E. GEISENBERGER.

APPARATUS FOR MANUFACTURING HYDROGEN GAS.

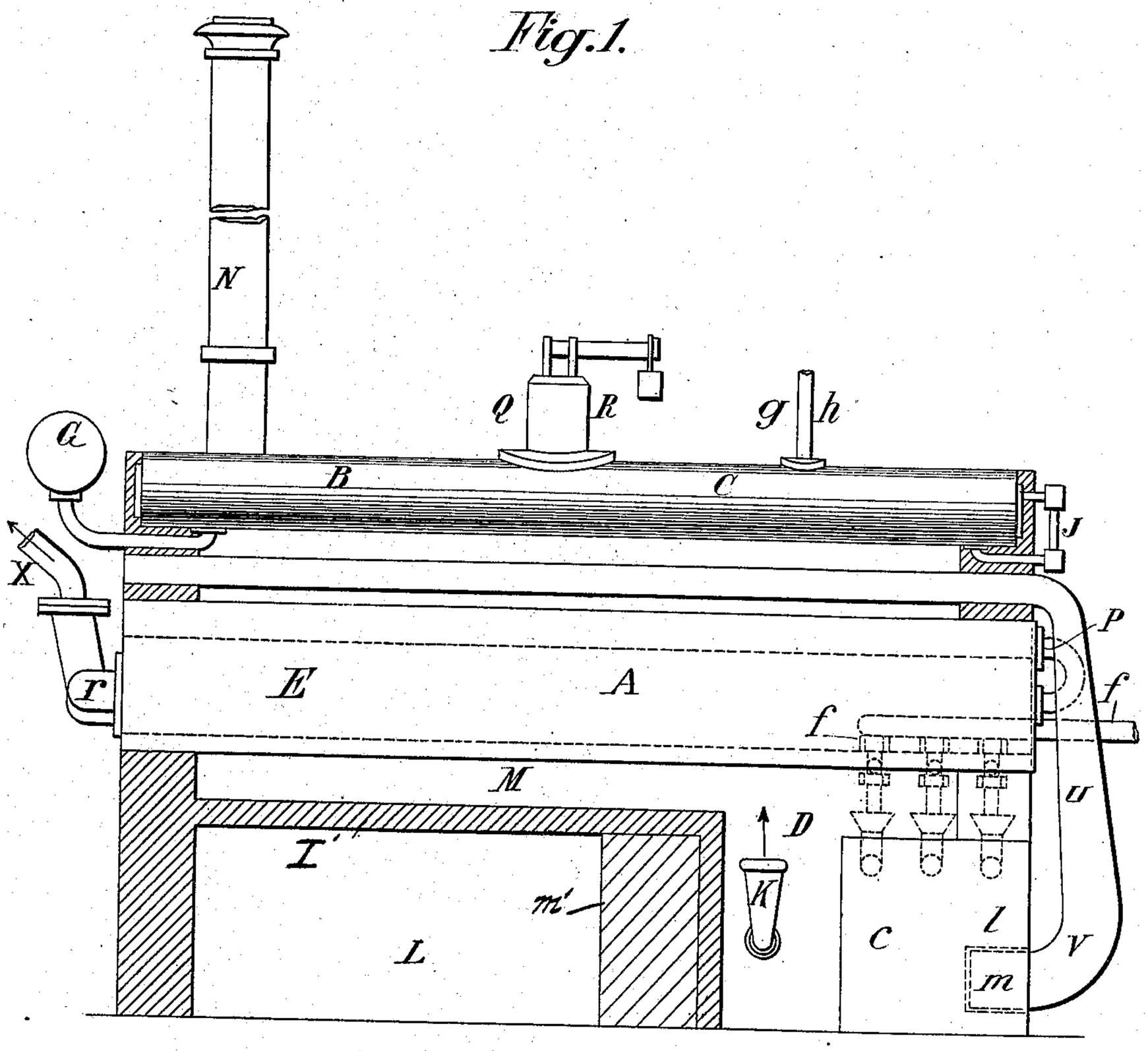
APPLICATION FILED JAN. 12, 1906.

900,516.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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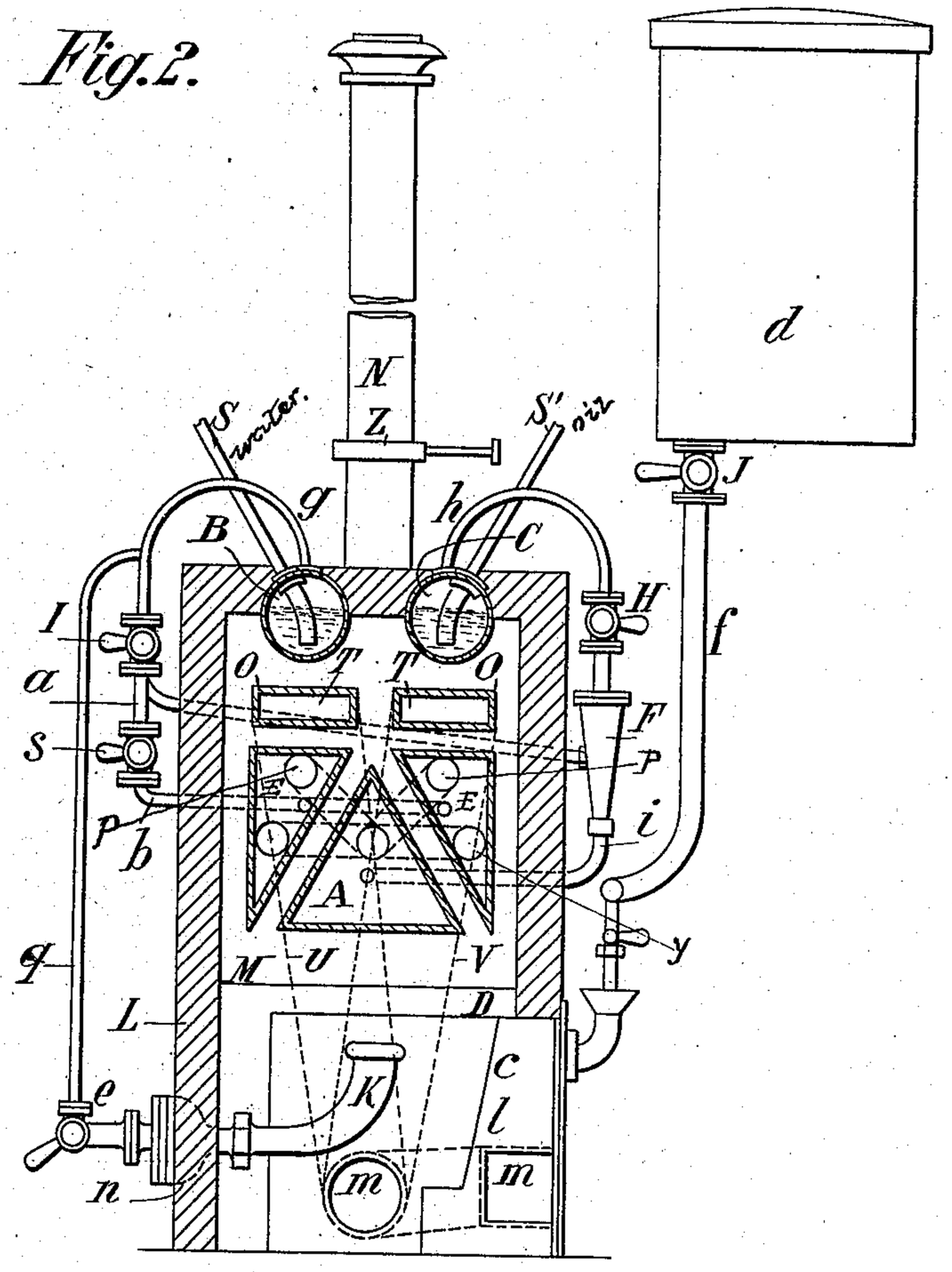
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

EDMOND GEISENBERGER, OF LIEGE, BELGIUM.

APPARATUS FOR MANUFACTURING HYDROGEN GAS.

No. 900,516. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed January 12, 1906. Serial No. 295,755.

To all whom it may concern:

Be it known that I, EDMOND GEISENBERGER, a citizen of the Swiss Confederation, and a resident of Liege, Belgium, have invented certain new and useful Apparatus for Manufacturing Hydrogen Gas, of which the following is a specification.

Although the apparatus hereinafter described may be used for a number of purposes, its chief object is for use in the practice of a new process of making hydrogen gas, either pure or mixed with oxids of carbon, but having in all cases a density sufficiently low to permit of its being used for inflating balloons.

This apparatus, of which a detailed description is hereinafter set forth, is preferably constructed in such a manner that it may be easily transported, as by mounting it upon wheels, its chief use at present contemplated being to inflate military balloons.

The process in connection with which my improved apparatus is employed, is based upon the decomposition of liquid hydrocarbons or those which may be easily liquefied, such for example as benzin, naphtha, petroleum, tars, paraffin, wax, turpentine, all of the mineral oils and many of the vegetable or animal fats or oils, the said decomposition being accomplished by means of heat in the presence of water. This water will be used in most cases in the form of steam. It is also possible to carry out the process by the use of heat alone, without the presence of water.

In the operation of the apparatus I preferably employ the refined petroleum or kerosene, although most of the other hydrocarbons, and especially the liquid ones, may be used.

The apparatus is preferably heated by means of kerosene, and water is preferably employed for producing a double decomposition of petroleum as hereinafter more fully described.

In the annexed drawings one form of my apparatus is shown by way of example, and in this drawing Figure 1 is a longitudinal section with some of the parts shown in side elevation, and Fig. 2 is a cross-sectional view of the apparatus.

In the drawing in which like characters of reference designate corresponding parts throughout the views, A designates the principal retort in which the hydrocarbons employed are decomposed. Above this retort are arranged chambers B and C in which water and the hydrocarbons are respectively heated prior to being conducted into the decomposing retort A.

Above and at either side of the principal retort A are auxiliary retorts E. Retort A is connected by pipe *i* with a mixer in which steam and hydrocarbon vapor from the receptacles B and C are mixed in the proportions desired. The mixer F is connected with C by means of the pipe *h* provided with the controlling cock H and with chamber B by the pipe *g* provided with the controlling cock I. The retorts E, E are each connected with B through the medium of the pipe *b* provided with a controlling cock *s*. Retorts E, E are connected by means of the pipe Y shown in Fig. 2 of the drawing and each of these retorts are connected with retort A by means of pipes P, P.

The apparatus is provided with a fire box D supplied with hydrocarbon burners *c* which receive fuel from the tank *d* through pipe *f* which is provided with a controlling cock J.

The combustion of the hydrocarbon in the fire box D is facilitated by means of a blower K in which air is drawn through the connection *n* by a steam jet therein. Steam is supplied from B through the pipe *q*, controlled by cock *e*.

In the rear of the fire box D is a closed chamber L having the solid upper wall *l'* and the solid partition wall *m'* between it and the fire box D. Above the chamber L is a space M through which the products of combustion pass on their way to the stack N.

In the path of the products of combustion from the fire box D are located flat air conduits T, T through which air is drawn from the rear end of the apparatus downward through the pipes U and V, and is admitted at *m* into the fire box D through the pipe *l*. The chambers B and C receive water and hydrocarbon through the pipes S and S' respectively, and each of these chambers is provided with a tank G into which liquid may be forced when the pressure within the chamber becomes excessive. Both chambers are provided with a safety valve designated as Q and R in Fig. 1, and a water gage *j*. The retorts E, E are provided with a gas collector *r* which is in communication with the gas outlet pipe X. A damper Z may be supplied to the stack N if desired.

In the use of my apparatus after introducing petroleum or other hydrocarbon to the

chamber C and water to the chamber B, both of these chambers are heated until the pressure in each of them has reached the desired point, by means of the burners *c* in the fire box D, which also supplies heat to the retorts A and E, E.

The cocks H and I are then opened to admit steam and hydrocarbon vapor to the mixer F from which it passes into the retort A. These cocks are preferably adjusted so that a slight excess of steam is admitted to the retort A.

The hydrocarbon vapors and the steam circulate together in the retort A, which has been previously heated to a temperature such that the decomposition of the vapors may take place as the said vapors arrive and come into contact with the walls of the retort. The escape of these vapors is controlled in such a manner that the greatest part, if not all of them, will be decomposed.

As a result of the decomposition hereinbefore mentioned, there is produced from the steam and hydrocarbon vapor a mixture of hydrogen and carbonic oxid with, in some cases, some carbonic acid gas and deposits of carbon.

The gaseous mixture produced is conducted by the outlet pipe X to purifying apparatus, or directly to the balloon to be inflated.

It is to be understood that the apparatus may be variously modified without departing from the spirit of my invention or the scope of the appended claims.

Having described my invention, I claim;

1. An apparatus for manufacturing hydrogen gas comprising, a chamber for water and a chamber for containing a liquid hydrocarbon, a mixer in communication with said chambers for producing a mixture of steam and hydrocarbon vapors produced in said chambers, a retort in communication with said mixer and adapted to heat said mixture, an auxiliary retort in communication with one of said chambers, means of communication between said retorts, means for heating said retorts and chambers and means for conducting off the gas produced, substantially as described.

2. An apparatus for manufacturing hydrogen gas comprising a casing containing a chamber for water and a chamber for containing hydrocarbon, a retort in communication with both chambers and a plurality of retorts connected by a pipe connection with one only of said chambers, means of communication between said last named retorts and separate means of communication between said last named retorts and said first named retort, means located within said casing for simultaneously heating said chambers and retorts and means for conducting off the gas produced, substantially as described.

3. An apparatus for manufacturing hydrogen gas comprising a casing, a chamber for containing water and a chamber for containing a liquid hydrocarbon, both chambers being disposed within said casing, a retort in communication with each of said chambers, means for simultaneously heating said chambers and retort, and an overflow tank located without said casing and communicating with each of said chambers at the lower portion thereof, substantially as described.

4. An apparatus for manufacturing hydrogen gas comprising a plurality of chambers adapted to contain liquid, the retort located beneath said chambers and in communication therewith, a furnace adapted to supply heat to said chambers and retort, and an air conduit located beneath said retort and chambers and in communication with the fire box of said furnace, substantially as and for the purpose specified.

5. An apparatus for manufacturing hydrogen gas comprising a chamber for containing water, and a chamber for containing hydrocarbon, a mixer in communication with both of said chambers for producing a mixture of steam and hydrocarbon vapor, a retort in communication with said mixer, a plurality of retorts in communication with the water-containing chamber and said first named retort, a furnace for supplying heat to said chambers and retorts, a fluid pressure operated blower in the fire box of said furnace and in communication with the said water-containing chamber by a valve controlled pipe and means for conducting off the gas produced, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

EDMOND GEISENBERGER.

Witnesses:
D. DUNNING, Jr.,
GREGORY PHELAN.