UNITED STATES PATENT OFFICE.

ALBERT C. SCHUMACHER, OF ANN ARBOR, ASSIGNOR TO THE MUSKEGON CHEMICAL FIRE ENGINE COMPANY, OF MUSKEGON, MICHIGAN.

PROCESS OF AND COMPOUND FOR EXTINGUISHING FIRES.

SPECIFICATION forming part of Letters Patent No. 520,012, dated May 15, 1894.

Application filed May 29, 1891. Serial No. 394,540. (No specimens.)

To all whom it may concern:

Be it known that I, ALBERT C. SCHUMACHER, a citizen of the United States, residing at Ann Arbor, in the county of Washtenaw and State of Michigan, have invented a new and useful Improvement in Fire-Extinguishing Compounds, of which the following is a specification.

My invention consists of an improved fire extinguishing compound, and a process of using the same in extinguishing fires, which will be hereinafter fully described, and particularly pointed out in the claims.

Heretofore fire extinguishing compounds have usually consisted of those wherein the carbonic acid gas is liberated by the intimate mixture of a strong acid with an alkali, (sulphuric acid and bicarbonate of soda being commonly employed,) the mixture being effected quickly and rapidly by precipitating the acid into the alkali, which alkali is contained in solution in the body of water in the main tank of the apparatus. The almost instantaneous generation of carbonic acid gas which takes place under the above mentioned conditions causes the formation of an operative pressure in the tank sufficient to expel the water from the same and to cause the absorption in the outgoing stream of a considerable quantity of the carbonic acid gas.

Among the disadvantages of the above system is that it requires a very high initial pressure, to cause the necessary absorption of the gas in the water at the beginning of the discharge, in order that the stream may exert its due extinguishing effect on the fire. The length of effective propulsion of the stream from the nozzle of the hose is also shortened by the tendency of the absorbed gas to escape from the stream, thus breaking up the same, and the loss of carbonic acid gas resulting therefrom is disadvantageous, as the stream is dependent for its extinguishing quality upon the amount of absorbed gas it carries to the fire.

A further disadvantage of the present fire extinguishing compounds is that the reagents used are liquid in form, and, since they must necessarily be strong and concentrated to exert a vigorous action in liberating the carbonic acid gas, they must be handled with considerable care, and be carried in strong vessels.

One object of my invention is to provide a fire extinguishing compound which can be transported and held until the time for its use in a dry state in the form of a powder. Ease and economy in transportation are thus acquired.

Another object of my invention is to produce a fire extinguishing compound which will be carried in solution or suspension in the stream of water propelled from the extinguishing apparatus, and the ingredients of which will have no chemical reaction upon each other until exposed to the heat of the fire, but which will, when exposed to such heat, generate at once and with certainty a large amount of fire extinguishing gas. I thus secure the generation of the gas at the time and place where it is most needed, and secure myself from loss of extinguishing gas during the transit of the stream. I also preserve the fabrics upon which the stream of water may fall from injury due to heat caused by the reaction of the ingredients of my compound, unless the said fabrics themselves be in a place where the heat is sufficient to cause such reaction of ingredients. Since I thus rely for the gas used in extinguishing the fire, not upon such gas as may be absorbed by the stream of water before expulsion from the generator, but upon the mutual action of ingredients carried by the stream, which are themselves inactive unless exposed to heat, I do not require as strong an initial pressure to expel the stream from the generator, as is required when the carbonic acid gas is to be absorbed in and carried by the stream, and the stream is thus not subjected to the dispersing action above noted in connection with such carbonic acid gas streams, and has a longer range of effective throw. I attain the objects thus noted by the use of a compound composed of the following ingredients, viz., oxalic acid, an oxalate, and suitable oxidizing agents, such as manganese dioxide and potassium permanganate. These compounds are all used in their dry form, as powders.

I may use any convenient oxalate in my

compound, preferring, however, to use either sodium or potassium oxalate, on account of their cheapness. I may use also any other oxidizing agents than those above mentioned, citing manganese dioxide and potassium permanganate merely as examples, but the oxidizing agent used to oxidize the oxalate should be such that it will have no action with the oxalate, either when dissolved in water or otherwise, unless exposed to heat. Two oxidizing agents may be, and are preferably used, one to act upon the oxalic acid and one to act upon the oxalate, but only one may be used if desired. By the use of two oxidizing agents a more rapid and responsive action of the ingredients of the compound is obtained. The proportion in which these ingredients are preferably used is the following: A charge for a chemical engine is made up by mixing forty parts of dry oxalic acid with one hundred parts of dry oxalate. To these are added, when the generation of gas is to be caused, twenty parts of manganese dioxide and three parts of potassium permanganate. All of the proportions are given by weight. The charge when so made up is proportioned in quantity to the capacity of the generator of the fire extinguisher, in substantially the proportions of sixteen pounds of the mixture to a generator of twenty-five gallon capacity. I do not limit myself to these exact proportions but mention them as an example of proportions which will produce good results. From the proportions given, it will be apparent that the manganese dioxide is intended to act upon the oxalate, and the potassium permanganate upon the oxalic acid. The charge so made up is kept from the liquid contents of the generator, until desired for use, in two separate receptacles, one containing the oxalic acid and the oxalate, and the other the mixture of the oxidizing agents. When required for use, the charge is precipitated by dumping or breaking the receptacles in which the ingredients are held into the water in the main tank of the generator where the mass should be thoroughly agitated, in order that all of the oxalic acid may be oxidized, as none of the acid should be expelled from the generator. Immediately a vigorous oxidizing action takes place between the oxalic acid and the oxidizing agents, potassium permanganate especially, and in consequence of the reduction of the acid, carbonic acid gas is set free in large quantities, and creates a pressure sufficient to throw a stream containing the oxalates and the manganese dioxide to the desired point. The evolution of gas this produces is very uniform, and the pressure produced is consequently uniform, and is not sudden and violent as is the case when an acid and an alkali are used. Since the main object of the evolution of gas at this time is to produce a pressure sufficient to expel the contents of the generator, as high an operative pressure is not required as when it is necessary to cause the outgoing stream of liquid to absorb large quantities of carbonic acid gas, and a pressure about two-thirds of that now usually employed will throw a stream quite as far as the same can be thrown now by the higher pressure. Of course such carbonic acid gas as is absorbed by the stream has its usual extinguishing effect. The stream produced in this manner has but little tendency to spread, on account of the small proportion of gas absorbed thereby.

The stream propelled from the apparatus contains the oxalate and the oxidizing agent which is to act upon it, the chemicals being inert with reference to each other as they are carried by the stream. The mixture thus conveyed, when it strikes the fire, will become active, and carbonic acid gas will be evolved rapidly and at the point where it is most needed. If the stream does not strike a place where the heat is intense, no evolution of gas will take place, and the fabrics with which it comes in contact will be saved the injury which the heat produced by the chemical action of the ingredients might otherwise cause.

It is to be noted that my improved compound generates the carbonic acid gas by the chemical process of oxidation and reduction, instead of that of liberation by the substitution of an acid radical for carbon dioxide in its combination with a base. This of itself is a great improvement, as it enables me to utilize as a fire extinguishing agent very nearly the whole amount of the chemicals employed, a thing which has heretofore been impossible in the ordinary processes of the substitution of sulphuric acid radical for the carbonic acid in combination with soda, the resultant sodium sulphate being practically inert so far as fire destroying properties are concerned.

It is obvious that the oxalates and oxidizing agents alone could be used in solution, and be precipitated upon the fire by any mechanical means, as by air pressure forced into a generator, or other equivalent means, and I do not limit myself to the employment of oxalates when thrown upon the fire by the pressure of gas generated by the oxidation of oxalic acid. It is also evident that instead of the oxalates being mixed with the oxalic acid, when such acid is used to generate the operative pressure, it may be in solution in the main tank of the apparatus, as may also the oxidizing agent which is to act upon it, and the oxalic acid may be so placed that it will generate the carbonic acid gas forming the operative pressure, without being thrown into the main tank.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein described process of extinguishing fires, which consists in throwing upon the fire a stream carrying in solution an oxalate and a suitable oxidizing agent therefor, producing a fire extinguishing gas by the combination of the said chemicals when ex-

posed to the heat of the fire, and thereby extinguishing the fire, substantially as described.

2. The herein described process of extinguishing fires, which consists in producing an operative pressure in the generator by the oxidation of oxalic acid by an oxidizing agent, propelling upon the fire by the pressure thus formed a stream carrying in solution an oxalate and suitable oxidizing agent therefor, producing a fire extinguishing gas by the combination of the said chemicals when exposed to the heat of the fire, and thereby extinguishing the fire, substantially as described.

3. The herein described process of extinguishing fires, which consists in throwing upon the fire a stream containing in solution an oxalate and manganese dioxide, producing carbonic acid gas by the action of the said chemicals when exposed to the heat of the fire, and thereby extinguishing the fire, substantially as described.

4. The herein described process of extinguishing fires, which consists in forming an operative pressure in the generator by the action of oxalic acid and potassium permanganate, throwing upon the fire by the pressure thus formed a stream carrying in solution an oxalate and manganese dioxide, producing carbonic acid gas by the action of the said chemicals when exposed to the heat of the fire, and thereby extinguishing the fire, substantially as described.

5. A fire extinguishing compound consisting of the mixture in suitable proportions of an oxalate and manganese dioxide, substantially as described.

6. A pressure producing and fire extinguishing compound consisting of the mixture in suitable proportions of oxalic acid, an oxalate, potassium permanganate, and manganese dioxide, substantially as described.

In witness whereof I have set my hand this 27th day of May, 1891, in presence of two witnesses.

ALBERT C. SCHUMACHER.

Witnesses:
R. A. PARKER,
H. L. DELANO.