

No. 786.098.

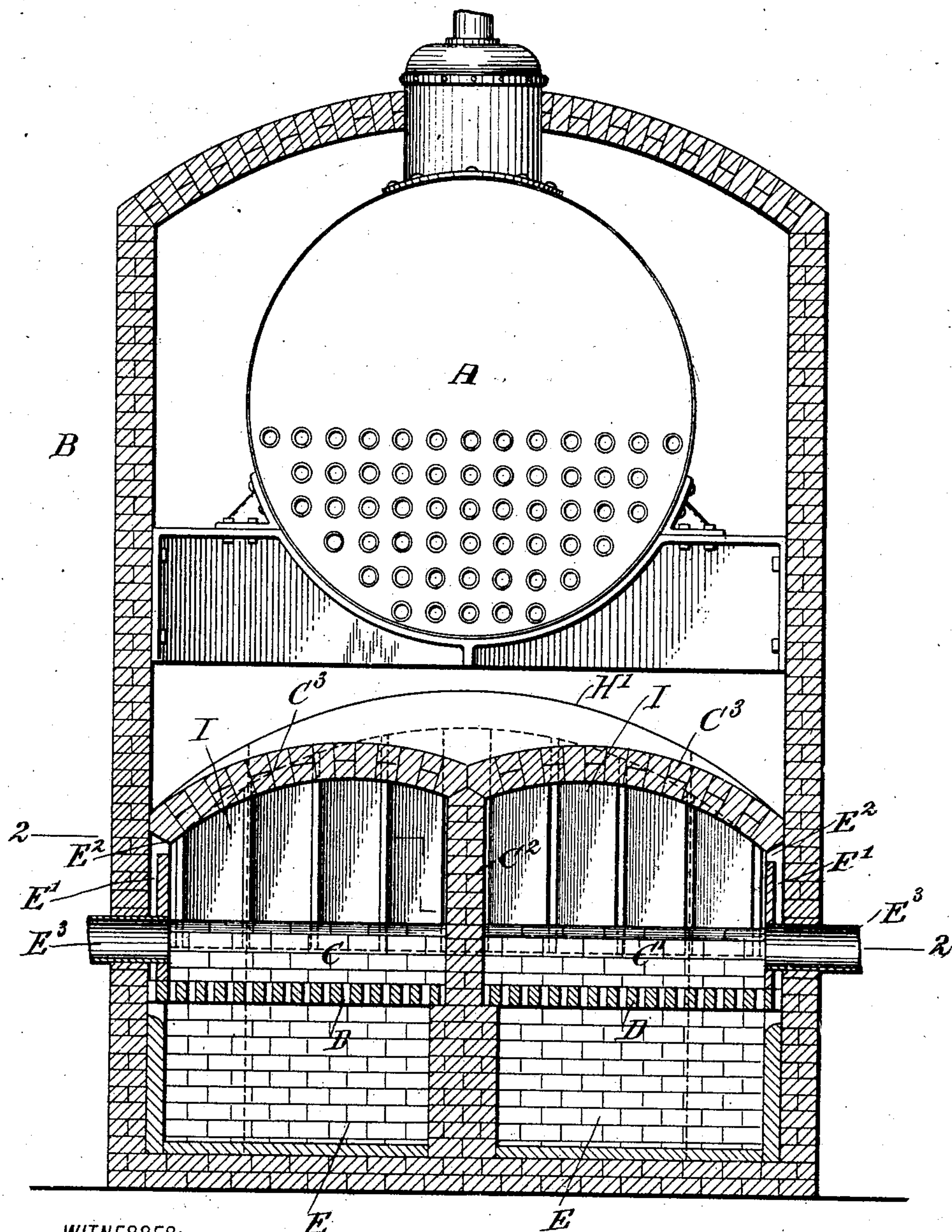
PATENTED MAR. 28, 1905.

E. S. CHASE.
FURNACE.

APPLICATION FILED JULY 14, 1904.

3 SHEETS—SHEET 1.

Fig. 1



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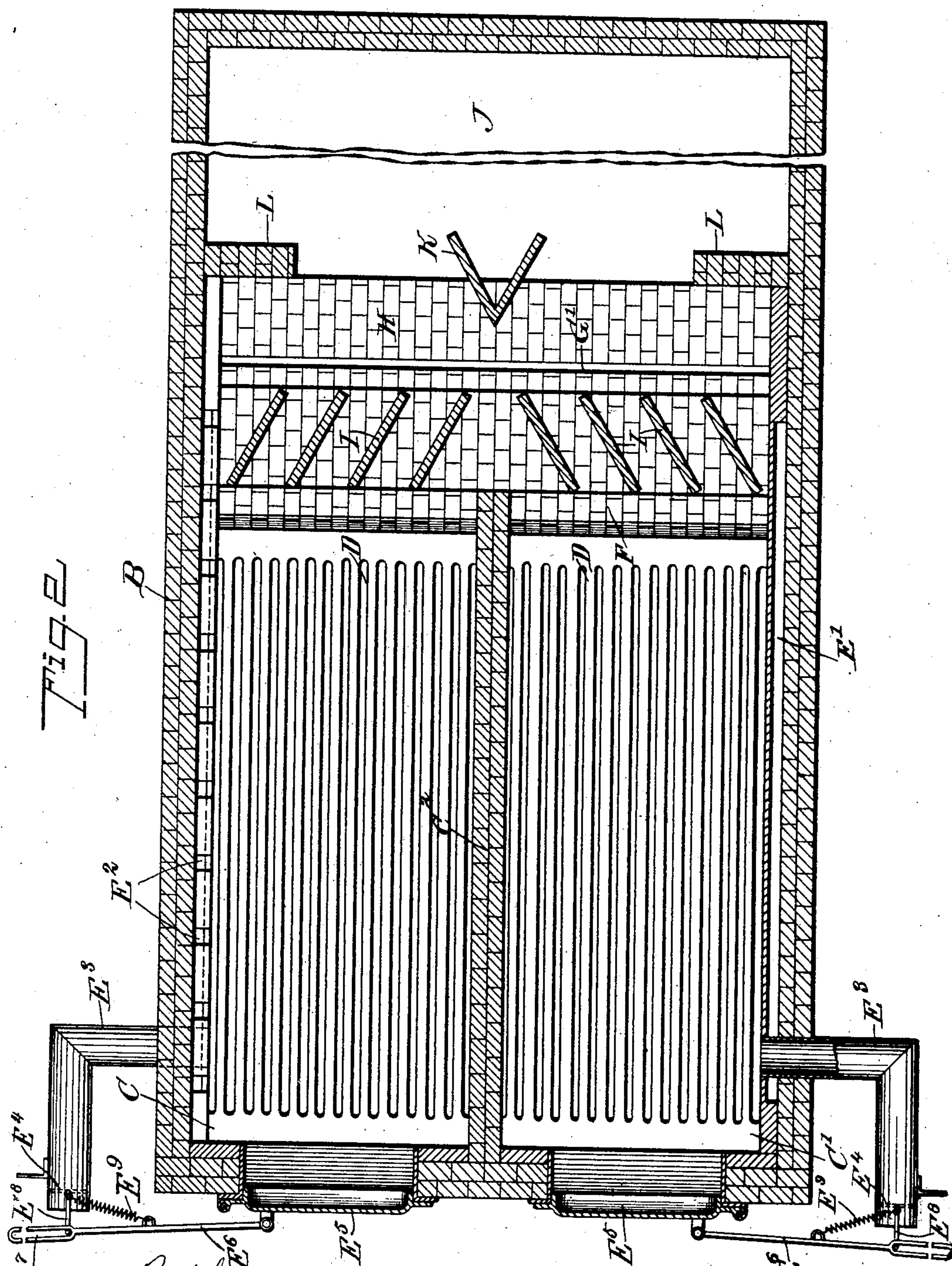
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3 SHEETS—SHEET 2.



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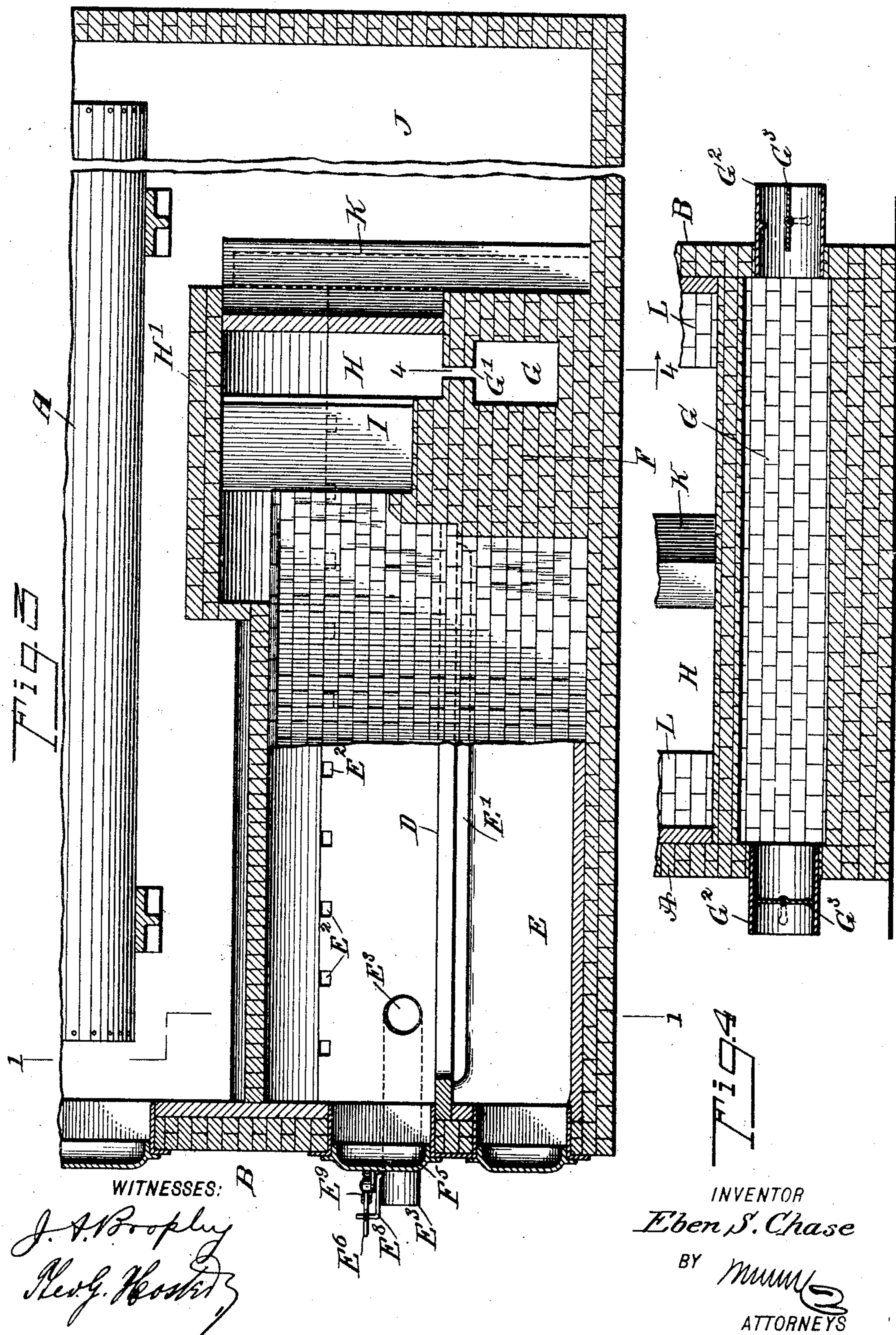
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

EBEN SIMPSON CHASE, OF SALT LAKE CITY, UTAH, ASSIGNOR TO THE
CHASE SMOKELESS FURNACE CO., A CORPORATION OF UTAH.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 786,098, dated March 28, 1905.

Application filed July 14, 1904. Serial No. 216,523.

To all whom it may concern:

Be it known that I, EBEN SIMPSON CHASE, a citizen of the United States, and a resident of Salt Lake City, in the county of Salt Lake and State of Utah, have invented a new and 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 the like arranged to insure complete combustion of the burning fuel, to prevent the formation of smoke, and to utilize the burning fuel to the fullest advantage and to keep either one or two fire-boxes in action under the steam-boiler.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a cross-section of the improvement on the line 1 1 of Fig. 3. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1. Fig. 3 is a longitudinal sectional elevation of the improvement, and Fig. 4 is a cross-section of part of the same on the line 4 4 of Fig. 3.

The boiler A is mounted in the usual manner in the brickwork B of the furnace, which latter is preferably provided with two fire-boxes C and C', arranged one alongside the other and separated by a longitudinal partition-wall C². The fuel-chambers of the fire-boxes have arched roofs or tops C³ and grates D, below which are located ash-pits E, each connected at its side wall by a channel E' and ports E² with the upper portion of the corresponding fire-boxes, so that atmospheric air can pass from the ash-pits, by way of the said channels E' and ports E², to the burning fuel in the fire-boxes to aid combustion.

Into each fire-box C or C' opens an air-supply pipe E³, containing a damper E⁴ moved automatically into an open position from the corresponding furnace-door E⁵, and at the

time the door E⁵ is opened and a fresh supply of fuel is thrown through the open door onto the burning fuel in the corresponding fire-box C or C'. For the purpose mentioned a rod E⁶ is pivotally connected with the furnace-door E⁵ and is formed at its free end with an elongated slot E⁷, engaging a crank-arm E⁸ on the damper E⁴. A spring E⁹, held on the rod E⁶, (see Fig. 2,) is connected with the crank-arm E⁸ to hold the damper E⁴ normally closed. Now when the door E⁵ is opened the rod E⁶ acts on the crank-arm E⁸ to swing the damper E⁴ open to admit atmospheric air to the fire-box C or C', according to which fire-box is to be fed with fresh fuel. When the door E⁵ is closed, the damper E⁴ remains open, as the crank-arm E⁸ travels freely in the slot E⁷. Now after the fresh fuel has been burning awhile the damper E⁴ is closed by the fireman manipulating the crank-arm E⁸. The entrance of the pipes E³ into the fire-boxes C C' may be in front or on the side, as shown.

The bridge-wall F is common to both fire-boxes, and in the said bridge-wall is formed an air-supply chamber G, connected at its top by a transverse slot G' with a mixing-chamber H in communication with the rear ends of the fire-boxes, the top or roof H' of the said mixing-chamber being arched, the arch extending from one side wall of the brickwork B to the other, as plainly indicated in Fig. 1. The arched top H' extends partly over the rear ends of the fire-boxes, and on the top of the bridge-wall F, adjacent to the rear ends of the fire-boxes, are arranged vertically-disposed deflectors I, set obliquely, as plainly indicated in Fig. 2, the deflectors in the rear of one fire-box extending, however, in an opposite direction to the deflectors in the other fire-box, said deflectors being used to deflect the products of combustion passing from the fire-boxes into the mixing-chamber H to insure a thorough mixing of the said products of combustion and the air entering through the slot G' to form an easily-combustible mixture burned in the combustion-chamber J, arranged in the rear of the mixing-chamber H and leading to the boiler A.

The channels E' extend rearwardly in the

side walls of the brickwork B beyond the fire-boxes C C', (see Fig. 2,) and the rear ports E² open into the forward portion of the mixing-chamber H opposite the deflectors I to admit air to the smoke and gases as the latter pass over the bridge-wall F.

Between the combustion-chamber and the mixing-chamber H is arranged a V-shaped spreader K, approximately in longitudinal alinement with the partition-wall C², to spread the highly-combustible mixture of air and products of combustion during their passage from the mixing-chamber to the combustion-chamber. The apex of the spreader K is at the forward end thereof, as plainly indicated in Fig. 2.

Wing-walls L are arranged on the sides of the brickwork B between the combustion-chamber J and the mixing-chamber H, the said wing-walls being preferably in transverse alinement with the spreader K.

Air is admitted to the air-supply chamber G by suitable ducts G arranged in the side wall of the brickwork B, (see Fig. 4,) the said ducts being preferably provided with suitable dampers G³ for admitting more or less air to the air-supply chamber G.

In practice the two fire-boxes C and C' are fed alternately, so that the smoke and gases rising in the fire-box from the fuel fed at the time are deflected by the corresponding deflectors I to the hotter products of combustion coming from the other fire-box, so that a quick mixing of the products of combustion from the two fire-boxes takes place in the mixing-chamber, to which air also is supplied to insure complete burning of the mixture in the combustion-chamber and the production of a high heat. If desired, the fire in one fire-box C or C' may be dampened, so that only one fire-box is in use at a time. As the arches C³ and H' and the deflectors and superheaters I are highly heated, they readily radiate their heat to the gases generated from the freshly-fired fuel to insure a very quick heating of the said gases and a ready burning thereof, especially when mixed with air, as above explained. As the boiler A is located above the arches C³ and H', it is evident that the boiler-shell is not cooled when the fire-boxes are fired, and besides the said shell receives the heat radiated by the said arches C³ and H' to keep the shell under uniform temperature.

By having the spreaders K and the wing-walls L arranged as described the velocities and temperatures of the traveling gases are equalized by causing the gases to form eddies and swirls. The roof or arch H' of the mixing-chamber H is somewhat extended over the rear ends of the fire-boxes C C' (see Fig. 3) to enlarge the cross-sectional area of the fire-boxes at this point for a ready expansion of the generated gases.

When the furnace is in operation, the deflectors I become red-hot, and consequently act

as superheaters for the gases impinged or thrown against the deflectors and of a lower temperature than the deflectors. The division-wall C² is extended to the bottom of the ash-pit to render each unit of the grates independent of the other in the matter of draft through the grates.

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

1. A furnace comprising a fire-box having a fuel-chamber and an ash-pit connected by channels in the side walls of the fire-box with the fuel-chamber, a bridge-wall having an air-supply chamber, a mixing-chamber connected by a transverse slot with the top of said air-supply chamber, and deflectors set at angles between the mixing-chamber and the rear end of the fuel-chamber.

2. A furnace comprising a fire-box having a fuel-chamber and an ash-pit connected by channels in the side walls of the fire-box with the fuel-chamber, a bridge-wall having an air-supply chamber, a mixing-chamber above the air-supply chamber and connected by a transverse slot with the top of said air-supply chamber, deflectors set at angles between the mixing-chamber and the rear end of the fuel-chamber, a boiler, and a combustion-chamber in the rear of the mixing-chamber and connected with the flues of the boiler.

3. A furnace comprising a fire-box having a fuel-chamber and an ash-pit connected by channels in the side walls of the fire-box with the fuel-chamber, a bridge-wall having an air-supply chamber, a mixing-chamber connected with the said air-supply chamber, deflectors set at angles between the mixing-chamber and the rear end of the fuel-chamber, a boiler, a combustion-chamber in the rear of the mixing-chamber and connected with the flues of the boiler, and a spreader between the mixing-chamber and the combustion-chamber.

4. A furnace comprising a fire-box having a fuel-chamber and an ash-pit connected by channels in the side walls of the fire-box with the fuel-chamber, a bridge-wall having an air-supply chamber, a mixing-chamber connected with the said air-supply chamber, deflectors set at angles between the mixing-chamber and the rear end of the fuel-chamber, a boiler, a combustion-chamber in the rear of the mixing-chamber and connected with the flues of the boiler, and a spreader and wing-walls between the mixing-chamber and the combustion-chamber.

5. A furnace comprising two fire-boxes arranged one alongside the other, a bridge-wall for the said fire-boxes and provided with an air-supply chamber, a mixing-chamber in communication with the rear ends of both fire-boxes and located above the bridge-wall and connected at its bottom by a slot with the said air-supply chamber, the mixing-chamber having an arched roof and deflectors extending from the bridge-wall to the arched roof of the

mixing-chamber, the deflectors being arranged between the slot and the rear ends of the fire-boxes.

5 6. A furnace comprising two fire-boxes arranged one alongside the other, a bridge-wall for the said fire-boxes, provided with an air-supply chamber, a mixing-chamber in communication with the rear ends of both fire-boxes and located above the bridge-wall and
10 connected at its bottom by a slot with the said air-supply chamber, the mixing-chamber having an arched roof and deflectors extending from the bridge-wall to the arched roof of the mixing-chamber, the deflectors being arranged
15 between the slot and the rear ends of the fire-boxes, the deflectors standing obliquely and the deflectors in the rear of one fire-box being arranged in an opposite direction to the deflectors in the rear of the other fire-box.

20 7. A furnace comprising two fire-boxes arranged one alongside the other, a bridge-wall for the said fire-boxes, provided with an air-supply chamber, a mixing-chamber in communication with the rear ends of both fire-
25 boxes and located above the bridge-wall and connected at its bottom by a slot with the said air-supply chamber, the mixing-chamber having an arched roof, deflectors extending from the bridge-wall to the arched roof of the mixing-
30 ing-chamber, the deflectors being arranged between the slot and the rear ends of the fire-boxes, the deflectors standing obliquely and the deflectors in the rear of one fire-box being arranged in an opposite direction to the de-
35 flectors in the rear of the other fire-box, a com-

bustion-chamber in the rear of the mixing-chamber, and a V-shaped spreader disposed vertically in the middle of the furnace, between the mixing-chamber and the combustion-chamber.

40 8. A furnace comprising two fire-boxes arranged one alongside the other, a bridge-wall for the said fire-boxes, provided with an air-supply chamber, a mixing-chamber in communication with the rear ends of both fire-
45 boxes and located above the bridge-wall and connected at its bottom by a slot with the said air-supply chamber, the mixing-chamber having an arched roof, deflectors extending from the bridge-wall to the arched roof of the mix-
50 ing-chamber, the deflectors being arranged between the slot and the rear ends of the fire-boxes, the deflectors standing obliquely and the deflectors in the rear of one fire-box being
55 arranged in an opposite direction to the deflectors in the rear of the other fire-box, a combustion-chamber in the rear of the mixing-chamber, a V-shaped spreader disposed vertically in the middle of the furnace, between
60 the mixing-chamber and the combustion-chamber, and wing-walls at the sides of the furnace, in transverse alinement with the said spreader.

In testimony whereof I have signed my name to this specification in the presence of two sub- 65
scribing witnesses.

EBEN SIMPSON CHASE.

Witnesses:

GEO. R. SMITH,
H. COHEN.