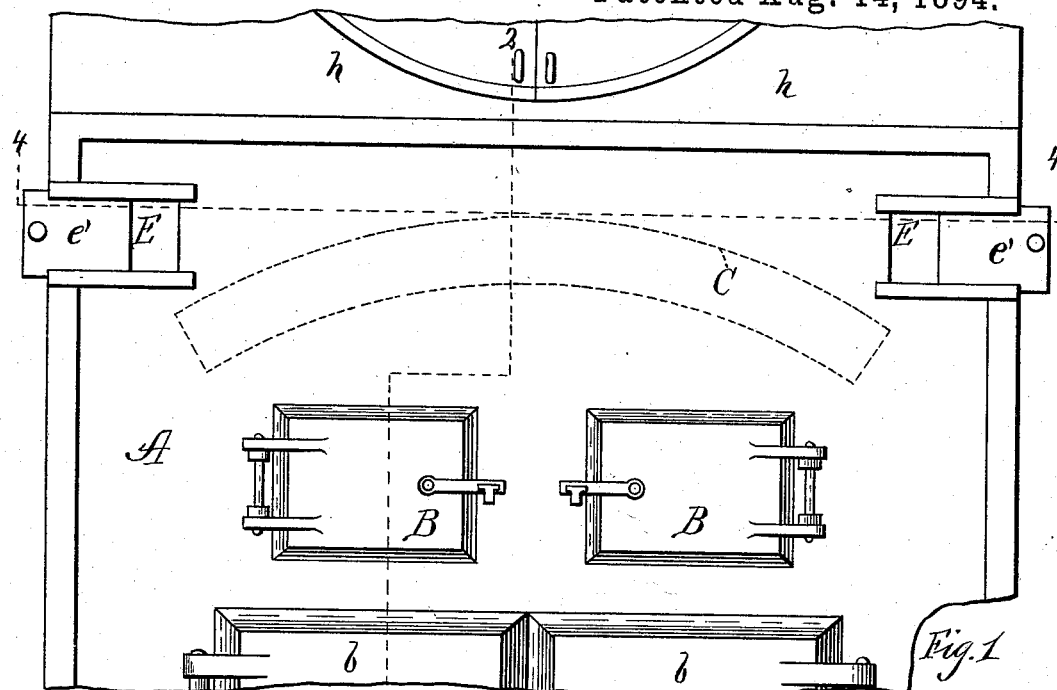
(No Model.)

2 Sheets—Sheet 1.

F. W. INGRAM & E. E. CARR.
FURNACE.

No. 524,328.

Patented Aug. 14, 1894.



Witnesses:
W. C. Corlies
Jno. A. Christianson.

Inventors:
Franklin W. Ingram
E. E. Carr
By Louis K. Seaton
Atty.

(No Model.)

2 Sheets—Sheet 2.

F. W. INGRAM & E. E. CARR.
FURNACE.

No. 524,328.

Patented Aug. 14, 1894.

Fig. 3.

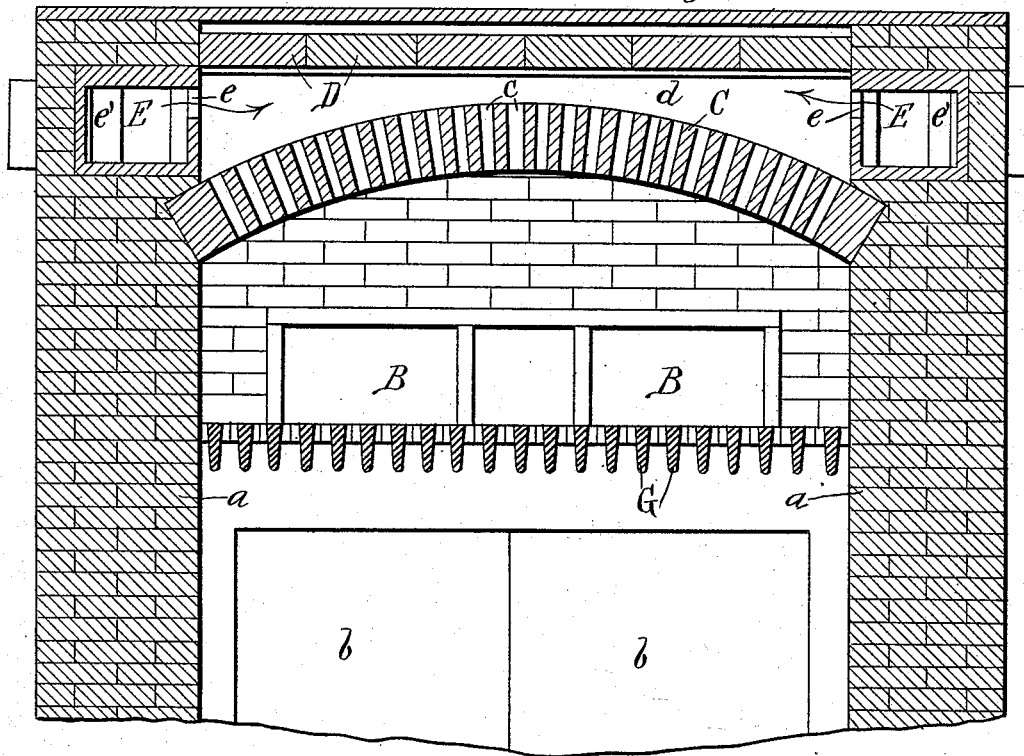
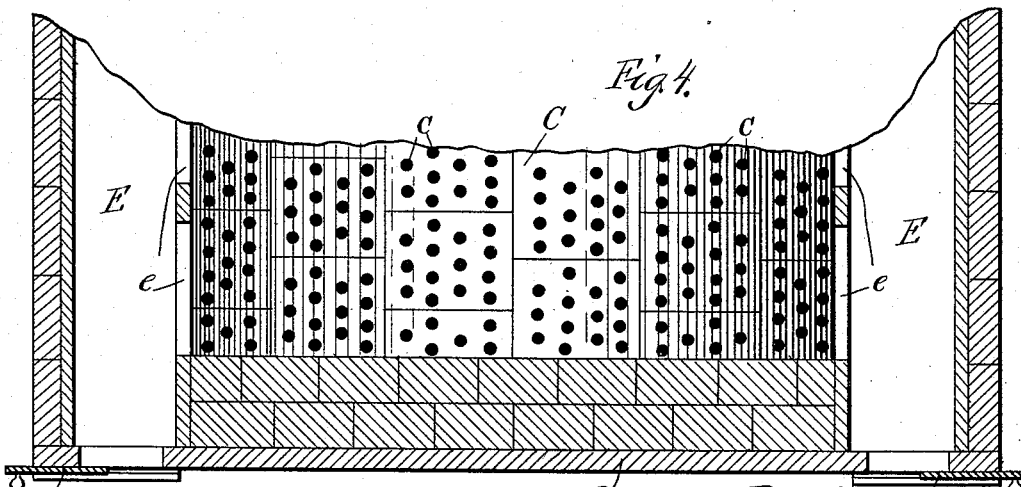


Fig. 4.



Witnesses:
W. C. Corlies
Jno. A. Christenson.

Inventors:
Franklin W. Ingram
Elihu E. Carr
By Louise L. Gilson

Atty.

UNITED STATES PATENT OFFICE.

FRANKLIN W. INGRAM AND ELMER E. CARR, OF CHICAGO, ILLINOIS.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 524,328, dated August 14, 1894.

Application filed April 1, 1893. Serial No. 468,699. (No model.)

To all whom it may concern:

Be it known that we, FRANKLIN W. INGRAM and ELMER E. CARR, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces; and we do 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 the letters of reference marked thereon, which form a part of this specification.

Our invention relates to boiler furnaces. Its object is to secure improved means for providing a supplemental supply of air for admixture with the vapors distilled by the burning fuel and thereby obtain complete combustion of the carbon, and thus prevent smoke.

The invention consists in the use of an arch perforated throughout its entire area, in conjunction with a roof above the arch so as to form between the two an air chamber.

In the accompanying drawings, Figure 1, is a front elevation of a boiler furnace. Fig. 2, is a longitudinal section of the same on the line 2—2 of Fig. 1. Fig. 3, is a transverse vertical section on the line 3—3 of Fig. 2. Fig. 4, is a plan section on the line 4—4 of Fig. 1.

We show at A, the front plate of an ordinary furnace, and at *a, a*, the side walls of the same. The doors to the fire-box are shown at B, B, and to the ash pit at *b, b*. The grate is represented at G, and the bridge wall at F, a portion of the front end of the boiler at H, and of the front end of the smoke arch at *h*.

The furnace arch C, is perforated, the perforations *c*, being small and extending throughout the entire area of the arch. Above the arch C, and spaced away from it so as to form between the two a chamber *d*, is a roof D.

Extending from the front of the furnace and within the walls *a, a*, are air flues E, E, lying alongside of the chamber *d* reaching back substantially to the rear end of the arch C and opening to the chamber *d*, by means of longitudinal slots *e, e*. The front ends of the flues E, E are provided with slide doors

e', e', whereby they may be wholly or in part closed. The area of the slots *e, e*, is substantially the same as of the outer opening of the flues E, E, so that the column of air entering the flue E, is discharged into the chamber *d*, throughout its entire length.

In kindling the fire the doors *e', e'*, may be closed. When the fuel is properly ignited these doors should be opened and air will enter the chamber *d*, and the supply being thoroughly distributed through it a jet of air will pass into the fire-box through each of the openings *c*, shooting down into the vapors rising from the fuel with considerable velocity and becoming thereby thoroughly intermingled with them, thus providing ample oxygen for complete combustion without danger of destroying the draft through the grate. The introduction of the air in jets over the entire bed of coals also obviates the danger of providing too much oxygen in one part of the furnace and too little in other portions and thereby allowing considerable of the products of combustion to pass off in the form of carbonic oxide.

The commodious chamber *d*, retains the air long enough to allow it to become considerably heated so that its entry into the fire-box does not seriously lower the temperature of the gases, while on the other hand the passage of the air through the arch prevents the latter from becoming so highly heated as to burn it out.

The roof D, remains comparatively cool so that there is little loss of heat by radiation from the arch, the heat which passes through it being taken up almost wholly by the air in the chamber *d* and carried back into the fire-box.

We claim as our invention—

1. The combination with a steam boiler, and with a furnace having its flue opening at the back of the fire-box, of a fire-box arch extending from the front wall of the furnace to the line of the bridge wall, and having perforations substantially throughout its entire area for the admission of air jets transverse to the direction of the draft, and a roof or covering independent of the boiler and located above the arch and adapted to form

therewith an air chamber, substantially as described and for the purpose specified.

2. In a furnace for steam boilers, the combination with an arch having perforations
5 for the admission of air jets substantially throughout its entire area, of a roof or covering located above the arch so as to form therewith an air chamber, and air ducts located at the sides of said chamber and opening
10 thereto substantially through their entire

lengths, substantially as described and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANKLIN W. INGRAM.
ELMER E. CARR.

Witnesses:

L. K. GILLSON,
M. H. L. WING.