

UNITED STATES PATENT OFFICE.

GEORGE J. NIKOLAS, OF CHICAGO, ILLINOIS.

PROTECTED FABRIC.

No Drawing.

Application filed November 21, 1918. Serial No. 263,614.

To all whom it may concern:

Be it known that I, GEORGE J. NIKOLAS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Protected Fabrics, of which the following is a specification.

This invention relates to protected fabrics, and it comprises a fabric carrying a water-proofing and fire-proofing protective coating of varnish material, advantageously pyroxylin, carrying uniformly incorporated therein impalpably fine particles of fire-proofing salts, i. e., such salts as carry combined water or ammonia, or both, which can be evolved on heating; all as more fully hereinafter set forth and as claimed.

Aeroplane wings are made with the aid of linen or cotton canvas stretched over the framework. It is necessary that the textile fabric be water-proof and that the water-proofing be of such a character as to cause a tautening action. In practice water-proofing is usually obtained with the aid of pyroxylin varnishes or cellulose acetate varnishes, the treated fabric being afterwards covered with an outer layer of a good spar varnish. Neither of these water-proofing varnishes is perfectly satisfactory in use. Pyroxylin is a variety of gun cotton and of course is readily inflammable, but it furnishes varnishes which are cheaper and easier to make than those made with cellulose acetate, and it is also a better coating material. Varnish films made with cellulose acetate varnishes are much less readily inflamed although they are not fire-proof. It is in practice highly desirable to be able to fire-proof aeroplane wings as well as water-proof them, the fire-proofing being at least sufficient in degree to prevent the spreading of combustion should the textile material start to burn at one point. The usual test for fire-proofing is to put a few drops of gasoline on a wing and set fire to it. With a satisfactory "dope" the wing should not take fire or char. Resistance to this test can be given a pyroxylin varnish by the expedient of incorporating hygroscopic salts such as chlorid of zinc, magnesium chlorid, calcium chlorid, etc.; these salts acting by virtue of their power of attracting moisture from the atmosphere. Virtually they fire-proof by keeping the fabric damp. But such compositions are not water-proof and

water-proofing in an aeroplane wing is even more desirable than fire-proofing. As a rule, these hygroscopic salts are simply dissolved in the solvent used for the pyroxylin.

I have found that a better type of simultaneous water-proofing and fire-proofing can be obtained, giving textile surfaces carrying a pyroxylin varnish film which will withstand the above test by the simple expedient of incorporating into or suspending in the varnish an impalpably fine fire-proofing salt of the character of alum, sulfate of soda (sodium sulfate), sulfate of alumina, borax, sulfate of ammonia, etc. All these salts, and many others like them, are permanent in air, neither taking up moisture or giving it off at the ordinary temperature, while on heating they evolve vapors of water or ammonia, or both, with absorption of heat. By incorporating a suitable proportion of these salts into the varnish and then varnishing the fabric, on drying, the surface is left covered with a coating of pyroxylin mixed with fine grains of the salts. The pyroxylin not only water-proofs the canvas but also water-proofs the individual particles of these salts, shielding them against rain, etc. On application of heat to such a varnished surface the result is an evolution of water vapors or of ammonia, as the case may be, with a great absorption of heat. The vapors stifle the combustion and the absorption of heat delays ignition. One or more of these salts can be used. All the salts of this character are insoluble in most of the volatile solvents used for pyroxylin, such as amyl acetate, acetone, alcohol-ether, etc. And they in no way interfere with the use of the varnish or change its character on drying. For a satisfactory coating under the present invention this is necessary.

Ordinary ammonia alum, $(\text{Al}_2 (\text{SO}_4)_3 \cdot (\text{NH}_4)_2 \cdot \text{SO}_4 \cdot 24\text{H}_2\text{O})$ contains about 47 per cent of water and about 4 per cent of ammonia, giving off both readily when it is heated. Ordinary crystallized aluminum sulfate $(\text{Al}_2 (\text{SO}_4)_3 \cdot 18 \text{H}_2\text{O})$ contains about the same per cent of water. Either is useful for the present purposes. Ordinary sodium sulfate $(\text{Na}_2 \text{SO}_4 \cdot 10 \text{H}_2\text{O})$ contains somewhat more water, about 55 per cent; and it may be used. Borax also contains more than one half its weight in water and is a suitable material for the present purposes. In using any of these materials they

may be ground to an impalpably fine powder and directly mixed with the varnish by any suitable mixing device. Or they may be added to the varnish and the mixture ground in an ordinary paint mill until a uniform suspension is obtained. With a pyroxylin varnish containing about six or seven ounces of pyroxylin to the gallon, a good proportion of fire-proofing salts is about a half pound to the gallon. With such proportions a varnish is obtained which on drying down contains finely subdivided fire-proofing salts in amount somewhat larger than that of the pyroxylin present. A surface varnished with such a film may be considered as being covered with a thin film of fire-proofing salts, each granule or particle in the film being bound to and separated from the next adjacent particle by a layer of pyroxylin. The presence of this amount of fire-proofing salt in the varnish in no way interferes with its properties of water-proofing the canvas and tautening it. The composition may be applied to the wing in exactly the same manner as the usual pyroxylin varnishes or dope. After this application it may receive the usual coating of spar varnish. I think it expedient in some cases to incorporate in the spar varnish fire-proofing salts in exactly the same manner.

I find that on the whole the most valuable results are obtained with a good pyroxylin varnish containing amyl acetate as a solvent and ordinary crystallized sodium sulfate or Glaubers salts as a fire-proofing salt, the proportion being about as above indicated.

While I find that for aeroplane work compositions containing pyroxylin dissolved in volatile solvents are the best adapted for the present purposes, many other varnishes may be employed. Cellulose acetate dissolved in chloroform, acetylene tetrachlorid, acetone, etc., may be used. A cellulose acetate varnish containing these fire-proofing salts is superior to the cellulose acetate varnish alone.

The present composition may be used for simultaneous water-proofing and fire-proofing of many other things than aeroplane wings and for treating other textiles than linen or cotton canvas, but I regard the main utility of the present invention to be with respect to aeroplane wings.

What I claim is:

1. As a new article of manufacture, a layer of fabric carrying a protective coating of varnish material containing intimately and uniformly incorporated impalpably fine particles of fireproofing salts such salts being insoluble in solvents wherein such varnish material is soluble.

2. As a new article of manufacture, a layer of fabric carrying a protective coating of pyroxylin varnish material containing intimately and uniformly incorporated impalpably fine particles of fireproofing salts such salts being insoluble in solvents wherein such pyroxylin varnish material is soluble.

In testimony whereof, I affix my signature hereto.

GEORGE J. NICKOLAS