(No Model.)

J. F. BOYNTON.

PROCESS OF AND APPARATUS FOR GENERATING DIOXIDE OF CARBON FOR EXTINGUISHING FIRE.

No. 263,015. Patented Aug. 22, 1882.

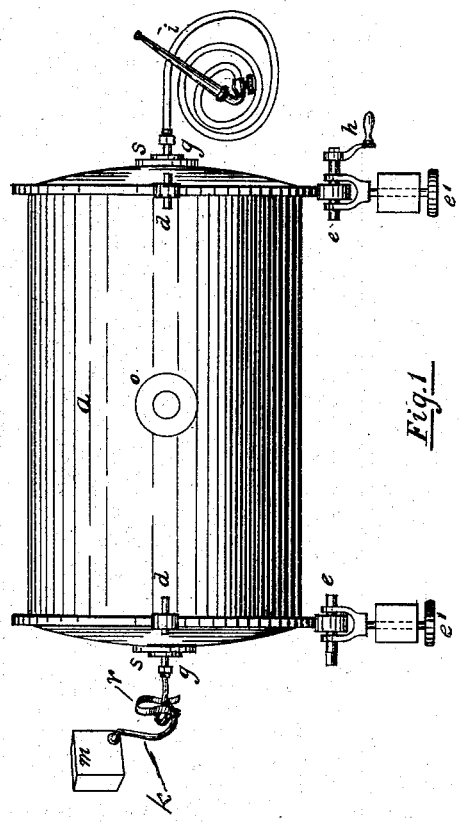

Fig. 1

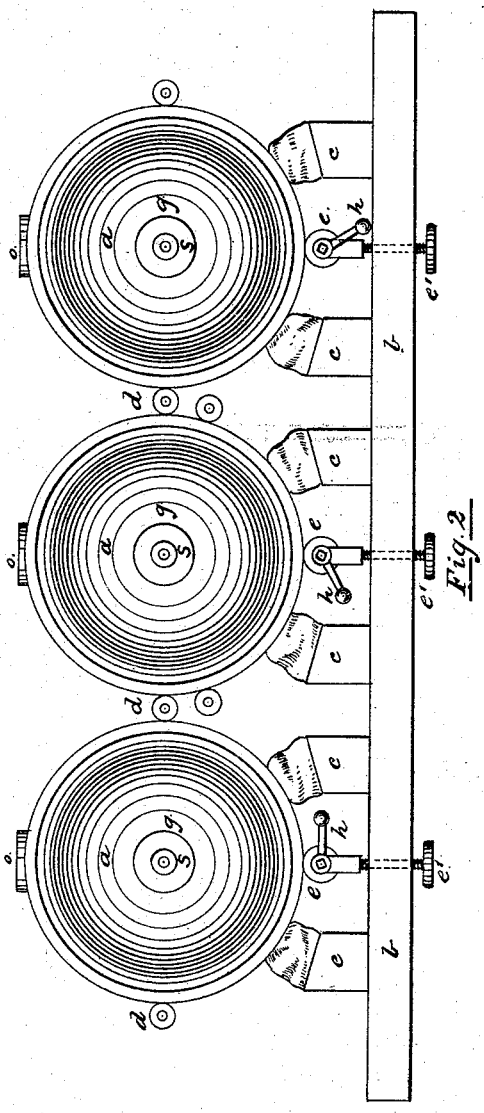

Fig. 2

Witnesses.

S. D. Hamm

J. W. Chadwick

Inventor.

John F. Boynton

by J. B. Hyde atty

UNITED STATES PATENT OFFICE.

JOHN F. BOYNTON, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR GENERATING DIOXIDE OF CARBON FOR EXTINGUISHING FIRE.

SPECIFICATION forming part of Letters Patent No. 263,015, dated August 22, 1882.

Application filed September 20, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. BOYNTON, of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for and Processes of Generating and Utilizing Carbonic Acid and other Gases, of which the following is a specification.

My invention relates chiefly to the production of dioxide of carbon by a novel process and apparatus therefor, the object of the improvement being to form the gas at low pressure in a closed vessel and in large but continuous volume, and to arrest the chemical action at the will of the operator for extinguishing fires.

Several distinct inventions for extinguishing fires by carbonic-acid gas combined with the spray or vapor of water are in well-known use, consisting of strong and closely-sealed vessels or cylinders of metal inclosing carbonate salts, acid, and water. Some of these contrivances are put in operation by breaking the acid-vessel to set free its contents upon the salts; others are arranged to upset the acid-holder without breaking it; and still others require that the entire apparatus be turned upside down to allow the acid freedom to mix with the salt or its water-solution, and so on.

All these contrivances involve three objectionable and uncontrollable features: first, that when once put in use the generating of the gas must go on continuously until the chemical action is exhausted, whether needed or not; and, second, the consequent extreme and often dangerous pressure exerted thereupon; and, third, that the sulphate of soda is formed as a hydrated crystallized compact salt adhering to the sides and bottom of the cylinder, requiring disagreeable labor and time for its removal in fitting the vessel for another charge. Most of the metallic generators referred to are made portable, to be carried on the back or otherwise. Others are made larger and placed on wheels, and even on carriages to be drawn by horses, in all of which cases the objections named apply with augmenting force as the volume of the generator is increased.

My improvements consist in the construction and novel use of a cylindrical vessel of metal, placed on its side upon and against friction-rollers in proper bearings, so that the cylinder may be rotated circumferentially, and having on its inner surface longitudinal or spiral flanges, continuous or in section, secured to and projecting from the sides. I mount one or more such cylinders in proper framework, and generally on a wheeled carriage to be drawn by horses, the whole interior part of said cylinder being sheathed or coated throughout with sheet-lead or other proper material to resist the acid. The cylinder or generator thus placed on its side is capable of being rotated while in action by a hand-crank, as shown in the drawings. And my improvement further consists in a novel treatment of the elements from which I produce dioxide of carbon at low pressure for extinguishing fires within a vessel the interior of which is always in open communication with the exterior air. As the generating-vessel used in my process acts by the revolving method, so long as it is in action the gas is freely developed, and when the fireman stops the rotation and the acid-supply is cut off the generation of gas is arrested; but whether the vessel be in operation or not, it is always intended to be open to the external air through the nozzle and exit-pipe, whereby the pressure within the generator will be that derived from the *vis a tergo* resulting from the chemical decomposition, setting free the said gas. (See drawings, Fig. 1.)

Figure 1 shows a plan of a single cylinder, *a*, with its attachments; and Fig. 2 represents an end elevation of three cylinders combined on a truck-frame, *b*, designed to be placed on wheels for transportation by horses.

c c are bearers, of caoutchouc or other proper yielding material, secured to supporting-blocks fixed to the frame *b*, and on which the cylinders rest and are transported when not in use.

d d are friction-rollers secured in the framework of the apparatus at the sides of the ends of the cylinders to steady them in position and facilitate their rotation.

e e are actuating friction-rollers under the centers of each end of the cylinders, and rotating on journals in blocks that slide vertically in the frame *b*, or otherwise, by an elevating and depressing lever or screw, *e' e'*, by which the cylinder may be raised clear from the bearers *c*, so that it will be supported on the pulleys or rollers *e*, having strong journals, their outer ends made to project beyond their bearings to receive a hand-crank, *h*, fixed in position only when the cylinder is to be rotated, which is

effected by friction between the bearing-surfaces of the pulley and the edges of the cylinder ends, which surfaces may, if necessary, be provided with interlocking gear or other device to insure rotation; and, instead of the cylinder being raised by the actuating-pulley *e* away from the support *c*, those supports may be lowered by any convenient device, so as to allow the cylinder to bear upon the pulleys, as first stated.

g g represent man-hole plates, alike in each end of the cylinders, the centers of which plates are perforated to take a union gas-joint and short screw-capped pipe, *s*, to receive a gas-conducting hose, *i*, at one end and the acid-charging tube *k* at the other end, as shown at Fig. 1.

o shows a man-hole plate on the side of the cylinder, which has another capped orifice on the opposite side, (not shown in Fig. 1)

The carbonate salts placed in proper-sized charges are stored in a magazine-box on the carriage, and the sulphuric acid, of not less than 66° Baumé specific gravity, as containing least water of constitution, is stored in leaden or other proper flasks placed in a second magazine-case, also on the carriage.

To operate the machine one or more of the charges of the carbonate salts taken from the magazine are placed in the cylinder by one or more of the man-holes, and a flask, *m*, of acid, laid upon a proper place of rest upon the machine, has its conducting-tube *k* of rubber attached, the opposite end of which is united to the cylinder by the short pipe *s* or otherwise, a short bend in this tube being collapsed as a sealing-valve at *r*, held by any convenient clamping device. The cylinder is now raised away from the support *c* by the hand-wheel *e'* and the crank *h* adjusted in position.

The acid may be released by removing the clamp at *r* and turning the crank *h*. The friction at *e* will cause the cylinder to rotate by a slight force only, mixing the acid and carbonate, the generated gas flowing freely by the hose and nozzle *i* as dioxide of carbon free from presence of or admixture with water, except that portion which may have been held in the acid, and formed in a vessel with its outlet at all times open to the atmosphere, and in the absence of internal pressure other than that produced by the generation of said gas.

In practice it is designed that the rotation be alternately from right to left by single or half turns only. Cessation of the crank motion or closing of the acid-tube should arrest the flow of gas. When at work, if the gas ceases to flow, it will arise from the exhaustion of the acid or of the salts. In the one case the acid-flask should be replaced by a full one, and in the other the man-hole may be opened and a charge of salt be added—operations quickly performed; but where two or more generators are used they should be worked alternately, shutting off one while employing the other.

To clear the cylinder from spent salts, remove the man-hole plate at *o* and invert the cylinder. The residuum will flow out and a slight stream of water by another man-hole will quickly wash clean the interior.

By the described process I am enabled to generate dry dioxide of carbon, one cubic foot of which is sufficient to render about ten cubic feet of atmospheric air capable of extinguishing flame.

The described apparatus is designed for use without internal pressure other than that due to the weight of the column of gas in the conducting-hose; but, as a precaution against undue pressure from accidental closing of the outlets or otherwise, I attach to each cylinder a safety-valve and pressure-gage.

It will further be seen that my rotating cylinder as arranged and operated is also adaptable for use in generating dioxide-of-carbon gas under pressure with water as well as without.

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

1. In an apparatus for generating dioxide of carbon for extinguishing fires, the cylinder *a*, mounted upon proper frame-work and arranged to be rotated circumferentially, in the manner substantially as set forth.

2. The described mode of extinguishing fires in buildings or other places by the use of ordinarily dry dioxide of carbon, which consists in liberating said gas by the action of a suitable acid and carbonate salt, without the intervention of water or other liquid medium, said gas being liberated under ordinary atmospheric pressure and placed under such conditions of elevation of apparatus to the height required as to deliver said gas upon a fire in buildings or other places.

JOHN F. BOYNTON.

Witnesses:
JOHN A. BASSETT,
I. B. HYDE.