

No. 617,646.

Patented Jan. 10, 1899.

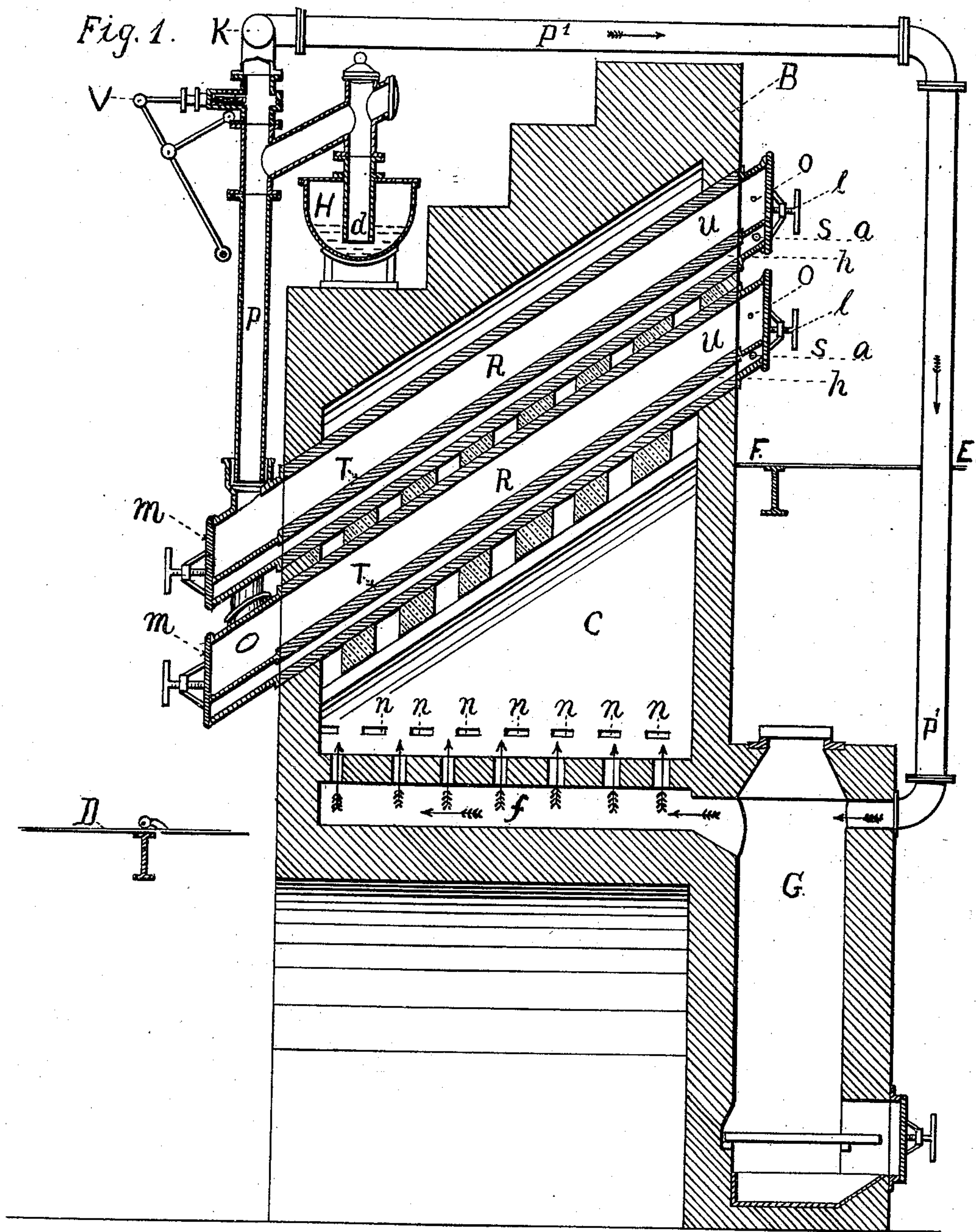
F. EGNER.

APPARATUS FOR MANUFACTURING GAS.

(Application filed July 11, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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Fig. 2.

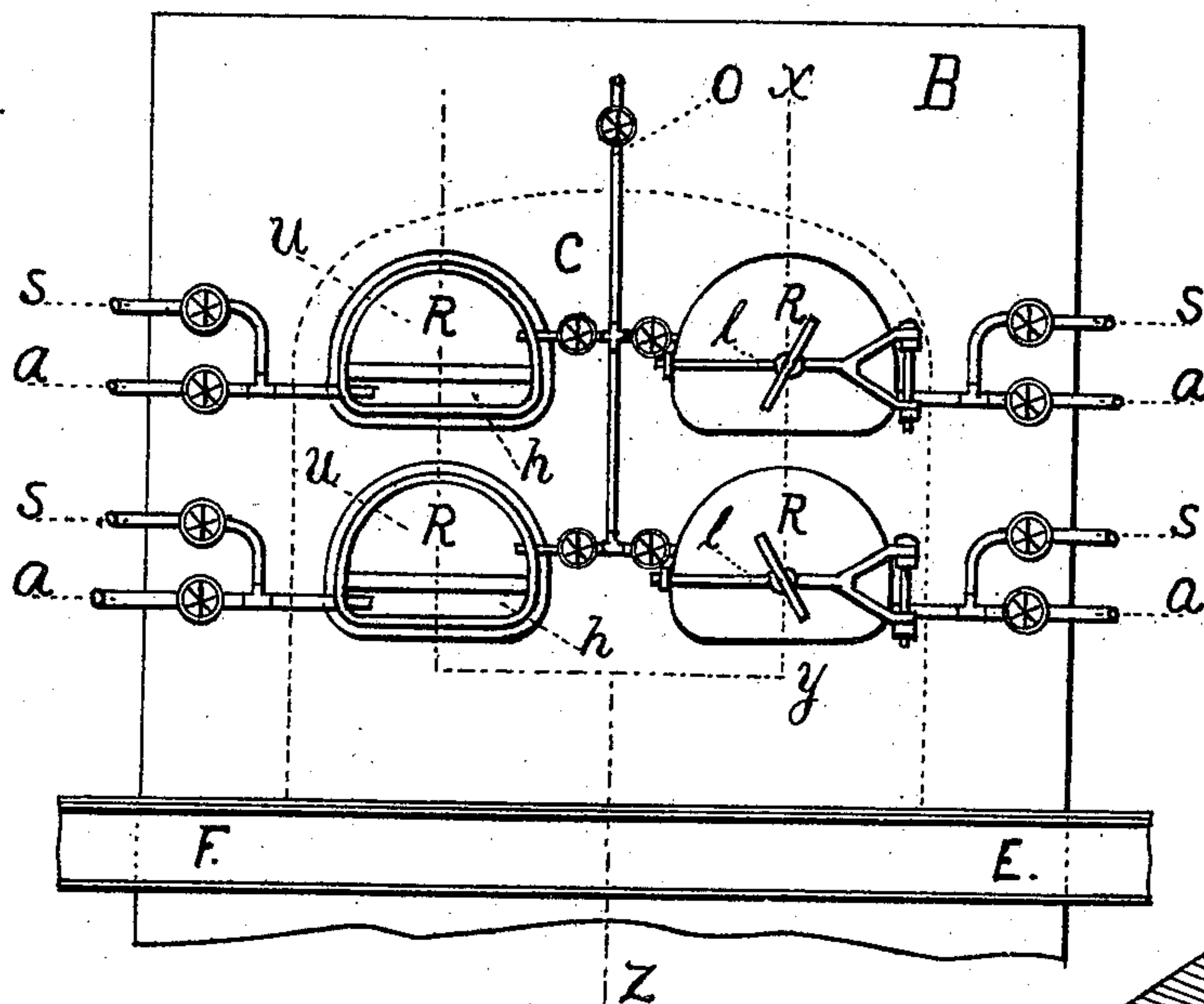


Fig. 3.

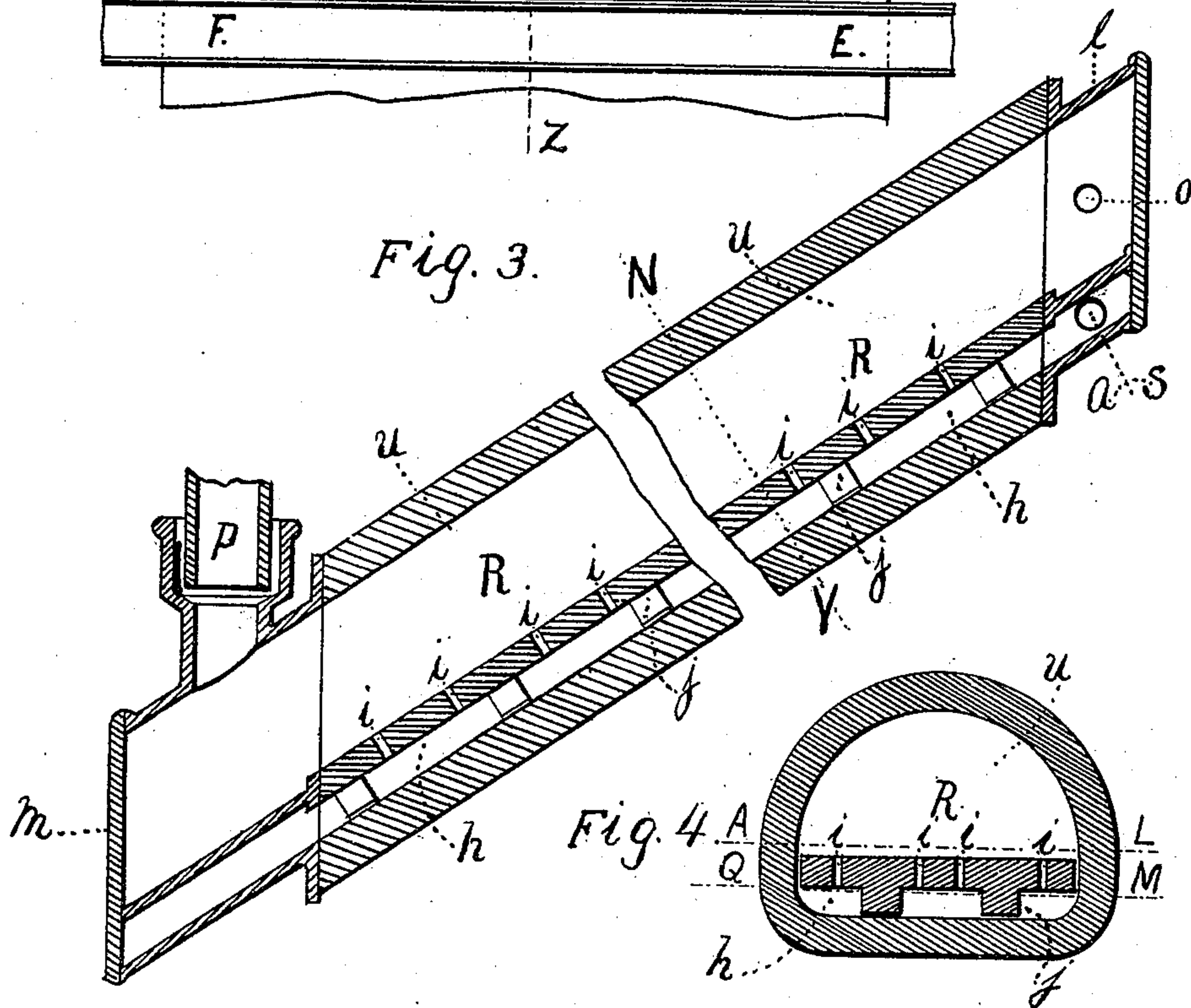
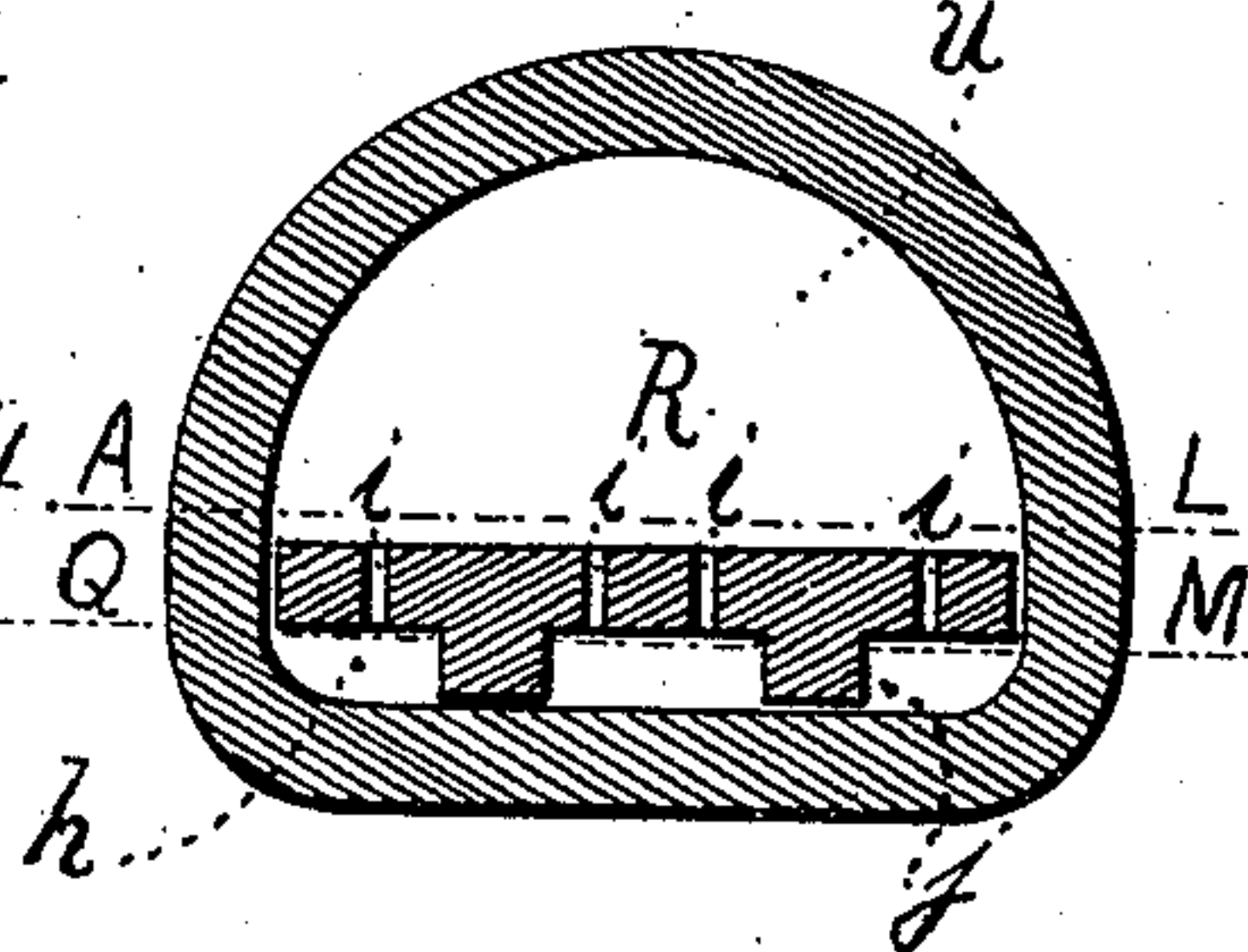


Fig. 4.



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Fig. 5.

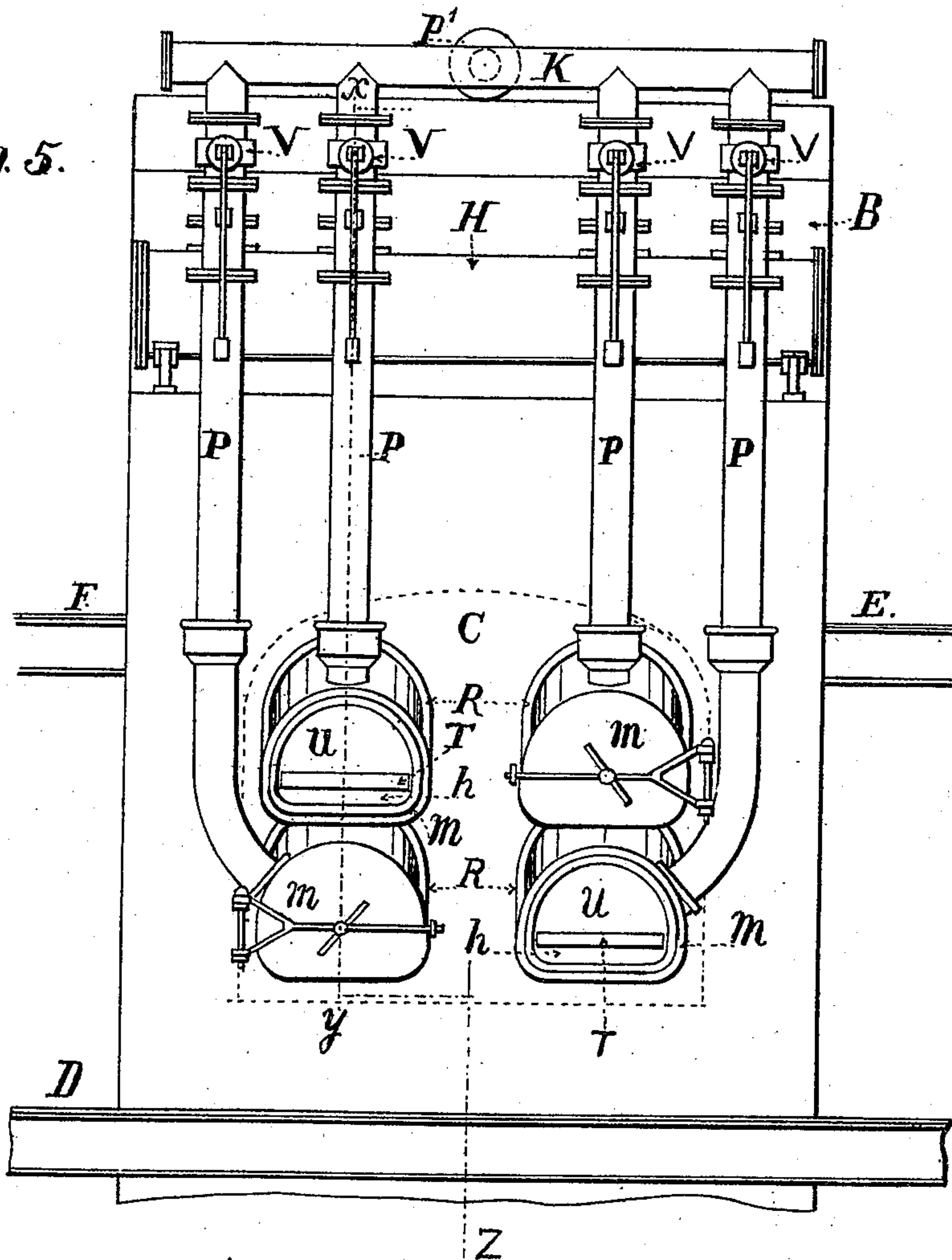


Fig. 6.

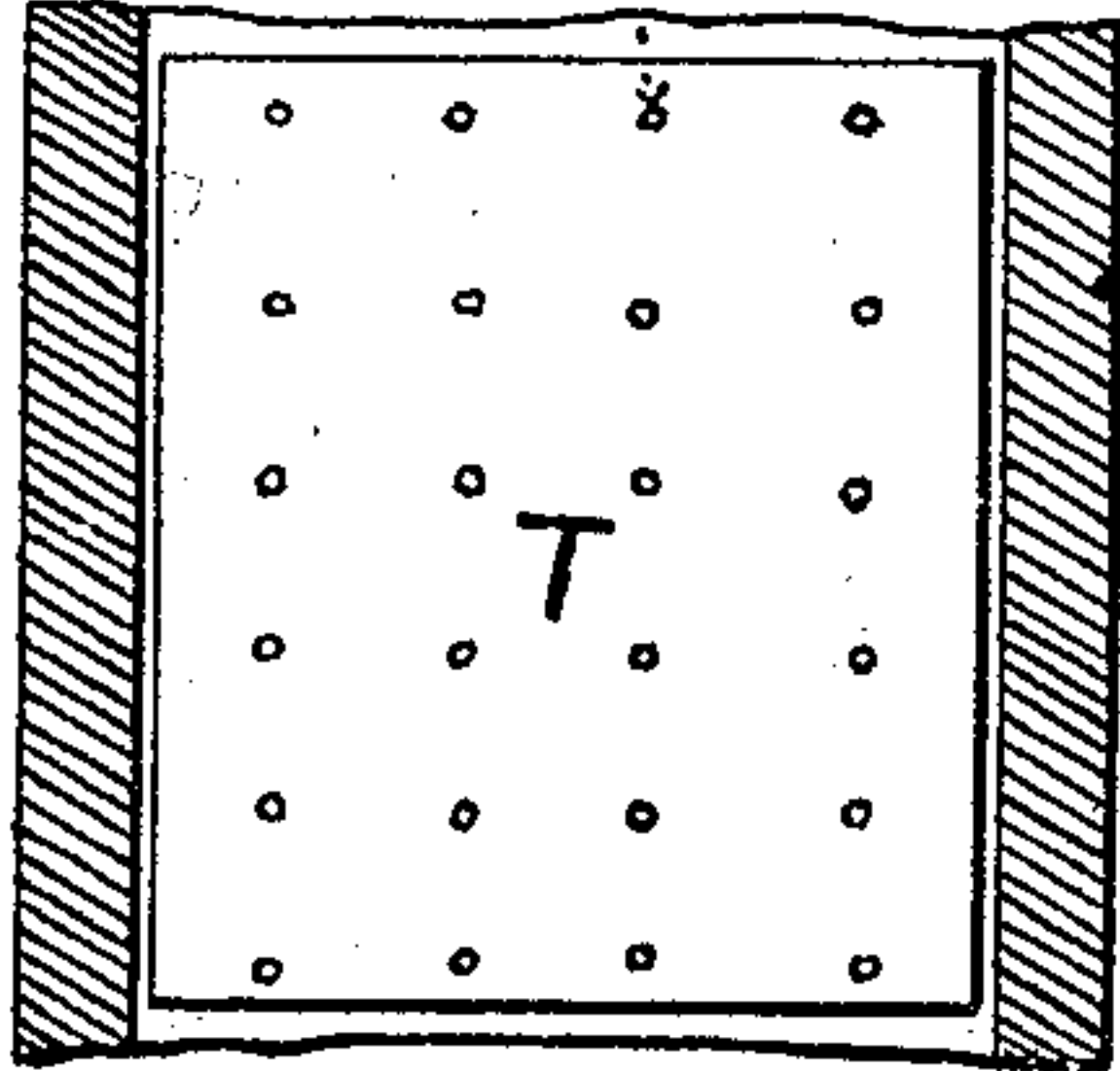
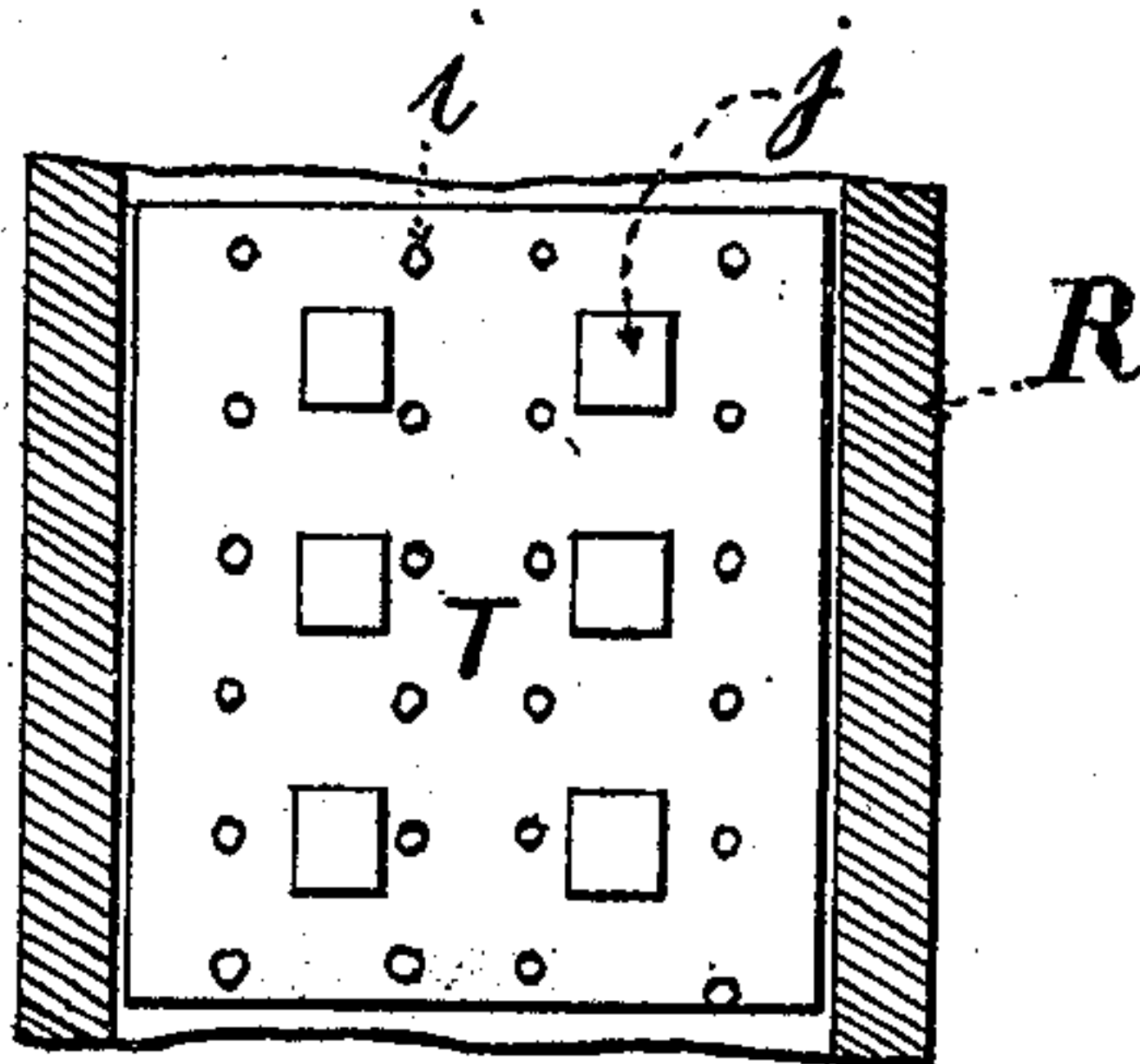


Fig. 7.



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APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 617,646, dated January 10, 1899.

Application filed July 11, 1898. Serial No. 685,674. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK EGNER, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented a new and useful Improvement in Apparatus for the Manufacture of Gas, of which the following is a specification.

In this apparatus may be made coal-gas, oil-gas, water-gas, or a combination of any or all of them.

The apparatus is also adapted to use at will gas-coal, coke, or anthracite and any liquid hydrocarbons usually employed in the manufacture of illuminating or fuel gas.

In the accompanying drawings, Figure 1 is a vertical section of the entire apparatus in the direction of lines $xyhz$, Figs. 2 and 5. Fig. 2 is a rear end view of the apparatus above the charging-floor FE , Figs. 1, 2, and 5. Fig. 3 is a longitudinal section, on an enlarged scale, of the upper and lower ends of the retorts on lines xy , Figs. 2 and 5. Fig. 4 is a transverse section of the retorts on line NY , Fig. 3. Fig. 5 is a front end view of the apparatus above the discharging-floor D , Figs. 1 and 5. Fig. 6 is a section of the retorts on line AL , Fig. 4. Fig. 7 is a section of the retorts on line QM , Fig. 4.

Like letters refer to like parts in all the figures.

In the combustion-chamber C of the retort-bench B , Figs. 1, 2, and 5, are set four retorts R at an inclination of about thirty-three degrees. Each retort is divided into an upper and a lower chamber u and h by removable tiles T . Any other number of retorts may be used in like manner. The lower ends of the retorts are furnished with mouthpieces m and the upper ends of the retorts with mouthpieces l . These mouthpieces are constructed in such a manner that there can be no communication between the upper and lower chambers of the respective retorts excepting through the perforations i (see Figs. 3, 6, and 7) of tiles T or through the joints of said tiles and between their edges and the sides of the retorts.

In the sectional view of the apparatus, Fig. 1, I have shown the retorts R with both ends closed by means of suitable lids or doors; but in the end views, Figs. 2 and 5, are shown

two retorts open and two closed, for the purpose of assisting in a better understanding of the description of this apparatus. The lower mouthpieces of the retorts connect by means of pipe P , through dip d , with the hydraulic seal or main H , through which the gas may pass in the usual manner to the other apparatus and treatment common at gas-works.

Above pipe P is valve V , collecting-main K , and pipe P' , (see Figs. 1 and 5,) by means of which such of the gas which it is not desired to retain may be conveyed to the generator G , Fig. 1, to be burned or to assist in heating the retorts on the outside.

The upper mouthpieces of the retorts are provided with openings for the admission of air, steam, and oil by means of suitable pipes and valves. (Shown on Fig. 2 and marked, respectively, for air a , for steam s , and for oil O .) As will be seen by referring to Fig. 2, one opening in a mouthpiece may serve for the admission of both air and steam if the connecting-pipes and valves are suitably arranged.

While the generator-furnace G , Fig. 1, is not a part of my invention, it is necessary for the purpose of illustration to show a furnace in connection therewith. In the drawings the gas produced in the generator G enters the combustion-chamber C of the bench B through the ports marked by arrows from flue f . This gas meets currents of air entering the setting in any convenient way and passing into the combustion-chamber through ports n . The gas produced in the generator G is supplemented or increased by the gas periodically entering the same through pipe P' with the object and for the purpose previously mentioned. To make coal-gas only with this apparatus, the retorts are first heated externally in any well-known manner. Then a small charge of some non-gas-producing material sufficient to partly fill the lower mouthpieces is introduced through the upper mouthpieces of the retorts, after which a suitable charge of gas-coal is placed into the retorts in the same way. The object of the preliminary charge of non-gas-producing material is to form a backing for the gaseous material to prevent waste, since the material which is in the mouthpieces is not subjected to sufficient heat to make gas. After the gas

in the charge of coal has been expelled the usual course would be, if working for coal-gas alone, to open the lower end of the retorts and let the resultant coke slide out, close the retort again below, and repeat the former operation; but suppose we wish to continue making gas with the material from which the coal-gas has been expelled, as indicated above. Instead of removing said material we now would turn on a current of steam, which, passing into the lower chamber of the retorts, would make its way through the perforations and around the tiles T, up through the coke remaining from the previous operation, and, being decomposed, would form uncarbureted water-gas, which may be carbureted by admitting any liquid hydrocarbon through valves and openings O while the production of water-gas is going on. When in due time the coke in the retorts is no longer hot enough to decompose the steam and gasify the liquid hydrocarbon used, we proceed as follows: Shut off the oil and steam valves s and O, Fig. 2, and turn on air through openings and valves a. This air is furnished by a suitable blower, (not deemed necessary to show in the drawings.) In the manner now described we heat the retorts internally, while they are also continually heated externally, as has been shown. It will be found that owing to the comparatively low fuel-bed inside of the retorts and the constant heat applied at the outside by means of the furnace the retorts and fuel on the inside will be heated quickly to the necessary temperature and that the result will be a saving in fuel required for the production of water-gas and also a saving in oil or any liquid hydrocarbon used to carburet the gas to any particular candle-power, which latter result will, however, be due to the more even temperature which can be applied in the gasifying of the material. Now when the fuel-bed within the retort has been reduced below a useful strata the same may be removed in the manner already mentioned as customary when coal-gas alone is made, and then the former operation may be repeated.

Suppose we wish to make water-gas from coke or with anthracite and not use gas-coals. The operation of the apparatus will be practically the same as before. We would merely substitute coke or anthracite or wood, may be, for gas-coals or cannel.

Movable tiles have been designed in my apparatus to divide the retorts into an upper and a lower chamber, because I have found in practice that the perforated bottom of double-chambered (and in that case horizontal) retorts soon clogged up and that in opening these small holes much time and heat were lost, sometimes even the retort rendered useless for the purpose, and hence the movable perforated tile was introduced in my apparatus, since it can be quickly removed, others inserted, and the previous tiles cleaned easily at leisure. These tiles should have feet molded on them, as shown at j in Figs. 3, 4, and 7.

I am aware that the use of retorts set at an incline is not new; but I do not believe that such have ever been divided into an upper and a lower chamber, as is done in my apparatus, and double-chambered retorts are not new, neither the method of using steam and oil or coal, as described in mine; but such retorts have not been set at an incline and have not been provided with a readily-removable partition, as described herein; but, above all, in no case has any retort or other gas-making apparatus been devised like the one herein described—namely, where the retorts are heated externally constantly and internally at the same time at will with the results and object set forth. I therefore do not claim any of those well-known devices; but

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

In an apparatus for the manufacture of gas, the combination of a retort-furnace; a number of retorts set therein at an angle from the horizontal; each retort being divided into an upper and lower chamber by means of perforated removable tiles; means to heat the retorts simultaneously and constantly externally, and at will internally; one end of the retorts provided with means whereby oil, steam and air may be injected into them, and the other end furnished with means whereby the gas produced may be conducted either to the hydraulic main or into the combustion-chamber of the retort-furnace or elsewhere, substantially as shown and for the purpose described.

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