FIP8312 XR 1,837,150 CROSS REFERENCE EXAMINER

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FIREPROOF FABRIC AND METHOD OF MAKING THE SAME

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This invention relates to the treatment of combustible material such as yarns and fabrics of all kinds, paper or wood, etc. but particularly to the treatment of yarns or fabrics composed in part or in whole of organic derivatives of cellulose, in order to render the same fire proof or flame proof.

An object of our invention is to produce a fabric or yarn which is fire proof or flame proof.

A further object of our invention is to render combustible material such as paper, wood or fabrics of all kinds, but particularly fabrics composed in whole or in part of organic derivatives of cellulose, fire proof by subjecting the same to a solution containing phosphoric acid or equivalent acids.

Further objects of our invention will appear from the following detailed description.

This invention is of general application, and may be used in the rendering flame-proof or fire-proof of combustible material of all kinds, such as paper and wood, but more particularly yarns or fabrics made of all kinds of fibers such as cotton, reconstituted cotton, natural silk and derivatives of cellulose. However, in the treatment in accordance with our invention of yarns or fabrics made of organic derivatives of cellulose, such great enhancement of fire-proof or flame-proof qualities are attained, that we shall describe our invention with respect to the treatment of such fabrics or yarns.

The organic derivatives of cellulose may be organic esters of cellulose, or organic ethers of cellulose. Examples of organic esters of cellulose are, cellulose formate, cellulose acetate, cellulose propionate, and cellulose butyrate. Examples of organic ethers of cellulose are methyl cellulose, ethyl cellulose and benzyl cellulose. The fabric or yarn treated may be composed entirely of one of the above mentioned organic derivatives of cellulose or it may be composed entirely of a mixture of two or more of the above named materials. Further, the fabric may be a "mixed" fabric composed of a mixture of yarns made of any of the thermoplastic or organic derivatives of cellulose above mentioned and of yarn made of other fibers. Likewise, the yarn to be treated may be composed of a mixture of thermoplastic or organic derivatives of cellulose filaments and of other fibers. Examples of such "mixed" fabrics or yarns are mixed cellulose acetate and natural silk, mixed cellulose acetate and wool, mixed cellulose acetate and cotton, etc.

In the interest of brevity, a detailed description will be given with respect to a fabric composed entirely of cellulose acetate. However, it is to be understood that this invention is not limited to the treatment of pure cellulose acetate fabrics but may be applied to any yarn or fabric as set forth above.

According to our invention, the cellulose acetate fabric treated with a solution containing phosphoric acid that is adapted to decrease its combustibility. We have found for instance the ordinary phosphoric acid for instance the ordinary phosphoric acid having the formula H_3PO_4, can be used. Furthermore, the solution for treating the fabric may contain other suitable or desirable ingredients or salts such as aluminum acetate, etc. Moreover, the treating solution may contain substances suitable for treatment of the fabric other than flame proofing. For instance, it may contain a dye so that the fabric is simultaneously dyed and flame-proofed.

In one mode of carrying out our invention, cellulose acetate fabric is immersed in an aqueous bath containing from 50 to 150 grams of phosphoric acid per liter of solution. A bath containing 100 grams of phosphoric acid per liter of solution was found to give very satisfactory results.

The temperature of the bath may be anywhere between ordinary room temperature (15° C.) to 60° C., although we have found a bath temperature of 40° C. is advantageous.

The time of treatment also may be varied within wide limits thus from 10 minutes to 90 minutes, but we have found that satisfactory results may be obtained by immersing the fabric in the bath for 15 minutes. The fabric is then rinsed and dried and is then ready for any finishing operation that is desired or necessary.

In another mode of carrying out our invention, a cellulose acetate fabric is immersed in an aqueous bath containing 10 grams of basic aluminum acetate per liter of solution and 100 grams of phosphoric acid per liter. The bath temperature is 40° C. and the time of immersion one hour. Obviously the concentration of the phosphoric acid, the temperature of the bath and the time of treatment may be varied within the wide limits set forth in the foregoing example. Likewise a salt other than the basic aluminum acetate may be used and the bath may contain 10 grams, 20 grams, 30 grams, 40 grams, etc., of the salt.

This treatment of a cellulose acetate fabric results in a remarkable enhancement of its fire resistant properties. The cellulose acetate fabric treated in accordance with our invention will not flame. Thus when such fabric is heated to above the ignition point of untreated cellulose acetate fabric by the application, for instance, of a naked flame, the fabric will not flame, the material simply melting without bursting into flame. The results obtained by the treatment in accordance with the foregoing process are quite surprising, in that the fact that the use of an acid such as phosphoric acid gives these excellent results, is quite unexpected. Moreover, the fabric, after treatment with the fire proofing agent, retains its original excellent handle and fine appearance, whereas with the old methods of fire proofing, either the appearance of the fabric is altered or the fabric is stiffened materially. Apparently, the phosphoric acid combines with the fabric and even after drastic washing of a fabric treated in accordance with our invention, the flame-proof properties of the fabric is not materially diminished.

As was stated before, other combustible materials can be treated in accordance with our invention. Thus articles of wood and paper may be rendered flame-proof by the use of our process. Fabrics or yards of the animal or vegetable fibers such as silk, cotton, wool, linen, etc. may be flame-proofed in this manner. In the treatment of yarns, the yarns may be subjected to the action of the flame-proofing agent while in the form of hanks, cops, bobbins, etc. The material may be treated with the solution either by immersion therein or by otherwise applying the same such as by brushing, spraying, etc. Also the flame-proofing reagent may be applied to the material to be treated in the form of a paste.

Instead of phosphoric acid, acid salts of phosphoric acid, and also other equivalent acids such as arsenic acids, antimonic acids and the like may be used. Moreover, other fire-proofing agents may be added to the solution containing these acids.

It is to be understood that the above detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention what we claim and desire to secure by Letters Patent is:

1. A fire proof of flame proof article made of normally combustible material rendered fire proof or flame proof by the treatment with a reagent containing a phosphoric acid in a free state.

2. A flame proof textile material such as yarn and fabric, made of normally combustible material rendered fire proof or flame proof by the treatment with a reagent containing a phosphoric acid in a free state.

3. A flame proof fabric containing yarn of normally combustible material rendered fire proof by the treatment with a reagent containing a phosphoric acid in a free state.

4. A fabric containing yarn of organic derivatives of cellulose rendered flame proof by treatment with a solution containing phosphoric acid in a free state.

5. A fabric containing yarn of cellulose acetate rendered flame proof by treatment with a solution containing a substantial amount of phosphoric acid.

6. A fabric containing yarn of cellulose acetate rendered flame proof by treatment with a solution containing a substantial amount of phosphoric acid and an inorganic salt.

7. The method of rendering flame proof or fire proof of articles containing normally combustible material comprising treating the same with a reagent containing a phosphoric acid in a free state.

8. Method of rendering flame proof of a textile material such as yarn and fabric containing normally combustible material comprising treating the same with a reagent containing a substantial amount of a phosphoric acid.

9. Method of treating fabrics containing yarn of organic derivatives of cellulose comprising treating the same with a solution containing a phosphoric acid in a free state.

10. Method of treating fabrics containing yarn of cellulose acetate comprising treating the same with a solution containing a phosphoric acid in a free state.

11. Method of treating fabrics containing yarn of cellulose acetate comprising treating the same with a solution containing the phosphoric acid H_3PO_4.

12. Method of treating fabrics containing

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yarn of cellulose acetate comprising immersing the same in an aqueous solution containing approximately 100 grams of the phosphoric H_3PO_4 acid per liter at a temperature of approximately 40° C. and for a period of approximately 15 minutes.

In testimony whereof, we have hereunto subscribed our names.

CAMILLE DREYFUS.
HERBERT PLATT.

CERTIFICATE OF CORRECTION.

Patent No. 1,837,150. Granted December 15, 1931, to

CAMILLE DREYFUS ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 69, strike out the words "for instance the ordinary" and insert the words that an aqueous solution of a; page 2, line 80, claim 1, for "of" read or; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of February, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.