Patented Dec. 26, 1950

2,535,846

UNITED STATES PATENT OFFICE

2,535,846

TREATMENT OF MATERIALS CONSISTING WHOLLY OR PARTLY OF WOOL

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No Drawing. Application September 20, 1949, Serial No. 116,855. In Great Britain September 29, 1948

7 Claims. (Cl. 8—128)

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This invention relates to improvements in the treatment of materials consisting wholly or partly of wool with halogens.

Within the scope of the term "wool" whenever used in the present specification, we include all animal fibres which are capable of being felted.

In describing this invention, the term "felt" is to be understood to refer to that property of ordinary wool which causes the individual fibres to close upon each other in washing, or other treatment in aqueous liquor in which the wool material is repeatedly squeezed and rubbed, so that the wool material becomes denser and more compact. This property of felting is responsible for the shrinkage which wool yarns and fabrics suffer when washed, so that when wool is rendered less liable to felt it is also rendered less liable to shrink.

It is known that the treatment of wool with halogens in the gaseous or dissolved form is capable of giving the wool increased affinity for dyestuffs and reduced tendency to felt.

It has now been found that the treatment of wool with halogens can be effected by placing it in contact with a solid substance which liberates or can be caused to liberate halogen when in contact with wool. The time required for treatment depends upon the nature of the solid substance employed and the effect desired.

According to the present invention, therefore, materials consisting wholly or partly of wool are treated with halogen by liberating the halogen from a solid substance placed in contact with the materials.

The materials treated by the present invention may be in the form of loose fibres or in a manufactured form such as yarn or woven or knitted fabric or in any intermediate stage. The materials may have received some treatment such as scouring, bleaching, dyeing, hot pressing and milling. The method of the present invention is also suitable for the treatment of woven or knitted goods such as garments. The wool may be in admixture with other materials such as cotton.

The method of the present invention has the advantage over the known methods using halogens in the gaseous or dissolved form that it is simpler to carry out and easier to control. It also has the great advantage that it may be used on shaped garments with less tendency for the garments to become distorted than when they are treated with liquid or gaseous reagents.

The solid substance which is preferably used in

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the form of a finely divided powder may be a compound of a fluid halogen which will liberate or can be induced to liberate such halogen when in contact with wool at atmospheric or superatmospheric temperatures or it may be a solid having halogen absorbed or adsorbed in or upon it. The preferred halogens are chlorine and bromine gases, the former being cheaper and more convenient to use. A suitable compound to employ is bleaching powder which is a well known and commercially obtainable product obtained by passing chlorine gas over lime.

If the solid substance, after it has been used in the method of the present invention, is still capable of liberating halogen it may be used again.

The method of the present invention may be so employed that the extent of treatment of the wool is insufficient to reduce materially its tendency to felt but sufficient to increase its affinity for dyestuffs. Such treatment may be followed, if desired, by further treatment with an oxidising or reducing agent, such as hydrogen peroxide, which is known to reduce the tendency of wool to felt. The extent of treatment and the time required for treatment, can be modified by employing the solid substance in admixture with a solid diluent inert to the halogen used preferably in the form of a finely divided powder. The effect of the halogen is increased with increase in time of treatment and is reduced by dilution of the solid substance with the solid diluent. The time required for treatment depends upon the nature of the solid substance employed and the effect desired. The time required to produce any given effect, e. g. degree of felting resistance also depends upon the acidity or alkalinity of the wool. In general, the time of treatment is longer if the wool is on the alkaline side and shorter if it is on the acid side of neutrality. Similarly, the time depends upon the moisture content of the wool. Within ordinary limits, the moisture content of the wool does not appear to be of great importance, but if the wool is drier than customary then the time of treatment may be more prolonged. The solid material with which the wool is treated may be moist or dry.

The treatment can conveniently be carried out at atmospheric temperature, although higher temperatures and reduced pressures may be employed if desired.

Conveniently the wool material may be embedded in the finely divided solid substance capable of liberating halogen when in contact with wool or in the solid substance mixed with the solid diluent.

Alternatively one face of a fabric may be covered with a layer of the solid substance and the fabric may then be rolled up so that the solid substance is in contact with both faces. The solid substance may be removed after the desired time of contact by unrolling the fabric and shaking and/or brushing the solid substance from the fabric which is thereafter washed. The washing preferably includes treatment with an "anti-chlor" such as sodium bisulphite which may itself reduce the tendency of the wool to felt.

If bleaching powder is spread over a wool fabric, or a wool fabric is buried in bleaching powder and the two materials are allowed to remain in contact, for a number of hours, the wool acquires an increased resistance to felting. Movement of the fabric while in contact with the bleaching powder improves the evenness of the result which is particularly desirable where the fabric is to be subjected to additional treatment after the treatment to improve its resistance to felting. The action of the bleaching powder on the wool can be conveniently retarded by diluting the bleaching powder with a solid inert to bleaching powder such as china clay, sodium carbonate or fine sand preferably in the form of a finely divided powder, the extent of reaction in unit time being determined by the proportion of inert powder. For example, with two parts of inert powder to one part of bleaching powder by weight, the time required to produce a substantial degree of anti-felting is about seventeen or eighteen hours at room temperature. Inert diluents which are water-soluble, such as the sodium carbonate refererd to above, are advantageous as they can be removed from the wool by washing.

The invention will be illustrated by, but is not limited to, the following examples.

Example 1

One face of an unscoured knitted all wool fabric containing 14–18% moisture was wholly covered with solid bleaching powder in fine powder form by spreading on to the fabric 1½ parts by weight of the powder to 1 part of wool. The exact constitution of bleaching powder is uncertain, but it is commonly stated to contain lime, $Ca(OH)_2$, and calcium hypochlorite, $Ca(OCl)_2$.

The fabric was rolled up and left in this condition for 6–8 hours at room temperature and the powder was then removed by shaking and brushing and exposure to currents of air. The fabric was then passed through a bath of water containing a wetting agent and then thoroughly washed in a second bath of cold water. It was then passed through a bath containing 1% of sodium bisulphite and finally washed free of all salts and finally dried.

The treated fabric showed greater resistance to felting than the untreated fabric.

Example 2

A mixture of 1 part by volume of bleaching powder in fine powder form and 2 parts of anhydrous sodium carbonate was evenly scattered over one face of a scoured woven mixture fabric consisting of 50% cotton and 50% wool, the wool component of which contained 18% moisture. The proportion of mixed powder to fabric used was 2 to 1 by weight. Without removing the solid powder the fabric was wound on a roller so that both the upper and lower surfaces of the fabric were in contact with the powder and the fabric was allowed to remain in this condition for 18–20 hours at room temperature. The fabric was then unrolled, and the powder removed and the fabric washed and dried as described in Example 1.

The finished fabric when washed with soap showed greater resistance to felting than the untreated fabric.

Example 3

Knitted wool socks were air conditioned and then buried in a mixture of finely divided silica and bleaching powder in the proportions by volume of 2 to 1½, contained in a suitable vessel. After 24 hours the socks were freed of solid powder by shaking, exposing to currents of air and washing as described in the preceding examples. The treated socks were more resistant to felting than the untreated.

Example 4

One face of a woven all wool fabric which contained 210% by weight of water was covered with solid bleaching powder in fine powder form. The fabric was rolled up and left for 4 hours. At the end of this time the powder was shaken off the fabric which was then washed in water containing a wetting agent. Then it was immersed in dilute sodium bisulphite solution and finally washed.

The untreated fabric when washed and milled in soap solution shrank by 42% of its original area, whilst the treated fabric when washed under the same conditions showed no shrinkage.

Example 5

The wet fabric of Example 4 was covered with a mixture consisting of 2 parts by volume of anyhdrous sodium carbonate and 1 part of bleaching powder. The fabric was rolled up and was left for 4 hours and after removing the powder mixture, was finished and washed as described in Example 4.

On washing and milling in soap solution the untreated fabric shrank by 42% as compared with 0.3% for the treated fabric.

I claim:

1. A process of treating wool with chlorine which comprises placing it in contact with solid bleaching powder.

2. A process of reducing the tendency of wool to felt which comprises embedding it in solid bleaching powder for a period exceeding one hour.

3. A process of reducing the tendency of wool to felt which comprises placing it in contact for a period exceeding four hours with solid bleaching powder.

4. A process of reducing the tendency of wool to felt which comprises placing it in contact for a period exceeding one hour with a mixture of solid bleaching powder and a solid diluent inert to bleaching powder.

5. A process of reducing the tendency of wool to felt which comprises placing it in contact for a period from about eight to about twenty-four hours with a mixture of solid bleaching powder and a finely divided solid inert to solid bleaching powder.

6. A process of reducing the tendency of wool to felt which comprises placing it in contact for a period from about eight to about twenty-four hours with a mixture of solid bleaching powder and a finely divided water-soluble solid diluent inert to solid bleaching powder.

7. A process of treating wool with chlorine which comprises placing it in contact for a period exceeding one hour with a mixture of solid bleaching powder and solid sodium carbonate.

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