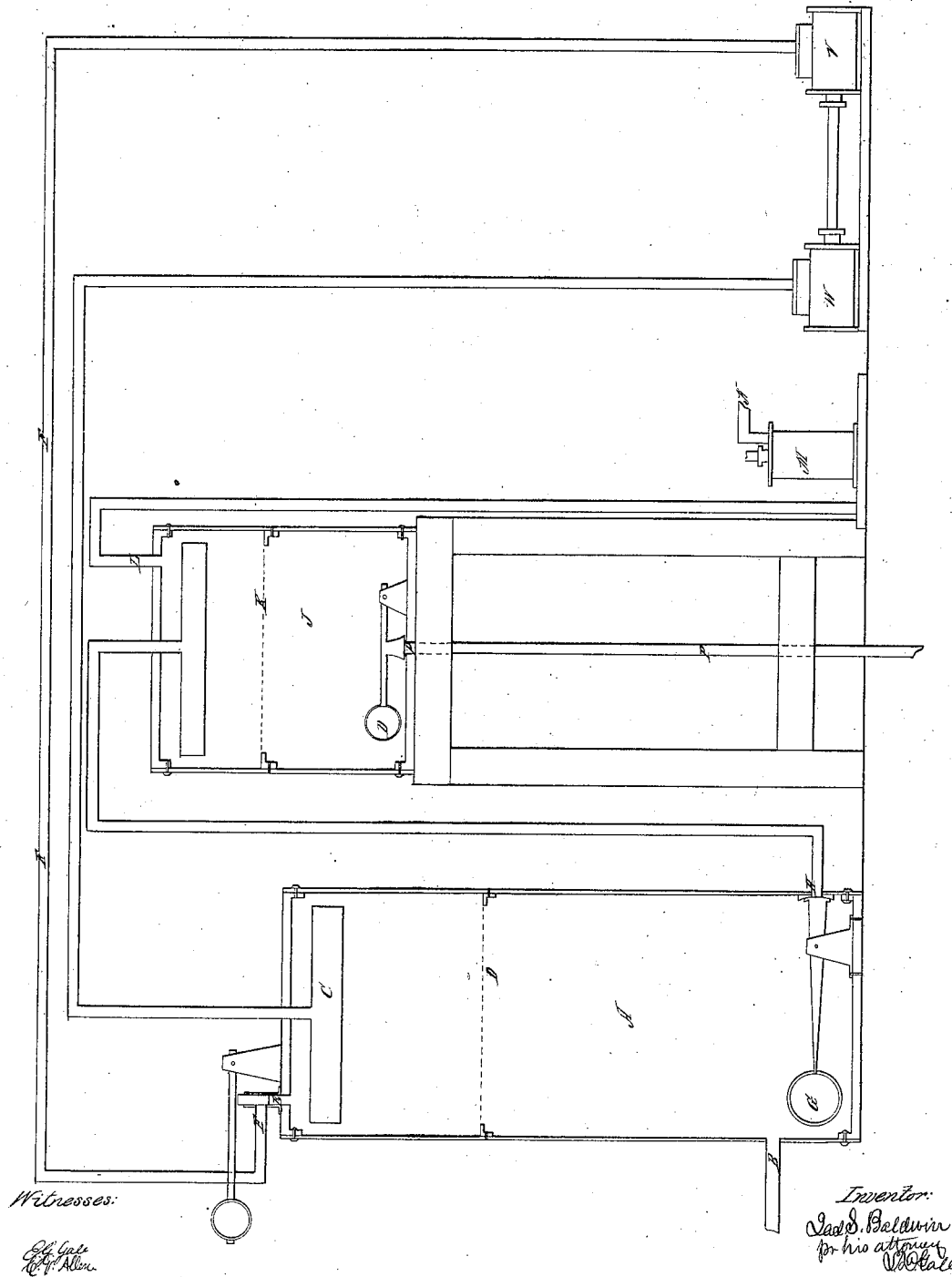


J. S. Baldwin,

Gas Generator,

N^o 55,038.

Patented May. 29, 1866.



UNITED STATES PATENT OFFICE.

JAMES S. BALDWIN, OF NEW YORK, N. Y.

IMPROVED METHOD OF COLLECTING AND SEPARATING CARBONIC ACID FROM MIXTURES OF GASES.

Specification forming part of Letters Patent No. **55,038**, dated May 29, 1866.

To all whom it may concern:

Be it known that I, JAMES S. BALDWIN, of New York, county of New York, and State of New York, have invented or discovered a certain new and useful method of separating, purifying and applying to use carbonic-acid gas as obtained from any well-known source; and I hereby declare that the following is a full and sufficient description thereof, reference being had to the accompanying drawings and references thereof, making a part of this description.

The method of manufacturing carbonic acid for soda-water, &c., in general use, where sulphuric acid and common marble constitute the materials used, is expensive, because no available use can be made of the waste materials after separating the gas. There are two methods, both cheap and practical, that may be used for generating the gas cheaply. The first is that by the combustion of anthracite coal or charcoal. The second is that of the limekiln, where carbonate of lime is burned into quicklime, expelling the carbonic-acid gas by means of the heat of burning fuel. The second is by far the most abundant source. The amount of fuel burned is the source in the first process, and the amount of fuel added to the amount of marble decomposed is the source in the second process, and gives nearly twenty times the amount yielded by the first process. If the gas be made from burning coal, as that used under a steam-boiler, there the expense of the coal has already paid for itself in heating the water. The gaseous products being drawn from the chimney above the fire are taken to the proper apparatus for absorbing the carbonic acid and forcing forward the waste gases to a secondary use, as hereinafter explained; but the second process—namely, that from the limekiln—I prefer, from the greater quantity yielded by the same expenditure of fuel.

The products of gases in the ordinary combustion of coal are vapor of water, carbonic acid, carbonic oxide, and nitrogen. That of limekiln is similar, so far as the fuel is concerned; but besides this the total amount of carbonic acid separated from the limestone—that is to say, every fifty pounds of pure limestone—will yield twenty-two pounds of carbonic acid and twenty-eight pounds of quicklime. Of the gaseous products, vapor of water

and carbonic acid are absorbed by water, while the carbonic oxide and nitrogen are not absorbed under the same exposure, but are expelled as waste gases. The water used to condense the gases is kept cold. To effect a separation of the gaseous products of combustion in limekilns, &c., I avail myself of the carbonic acid evolved.

Let A in the accompanying drawings represent a cylinder or tank, into which the gaseous products of combustion are forced through pipe B at the same time that a continuous shower of cold water is discharged from reservoir C through its perforate bottom, and thence through the diaphragm of wire-cloth D. The spray of water receives the carbonic-acid gas and vapor of water under a heavy pressure and absorbs them, while the nitrogen and carbonic oxide are allowed to escape through a weighted valve, E, balanced at a pressure of seventy-five pounds (or about five atmospheres) to the inch, and are thus carried away by pipe F F F, to be used for a motive power. The water shower in chamber A accumulates in the bottom until it raises float-valve G and opens a passage through pipe H for the escape of the surcharged water into second cylinder, J, through water-reservoir I, perforated at the bottom, and wire-cloth K, preparatory to being forced out into pipe P into a reservoir. As the liquid escapes from chamber A, with a pressure of seventy-five pounds to the inch, into chamber J, with only ten pounds, nearly all the gas will be set free, as I find a diminished pressure in the second cylinder to be necessary; so I keep the chamber of this cylinder partially exhausted by means of pump M, connected with it by pipe L. This arrangement (for exhaustion) of second cylinder and weighted valve in the first cylinder enables me to preserve any suitable pressure in the several cylinders as required. The relative proportion of pressure may be varied somewhat without varying the character of the invention. I have thus far found good results with a pressure of seventy-five pounds to the inch in the tank A, while there is a vacuum of ten pounds in tank J, and pure carbonic acid passes through L. Now, the present process for separating carbonic-acid gas from the waste gases is based on the absorbability of the former and non-absorbability of the latter by water when cold. The cylinder A may, therefore, be cooled by

ice, which will greatly increase its power of absorbing carbonic acid. Now, the waste gases passing off through the valve E, the carbonic acid is thus purified and transferred bodily in the water under a pressure of about five atmospheres to the second cylinder, J, where it is suddenly relieved of its pressure by a partially-exhausted atmosphere in the chamber of J, and is carried away through pipe L by the operation of exhausting-pump M, and forced into a suitable apparatus for condensing into the solid form or for other use. It is proper to say in this connection that the tank I in the upper part of cylinder J is equally advantageous in spreading the carbonated liquid open to a large surface for the escape of the carbonic-acid gas in a partially-exhausted atmosphere, as was a similarly-exposed surface for absorption of the same gas in a highly-compressed atmosphere in chamber A. The process is a cheap and easy way of purifying carbonic-acid gas obtained from cheap material for the preparation of an article used to a very great extent in cities. I mean soda-water, a wholesome and, in itself, cheap beverage, which ought to be cheaper than any other liquid in use for such

purpose, and by cheapening the process the article itself will necessarily be cheapened, and the substituting of a cheaper and healthier drink for intoxicating liquor will be greatly encouraged.

The waste gases which escape from cylinder A through pipe F F F furnish considerable mechanical force, and are capable of being applied to work the exhausting-pump M, or pump V W, or for any other suitable purpose where power is needed.

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

1. Separating, purifying, and transferring carbonic-acid gas from waste gases by means of water or its equivalent liquid, substantially in the manner and for the purpose herein set forth.

2. Driving the pumps, or other machinery, by the waste gases evolved in this process, substantially as described.

JAMES S. BALDWIN.

Witnesses:

WM. H. RIBLET,
L. D. GALE.