Patented May 26, 1942 2,284,387

UNITED STATES PATENT OFFICE

2,284,387

TREATMENT OF MECHANICAL FABRICS

Carlton C. Gordon, Elsmere, N. Y., assignor to Albany Felt Company, Albany, N. Y., a corporation of New York

No Drawing. Application December 1, 1939, Serial No. 307,114

6 Claims. (Cl. 8—128)

My invention relates solely to the treatment of wool, and to the treatment of mechanical fabrics which are made in whole or in substantial part of wool, whereby their resistance to stretching and disintegration under attack by alkalies and alkaline solutions such as those of caustic soda, silicates, phosphates, carbonates or lime, and certain bleaches such as chlorine, hypochlorous acid and hydrosulphites is greatly enhanced and the life of the fabrics thereby substantially prolonged. By the term, "mechanical fabrics," I mean to include fabrics such as paper machine felts and jackets, slasher cloth and jackets, quirin sleeves, fume bag cloth, Sanforizing and Palmer blankets, etc., which are used in the mechanical arts, as for example, the paper making and printing arts, and to exclude fabrics used for such purposes as wearing apparel, floor coverings, bed blankets, unholstering and the like.

My process is not limited in its application to wool after the same has been reduced to the form of a fabric but may be applied to raw wool, loose roping, yarn and the like, although the advantages of the treatment will probably not be recognized until the wool is in the fabric form. Furthermore, the treatment is not limited to mechanical fabrics consisting entirely of wool but may be used in the treatment of such fabrics having a substantial portion of wool therein but also containing some vegetable fibers, such for example as a cotton or linen warp. It cannot be said that the treatment improves the vegetable fibers in the fabric but the resistance of the wool portion to the destructive effect of any of the media mentioned above is so greatly enhanced as entirely to offset any detrimental effects on the other fibers.

Broadly, the process consists in impregnating the wool with a chromium compound, and this, in general, is accomplished in two steps. First, the wool or wool fabric is chromed by treating it in an acid solution of an alkali chromate or dichromate, or chromium trioxide, and for a long enough time to develop a dark brown color. For example, I may use chromium trioxide, or a chromate or dichromate of ammonium, potassium, sodium, lithium, calcium, strontium, or barium; sodium dichromate being preferred because there is more active ingredient present therein than in the chromate, and because of its cheapness and ready solubility. This may require from 1 to 6 hours depending upon the temperature and the concentration used. Thereafter, the solution is preferably, but not necessarily, discarded, the wool rinsed in clear water, and then treated with a chemical solution which will reduce the chrome, at least in part, to chromium oxide. Solutions containing any of the alkali metal bisulphites or sulphites in conjunction with an acid, sodium thiosulphate in conjunction with an acid, sulphur dioxide, or hydrosulphite are suitable reducing agents. This step may require from a few minutes to several hours depending upon which reducer is used, the concentration thereof and the temperature at which the process is conducted. This step is followed by a good rinse.

The general range of the chromium compound used may be between about 5 lbs. and about 25 lbs. per 100 lbs. of wool treated. The temperature at which my process is conducted may vary from normal room temperatures (about 70° F.) up to the boiling point of the solution, but since heat, in and of itself, may substantially deleteriously affect the strength and soundness of a wool fabric, the process is preferably conducted within the temperature range of about 90° F. to 120° F.

As stated above, the intermediate rinse between the two treatment steps may be eliminated and the second step conducted by incorporating the reducing agent in the bath used for the first step; it being understood that, in any case, although a single bath may be used the process is nevertheless conducted in two separate steps. However, this procedure results in a considerable loss of time and chemicals.

As a specific example let it be assumed that a papermaker's felt weighing from about 70 lbs. to 100 lbs. is to be treated. The felt is put in a tub, in which preferably a circulation of the liquid contents can be maintained, or which is equipped with some means for providing relative movement of the felt and liquid to insure uniformity of treatment, together with about 100 gals. of water and heated to 110° F. Three lbs. of muriatic acid diluted with water are then added and followed by the addition of 15 lbs. of sodium dichromate previously dissolved in water. The dichromate solution is added in small quantities over a period of about ten minutes. Six lbs. of muriatic acid diluted with water are then added slowly. The temperature of the solution is preferably maintained at about 110° F. and the felt is treated therein for from 2 to 3 hours. The solution is then dropped and the felt rinsed with clear water several times; the last rinse being heated to 110° F. and left in the tub.

Ten lbs. of sodium thiosulphate and 6 lbs. of muriatic acid are added to the bath. The thiosulphate is first dissolved in water and the acid is diluted before being added, and the addition should be done over a period of about ten minutes. The felt is treated in this solution for about 30 minutes whereupon the solution is dropped and the felt rinsed with clear water. One hundred gals. of water at 110° F. are then run into the tub. Five lbs. of sodium thiosulphate dissolved in water are added and followed by the addition of 3 lbs. of muriatic acid diluted

with water. The felt is treated in this solution for ten minutes whereupon additions of 5 lbs. of sodium thiosulphate and 3 lbs. of muriatic acid, as described above, are made several times so that the solution is maintained a milky green color; it being understood that the temperature of the bath is preferably maintained at about 110° F.

Sometimes a total of 40 to 45 lbs. of the sodium thiosulphate may be required and usually 1 to 3 hours from the time the first thiosulphate is added are necessary to complete this step.

When the reduction has been completed the felt is thoroughly rinsed and taken to the finishing room for other processes. After a felt has been given my treatment it is made substantially more resistant to certain chemicals but less resistant to others. In other words, the desirability of the treatment will depend upon the conditions under which the felt is to be used.

In order to show the resistance to a lime solution of a felt treated by my process, strips thereof which, before treatment, normally had a wet breaking strength of 98 lbs. and a stretch of 16½% under a 30 lb. load were subjected to a saturated lime solution for 6 hours at approximately 120° F. This treatment reduced the breaking strength to 54 lbs. and the stretch was increased to 21% under a 30 lb. load. Duplicate strips from the same felt which had been given my treatment were treated in the same lime bath for the same length of time and upon removal showed a breaking strength of 64 lbs. and a stretch of only 15½% under a 30 lb. load.

From the foregoing it may be seen that my treatment allowed the felt strips to retain more of their original strength after the injurious lime bath and the stretch was very substantially less than that of the untreated strips. Both of these properties obviously indicate a sounder felt.

New felt strips having a normal wet breaking strength of 95½ lbs. and a stretch of 15½% under a load of 30 lbs. were subjected to a 30% hydrosulphite solution (based on the weight of the wool) for 5 hours at 160° F. After the treatment the felt strips which had not been treated by my process had a breaking strength of 57 lbs. and a stretch of 36% under a 30 lb. load. Strips from the same felt, but treated according to my process, when subjected to the same hydrosulphite solution for the same length of time showed, after treatment, a strength of 63½ lbs. and a stretch of only 15% under a load of 30 lbs. Here, the strips treated by my process were appreciably stronger than the untreated strips but, what is more important, the test shows that my treatment prevents excessive stretching of the felt under moderate loads.

As a protection against the injurious action of sulphurous acid solution my treatment is also helpful.

New felt strips having a normal wet breaking load of 96 lbs. and a stretch of 14½% under a load of 30 lbs. were subjected to a 0.5 normal sulphurous acid solution at a temperature of about 80° F. for 21 hours. After the treatment these strips broke at 43 lbs. and stretched 61% under a 30 lb. load. Strips of the same felt, pretreated according to my process and then subjected to the above test, broke at 49 lbs. and stretched 50% under a 30 lb. load.

It should be pointed out that my process is not at all suited for treating wool or fabrics which are to be subjected to hydrogen peroxide. Felt strips subjected to my treatment had no appreciable strength after being subjected for 3 hours to the action of a 10 volume hydrogen peroxide solution at about 80° F. while untreated strips retained a substantial portion of their initial strength after the same treatment.

What I claim is:

1. The method of treating a mechanical fabric of the character described formed in substantial part of wool fibers to enhance its resistance to stretching and disintegration caused by exposure to alkaline solutions, hydrosulphites, sulfur dioxide, chlorine and hypochlorous acid which comprises chroming the fabric by treating it with an acid solution of an alkali dichromate and thereafter treating the fabric with a reducing agent to reduce the chrome therein to chromium oxide.

2. The method set forth in claim 1 in which the operation is conducted at a temperature of from about 90° F. to 120° F.

3. The method of treating a mechanical fabric of the character described formed in substantial part of wool fibers to enhance its resistance to stretching and disintegration caused by exposure to alkaline solutions, hydrosulphites, sulfur dioxide, chlorine and hypochlorous acid which comprises chroming the fabric by treating it with an acid solution of an alkali dichromate until is acquires a dark brown color and thereafter treating the fabric with a reducing agent to reduce the chrome therein to chromium oxide.

4. The method set forth in claim 1 in which the fabric is washed with water after chroming and before the reduction treatment.

5. The method of treating a mechanical fabric of the character described formed in substantial part of wool fibers to enhance its resistance to stretching and disintegration caused by exposure to alkaline solutions, hydrosulphites, sulfur dioxide, chlorine, and hypochlorous acid which comprises chroming the fabric by treating it in an acid solution of a chromium compound selected from the group consisting of chromium trioxide and the chromates and dichromates of ammonium, potassium, sodium, lithium, calcium, strontium and barium, until it acquires a dark brown color and thereafter treating the fabric with a reducing agent to reduce a substantial portion of the chrome therein to chromic oxide.

6. The method of treating a mechanical fabric of the character described formed in substantial part of wool fibers to enhance its resistance to stretching and disintegration caused by exposure to alkaline solutions, hydrosulphites, sulfur dioxide, chlorine, and hypochlorous acid which comprises chroming the fabric by treating it in an acid solution of a chromium compound selected from the group consisting of chromium trioxide and the chromates and dichromates of ammonium, potassium, sodium, lithium, calcium, strontium and barium, until it acquires a dark brown color and thereafter treating the fabric in an acid solution of sodium thiosulphate to reduce a substantial portion of the chrome therein to chromium oxide.

CARLTON C. GORDON.