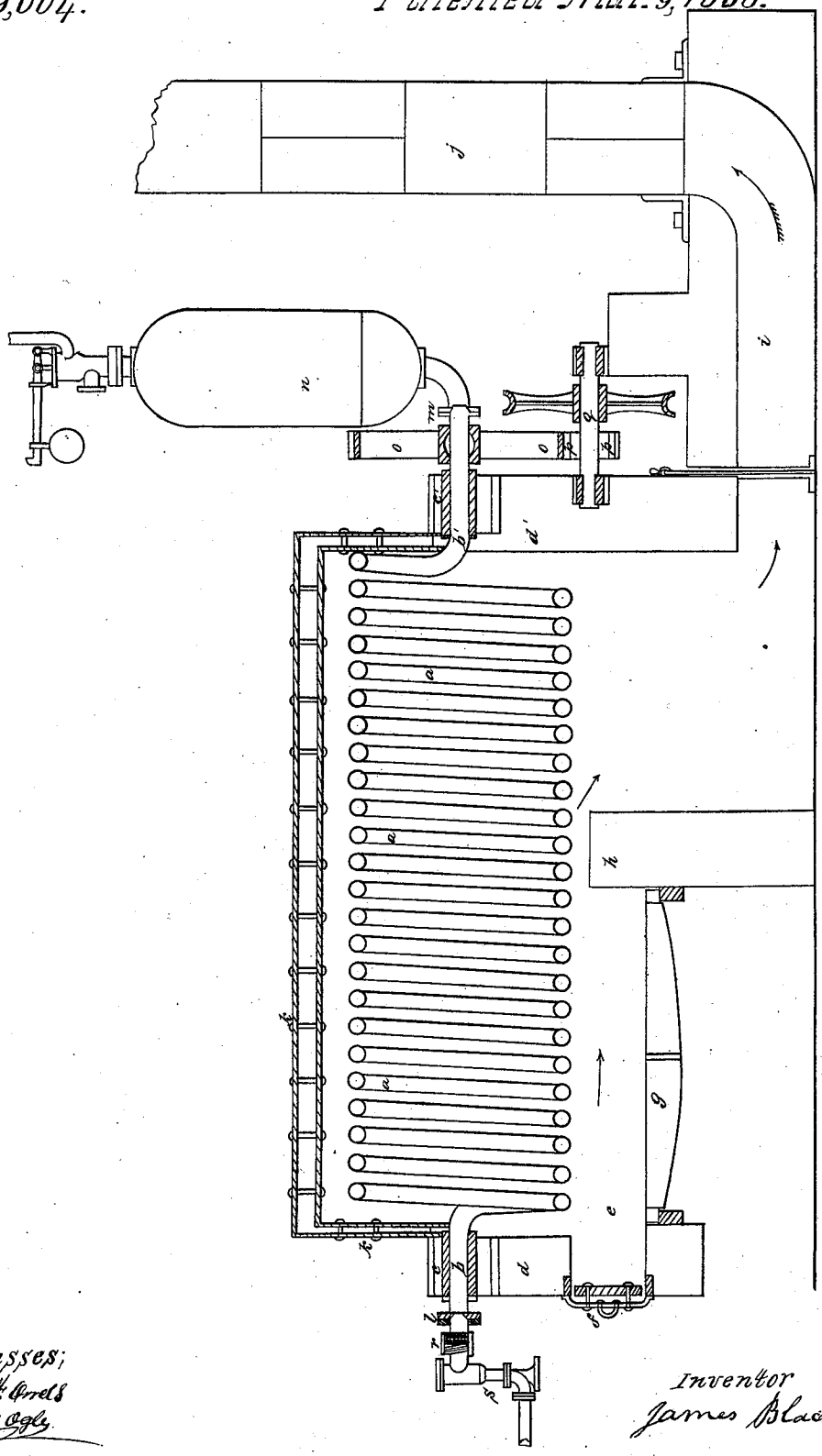
J. Black,

Burning Hydrocarbon.

No. 19,604. Patented Mar. 9, 1858.



Witnesses;
George F. Ords
Williams Ogle

Inventor
James Black

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UNITED STATES PATENT OFFICE.

JAMES BLACK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCOTT, TODD & CO., OF SAME PLACE.

IMPROVED METHOD OF GENERATING STEAM IN COMBINATION WITH ATMOSPHERIC AIR AS A MOTIVE POWER.

Specification forming part of Letters Patent No. **19,604**, dated March 9, 1858.

To all whom it may concern:

Be it known that I, JAMES BLACK, of Philadelphia, in the State of Pennsylvania, have invented a certain new and Improved Method of Generating Vapor or Gas to be used as a Motive Power, which I denominate "aerated steam;" and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, which said drawing represents in longitudinal vertical section a generator such as I have employed for the application of my said invention.

My invention consists in injecting into a heated metallic vessel of any suitable construction atmospheric air and water commingled, preferring so to inject it that it shall enter the heated vessel in the form of spray, as I have discovered that the vapor or gas generated from this mixture possesses more tensive force, or will produce a greater amount of mechanical power with a given quantity of fuel, than can be produced from steam generated from water alone or any other known fluid or mixture of fluids. To enable any one skilled in this branch of the arts to understand, apply, and use my said invention, I will describe the generator which I have used for this purpose.

In the accompanying drawing, *a* represents a metallic tube bent in the form of a helical coil, and each end of the said tube brought to and extended for some distance in the line of the axis of the coil, as at *b b'*. The parts *b* and *b'* are fitted like journals and mounted in suitable boxes, *c* and *c'*, in the masonry or outer casing, *d d'*, surrounding the coil. This masonry surrounds the lower part of the coil and extends a little above the boxes *c c'*, and that part of the casing *k* which surrounds the upper part of the coil is made of metal, and double, to constitute, if desired, a water-heater in which to pass the feed-water, that it may be partly heated preparatory to being injected in the coil; but the feed-water may be heated in any other suitable manner, or it may be injected without having been previously heated. A suitable furnace, *e*, with feed-door *f*, grate *g*, and bridge *h*, is to be provided under the forward part of the coil, the products of combustion passing from the bridge through the flue-space *i* to the chimney *j*, or in any other suitable manner. The end *b'* carries a spur-wheel, *o*, which engages a pinion, *p*, on a driving-shaft, *q*, by which a slow rotary motion is imparted from any suitable motor to the coil, and the extreme end *b'* is connected by a suitably-packed turning-joint, *m*, with a steam-drum, *n*, provided with a safety-valve and other requisite appendages. The end *b* of the coil is also connected, by a suitably-packed turning-joint, *l*, with a chamber, *r*, containing disks of wire-gauze or perforated plates, and this chamber is in turn connected with the feeding apparatus *s*.

The feeding apparatus should be constructed in any suitable and well-known manner, and to consist of a force-pump to receive atmospheric air and water in the proportion of about thirty cubic feet of air to about one cubic foot of water, and to force this mixture through the meshes of the wire-gauze or perforations of the plates in the chamber *r*, by which it will be divided into spray to enter the heated coil in that condition.

The coil is slowly rotated, which presents in succession every part of its circumference to the intense action of the heat, so that all parts of the circumference will be equally heated; and as the mixed spray of air and water is injected into this coil it is vaporized, and the vapor or gas thus produced passes through the coil to the drum *n*, from whence it is to be drawn for use.

It will be found that the vapor or gas thus generated will produce a greater mechanical force for a given amount of fuel than when generated either from water alone or from any known fluid or mixture of fluids; and although I have stated that I mix the air and water in the proportions of thirty cubic feet of atmospheric air to one cubic foot of water I wish it to be distinctly understood that I have given these proportions, because I have thereby produced the best results, although I have produced good results with a greater and with a less proportional quantity of water, and therefore I do not wish to be understood as limiting my claim of invention to the use of the proportions specified, nor do I wish to be understood as limiting myself to the application of my said invention in connection with the kind of generator described, as any other

suitable generator will answer which will admit of introducing in the form of spray the mixture of air and water, so that the required heat will be applied to it.

I am aware that it has been proposed to generate a gas or vapor for mechanical purposes by causing atmospheric air to pass up through falling heated water and then injecting such moistened air into a heated vessel or generator to be expanded. I do not, therefore, wish to be understood as making claim, broadly, to generating a vapor or gas from atmospheric air holding moisture in suspense, as this will not produce the result contemplated by me; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

Generating a vapor or gas for mechanical purposes by injecting into a suitable heated vessel or generator a mixture of atmospheric air and water in about the proportions herein specified, and substantially in the manner and for the purpose specified.

JAMES BLACK.

Witnesses:
WILLIAMS OGLE,
GEORGE F. ORRELL.