

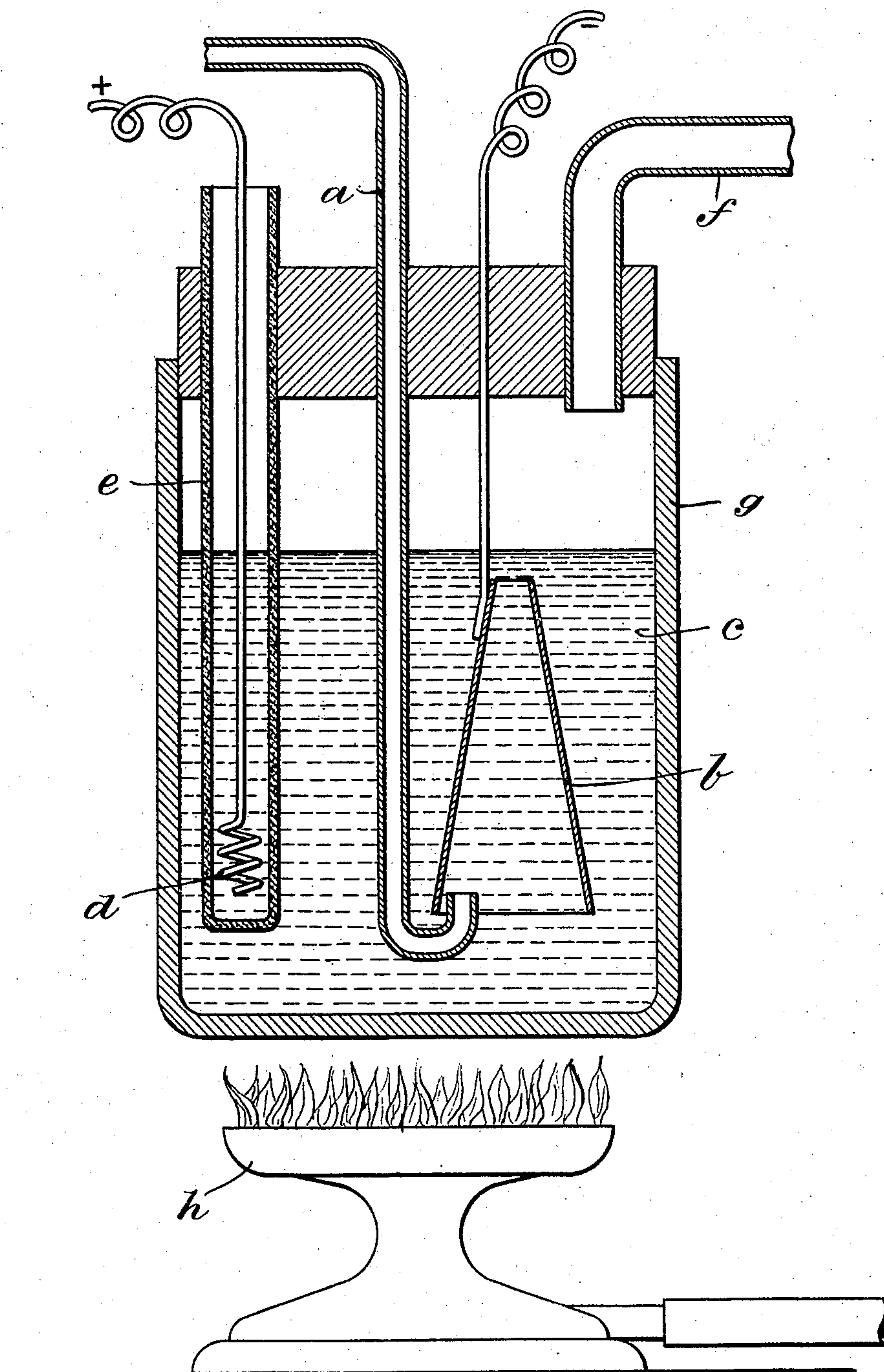
No. 711,565.

Patented Oct. 21, 1902.

J. W. HARRIS.
MANUFACTURE OF ETHER.

(Application filed June 5, 1902.)

(No Model.)



Witnesses
Henry E. Grudery
Jas. C. Wobensmith

Inventor
Joseph W. Harris
By Walter Douglas
Attorney

No. 711,566.

Patented Oct. 21, 1902.

C. D. HAZARD, insane.

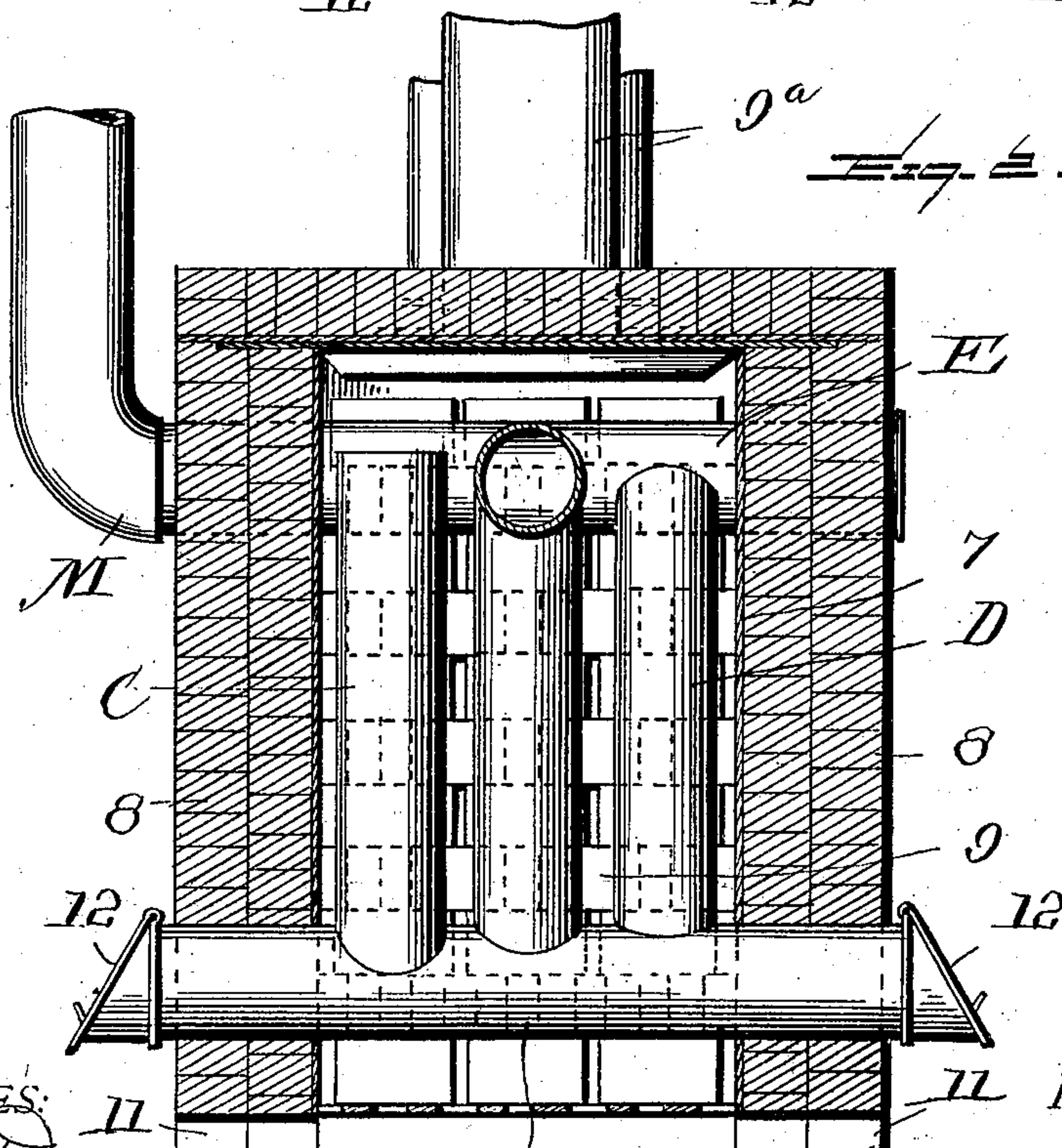
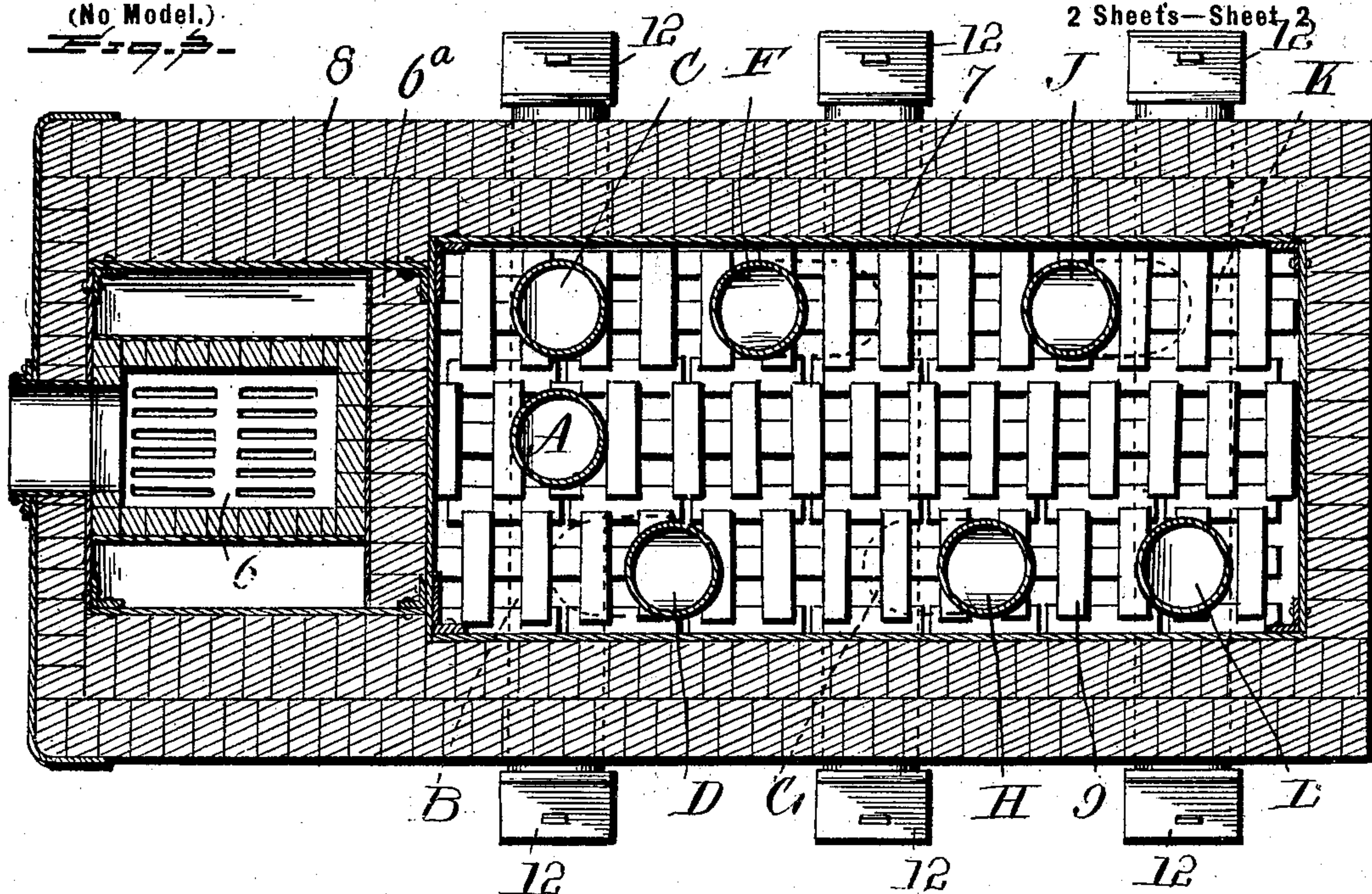
C. A. GIBBS, Guardian.

HEATING FURNACE.

(Application filed Mar. 7, 1902.)

(No Model.)

2 Sheets—Sheet, 2



WITNESSES:

Wm. F. Ray Jr.

Geo. E. Sew.

INVENTOR

$$B$$

By

Clark D. Hazard

Milo B. Stevenson Attorneys

UNITED STATES PATENT OFFICE.

CLARK D. HAZARD, OF CLEVELAND, OHIO; CLARENCE A. GIBBS GUARDIAN
OF SAID HAZARD, AN INSANE PERSON.

HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 711,566, dated October 21, 1902.

Application filed March 7, 1902. Serial No. 97,171. (No model.)

To all whom it may concern:

Be it known that I, CLARK D. HAZARD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Heating-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to furnaces, and particularly to air-heating furnaces having a secondary radiating-chamber through which the flue from the fire-box extends.

The object of the invention is to provide a construction intended to deprive the products of combustion of the greatest amount of heat possible.

A further object is to provide means for retaining and storing said heat so that the furnace will continue to supply heat even after the fire is out.

A further object is to provide means by the storing of heat whereby the amount of heated air delivered can be increased or diminished regardless of the amount of live coals in the fire-box.

Generally speaking, the furnace consists of a fire-box, a secondary heating-chamber, through which the flue extends in a tortuous course, and a construction of checker brickwork within said chamber and around the flues, whereby the heat is absorbed by the checker brickwork and the air in the spaces between the bricks, so that the heat generated is retained or stored and may be used as desired.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of the furnace. Fig. 2 is a vertical cross-section thereof on line 3 3 of Fig. 1. Fig. 3 is a horizontal section.

Referring specifically to the drawings, the fire-box is indicated at 6, having the usual parts suitable thereto. A flue A leads from the fire-box into a radiating-chamber, which is separated from the fire-box by a cross-wall

6^a. After leaving the fire-box the flue A leads vertically downward to a cross-flue B, which extends across the radiating-chamber at or near the bottom thereof. Similar lower cross-flues G and K extend across the radiating-chamber and are connected to corresponding top cross-flues E, I, and M by inclined flues D, F, H, and J. The connections are at opposite ends of the top and bottom flues alternately, so that a long and tortuous flue is formed through which the products of combustion pass. The last bottom flue K is connected by a vertical flue L with a flue M, which extends through the wall of the casing to the chimney. A dead end flue C rises from the end of the flue B opposite to the flue D, and this dead end has no function except to increase the radiating-surface. It is, however, provided with a small gas-outlet *a*, leading to the flue E.

The radiating-chamber and fire-box are inclosed by suitable walls, which are preferably formed of a sheet-steel casing (indicated at 7) inclosed by a brick wall 8. The radiating-chamber is filled around the flues with checker brickwork, (indicated at 9.) This is an important feature of my invention and serves to give the furnace its heat-retaining qualities. The heat is absorbed by the bricks of the checker brickwork and also by the air in the spaces between the bricks. Outlet service-pipes, (indicated at 9^a,) provided with dampers 10, extend through the top wall of the furnace and communicate with the radiating-chamber. Air-inlets (indicated at 11) extend through the walls at the bottom of the furnace. The lower tier of cross-flues are extended through the side walls and are provided with vents 12 to control the draft and to clean the flues. The heat absorbed by the checker brickwork and the air in the interstices thereof is stored or retained within the walls of the radiating-chamber and may be served at pleasure by manipulation of the dampers 10. By actual experiment it has been found that the products of combustion leave the radiating-chamber quite cold, whereby a great saving of fuel is effected. The course of the air through the interstices of the checkered brickwork is crooked and long, so that the heat absorbed by the bricks

is thoroughly diffused to the air, and heated air may be drawn from the furnace for several hours after the fire has been extinguished; also, since the heat generated is stored it
5 may be drawn on at any time irrespective of the state of the fire in the fire-box.

The furnace has many practical advantages of construction in that the parts are formed of cheap and plentiful materials,
10 which are readily procurable at almost any place.

What I claim is—

1. In a furnace, the combination with a fire-box and a radiating-chamber; of a flue
15 extending from the fire-box through said chamber, said flue comprising horizontal top and bottom sections across the chamber and substantially vertical sections at the sides of the chamber connecting the horizontal sec-

tions at opposite ends alternately; and a
20 structure of heat absorbing and diffusing material in said chamber supporting and receiving heat by direct radiation from the flue, and air-passages through said structure.

2. In a furnace, the combination with a
25 fire-box, of a radiating-chamber, a flue leading from the fire-box through the chamber, and a checker-work structure surrounding and supporting said flue and receiving heat by direct radiation therefrom, said structure
30 having air-passages therethrough.

In testimony whereof I do affix my signature in presence of two witnesses.

CLARK D. HAZARD.

Witnesses:

S. H. WOLCOTT,
R. L. CARR.