

No. 748,374.

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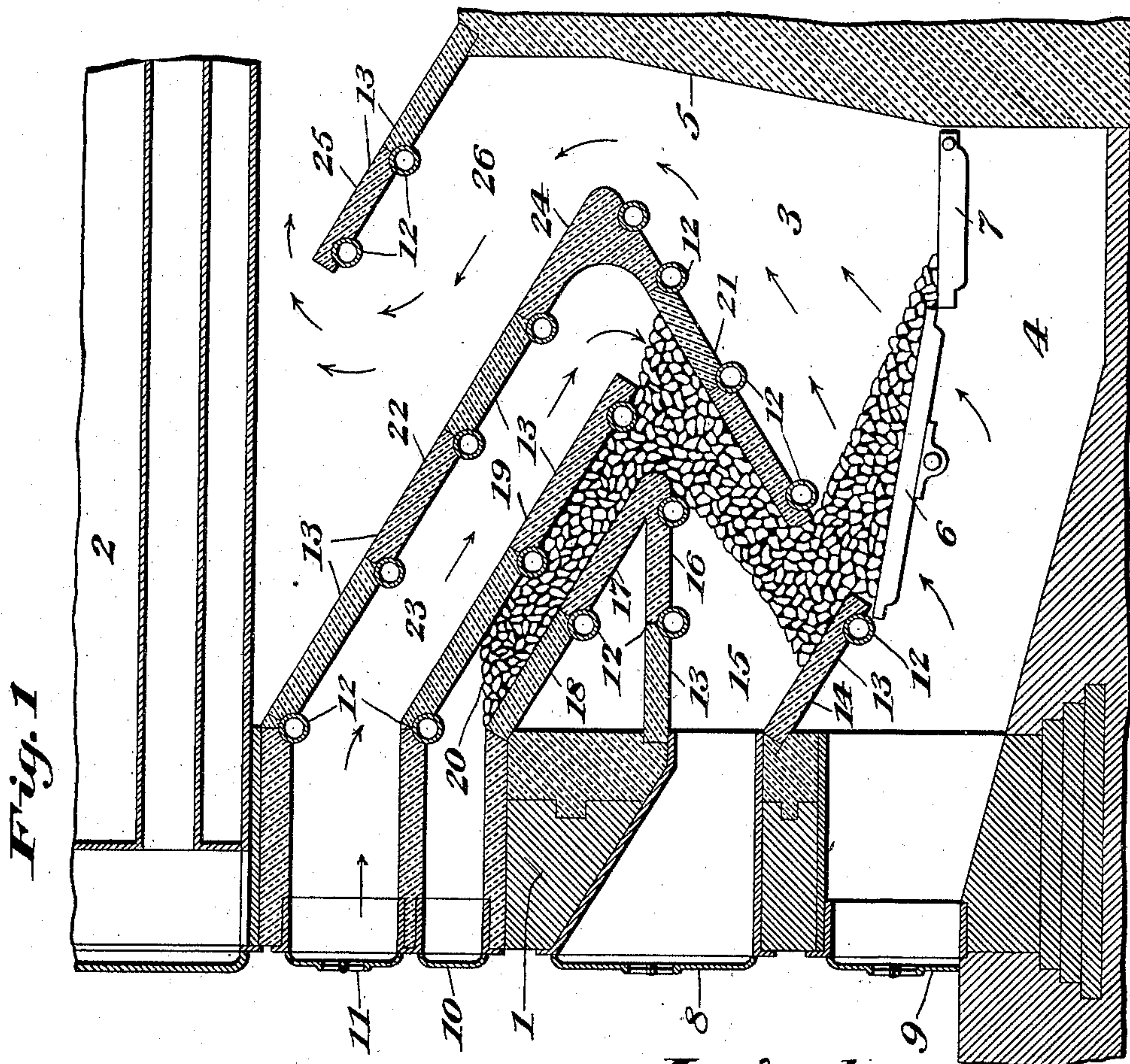
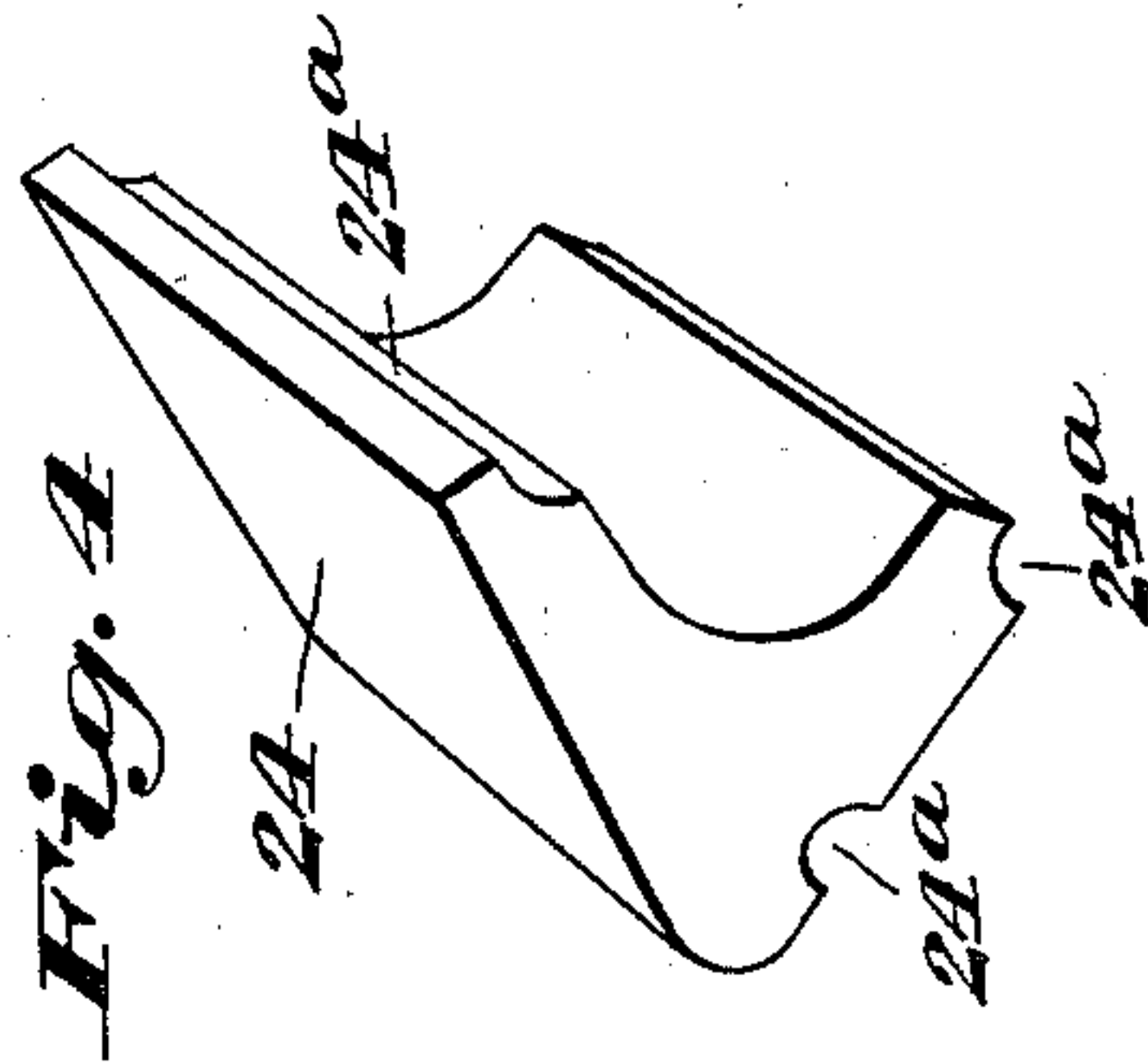
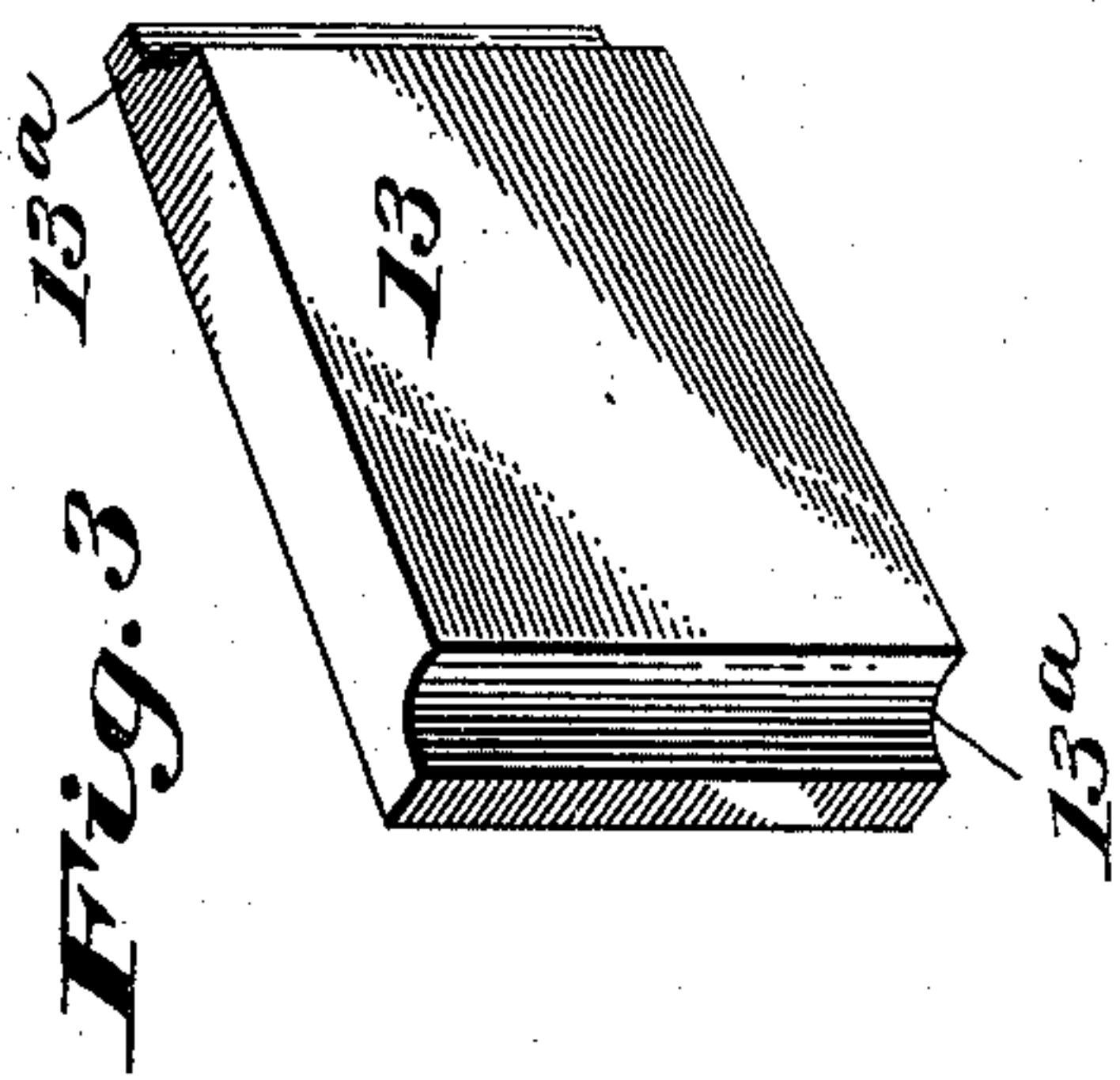
C. HENRY & R. A. DILLON.

BOILER FURNACE.

APPLICATION FILED MAY 18, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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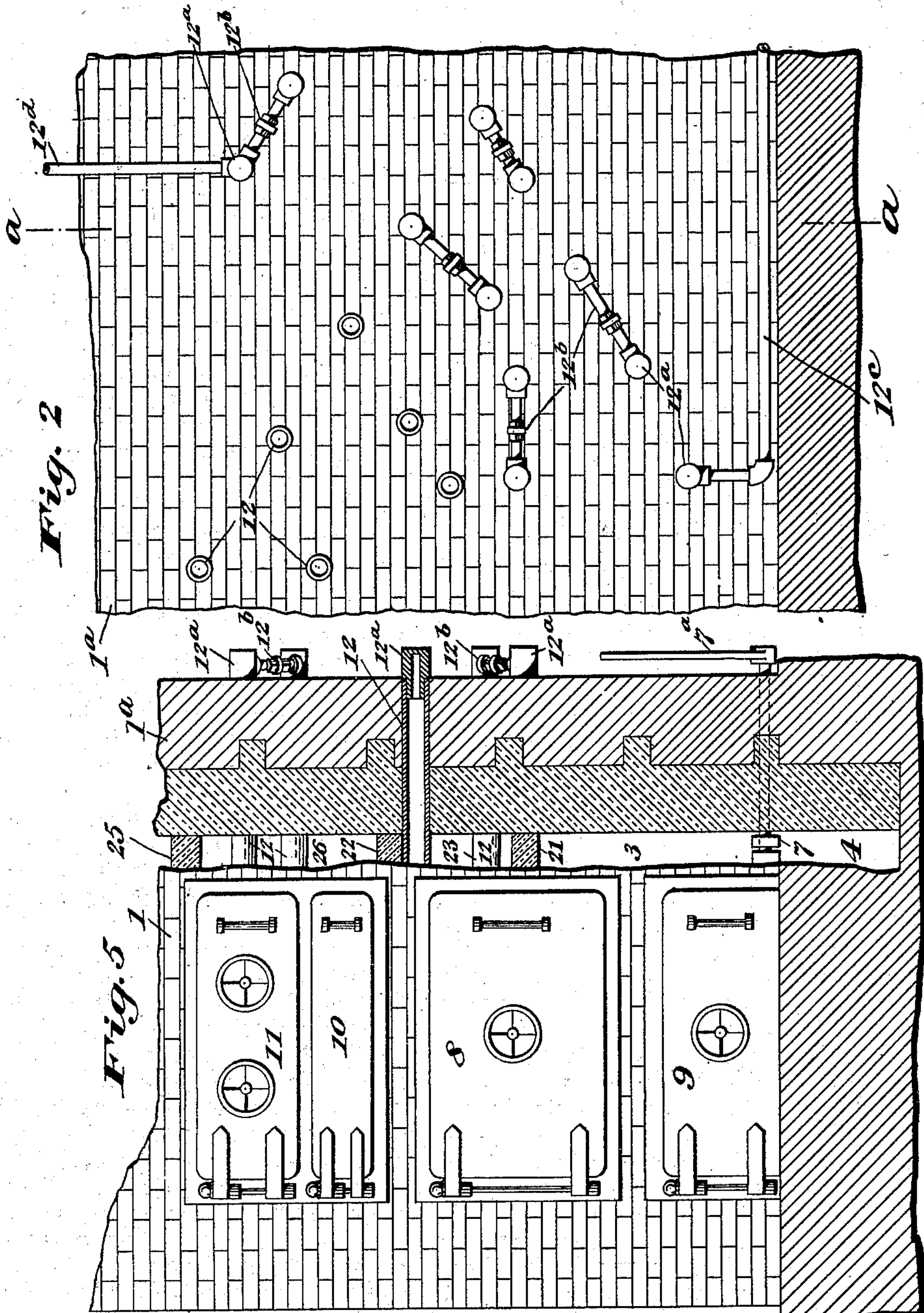
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**Witnesses**  
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# UNITED STATES PATENT OFFICE.

CLAY HENRY AND ROBERT A. DILLON, OF CINCINNATI, OHIO.

## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 748,374, dated December 29, 1903.

Application filed May 18, 1903. Serial No. 157,607. (No model.)

*To all whom it may concern:*

Be it known that we, CLAY HENRY and ROBERT A. DILLON, citizens of the United States of America, and residents of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

This invention relates to certain improvements in steam-boiler and other similar furnaces employed for burning soft coal as a fuel; and the object of the invention is to provide a furnace of this general character of a simple and inexpensive nature and of a construction such as to insure a practically complete and thorough combustion of the fuel, so that the production of soot and black smoke and the emission of these products from the furnace are entirely prevented.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved furnace whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate our invention, Figure 1 is a vertical section taken through the lower parts of the improved furnace, the plane of the section being parallel with the length of the boiler; and Fig. 2 is a partial side elevation of the improved furnace, showing certain features of the feed-water-heating devices. Fig. 3 is a detached perspective view showing a form of tile adapted for use in the improved furnace, and Fig. 4 is a similar view showing still another form of tile for use in the furnace. Fig. 5 is a partial front elevation of the improved furnace, one side portion thereof being broken out and shown in section in a vertical plane indicated by the line *a a* in Fig. 2.

In the views, 1 indicates the front wall, and 1<sup>a</sup> the side or end wall, of the improved furnace, and 2 indicates the boiler, which may be of any kind mounted in any way.

3 indicates the fire-box, and 4 the ash-pit, and 5 indicates the bridge-wall, located at the

rear of the fire-box and extended up in the usual way to near the lower part of the boiler 2.

6 represents a grate arranged at the forward part of the fire-box and slightly inclined downward from front to rear, and 7 indicates a dump-grate located behind the grate 6 and designed to receive the fuel after it has passed rearward off said grate 6. The dump-grate 7 is capable of being dumped, for which purpose a lever 7<sup>a</sup> is provided, as indicated at the right in Fig. 5, this lever permitting of dumping the grate 7, so that refuse may be permitted to fall from it into the ash-pit to prevent clogging of the fire.

8 indicates the fire-door at the front of the furnace and affording access to the fire-box 3 for stoking and stirring the fire, and 9 indicates the door affording access to the ash-pit for removal of ashes. These doors 8 and 9 are provided with dampers in a well-known way, so that air may be admitted for promoting combustion.

10 indicates another door formed in the front wall of the furnace and affording access to a fuel-magazine arranged above the fire-box and designed for the discharge of fuel into the same, and 11 indicates still another door in the furnace-front above door 10 and affording access to an air-chamber within the furnace and above the magazine and fire-box and designed to supply an auxiliary volume of air to the fuel being fed from the magazine, so that a complete combustion of said fuel is effected and the formation of soot and green smoke and emission thereof from the furnace are prevented.

20 indicates the magazine, and 23 indicates the air-chamber above the magazine, and these parts are usually arranged at a sharp inclination downward from the front of the furnace, so that the fuel may be fed by gravity into the fire-box.

The magazine and air-chamber are formed between parallel walls or partitions 18, 19, and 22, each of which walls or partitions is made up of tiles 13, having the general conformation shown in Fig. 3, being provided at their ends with concave recesses 13<sup>a</sup>, adapted to engage and fit over the upper side portions of metal tubes or supports 12 12, extended transversely across the furnace from one



side wall 1<sup>a</sup> to the other, the extremities of said metal tubes or supports being passed through and embedded in the said end walls 1<sup>a</sup>, as indicated in Fig. 5. There is an inclined series of tubes 12 for each of the walls or partitions 18, 19, and 22, and at the lower rear end of the upper partition or wall 22 of the air-chamber 23 is arranged an oppositely and downwardly inclined wall or partition 21, formed similarly to the walls or partitions 22, 19, and 18 above referred to and designed to lead the fuel escaping at the lower end of the fuel-magazine forward and downward to the front of the grate 6, on which said fuel is deposited, as indicated in Fig. 1, and is permitted to spread out within the fire-box for its proper consumption.

At the forward end of the grate 6 a tile 14 is arranged, supported between a tube 12 and the front wall of the furnace, to prevent the fuel from dropping into the ash-pit, and above this tile or partition 14, and at the front or fire-door 8 of the fire-box is produced a coking-chamber 15, the top wall of which is formed of a partition 16, of tile, supported upon tubes 12, as above described.

The lower wall or floor 18 of the fuel-magazine is arranged to meet the top wall 16 of the coking-chamber 15 at a sharp angle, and for simplicity and convenience the meeting portions of these two walls or partitions are formed of angularly-shaped tiles 17, as shown in Fig. 1. A somewhat similar form of tile is employed for forming the meeting portions of the upper wall 22 of the air or draft chamber 23 and of the deflecting wall or partition 21, this form of tile being indicated at 24 in Figs. 1 and 4 and having recesses 24<sup>a</sup>, somewhat like the recesses 13<sup>a</sup> of tiles 13 and adapted to receive and fit upon the tubes 12.

25 indicates a baffle-plate arranged at the upper part of the bridge-wall 5 and designed to deflect the flames and hot gases forward beneath the boiler 2, and this baffle-plate 25 is, like the walls and partitions above referred to, formed from tiles 13, supported on tubes 12, extended across the furnace.

In the use of the improved furnace when the fire is lighted and the magazine supplied with fuel it is evident that the fuel will run down the inclined floor of the magazine 20 and be guided by the deflecting-wall 21 to the coking-chamber 15, at which point it falls from the deflecting-wall 21 upon the grate 6. The fuel burning at the grate will generate flames and hot gases, for the consumption of which air will flow through the grate, as indicated by the arrows in Fig. 1, and the heat thus generated will be partially transmitted up through the fuel resting upon the deflecting-wall 21 in such a way as to convert such fuel into coke, the gases produced in the coking of such fuel being carried along by the downward draft of air from the draft-chamber 23 and supplied at the point of combustion at the grate 6, so as to be completely consumed. By this means it will be evident

no smoke or soot is permitted to escape from the furnace, since the fuel is coked and deprived of its surplus gas while contained in the coking-chamber 15 and as a preliminary to being supplied upon the grate, and the gases produced by this coking process are supplied at the grate, so as to be entirely consumed.

In practice we prefer to employ certain of the pipes or tubes 12 as portions of a feed-water-heating means, choosing for this purpose those tubes which are directly exposed to the heat and causing a current of water to flow through them, so as to keep the tubes from burning out and also at the same time utilize the abstracted heat for heating the feed-water.

As shown in Figs. 2 and 5, the tubes 12 have nipples 12<sup>a</sup> upon their ends, and these nipples are connected by couplings 12<sup>b</sup> in such a way as to provide a continuous channel for the flow of the feed-water. One end of this channel has connection, as shown at 12<sup>c</sup>, with a feed-pipe, and the other end has connection with a boiler-feed pipe 12<sup>d</sup>, as indicated in Fig. 2.

From the above description it will be seen that the improved furnace constructed according to our invention is of an extremely simple and inexpensive nature and is adapted for use with a complete elimination of the soot and green smoke commonly emitted from similar furnaces, so that the device is especially well adapted for use. The arrangement of the improved furnace with its passages and chambers formed between partitions or walls of tiles supported upon tubes is also extremely simple and convenient, and the employment of those tubes exposed to heat as portions of a feed-water heater increases the life of the furnace and also effects a very material economy in the operation thereof.

It will also be obvious from the above description that the device is capable of considerable modification without material departure from the principles and spirit of the invention, and for this reason we do not wish to be understood as limiting ourselves to the precise form and arrangement of the several parts of the device as herein set forth in carrying out the invention in practice.

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

1. A furnace having a fire-box provided with a door at the furnace-front, a coking-chamber, the floor of which is inclined downward toward the furnace-front, said chamber being arranged to discharge into the fire-box, a fuel-magazine above the fire-box with its floor inclined downward toward the rear part of the furnace, said magazine being arranged to discharge into the upper part of the coking-chamber and means for passing a draft of air through the fuel in the coking-chamber and into the fire-box.



2. A furnace having a fire-box provided with a door at the furnace-front, a coking-chamber the floor of which is inclined downward toward the furnace-front, said chamber being  
5 arranged to discharge into the fire-box, a fuel-magazine above the fire-box with its floor inclined downward toward the rear part of the furnace, said magazine being arranged to discharge into the upper part of the coking-  
10 chamber and a draft-chamber above the magazine and also having its floor inclined downward toward the rear of the furnace and having its lower end arranged for communication with the upper part of the coking-cham-  
15 ber.

3. A furnace having a fire-box and having at its forward part and above the fire-box a plurality of inclined walls forming between them a fuel-magazine above the fire-box and  
20 a draft-chamber above the magazine, the furnace-front having at different levels doors communicating with the fire-box, magazine and draft-chamber, and a reversely-inclined wall arranged within the furnace and adapt-

ed to receive the fuel discharged from the 25 magazine and to deflect it toward the forward part of the fire-box.

4. A furnace having a fire-box provided with a door at the furnace-front, a partition above the fire-box and inclined from the furnace- 30 front downward toward the rear part of the fire-box, said partition forming a fuel-magazine above it and the said fuel-magazine having a door at the furnace-front and another partition reversely inclined with relation to 35 the first-mentioned partition and arranged with its upper end adapted to receive fuel from the magazine and its lower part inclined downward toward the furnace-front and adapted to discharge fuel into the fire- 40 box.

Signed at Cincinnati, Ohio, this 14th day of May, 1903.

CLAY HENRY.

ROBERT A. DILLON.

Witnesses:

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