

P. L. WEIMER.
Modes and Apparatus for Utilizing Waste Gases.
 No. 148,531. Patented March 10, 1874.

Fig. 1.

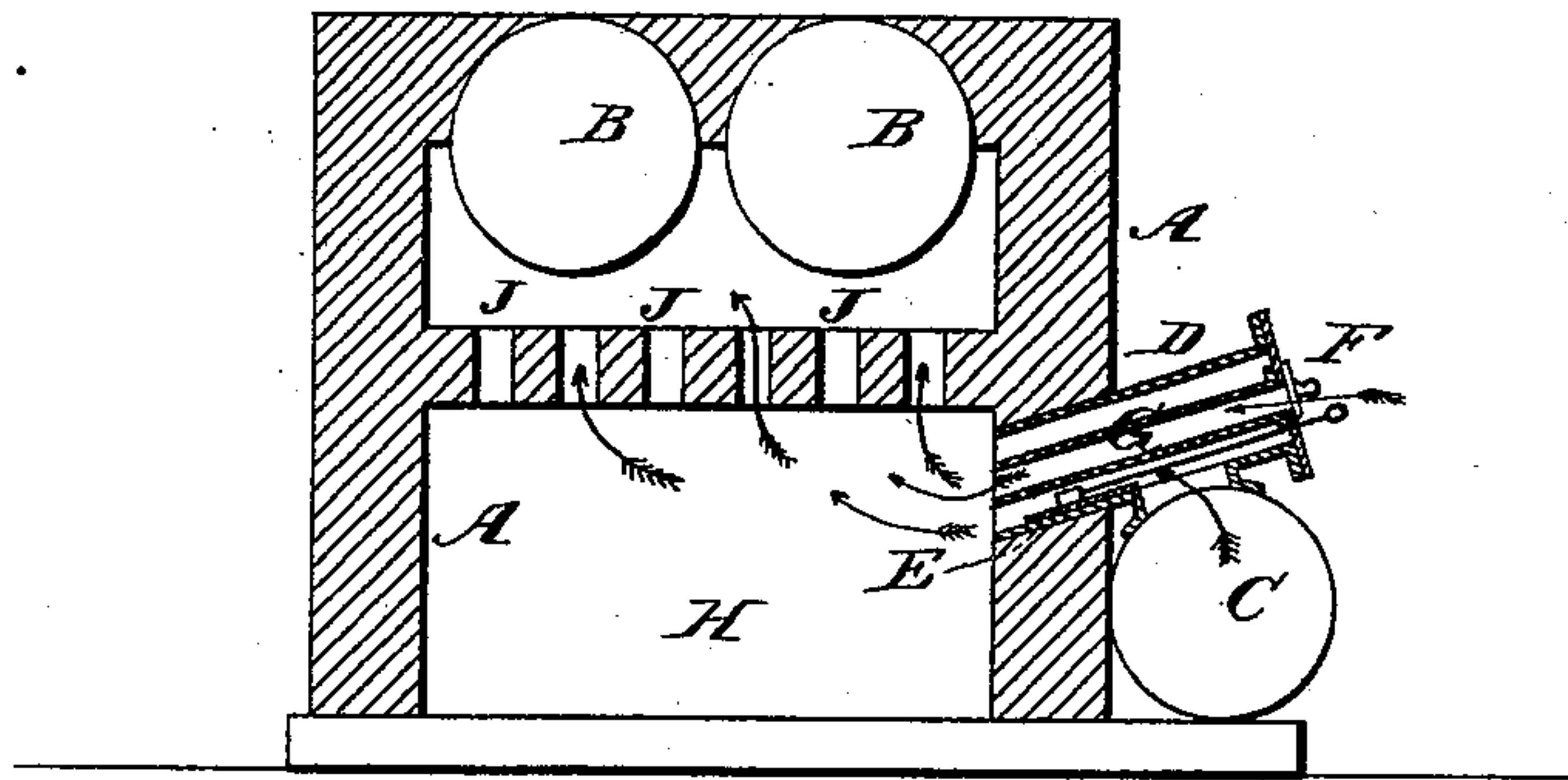


Fig. 2.

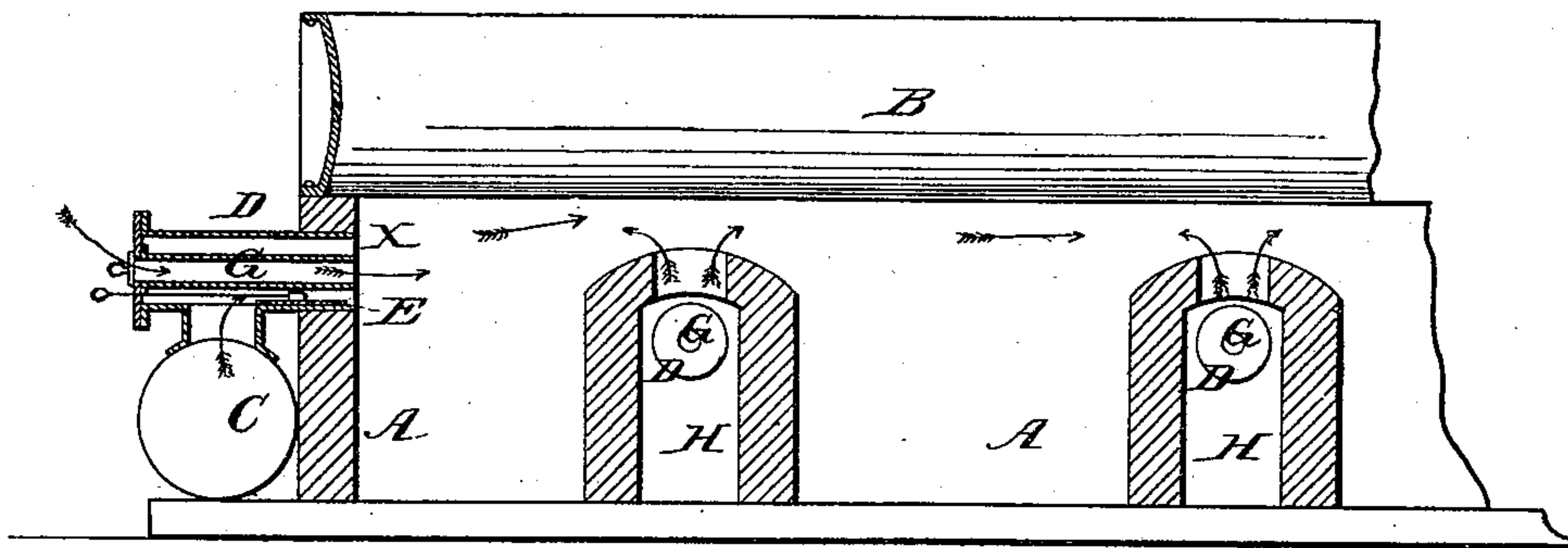
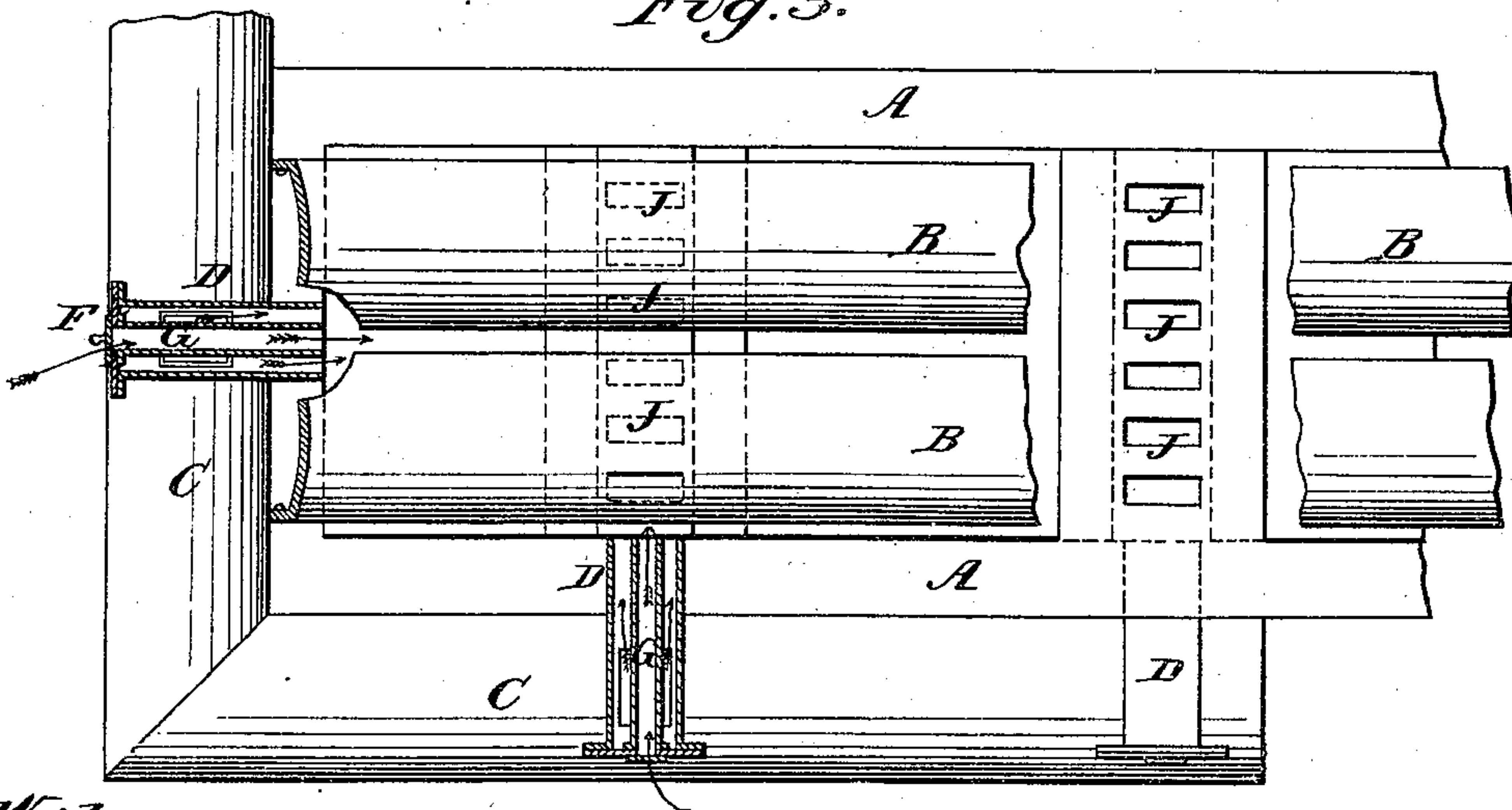


Fig. 3.



Witnesses.

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Inventor:

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Fig. 4.

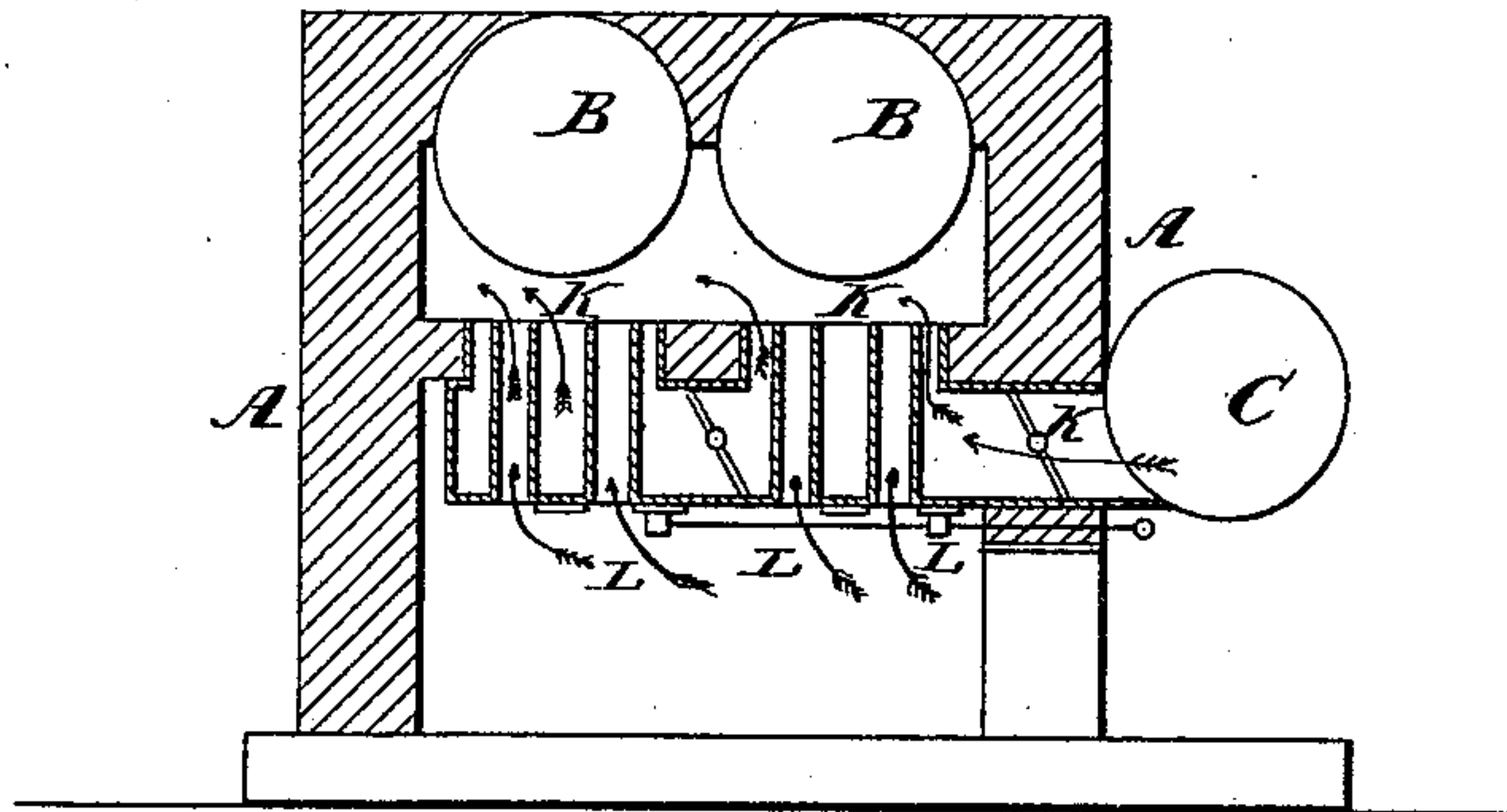


Fig. 5.

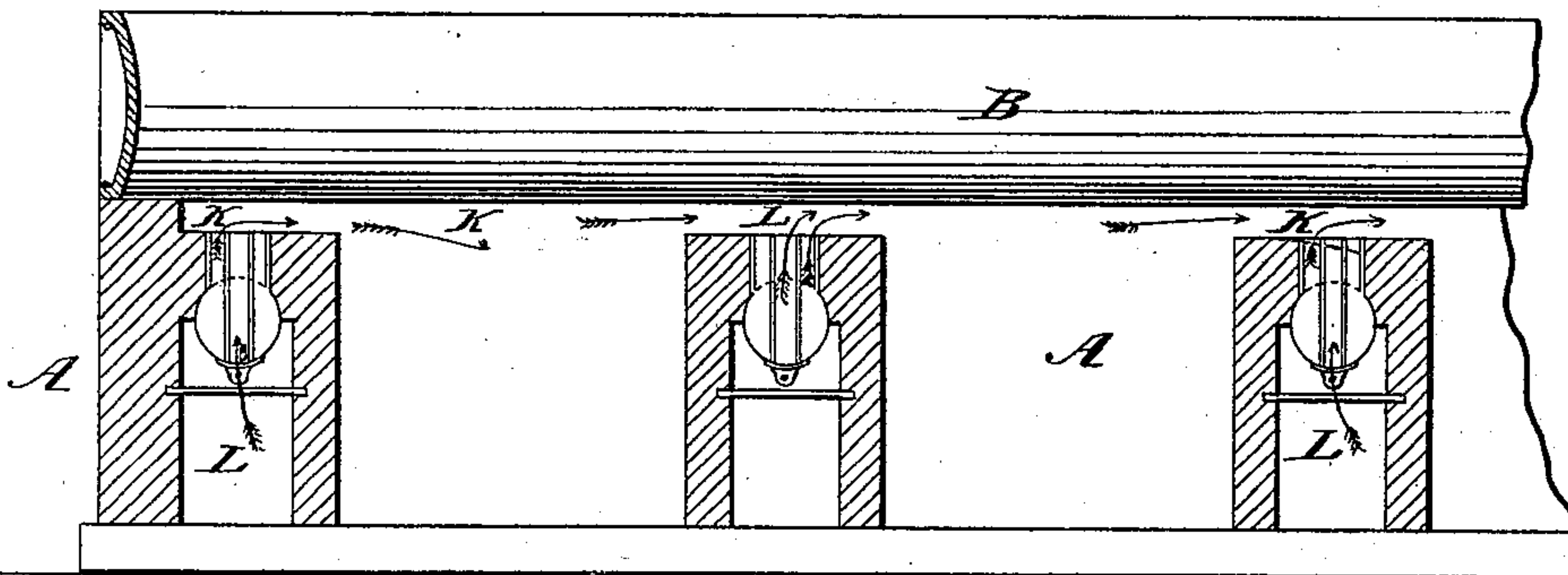
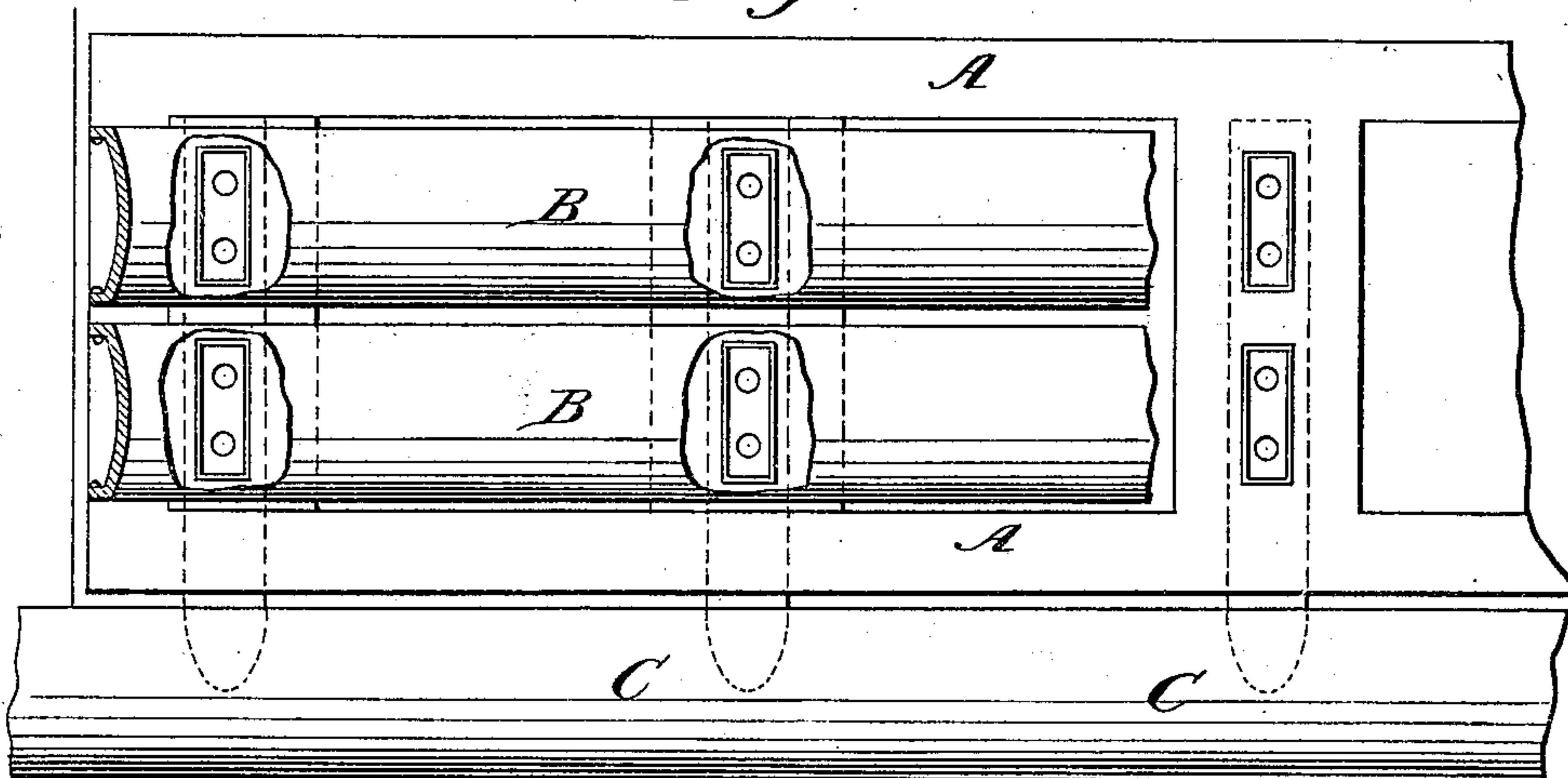


Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

IMPROVEMENT IN THE MODES AND APPARATUS FOR UTILIZING WASTE GASES.

Specification forming part of Letters Patent No. **148,531**, dated March 10, 1874; application filed December 10, 1873.

To all whom it may concern:

Be it known that I, PETER L. WEIMER, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented new and useful Improvements in Mode of and Apparatus for Utilizing the Waste Gases from Iron-Smelting Furnaces, for the generation of steam, of which the following is a specification:

The invention has for its object the more thorough and economical combustion of the waste gases from iron-smelting furnaces, when such gases are used for generating steam. It is now a common practice to introduce such gases under one end of the boiler by means of a jet or burner; but coming, as they do, in contact with the comparatively cool surface of the boiler, a very imperfect combustion takes place, and a portion of the gases are cooled so rapidly that they pass off without igniting. My invention consists in introducing only a portion of the gases at the front end of the boiler, and introducing the remainder at one or more points between the front and rear of the same, thereby causing such gases as are not ignited or consumed to pass over freshly-ignited or highly-heated gases introduced at later points, whereby a thorough combustion of all the gases is obtained. The invention also consists in peculiar construction and arrangement of chambers under the boiler in which the gases are consumed, and from which the resultant highly-heated vapors pass up in contact with the boiler.

Figure 1 is a cross-section of my apparatus; Fig. 2, a longitudinal vertical section of the same; and Fig. 3, a ground-plan view thereof. Fig. 4 is a cross-section of a modified form of the apparatus; Fig. 5, a longitudinal vertical section of the same; and Fig. 6, a ground-plan view.

A represents the wall or masonry in which the boilers are set. B B are the steam-boilers, of which, in the present instance, there are two, arranged side by side. C is the gas flue or conduit by which the waste gases from the tunnel-head of an iron-smelting furnace are brought to the boilers. D D are ordinary tubular burners, conducting the gases from the flue C under the boiler. Of these burners, there is one at the front end, X, of the boiler as usual, and one or more at suita-

ble points between the front and rear ends of the boiler. Each one is provided with a sliding valve or gate, E, by means of which the flow of gas from the flue or conduit is controlled. Each burner is also provided with an inside tube, G, which permits atmospheric air to enter and mingle with the gases as they escape from the burner. These air-tubes are each provided with a valve or register, F, to control the admission of air. H H are fire-brick chambers, built transversely under the boiler opposite the rear burners D, so that the mingled gases and air issue from the burners into said chambers. Each chamber is provided at the top with numerous openings, J, through which the heated vapors and products of combustion escape.

The operation of the above apparatus, having its flue C connected with the tunnel-head of a smelting-furnace, is as follows: When the blast is introduced into the furnace, there results from the combustion therein a combination of several incombustible gases, which pass off through the flue C, and escape through the burners D under the boilers B. As the gases escape from the burners they meet and mingle with the atmospheric air entering through the tubes G, the result of which is the production of a highly inflammable compound, which instantly ignites and burns with great intensity. As a result of the combustion the brick chambers H are in a very short time raised to a white heat. The highly-heated vapors and products of combustion pass up through the openings J, and come in contact with the surface of the boilers B. The gases and air discharged from the burner at the front end of the boiler, where there is no chamber H, ignite directly under and in contact with the boiler, but the comparatively cool surface of the latter cools them so rapidly that a large portion passes off unconsumed. These unconsumed gases, however, in passing backward encounter the highly-heated gases or vapors escaping from the openings J, in the chambers H, by which their temperature is raised, and they are ignited and entirely consumed. It will thus be seen that, by introducing the gases at several points under the boiler, and conducting the unconsumed portions from one point over the highly-heated or burning portions at a later

point, I am enabled to consume them all. There may be any desired number of the chambers H, at suitable intervals, under the boilers, the number being controlled by the length of the boilers, and other circumstances.

It is obvious that the form and size of the chambers may be varied, as experience may dictate, and also that it is quite immaterial what form and construction of burner is used, provided they mingle the gases and air, and answer the other requirements.

In the modified form of the apparatus shown on sheet 2 of the drawings, the chambers H are dispensed with, the burners arranged vertically below the boilers, and the combustion carried on in direct contact with the boilers.

The burners differ in form, but are the same in principle and operation as those used in the first form of apparatus.

This modified form of apparatus, while answering a very good purpose, is not as satisfactory as that in which the chambers are used.

Having thus described my invention, what I claim is—

1. The method of generating steam by the waste gases from smelting-furnaces, by introducing the gases at different points under the

boiler, in such manner that the unconsumed portions from one point are brought in contact with the highly-heated or burning portions at another point, by means substantially such as herein shown and described.

2. In combination with a steam boiler, B, and a flue, C, connected with a smelting-furnace, burners B, located one at or near the front end of the boiler, and the others at proper points between the front and rear ends of the same, as shown and described.

3. In combination with a steam-boiler, B, and a flue, C, connected with a smelting-furnace, a burner, D, at or near the front end of the boiler, and one or more combustion-chambers, H, located at suitable points in rear of the burner D, and supplied with gas from the said flue.

4. The fire-brick chambers H located under the boiler, and provided with openings J, in combination with the gas-burners D, or their equivalents, so arranged that the combustion takes place within the chambers, as set forth.

PETER L. WEIMER.

Witnesses:

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A. JEREMIAH STRIGER.