C. F. GIRARD.

FIRE EXTINGUISHER.

No. 190,026. Patented April 24, 1877.

Fig. 2.

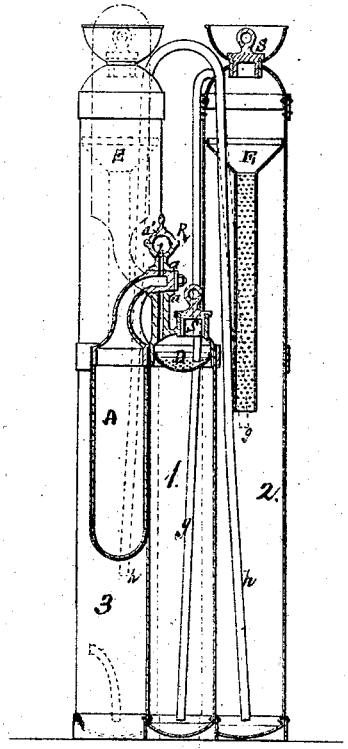
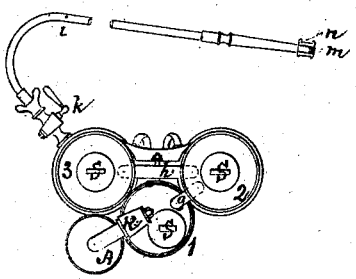


Fig. 1.



Witnesses.

Edwin Bonnell

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UNITED STATES PATENT OFFICE.

CHARLES F. GIRARD, OF PARIS, FRANCE.

IMPROVEMENT IN FIRE-EXTINGUISHERS.

Specification forming part of Letters Patent No. **190,026**, dated April 24, 1877; application filed March 26, 1877.

To all whom it may concern:

Be it known that I, CHARLES FELIX GIRARD, of Paris, France, have invented certain new and useful Improvements in Fire-Extinguishers, of which the following is a specification:

The apparatus in which my invention consists has for its object the instantaneous extinguishment of fire with little expenditure of liquid, and by the employment of elements which possess, in a high degree, properties most opposed to combustion.

To attain this end I proceed upon the principle that rapid extinguishment of fire requires the simultaneous action of prompt cooling of the inflamed article, and its isolation from atmospheric air.

In the use of my extinguisher the cooling action is obtained by means of a powerful stream projected from the extinguisher, which causes the extinguishing liquid not only to penetrate without loss all parts of the charred article, but also, in part, to scatter or recoil from the article in the condition of a fine mist, which offers an extended surface for vaporization and for disengagement of the extinguishing gases. These conditions are most favorable to a great absorption of the heat, the greater part of which passes to the latent state.

Isolation is obtained by the incombustible coat or jacket that the projected liquid deposits on the burning article, and by the gases which disengage themselves, such as carbonic and sulphohydric acids, the carbonate and the sulphohydrate of ammonia, &c., and the vapor of water, thus isolating the burning article from the atmosphere by the interposition of a local atmosphere that smothers combustion.

This principle of operation is applied and embodied in a special construction of extinguisher. In this extinguisher I have endeavored to realize not only the conditions above named, but also that of instantaneous action at any required moment. In conjunction with this instantaneous action, it is necessary also to be able to utilize, without preliminary reaction, the different chemical agents, which, of course, should not mix, except at the moment they are projected on the fire.

In the accompanying drawing, Figure 1 is a plan view of the apparatus. Fig. 2 is a sectional elevation of the same.

A is an acid-containing bottle, the curved neck of which fits and is adapted to revolve in a seat, *a*, the neck and seat constituting a cock, R, surmounting the receiver 1, which I term the "generator."

The bottle swings on its neck as an axis. When the bottle is caused to describe a half revolution, so as to occupy the elevated position indicated by dotted lines in Fig. 2, it then is in communication with the generator through the cock, which, by the act of raising the bottle, is opened. When the bottle, on the other hand, is down, as indicated in full lines, the cock is closed, and there is no communication between the bottle and the generator.

The generator 1 is a cylindrical receptacle designed to contain a strong solution of bicarbonate of soda, or any other salt that will abundantly produce carbonic acid.

The cylindrical receiver 2 is designed to contain a solution of the triple sulphate of alumina, of soda, and of ammonia, entirely neutral, and acting, in the first place, on the excess of the bicarbonate that comes from the generator.

The cylindrical receiver 3 is designed to contain a solution of sulphur and alkaline silicate.

The receivers 2 and 3 are provided inside each with a funnel, E, which is prolonged into a perforated tube, in order to facilitate the division and mingling of liquids.

The three receivers 1 2 3, constructed of sheet iron or copper, tinned or lined with lead, are bound together, so as to constitute one structure. They communicate with one another through plunger-tubes, of which the first, *g*, extending from the bottom of receiver 1, communicates with the upper part of receiver 2, and the second, *h*, extending from the bottom of receiver 2, communicates with the upper part of receiver 3.

Each receiver is provided on top with a screw-stopper, S, that closes the orifice through which is introduced into the receiver the special liquid which it should contain.

The acid is introduced into bottle A through the opening *b* of the stop-cock R, the funnel surrounding this opening being surmounted

by a hinged cover, *a'*. This bottle has a sheet-iron body, lined with a lead coating of two millimeters in thickness, and its neck is formed of a bronze tube, the curved end of which forms, as above stated, the key or valve of the cock R.

The acid which I prefer to employ is sulphoglyceric acid, on account of its small volume, and of its being innoxious to the touch.

I prefer also to use, as shown, receivers of small diameter, and of considerable height, in order that they may be better able to resist internal pressure, and also to facilitate the mixture of gases and liquids by causing them to traverse a long passage before finally escaping from the apparatus.

The apparatus charged with the above-specified matters can be kept for an indefinite length of time without alteration or reaction of the chemicals, and without bringing them into communication.

Whenever it is desired to make use of the apparatus, it suffices to make a half revolution of the bottle A, so as to bring it above the cock R.

The acid in the bottle instantly descends and makes its way through the open cock into the generator 1, where it is finely divided by passing through the perforated screen or sieve D, in such manner that it will instantly mingle with the solution of bicarbonate in the generator. There immediately takes place the production of carbonic-acid gas and a corresponding pressure, which is communicated to the liquids of the two other receivers 2 and 3—a pressure which should be from twelve to fifteen atmospheres.

The apparatus is then put on the back of the fireman or the user, like any other fire-extinguisher, and is thus carried to the place where it is to be used. The pipe or hose *i* is connected with the receiver 3, and at the point of connection is a cock, *k*. When this cock is opened, the liquids are put in motion. The liquid, charged with carbonic-acid gas from the generator 1, passes by degrees into receiver 2, while receiver 3 is fed by receiver 2. The liquids of the three receivers 1, 2, and 3 are all extinguishing-liquids separately considered; but the reactions resulting from their mixture, due to chemical affinities, produce multiple combinations, which augment the extinguishing properties of the primary liquids and gases, such as sulphohydric acid, the sulphohydrate and carbonate of ammonia, which result from the effect of the alkaline bases on the sulphates of alumina and ammonia.

Under these conditions the liquid can be projected some fifteen or twenty meters, and, in order to make this sure, it is important that the orifice of the discharge-nozzle should not be liable to increase in size from oxidation or other causes. This I guard against by providing the nozzle with a glass tip, *m*, which is held on by the sleeve or cap *n* that screws onto the nozzle.

This combination of distinct or separate generator with one or more receivers connected one to the other in succession is productive of decided advantages. The receivers, of small diameter for the reasons above given, can be of any desired number.

The generator contains an excess of bicarbonate, to which is due the complete and instantaneous saturation of the acid furnished to the generator from the acid-bottle. There is also an additional production of carbonic acid in receiver No. 2, due to the excess of the bicarbonate from the generator.

The arrangement of the acid receptacle or bottle as an external organ is also advantageous, as said receptacle can always be inspected, and is less liable to derangement.

The chemicals above named are those I prefer to use. They may be varied, however, without departure from my invention.

What I claim as my improvements in fire-extinguishers, and desire to secure by Letters Patent, is as follows:

1. The combination of the independent and separate generator and one or more receivers, connected one to the other in succession by plunger-tubes, substantially as set forth.

2. The combination, with the generator, of the acid-containing bottle or receptacle arranged outside of the generator and communicating with the same through a two-way cock, through which also the acid-containing bottle is filled, substantially as set forth.

3. The combination, substantially as set forth, of the external acid-containing bottle or receptacle, the generator and one or more receivers connected one to another in succession, the combination being and acting as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

C. F. GIRARD.

Witnesses:
EMILE BARRAULT,
AUG. VINCK.