

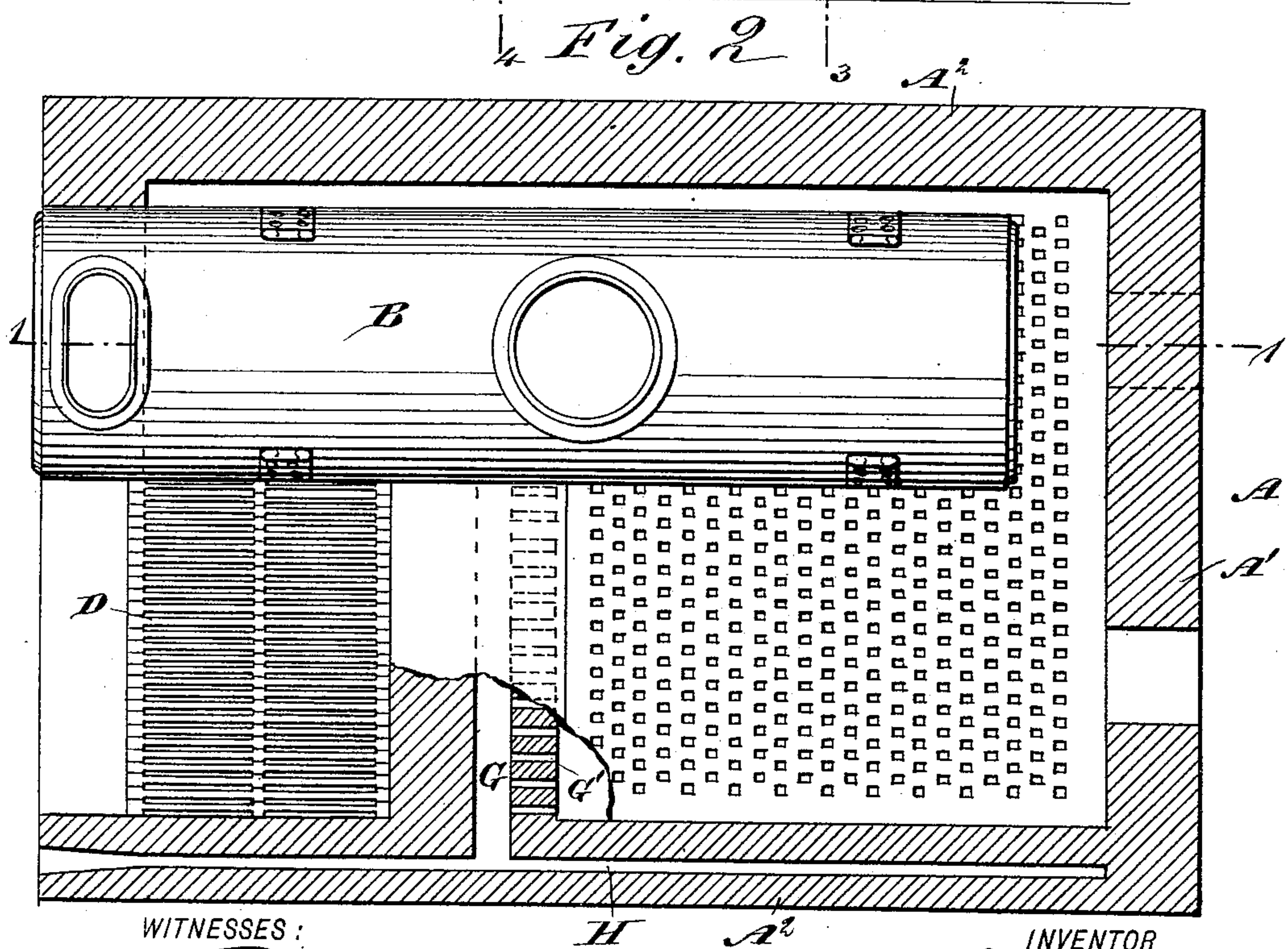
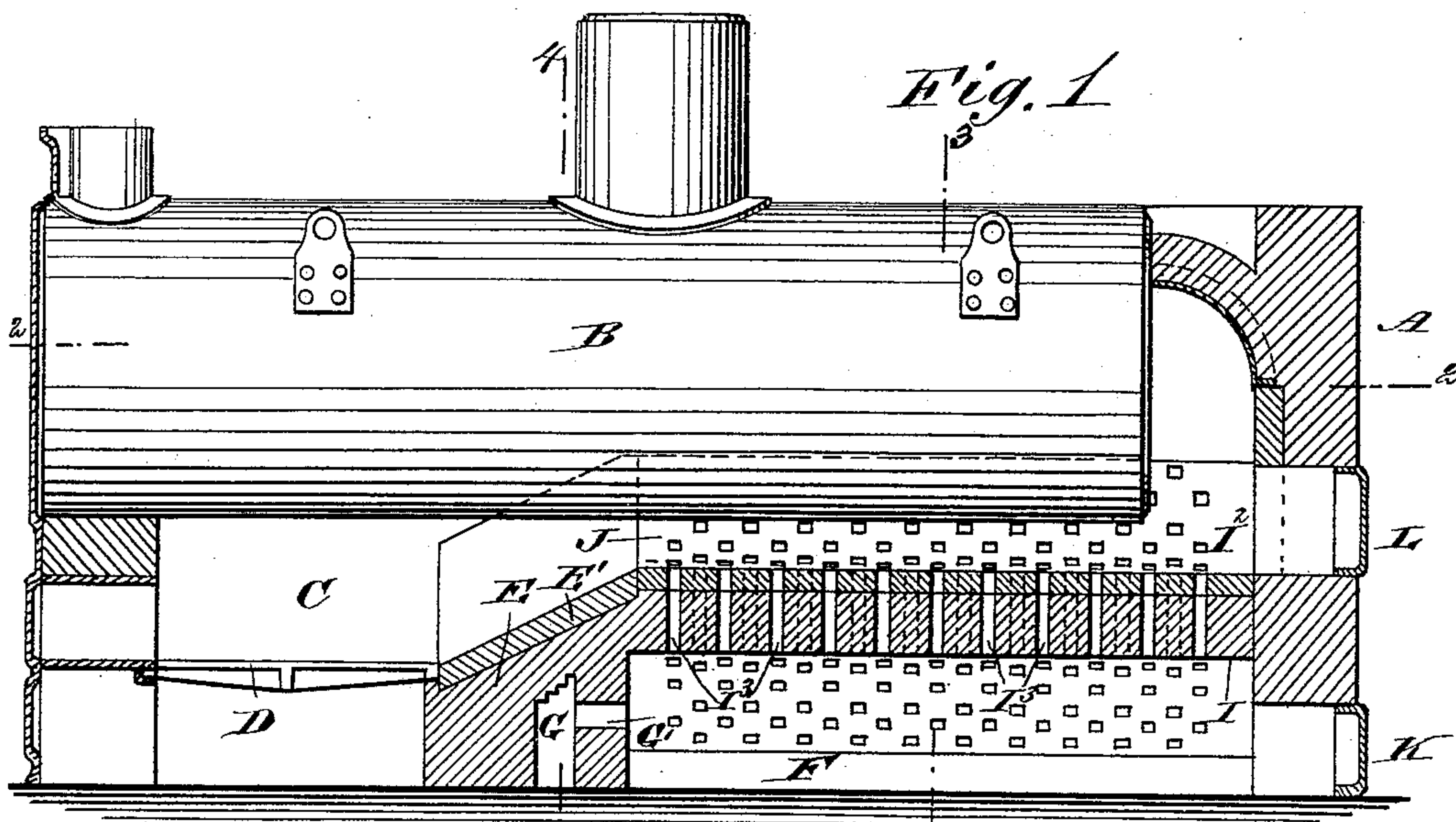
(No Model.)

2 Sheets—Sheet 1.

J. S. ECKER.
FURNACE.

No. 486,704.

Patented Nov. 22, 1892.



WITNESSES:

C. Neveu
C. Sedgwick

INVENTOR

J. S. Ecker

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ATTORNEYS.

(No Model.)

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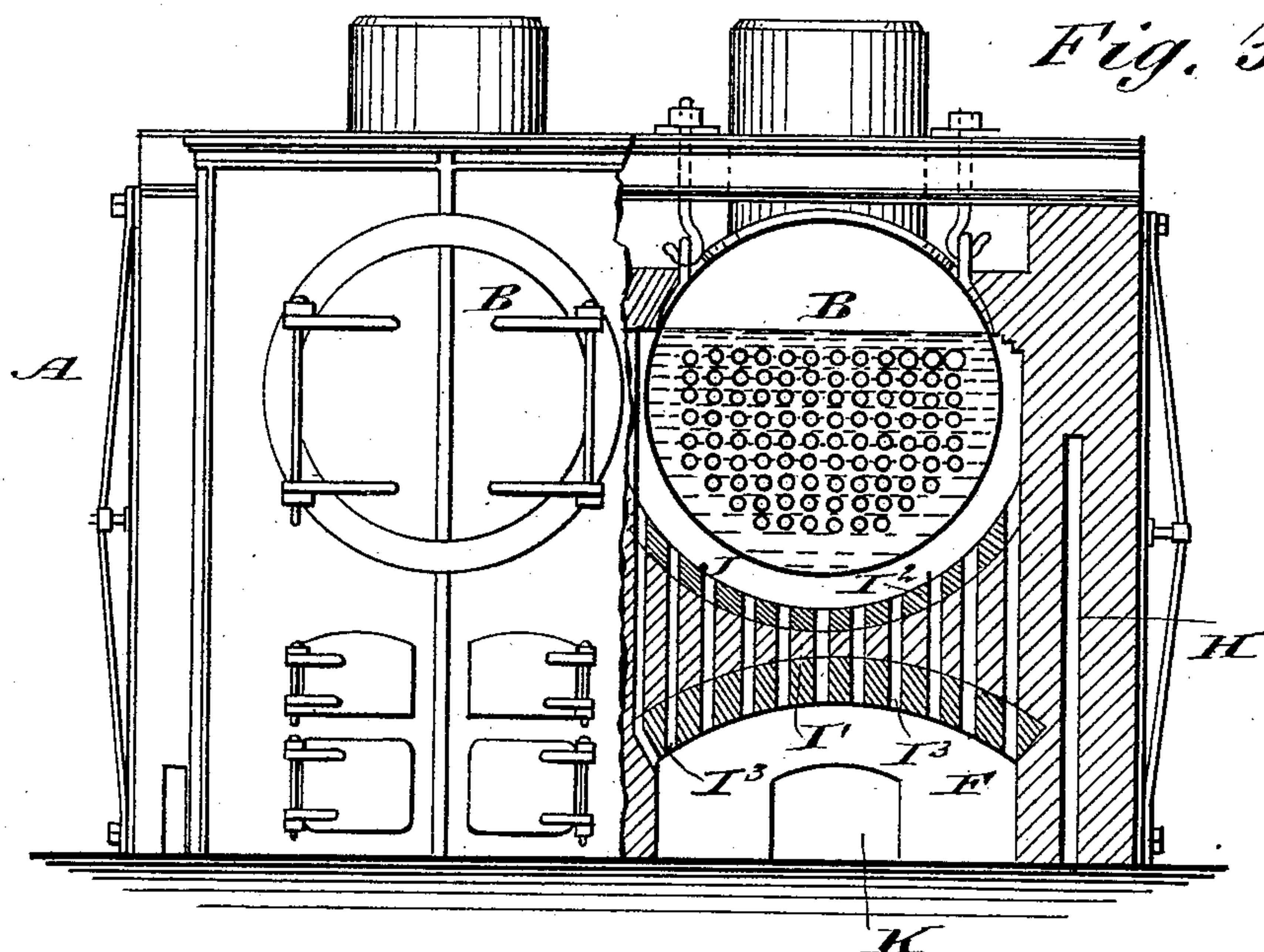
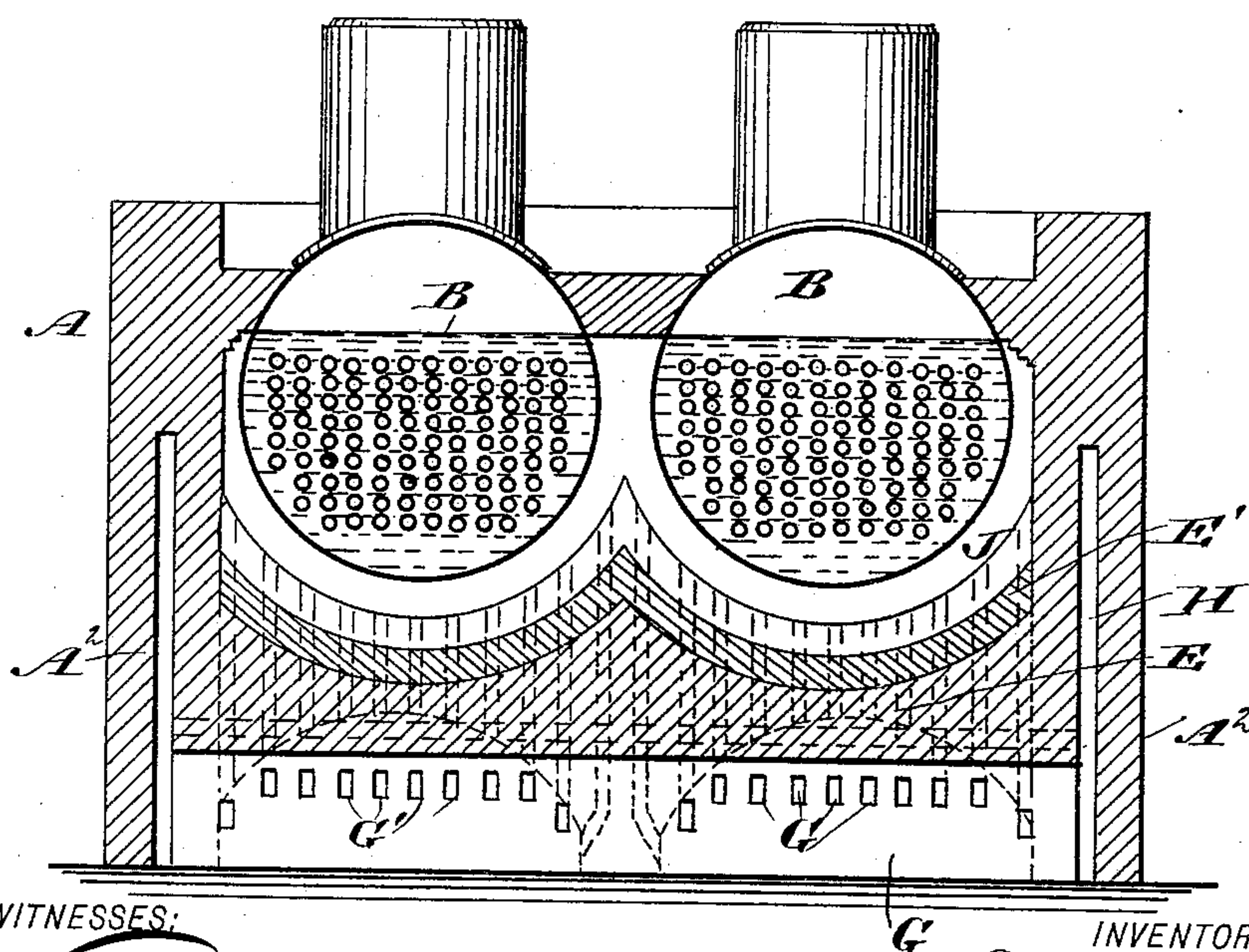


Fig. 4



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UNITED STATES PATENT OFFICE.

JAMES SCOTT ECKER, OF PORTLAND, OREGON, ASSIGNOR OF FIVE-EIGHTHS
TO JOHN S. LAIDLAW AND JAMES LAIDLAW, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 486,704, dated November 22, 1892.

Application filed June 18, 1892. Serial No. 437,169. (No model.)

To all whom it may concern:

Be it known that I, JAMES SCOTT ECKER, of Portland, in the county of Multnomah and State of Oregon, have invented a new and
5 Improved Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved furnace for steam-boilers and for other purposes, and which is simple
10 and durable in construction and arranged to utilize the fuel to the fullest advantage.

The invention consists of an air-heating chamber arranged in the rear of the bridge-wall and connected by ports with a transverse
15 channel formed in the bridge-wall, the said channel leading to channels in the side walls of the furnace. The top of the said chamber is flush at its front with the upper edge of bridge-wall and extends under the rear part
20 of the boiler and is curved concentrically to the latter to form a radiating-channel and combustion-chamber.

The invention also consists of certain parts and details and combinations of the same, as
25 will be hereinafter described, and then pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate
30 corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement on the line 1 1 of Fig. 2. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1, with one of the boilers removed. Fig. 3 is a transverse section of the
35 improvement on the line 3 3 of Fig. 1, parts being shown in elevation, and Fig. 4 is a transverse section of the same on the line 4 4 of Fig. 1.

40 As illustrated in the drawings, the furnace is built for two steam-boilers, but it may be arranged for a single boiler, or for other devices to be heated. The furnace proper is provided with the usual brickwork A, in
45 which are set the boilers B, extending longitudinally and extending near their front ends into the fire-box C, provided with the usual grate D, ash-pit, and doors, of any approved construction. The rear end of the grate D
50 connects with the bridge-wall E, in the rear of which is formed an air-chamber F, extend-

ing between the said bridge-wall E and the rear end A' of the brickwork A, and also extending from one side wall A² of the brickwork to the other side wall. Into the front
55 end of this air-chamber F leads a series of longitudinally-arranged ports G', opening into a transverse channel G, formed in the bridge-wall E, the ends of the said channel G connecting with longitudinally-extending chan-
60 nels H, formed in the side walls A² of the brickwork A. The channels H open at their front ends to the air, so that the latter can pass through the channels H and G and ports G' into the air-chamber F. The top I of the
65 chamber F is flush at its front end with the top edge of the bridge-wall E and extends to the end wall A' and the side walls A², the under side of this top I being formed with an arch I', and an inverted arch I² forms the top
70 surface of the said top I, and this inverted arch I² is concentric with the boiler B, so as to form a segmental space J, which consists of a combustion and radiation chamber for the boiler B, as will be seen by reference to
75 Fig. 4. The top E' of the bridge-wall E slants upwardly and rearwardly, as shown in Fig. 1, and is curved to correspond with the curved top surface or arch I² of the top I, as
80 will be readily understood by reference to the said Fig. 1. In the top I, and passing through the arches I' and I², are arranged a series of openings or ports I³, establishing communication between the chamber F and the cham-
85 ber J. It will be seen that this top I for the chamber F is built of a large amount of brick, so as to form a storage-chamber for the heat arising, as hereinafter more fully described. Suitable doors K are arranged in the rear
90 wall A' of the brickwork A, to give ready access to the air-chamber F in order to clean the same whenever necessary. Similar doors L are also arranged in the said end wall A' and lead to the top surface of the top I, to clean
95 the combustion-chamber whenever required. The operation is as follows: The fuel burning on the grate D in the fire-box C generates heat, which passes over the inclined curved top E' of the bridge-wall E, to and
100 through the chamber J, around part of the boiler B, and this heat, consisting of smoke and gases, comes in contact and mixes with

the pure air passing upward through the openings I³ from the air-chamber F. This additional supply of air for the smoke and gases causes combustion of the same, so that
 5 all the smoke is consumed before it passes to the rear end of the boiler B and through the flues of the same to the chimney. Furthermore, the heat generated by this second combustion heats the top I of the air-chamber F,
 10 so that a considerable amount of heat is stored in this top I, and by the peculiar construction of the inverted arch I² the heat thus stored is radiated out the boiler through the chamber J, whereby the said boiler is heated
 15 uniformly and perfectly, at the same time using the fuel to the greatest and fullest advantage.

In constructing the top I it is preferably built loosely of suitable brick without clay or
 20 mortar, so as to allow for expansion and contraction without injury to the walls. As before mentioned, a large body of brickwork thus forms the top I and has considerable storage capacity for heat utilized, as before
 25 described.

By making the top surface of the top I concentric to the boiler B a perfect radiator is formed, so as to equalize the heat throughout the entire length of the boiler or other object
 30 to be heated, thus insuring a regular and uniform expansion and relieving the heated object of the unequal strain of expansion at one point and contraction at another, thereby securing perfect circulation of water in the
 35 boiler and preventing the formation of scale or sediment therein. It will further be seen that by the peculiar construction a perfect combustion-furnace is formed, as the air is taken into the air-chamber under the heated
 40 top I through the hollow bridge-wall provided with the ports, as described. As the air is taken into the bridge-wall channel from some point in the side walls A² of the brickwork A, and most convenient for the firemen to regulate the
 45 amount by a suitable damper, (not shown,) the flow of air can be regulated according to the amount of fuel used in the fire-box C.

It will be seen that direct connection is made with the outside, so as to prevent the

air from circulating through the bricks in the walls and thus becoming heated, as experience teaches that air so heated becomes detrimental to combustion, as the oxygen has been consumed in the walls before reaching the combustion-chamber. With my arrangement the
 55 air in its pure state is introduced into the air-chamber under its arch top and is circulated through the openings I³ to the top inverted surface, for the purpose previously described. As pure oxygen is contained in the air thus
 60 introduced into the combustion-chamber J, a perfect combustion will take place with the gases coming from the fire-box C.

It is understood that the large amount of brickwork in the top of the air-chamber F
 65 and the porous nature of the brick naturally absorbs the heat and stores it until ready for use in heating the boiler. The surface of the perforated inverted top with air passing through openings makes a perfect radiator and
 70 with the combustion of oxygen delivered from the air-chamber and the gases from the grate-surface, combustion is complete and the result is a clean boiler and clean flues.

Having thus fully described my invention, 75 I claim as new and desire to secure by Letters Patent—

A furnace comprising the brickwork A, the fire-chamber C in the front end thereof, the ash-pit therebelow, the curved bridge-wall E, 80 having its top E' inclined upwardly and rearwardly from the grate and having a transverse channel G communicating with the outer air through passages H, leading through the side walls to the furnace-front, a cham- 85 ber F between the bridge-wall and rear end of the brickwork A and formed of brickwork with an arched top I and an inverted arched radiating-surface I², registering at one end with the rear edge of the curved inclined top 90 E', openings G', connecting the chamber F and passage G, and series of vertical openings I³, leading through the top I, substantially as set forth.

JAMES SCOTT ECKER.

Witnesses:

GEO. B. RATE,
 MALCOLM G. SEAGER.