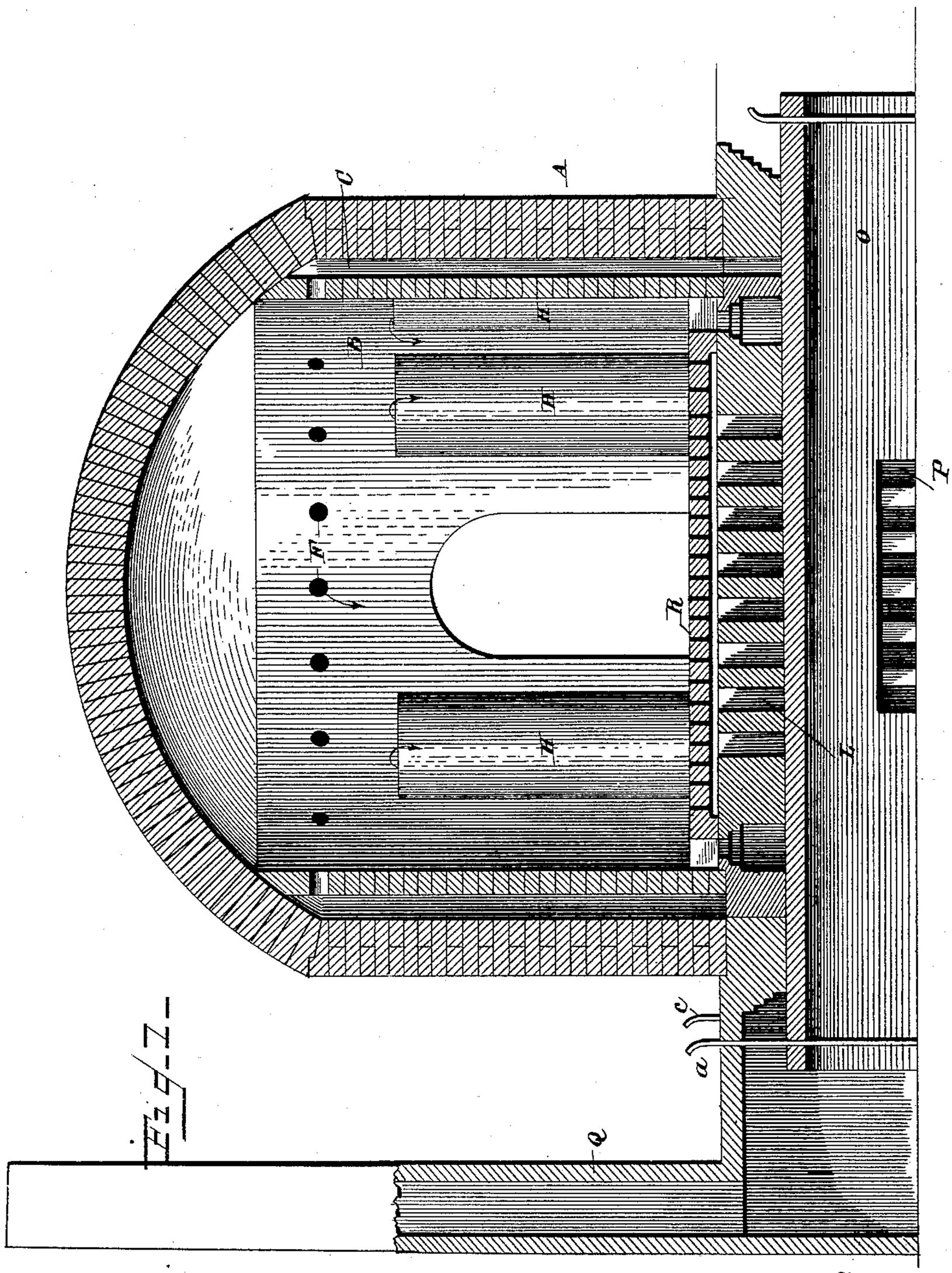
(No Model.) 3 Sheets—Sheet 1.

J. I. KNAPP, J. C. McKENZIE & W. HUMPHREY.

BRICK AND TILE KILN.

No. 348,916. Patented Sept. 7, 1886.



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3 Sheets—Sheet 2.

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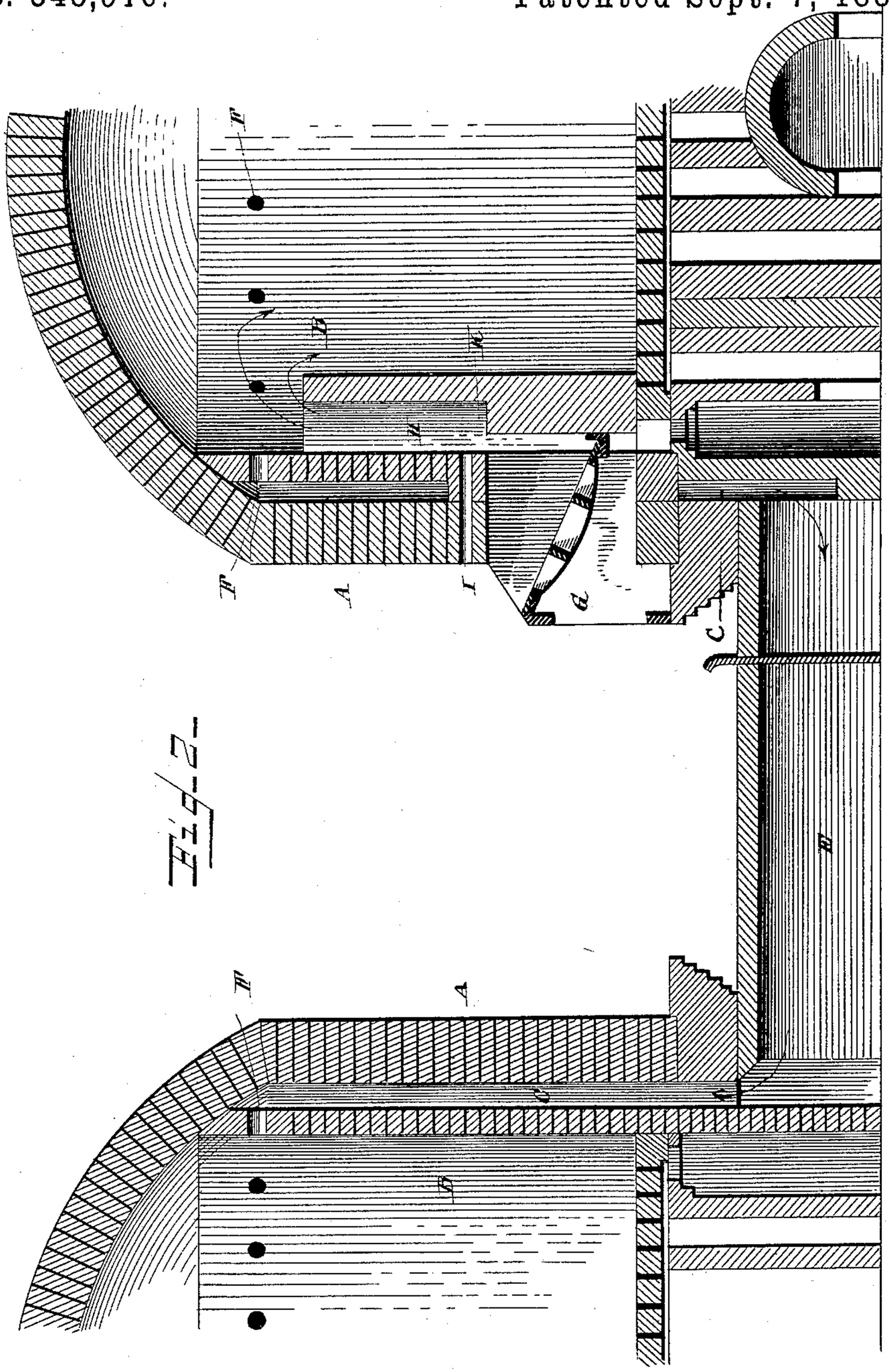

Fig. 2.

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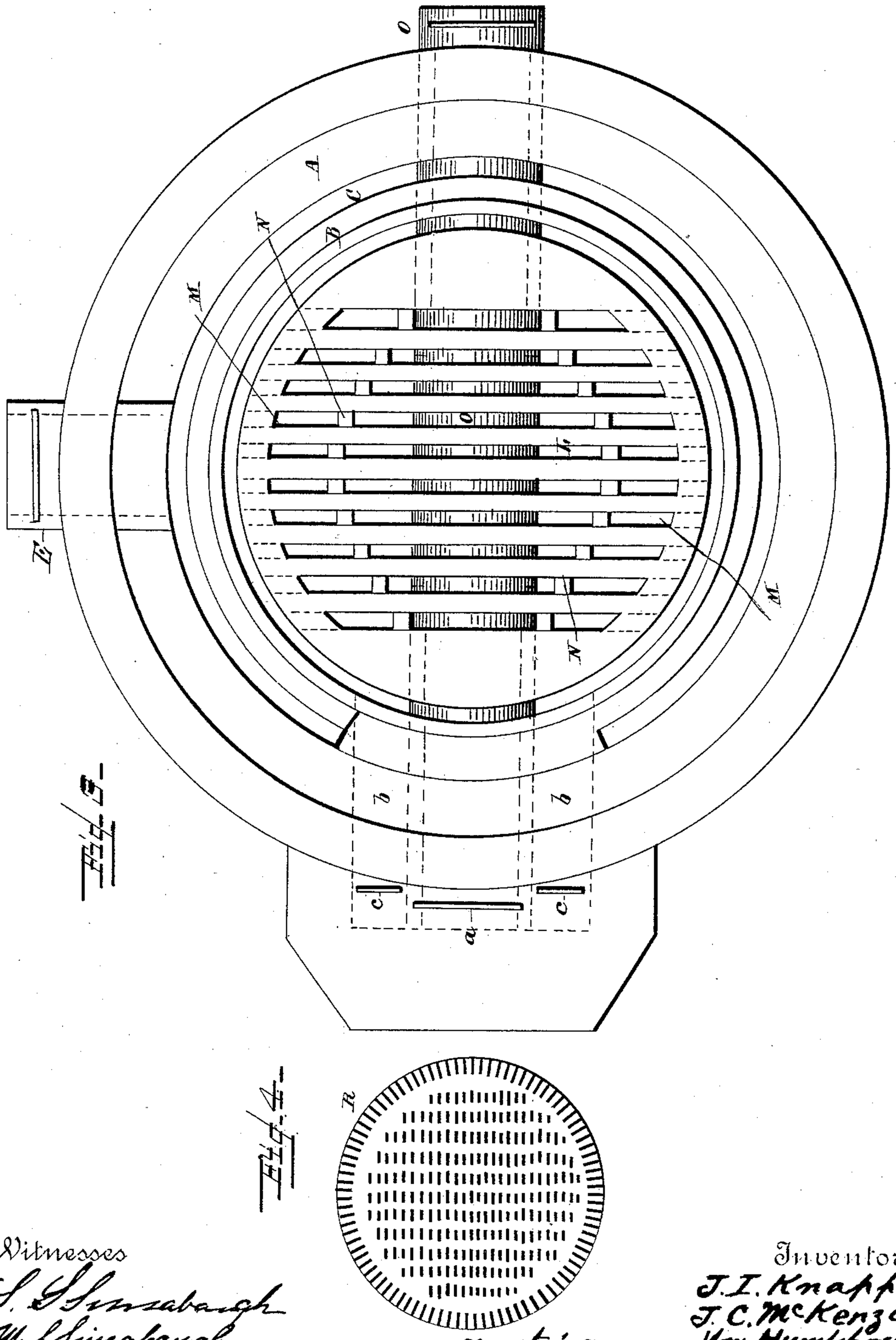

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UNITED STATES PATENT OFFICE.

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BRICK AND TILE KILN.

SPECIFICATION forming part of Letters Patent No. 348,916, dated September 7, 1886.

Application filed January 18, 1886. Serial No. 188,844. (No model.)

To all whom it may concern:

Be it known that we, JOHN I. KNAPP, JOSEPH C. McKENZIE, and WILLIAM HUMPHREY, citizens of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Brick and Tile Kilns, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to improvements in kilns for burning brick, tile, and other articles, and more particularly to that class known as "downdraft" kilns.

The object of our invention is to have the heat and products of combustion so under the control of the operator that the heat will be readily distributed to all parts of the kiln, or concentrated at a particular point in the kiln, if desired.

Our invention consists in connecting the furnaces with the interior of the kiln by means of fire bags or flues, by which the heat and products of combustion are carried up to the top of the kiln and mingled with hot air coming up through an open space between the outer and inner walls of the kiln, and in providing separate compartments or chambers below the floor of the kiln, which are controlled by suitable dampers, so that the heat can be directed to the center or sides of the kiln, as may be desired. Other novel features will be described more fully hereinafter.

Referring to the drawings, Figure 1 is a vertical longitudinal sectional view of our improved kiln. Fig. 2 is also a vertical longitudinal sectional view of a portion of two kilns joined by a flue, through which the waste heat of a newly-burned kiln is carried over to dry the brick or tile in the adjacent kiln. Fig. 3 is a top or plan view. Fig. 4 is a plan view of the supplemental floor.

A indicates the main body or outer wall of the kiln, which is built on a suitable foundation located below the ground level, and B is an inner wall, separated from the outer wall, A, by an intervening space, C, said inner wall being built up from the foundation, and entirely separated from the exterior wall, except at the top, where it joins the roof or arch D of the kiln, and suitable braces to prevent it from being pushed against the outer wall. The space or narrow chamber C is provided with suitable openings for the admission of air from the outside, or where several kilns are arranged together the chamber C is connected to the flue E, through which the waste heat from one kiln is brought over into the next kiln, and utilized to dry the brick in said kiln, and to mingle with the gases from the furnaces, and thus effect a complete combustion.

It will be understood that when the waste-heat is being transferred from one kiln to another through the flue E that the draft is reversed, and the heat is drawn upward through the kiln, enters the chamber or space C through the perforations F, and thence to the flue E, and enters the space C of the adjacent kiln, as shown in Fig. 2.

The chamber C is connected to or communicates with the burning-chamber of the kiln by means of a series of openings, F, near the top thereof, as will be more fully hereinafter described.

G are the furnaces, any desired number of which are located in the outer wall of the kiln, and extend through both walls of the kiln. These furnaces may be of any suitable kind, and communicate with the fire bags or chambers H, which direct the products of combustion upward and deposit or distribute them into the top of the burning-chamber, where they meet with the hot air coming through the perforations F from the hot-air space C, which on mingling with the gas from the furnaces effects a complete combustion.

I are air-flues located in the arches of the furnace, and communicate with the fire-bags, through which air is admitted to the fire-bags above the throat of the furnace. The fire-bags are provided with an offset, K, which forms the contracted throat of the furnace, and by which the gas from the fuel is compressed, so that when it passes the offset K and mingles with the air coming through the flues I the volume of gas and air will be expanded in the larger portions of the fire-bags.

The bottom of the kiln is divided into three separate chambers, located below the floor of

the kiln—the central chamber, L, and the two side chambers, M—the side chambers, M, being separated from the central chamber, L, by the dead or partition walls N, and extending around the outer edge of the perforated floor. The central chamber communicates with the arch or flue O through openings P, formed on each side of the arch or flue O, said flue O being provided with a valve or sliding door, *a*, by which the draft through the central portion of the kiln is regulated or entirely cut off. The arch or flue O extends clear through the bottom of the kiln and communicates with the smoke-stack Q. The side chambers communicate with the flue O by means of suitable ducts, *b*, which are controlled by suitable dampers or valves, *c*.

Suitable and numerous openings are formed in the bottom of the kiln, which form a connection between the kiln and the chambers L and M, and over this bottom is placed a supplemental bottom, R, which is provided with numerous perforations, and on which the bricks or tiles to be burned are placed, it being understood that the articles are placed in the kiln to leave spaces between, so that they will be subjected on all sides to the action of the calorific currents.

In operation the fires are lighted in the furnace G and the gases and flame find their way up through the fire-bags H and into the main body of the kiln at the top of the fire-bags. The hot air coming up through the chamber C is mingled with the products of combustion, and the same are ignited and consumed in the main body of the kiln, the flame passing down through the brick or tile and the waste products passing into the chambers L and M, and thence to the smoke-stack, as has been heretofore explained. If it is desired to carry the flame through the center of the kiln into the chamber L, the dampers or valves *c* are closed and the valve *a* opened. This closes the draft through the chambers M and draws the flames toward the center of the kiln. If, however, it is desired to direct the flame to the sides of the kiln, the damper or valve *a* is closed, which cuts off the draft through the central chamber, L, and the heat is directed to the sides of the kiln and into the chambers M, and from thence to the main flue or stack. It will be noticed that by this arrangement the operator is enabled to direct the flame to any portion of the kiln desired, and in this way a uniform burning of the articles is insured.

The most exposed portions of the kiln—such as the fire-bags and the inner wall, B—are made of fire-brick. The outer wall and portions not exposed to the flame may be made of common brick.

The kilns are provided with the usual doors or openings, through which they are filled and discharged.

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

1. A kiln for burning brick, tiles, &c., of the character described, having the separate chambers L and M, located below the perforated floor of the kiln, said chambers being connected to a common flue or arch, and each independently controlled by suitable dampers or valves, as set forth.

2. In a brick-kiln, the chambers M, located below the perforated floor and at the sides of the kiln, said chambers being connected to the main draft-flue by suitable ports or flues which are controlled by suitable dampers, as set forth.

3. In kilns for burning brick, tiles, &c., the furnaces located in the outer walls and communicating with the interior of the kiln by means of the fire-bags H, in combination with the air-space C, communicating with the interior of the kilns by means of the ports F, whereby the gases from the furnace are supplied with hot air to complete combustion, as set forth.

4. In a brick or tile kiln, the fire-bags H, provided with the offset K, forming a contracted throat at the rear of the furnace, as and for the purpose set forth.

5. In a brick or tile kiln of the character described, the flue E, joining the hot-air spaces C of two adjacent kilns, whereby the heat of one kiln is transferred to the other, as set forth.

JOHN I. KNAPP.
JOSEPH C. McKENZIE.
WILLIAM HUMPHREY.

In presence of—
R. B. ROBBINS,
L. R. BURR.