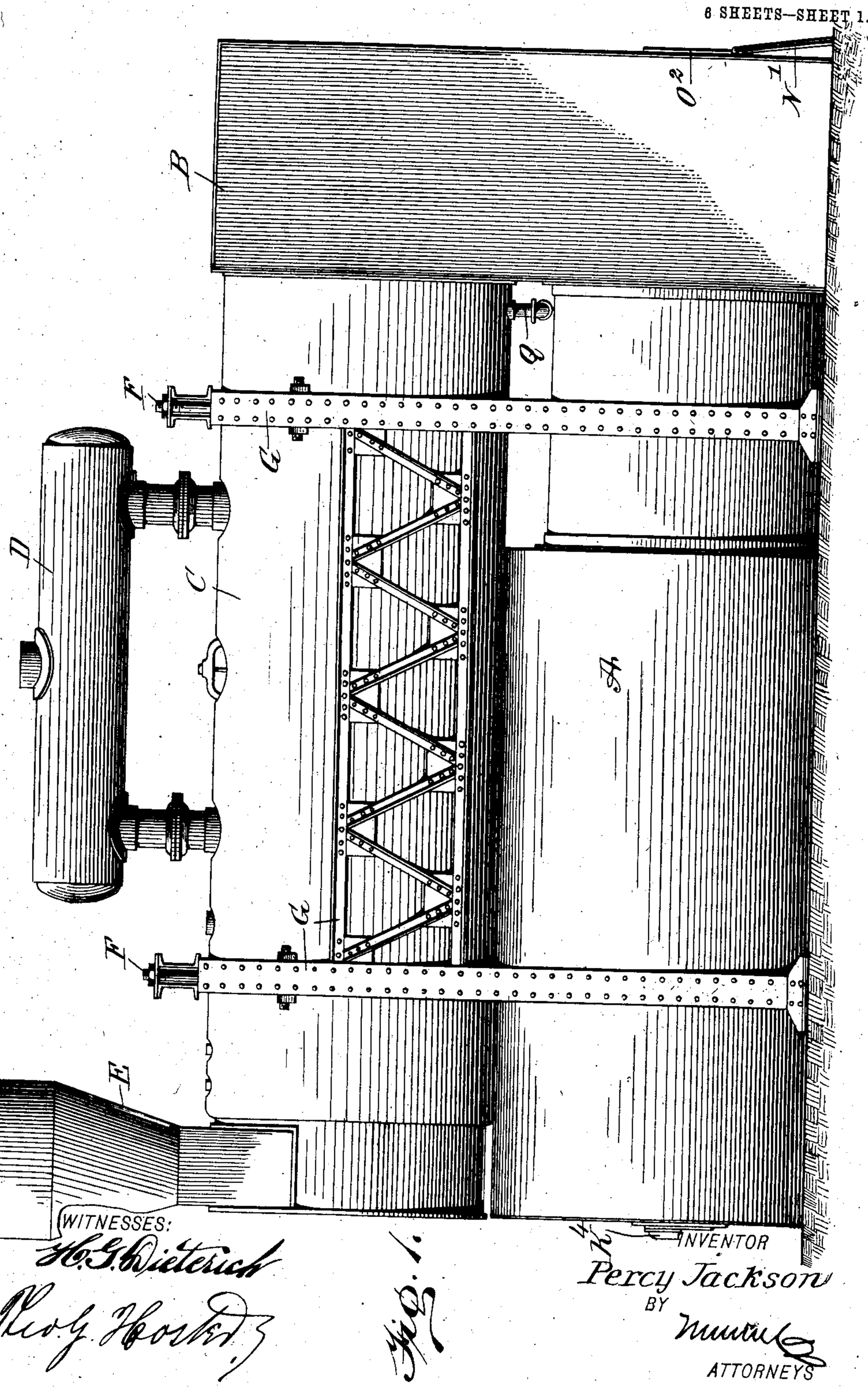
No. 834,058. PATENTED OCT. 23, 1906.

P. JACKSON.

BOILER FURNACE.

APPLICATION FILED NOV. 1, 1905.

6 SHEETS—SHEET 1.



WITNESSES:

H. G. Dieterich

Rud. J. Hoerter

Fig. 1.

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6 SHEETS—SHEET 2.

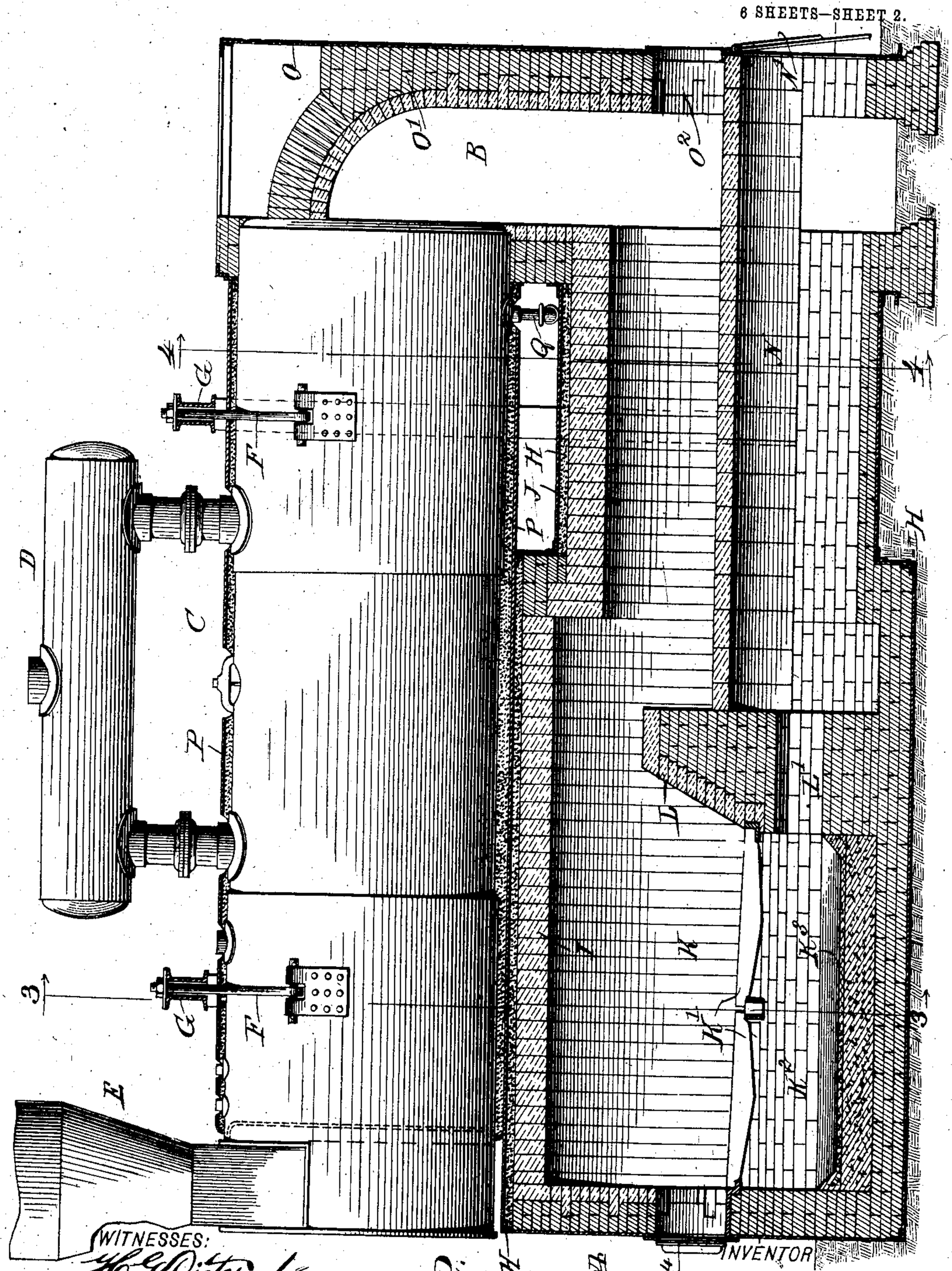

Fig. 2.

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6 SHEETS—SHEET 3.

Fig. 4.

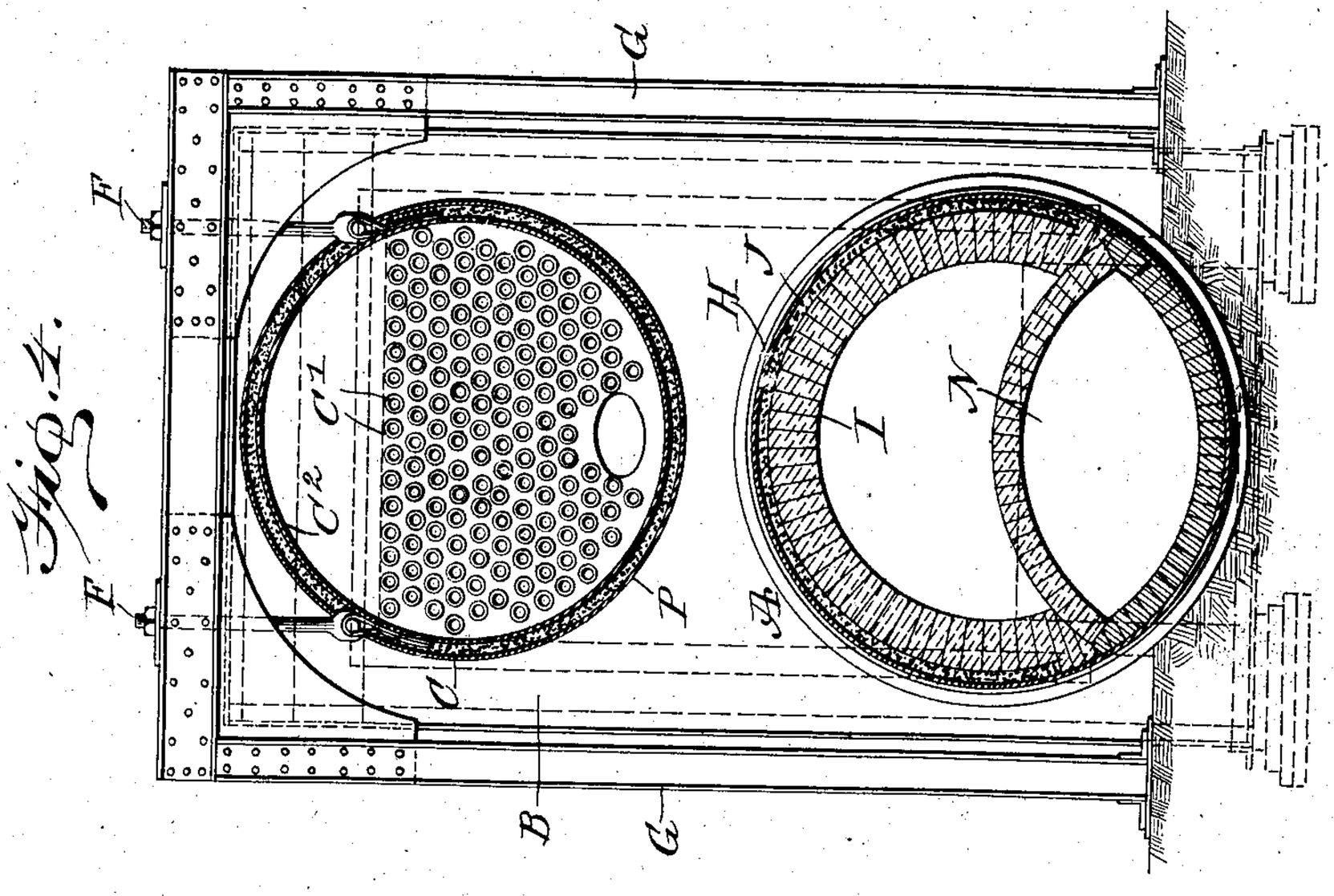
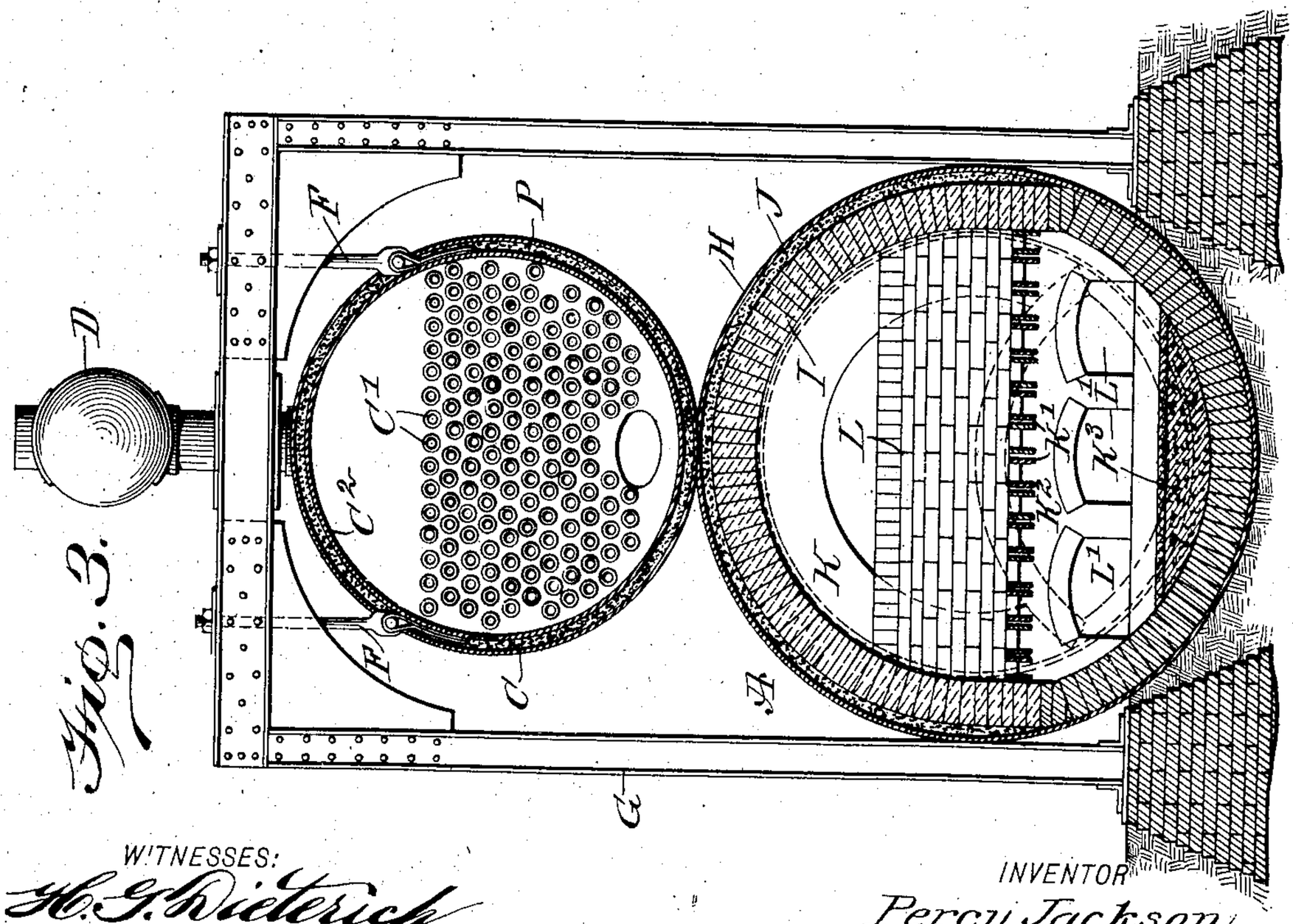


Fig. 3.



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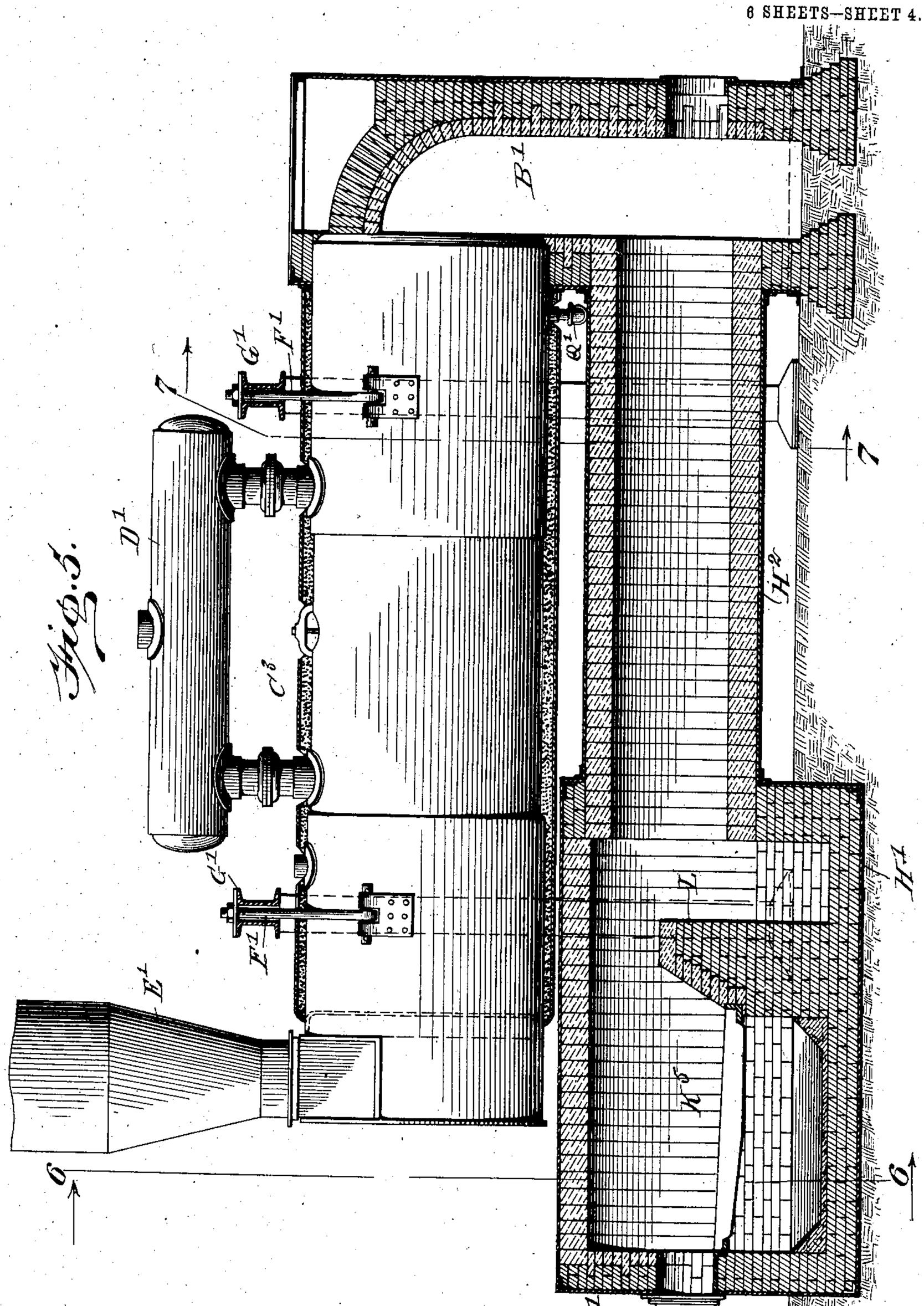
6 SHEETS—SHEET 4.

Fig. 5.



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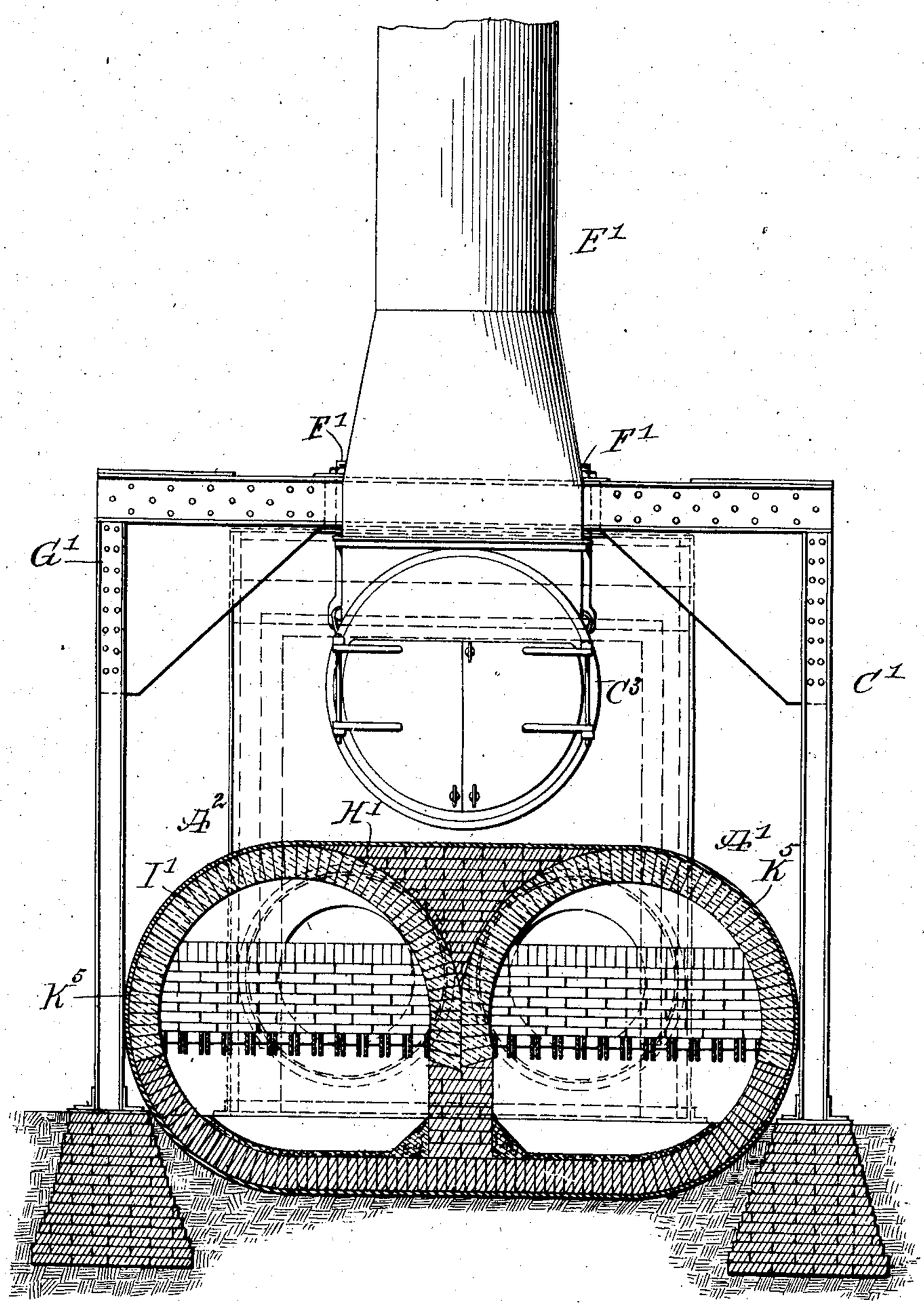
6 SHEETS—SHEET 5.

Fig. 6.



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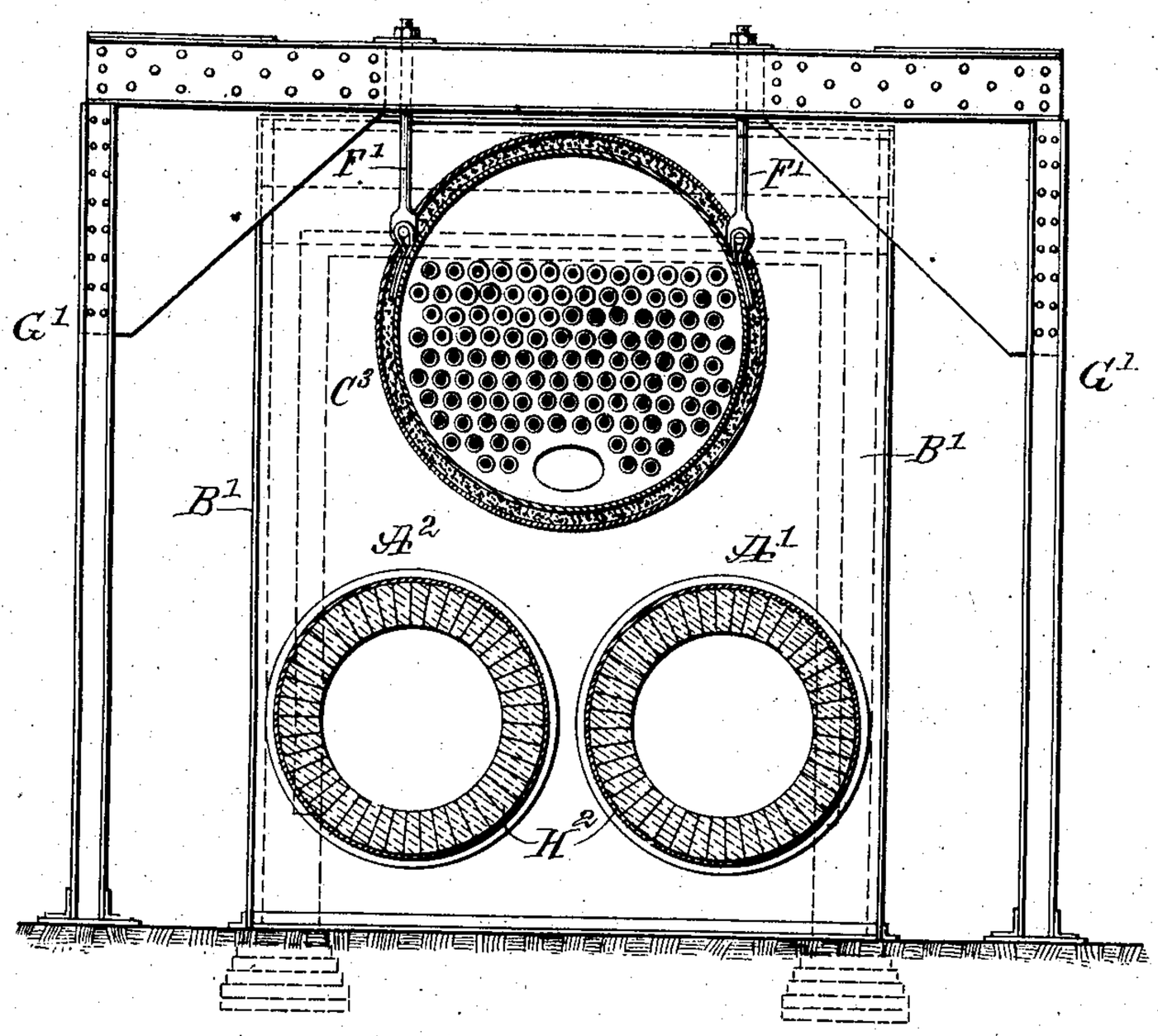
6 SHEETS—SHEET 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

PERCY JACKSON, OF MACON, GEORGIA, ASSIGNOR TO J. S. SCHOFIELD'S SONS CO., OF MACON, GEORGIA.

BOILER-FURNACE.

No. 834,058. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed November 1, 1905. Serial No. 285,450.

To all whom it may concern:

Be it known that I, PERCY JACKSON, a citizen of the United States, and a resident of Macon, in the county of Bibb and State of Georgia, have invented a new and Improved Boiler-Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved boiler-furnace capable of using coal, mill refuse, bagasse and the like as a fuel and arranged to insure a complete combustion of the burning fuel and to utilize the heat to the fullest advantage with a view to economize in fuel and to quickly generate steam without danger of burning the boiler-shell.

The invention consists of novel features and parts and combinations of the same, which 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 side elevation of the improvement arranged for burning coal and like fuel. Fig. 2 is a longitudinal sectional side elevation of the same. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 2. Fig. 4 is a like view of the same, on the line 4 4 of Fig. 2. Fig. 5 is a longitudinal sectional side elevation of the improvement as arranged for burning mill-refuse, bagasse, and like fuel. Fig. 6 is a cross-section of the same on the line 6 6 of Fig. 5, and Fig. 7 is a similar view of the same on the line 7 7 of Fig. 5.

In the improved boiler-furnace illustrated in Figs. 1. 2, 3, and 4 the heat-generator A is connected at its rear end by a connecting-chamber B with the rear end of a steam-generator C, provided on its top with a steam-dome D, and at its front end with a smoke-stack E. The steam-generator C is hung on eyebolts F, connected with a suitably-constructed frame G for supporting the steam-generator C wholly independent of the heat-generator A and directly above the same to economize in space, as will be readily understood by reference to the drawings.

The heat-generator A, the connecting-chamber B, and the steam-generator C are provided with envelops of a non-heat-penetrating construction, so that the heat is confined within the said devices without danger of loss of heat by leakage or radiation, it being understood that the heat generated in the heat-generator A passes from the rear end thereof into the connecting-chamber B, in which the heat rises to finally pass through the flues C′ of the steam-generator C into the smoke-stack E.

The heat-generator A is provided with a cylindrical metallic casing H, having an interior lining I, the upper portion of which is made of fire-brick, while the lower portion is made of ordinary brick, as plainly indicated in Figs. 3 and 4. A packing J, of asbestos, cement, or like non-heat-conducting material, is placed between the casing H and the upper or fire-brick portion of the lining I to prevent all escape of heat from the interior of the heat-generator A through possible spaces or cracks that may form between adjacent fire-clay bricks of the lining. As shown, the bricks for the lining I are disposed radially, so as to form an exceedingly-strong and durable envelop for the heat-generator A. In the front portion of the heat-generator A is arranged a fire-box K, provided with a grate K′ and an ash-pit K^2, having a bottom K^3 made of concrete or like material, access to the fire-box K being had by the usual fire-door K^4, through which the coal or other fuel is introduced. The bridge-wall L for the rear end of the fire-box K is provided in its lower portion with openings L′, connecting the rear end of the ash-pit K^2 with the front end of an air-duct N, built in the rear portion of the heat-generator A and extending through the connecting-chamber B to the outside or outer end of the said duct N, being controlled by a door N′ to admit more or less air to the said duct. When the boiler-furnace is in operation, atmospheric air can pass through the duct N and openings L′ into the ash-pit K^2 to then rise through the grate K′ into the fuel to insure a complete combustion thereof.

By reference to the drawings, it will be seen that the roof of the air-duct N is arched and made of fire-brick, the ends of the arch resting on the lower portion of the lining I, made of ordinary brick. (See particularly Fig. 4.) By reference to the drawings it will also be noticed that the rear portion or combustion-chamber of the heat-generator is preferably made somewhat less in diameter than the for-

ward portion, which contains the fire-box K, it being understood, however, that the said reduced rear portion is sufficiently large to readily accommodate the heat and gases passing from the fire-box K, over the bridge-wall L, through the reduced portion and over the roof of the duct N into the connecting-chamber B. Now the gases in their passage through the reduced portion of the heat-generator A heat the roof of the duct N, so that the air passing through the said duct is highly heated before it reaches the openings L′ and the ash-pit K^2, and this highly-heated air when passing into the fuel greatly facilitates the combustion thereof.

The connecting-chamber B has its wall or envelop of a non-heat-penetrating construction, and for this purpose a metallic shell O is provided, having an interior lining O′, the inner face of which is preferably of fire-brick, as plainly indicated in Fig. 2. A manhole O^2 is arranged in the rear wall of the connecting-chamber B to permit convenient access to the interior of the connecting-chamber B and the heat-generator A.

The steam-generator C is provided with a metallic shell C^2, containing the usual boiler-heads, in which the ends of the flues C′ are fastened in the usual manner, and the said shell C^2 is provided with an envelop of a non-heat-penetrating construction, preferably in the form of a covering P, of asbestos or other non-heat-conducting material. The feed-water pipe Q connects with the interior of the shell C^2 in the usual manner.

By the construction shown and described it is evident that the heat generated in the heat-generator A is not liable to radiate or leak through the envelop, but passes into the connecting-chamber B, also arranged to prevent loss of heat by leakage or radiation, the heat finally passing into the rear ends of the flues C′ and through the same to heat the water contained within the shell C^2 and surrounding the flues C′. The flues C′ are comparatively small in diameter and are placed exceedingly close together to provide a very large heating-surface to insure a rapid generation of steam, it being expressly understood that the shell C^2 of the heat-generator A is not subjected directly to the heat generated in the heat-generator A, owing to the non-heat-penetrating envelops of both the heat-generator A and the steam-generator C. Thus a long life is insured to the shell C^2 and danger from explosion is reduced to a minimum, as the entering of cold feed-water is not liable to strike an overheated part of the shell C^2, as the latter is not subjected directly to the heat generated in the heat-generator A.

For burning mill refuse, bagasse, and like fuel the air-duct N is preferably dispensed with, (see Figs. 5, 6, and 7,) and the heat-generator is preferably made double, as indicated by A′ and A^2, and in this case the shell H′ for the heat-generator is elongated in cross-section, as plainly shown in Fig. 6, and the lining I′ is arranged to form a central longitudinal partition to divide the heat-generator into two parts, each having its own fire-box K^5 similar, however, to the construction above shown and described, so that further detailed description of the same is not deemed necessary, it being, however, understood that the rear end of the double heat-generator A′ discharges the heat and gases into the single connecting-chamber B′ similar to the chamber B and delivering the heat and gases through the smoke-flues in the single steam-generator C^3, provided with the steam-dome D′ and the smoke-stack E′. The steam-generator C^3 is hung by eyebolts F′ from a frame G′ similar to the frame G above described in reference to Figs. 1, 2, 3, and 4, so that further description of the same is not deemed necessary. The steam-generator C^3 is in its detail construction like the steam-generator C and is also provided with a pipe Q′ for supplying feed-water to the said steam-generator.

As shown in Figs. 5 and 6, the rear portion of each heat-generator A′ or A^2 is reduced relative to the front portion thereof containing the fire-box K^5.

For burning sawmill refuse, bagasse, and the like it is desirable to make the rear portion, which forms the combustion-chamber of considerable length, to facilitate the combustion of the fuel during its passage from the fire-box K^5 into the connecting-chamber B′.

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

1. A boiler-furnace provided with a heat-generator, comprising a cylindrical envelop closed at the front end and open at the rear end, the envelop having a lining of a non-heat-penetrating material, a fire-box in the front end of the envelop, a bridge-wall built within the said envelop, and an air-duct extending in through the rear end of the envelop to the said bridge-wall to connect with openings therein leading to the ash-pit of the fire-box.

2. A boiler-furnace provided with a heat-generator, comprising a cylindrical envelop closed at the front end and open at the rear end, the envelop having a lining of a non-heat-penetrating material, a fire-box in the front end of the envelop, a bridge-wall built within the said envelop, and an air-duct extending in through the rear end of the envelop to the said bridge-wall to connect with openings therein leading to the ash-pit of the fire-box, the said air-duct having its roof arched and its ends abutting on the said lining.

3. A boiler-furnace, comprising a heat-generator having an envelop of non-heat-

conducting material, a steam-generator wholly independent of the said heat-generator and having an envelop of a non-heat-conducting material, the rear portion of the said heat-generator being reduced in diameter, a connecting-chamber for connecting the rear ends of the said generators with each other, the said connecting-chamber having its wall of a non-heat-conducting material, and an air-duct having an arched roof and extending through the reduced portion of the heat-generator and the connecting-chamber and opening into the ash-pit of the heat-generator.

4. A boiler-furnace provided with a heat-generator having a tubular envelop of a non-heat-penetrating construction, the front portion of the envelop containing the fire-box and the rear portion being reduced in diameter and forming a combustion-chamber, an apertured bridge-wall between the fire-box and combustion-chamber, a connecting-chamber into which opens the rear end of the said heat-generator, an air-duct having an arched roof and extending from the bridge-wall through the combustion and connecting chambers and communicating with the ash-pit of the heat-generator through the apertures of the bridge-wall, and a steam-generator wholly independent of the said heat-generator and having one end opening into the said connecting-chamber.

5. A boiler-furnace, comprising a steam-generator, a heat-generator below the steam-generator and having a fire-box in its front portion and a combustion-chamber in its rear portion and provided with an apertured bridge-wall, the combustion-chamber being reduced in diameter, a chamber at the rear of the steam and heat generators and connecting the same, and an air-conduit having an arched wall and extending from the bridge-wall through the connecting-chamber and provided with a closure at its outer end.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PERCY JACKSON.

Witnesses:
B. W. HOLTZCLOW,
H. C. LAMAR.