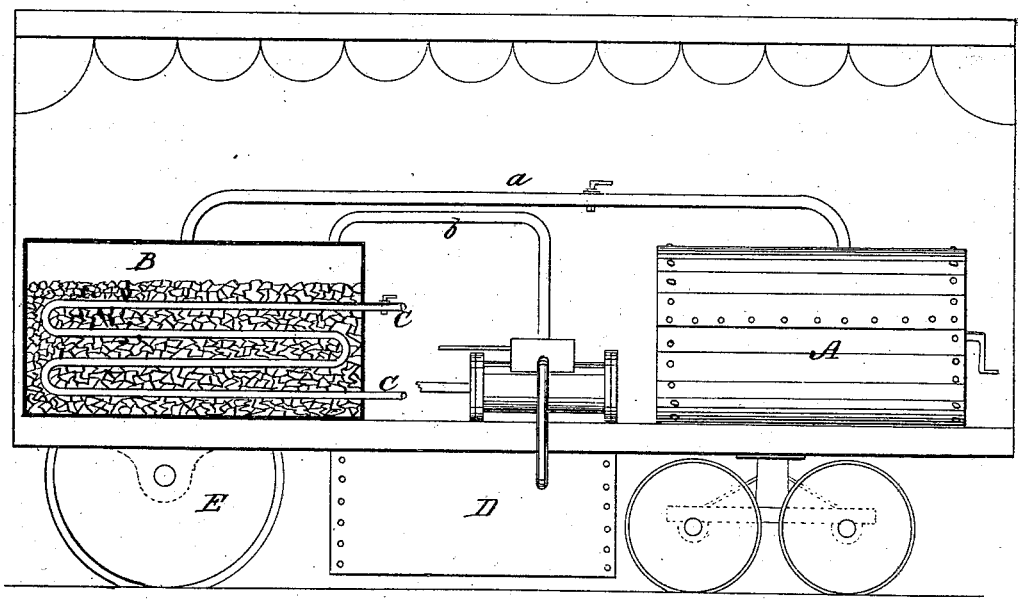
J. WESTCOTT.

Method of Using Carbonic-Acid Gas as a Motive Power.

No. 168,546. Patented Oct. 5, 1875.



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JOHN WESTCOTT, OF TOCOI, FLORIDA.

IMPROVEMENT IN METHODS OF USING CARBONIC-ACID GAS AS A MOTIVE POWER.

Specification forming part of Letters Patent No. **168,546**, dated October 5, 1875; application filed September 13, 1875.

To all whom it may concern:

Be it known that I, JOHN WESTCOTT, of Tocoi, in the county of St. Johns and State of Florida, have invented a new and Improved Method of Utilizing Carbonic-Acid Gas as a Motive Power; and I do hereby declare the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming a part of this specification, in which the figure is a side elevation, with the multiplier or receiver in section.

The object of this invention is to enhance the value of aeriform motors or gas-engines by providing a new method of storing and utilizing the expansive gas which constitutes the motive power. It consists in conducting the carbonic-acid or other gas from its generator to a receiver or multiplier, where it is expanded by heat, which multiplier is filled with vegetable or animal charcoal, or other amorphous form of carbon, or equivalent absorbent material, whereby a much greater quantity of the gas is stored up in the multiplier with less pressure upon the same than can be attained under ordinary circumstances, the charcoal absorbing, under ordinary temperature, about thirty-five times its volume of carbonic-acid gas, so that when the multiplier is charged from the generator it holds in reserve a far greater available force than is indicated by the pressure-gage, which, when properly developed and eliminated by the application of heat or electricity, is available as a motive power sufficiently constant, when re-enforced from time to time by the generator, to be a practical success.

The invention also consists in the method of developing, expanding, and eliminating the gas held by the charcoal by the application of heat through a vehicle of boiling oil, which is made to pass continuously through a heating-boiler and a series of tubes contained in the multiplier. The multiplier is fed by the generator from time to time, as it may require replenishing, and the gas utilized is discharged into a closed exhaust-box filled with the charcoal or absorbent material, by which it is reabsorbed and retained, and ready to be substituted for the charge in the multiplier when necessary.

In illustrating my invention, I have shown its application to a locomotive; but it is obvious that it is intended to be used for all the industrial purposes in which motive power is required.

A represents a gas-generator adapted to develop carbonic-acid gas from a mixture of sulphuric or hydrochloric acid with marble-dust or other cheap carbonates. Said generators are made strong enough to resist the required pressure, and are provided with suitable agitators and openings for charging and cleaning out. They are also, preferably, two in number, so that one is always ready for use while the other is being cleaned out, and the arrangements for feeding the acid are such that, instead of mixing the whole charge at once, it may be fed to the carbonate gradually, according to the circumstances of the case. B is the receiver or multiplier, which communicates with the generator through a suitable pipe, *a*, and with the induction-port of the engine-cylinder through a second pipe, *b*. Within the said multiplier is placed the absorbent material, which may be animal or vegetable charcoal, asbestus, or other material capable of exerting that adhesive surface attraction which causes the absorption of the gas. C is a series or coil of pipes placed in the multiplier, and passing through the absorbent material in the same. Said coil is attached to a heating-boiler, and through the same boiling oil is made to circulate as a vehicle of heat for the development and elimination of the gas from its condensed form in the charcoal. As the development of the gas must be conducted uniformly and with care, the boiling oil is specially adapted to the purpose, for the reason that it is capable of a much higher degree of heat without evaporating than water or other available liquids, and its temperature is not subject to sudden variations or fluctuations, which might prove disastrous to the multiplier. D is an air-tight exhaust-box, into which the waste gas is discharged after being utilized in the cylinder. This box is made perfectly tight, and is filled with absorbent material of the same kind that is contained in the multiplier, which reabsorbs a portion of the carbonic-acid gas, and prevents the entire waste of the same. E is one of the driving-wheels, which is rotated by the engine through the usual connections, or by means of a friction-wheel engaging with its

periphery. In operating an engine constructed according to my plan it will be necessary to feed the multiplier from the generator from time to time, and the oil-pipes will be provided with stop-cocks to regulate the flow of oil from the boiler, and the transmission of heat to the multiplier, according to the development of gas from the absorbent required to augment or supplement the power.

As compared with the fuel for steam-engines the cost of the materials are but trifling, the carbonates being so abundant as to make them cost only for transportation, and the acid used being of less value than the sulphate of lime, which is the product of the decomposition. In carbonic-acid-gas engines heretofore attempted the difficulty has been to get an action sufficiently continuous. If a large quantity is generated, sufficient to last for a considerable time, the pressure is either too great, or too large and cumbersome a generator is required. By means of the principle of surface adhesion or magnetic attraction which charcoal and some other substances manifest for certain gases, the molecules of the gas are brought into a very intimate relation, and condensed upon the surface of the absorbent, so as to admit of the storing of large volumes of the gas under pressure without risk to the tensile strength of the receiver.

Now, as this attraction of the absorbent for the gas is comparatively feeble, and the affinity easily broken up by heat, it will be seen that I have at command an immense power stored up, which I may utilize at the intervals between the operation of the generators, or at the same time therewith, by turning on the hot oil, whereby the actual pressure of the gas may be increased at will, or the diminishing effect of the generator supplemented and re-enforced.

By means of this improved method I am enabled, with two generators of a practical size, to produce a motive effect that shall compete with steam for some purposes, and, in many respects, be vastly superior to it, there being no smoke and cinders, and but little heat, which advantages give it a special adaptation to use on street-railways.

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

1. The herein-described method of utilizing carbonic-acid and other gases to be used as a motive power, by storing the same up by condensation through the surface attraction of charcoal or other equivalent absorbent placed in a receiver, and afterward eliminating and developing the said gas by heat or electricity when desired.

2. The method of applying the heat, for the purpose of effecting the elimination and development of the gas, by means of a vehicle of boiling oil, which is made to circulate through pipes in the receiver, substantially as described.

The above specification of my invention signed by me this 9th day of September, A. D. 1875.

JOHN WESTCOTT.

Witnesses:

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