

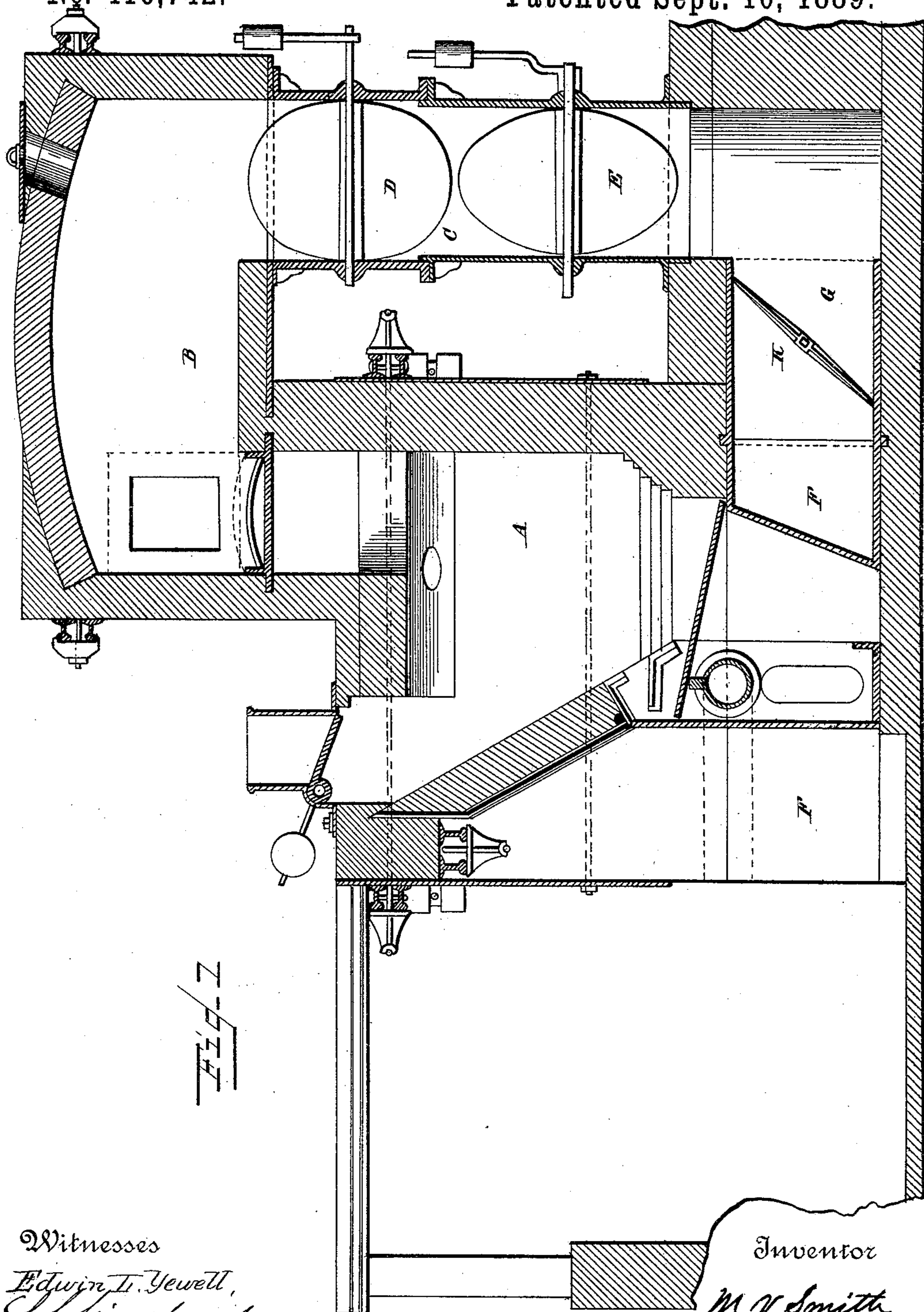
(No Model.)

4 Sheets—Sheet 1.

M. V. SMITH.
POT FURNACE.

No. 410,742.

Patented Sept. 10, 1889.



Witnesses
Edwin T. Yewell,
S. J. Simsbach

By his Attorney

Inventor

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S. J. Simsbach

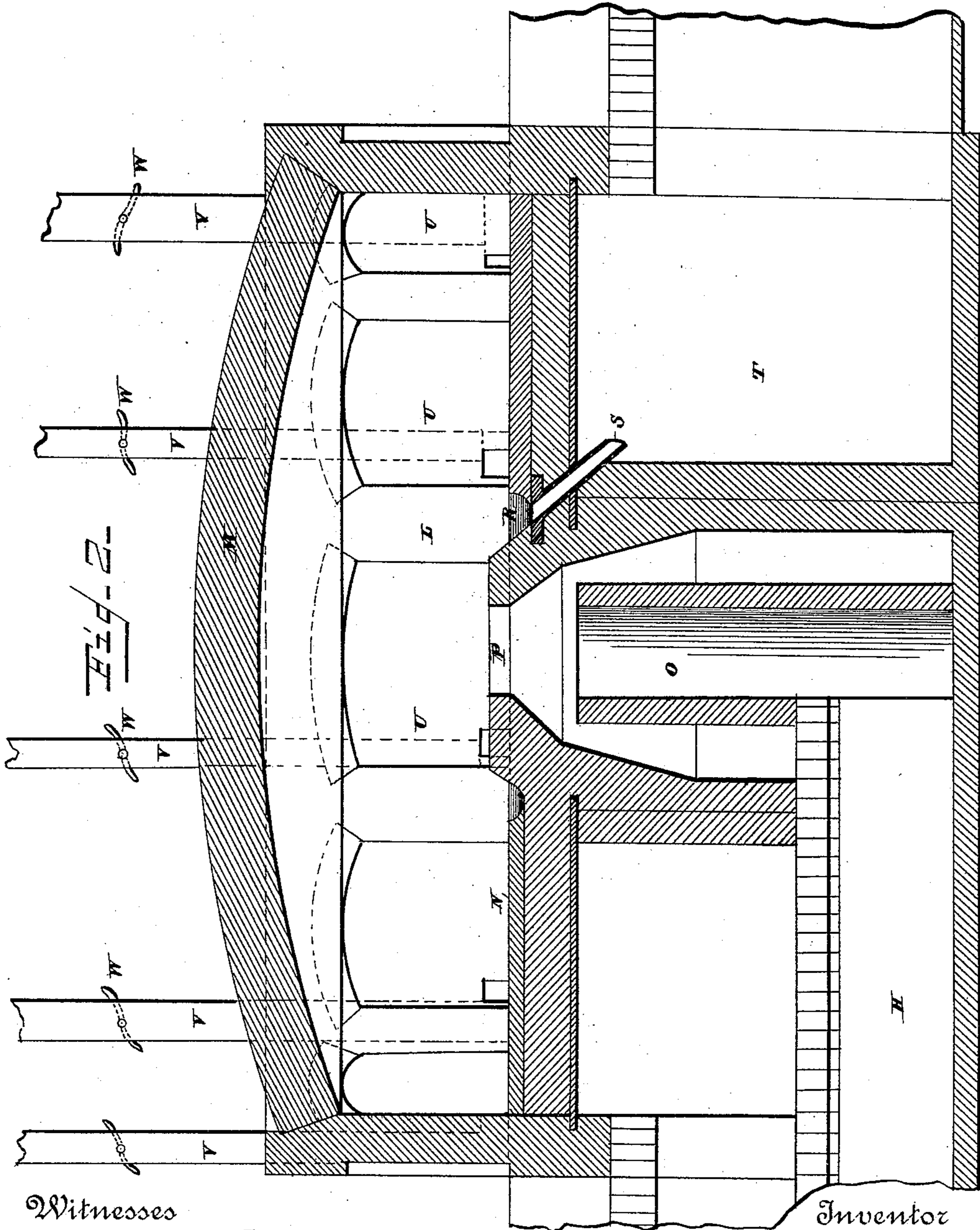
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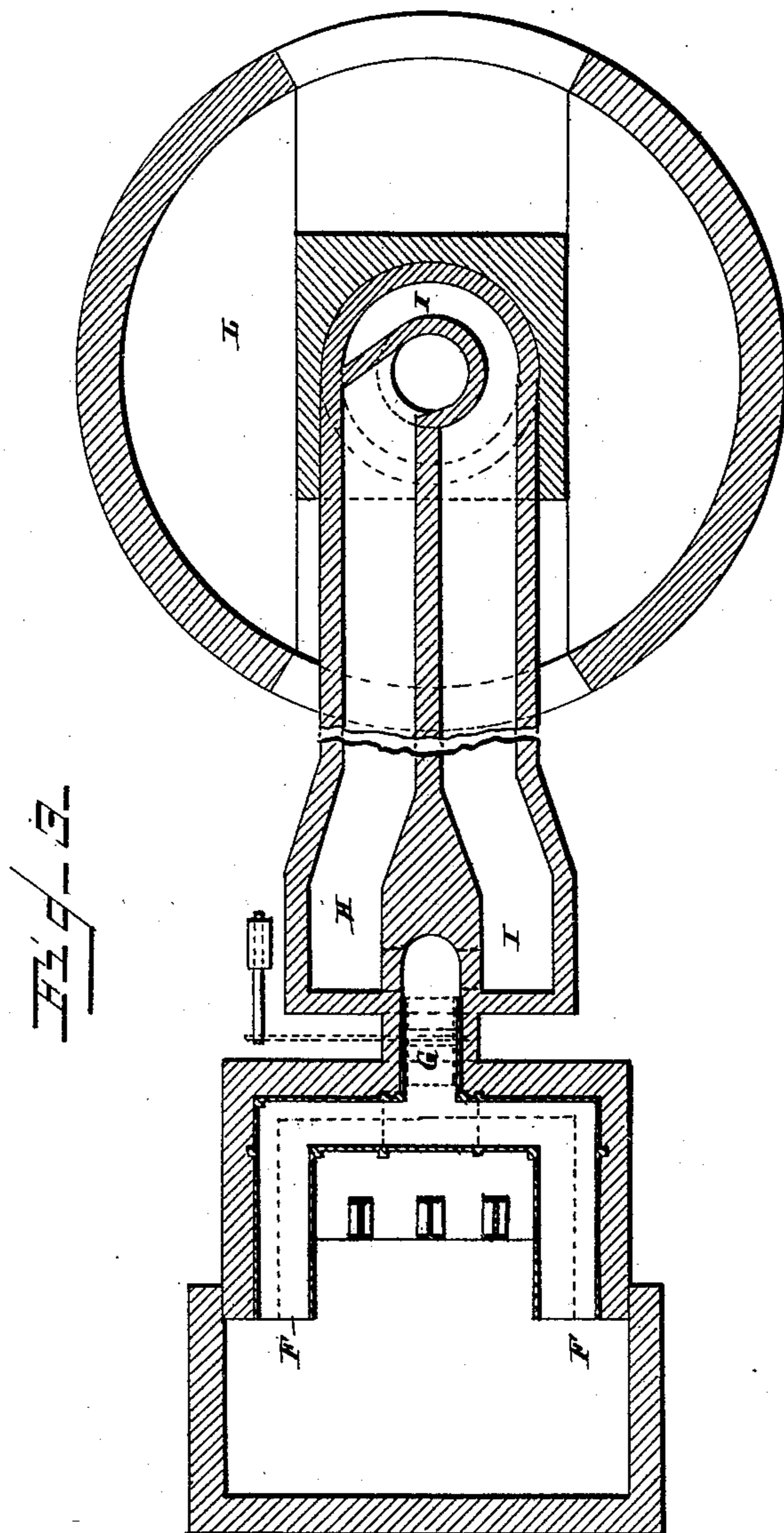
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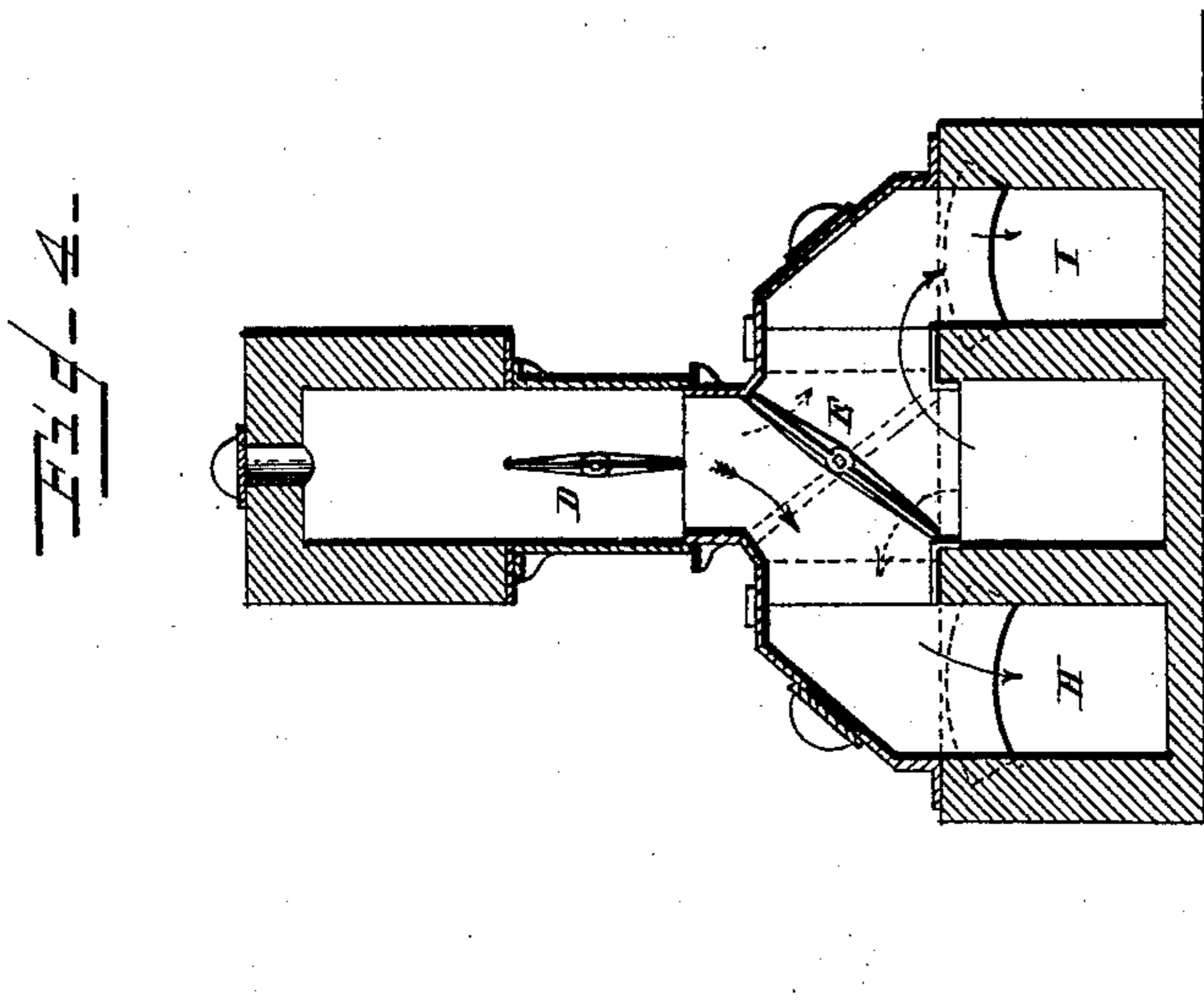
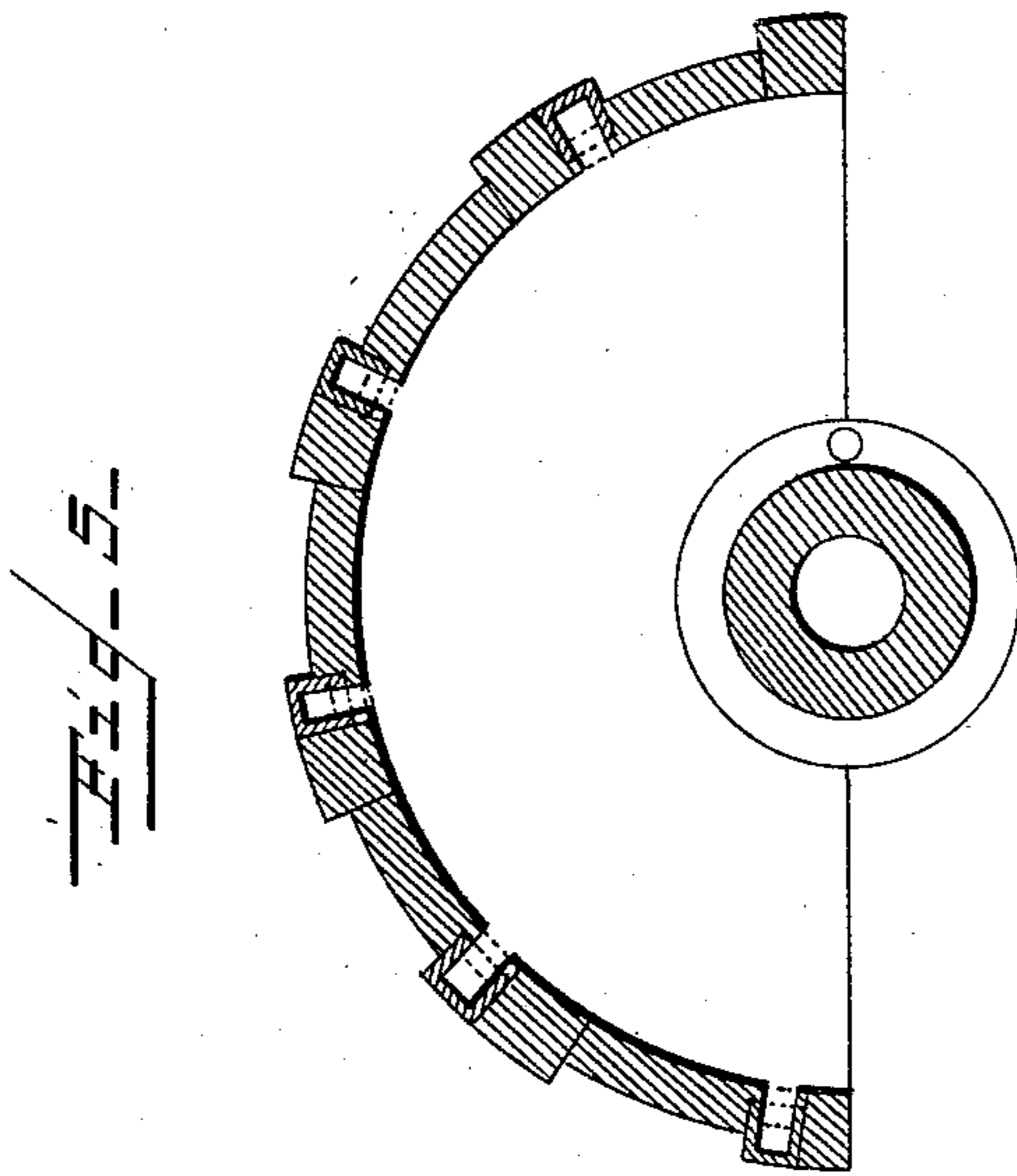
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No. 410,742.

Patented Sept. 10, 1889.



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UNITED STATES PATENT OFFICE.

MARTIN V. SMITH, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO THE CALUMET FIRE CLAY COMPANY, OF CALUMET, OHIO.

POT-FURNACE.

SPECIFICATION forming part of Letters Patent No. 410,742, dated September 10, 1889.

Application filed April 15, 1887. Serial No. 234,955. (No model.)

To all whom it may concern:

Be it known that I, MARTIN V. SMITH, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pot-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in gas-furnaces for metallurgical and other purposes.

The object of my invention is to produce a gas-furnace which will be comparatively cheap in construction and effective in operation.

My invention consists in leading the gas from the producers and the air through ducts or flues parallel with each other, which unite in the nozzle or combustion-chamber of the furnace, said flues being provided with a valve by which the gas and air can be changed from one flue to the other.

It further consists in providing the gas-producer with metallic air-tubes, forming the side or sides and end walls of the ash-pit, whereby the air is heated by the waste heat from the fire and the ashes which lie against it.

Other novel features of my invention will be described hereinafter, and pointed out in the claims.

Figure 1 is a longitudinal sectional view of the gas-producer. Fig. 2 is a sectional view of the combustion or melting chamber. Fig. 3 is a horizontal sectional view of the producer and melting-chamber, with the gas and air flues leading from the producer to the melting or combustion chamber. Fig. 4 is a sectional view through the front of the flues and the reversing-valves. Fig. 5 is a horizontal sectional view of a portion of the hearth of the melting or working chamber.

A indicates the producer, which is essentially of the same construction described and claimed in the patent granted to me August 3, 1886, No. 346,781, and need not be further referred to at this time.

B is a gas-chamber leading from the producer A to the gas-flue C, in which is located the valve D, which controls the amount or

volume of gas to be admitted through the flues to the combustion-chamber.

E is a reversing-valve located in the flue C below the valve D, by which the flow or supply of air and gas is changed from one flue to the other, as will more fully appear.

F is a cast-iron box or chamber placed around the sides and rear end of the ash-pit, or on which the walls of the producer may be built or supported, the front ends of said cast-iron box being left open, so that the air will readily pass thereinto. The air in its passage through the box or flue F is heated by the waste heat from the fire and the heat contained in the ashes which lie alongside of it, so that it will be in proper condition to effect a complete combustion when brought in contact with the gas in the combustion-chamber, and when the direction of the gas and air is changed from one flue to another the hot air will serve to burn out the soot and bitumen deposited by the gas in its passage through this flue.

G is a short flue connecting with the central portion of the air-heating box, and extends back to a point where it communicates with lateral flues entering the flues H and I, as shown in Fig. 3.

K is a valve located in the short flue G, by which the proper amount of air is admitted to the combustion-chamber to effect a complete combustion of the gases.

L is the melting or combustion chamber, which may be of any suitable form or size; but by preference it is made of circular form with the usual arch or crown M, and a hearth N, on which the pots or crucibles are placed, or it may be used as the ordinary melting-hearth. As heretofore stated, the combustion-chamber communicates with the producer through the flues H and I, said flues terminating in the center of the combustion-chamber, the flue H terminating in the vertical flue O, while the flue I surrounds the flue O and terminates at the point of combustion or nozzle of the furnace P.

The operation of this portion of my invention is as follows: The gas-valve D being opened, the gas enters the flue H and is conducted to the vertical flue O, while that of

the air-valve K is opened for the purpose of admitting the air under the reversing-valve E, which passes into the flue I and is conducted to the point of combustion in the melting-chamber. The air and gas pass through the flues H and I and come together at the upper end of the flue O, where combustion takes place.

The object of placing the reversing-valve E over the flues leading to the combustion-chamber is for the purpose of changing the direction of the air and gas through the respective flues—*i. e.*, after passing the gas through the flue H from one to four hours, considerable soot, tar, and bituminous matter are deposited in the flue; but by reversing the valve E and taking the gas through the flue I the soot and bituminous matter are burned out. After the furnace has run for a few hours the valve E is again reversed and the currents of air and gas are again changed, thus bringing the air into the flue through which the gas had passed previous to reversing and the gas into the flue through which the air had passed previous to reversing.

The combustion-chamber P of the furnace is built up somewhat above the hearth of the furnace, so as to form a nozzle or contracted portion, as shown in Fig. 2, and around this raised portion is formed a gutter R, in which the spout S is placed, so that if one of the pots or crucible should break, the molten material will run down into the gutter R and through the spout S into the pit T underneath the working-hearth, and not down into the nozzle or combustion-chamber P, as would be the case if not intercepted by the gutter R.

The walls surrounding the working-hearth are provided with flues U, (shown in dotted lines in Fig. 2,) which lead up through the crown or top of the furnace, on top of which are placed suitable stacks or chimneys V. Each of these stacks or chimneys is provided with a damper W for shutting off the draft from that part of the working-hearth, so that the

heat can be increased or diminished at a certain point by opening or closing the damper.

Having now described my invention, I claim—

1. The combination, with a pot-furnace and a gas-producer, of the parallel flues having outlets at the center of the furnace and communicating with the producer at the other end and the external air, one of said flues terminating at the furnace end in a vertical flue, and the other one of said parallel flues terminating in an annular chamber surrounding the vertical flue, and a reversing-valve constructed and arranged to change the gas and air from one flue to the other, as set forth.

2. The combination, with a pot-furnace and producer, of parallel flues communicating at one end with the producer and having outlets at the center of the furnace, air and gas supply tubes communicating with both of said parallel flues, and a reversing-valve constructed and arranged to cause the current of gas and air to be directed through either of the parallel flues at will, substantially as described.

3. In a pot-furnace, the combination of the parallel flues to communicate with the producer, one of said parallel flues terminating in a vertical flue and the other in an annular chamber surrounding the vertical flue, and said vertical flue and chamber uniting in the nozzle of the combustion-chamber in the center of the working-hearth, the air-flue with its regulating-valve, and the gas-flue with its regulating-valve, and a reversing-valve for changing the air and gas from one flue to the other, substantially as described.

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

MARTIN V. SMITH.

Witnesses:

C. M. HAGEN,
JAMES M. CHRISTY.