

UNITED STATES PATENT OFFICE.

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ART OF PROTECTIVELY TREATING MATERIALS.

1,388,828.

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, ARTHUR ARENT, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in the Art of Protectively Treating Materials; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the art of protectively treating material, more particularly, but not exclusively, fibrous materials such as wood, wood pulp, paper, canvas, duck, textile fabrics generally, and especially cloth used for aeroplane wings, hangar tents, balloons, etc.

The present application comprises matter divided out of my prior copending applications Serial No. 254,958, filed September 20, 1918, Serial No. 275,242, filed February 5, 1919, and Serial No. 306,928, filed June 26, 1919, the present application relating more particularly to oily compositions containing fire-retardants, the preparation of said compositions, and articles of manufacture obtained by the use of said compositions.

Generally described, the invention involves the use of a fire-retardant metal compound to render oils and oily materials substantially non-inflammable, or to lower their inflammability to any desired extent. As herein employed, the term non-inflammable is applied to material which merely chars upon exposure to direct contact with flame, but does not inflame or continue to burn after the removal of the applied flame.

For the sake of affording a clear understanding of the invention, certain specific embodiments thereof will be hereinafter described in detail; but such examples are to be understood as merely illustrative of the broad principles involved and not as limiting the scope of the invention.

I have found that by dissolving antimony trichlorid in oil or oily matter, either with or without an additional solvent, the resultant mixture can be used either alone or in conjunction with other materials for coating or impregnating articles which it is desired to protect and whose combustibility it is desired to reduce. Where an additional solvent is employed, amyl acetate is especially suitable, although the invention is not restricted thereto. Solvents such as

benzol, acetone, carbon tetrachlorid, chloroform, etc. offer special advantages in some cases. I have found that amyl acetate will dissolve antimony trichlorid very freely to give a solution which can be effectively introduced into and blended with oils and the like uniformly and in sufficient quantity to reduce their inflammability and to insure effective fireproofing of material treated with such modified oils. The concentration of the amyl acetate solution so employed may vary considerably, but in practice I have found it convenient to employ a saturated solution which can be diluted, if necessary, according to the particular material to be treated. Such saturated solution can readily be prepared by shaking an excess of pure antimony trichlorid crystals with amyl acetate and allowing the mixture to stand for a few hours at ordinary temperatures. An advantageous method of procedure is to mix the amyl acetate solution of antimony trichlorid with a drying oil such as linseed oil, and to apply this mixture to the canvas or other fibrous material to be treated. This results in a thoroughly waterproofed canvas or other fabric which, at the same time, is also non-inflammable. I have found a mixture consisting of equal parts by volume of linseed oil and a saturated solution of antimony trichlorid in amyl acetate to be particularly effective in practice. After evaporation of the amyl acetate from the treated fabric and exposure to the atmosphere until the surface is no longer tacky, the fabric is perfectly waterproofed and at the same time cannot be made to take fire even upon direct application of a flame, the fabric merely charring at the region where the flame is applied.

In another particularly advantageous embodiment of the invention, antimony trichlorid is dissolved in amyl acetate in the proportion of 14 ounces (avoirdupois) of the antimony salt, to 16 fluid ounces of amyl acetate, and about one volume of the resultant solution being added to 4 or 5 volumes of linseed oil and thoroughly mixed therewith. Linseed oil thus treated, and especially after drying, is rendered non-inflammable, and canvas, paper, and the like, coated or impregnated with such treated linseed oil is also rendered non-inflammable. Such linseed oil may also obviously be employed in the usual manner in paint mixtures which are thereby rendered similarly

fireproof or fire-resistant. Linseed oil is of course merely typical of paint oils generally of the drying or semi-drying type, including hemp, poppy, sunflower, corn, and other well known oils, all of which may be employed in my novel compositions. Non-drying oils may similarly be rendered fire-resistant by treatment in the same manner.

According to still another way of carrying out this phase of the invention, the antimony salt may be dissolved directly in or mixed with the linseed oil or other drying oil employed, without using a special solvent such as amyl acetate. The resultant mixture can be applied in the same manner to the materials to be protected and the resultant fabric is found to be waterproofed and at the same time is non-inflammable.

An amyl acetate solution of antimony trichlorid can be advantageously mixed with oil-containing varnishes of various kinds to give mixtures which can be used like ordinary varnishes to produce protective coatings which are, however, non-inflammable as opposed to the high inflammability characterizing ordinary varnishes. The term varnishes is employed herein in a broad sense to include not only solutions of natural or artificial gums and resins, but also solutions of cellulose and cellulose derivatives such as cellulose nitrates, cellulose acetates, viscose, etc.

It is evident also that, in addition to varnishes, other oily liquid coating and impregnating compositions such as paints, stains and the like, comprising coloring matter in the form of pigments or dye stuffs, carried by a suitable salt such as antimony trichlorid, either by direct solution thereof in the vehicle or by addition of a solution of such salt in amyl acetate or other appropriate solvent.

The treated products prepared as above described may be applied, when in liquid condition, by brushing, dipping, spraying, etc.; and materials and articles to which such products have been applied and which are rendered fire-resistant or non-inflammable as already explained, are included within the present invention.

Subjecting articles coated or impregnated with the products above described, to the action of air, and particularly to the action of water, steam or moist air, has the effect of apparently oxidizing the antimony to some extent at least in the exposed outer surfaces or layers with formation of highly fire-retardant basic compounds, which are probably basic chlorids or oxychlorids or analogous compounds of antimony, insoluble in water and tenaciously adherent; so that the fabric or other article protected with a composition of the character above described does not lose its fire-resistant character after long exposure to weather, even in cases

where the waterproofing agent may have deteriorated to a greater or less extent. It is for this reason, among others, that metal compounds which act in this respect similarly to anhydrous antimony trichlorid are especially advantageous in practising the present invention. The special desirability of antimony trichlorid is due to the fact that it is readily soluble in many oils either directly or with the aid of any one of a number of organic solvents to give a fluid mixture with which materials can be impregnated or otherwise treated; and also to the fact that it does not dissolve in water and hence cannot be washed out of material treated therewith, but on the contrary decomposes instantly upon contact with water, forming insoluble products as above mentioned. Other salts of antimony such as the sulfate are ordinarily less desirable because of the possibility of stronger corrosive action consequent upon development of free sulfuric acid; although this corrosive action may be guarded against in the case of either the chlorid or the sulfate by incorporating an antacid substance such as sodium carbonate, lime, or the like, with the composition or by washing the finally coated or impregnated articles with a mildly alkaline solution of any appropriate character. Neither is the invention restricted in its broader aspects to the use of antimony salts, although antimony salts, and antimony chlorid especially, give in practice results which are markedly superior to even such other metal compounds as react with water in a somewhat similar manner.

What I claim is:

1. The process of waterproofing and decreasing the combustibility of fibrous material which comprises applying thereto a mixture of a drying oil and a fire-retardant antimony compound.

2. The process of waterproofing and decreasing the combustibility of fibrous material which comprises applying thereto a mixture of a drying oil, a fire-retardant antimony compound, and a volatile solvent.

3. The process of preparing a liquid treating composition which comprises dissolving antimony trichlorid in amyl acetate, and mixing the solution with a drying oil.

4. As a new composition of matter, a liquid material comprising linseed oil having a fire-retardant antimony compound dissolved therein.

5. As a new composition of matter, a mixture of linseed oil and amyl acetate containing a dissolved fire-retardant antimony compound.

6. As a new composition of matter, a mixture of linseed oil and amyl acetate containing antimony trichlorid dissolved therein.

7. As a new composition of matter, a liquid mixture comprising a drying oil, amyl

acetate, and a fire-retardant metal compound.

5 8. As a new composition of matter, a hydrolyzable salt of a metal dissolved in a drying oil in a proportion sufficient for a fireproofing effect.

9. A new composition of matter comprising a drying oil associated with a fire-retardant antimony compound in a proportion sufficient for a fireproofing effect.

10 10. The process of treating linseed oil to render the same less inflammable, which comprises added thereto from one-fifth to one-fourth its volume of an amyl acetate solution of antimony trichlorid, containing about 14 ounces by weight of antimony trichlorid to 16 fluid ounces of amyl acetate.

11. The process of treating drying oils

for use as protective material, which comprises adding to said oil from one-fifth to one-fourth its volume of an amyl acetate solution of antimony trichlorid, containing about 14 ounces by weight of antimony trichlorid to 16 fluid ounces of amyl acetate.

12. As new articles of manufacture, products substantially waterproofed and fireproofed by a composition comprising a drying oil and a fire retardant antimony compound.

13. As new articles of manufacture, products substantially waterproofed and fireproofed by a composition comprising linseed oil and antimony trichlorid.

In testimony whereof I hereunto affix my signature.

ARTHUR ARENT.