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PROCESS OF TREATING FIBERS FOR SPINNING PURPOSES.

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This invention relates to the treatment of fibers with a view of improving their adaptability for the spinning process, and it comprises in particular an improvement in the roughening of fibers with more or less sharp edges or granular or powdrous abrading agents in the dry or wet condition in devices suitable for effecting the intimate contact of the fibers with such material. As heretofore suggested, the roughening agents were wholly or partially removed in order to be able to use them over again, and to avoid the liberation of dust which is very annoying and harmful in the spinning process, and also in view of the fact that the roughening agents have hardly been worn by the treatment.

It is, however, impossible to remove the last residues of these roughening agents without great difficulties, inasmuch as a portion of the powder or granules adheres so strongly to or within the fibers as to defy all attempts of removing them by the ordinary mechanical means, particularly in case the fibers have been submitted before the treatment to the usual greasing process or before removing the dust therefrom.

It has been ascertained that the quantities of the remaining roughening agents do not constitute an annoying or noxious admixture neither in the spinning operation, nor in the finished product, but they act on the contrary to make the threads more voluminous, of softer touch and more resistant against tearing strain. In view thereof it has turned out to the preferable to only remove the excess of roughening agents which does not adhere to the fibers and therefore merely constitutes an unnecessary weight and to avoid any further removal, and sometimes it will even be of advantage to promote the retaining of the roughening agents by the addition of substances adapted to assist the adhesion thereof, because the adhering roughening agents facilitate the entire procedure of subsequent roughening, and the curling, bending and twisting of the fibers. Thus for instance, the roughening agents or granules may be added simultaneously with or in mixture with the greasing agent or with any other agent adapted to assist in the adhesion. I may also proceed by suspending the roughening agent in water or in any other liquid which is then mixed with the fibers, the mixture being then agitated and dried.

In the drying operation a mechanical pressure may be made to operate upon the mixture, and the change of surface and of the shape of the fibers will be in proportion with the strength of said pressure. As a final step the mixture is freed from dust as much as necessary. The roughening agents or granules or grains may not only be added simultaneously with the agent promoting the adhesion, but also at different times.

Particularly in the case of long fibers, such as artificial silk, or staple fibers the roughening agents may also possess softer or less sharpened edges, and in this connection silica-gel for instance or other inorganic or organic equivalent substances with softer edges have been found to be suitable as roughening agents.

The addition of the roughening agents and the treatment therewith may be effected in any stage of the manufacture and of the further treatment of the fibers, thus for instance, in the spinning operation. In the case of artificial silk, or staple fiber the addition may be effected in all stages of operation succeeding the formation of the fibers, thus for example, in the hardening, winding, cutting, curling or similar operations.

Particularly satisfactory results are obtained when using the process for curled products, or when combining the treatment with roughening agents with the curling operation. The treatment may be carried out in all kinds of devices which are adapted to produce the intimate contact of the fibrous substances with the roughening agents.

The process of treatment described may be employed for all fibers of the kind described and of vegetable or animal origin. The following are particularly to be considered in this connection, viz, wood pulp-fiber, cottonized fibers of flax, hemp and the like, nettle (all kinds of nettle belonging to the botanic family of the urticaceae, as for instance, *urtica dioica* L. and *Boehmeria nivea*) kapok, artificial silk, artificial-silk-refuse, staple fibers in various lengths, animal hairs, cotton, artificial cotton, silk, wool, jute, and fiber waste and mixtures of these substances.

As an illustration of the mode of operation of the process the following examples may be described:—

The fibers, as for instance artificial silk,

staple fibers and the like are first mixed with a suspension of the roughening grains in water or in any other liquid. As roughening grains the following have been found to be particularly suitable, viz, infusorial earth, kaoline, silica-gel, starch granules, ordinary fine sand and the like. The mixture is then suitably agitated in mixing or beating devices of any suitable type or construction, the strength of the agitating or beating action being governed by the condition of the fibers. After the agitating the fibers are dried, for which purpose the excess of liquid may first be removed by centrifugal action. With the liquid a small portion of the roughening grains is also removed, and the larger part of the roughening grains is dried together with the fibers. By this means a roughened, twisted, bent and very suitable material for spinning purposes is obtained. If, as hereinbefore stated, a pressure is used during the drying operation, the roughening grains are impressed into the fibers, and modify the nature of the material still more, than would be the case, if no pressure was used.

All the different operations above referred to may be repeated so as to increase the resulting action thereof. Thereupon the dust is removed in suitable devices to the extent of avoiding any substantial liberation of dust during the spinning operation. By the addition of suitable binding agents the evolution of dust may be diminished, and on the other hand, by this means, the quantity of roughening grains adhering to the fibers may be increased, whereby the spinning structure of the fibers will be improved, as hereinbefore described.

If the process is carried out in the dry way, the mode of operation may, for instance, be as follows:—The fibers together with the roughening bodies or grains may be treated in beating or pounding mills, or for instance in cross beating mills or the like, and one may, for instance, proceed by using equal quantities of roughening grains and of fibers. Before the treatment the fibers may be greased, and they may be greased again after the treatment, after the roughening grains have been removed more or less from the fibers by dust removing methods. This may be effected by so-called "cyclone" devices or by sifting drums or the like. All these operations may, of course, be repeated any suitable number of times. One may also proceed by first treating the fibers in the wet way, and then in the dry way.

If the operation is carried out in the semi-dry, or moist condition of the fibers, it is, of course, necessary to dry the fibers before removing the dust; all other procedures are effected in accordance with the above statements and the condition of the fibers. The treatment in the wet or semi-wet condition

is particularly efficient in the case of artificial silk.

A certain degree of roughness and curling is also obtained in the case of artificial silk by agitating the fibers in more or less moist condition without the addition of powdered grains referred to, while otherwise the treatment remains the same, as hereinbefore described.

By repeated agitation, and by repeated wetting and drying of the fibers their spinning structure is likewise improved.

In all operations and stages water may be replaced by such liquids or solutions which have a particularly favorable influence upon the roughening or curling operation. The process is based upon the frictional contact of the agents during their agitation, which frictional contact may be assisted and increased by the roughening means above referred to, and on the other hand by moistening of the fibers, such means having the effect of increasing the bending and twisting tendency of the fibers by loosening the outer filaments thereof more or less, and various means may be employed within the principle hereinbefore enunciated as practical embodiments thereof, and within the scope and spirit of the claims, as hereinafter appended.

I claim:—

1. The process of treating and increasing the spinning qualities of fibers, which consists in incorporating loose textile fibers with particles, adapted to exert an abrasive action upon the said fibers.

2. The process of treating and increasing the spinning qualities of fibers, which consists in incorporating loose textile fibers with finely granular particles, adapted to exert an abrasive action upon the said fibers.

3. The process of treating fibers and increasing the spinning qualities thereof, which consists in incorporating textile fibers in a loose condition with finely granular, chip-like, adhering fragments of inorganic abrasive agents.

4. The process of treating fibers and increasing the spinning qualities thereof, which consists in treating loose textile fibers with a carrier in the liquid condition and with finely granular, chip-like adhering fragments of abrasive agents, drying the resultant mixture of fibers, carrier and fragments, submitting the mixture to mechanical pressure in the drying operation, thereby incorporating the fibers with said fragments, and then removing the non-adhering residue of fragments.

5. The process of treating fibers and increasing the spinning qualities thereof, which consists in incorporating fragments of silica-gel with textile fibers in a loose condition, and causing said fragments to be retained in said fibers.

6. As a new article of manufacture, a mixture of loose textile fibers with finely granular, chip-like fragments of abrasive material incorporated and retained therein.
- 5 7. As a new article of manufacture, a mixture of loose temporarily moistened, dried, roughened textile fibers with finely granular fragments of abrasive agents adhering thereto and permanently incorporated therewith.
8. As a new article of manufacture, a mixture of loose textile fibers with silica-gel incorporated therewith and retained therein.

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