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CLEANED AND DEGREASED WOOL SLIVER AND PROCESSES EMPLOYING THE SAME

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My invention relates to cleaned and degreased wool sliver useful particularly for making improved pile fabrics having a pile of wool yarn made from such sliver and to processes of treating wool to produce such sliver, yarns and fabrics. The objects of the invention are to clean and degrease the wool and to reduce the soil adherent properties of the treated wool particularly in the pile of floor covering such as carpets and rugs. Heretofore such piles have contained greasy substances, both natural and artificial, which have rendered such pile adherent to soil so that more or less frequent and expensive treatment of the carpets and rugs having such pile have been necessary to clean them. By my invention the necessity for such treatments is greatly reduced.

In the process of preparing wool to be made into pile yarn the wool raw stock is washed and scoured. After washing and scouring, the wool raw stock is dried and then picked and carded to produce a sliver which is subjected to the other usual operations which convert it into yarn to be woven as the pile in carpets and rugs.

According to my invention my preferred process is as follows. During the picking operation I spray the wool with an aqueous dispersion of bentonite. This dispersion is preferably prepared by dissolving one part by weight of sodium sulfate (anhydrous) and two parts of sodium bisulfate (40% sulfuric acid content) in 500 parts of water. After completion of the solution, I add to it slowly with agitation 56 parts of a swelling type of bentonite. I have obtained the best results with a swelling type of bentonite of which about 90% consists of montmorillonite, a clay mineral, and about 10% of minute particles of other minerals.

Such a dispersion consists of about 10% bentonite, is slightly acid and is sufficiently fluid to be sprayed. An effect of the sulfates, or electrolytes, is to inhibit the swelling of the bentonite so that the desired solids content may be obtained, yet the dispersion remains sufficiently fluid to be sprayed. When the bentonite of montmorillonite is used it separates into extremely fine particles of which much the greater proportion, about 87 to 89%, are finer than 0.5 micron in diameter and a large proportion, about 60 to 65%, are finer than 0.1 micron in diameter.

The slight acidity of the solution assists in preserving the quality of the wool when stored in bins. Other electrolytes such as sodium chloride, potassium chloride, potassium sulfate, calcium sulfate (all of which are salts), and sulfuric acid, hydrochloric acid, etc., may be employed in various combinations, instead of the sodium sulfate and sodium bisulfate, and a range of viscosities is possible by varying the percentages of the salts and acids.

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The dispersion may be applied to the wool raw stock in any suitable manner, but I prefer to spray it onto the wool during the picking operation. By spraying 10 to 20% of the dispersion 1 to 2% of bentonite solids is dispersed in the wool, that is, 100 pounds of wool are impregnated with one to two pounds of bentonite.

Or, a dispersion containing 20% of a swelling type bentonite may be prepared by dissolving 18 parts of sodium sulfate and 15 parts of sodium bisulfate in 500 parts of water and by adding to this solution 129 parts of bentonite. By spraying 10% of this dispersion onto the wool the wool is impregnated with 2% of bentonite solids. Of course, the amount of bentonite may be varied to suit the condition and characteristics of the wool but I prefer that the amount of bentonite be not less than 1% of the weight of the wool.

The impregnated wool raw stock is processed in the usual manner.

In spite of a thorough washing and scouring of wool raw stock, substantial quantities of soil, excrement, oil and grease, and some particles of soap and salts remain in the wool.

The particles of bentonite, applied during the picking operation, absorb a considerable amount of the oils and grease and other similar substances and pick up much of the dirt. They also cause particles of dirt to be detached from the wool.

In the carding operation, which follows the picking, much of the bentonite with the absorbed oils, grease and similar substances and the attached dirt and much of the detached dirt fall out of and are removed from the wool. There is thus produced a wool sliver which is substantially degreased and clean, that is, it is free from at least 50% of the greases, oils and dirt contained in the wool raw stock. There remains however in the degreased and cleaned wool sliver, after the carding, enough bentonite, approximately $\frac{1}{4}$ to 1% of the weight of the wool, to reduce and practically to eliminate the tackiness of the small remaining percentages of the grease and oils in the wool, so that the carded wool sliver has little or no soil adherent properties. Consequently, when this wool sliver is converted into yarn, which is woven, as the pile yarn, into a pile floor covering, such as a rug or carpet, the yarn is likewise degreased and clean and the dust and dirt particles which accumulate in use in the pile, are sufficiently free or detachable from the surfaces of the wool as to be readily removed by conventional household cleaning devices, such as carpet sweepers and vacuum cleaners. This is due to the substantial absence of greasy substances on the surfaces of the tufts which are the parts of the wool pile protruding from the backing structure of the pile fabric and form its tread surface. This condition of the wool sliver and

of the wool pile tufts, woven by the yarn derived from such sliver, I refer to as "degreased." When bentonite of montmorillonite is used its particles are present in the sliver and in the pile tufts of the rug or carpet in minute form, the larger proportions of which are less than 0.5 micron in diameter.

My invention also renders it possible to dispense with the customary treatment of wool with an oil emulsion which has been used to improve its workability in the spinning and other processes to which it is subjected. This oil emulsion is used because the wool, after scouring and drying, is in a fluffy state and possesses undesirable electrostatic qualities which render it difficult to work in that condition. To overcome this condition the oil emulsion has been applied to the wool usually during the picking operation. But this oil emulsion adds oil and grease to such similar materials as are naturally in the wool so that it increases the tendency and capacity of the wool and of the wool yarn in the pile of floor coverings to pick up and retain dirt.

The bentonite dispersion, I have found, is superior to the oil emulsion in that it more effectively eliminates the electrostatic condition in the fluffy wool so that the sliver and the yarn made therefrom are sufficiently free of static as to be spinnable, that is, they are substantially static free in that the wool may be efficiently worked in the subsequent treatments including spinning. At the same time the bentonite reduces, instead of increases, the greasy and oily content of the wool. The oil emulsion may thus be dispensed with.

I have also found that the presence of the bentonite in the wool has a delustering effect on the wool which is desirable in the pile of the finished fabric.

My divisional application Serial No. 237,062, filed July 16, 1951, claims the yarn and pile fabric disclosed herein.

I claim:

1. Washed, scoured, dried, picked, carded and static-free wool sliver substantially free of greasy substances and having adhered to the fibers of the sliver $\frac{1}{4}$ to 1% of finely divided particles of bentonite to the weight of the wool, the greater proportion of said particles being less than 0.5 micron in diameter, and said sliver being capable of being made without oil treatment into yarn suitable for use as pile yarn of carpets and rugs.

2. The process for producing a bentonite-containing wool sliver to be made into yarn which comprises washing, scouring, and drying raw wool, picking the washed, scoured, and dried wool and simultaneously spraying it with an aqueous dispersion consisting essentially of water, an electrolyte and substantially unswollen bentonite particles the greater proportion of which are less than 0.5 micron in diameter, wherein the electrolyte inhibits swelling of said particles, to distribute not less than 1% of the weight of the wool of such bentonite particles throughout the wool and thereby to cause said particles to adhere to the wool and to greasy substances and dirt in the wool, thereafter carding the wool and in so doing removing a substantial proportion of said particles with at least 50% of the greases, oils, and dirt contained in the raw wool stock, but leaving distributed therethrough more than approximately $\frac{1}{4}$ % of the weight of the wool of

bentonite particles the greater proportion of which are less than 0.5 micron in diameter, and which sliver is adapted to be made without treatment with oil into yarn suitable for use as pile yarn of carpets and rugs.

3. The process for producing a bentonite-containing wool yarn suitable for use as pile yarn of carpets and rugs, which comprises washing, scouring, and drying raw wool, picking the washed, scoured, and dried wool and simultaneously spraying it with an aqueous dispersion consisting essentially of water, an electrolyte and substantially unswollen bentonite particles the greater proportion of which are less than 0.5 micron in diameter, wherein the electrolyte inhibits swelling of said particles to distribute not less than 1% of the weight of the wool of such bentonite particles throughout the wool and thereby to cause said particles to adhere to the wool and to greasy substances and dirt in the wool, thereafter carding the wool and in so doing removing a substantial proportion of said particles with at least 50% of the greases, oils and dirt contained in the raw wool stock, but leaving distributed therethrough more than approximately $\frac{1}{4}$ % of the weight of the wool of fine particles of bentonite the greater proportion of which are less than 0.5 micron in diameter, and making said sliver into yarn without treatment with oil.

4. The process for producing a pile floor covering having a pile surface of bentonite-containing wool yarn, which comprises washing, scouring, and drying raw wool, picking the washed, scoured, and dried wool and simultaneously spraying it with an aqueous dispersion consisting essentially of water, an electrolyte and substantially unswollen bentonite particles the greater proportion of which are less than 0.5 micron in diameter, wherein the electrolyte inhibits swelling of said particles to distribute not less than 1% of the weight of the wool of such bentonite particles throughout the wool and thereby to cause said particles to adhere to the wool and to greasy substances and dirt in the wool, thereafter carding the wool and in so doing removing a substantial proportion of said particles with at least 50% of the greases, oils and dirt contained in the raw wool stock, but leaving distributed therethrough more than approximately $\frac{1}{4}$ % of the weight of the wool of fine particles of bentonite the greater proportion of which are less than 0.5 micron in diameter, making said sliver without treatment with oil into yarn, and weaving said yarn as the pile yarn of a carpet or rug.

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