No. 786,746. PATENTED APR. 4, 1905.

G. L. FOGLER.

FURNACE.

APPLICATION FILED OCT. 31, 1903.

3 SHEETS—SHEET 1.

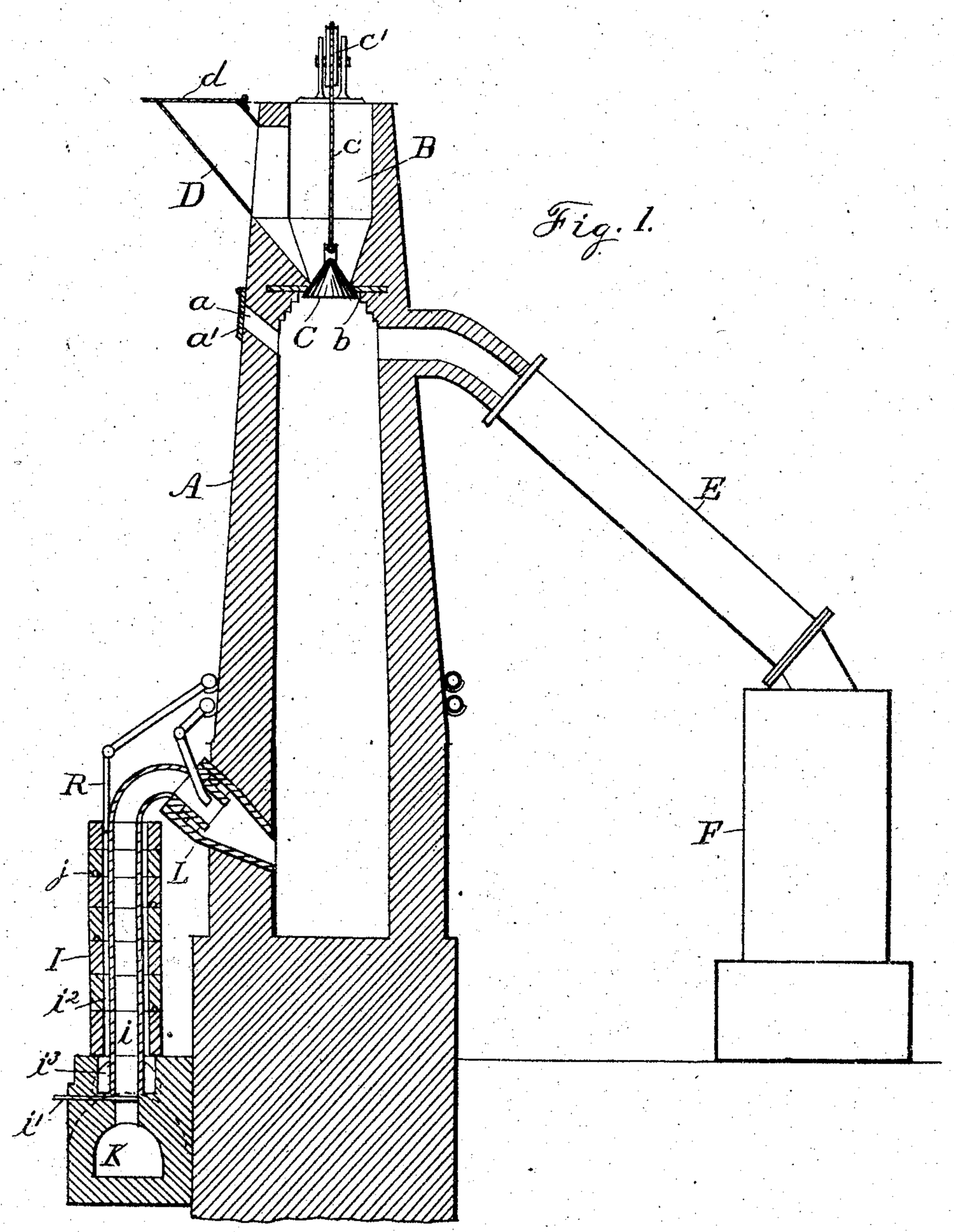

Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

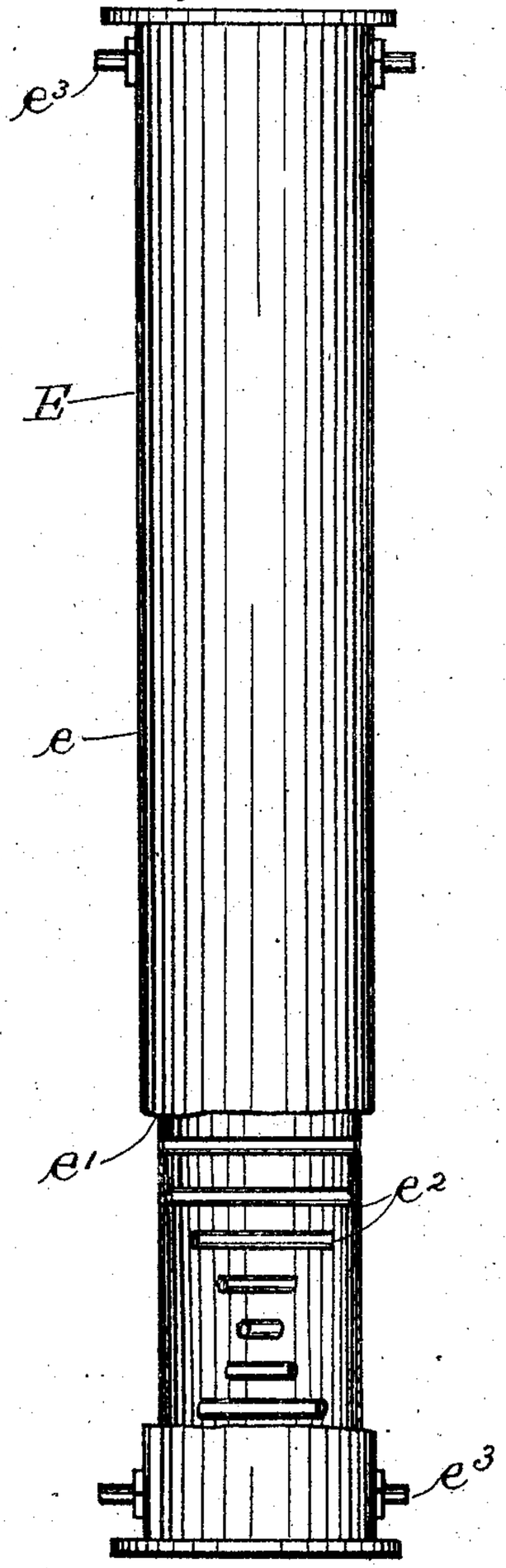
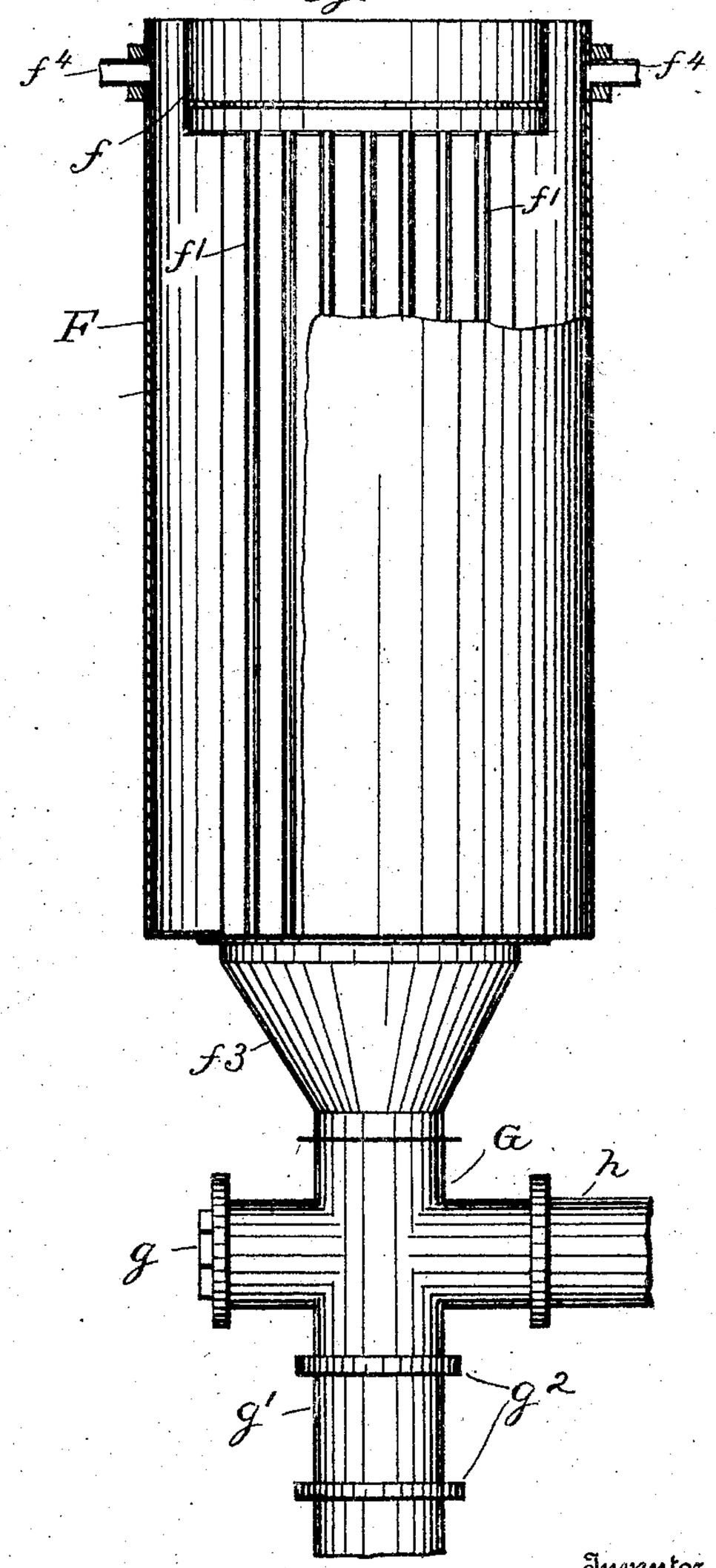


Fig. 3.



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3 SHEETS—SHEET 3.

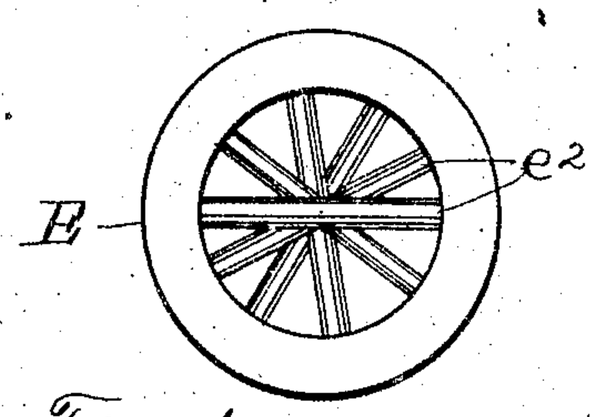


Fig. 4.

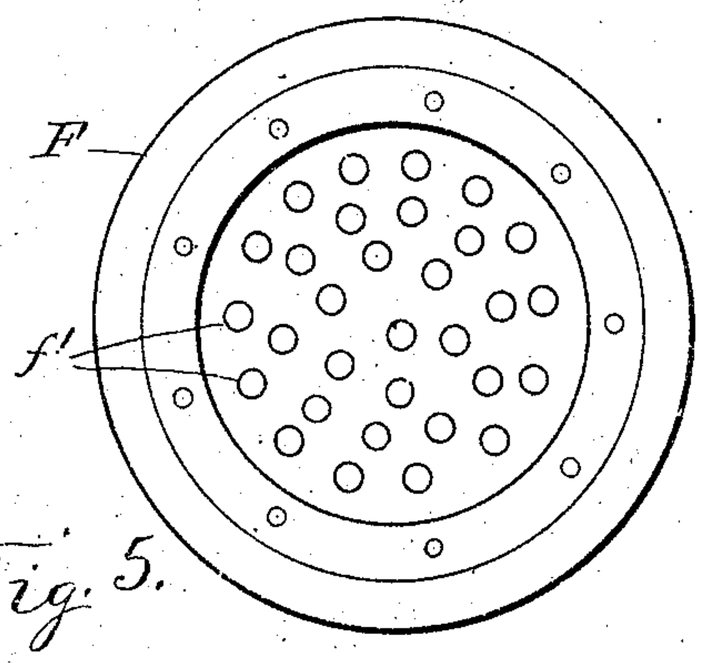
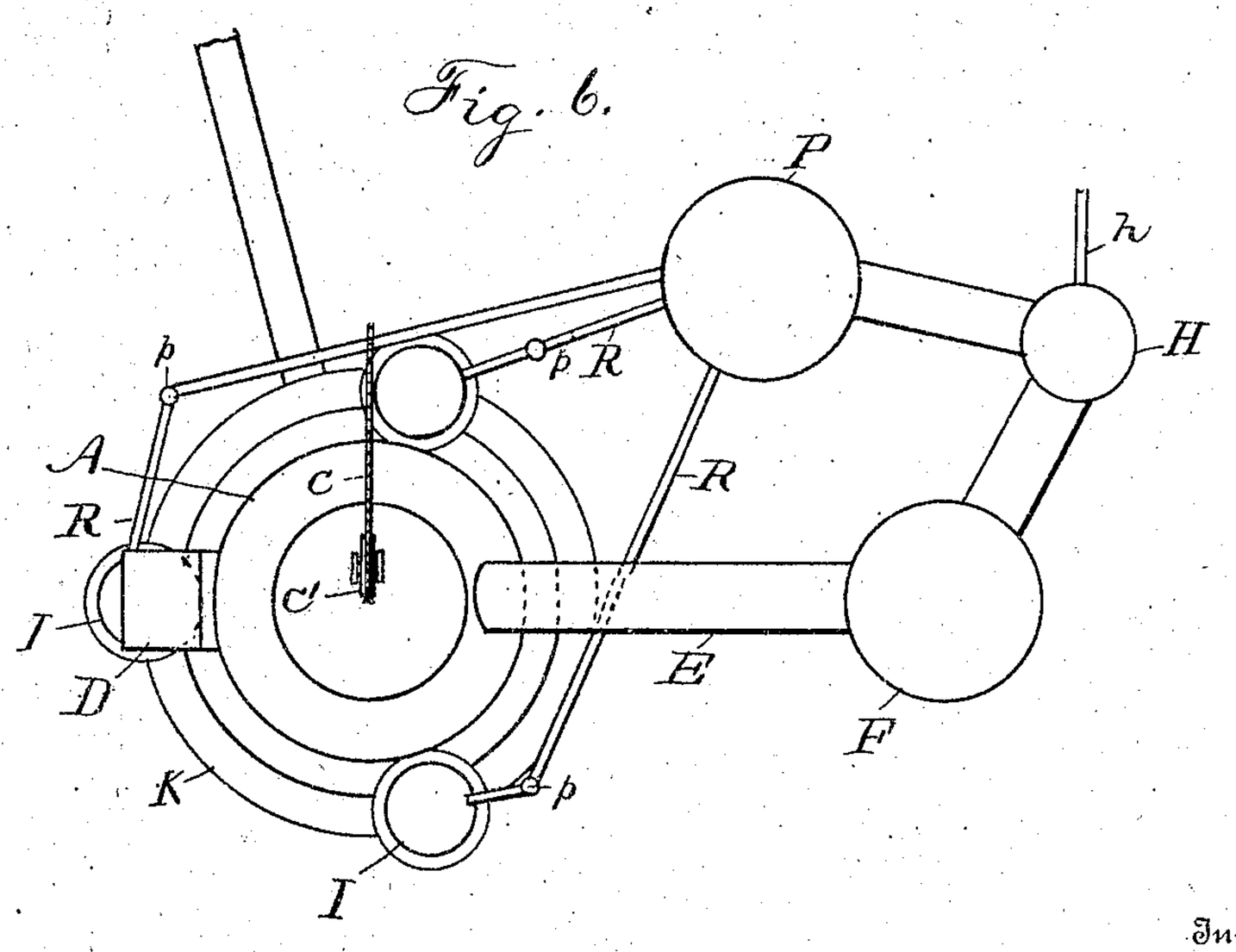


Fig. 5.

Fig. 6.



Witnesses

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No. 786,746.

Patented April 4, 1905.

UNITED STATES PATENT OFFICE.

GEORGE LUTHER FOGLER, OF PITTSBURG, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 786,746, dated April 4, 1905.

Application filed October 31, 1903. Serial No. 179,395.

To all whom it may concern:

Be it known that I, GEORGE LUTHER FOGLER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to reducing-furnaces in which gas is used in part as fuel. It includes improved means for heating the gas before feeding it, means for collecting, purifying, and conveying to the gas-heater the combustible gas generated in the furnace, together with various other features, all of which are illustrated in the accompanying drawings and described and claimed in the following specification.

In the drawings, Figure 1 is a reduced elevation, partly in section, of a furnace, showing portions of the invention. Fig. 2 is a longitudinal view of a down-flue, partly in section. Fig. 3 is a similar view of a gas-cooling tank. Fig. 4 is a plan of the end of a down-flue. Fig. 5 is a plan of the end of a cooling-tank, and Fig. 6 is a reduced general plan of the invention in outline.

The various features of the invention are referred to by letters, similar letters denoting corresponding parts in the different views.

The letter A indicates an exhaust-furnace, and *a* an explosion-vent covered by a valve *a'*.

B is a chamber above the furnace and connected with it by an opening *b*, which is closed by a bell C. This bell is suspended by a chain *c*, which passes over a pulley *c'* and to a place convenient to the operator.

D' is a hopper or chute at a side of the chamber B. This chute is closed by a door *d*. When stock is fed to the furnace, the opening *b* is closed by the bell C. Then the door *d* is opened, and the chamber B is charged. Then the door *d* is closed, and the bell C is lowered sufficiently to permit the stock to drop into the furnace. This device prevents an inrush of air into the furnace and a possible explosion.

E indicates a down-flue leading from the upper part of the furnace to the cooling-tank F. The flue E has an outer casing *e* to form a water-jacket *e'* around the flue. Cross water-pipes e^2 extend from side to side of flue E and open into the water-space *e'*. To secure the best effect, the pipes e^2 should be arranged in a spiral order, as shown.

The gas-cooling tank F has an upper chamber *f*, connecting with the gas-pipes *f' f'*, which extend to the bottom of the cooler and open into a tapering outlet f^3. The space around the pipes *f'* is filled with water supplied and drawn off through pipes f^4 f^4. Water-pipes e^3 e^3 connect also with the jacket *e'* of the down-flue E. The outlet f^3 connects with a four-way pipe G, having a cap *g* at one side and opposite thereto a pipe *h*, leading to the exhaust-fan H. The down-pipe *g'* is provided with two valves g^2 g^2, by means of which the deposit of dust and ashes from the gas can be removed while the furnace is in operation. The door *g* is used for cleaning out these parts when the furnace is not in use. The fan H is sprayed with water through a pipe *h*, and the gas thus purified passes on through a gasometer P to the gas-heating stack I, located close to the furnace A. Several of these stacks are preferably used, arranged conveniently around the furnace. A safety-valve *p* is provided in the pipe R between the gasometer and the stack I.

The gas for the furnace is drawn into the stack through a flue K and passes up through a flue *i* in the stack to a twyer L and is directed into the furnace, preferably at an inclination, as shown in Fig. 1.

The flue *i* has a bottom slide-valve *i'* and is surrounded by a flue i^2, having its upper end open to the outer air and connected at its bottom to an outlet i^3, leading to a chimney. There is a downdraft through the flue i^2, and the gas discharged from the pipe R into the flue i^2 is ignited, and the flame is drawn down and around the gas-flue *i*, thus heating the gas in that flue before it enters the twyer.

I do not restrict myself to the introduction of the heating-gas into the top of flue i^2 and its subsequent passage downward, as it may be introduced as well at the bottom of said flue and pass upward, if that construction is preferred. Neither do I restrict myself to a heat-flue which entirely surrounds the gas-fuel flue. It is only essential that such contiguity

should exist between these flues that the gas in the fuel-flue should be sufficiently heated.

The stack is constructed of circular tiles of any refractory material, having dowels *j* on one edge and sockets on the opposite edge, by which the tiles are maintained in position.

I use the "Fogler" patent water-jacket twyer, as shown in the drawings. When it is desired to remove this twyer for repair or renewal, the valve *i'* is closed to temporarily cut off the gas-supply.

The fan H is adjusted to maintain the pressure of the gases in the furnace, so it will vary from a pressure slightly below atmospheric pressure at the twyers to a pressure considerably above atmospheric pressure at the fan. These variations in pressure at different points in the apparatus are coexistent and result from the resistance offered by the charge in the furnace to the passage of the gases.

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

1. A gas heating device comprising outwardly a stack of refractory material, a gas-flue through said stack, a twyer in the furnace, said gas-flue connecting the gas-supply with said twyer, a valve at the bottom of said gas-flue, a heat-flue surrounding said gas-flue having an inlet at its top and an outlet at its bottom, a chimney connected with said outlet, and a pipe adapted to feed gas into said inlet substantially as described.

2. A gas heating device comprising outwardly a stack of refractory material, a gas-flue through said stack, a twyer in the furnace, said gas-flue connecting the gas-supply with said twyer, a valve at the bottom of said gas-flue, a heat-flue surrounding said gas-flue having one end open to the outer air and its other end connecting with a chimney, and a pipe to feed heating-gas into the open end of said heating-flue so that said heating-gas may be ignited at its entrance into said heat-flue as described.

3. In a furnace provided with a gas-flue and a twyer, said gas-flue connecting the gas-supply with the said twyer, a heat-flue contiguous to said gas-flue having one end open to the outer air and its other end connected to a chimney and a pipe to feed heating-gas into the open end of said heat-flue so that said heating-gas may be ignited at its entrance into said heat-flue for the purpose specified.

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

GEORGE LUTHER FOGLER.

Witnesses:

MILHALL MCCALL,

P. JOS. HESS.