2 Sheets—Sheet 1.

J. M. HUNTER.

Apparatus for Producing Power, Heat, and Light from Hydrocarbon and Water.

No. 217,223. Patented July 8, 1879.

Fig. 1.

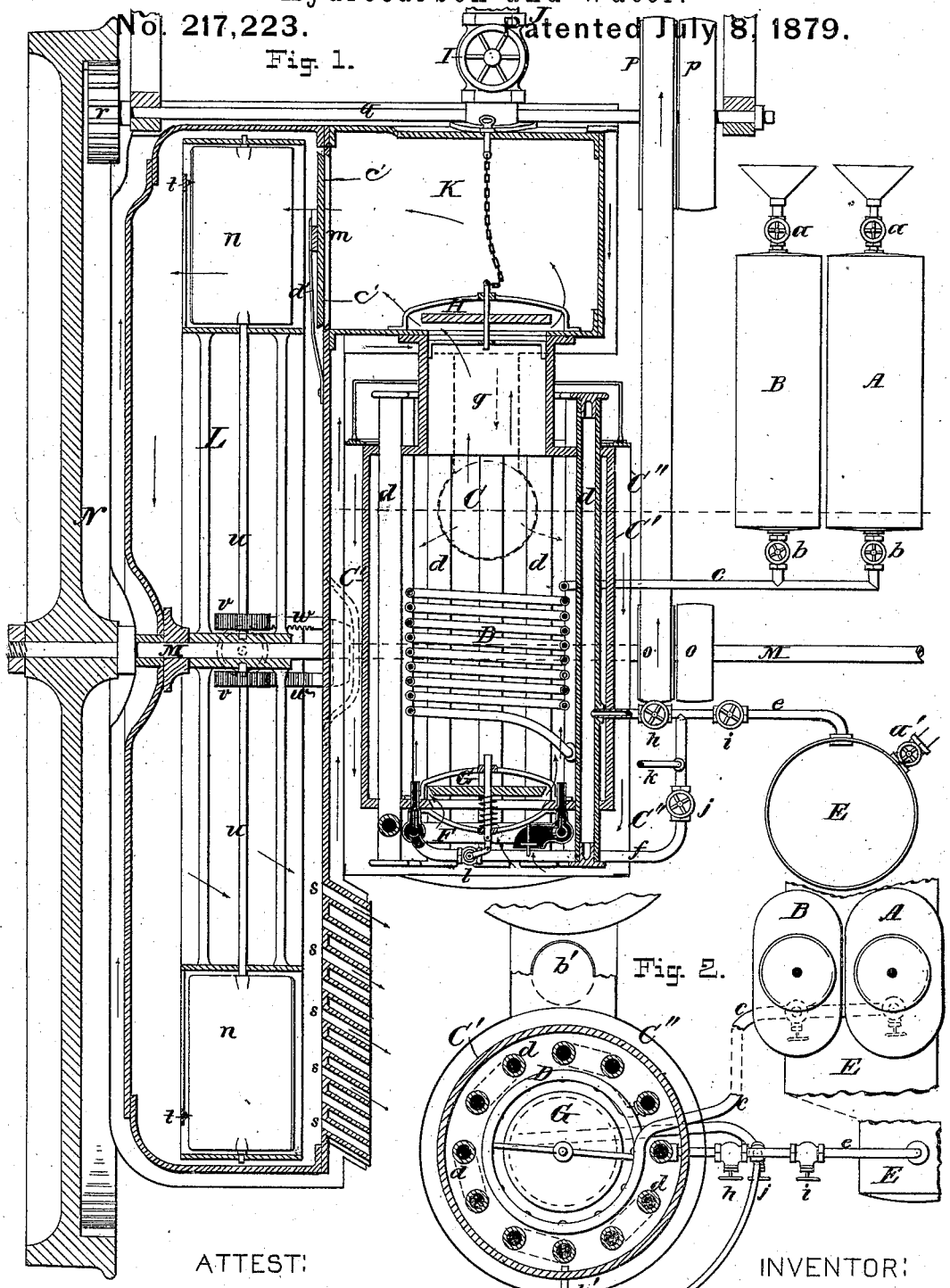

Fig. 2.

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2 Sheets—Sheet 2.

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Fig. 3.

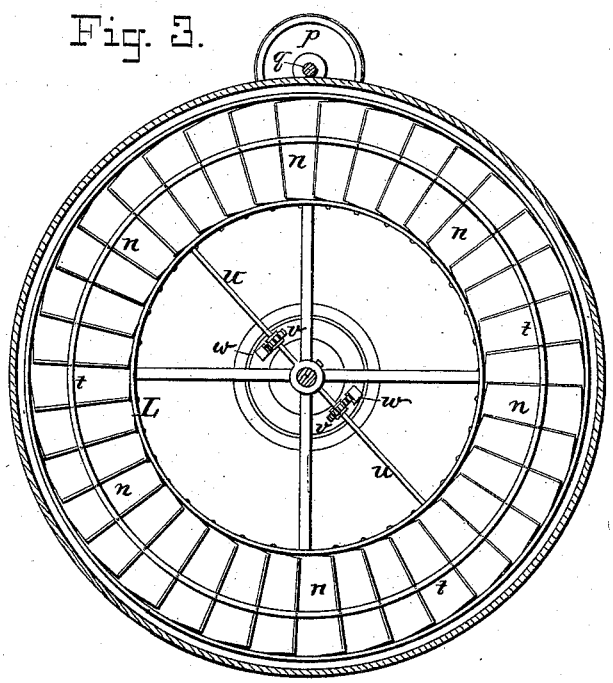
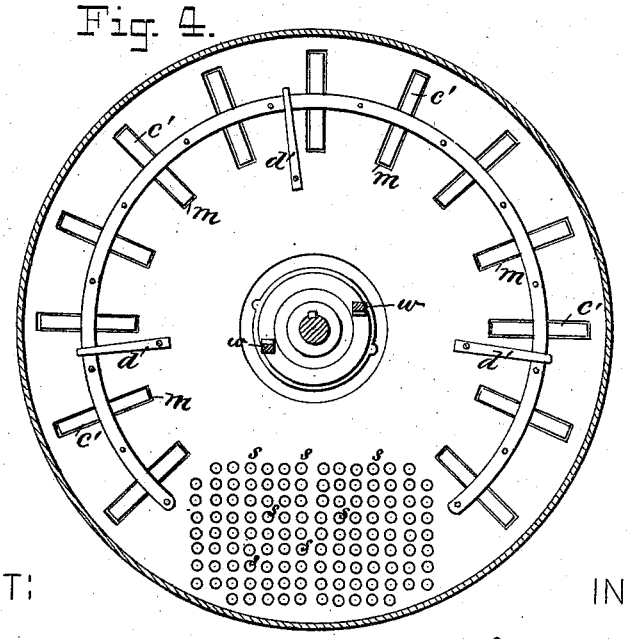


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN APPARATUS FOR PRODUCING POWER, HEAT, AND LIGHT FROM HYDROCARBONS AND WATER.

Specification forming part of Letters Patent No. **217,223**, dated July 8, 1879; application filed March 10, 1877.

To all whom it may concern:

Be it known that I, JOHN MORRISON HUNTER, M. D., of the city, county, and State of New York, have invented certain Improvements in Apparatus for Producing Power, Heat, and Light from Hydrocarbons and Water, of which the following is a specification.

This invention relates to apparatus for vaporizing and decomposing the vapors of water and hydrocarbons while in contact by means of heat for the production of power, heat, and light, and in mechanism whereby the automatic explosion of the resulting gases or vapors, combined with air, is utilized as a motive force, all as will be hereinafter specifically set forth.

In the drawings, Figure 1 is a vertical sectional view through the motor and generating apparatus, arranged to illustrate the interior construction. Fig. 2 is a horizontal section of the generator. Fig. 3 is a front view of the motor-wheel with the inclosing-cap removed. Fig. 4 is a vertical section taken back of the motor-wheel to show the valvular openings in the cylinder. The last two views are on a reduced scale.

A is a vessel for holding a hydrocarbon, as crude petroleum, and B is a water-vessel. Both of these vessels are provided with funnels for filling and valves *a a* and *b b* above and below. These vessels connect by a pipe, *c*, common to both, with a generator, C. This generator consists of a coil or worm, D, arranged inside a series of upright tubes, *d d*, and connected alternately at the top and bottom, the object being to provide an extended circulation of the vapors. The pipe *c* connects with the coil D, and the latter connects with one of the tubes *d*. A tube at the other extremity of the series is tapped by a pipe which leads to a gas-holder, E.

The gas-pipe *e* is tapped by a pipe which leads to a circular or ring burner, F, located at or near the base of the generator, but within the space circumscribed by the tubes *d d*. This ring may be provided with jet-holes or have a series of Bunsen burners affixed thereto, as shown, the object being to produce intense heat.

The internal mechanism of the generator is incased in a shell or drum, C′, as shown, and outside of this a sheet-metal housing, C″, which may be provided with capped openings by which to get at the interior, and into which atmospheric air is admitted.

G is a valve in the bottom of the inner drum, C′, which is normally upheld by a spring, and H is a lift-valve in the upper portion or neck, *g*, of the said drum, which is adapted to close by its own weight.

The gas-pipes *e* and *f* are provided with cut-off cocks or valves *h*, *i*, and *j*, as shown, and *k* is a jet-tube from the gas-pipe *f*. This tube opens in close proximity with a shorter horizontal tube, *k′*, opening into the generator-case.

So far as described the operation is as follows: I first charge the holder E with hydrogen or carbureted-hydrogen gas under pressure at a suitable opening, *a′*. On opening the cocks *i* and *j*, the gas passes from the holder through the pipes *e f* to the burners F. The burners are lighted and heat up the generator and coil, air for supporting the combustion being admitted through a conduit opening into the outer shell or casing around the generator, as shown at *b′* in Fig. 2. Water and liquid hydrocarbon from the receivers or holders A B are admitted in small quantities to the coil D through the pipe *c*, and the intense heat from the burner F volatilizes the hydrocarbon, forming carbureted hydrogen, and decomposes the watery vapor into oxygen and hydrogen. The oxygen combines with the excess of carbon from the hydrocarbon, generating combustible carbonic oxide, and permanent gases result. This transformation into permanent gases may take place before the entire circulatory series of coil and pipes is passed through, so that the said gases may pass through the pipe *e* to the holder E as fast as formed, to take the place of that consumed in heating up the coils.

To permit the escape of the products of combustion during this preliminary operation, the valve H is lifted by a chain, as indicated in Fig. 1, or otherwise, and a valve, I, in an outlet, J, opened.

After the operation first described has been carried far enough to produce decomposition

by heat of the contents of the generator, the valve I is permanently closed, the valve H lowered, the valve *h* opened, the valve *i* permanently closed, and the valve *j* temporarily closed for the purpose of extinguishing the lights in the burner F, after which it is again opened to admit gas from the generator-tubes to the interior of the generator-drum C′.

The gas enters the drum through the burner-ring F and mixes with atmospheric air, which passes down the annular space between the drums C′ C″, and enters the inner drum through the valvular opening in the bottom of the same.

When the mixture of gas and air has reached the explosive point, which proportioned mixture is well understood, it is ignited by a jet burning at the tip of the tube *k*.

The explosion acts to close the valve G and lift the valve H, so that the gases or heated products expand into a chamber, K. Immediately after the explosion the valves G and H resume their normal positions, as before.

A stem on the valve G acts, in seating by the force of the explosion, to close a valve, *l*, in the pipe *f*, so as to cut off the entering gas momentarily. This valve is again thrown open on the rising of the valve G. If it were not for this latter device, or some one equivalent thereto, the explosion would be likely to ignite the burners and defeat the purpose in view.

The explosions will follow each other in quick succession, and the intense heat generated will keep the coil and generator tubes at a temperature sufficiently high to vaporize and decompose their fluid contents, thus producing a constant supply of gas, and rendering the action of the generator automatic.

To apply or utilize the force generated by the successive explosions in the drum C′, any suitable mechanism may be employed. I have herein illustrated one good form, which I will now describe.

The chamber K is in the nature of an annular segment provided with valvular openings *m m*. (Best seen in Fig. 4.) The expanding products of combustion from the chamber K pass through these openings and impinge upon the obliquely-arranged blades *n n* of a motor-wheel, L. (See Fig. 3.) This motor-wheel may be fixed on a shaft, M, and transmit motion to a wheel, N, through gears and pulleys *o p*, a shaft, *q*, and a pinion, *r*, meshing with teeth on the wheel N. In this arrangement the wheel N rotates on the shaft M; but by mounting the motor-wheel and pulleys *o o* on a tubular shaft a wheel, N, might be fixed rigidly to each end of the shaft M.

After the force of the expanding products is expended on the blades *n* to rotate the motor-wheel, they pass off through tubes or openings *s s* in the shell or casing around the wheel L. These openings should have a collective area large enough to allow the escape of the gases without back-pressure.

I propose to utilize the heat of the escaping products as follows: The air used to form the explosive mixture in the generator passes in around the tubes *s s*, circulates through the jacket-place around the heated parts, and finally enters the opening *b′* with augmented temperature; or the heat arising from the burning gases may be employed to warm rooms or offices by applying it through the medium of radiators or registers of ordinary construction.

The blades *n n* are pivoted axially, and are all connected together by some suitable means. That shown consists of a ring, *t*, linked to each blade.

One or more of the blades *n* are provided with prolonged axes *u*, provided with pinions *v*, and meshing with these are racks *w*, secured to a disk along the shaft. The racks are caused to rotate pinions, and thus regulate the degree of obliquity of the blades. By shifting the blades far enough the direction of rotation of the wheel L may be reversed.

To maintain a certain pressure in the chamber K, I provide the openings *m m* with valves *c′ c′*, which may be held down to their seats by springs *d′*, as shown in Figs. 1 and 4. These are lifted at each successive explosion in the generator, and are closed by the springs.

I wish it understood that I do not claim as part of my present invention the decomposition of water or superheated steam in the presence of a hydrocarbon to form permanent combustible gases; nor do I desire to confine myself to the decomposition of the vapors at all, as it is well known that the vapor of hydrocarbon alone, when mixed with a proper proportion of air, will explode when ignited.

Whether a permanent gas or only an attenuated vapor of hydrocarbon be produced by the generator, a succession of explosions will be produced automatically in the drum C′, and the heat thereby induced will develop the vapor or gas exploded, and this is the important feature of my invention.

It is not important that the holders A, B, and E be arranged or distributed as shown. They may be arranged in the most convenient way. Nor need the circulating portions of the generator be arranged and constructed as shown. The worm D may be omitted if the pipes *d d* are found sufficient for the purpose.

The generator may be of any size required, or there may be two or more, as indicated in Fig. 2.

The gas in the holder E may be utilized for illuminating purposes as well as for power by providing said holder with suitable pipes and burners similar to that shown at *k*, and I contemplate employing said gases for that purpose.

I claim—

1. In a gas-engine, a generator consisting of a series of pipes or coils for containing the fluids from which the gases or vapors are to be generated, arranged within a strong drum having a valve, G, to admit air, a valve, H, to

allow the escape of the expended products, a burner, F, to admit gas at the bottom and to primarily heat the coil, and a jet to explode the mixture of air and gases or vapors automatically, all arranged substantially as set forth.

2. In a gas-engine, a gas or vapor generator arranged within a strong shell or cylinder, and provided with suitable valves and heating apparatus, substantially as shown, all so arranged that a series of explosions may be produced within the shell of the generator by means of a constantly-burning jet, substantially as and for the purposes set forth.

3. In a gas-engine, the combination, with the generator C and the chamber K, of the motor-wheel L, all constructed and arranged substantially as set forth.

4. In a gas-engine, the generator consisting of the circulatory pipes or coils, the shell C′, the burner F, the valve G, the valve H, the pipes *c e f*, holders A B, and gas-receiver E, all combined and arranged substantially as set forth.

5. In a gas-engine, the motor-wheel L, provided with adjustable pivoted blades *n n*, connected together and arranged to be set by means of pinions *v* and racks *w*, in combination with the chamber K, provided with openings to admit the heated products to impinge directly upon the blades, substantially as set forth.

6. In a gas-engine, the generator provided with vertically-arranged tubes *d d*, forming a series connected above and below alternately, to form a continuous circulating channel or passage for the vapors around the heating-chamber, substantially as and for the purpose herein specified.

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Witnesses:
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FRED. HAYNES.