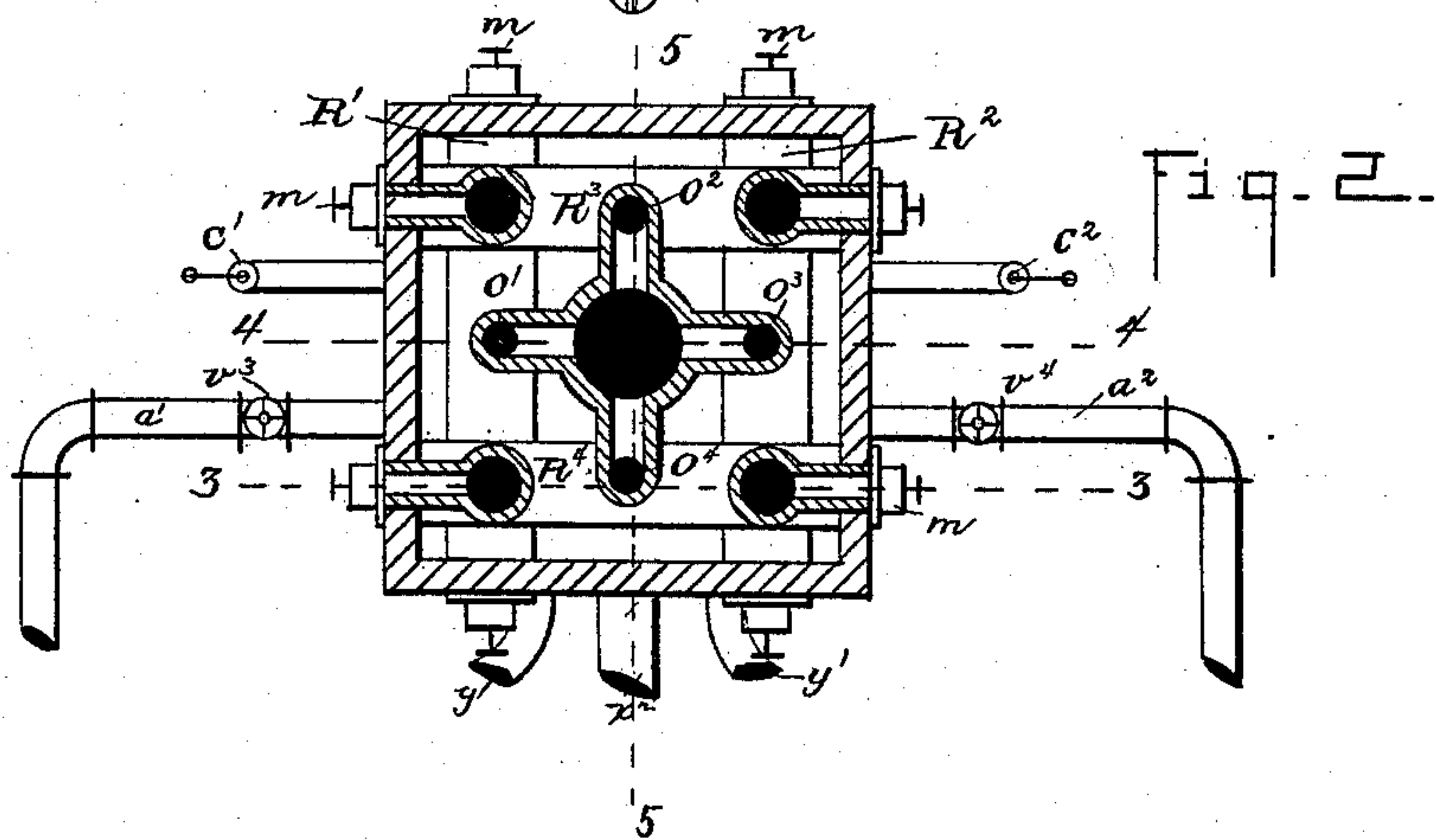
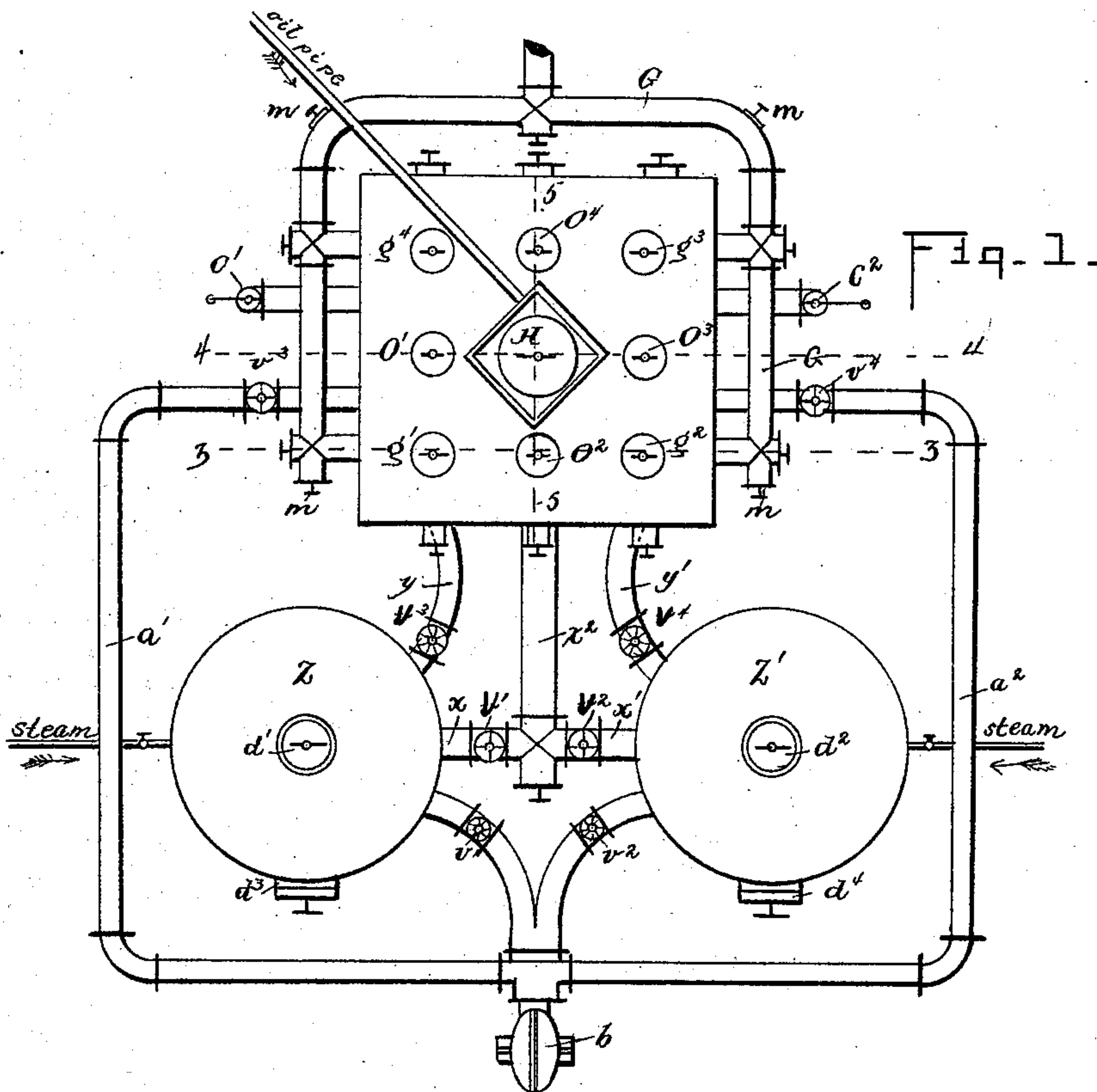


G. H. BROWN.
APPARATUS FOR THE MANUFACTURE OF GAS.

No. 402,395.

Patented Apr. 30, 1889.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

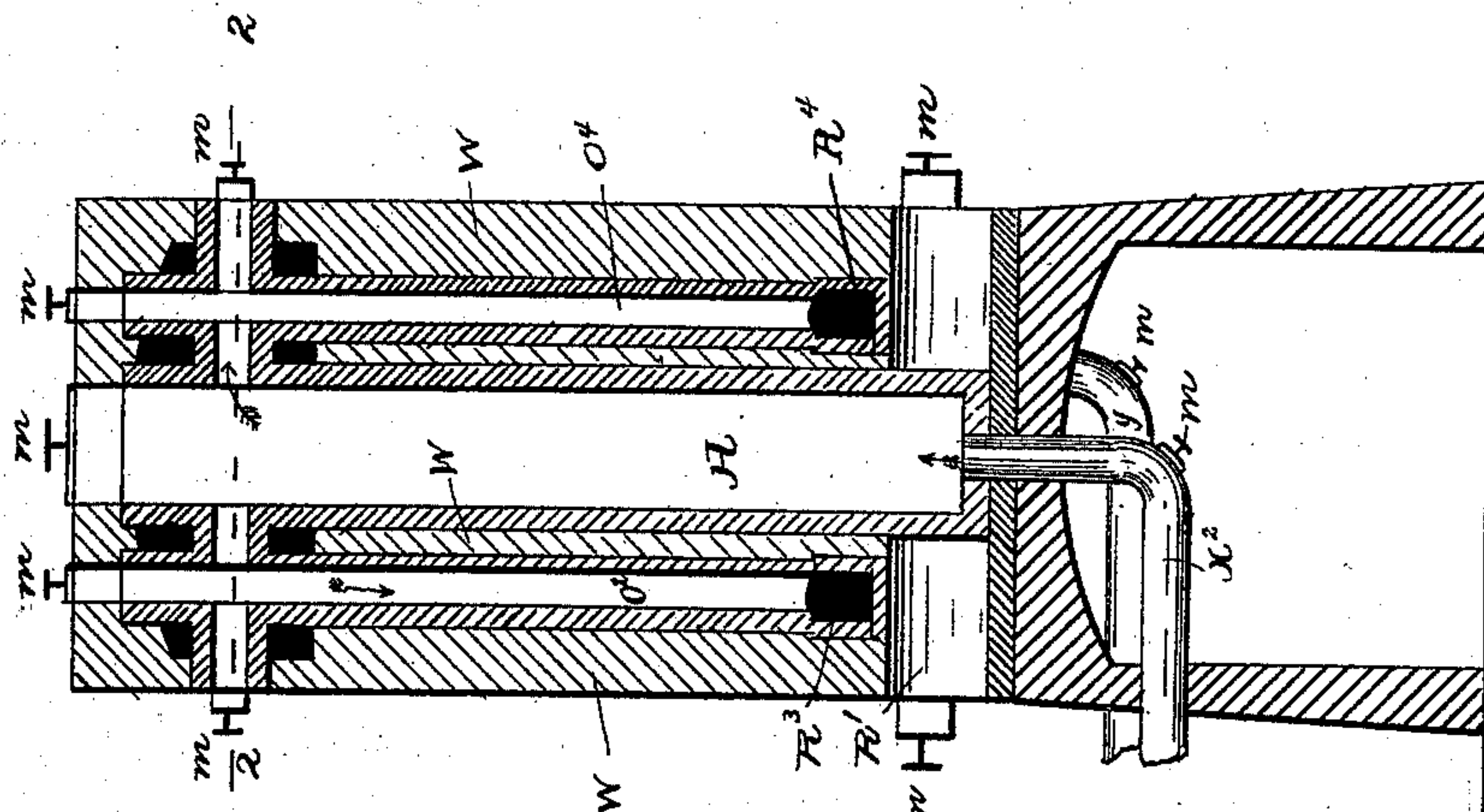


Fig. 4.

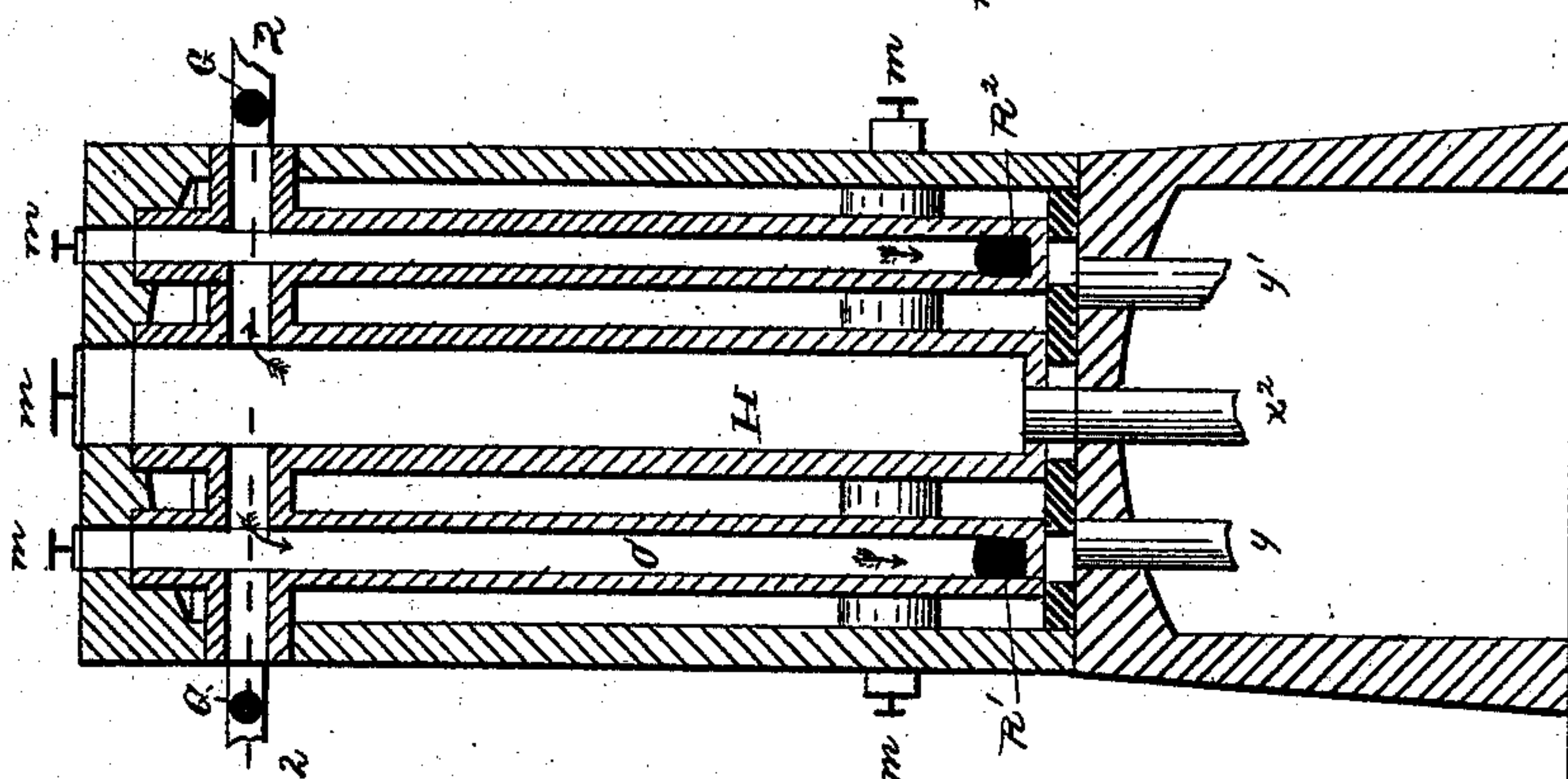
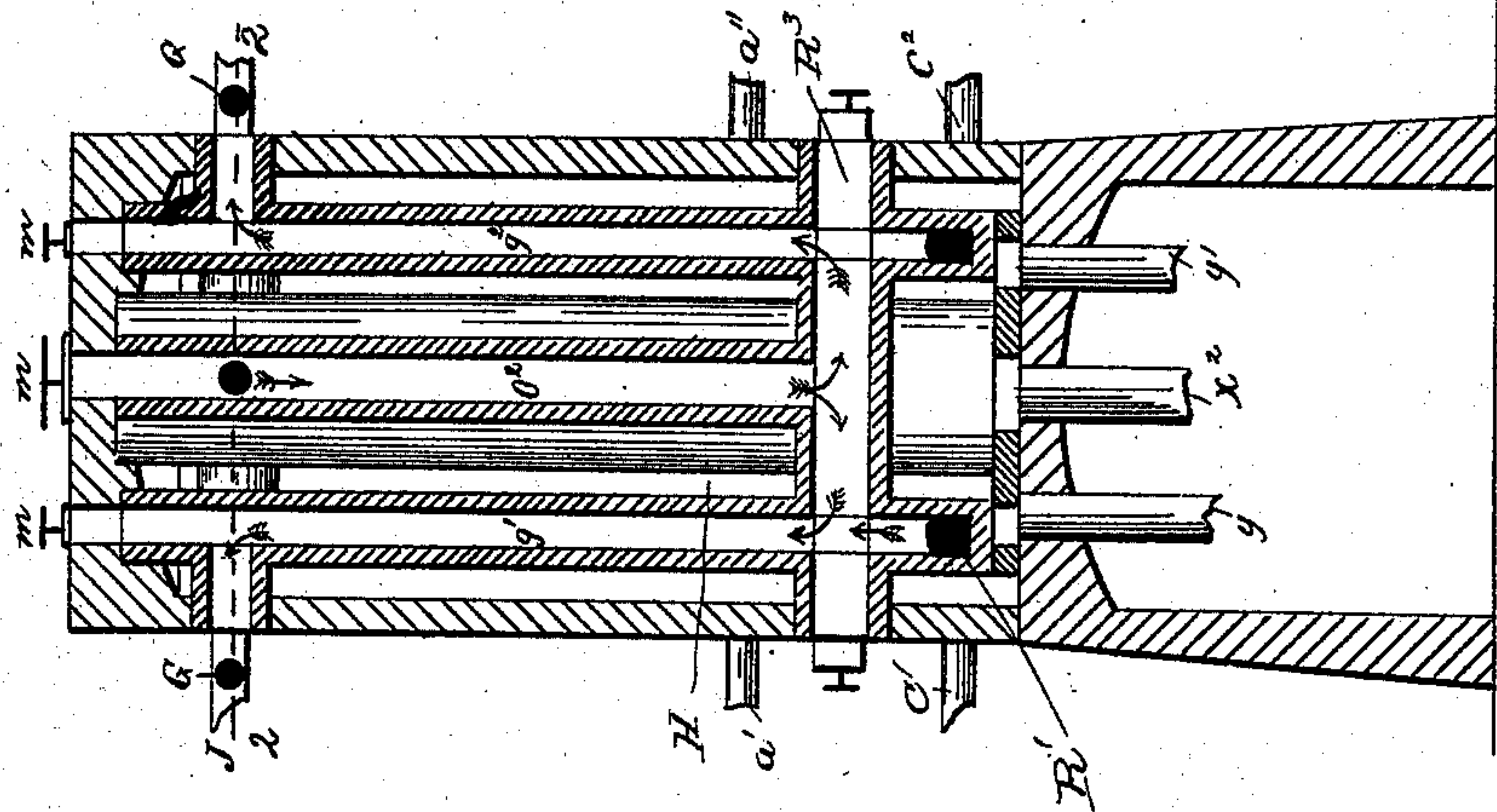


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE HENRY BROWN, OF ST. LOUIS, MISSOURI.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 402,395, dated April 30, 1889.

Application filed January 16, 1889. Serial No. 296,561. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HENRY BROWN, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a new and useful Improvement in Apparatus for the Manufacture of Gas, of which the following is a specification.

My invention relates to apparatus for making gas, in which a mass of carbonaceous material is first brought to incandescence by having air forced through it, which air in due time is shut off and steam substituted therefor, producing what is known as "water-gas," which is afterward carbureted and fixed in suitable fixing-vessels.

The object of my invention is to provide a simple, compact, and efficient apparatus wherein the process of making illuminating-gas can be carried on continuously, and whereby the heavier crude petroleum-oils can be readily used to the best advantage for the purpose of carbureting the non-luminous gas produced.

My invention consists in combining two or more of the ordinary style of water-gas generators with a fixing-chamber of novel design, the same being adapted to operate together in the manner hereinafter set forth to produce the results above mentioned.

Reference now being had to the drawings which illustrate my invention, Figure 1 is a plan view of the whole combined apparatus. Fig. 2 is a sectional view of the fixing-chamber on line 2 2, Fig. 4, with pipe G removed the better to show the mouth-piece of the lower retorts, R', R², R³, and R⁴. Fig. 3 is a sectional elevation of the fixing-chamber on line 3 3, Fig. 2. Fig. 4 is a sectional elevation of the fixing-chamber through line 4 4, Fig. 2. Fig. 5 is a sectional elevation of the fixing-chamber on line 5 5, Fig. 2.

Like letters of reference refer to similar parts in all the figures.

Z Z' are the generators, constructed in general like the well-known water-gas producers in common use. I employ with each generator Z and Z' a set of two outlet-pipes, X Y and X' Y', fitted with quick-moving valves of ordinary construction, V' V² and V³ V⁴. I have the usual blower, b, driven by an engine, (not shown,) delivering air through pipes a a' a², regulated by valves v' v² v³ v⁴, to the generators and fixing and combustion cham-

ber Y, as may be required; also steam-pipes s s', which are supplied from a boiler, (not shown,) to convey steam into the generators at the proper time. The generators also have charging-doors d' d² and cleaning-doors d³ d⁴.

m m m, &c., are (in all the figures) suitable openings furnished with mouth-pieces, doors, and fastening appliances to admit of quickly cleaning any portion of the apparatus which may become fouled from any cause whatever.

The fixing-chamber Y is preferably in the shape of a parallelopiped standing on one of its smaller sides. The outer casing is made airtight of light boiler-iron. This is lined everywhere with fire-clay blocks. It is divided into two combustion-chambers by a brick wall, W, Fig. 5, from the bottom to within a short distance of the top, in the line 5 5, Fig. 2, thus leaving a passage for gas between the two chambers at the top only. A series of horizontal and vertical retorts are set into this fixing-chamber, all connected as shown in the drawings.

Retorts R' and R² are in the bottom of the fixing-chamber, set so as to permit the free circulation of heat around them. At right angles to these first retorts, and resting upon them, are set retorts R³ and R⁴. At the points where these superposed series of retorts meet or cross one another they are provided with communicating openings, as shown, for example, in Fig. 3, where the retort R³ of the upper series is shown in communication with the two retorts R' R² of the lower series. There is the same connection between the last-named retorts and the retort R⁴. These connections are located at or near the opposite ends of the retorts. Half-way of their length retorts R' and R² have openings in the top, over which are set vertical retorts O' and O³, as seen in Fig. 4.

The retorts R³ R⁴ not only are in communication at the bottom with the tops of retorts R' R², as already described, but they have each an opening at each end on top, to which openings are applied the vertical retorts g' g² g³ g⁴ (these openings being over those through which the retorts R' R² communicate with the retorts R³ R⁴) and a third opening half-way of their length, to which latter openings are applied the vertical retorts O² O⁴.

The retorts O' O² O³ O⁴ are, in a sense, flues

through which the gas is supplied to each one of the four retorts $R^1 R^2 R^3 R^4$, and the retorts $g^1 g^2 g^3 g^4$ are in the same sense flues through which the gas is drawn or carried off from the same retort.

A large central vertical retort, H, communicates at the top through suitable horizontal branches with the four retorts $O^1 O^2 O^3 O^4$, and this retort H at its lower end is in communication with the pipe x^2 , from which branch the outlets $x x'$ connect with the generators Z Z'.

Outlet y leads from one generator, Z, into one combustion-chamber of the fixing-chamber, and outlet y' leads from the other generator, Z', to the opposite combustion-chamber of the fixing-chamber. The branch air-pipes $a a'$ also lead, respectively, to one and the other of the said combustion-chambers.

The vertical retorts $g^1 g^2 g^3 g^4$ at their upper ends communicate with outlet-pipes G, which may lead to an exhaustor or to the purifying-vessels direct. Air-tight easily-removable lids or doors (marked $m m$, &c.) are shown in all parts of the apparatus, as before mentioned.

Each of the two combustion-chambers of the fixing chamber or vessel or chamber Y is provided with a valve-controlled outlet for discharging the products of combustion, these outlets being lettered $C^1 C^2$, respectively. These outlets, for the sake of greater clearness in the drawings, are shown only in Fig. 1. They are placed near the bottom and on opposite sides of the fixing-chamber.

The manner of operating the apparatus is as follows: Having a sufficient depth of incandescent fuel in both generators Z and Z', we turn on the air-blast to one of the generators—say Z—by opening valve v^1 . Before doing this, valve V^1 of pipe x must be closed and valve V^3 of pipe y and the valve of outlet C^2 on the right of the fixing-chamber must be opened. Outlet C^1 , on the contrary, must be closed. The gas (mostly carbonic oxide) generated by the passage of the air through the incandescent fuel in generator Z will be forced through the pipe y into the left-hand side of fixing-chamber Y. Air-valve v^3 of branch pipe a' is then opened and the carbonic-oxide gas sent into the fixing-chamber will be burned therein, the highly-heated products of combustion passing up the left-hand portion of the fixing-chamber, through the opening or openings left at the top of the division-wall W, down into the right-hand portion of the fixing-chamber, and thence out from the same, through outlet C^2 , into a suitable chimney-flue. (Not shown.) In this way the retorts in the fixing-chamber become and remain highly heated, so long as the operation is continued, the products of combustion passing on the outside of and in contact with the retorts. While this is going on in the portion of the apparatus above referred to steam is turned out to the incandescent fuel

in generator Z', air-valves $v^2 v^4$ and valve V^4 of pipe y' being closed and valve V^2 of pipe x' being opened. The water-gas thus generated will pass through pipes $x' x^2$ into and up through retort H, from the upper end of which it is distributed to and passes down through the four retorts $O^1 O^2 O^3 O^4$, carrying with it any kind of oil (preferably crude petroleum) which may be admitted through the oil-pipe S, (shown in Fig. 1,) supplied from a suitably-situated tank in proper quantity. The mixture of water-gas and oil makes its way down through the last-mentioned retorts to the horizontal retorts $R^1 R^2 R^3 R^4$, and from them up through the vertical retorts $g^1 g^2 g^3 g^4$ to the outlet-pipe G, and thence to a purifying apparatus, as previously mentioned. In due time, when the fuel in generator Z' becomes cooled off to that point where it can no longer act efficiently, the steam is shut off and the connection of the two generators by means of their controlling-valves is changed, so that generator Z shall now supply water-gas to the retorts, while generator Z' shall supply fuel-gas to the combustion-chamber surrounding the retorts. In this way and by these means an exceedingly brilliant gas can be produced, and crude petroleum may be employed, the production being uniform and continuous, and the apparatus being so constructed that all portions of it can be easily reached and the coke and pitch resulting from the distillation of the crude petroleum can be easily removed.

What I claim herein as new and of my own invention is—

1. The combination, with the generators and the fixing-chamber, of the series of superposed horizontal and vertical retorts contained in said chamber, the vertical retorts constituting at the same time flues through which the gas is both supplied to and carried off from each one of the horizontal retorts, substantially as and for the purposes hereinbefore set forth.

2. The fixing-chamber provided with a vertical partition-wall dividing it into two combustion-chambers communicating with each other at one end and at the opposite end provided each with a valve-controlled outlet, and the generators communicating one with one and the other with the other combustion-chamber, in combination with the superposed series of horizontal and vertical retorts contained in said fixing-chamber, the vertical retorts constituting at the same time flues through which gas is both supplied to and carried off from each one of the horizontal retorts, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 11th day of January, 1889.

GEORGE HENRY BROWN.

Witnesses:

W. R. SILLITO,

JNO. A. TOMPKINS.