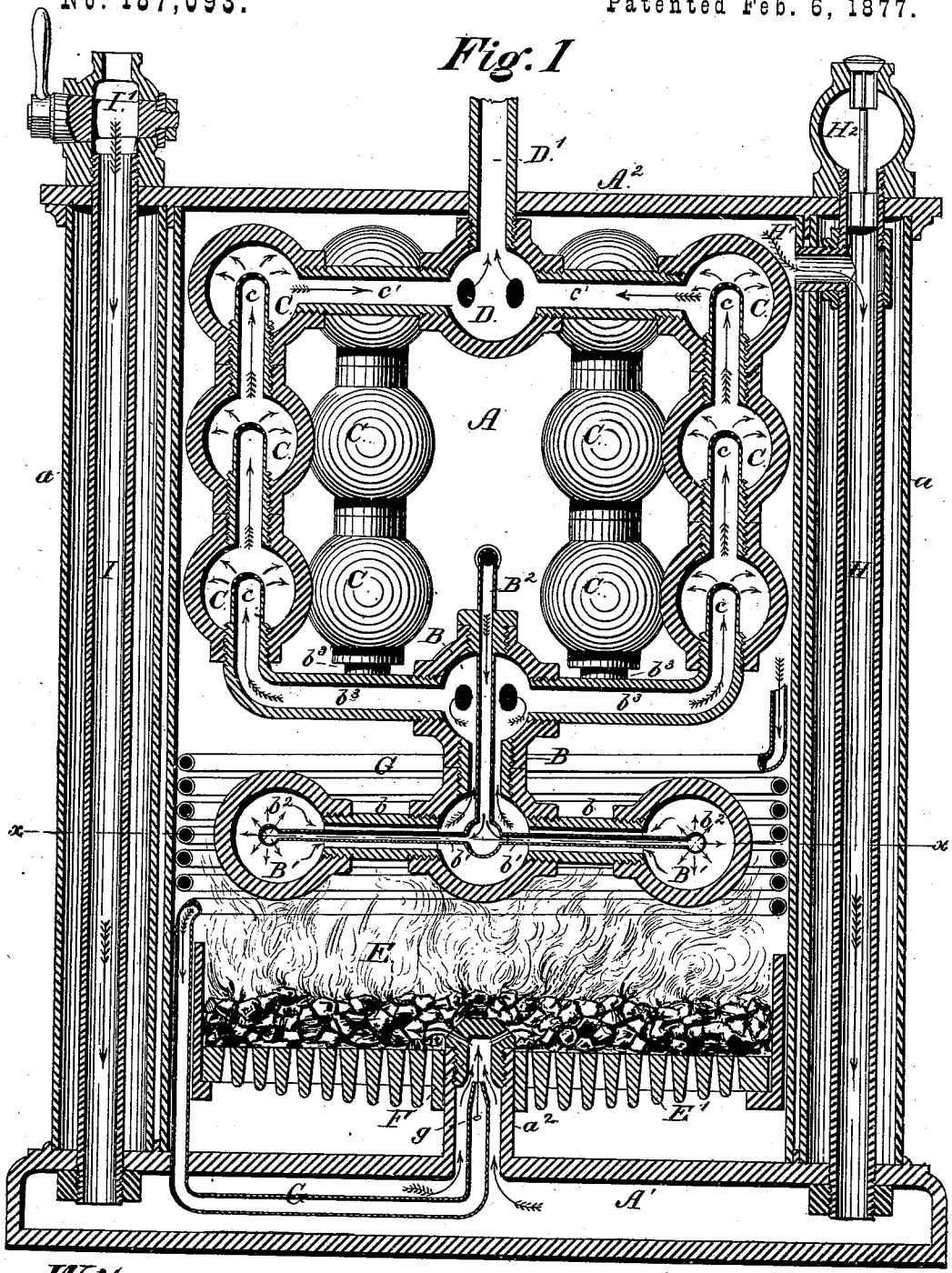
2 Sheets—Sheet 1.

R. D. BRADLEY.

APPARATUS FOR GENERATING MOTIVE GAS FROM WATER.

No. 187,093. Patented Feb. 6, 1877.

Fig. 1



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2 Sheets—Sheet 2.

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APPARATUS FOR GENERATING MOTIVE GAS FROM WATER.

No. 187,093. Patented Feb. 6, 1877.

Fig: 2

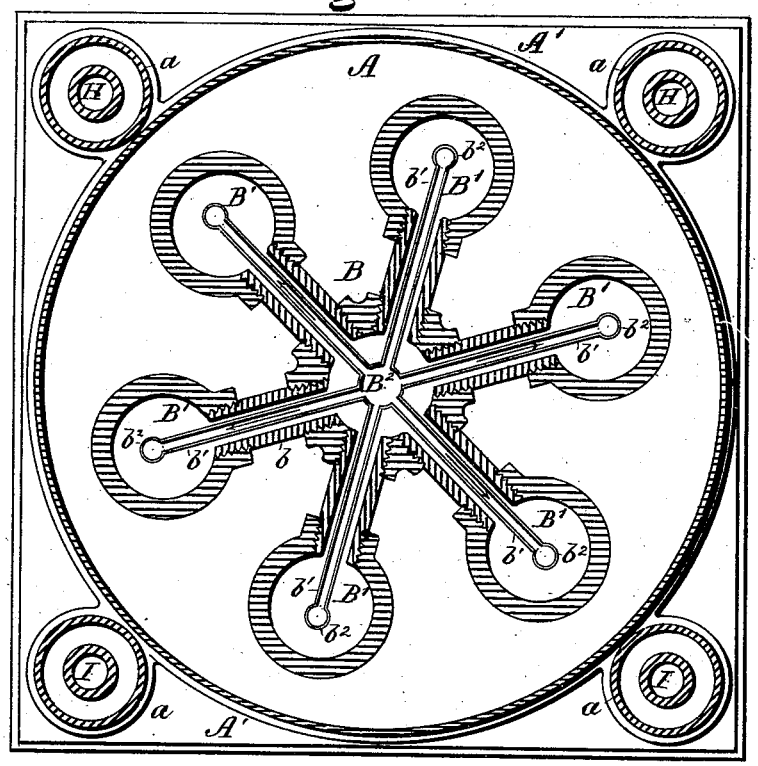
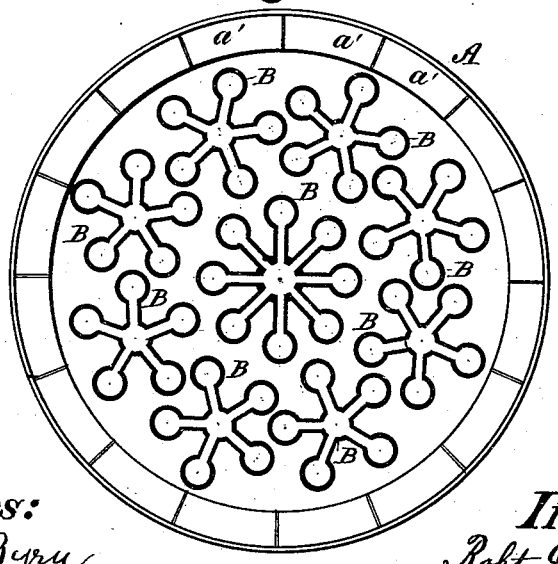


Fig: 3



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UNITED STATES PATENT OFFICE.

ROBERT D. BRADLEY, OF PRESTON, MARYLAND.

IMPROVEMENT IN APPARATUS FOR GENERATING MOTIVE GAS FROM WATER.

Specification forming part of Letters Patent No. **187,093**, dated February 6, 1877; application filed July 11, 1876.

CASE A.

To all whom it may concern:

Be it known that I, ROBERT D. BRADLEY, of Preston, in the county of Caroline and State of Maryland, have invented a new and Improved Apparatus for Generating a Motive Gas from Water; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the development of extraordinary motive power from water through the minute disintegration of the same and the agency of heat; and it consists in the peculiar construction and arrangement of the generating apparatus, as hereinafter more fully described.

In the accompanying drawings, Figure 1, Sheet 1, is a vertical central section through an apparatus embodying my invention; Fig. 2, Sheet 2, a transverse section of the same on the line *x x;* and Fig. 3, a diagram or plan, showing one of many modifications and forms for increasing or multiplying the volume of the gas and its consequent effective force.

Upon a base or bed-plate, A′, is mounted a chamber or casing, A, of circular or rectangular form, which may be lined with fire-brick or tiles a^1 a^1, (shown in Fig. 3,) as a non-conductor, to afford the necessary protection from the heat. Within this chamber or furnace A, and immediately above the fire, are placed the generators, consisting of any number of cells or spherical vessels, B^1 B^1 B^1, of an alloy of one part tin and nine parts copper, or other suitable material of sufficient tensile strength, connected to, and radiating from, a compound chamber or vessel, B. A pipe, B^2, is inserted into this vessel B, and is provided with a number of radial branches, b^1, corresponding with the number of the vessels B^1 B^1 employed. The ends of these branch pipes b^1 b^1 are closed by small bulbs or hollow spheres, which are provided with a number of very fine and delicate perforations, preferably about the size of the finest cambric needle, whose functions will hereinafter be described. From the upper part of the compound chamber B the branch pipes b^3 b^3 b^3 connect with a series of spherical vessels, C C C, which I designate "intensifiers." They are connected together, and provided with finely-perforated diaphragms *c c c*. The pipes *c′ c′ c′* connect the different series of intensifiers with the vessel D, having one outlet-pipe, D′.

The fire is supported upon a movable grate, E, having a vertical movement upon the cylindrical projection a^2 of the bed-plate A^1, and may have, also, a rocking movement to facilitate the cleaning of the fire. The smoke and heated air are conveyed through the tube H into the hollow bed-plate A^1, to unite with the gas which has done its work, and are passed through the coil of pipe G and the small opening *g*, to form a jet to promote combustion.

Whenever, at any time, any back pressure is created by the accumulation of carbonic-acid gas, the weighted relief-valve H′ will permit its escape to the atmosphere.

The cock or valve I′ is for the purpose of supplying the necessary quantity of atmospheric air through the tube I, which is carried into the furnace by induction produced by the blast of the gas through the nozzle of pipe G. The openings or jets of the united gases may be introduced either above the grate, as shown in the drawing, Fig. 1, or below the grate.

The process is as follows: Fire being made in the grate, the spherical generators become rapidly heated, when a jet of water is introduced by means of a pump or other suitable mechanical device through the pipe B^2, from whence it is distributed through the branch pipes b^1 b^1, and forced through the minute perforations at the end of these pipes, and is suddenly brought in contact with the heated surface of the generator, when it instantaneously assumes an expansive force far greater than that usually manifested by steam, and possessing marked peculiarities.

The spherical vessels are very small, never exceeding two inches of internal diameter, and are made strong enough to resist three or four times the pressure exerted upon them, and in the event of bad material or defect of workmanship these will merely crack, and do not exhibit any tendency to scatter or fly off into space, as in the case of boiler explosions. One advantage, then, of this mode of generating the gas, is in getting rid of a permanent body of steam, the water being injected

in separate pulsations from the pump, just as the gas formed thereby is used up, which injection of water ceases if the generator-cells crack.

The cells C C C, which I call "intensifiers," are for the purpose of increasing the expansive force of the gas generated, and to furnish a sort of reservoir to insure a regular and undiminished supply for the motor.

In the drawings I have shown three series of these intensifiers; but I do not confine myself to any particular number of them, or any particular number of series, as that will depend mainly on the amount of power required, and must be subject to future experiments.

The draft-connection is made through the tubes H H—that is to say, the smoke and portion of the heated air must pass through the tubes into the hollow bed-plate A^1, to unite with fresh air supplied by the cock I′ and pipe I, and the gas returned from the motor after having done its work through the coil G. This insures perfect combustion, as no trace of water or smoke can be discovered, the only product being ashes, heat, and carbonic-acid gas, which latter escapes through the valves H′.

Fig. 3, on Sheet 2, will illustrate how I may multiply my generators to obtain any amount of power. I may also state that, from experiments I have made, it is evident that I can produce any pressure, limited only by the strength of the material used in the construction of the apparatus.

I have tested the cells or vessels with a pressure of more than eight thousand pounds to the square inch, the registering capacity of the gage employed, and have worked an apparatus with a pressure of one thousand pounds to the square inch with perfect safety.

In relation to the rationale of the process of generating this gas, and the chemical character of the same, I will not attempt to explain this, nor define its power. Suffice it to say that the essential conditions for generating it, endowed with such extraordinary motive effect, consist in first mechanically disintegrating the water to a very finely divided state, and then expanding the same by heat. I have found that the effect is only produced when the water is forced under pressure through perforations of a certain degree of fineness, which vary in minuteness from the size of a fine cambric needle to the insensible natural pores of the metal, larger outlets serving to produce only the common effects of steam. These minute passages, it appears, introduces the water in such a condition as to prevent it from forming drops and halting or hesitating in the spheroidal state; but, by reason of its finely-divided condition and great surface, causes it instantaneously to expand into a gaseous motive fluid of high tension, as described.

Having thus described my invention, what I claim as new is—

1. The generating-cells B^1, arranged radially, and communicating with a central compound chamber, in combination with the water-pipe B^2, passing through compound chamber B, and having radial branches or glands b^1, which enter the cells through their communication with the compound chamber, and terminate in bulbs provided with minute perforations, substantially as and for the purpose described.

2. The generator-cells B^1, compound chamber B, and the contained water-pipe B^2, with glands b^1, in combination with a series of superposed intensifier-cells C, connected with chamber B through pipes b^3, and communicating with each other through perforated diaphragms *c*, substantially as and for the purpose described.

3. The air-tight chamber A^2, having a hollow base, and containing the generator and furnace, in combination with the air-pipe I, having cock I′, and the smoke-pipe H, communicating with the furnace above and the hollow base below, as and for the purpose described.

4. The combination, with the case A^2, having a hollow base, of the waste-pipe G, coiled about the generators, and leading through the hollow base to the furnace, as described.

5. The combination, with the case, having a hollow base and an air-pipe, I, and smoke-pipe H, communicating therewith, of the waste-pipe G, leading through the hollow base to the furnace, and adapted to feed the air and smoke to the same by induction, substantially as described.

The above specification of my invention signed by me this 8th day of July, 1876.

ROBERT D. BRADLEY.

Witnesses:

EDW. W. BYRN,

SOLON C. KEMON.