

No. 672,242.

Patented Apr. 16, 1901.

J. C. H. STUT.  
HEAT UTILIZING GARBAGE FURNACE.

(Application filed Dec. 11, 1899.)

(No Model.)

2 Sheets—Sheet 1.

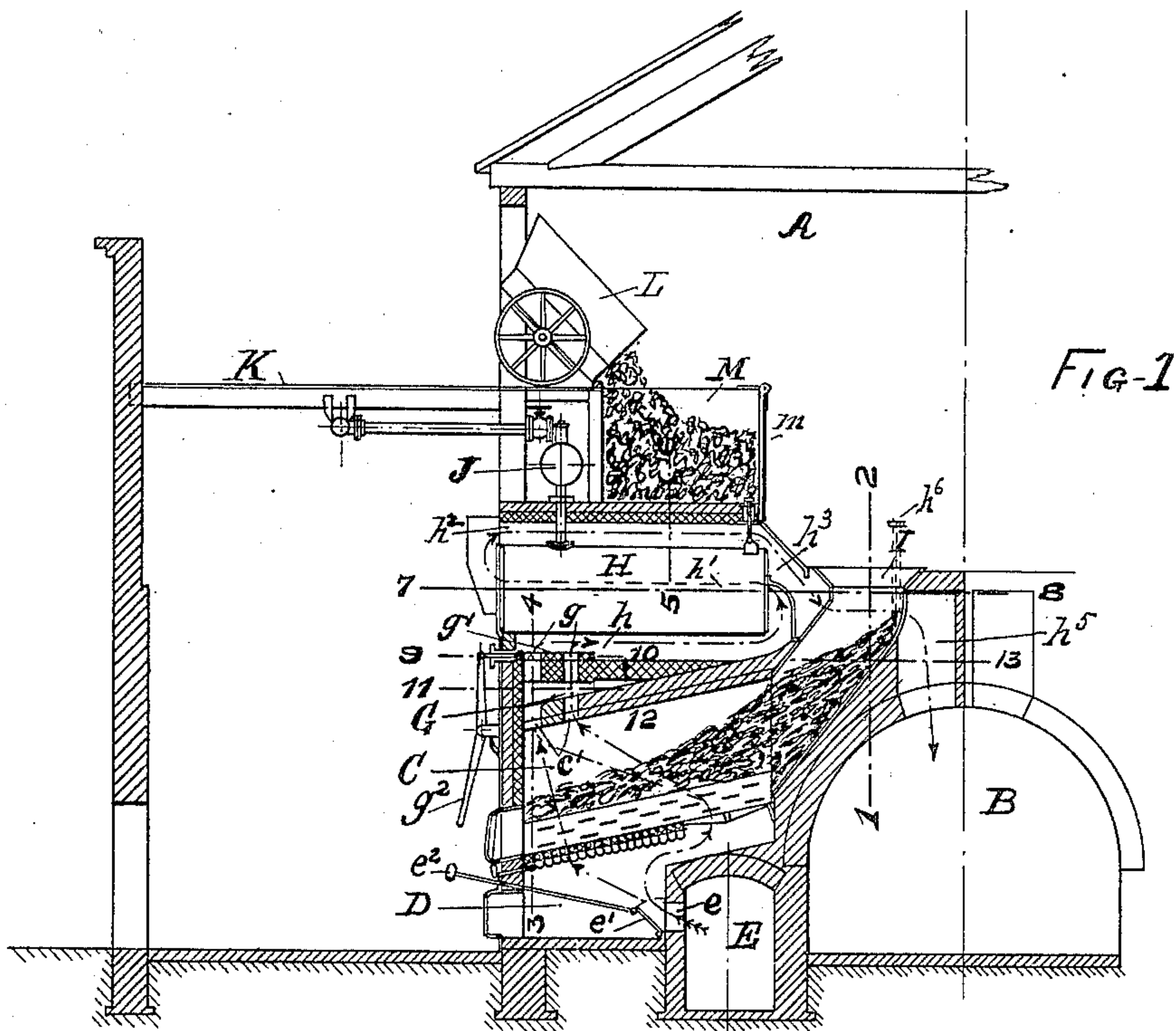


Fig-1

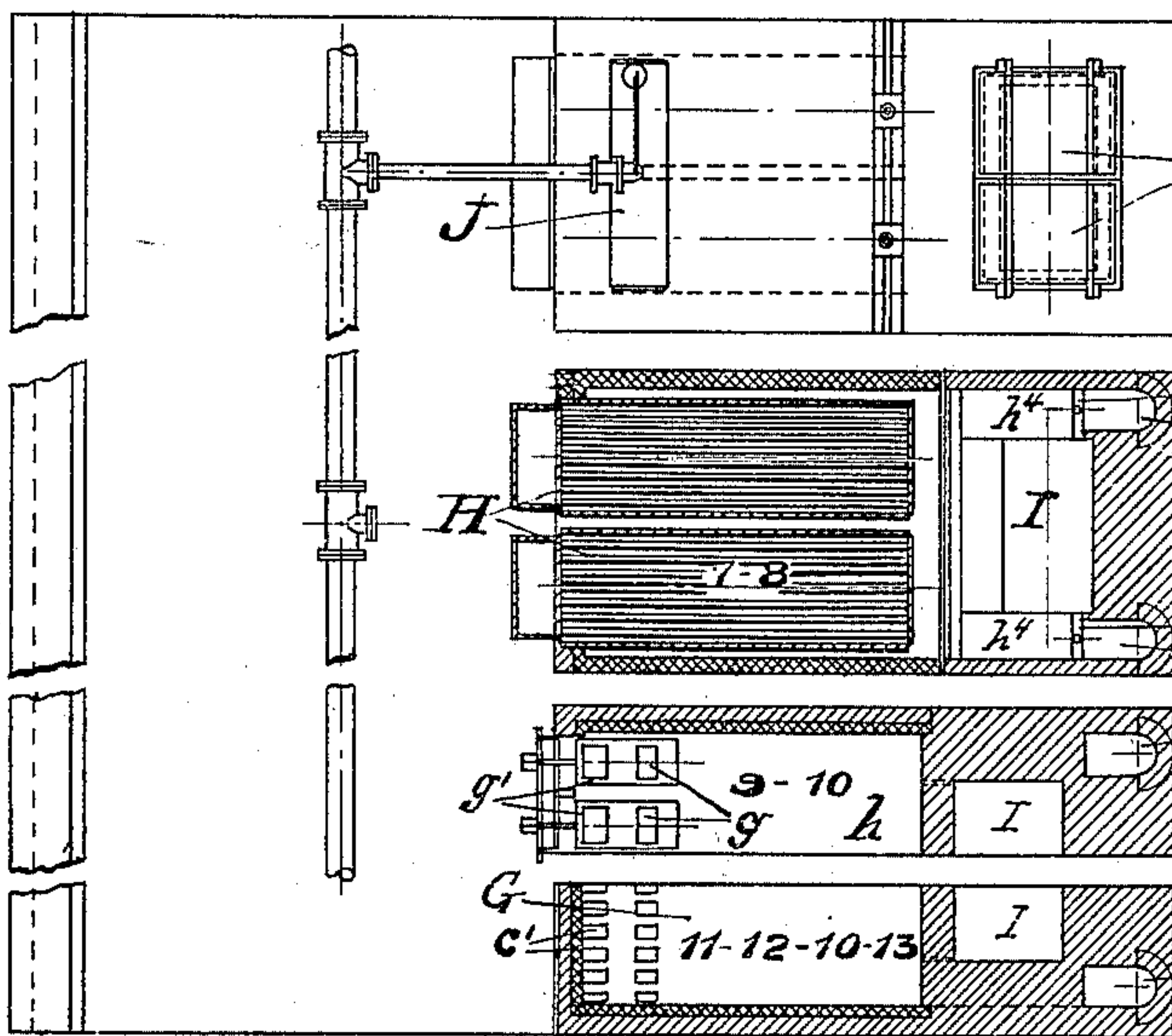


Fig-5

Fig-6

Fig-7

Fig-8

WITNESSES:

*Walter F. Vaux,*  
*D. B. Richards*

INVENTOR

*John C. H. Stut,*

BY

*Wm. F. Booth,*  
his ATTORNEY

No. 672,242.

Patented Apr. 16, 1901.

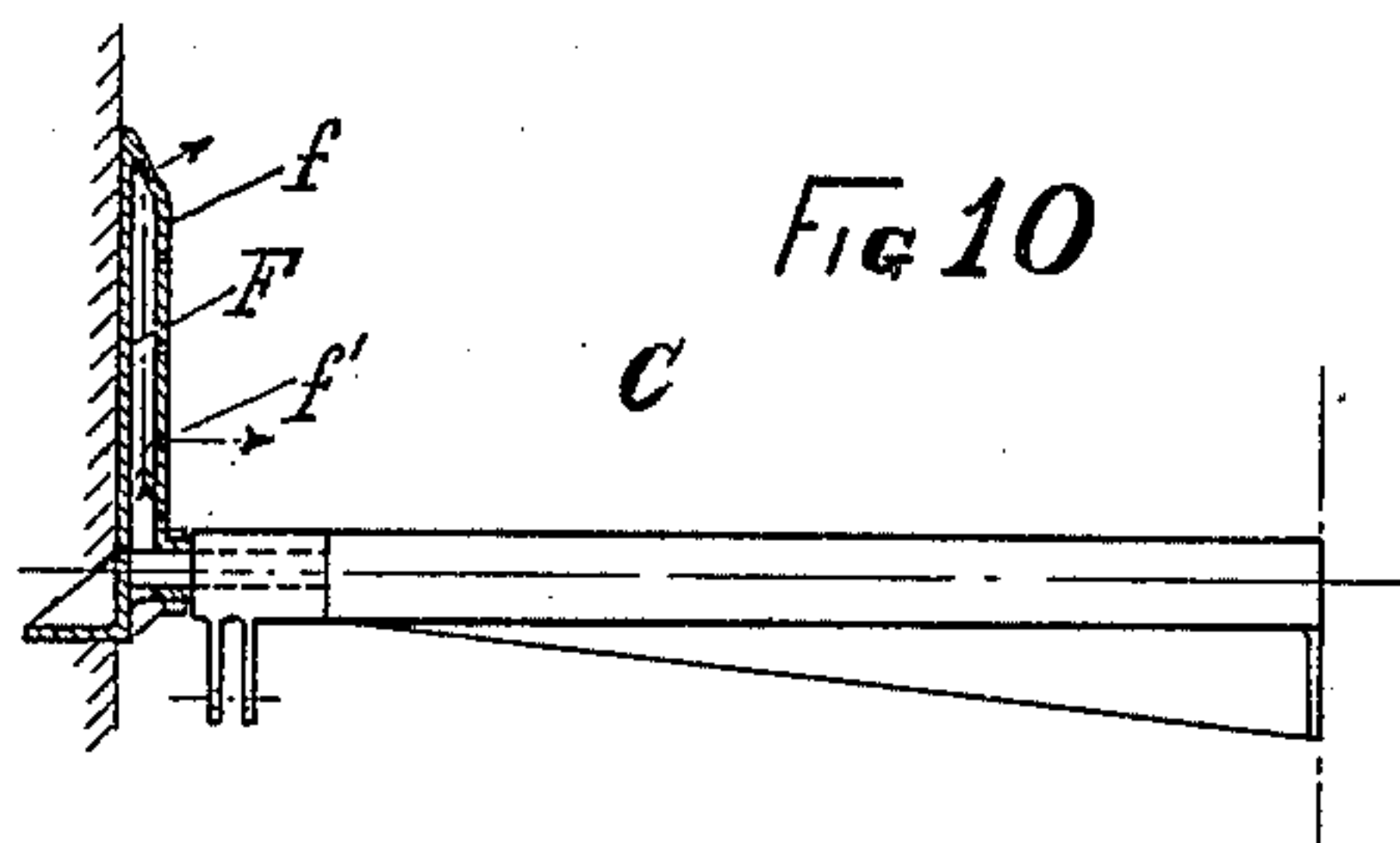
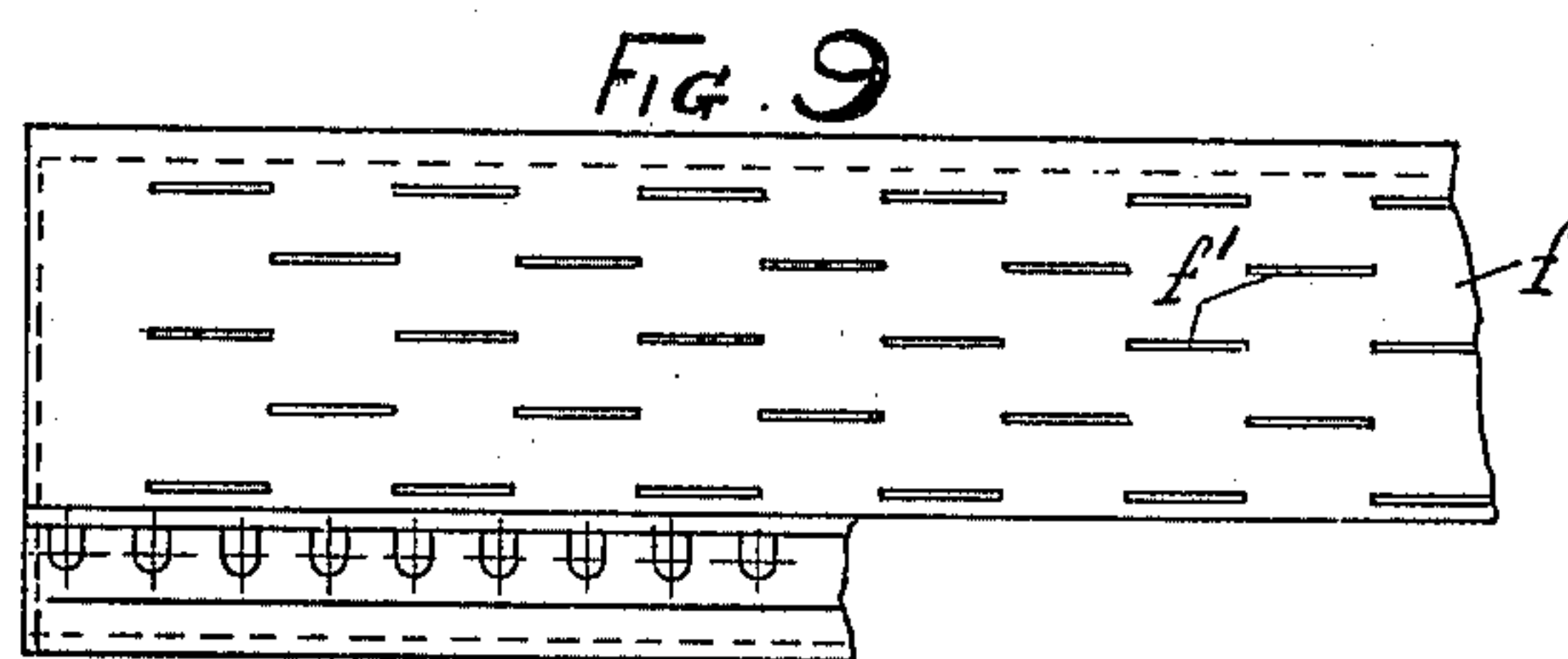
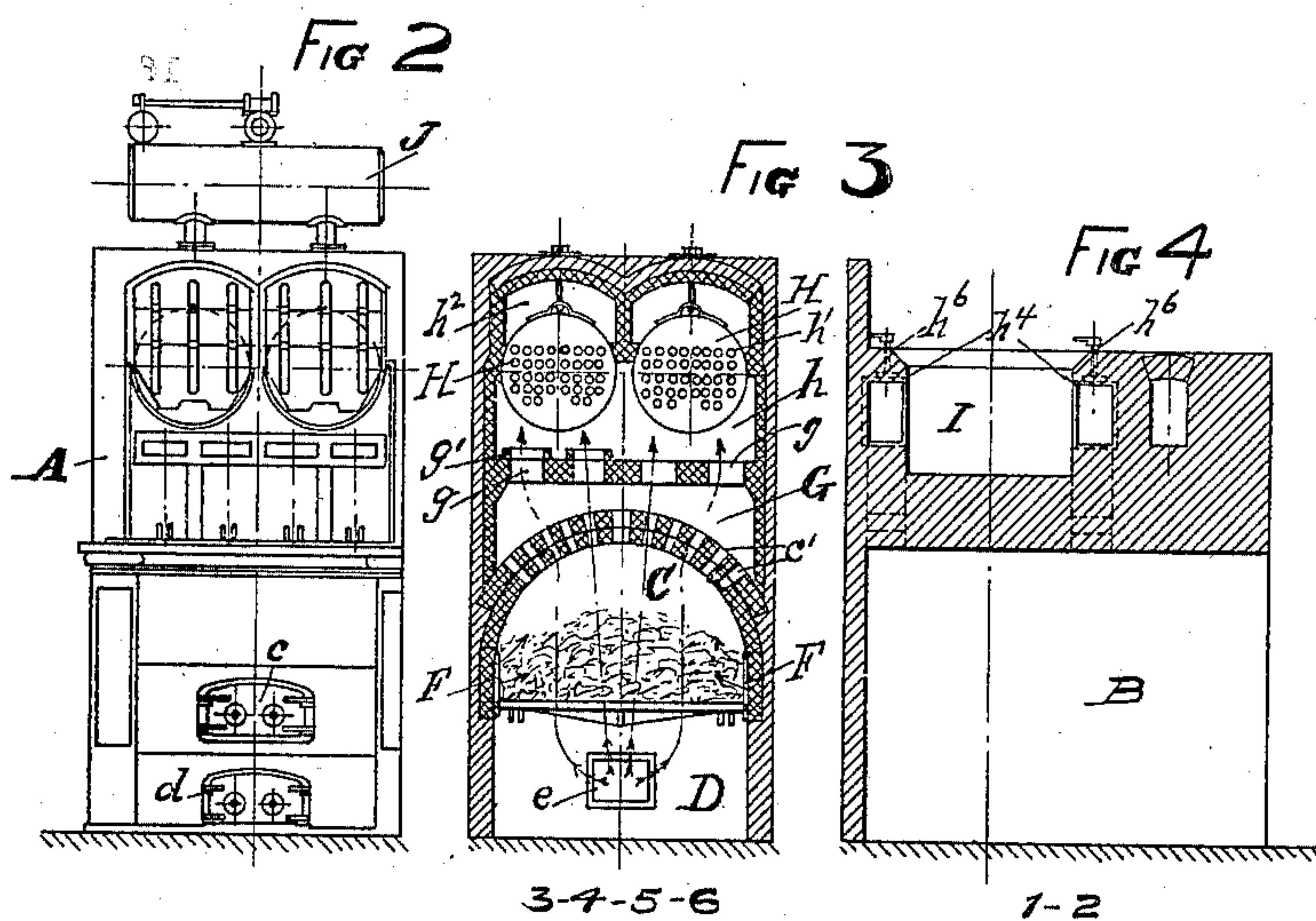
J. C. H. STUT.

HEAT UTILIZING GARBAGE FURNACE.

(Application filed Dec. 11, 1899.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

Walter F. Vance  
D. B. Richards

INVENTOR

John C. H. Stut.  
BY  
Wm F. Booth,  
his ATTORNEY.



# UNITED STATES PATENT OFFICE.

JOHN C. H. STUT, OF OAKLAND, CALIFORNIA, ASSIGNOR OF ONE-HALF TO  
JOHN L. HOWARD, OF SAME PLACE.

## HEAT-UTILIZING GARBAGE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 672,242, dated April 3, 1901.

Application filed December 11, 1899. Serial No. 739,970. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN C. H. STUT, a citizen of the United States, residing at Oakland, in the county of Alameda, State of California, have invented certain new and useful Improvements in Heat-Utilizing Garbage-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of furnaces designed for consuming garbage, with the further intent of utilizing the heat for useful work—as, for example, making steam.

My invention consists in the construction and arrangement of a furnace of this class, which I shall hereinafter fully describe and claim, and which has for its objects the attainment and maintenance of a high temperature and the avoidance of a nuisance.

Referring to the accompanying drawings, Figure 1 is a sectional elevation of my furnace. Fig. 2 is a front elevation of one of the several furnaces of which the plant is composed. Fig. 3 is a vertical section through the front part of the furnace at about the line 3 4, Fig. 1, and showing parts in elevation. Fig. 4 is a section view of the furnace on the line 1 2 of Fig. 1. Fig. 5 is a plan of one furnace. Fig. 6 is a horizontal section on the line 7 8 of Fig. 1. Fig. 7 is a section of the right half of the furnace on the line 9 10 13 of Fig. 1. Fig. 8 is a section of the left half of the furnace on the line 11 12 10 13 of Fig. 1. Fig. 9 is an elevation of the inner wall-plate of the side air-passages F. Fig. 10 is a detail section of said side air-passages.

In Fig. 1, A represents the general structure, in the lower portion of which is the main passage or flue B for the products of combustion to the stack. In the lower front of the structure are the main furnace-chambers C, one or more in number. As all are alike, a description of one will suffice for the others. In Fig. 2 I have shown in front elevation one of these as closed by the doors c, and in Fig. 3 I have shown another in section. Each chamber has under its bars an ash-pit D, Figs. 1 and 3, with the usual doors d, Fig. 2.

E in Fig. 1 is an air-passage from the exterior, and this communicates, through an

opening e, Figs. 1 and 3, with the space or ash-pit under the grate-bars, said opening being controlled by a damper e', Fig. 1, operated by a handle e<sup>2</sup>.

On the sides of the furnace-chamber are passages F, Figs. 3 and 10, which communicate with the ash-pit and have in their inner wall-plates f the openings f', Figs. 1, 9, and 10, whereby the air, in addition to passing up through the bars, passes also into the mass of material from the sides above the bars.

Through the forward part of the arch of the furnace-chamber are made a number of openings c', which communicate with a chamber G just above, which serves as a combustion-chamber, and said chamber, Figs. 1 and 3, has exits g in the top, which are controlled by a damper g', operated from without by the lever g<sup>2</sup>, Fig. 1. These openings communicate with the space h under the boilers H, which said space communicates at its rear end with the flues h', passing forwardly through the boilers, said flues communicating at their forward ends with the spaces h<sup>2</sup> above the boilers. These upper spaces communicate, Figs. 1 and 6, with a flue h<sup>3</sup>, which, dividing into branches h<sup>4</sup>, passes, one branch on each side of the funnel I, which supplies the material to the furnace-chamber C. Thence these branches pass into a down-flue h<sup>5</sup>, terminating in the main flue B, to the stack, Fig. 1. Dampers h<sup>6</sup> control the branches h<sup>4</sup> into the down-flue.

Above the boilers is the steam-dome J. An elevated platform K is used to enable the wagon, car, or other vehicle L, Fig. 1, to reach the dump-receptacle M, which receptacle has a rear gate m, by which the contents are discharged into the feed-funnel.

The entrance of the air to the furnace-chambers and the course of the products of distillation and combustion are indicated by the arrows.

The material, garbage, or refuse of any description is fed to the funnels, and thence down into the furnace-chambers, as indicated.

When the furnaces have to be opened to clean or rake out the ashes, the dampers g' and h<sup>6</sup> are closed, so that by closing dampers g' the cold air will not pass into the flues and



passages in and around the boilers and cool them, and by closing dampers *h*<sup>6</sup> the heat around said boilers will be retained.

The supply of air or steam jet, or steam and air combined, to assist combustion, is regulated by the damper *e*<sup>7</sup>.

The prime requisite in a furnace of this class is high heat. Without this there is not perfect combustion and the character of the material to be consumed is such that in the absence of high heat a partial combustion and distillation takes place, the products of which are inefficient to reach or to maintain the degree of heat necessary for a useful purpose, such as making steam, particularly where the boilers are situated at a distance from the furnaces. Moreover, this partial distillation is offensive, giving rise to odors and vapors, tending to make the furnace a nuisance in the neighborhood. Furthermore, the material is not properly consumed, thus clogging the furnaces and leaving a waste. The character of the material renders it necessary to obtain a high heat to reach proper combustion. In my furnace this high temperature is attained by a perfect combustion, reducing the material to carbonic-acid gas, ash, and clinker. This temperature or intense heat is gained partly by the provision for the inlet of the air from below and from the sides, and to this end there may be a forced draft, and either air alone may be used or air combined with steam or a steam-jet alone. It is further gained by causing the products of distillation arising from heating up the entering material in the feed-funnel to pass over and in contact with the glowing mass in the furnace-chamber, by which they are thoroughly consumed, and passing upward as highly-heated gases and products of combustion through the heated brick in the arches of the furnace-chambers are further heated and consumed in the combustion-chamber G, and thus highly heated these products are available for the purpose of making steam in the boilers, which latter, it will be noted, are close to the source of generation of such products, so that none of the heat is lost before being called upon for work. Finally these products, with the amount of heat remaining, are utilized in my furnace to further heat up the entering material in the funnels by passing by and in contact with said funnels on their way to the main flue. This is in marked contrast to a construction which permits the products of distillation from the entering material to escape at once to the main flue without any attempt to heat and consume them. In this case they become a nuisance, being both noisome and nauseous, besides being a waste and resulting in no work, while in my case these products, not being allowed to escape, are conducted through such a course that by contact with all available sources of heat—the burning mass, the heated air, and the heated surfaces of brick and iron—they become themselves highly heated, are capable of parting with

their heat for good work of any kind, making steam or other objects requiring heat, assist in raising the temperature of the entering mass, and finally are so consumed that they are discharged without nuisance. In this result the proximity of the boilers to the furnace-chambers is, as I have before intimated, a potent factor, and they are therefore placed close enough to the furnaces to utilize the available heat, and yet not so close as to destroy, as has been found by experience, the proper or full combustion—that is, the proper union of the elements to make combustion or the combination of the elements of CO<sub>2</sub>. The heat comes in contact with the clean surfaces of the boilers, and the remaining or waste heat coming from the boilers is, as before stated, used to further distil the entering material by contact with or proximity to the funnel containing it.

The back plate of the boiler-passages is of iron and is kept hot, and the funnel is of iron and also hot, but the heat is not great enough to consume the entering material, only to prepare it for combustion by raising its temperature and distilling its products. The arrangement for the supply of material from above saves the cost of lifting and is convenient and practicable. The wall-plates of the side passages F prevent clinkers from attaching to the sides of the furnace-chamber.

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

1. In a heat-utilizing furnace, the combination with inclosing walls, of a substantially horizontal furnace-chamber having a feed-opening at one end and exit-openings in the top wall at the opposite end, a secondary combustion-chamber over the furnace, and with which the exit-openings communicate, a boiler-chamber over the secondary combustion-chamber and communicating therewith, a boiler in the boiler-chamber, a passage from the boiler-chamber downward into an exit and a feed-funnel in proximity to said last-mentioned passage leading into the furnace, substantially as described.

2. In a heat-utilizing garbage-furnace, the combination with a substantially horizontally arranged furnace-chamber having an inclined grate therein, a feed-funnel entering the rear of the furnace, exit-openings in the top of the furnace at the forward end thereof, a boiler-chamber arranged directly over the furnace into which the exit-openings lead, means in the boiler-chamber for causing the heated products of combustion to pass tortuously to the boiler-chamber and an exit-flue from the boiler-chamber extending in close heating proximity to the mouth of the funnel, substantially as described.

3. In a heat-utilizing furnace, the combination of the inclosing walls, a substantially horizontal furnace-chamber near the bottom of the furnace closed at one end and open at the other, an inclined feed-funnel at the rear



of the furnace and communicating with the open end of the furnace-chamber and located within and spaced from the side inclosing walls to form passages on opposite sides of the funnel, a boiler-chamber located within the inclosing walls above the furnace-chamber and communicating therewith by means of openings in the roof of the furnace-chamber, said boiler-chamber communicating directly with said passages beside the feed-funnel, substantially as described.

4. In a heat-utilizing furnace, the combination of the inclosing walls, an inclined grate or partition constituting the bottom of the furnace-chamber, an inclined arched wall constituting the roof of said furnace-chamber, an inclined feed-funnel communicating with one end of the furnace-chamber and located

between the side inclosing walls and spaced therefrom to provide passages on opposite sides of the funnel, a horizontal wall above said arched roof of the furnace-chamber and spaced therefrom at one end, a boiler-chamber above said horizontal wall and communicating with the furnace-chamber by means of openings through said roof and horizontal walls, said boiler-chamber also communicating with said passages beside the feed-funnel, substantially as described.

In witness whereof I have hereunto set my hand.

JOHN C. H. STUT.

Witnesses:

WALTER F. VANE,  
D. B. RICHARDS.