(No Model.)

J. M. POLLARD.

Process of, and Apparatus for, Extinguishing Fires.

No. 237,899. **Patented Feb. 15, 1881.**

Fig. 1.

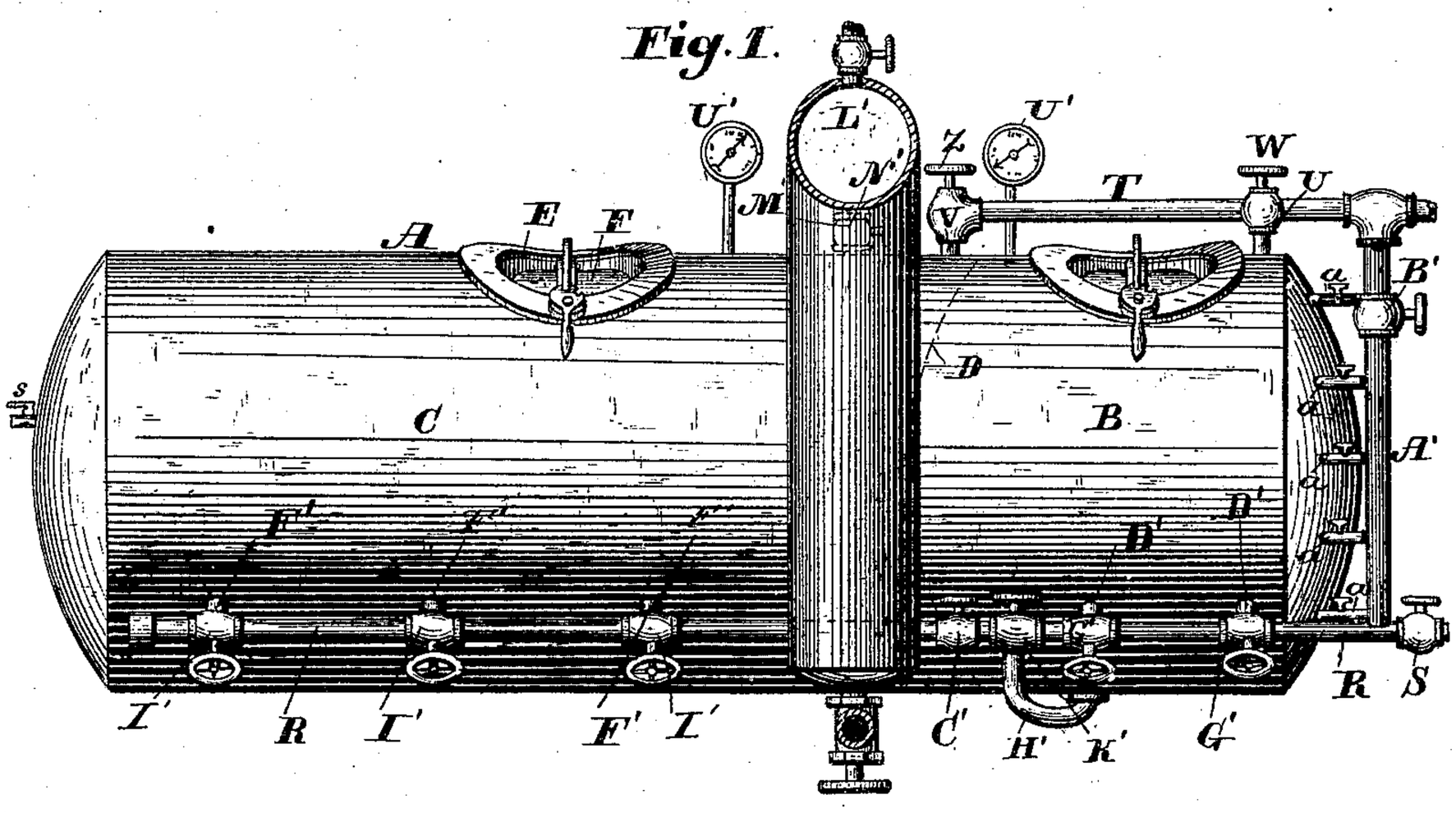
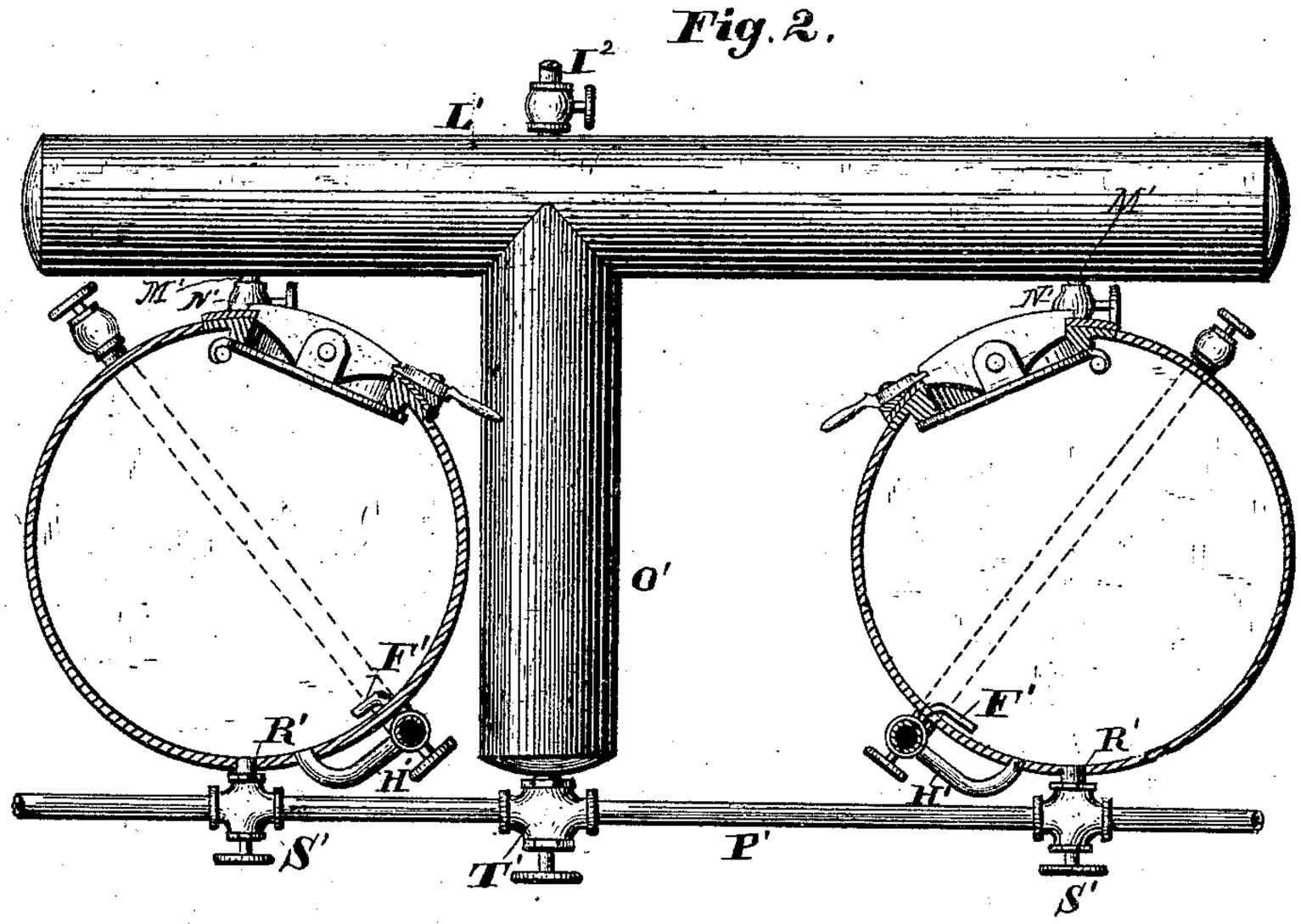


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PROCESS OF AND APPARATUS FOR EXTINGUISHING FIRES.

SPECIFICATION forming part of Letters Patent No. 237,899, dated February 15, 1881.

Application filed March 31, 1880. (No model.)

To all whom it may concern:

Be it known that I, JAMES MADISON POLLARD, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented new and useful Improvements in Process of and Apparatus for Extinguishing Fires, of which the following is a specification.

My invention relates to that class of processes and apparatus in which carbonic-acid gas in large volume is evolved and employed to extinguish fires by its direct application thereto; and it is especially designed and intended for use on shipboard and in places where it can be practically confined, such as in mines, tunnels, and tightly-closed warehouses or buildings.

Owing to the very large quantity of chemicals which are necessarily employed to supply the required volume of carbonic-acid gas, it has been long desirable to dispense with the use of free sulphuric acid in extinguishers of this class. It is troublesome to handle or transport the free acid in large quantities, and the constant pressure of several hundred gallons on a vessel would prove almost as great an element of danger as the contingency of fire on shipboard. It also ultimately corrodes and destroys the apparatus in which it is used, so that its use under the requisite pressure is unsafe.

Of the plans or devices designed to obviate the above-mentioned difficulties and objections, that set forth in Patent No. 196,562, granted to J. H. Connolly, October 30, 1877, is by far the most practicable and meritorious. It consists in the employment of the sulphuric acid in chemical combination with a base for which it has less affinity than for sodium, and in which condition, being perfectly inert and neutral, it is harmless and non-corrosive. In this condition, also, it possesses the very important advantage that, while the reaction is in every way as complete and perfect as though free sulphuric acid were used, it is not so energetic and violently sudden in liberating carbonic acid as when free sulphuric acid in large volume is used on equivalent quantities of carbonates.

In carrying out my invention I employ the sulphuric acid, in combination with a base, as above, preferably the salt known as "sulphate of alumina," deprived of most of its water. In this form it is a white porous powder, extremely soluble, requiring but its own volume, by measure, of cold water and less than half its weight of hot water to form a perfect solution.

The object of my invention is to provide an apparatus in which the carbonate of soda and sulphate of alumina, or equivalent salts, may be kept indefinitely without being in contact with each other, and mingled at pleasure in such quantities and with such rapidity as may be desired, the pressure, however, always automatically stopping the process whenever it reaches a fixed limit—say the safe working-pressure of the apparatus.

I am aware that it is not new to carry these or similar chemical agents inclosed separately in a fire-extingisher with devices for mingling them and generating the gas, when required, the distinction between my invention and machines of this class being in the quantities of material that may be used.

All machines in which a liquid compound of the chemicals used is forced by the pressure generated by their reaction upon the fire are designed to use only sufficient chemicals to produce the pressure found most desirable and effective, and to this end all the chemicals are mixed at once and agitated together. This plan is inadmissible in a dry-gas machine, in which it is necessary, owing to the large volume of carbonic-acid gas compared with its containing-vessel, that the chemicals should be gradually mingled and the pressure kept within certain limits; hence I dispense entirely with all plans in which the chemicals are mingled by the action of gravity, such as where one reagent is elevated above the other and dropped into the latter, or where an elevated acid-receptacle is used and supplied to the generating-vessel by means of a conducting-pipe and a suitable equalizing-pipe, as in either case the pressure can go on increasing to a dangerous or destructive degree.

My invention consists in a process of mingling the chemicals employed in the production of carbonic acid by blowing or forcing, by

steam or other aeriform fluid, one of the materials employed into contact or admixture with the other in confinement, the difference in pressure between the gas and the power employed causing the chemicals to mingle gradually, equalization of pressure automatically stopping the further mingling of the chemicals until, by using or otherwise disposing of the generated carbonic acid, the equilibrium is disturbed and mingling resumed.

My invention further consists in certain improvements in apparatus by which the process is carried into effect, as more fully hereinafter specified.

Referring to the drawings, Figure 1 shows a side elevation of one of the cylinders or generators of my improved fire-extinguisher; and Fig. 2, a transverse vertical section of two generators, with side elevation of the connecting drum or receptacle above them. Fig. 3 represents a top view of the man-hole or hand-hole, showing the method of inserting the cover through the same. Fig. 4 represents a top view of the man-hole with the cover secured against its seat; and Fig. 5, a view, partly in section and partly in elevation, of the man-hole and cover.

In practice two generators are generally employed, connected together by a dome; but it is not, however, essential that the generators should be in pairs, as such arrangement is simply for convenience in maintaining a constant supply of gas by recharging one generator while the other is used. As the generators are identical, a description of one will suffice for both.

The letter A indicates the generator, consisting of a strong vessel of steel, boiler-plate, or other suitable material, and is generally nine feet in length by three feet in diameter, or thereabout. It is divided into two compartments, B C, of unequal size, by means of the partition D, (indicated by the dotted line, Fig. 1.) Each compartment is provided with a suitable man-hole or hand-hole, as at E, which may be closed by a suitable door, preferably arranged to open inwardly.

The letter R indicates a pipe extending longitudinally along the lower part of the generator, provided with a valve, S, and connecting with a steam-boiler, preferably the main boiler of the engine, or the boiler of the donkey-engine of a ship, or in some instances with both.

The letter T indicates a pipe connecting with the steam-dome of the boiler or boilers, and with the chambers B C of the generator by means of branch pipes U V, which are provided with valves W Z.

The pipes R and T are connected by means of a pipe, A′, provided with a valve, B′, by means of which communication can be establtablished between the two or cut off from the same.

The letter C′ indicates a valve located in the pipe R between the branch pipes D′ and F′, which lead from pipe R to the respective compartments B and C. The branch pipes D′ and F′, respectively, are provided with valves G′ and I′, by which communication with the pipe R and the respective compartments may be cut off or established at will, as more fully hereinafter explained. The pipe H′ is bent downwardly from the pipe R, and enters the compartment B at the bottom, and is provided with a valve, K′. The branch pipes D′ and F′, after entering the respective compartments, are bent laterally, as indicated in Fig. 2, for the purpose to be hereinafter explained.

The letter L′ indicates a transverse drum extending over the generators A, when two of the same are employed, and connected with the same by means of the pipes M′, (shown in dotted lines, Fig. 1,) the said pipes being provided with valves N′, by means of which either of said generators may be put into communication with the dome.

O′ indicates a vertical receiver connected to the drum, and to a transverse pipe, P′, at its lower end, the said pipe being connected to the compartments B and C at their bottoms by means of branch pipes R′, as shown. The reservoir and branch pipes are provided with valves M′, by means of which communication with either of the compartments C or the receiver O′ may be established to draw off the contents of the same, as more fully hereinafter specified. The lower end of the reservoir O′ is provided with a valve, T′, by which its contents may be discharged, and the drum L′ with an escape-pipe, I².

The letter U′ indicates two pressure-gages, one applied to each compartment C and B. The letter *a* indicates a series of pet-cocks extending from the chamber B, through which the air may be expelled from the same, as more fully hereinafter explained.

The operation of my invention is as follows: Into the smaller compartment of the generator the sulphate of alumina is introduced so as to completely fill the same—say one thousand pounds of the same, or thereabout. Into the larger compartment an equivalent of sodium bicarbonate,—say seven kegs, or seven hundred and eighty-four pounds—is placed. The man or hand holes, which have been previously opened for the introduction of the chemicals, are now closed and the machine is ready for use, with the chemicals separate from each other and hermetically sealed from contact with the atmosphere. The valve C′ being closed, valves G′ and S are opened, permitting hot water from the boiler to flow through pipe R and branches D′ to chamber B, the confined air being permitted to escape through the open pet-cocks successively, which are closed one after the other as the water reaches their respective levels. When the said chamber B is completely filled the valve S is closed and the valve W opened, permitting steam from the boiler to exert its pressure directly upon the solution in chamber B. The valves G′ are then closed and the valves C′, K′, and I′ opened, the steam-pressure in the chamber B rapidly forcing the chemical solution from said chamber through

pipes H′ R and branches F′ to chamber C and into intimate contact with the sodium bicarbonate therein. The gas liberated by the reaction of the two reagents creates a pressure in the chamber C and connections, which continually approximates to the steam-pressure in the chamber B, thus diminishing the force of the flow of the alumina solution until an equilibrium is established between the two chambers, when no more alumina solution will be forced into chamber C, except when required or caused to do so by using a portion of the gas contained in C, and thus destroying the equilibrium. The evolution of gas is thus automatically regulated by the rapidity with which it is used. When the alumina solution is all forced into the chamber C the steam will follow from the chamber B and thoroughly agitate and mingle the chemicals in said chamber C. This will be indicated by the sound of the steam in passing through valve K′, which valve should be then closed and the valve S opened, allowing an additional volume of water to flow into chamber C, which should be filled up to the pet-cock *s*, when the valve S is to be closed and the valve B′ opened. This permits steam to flow through pipes A′ R and branches F′ to chamber C and thoroughly agitate the chemicals therein. This agitation should continue for a few moments, during which time the valves I′ should be alternately closed and opened, so that the steam will enter chamber C, first at one end and then at the other, thus thoroughly moving and mingling the chemicals, after which the valve C′ should be closed.

It will be borne in mind that the valves G′, K′, and I′ do not interrupt the passage-way through pipe R, but simply close and open the branches D′, H′, and F′ at their junctions with said pipe.

When the gas in C is all evolved, which will be indicated by the pressure-gage, the valve Z is opened and steam admitted, which will serve the double purpose of driving the gas from the chamber C and drum L′ out of the apparatus, and by opening the valve S′ will expel the residuum or sulphate of soda and hydrate of alumina remaining in the vessel. When the residuum is entirely expelled the valves W and Z are closed, when the remaining steam in the vessel will pass off through S′, leaving the vessel empty and in condition to be recharged.

The pipes D′, which enter the chambers some distance from their central portions, being bent at sharp or right angles to the bottom, prevent the chemicals from entering said pipes when the apparatus is not in use, and, by means of the water, steam, or chemical solutions ejected through said pipes, impart a rapid movement to the solutions, mingling them more perfectly than could be otherwise accomplished.

What I claim is—

1. The process herein described of generating carbonic-acid gas, the same consisting in blowing or forcing, by steam or other aeriform fluid, one of the materials employed into contact or admixture with the other in confinement, the difference in pressure between the gas and the power employed causing the chemicals to mingle gradually, and equalization of pressure automatically stopping the further mingling of the chemicals until, by using or otherwise disposing of the generated carbonic acid, the equilibrium is destroyed and the mingling resumed, essentially as set forth.

2. In a chemical fire-extinguisher, the combination of the two compartments for containing the reagents, and a pipe connecting the same with the lower part of the steam-boiler, and the connecting-pipes leading to the respective compartments, the said pipes being provided with suitable valves, whereby hot water may be admitted to one compartment and the contents, when dissolved, transferred to the second compartment, substantially as specified.

3. In combination with the compartments for containing the reagents, the hot-water pipes and steam-pipes proceeding from the steam and water portions of the boiler to the upper and lower parts of the respective compartments, and provided with suitable valves, whereby either hot water or steam may be admitted to either of the compartments, substantially as and for the purposes specified.

4. The combination, in a fire-extinguisher, of the two vessels constructed with separate compartments for the reagents, and provided with suitable connections extending from a steam-boiler, and suitable valves for supplying the compartments with water and steam, the connecting-pipes leading to the exits of the gas and waste solutions, and the controlling-valves, whereby the vessels may be alternately used and recharged, substantially as specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

J. M. POLLARD.

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.