

UNITED STATES PATENT OFFICE.

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FIRE-EXTINGUISHING COMPOUND.

1,097,145.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, WALTER O. SNELLING, a citizen of the United States, and a resident of Pittsburgh, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Fire-Extinguishing Compounds, of which the following is a description.

My invention relates to fire-extinguishing compounds, of the class in which a halogenated material is utilized, and my object is to produce an improved composition of this character in which certain defects, particularly the corrosive action of such compounds upon brass and other metals, will be obviated.

It is well known that carbon tetrachlorid is a valuable and efficient fire extinguishing material, and for a number of years several types of fire extinguisher have been on the market in which it is used as an ingredient. Carbon tetra-chlorid has however one pronounced disadvantage for this purpose, in that it exerts a marked corrosive action upon certain metals, particularly brass and similar alloys, when kept for a considerable time in metallic containers. Because of this action stop-cocks or valves attached to fire extinguishing apparatus in which carbon tetra-chlorid is used tend to become clogged. A fire extinguishing device should, of course, be instantaneously ready for use when required by the outbreak of fire, and hence the corrosive action of carbon-tetra-chlorid upon metals and alloys has greatly decreased its usefulness, resulting in the necessity of frequent inspections and replenishment of the material and failure of the apparatus at critical times when such watchfulness has not been observed.

The corrosive action of carbon tetrachlorid is due to the fact that it partially decomposes when left standing for a considerable time, and liberates chlorin, which attacks the brass or other metal of the container within which it is kept. I have found that this action may be entirely prevented by adding to the carbon tetrachlorid certain chemical agents which have the property of combining readily with free chlorin. For example, I find that certain unsaturated aliphatic hydrocarbons, such as various members of the acetylene

and ethylene series of hydrocarbons, when added to carbon tetra-chlorid, take up the small amounts of chlorin or chlorin compounds which are set free by the decomposition of carbon tetra-chlorid and thus prevent this chlorin from exerting a corrosive action upon the metal of the container. In addition to unsaturated hydrocarbons, I also find that certain other chemical bodies which have an affinity for chlorin can be used to prevent corrosive action by carbon tetra-chlorid. I find, for example, that an alkaline metal, such as sodium, or a metal of the alkaline earths, either as the free metal or in an alloy or an amalgam, will also serve to prevent corrosive action by carbon tetra-chlorid.

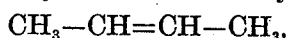
The unsaturated aliphatic hydrocarbons referred to are the class of substances which I consider best adapted for addition to the carbon tetra-chlorid, that is to say, the olefins (ethylene and its homologues), the acetylene series, the diolefin series, the olefin acetylene series, and the diacetylene series, or derivative of the same. The action of one of these substances, added preferably in a small amount to the carbon tetrachlorid, is to readily take up the free chlorin to form stable addition products. In the preferred form of my invention, the material added to the carbon tetrachlorid is one which has such an affinity for chlorin that it will combine with free chlorin or chlorin dissolved in carbon tetrachlorid, but does not have such affinity for chlorin that it will break up carbon tetrachlorid, or will take chlorin out of a stable chlorin compound. The unsaturated aliphatic hydrocarbons or derivatives, particularly referred to above, responds to this test. The addition of whatever hydrocarbon is used is preferably in a small amount, of say from $\frac{1}{2}$ per cent. to 3 per cent. by weight of the carbon tetra-chlorid. I have found that this small amount is sufficient for the desired purpose, and a greater amount is in some instances undesirable. If acetylene, for example, is the substance added to take up free chlorin, an excess of the same will of course be objectionable, since it is inflammable. Alkaline metals, such as sodium, and the like, referred to above, are not as desirable for addition to carbon tetrachlorid as the unsaturated hydro-carbons

described, since they do not fully respond to the test given above for the preferred form of my invention. Sodium not only takes up free chlorin, but it also takes up chlorin in small amounts directly from the carbon tetra-chlorid.

As stated, the unsaturated hydrocarbons, one of which, in the preferred form of my invention, should be used, should be aliphatic or chain hydrocarbons, or derivatives thereof, each of which contains two or more doubly or trebly linked carbon atoms, and which, therefore, has the ability to take up chlorin to form addition products. Hydrocarbons that take up chlorin or a halogen to form substitution products are not desirable for my purpose, since they would set free hydrochloric acid. Many hydrocarbons outside the classes mentioned can, by the use of sufficiently violent means, be chlorinated, but the hydrocarbons which will answer the requirements of my invention, *i. e.*, those that will take up chlorin under ordinary conditions of temperature, and in the dark, and in the absence of catalyzers, are apparently strictly limited to the aliphatic unsaturated hydrocarbons.

My invention accordingly contemplates, in its preferred form, the use of any aliphatic unsaturated hydrocarbon which will take up chlorin under the conditions present in a bottle or container of fire-extinguishing material, as stated.

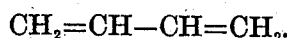
Of the classes of compounds especially referred to by me as desirable, good examples of desirable members may be given, for purposes of illustration, as follows: Of the olefin series: symmetrical di-methyl-ethylene,



Of the acetylene series: crotonylene,



And of the diolefin series: divinyl,



It should be understood that derivatives, of the unsaturated hydrocarbons referred to, which will share the desired properties of the same to the extent of answering my purpose, such for example, as the chlorids, may be used and are included in my invention. Accordingly, the words "unsaturated hydrocarbon of the ethylene series", "unsaturated aliphatic hydrocarbon", etc., in the claims, are to be understood as intended to include such derivatives of such bodies as are the equivalents thereof for the purposes of this invention.

Some of the materials which I propose to add to the carbon tetra-chlorid or other halogenated substance, would have the effect, if added in considerable quantity, to raise the boiling point of the mixture. Such materials, are for example, di-chlor-ethylene

and tri-chlor-ethylene. For the purposes of the present invention, I do not contemplate adding such materials in sufficient proportion to attain this result, and to practice my present invention it is not necessary to add such material in sufficient proportion to raise the boiling point of the mixture to any noticeable extent. In my application Ser. No. 702,195, filed June 7, 1912, I describe fire extinguishing compounds comprising carbon-tetra-chlorid in which is dissolved or commingled halogen substitution products of hydrocarbons containing two or more carbon atoms in the molecule, which poly-halogen compounds are added for the purpose of raising the boiling point of the material above that of carbon tetra-chlorid alone and forming heavy vapors that are not readily dispersed by the heated gases arising from the burning materials. To attain this result a greater proportion of the added material is necessary than is required to attain the purpose of my present invention. Some of the added substances mentioned in my previous application I have found will perform the function of my present invention to render the whole compound non-corrosive, such as di-chlor and tri-chlor-ethylene, as stated, but the same need not be added, to attain the purposes of my present invention, in as large a proportion as is required by my former invention. Also the classes of substances which I have found to perform the desired function in my present invention include certain members which would not be efficacious, in any proportions, in my former invention, such, for example, as acetylene, which may be utilized in small proportions in my present invention. When it is desired to attain the useful results of both inventions, some of the poly-halogen hydrocarbon compounds of my former invention, referred to, may be added to the compound of the present invention, in sufficient proportion.

It should be understood that my invention is not limited strictly to the use with carbon tetra-chlorid of substances having the effects specified, but that it is broad enough to cover fire extinguishing compounds in which halogenated compounds are used, other than carbon tetra-chlorid, in which there is a tendency to decomposition with the setting free of chlorin. In all such cases the unsaturated hydrocarbons added by me will render the compound non-corrosive, as stated. The preferred embodiment of my invention, however, comprises carbon tetra-chlorid and one of the unsaturated hydrocarbons referred to.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. A fire extinguishing compound comprising carbon tetra-chlorid and an unsat-

urated hydrocarbon having the property of combining readily with free chlorin.

2. A fire extinguishing compound comprising a halogenated hydrocarbon fire extinguishing material having the tendency to partially decompose with the consequent liberation of part of the halogen, and an unsaturated hydrocarbon having the property of combining readily with the halogen in a free state.

3. A fire extinguishing compound comprising a halogenated hydrocarbon fire extinguishing material having the tendency to partially decompose with the consequent liberation of part of the halogen, and a material which has such an affinity for the free halogen that it will combine with the same in a free state, to form a compound which is non-corrosive to metals, but has not such an affinity for the halogen that it will break down the said halogenated material, or take halogen out of a stable halogen compound.

4. A fire extinguishing compound comprising carbon tetra-chlorid and a material which has such an affinity for chlorin that it will combine with free chlorin or chlorin dissolved in carbon tetra-chlorid to form a compound which is non-corrosive to metals but does not have such affinity for chlorin that it will break down carbon tetra-chlorid, or take chlorin out of a stable chlorin compound.

5. A fire extinguishing compound comprising a halogenated fire extinguishing material and a substance which has the property of combining readily with free chlorin to form a compound which is non-corrosive to metals.

6. A fire extinguishing compound comprising carbon tetra-chlorid and an unsaturated hydrocarbon having the property of combining readily with free chlorin the said hydrocarbon being present in the proportion of not more than three per cent. of the carbon tetra-chlorid, by weight.

7. A fire extinguishing compound consisting of a halogenated fire extinguishing material and an unsaturated aliphatic hydrocarbon in the proportion of not more than three per cent. of the said fire extinguishing material by weight, which hydrocarbon has the property of combining readily with free halogen to form a compound which is non-corrosive to metals.

8. A fire extinguishing compound consisting of a halogenated fire extinguishing material, and a chain hydrocarbon containing two or more doubly-or-treble-linked carbon atoms, and having the property of combining readily with free halogen to form a compound which is non-corrosive to metals.

9. A fire extinguishing compound consisting of a halogenated fire extinguishing material in combination with a material having the ability to unite with any halogen set free from said halogenated fire extinguishing material to form addition products which are permanently non-corrosive to metals.

10. A fire extinguishing compound consisting of a halogenated fire extinguishing material and an unsaturated aliphatic hydrocarbon containing doubly or trebly linked carbon atoms, capable of uniting under the conditions present in a metallic container, at room temperature, with free chlorin or hydro-chloric acid set free from said halogenated material to form a compound which is non-corrosive to metals.

11. A fire extinguishing compound comprising carbon tetra-chlorid and an unsaturated hydrocarbon of the ethylene series, the said hydrocarbon having the property of combining readily with free chlorin.

This specification signed and witnessed this 25th day of March, 1913.

WALTER O. SNELLING.

Witnesses:

C. R. KERR,

GEORGE SCHULER.