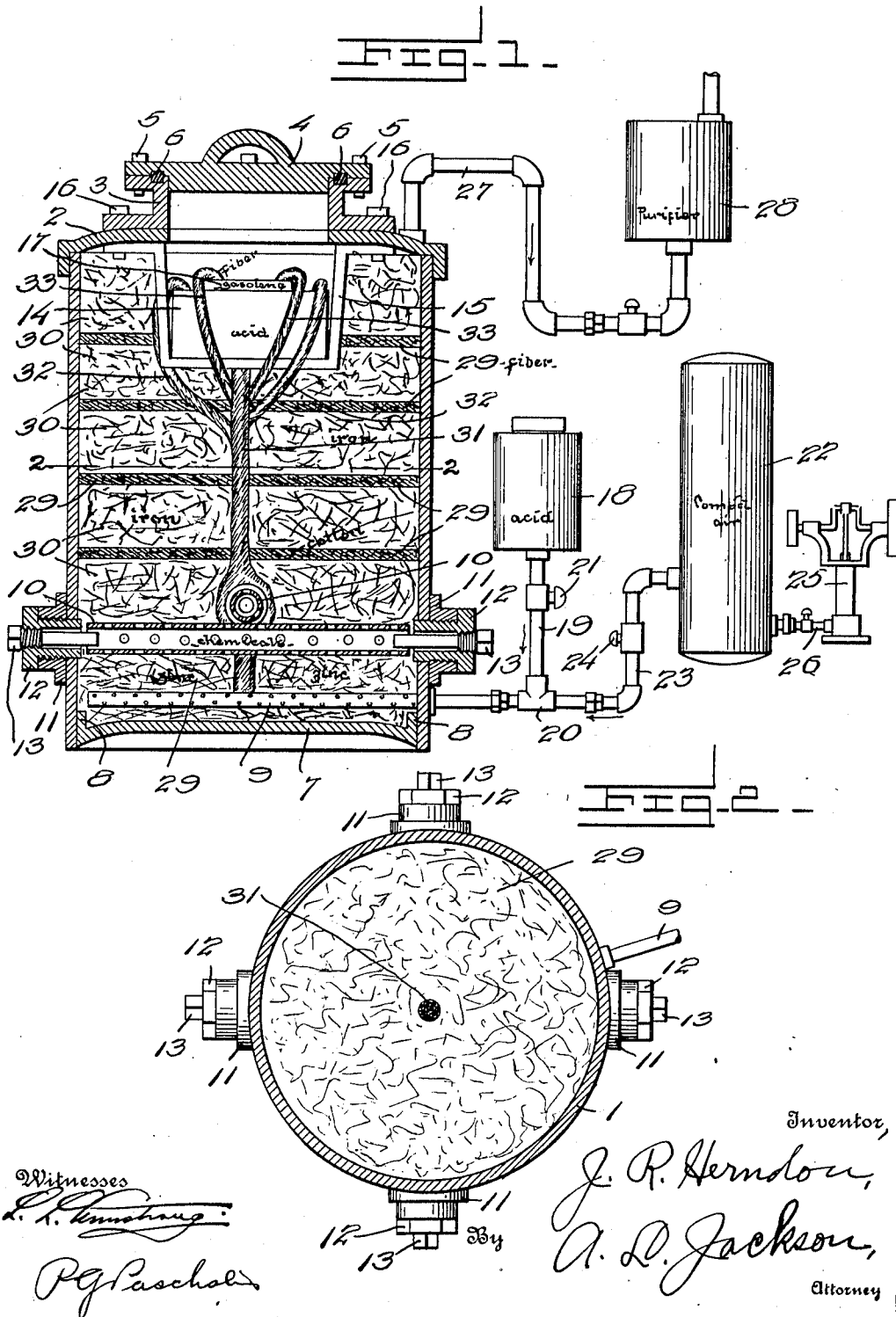


J. R. HERNDON.
 APPARATUS FOR MAKING CARBURETED HYDROGEN GAS.
 APPLICATION FILED JAN. 22, 1912.

1,019,714.

Patented Mar. 5, 1912.



UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING CARBURETED HYDROGEN GAS.

1,019,714.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed January 22, 1912. Serial No. 672,740.

To all whom it may concern:

Be it known that I, JOSEPH R. HERNDON, a citizen of the United States, residing at Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Apparatus for Making Carbureted Hydrogen Gas, of which the following is a specification.

My invention relates to apparatus for manufacturing gas, and the object is to provide improved apparatus for manufacturing carbureted gas and more particularly to provide gas generators for manufacturing gas at small cost for illuminating and general heating and power purposes.

The improvements relate to means for making the replenishing of the generator more easily accomplished without disturbing the entire contents of the generator tank. Other objects and advantages will be fully explained in the following description, and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings which form a part of this application.

Figure 1 is a vertical section of the gas generator and a diagrammatic view of the other parts of the mechanism. Fig. 2 is a horizontal section, taken on the line 2—2 of Fig. 1.

Similar characters of reference are used to indicate the same parts throughout the several views.

The apparatus includes a tank 1 provided with a top 2 which has a large perforation or opening for making the interior of the generator accessible for charging and recharging purposes. A cast metal rim 3 is bolted to the top 2 and a cap 4 is seated on the rim 3 and bolted thereto by bolts 5 and a gasket 6 is seated in an annular duct provided between the meeting faces of the cap and the rim for sealing purposes. The tank 1 is provided with a bottom 7 which is attached to the tank 1 by means of an inwardly projecting flange 8. A perforated pipe 9 is projected into the lower part of the tank for feeding acids and air to the generator. Pipes 10 are mounted in the tank 1 for containing chemicals. Flanged nipples 11 are attached to the exterior of the tank 1 and flanged bushings 12 are screwed into the nipples 11 and plugs 13 are

screwed into the bushings 12. The pipes 10 rest loosely on and are supported on the inner ends of the plugs 13. By this arrangement the pipes 10 can be replenished without disturbing the other contents of the tank 1. The pipes 10 can be removed by taking out the bushings 12. The pipes 10 serve as troughs to hold chemicals which are to be treated with acids and these pipes 10 may be located at any suitable position in the tank 1 to cause a mixture of the gases generated from the chemicals with the vapors of the hydrocarbon oil.

A tank 14 is provided for containing acid and this tank is suspended in the tank 1 by means of a hanger 15 which is attached to the top or cover 4 by means of the bolts which attached the cover rim to the top 2. A vessel 17 is placed within the vessel 14 for containing a hydrocarbon oil or other liquid fuel.

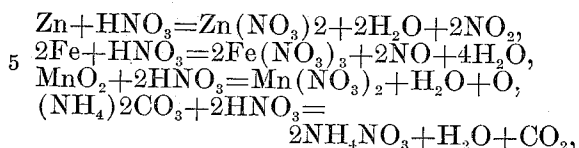
A tank 18 for containing acid for treating material in the bottom of tank 1 is provided. This tank 18 is connected to the perforated pipe 9 by means of a pipe 19 and a T-pipe 20. The pipe 19 is provided with a cock 21.

A compressed air tank 22 is provided and connected with the pipe 9 by means of a pipe 23 which is provided with a cock 24. A pump 25 is connected to the tank 2 by means of a pipe 26 for forcing air into the tank 22. A supply of compressed air is maintained in the tank 22.

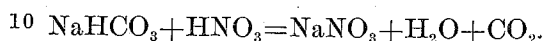
Gas is taken from the tank 1 through the top 2 by a pipe 27 which leads to a purifier 28.

Zinc scraps are placed in the bottom of the tank and treated with nitric or sulfuric acid of about 16½% strength which is supplied from the tank 18. A layer of fiber is placed on the zinc scraps. Then a layer of iron borings or slugs is placed on the layer of fiber, such as cotton. The fiber layers and the scrap iron or iron borings then alternate to the top of the tank 1. All the material above the zinc scraps is treated with nitric or sulfuric acid from the vessel 14 of a strength of about 10%. Black oxid of manganese MnO_2 , carbonate of ammonia $(NH_4)_2CO_3$, and bi-carbonate of soda $NaHCO_3$ are placed in the pipes 10 to be treated with the acid from the vessel 14 for generating hydrogen. When the ma-

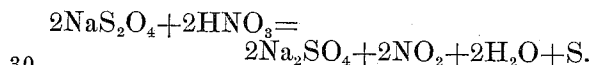
terials are saturated with nitric acid the reactions will be as follows:



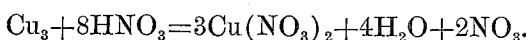
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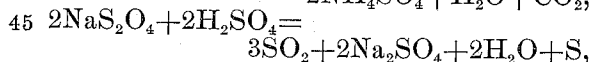
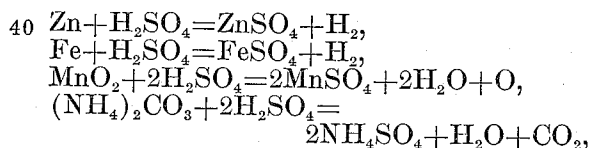
The acid is distributed or fed to all parts of the material in the tank by a central fiber stem 31, fiber ropes 32 leading from the vessel 14, and the fiber layers 29, the latter distributing the acids radially. Gasolene or other liquid hydrocarbon is placed in the vessel 17 and fed to all parts of the tank 1 by the fiber ropes 33, the fiber stem 31, and the layers of fiber 29. The ropes 32 and 33, and the stem 31, can be made of the same material, such as cotton. The manufacture of gas may be improved by adding copper scraps or sulfate of copper. The generation of gas may be improved by using hyposulfite of soda $\text{Na}_2\text{S}_2\text{O}_4$ instead of bi-carbonate of soda and the reaction will be as follows—



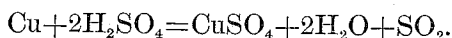
The copper is used as a substitute for the zinc and the reaction will be



35 If the sulfate of copper is used it is placed in the pipes 10 with the other chemicals. When sulfuric acid is used instead of nitric acid, the reactions will be:



and



50 The acids acting on the chemicals in pipes 10 will generate enough heat to convert the liquid hydrocarbon material into vapor. The hydrogen generated from the chemicals will be carbureted by the hydrocarbon vapors. Air pressure is used to commingle all the gases and vapors generated in the tank 1 and also to supply oxygen and hydrogen to the mixture of gases. Enough acid is introduced into the tank 1 from tank 18 to keep the zinc scraps substantially im-

mersed in acid. Compressed air is introduced constantly during the operation,—the communication between the compressed air tank and the tank 1 remaining open. The hydrocarbon oil and the acid are fed 65 constantly from the vessels 14 and 17 to the contents of the materials in the tank 1.

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

70 1. Apparatus for generating gas comprising a tank, alternate layers of metal scraps and of fiber, a central fiber stem co-operating with all of said layers of fiber for distributing liquids throughout said tank, 75 perforated pipes in the lower part of said tank for containing chemicals, flanged nipples attached to said tank, flanged bushings screwed into said nipples and projecting in said tank, plugs screwed into said bushings 80 and supporting said perforated pipes, a vessel for containing acid and a vessel for containing liquid hydrocarbon mounted in said tank, and means for forcing air into the lower part of said tank. 85

2. Apparatus for generating gas comprising a tank, alternate layers of metal scraps and of fiber mounted in said tank perforated pipes within said tank for containing chemicals, devices for mounting said 90 pipes and making provision for removal of said pipes through the side of said tank, means for distributing acids and liquid hydrocarbons throughout said tank, and means for forcing air into said tank. 95

3. Apparatus for generating gas comprising a tank, alternate layers of metal scraps and of fiber mounted in said tank, perforated pipes in the lower part of said tank, devices for mounting said pipes and 100 making provision for removal of said pipes through the sides of the tank, gas making chemicals in said pipes, a vessel for containing acid mounted in the upper part of said tank, fiber ropes for distributing acid 105 from said vessel throughout said tank, a vessel mounted within said vessel for containing liquid hydrocarbon, means for distributing the hydrocarbon throughout said tank to said metal scraps and fiber, and 110 means for forcing air into said tank under pressure.

In testimony whereof, I set my hand in the presence of two witnesses, this 2nd day of January, 1912.

JOSEPH R. HERNDON.

Witnesses:

A. L. JACKSON,
S. D. MATHEWS.