

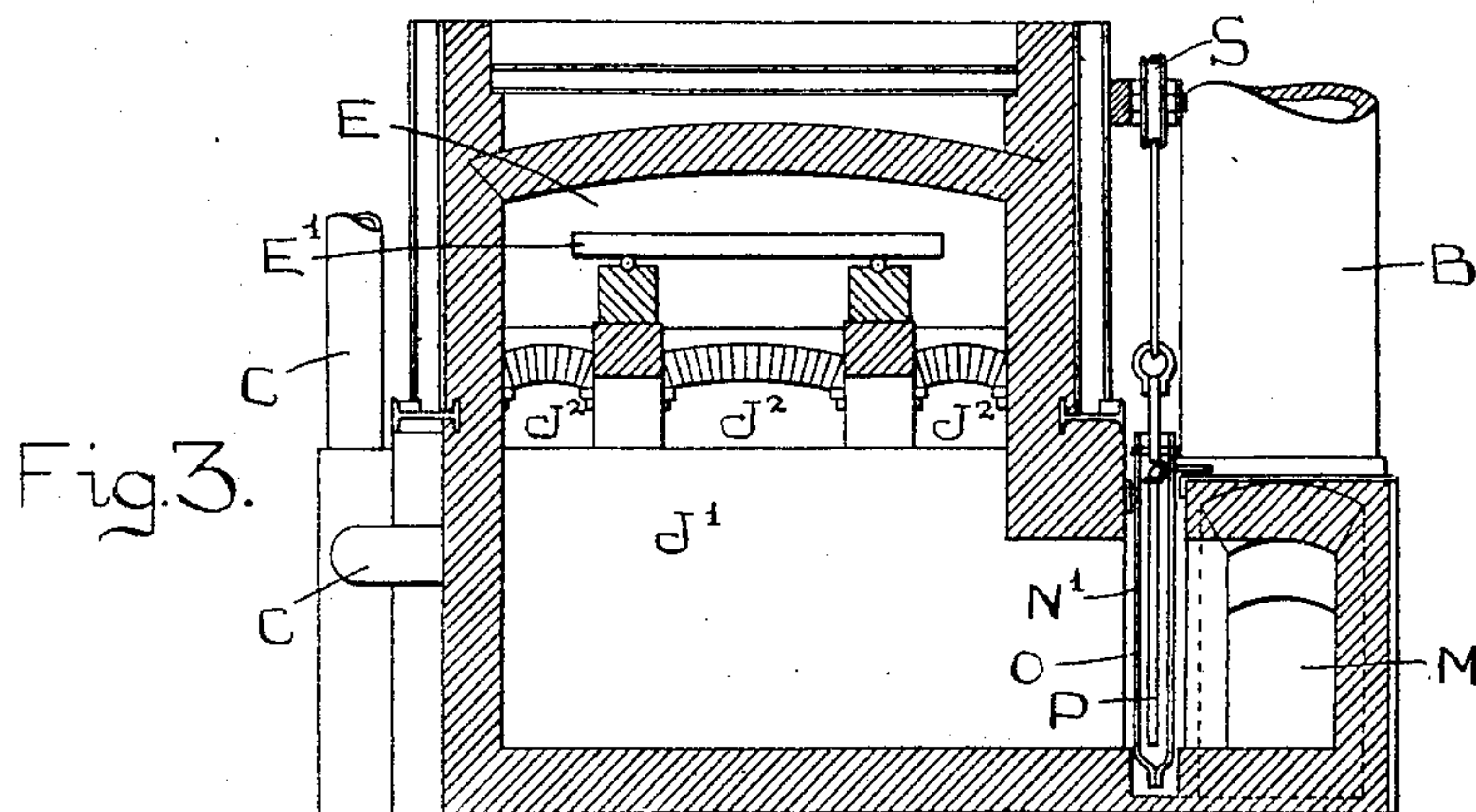
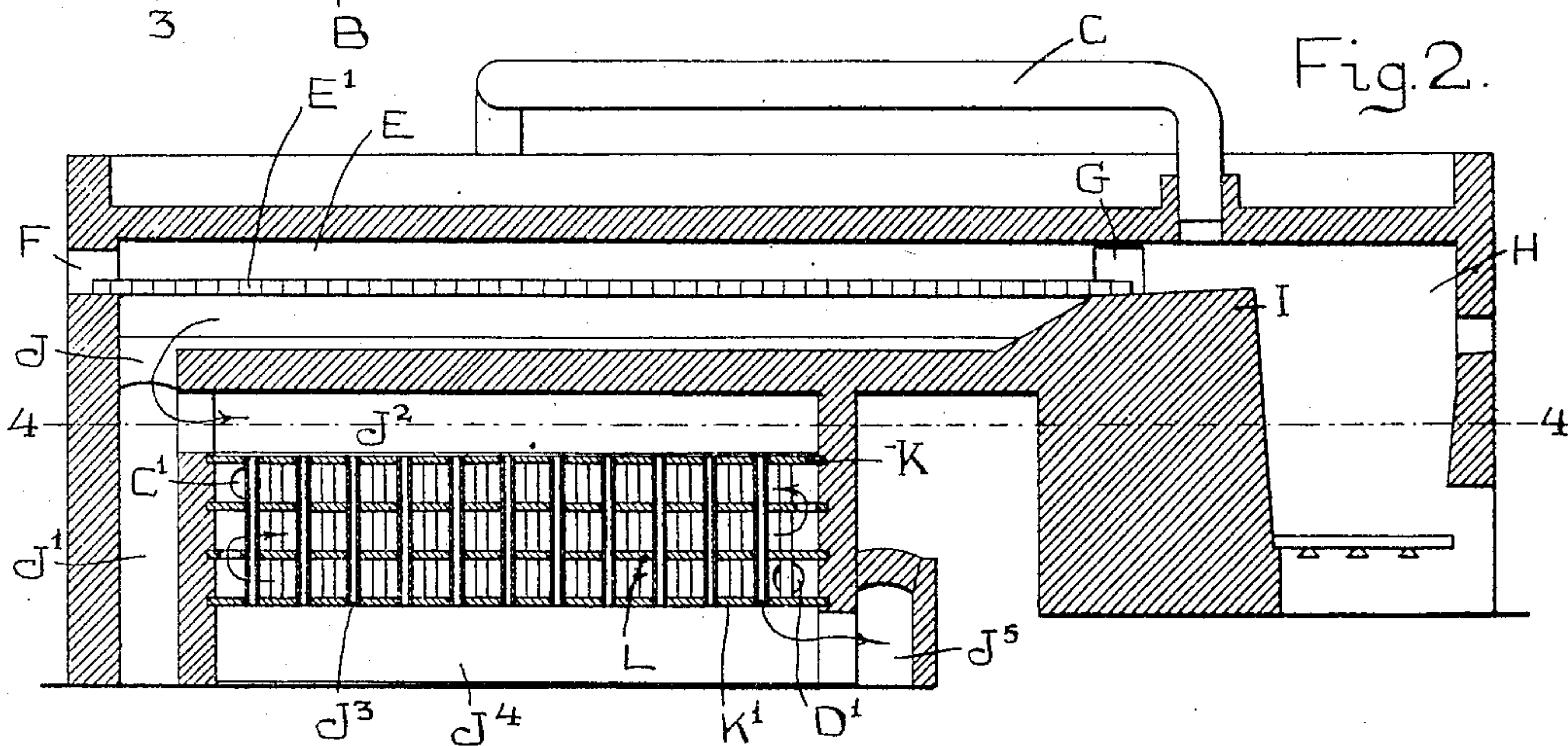
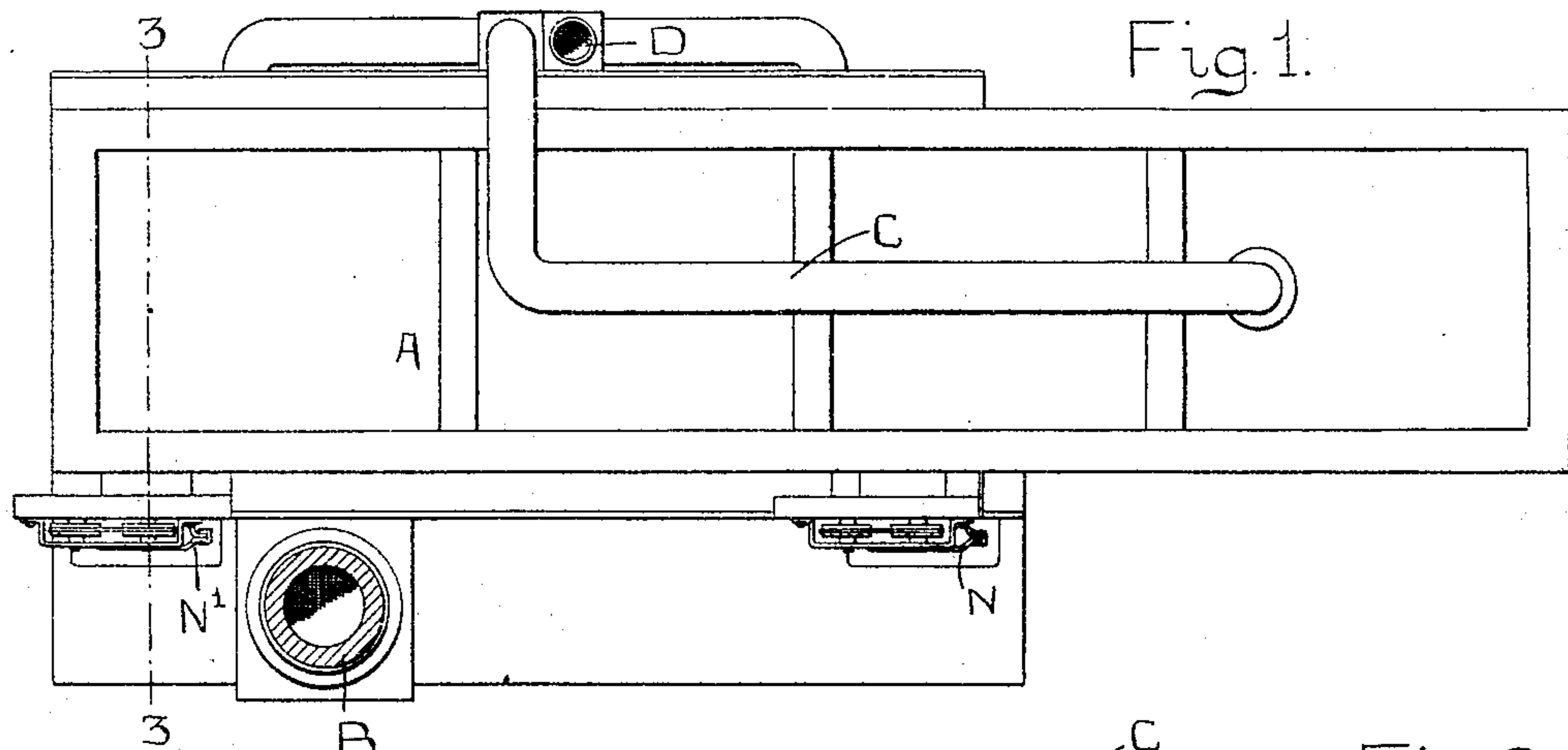
No. 779,412.

PATENTED JAN. 10, 1905.

E. H. CARROLL.  
FURNACE.

APPLICATION FILED MAY 23, 1901.

2 SHEETS—SHEET 1.



Witnesses

Roy D. Tolman.

*Penelope Comberbach.*

Inventor  
Elbert H. Carroll.  
By *Rufus B. Fowler*  
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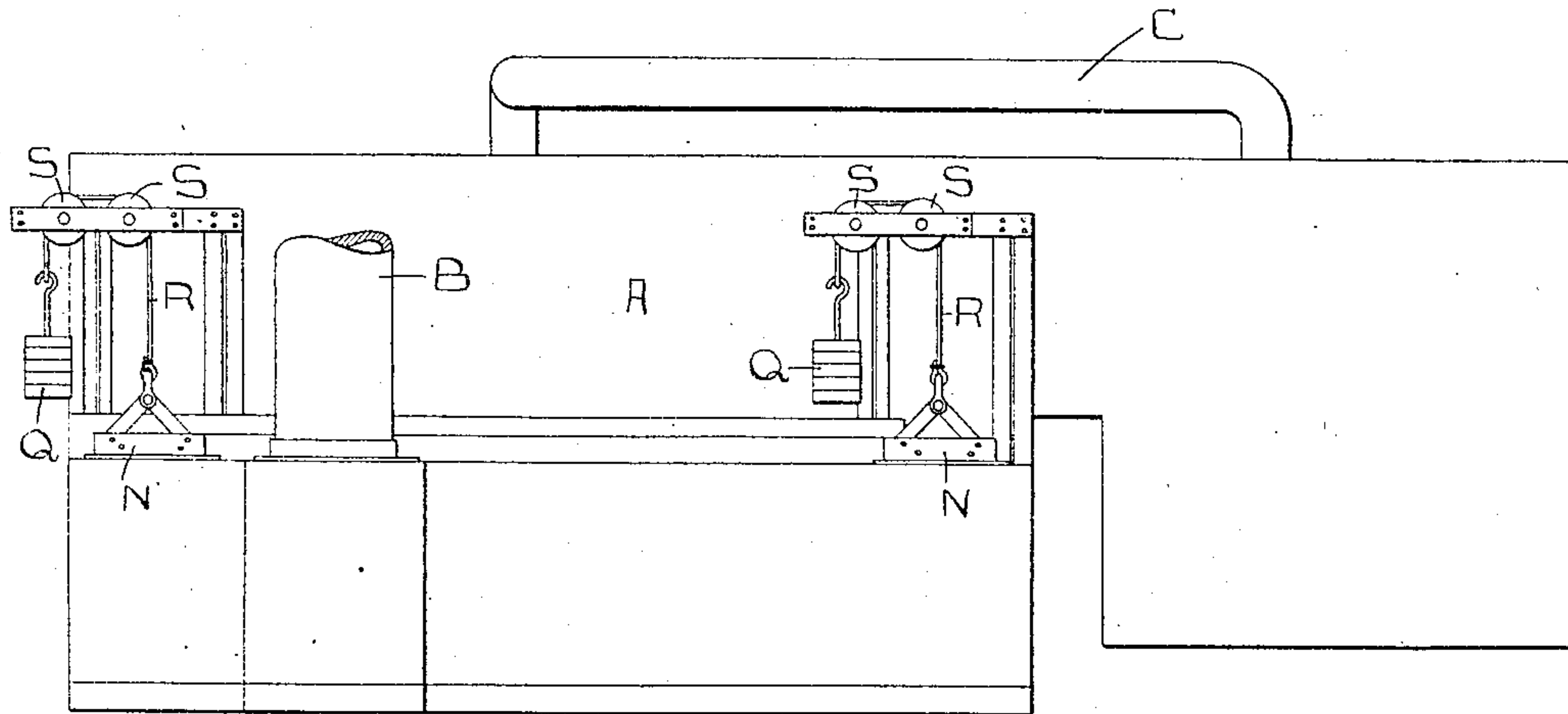
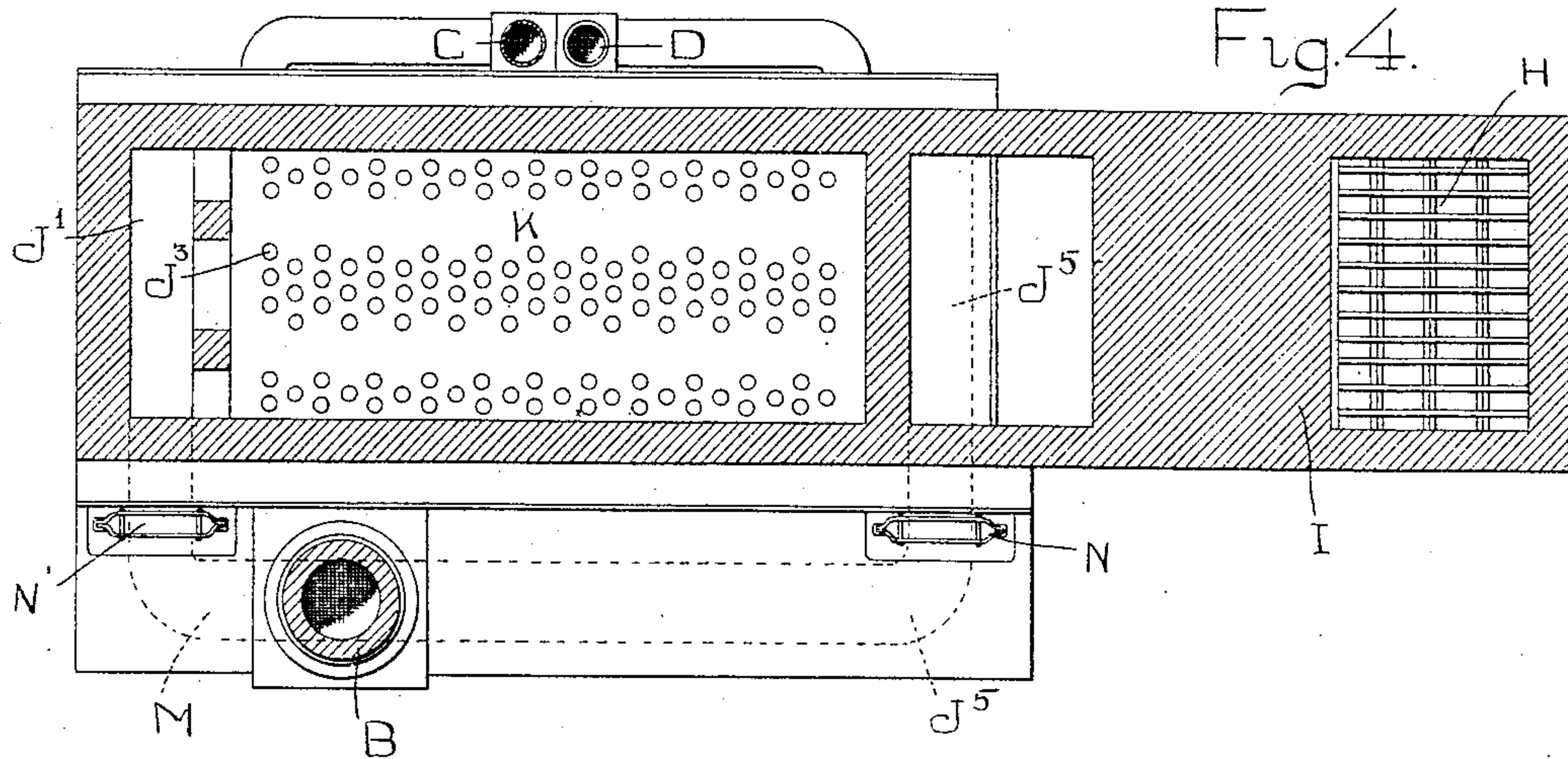
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2 SHEETS—SHEET 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

ELBERT H. CARROLL, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO  
MORGAN CONSTRUCTION COMPANY, OF WORCESTER, MASSACHU-  
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## FURNACE.

SPECIFICATION forming part of Letters Patent No. 779,412, dated January 10, 1905.

Application filed May 23, 1901. Serial No. 61,514.

*To all whom it may concern:*

Be it known that I, ELBERT H. CARROLL, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Furnaces, of which the following is a specification accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a plan view of a furnace embodying my invention. Fig. 2 is a central vertical sectional view. Fig. 3 is a vertical sectional view on line 3 3, Fig. 1. Fig. 4 is a plan view shown in section on the line 4 4, Fig. 2. Fig. 5 is a side elevation.

Similar reference-letters refer to similar parts in the different views.

My present invention relates to a furnace for heating billets, and particularly to that class of furnaces which comprise an air-heating oven or apparatus by which the air fed to the heating-chamber as a constituent part of the gaseous fuel is heated.

In the class of furnaces to which my invention relates the air-heating oven is interposed between the heating-chamber and the chimney or stack of the furnace and is heated by the products of combustion as they pass from the heating-chamber to the stack; and my invention consists in providing a supplemental flue or passage-way between the heating-chamber and the stack independently of the air-heating oven and in providing suitable gates or dampers for controlling the products of combustion in order to regulate the amount of heat imparted to the air-heating oven or to shut it off entirely therefrom, and thereby prevent the overheating of the oven whenever the admission of air to the oven is suspended.

In the following description and in the accompanying drawings I have represented a billet-heating furnace of a common and well-known type of construction and comprising an air-heating oven interposed between the heating-chamber and the stack, and the novel features of my construction are hereinafter described, and pointed out in the annexed claim.

In Fig. 1, A denotes the furnace; B, the chimney or stack; C, the pipe by which air is admitted from the oven to the heating-chamber, and D the opening or pipe by which air is forced into the air-heating oven, from which it passes through the pipe C to the heating-chamber of the furnace.

Referring to Fig. 2, E denotes the heating-chamber; F, an opening for the admission of billets; G, an opening for the delivery of the heated billets, and E' represents a row of billets supported upon piers or stacks within the heating-chamber. H denotes a furnace from which gaseous fuel intermingled with air supplied by the pipe C passes over the bridge I to the heating-chamber E. The products of combustion escape from the heating-chamber through the downward flues or openings J into a chamber J', placed beneath the charging end of the furnace and transversely thereto, from which they pass into a space J<sup>2</sup> above the oven and through tubular flues J<sup>3</sup> to a space J<sup>4</sup> below the oven and from the space J<sup>4</sup> through the passage J<sup>5</sup> to the stack. The space between the plates K K' and around the tubular flues J<sup>3</sup> constitutes the air-heating oven L, which is heated by the passage of the products of combustion through the flues J<sup>3</sup>. The pipe D, the open end of which is shown in Figs. 1 and 4, enters at its opposite end the side of the oven L and near the bottom at the position indicated by the circular line D', Fig. 2, to admit air to be heated, and the pipe C, one end of which enters the heating-chamber, also enters at its opposite end the oven L near its top to take the heated air from the oven to the heating-chamber, as shown at C', Fig. 2. The chamber J' also communicates at its lower end by a passage M with the stack B, and the passages M and J<sup>5</sup> are entirely or partially closed at will by means of the vertically-sliding gates N N', so that the products of combustion may be diverted at will either through the tubular flues J<sup>3</sup> and passage J<sup>5</sup> to the stack or through the direct passage M. Any suitable gates or dampers may be employed for closing the passages J<sup>5</sup> and M; but in the draw-



ings I have represented what I consider the preferable method of accomplishing this result by providing pockets or recesses adapted to receive vertically-sliding gates consisting of shells to be supplied with a current of water to prevent the undue heating of the gate. One of these pockets or recesses, with its inclosed gate, is shown at O, Fig. 3, having a pipe P extending to the bottom of the gate. In the construction shown in the accompanying drawings the gates N N' are counterbalanced by weights Q, which are suspended by cables or chains R, attached to the gates and passing over pulleys S S.

During the operation of the furnace and while a current of air is passing through the pipe D, oven L, and pipe C to the heating-chamber the gate N' is lowered, thereby closing the passage M and causing the heated products of combustion to pass through the space J<sup>2</sup> downward through the tubular flues J<sup>3</sup> into the space J<sup>4</sup> beneath the oven and thence through the passage J<sup>5</sup> to the stack. If, however, for any reason the supply of air to the oven L is shut off, the passage J<sup>5</sup> is closed and the passage M opened, thereby diverting the heated current through the passage M and preventing the injury to the oven arising from undue heating. By partially

closing the gates N N' the heat imparted to the oven L may be regulated and the heating of the air-current through the pipe C varied or the oven maintained at any desired degree of heat.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination with the heating-chamber of a furnace, of two chambers placed one above the other, an air-heating oven placed between said chambers, flues passing through said oven and connecting said chambers, an escape-flue, a passage for the products of combustion leading from one end of the heating-chamber to said escape-flue and communicating with the upper of said chambers, a second passage for the products of combustion leading from the lower of said chambers to the escape-flue, means for closing each of said passages to the escape-flue, means for admitting air to the lower part of said oven, and a pipe leading from the upper portion of said oven to said heating-chamber, substantially as described.

Dated this 20th day of May, 1901.

ELBERT H. CARROLL.

Witnesses:

E. LINELL,  
T. H. NYE.