

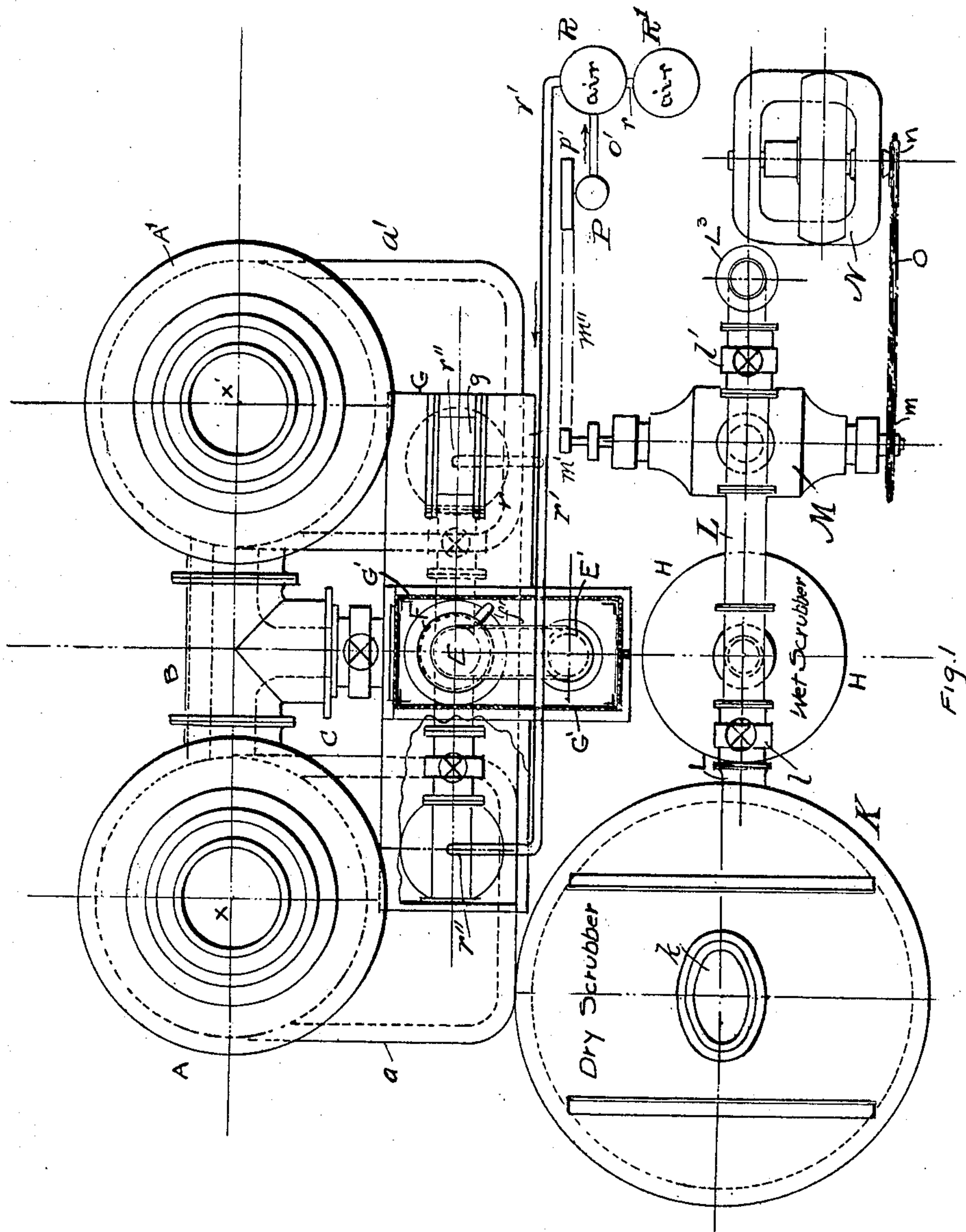
No. 885,372.

PATENTED APR. 21, 1908.

H. PETTIBONE.
APPARATUS FOR MANUFACTURING GAS.

APPLICATION FILED APR. 24, 1906.

3 SHEETS—SHEET 1.



Witnesses

J. H. Wise
James F. Crown

By

Inventor

Hawley Pettibone

E. B. Clark

Attorney

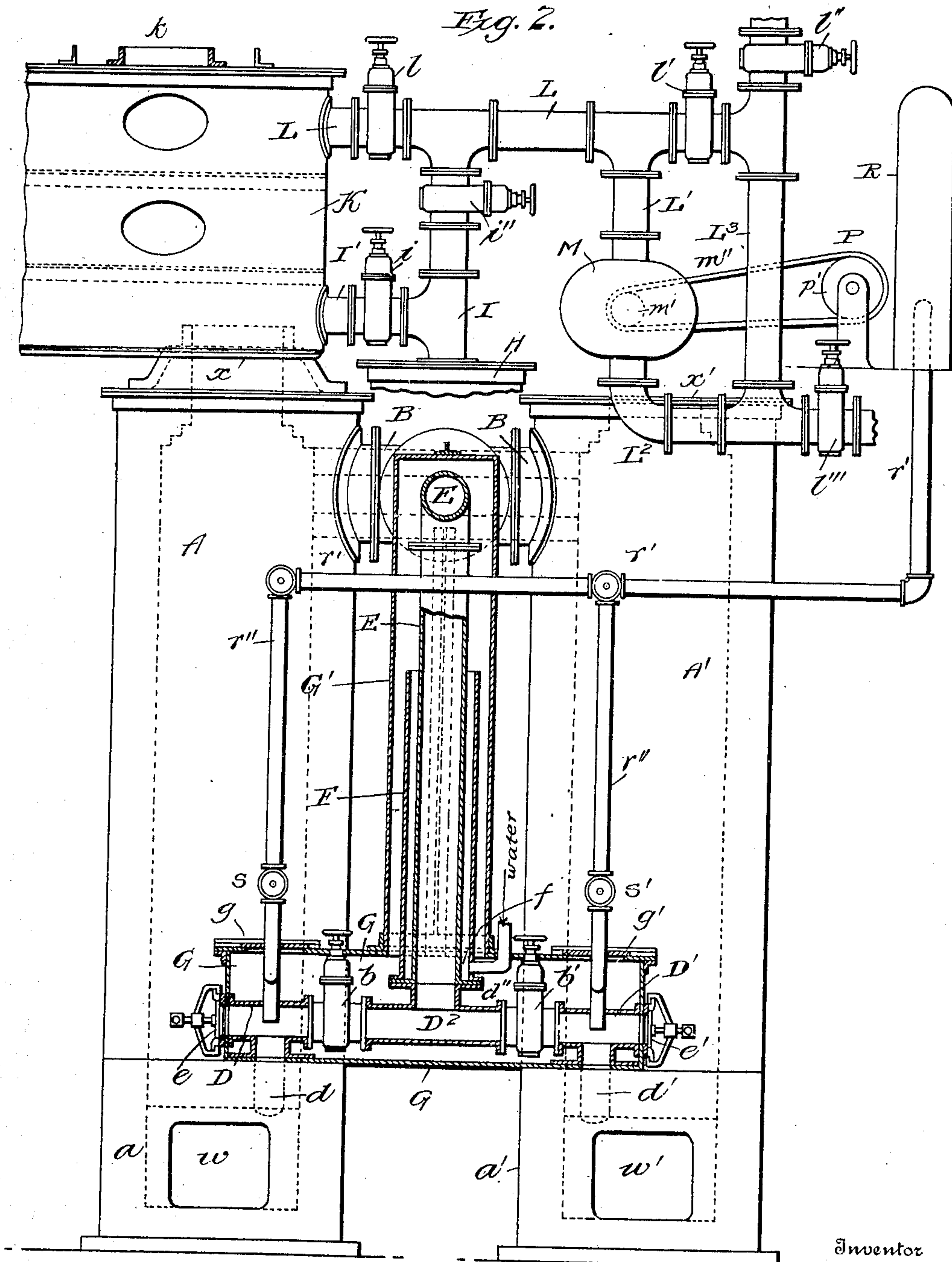
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Witnesses
J. L. Mochman
James F. Crown

By

Hawley Pettibone
E. B. Clark
Attorney

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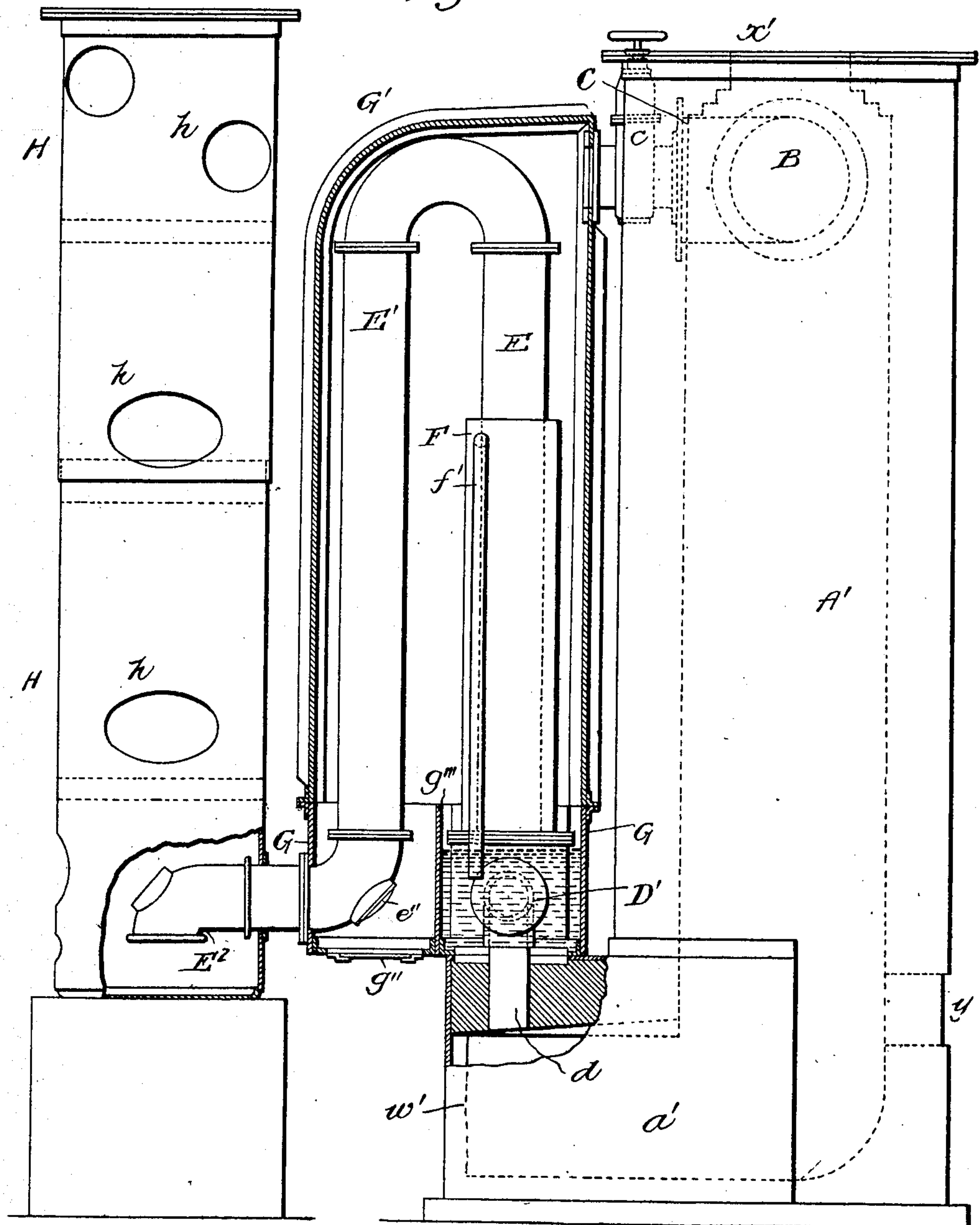
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3 SHEETS—SHEET 3.

Fig. 3.



Inventor

Hawley Pettibone

E. B. Clark

Attorney

Witnesses

T. L. Kocum
James F. Brown

By

UNITED STATES PATENT OFFICE.

HAWLEY PETTIBONE, OF NEW ROCHELLE, NEW YORK, ASSIGNOR TO POWER AND MINING MACHINERY COMPANY, A CORPORATION OF NEW YORK.

APPARATUS FOR MANUFACTURING GAS.

No. 885,372.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed April 24, 1906. Serial No. 313,413.

To all whom it may concern:

Be it known that I, HAWLEY PETTIBONE, a citizen of the United States, residing at New Rochelle, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Apparatus for Manufacturing Gas, of which the following is a specification.

This invention relates to apparatus for manufacturing gas adapted for motive power and heating purposes.

The object of my invention is to provide for economically and effectively heating air and vaporizing water to produce a hot air and steam supply to a cupola generator by means of waste heat of outgoing hot gas from such generator, whereby a uniform supply of hot air and steam or water vapor may be fed to the generator at a minimum cost, and the gas may be incidentally cooled on its way to the scrubber.

The matter constituting my invention will be defined in the claims.

I will describe my improved apparatus in detail by reference to the accompanying drawings in which—

Figure 1 represents a top plan view, partly in section, of the apparatus. Fig. 2 represents a sectional front elevation thereof with part broken away. Fig. 3 represents a side elevation with parts in vertical section and parts omitted.

I construct my cupola gas generators in pairs, A, A¹, which are connected at the top by a short cross pipe B, which in practice will be connected with an air heating and water vaporizing chamber and apparatus. At the bottom the generators A, A¹ are provided with horizontal extensions a, a' having end doors w, w'. The cupolas are also provided at the rear with an opening and door w. At the top the cupolas are provided with suitable door frames, and top lids or doors x, x' where they are charged with coal and where bars may be inserted for regulating the beds of fuels. The generators are constructed with sheet iron or steel shells and fire brick linings in the usual manner.

Upon the bottom extensions a, a' is located a water vaporizing box containing the gas outlet pipes and valves. These pipes are composed of the connections D having a drop pipe d extended, connecting with the interior of extension a; a similar pipe section D¹ and connection d' and a central section

D². Valves b and b' are connected with the pipes D and D¹ at their junctions with the central section D² as clearly shown in Fig. 2. To the outer ends of the pipe section D and D¹ are applied the end doors e and e' having suitable fastening devices as shown in Fig. 2. With the central section D², having a wide flange d'' is connected the stand pipe E rising nearly to the top of the cupola and there connecting by a return-bend with the second stand pipe E¹ which is provided at the bottom with an elbow having a hand-hole and cover e''; also a curved discharge end E² which extends downward in the bottom of the wet-scrubber H as shown in Fig. 3. This downwardly curved extension forms a dip pipe and is immersed in liquid, forming a seal. There is also connected to the wide flange d'' a water-jacket pipe F which, preferably, extends up around the gas take off pipe E a little more than one-half its height, as shown in Figs. 2 and 3. With the lower end of this water jacket pipe connects a water supply pipe f and near the upper end connects an overflow pipe f' which extends down into the water box G.

The water box and vaporizer G is constructed of sheet metal and seated upon the extensions a, a' and has a central extension as shown in Fig. 1, also an upper extension G¹ as shown in Figs. 2 and 3 for completely enclosing the gas take off stand pipes E and E¹. The top of box G is provided near each end with an air inlet opening to which are applied sliding covers or dampers g and g' as shown in Figs. 1 and 2. The bottom of the central extension of chamber G is also provided with an air inlet opening controlled by a sliding damper g''. The central part of the box G is provided with a partition plate g''' for separating the water compartment from the hot air compartment, as shown in Fig. 3. With the upper part of air heating chamber G' is connected a short pipe C, having a valve c and leading to the cross pipe B. The cross pipe B is preferably made as a T so that the connection C forms a part thereof. This pipe connection B, C, serves for admitting hot air and water vapor or steam into the upper parts of the two cupola generators A and A¹.

The wet scrubber H is supported on a suitable foundation and is provided with the usual manholes and covers h and has connecting with its upper end the gas outlet pipe I which connects with an upper pipe L and has

a branch pipe I^1 , provided with a valve i and connecting with the base of the dry scrubber K. The scrubber K is of a well known construction and is provided with the usual man-hole opening and cover k . At or near the top it is provided with an outlet pipe L having a valve l . With this outlet pipe connects the pipe I, having a valve i' as shown in Fig. 2. The outlet pipe L is extended and connects with the waste or blow off pipe L^3 and is also provided with the second valve l' . Between the valve l and l' a branch pipe L^1 connects with the exhaustor M. An outlet pipe L^2 leads from the exhaustor and may connect with the holder and is provided with a valve l'' . The cross pipe L^3 extends upward from pipe L^2 and is provided with a blow off valve l''' for the escape of gas which may be of inferior quality or for temporarily relieving the pressure when the holder is full of gas. To one end of the shaft of exhaustor M is applied a sprocket wheel m for a sprocket chain o which is passed over a second sprocket wheel n on the shaft of an electric motor N which serves for driving the exhaustor M. Any other suitable motor may be used for the purpose.

In order to provide for loosening up the beds of fuel when they become impacted or clogged with ash and cinder, I compress with suitable tanks or cylinders a gaseous or aeriform fluid, such as water-gas, or a noncombustible gas or air and admit such compressed fluid in sudden puffs or impulses into the base of one cupola while the resulting products are passed off from the base of the other cupola. A gas or air compressor P is provided with a belt-wheel p' which is connected by a belt m'' passing over the belt wheel m' on the extended shaft of the exhaustor. The pipe r' leads from the compressor to a compression tank R. Two tanks R, R^1 may be provided and connected by a short pipe r . A pipe r' leads from one of the compression tanks and connects by branch pipes r'' with the pipe sections D and D^1 which connect with the extensions a and a' at the bases of the cupolas. The pipes r'' are provided with valves s and s' for controlling the flow of compressed gas or air into the cupola generators.

By vaporizing water and heating air by means of the out-going hot gas passing through the stand-pipes as above described, and feeding the moistened air to the cupola generators, a mixed water gas and producer gas will be generated. The water box G and the water jacket F having been supplied with water, and the sliding dampers g, g', g'' , are opened and properly adjusted thereby admitting air, and, supposing beds of fuel to be properly ignited in the generators A, A^1 , the exhaustor M is put in operation thereby drawing gas off through the stand-pipes E, E^1 , and the scrubbers and discharging it to a

holder. During this operation air will be drawn in through the openings into the water box G and hot air chamber G^1 where it will be heated and saturated with moisture or water vapor from the water which is heated in the box and jacket surrounding the gas take-off pipes. As the water vapor and air rise they will be commingled and further heated by contact with the hot pipes in the top of chamber G^1 and then flow into the tops of the cupola generators. The operation of the exhaustor will draw the exhaustor of hot air and water vapor or steam down through the bodies of ignited fuel where combustion and decomposition will be effected resulting in a mixture of water gas and producing gas.

In the course of time, perhaps several hours operation the beds of fuel become impacted or clogged with ash and cinder so that it is very difficult to draw air and vapor down through them. When this condition arises, valve c and valve b may be closed and then the valve s in one of the pipes r'' suddenly opened admitting a blast of compressed gas in a sudden puff into the base of cupola A where it will loosen up the body of impacted fuel and clean ash and cinder from the interstices thereof. This operation may be repeated at short intervals until the body of fuel in cupola A is well opened and cleaned. At this time the gaseous products arising from the fuel in cupola A will be passed down through the body of fuel in cupola A^1 and thence off through the stand-pipes by the operation of the exhaustor. At any desired time the second body of fuel in cupola A^1 may be cleaned in the same manner by proper adjustment of the valves. When necessary to supply fresh fuel to the cupolas the top doors may be opened and the fuel thrown in without interrupting the operation of the exhaustor or generation of gas as the air and gas are drawn down through the bodies of fuel by the exhaustor.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a cupola gas generator, of a gas take-off pipe connecting with the base thereof and rising as a stand-pipe, a water jacket around said stand-pipe and having a water inlet-pipe a hot air and vapor chamber inclosing said stand-pipe and jacket and a pipe and valve connection from said chamber to the top of the cupola, substantially as described.

2. The combination with a cupola gas generator, of a gas take-off and stand-pipe connecting with the base thereof and having a horizontal section and valve, a water box surrounding said section and valve and having an air inlet provided with a slide or damper, a hot air and vapor chamber connecting with the water box and surrounding the stand-pipe, and a pipe and valve connection from

said chamber to the top of the cupola, substantially as described.

3. The combination with a cupola gas generator, of a gas take-off and stand-pipe connecting with the base thereof and having a valve, a water vaporizing box inclosing part of the pipe and the valve and having an air inlet and damper, a water jacket surrounding part of the stand-pipe and open at the top, a supply pipe to said jacket, a hot air and vapor chamber connecting with the water box and surrounding the stand-pipe and jacket, and a pipe connection from said chamber to the top of the cupola, substantially as described.

4. The combination with a cupola gas generator, of a gas take-off and stand-pipe connecting with the base thereof and having a horizontal section and valve, a return or second stand-pipe a water vaporizing box having an air inlet and damper and a water jacket on said section and stand pipe, a hot air and vapor chamber surrounding both stand-pipes and having an air inlet and damper adjacent to the second stand-pipe,

and a pipe and valve connection from said chamber to the top of the cupola, substantially as described.

5. The combination with a pair of cupola generators connected at the top and having extensions at the base, of horizontal pipe sections connecting with said extensions and each having a valve, a stand-pipe connecting with said sections, a water vaporizing box inclosing said sections and valves and having an air inlet and valve, a water jacket on the stand-pipe and having a water supply, a return stand-pipe, a hot air and vapor chamber surrounding said stand-pipes and jacket and having an air inlet and damper for admitting air to be heated, and a pipe and valve connection from said chamber to the tops of the cupolas, substantially as described.

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

HAWLEY PETTIBONE.

Witnesses:

GEORGE KNEISLER,
LUDWIG KAUFMANN.