Aug. 3, 1954 M. BALKIN ET AL 2,685,109

FIBER-DRAFTING ELEMENT USED IN TEXTILE SPINNING

Filed May 2, 1950

2 Sheets-Sheet 1

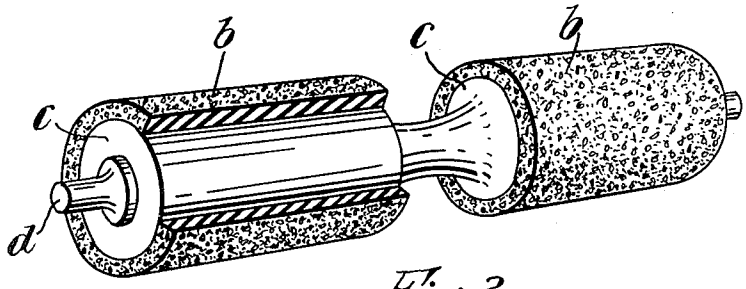

Fig. 3.

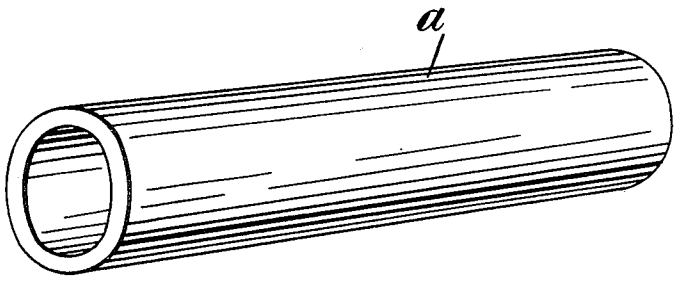

Fig. 1.

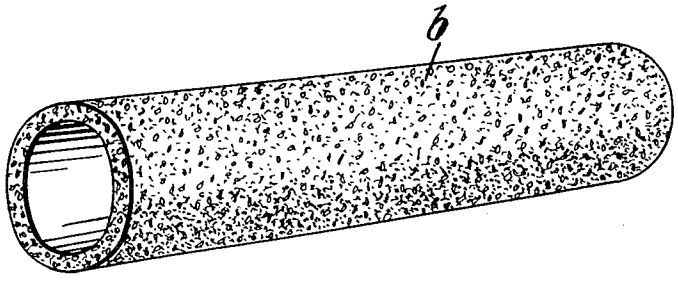

Fig. 2.

INVENTORS
MARK BALKIN AND DENYS G. TURNER
BY: Frances E. Boyce
ATTORNEY

Aug. 3, 1954 M. BALKIN ET AL 2,685,109

FIBER-DRAFTING ELEMENT USED IN TEXTILE SPINNING

Filed May 2, 1950

2 Sheets-Sheet 2

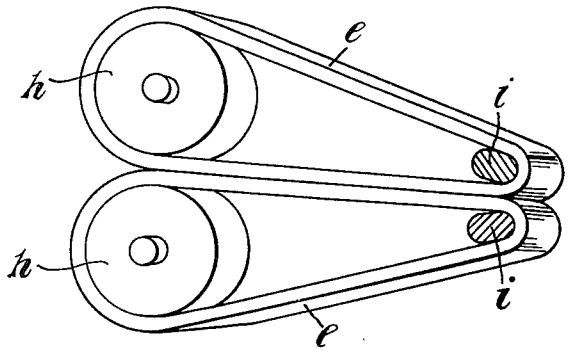

Fig. 6.

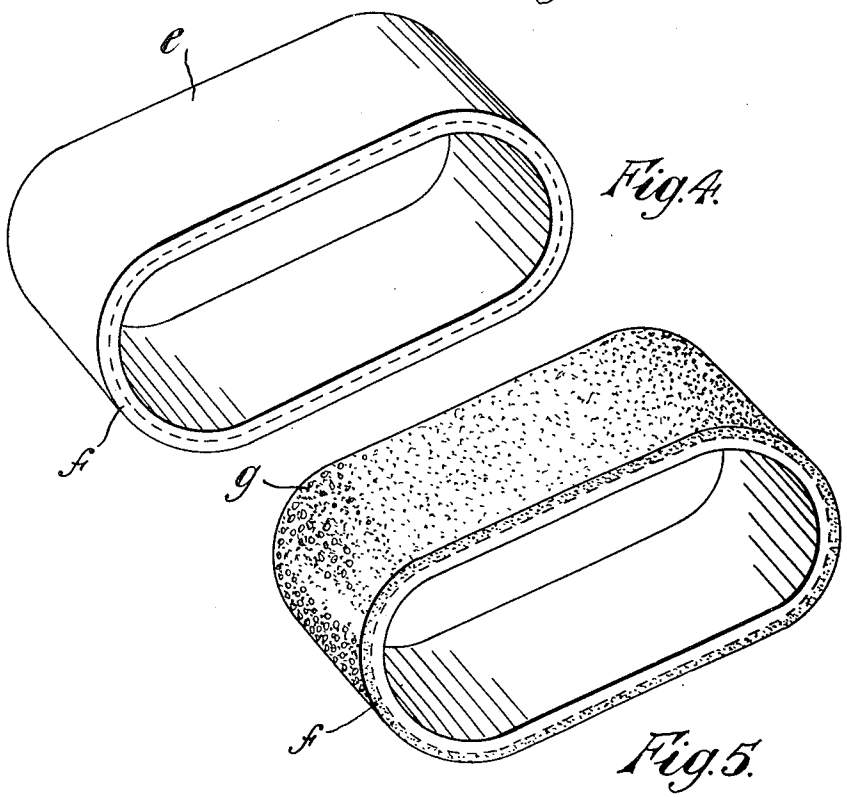

Fig. 4.

Fig. 5.

INVENTOR

MARK BALKIN AND DENYS G. TURNER

BY Francis E. Boyce

ATTORNEY

Patented Aug. 3, 1954

2,685,109

UNITED STATES PATENT OFFICE

2,685,109

FIBER-DRAFTING ELEMENT USED IN TEXTILE SPINNING

Mark Balkin and Denys Grahame Turner, Newcastle-upon-Tyne, England, assignors to George Angus and Company Limited, Newcastle-upon-Tyne, England

Application May 2, 1950, Serial No. 159,606

4 Claims. (Cl. 19—143)

1

This invention relates to fibre-drafting elements used in textile spinning, namely the coverings of rollers used in spinning textile fibres, and known as roller cots and spinning cots, and for large diameter rollers as tyres, and draft aprons used in spinning textile fibres.

Roller coverings used in spinning textile fibres are mounted on cylindrical metal rollers or spindles and each runs in contact with a fluted metal roller. Textile fibres are engaged between the two rollers, and are drawn by passing therefrom into engagement by a similar pair of rollers rotating at a higher peripheral speed.

A draft apron is an endless belt or tape, between an opposed pair of which, led around opposed rollers, fibres are nipped and supported in their passage towards a pair of drafting rollers rotating at a greater surface speed than that of the drafting aprons.

To improve resistance to abrasion, fibre-drafting elements, both fibre-drafting roller coverings and draft aprons, made of natural rubber have been tried, but these fail as natural rubber has poor resistance to oils, and fibre-drafting roller coverings and draft aprons made thereof swell and distort in service.

With the development of oil-resistant synthetic rubbers, such as copolymers of butadiene and acrylic nitrile, it has been proposed to make fibre-drifting elements of oil-resistant synthetic rubber, as such would be expected to show good resistance to abrasion. However, although initially a satisfactory fibre-drafting surface can be made from oil-resistant synthetic rubber, it has been found in practice that it often rapidly deteriorates in efficiency, resulting in dirty running, namely the tendency for fibres to cling to and go around with the fibre-drafting element. Such carried-around fibres, which are dragged out of the line of fibres, cause the production of uneven yarn having thin places where they have been removed. Moreover, these fibres collect as waste on the clearers, entailing an undesirable loss of material. Also, occasionally, such fibres may re-attach themselves elsewhere along the line of fibres being drafted, causing the production of a thicker uneven place in the spun yarn.

It has sometimes been found that if oil-resistant synthetic rubber fibre-drafting elements which run dirty are cleaned or lightly buffed, they function satisfactorily again.

We have found after close study that in many cases the cause of dirty running of oil-resistant synthetic rubber fibre-drafting elements, is the presence of oily, greasy or waxy material on the

2

surface of the fibre-drafting element. This contamination is mainly derived from the fibres which are being drafted.

Most textile fibres such as the natural fibres of cotton and wool are associated with fatty or waxy materials. For instance, cotton may contain up to 1% of natural wax of complex chemical composition. Incidentally, this wax serves a useful purpose in cotton spinning, as it is a desirable lubricant or softener of the fibres, and therefore it is not desirable to remove it before spinning..

Natural wool fibre normally contains an excessive amount of greasy or fatty matter, such as wool fat, and suint or wool sweat. Most of these impurities are removed from the wool by washing or other treatment before spinning the wool, but it is essential that up to about 1% of fat is retained by the wool to assist spinning, otherwise the fibres would be harsh and brittle. It is in fact usual to apply further controlled quantities of special oils to the wool fibres to lubricate them prior to spinning.

We have observed that in the course of drafting, whereas the fibre-drafting element was originally clean and free from grease, it gradually develops a greasy or oily surface, due to contamination by oil or grease derived from the fibres passing over and in contact with the synthetic rubber fibre-drafting surface. Such film or grease or oil provides a tacky surface on the synthetic rubber which causes the adherence thereto of fibres from the line of fibres being drafted, leading to the dirty running and the disadvantages associated therewith described above. The dirty running gradually becomes worse as the greasy film oxidises or congeals and thereby becomes more tacky in character.

Contamination by oil or grease of the fibre-drafting surface of a fibre-drafting element is particularly objectionable, when the fibre-drafting element, either a roller covering or a draft apron, has a fibre-drafting surface provided by finely cellular oil-resistant synthetic rubber.

The exposed cells at the surface of the finely cellular synthetic rubber fibre-drafting element initially provide a finely rough surface suitable for fibre-drafting. However, the finely rough surface exposed by grinding the surface of the cellular rubber, is particularly susceptible to contamination by oil, grease or wax. The fine surface pores become filled with the oil, grease or wax, which nullifies the advantages of the rough surface. In this manner the surface not only tends to become oily or greasy, but also smooth. Thus with cellular rubber, the surface advantage

of roughness becomes lost, although the cushioning effect of cellular rubber with unruptured cells and capability of volumetric compression thereof, are retained.

We have made many experiments endeavouring to find a means of preventing the accumulation of oil or grease on an oil-resistant synthetic rubber fibre-drafting element. It was found that the normal oil-resistant synthetic rubbers, whereas they are oil-resistant in the sense that they do not absorb oil and thereby become softened and swollen, on the other hand, are not oil-repellant, and, therefore, are readily wetted or contaminated by oil or grease adhering to their surface.

The object of the present invention is to render the fibre-drafting surface of an oil-resistant synthetic rubber fibre-drafting element, also oil-repellant. The rubber may be plain, i. e. solid, or finely cellular. We have discovered that by the addition to oil-resistant synthetic rubbers of so-called water-soluble gums of vegetable origin which are colloidal in nature, fibre-drafting elements can be made therefrom which do not tend to develop greasy or sticky surfaces even after continuous running in contact with fibres which normally contain oil or grease. In consequence dirty running is practically eliminated and good uniform yarn can be spun. In addition, waste is thereby reduced, and the necessity of frequent cleaning or buffing of the fibre-drafting surfaces is eliminated.

By water-soluble gums of vegetable origin are meant vegetable substances which have the following general characteristics, namely: They are soluble or can be dispersed in water to give thick colloidal solutions. They are hydrophilic. They are generally of complex indefinite composition consisting mainly of carbon, hydrogen and oxygen and are chemically carbohydrates or closely related to carbohydrates. Examples of such water-soluble gums are gum tragacanth, gum arabic, starch and dextrin.

Suitable water-soluble vegetable gums for adding to oil-resistant synthetic rubber to render it oil-repellant, are those mentioned, namely gum tragacanth, gum arabic, starch and dextrin. Suitable proportions are 50 parts by weight of the gum to 100 parts by weight of rubber.

Accordingly, according to the present invention the fibre-drafting surface of a fibre-drafting element is provided by an oil-resistant synthetic rubber composition, either plain or finely cellular, containing a substantial proportion of a colloidal water-soluble vegetable gum.

By "substantial" is meant sufficient to provide an effective oil-repellant action. The effectiveness of the oil-repellant action will depend upon the nature and greasiness of the fibre which is drafted, and for some kinds of fibres a proportion of 10 parts by weight of colloidal water-soluble vegetable gum to 100 parts by weight of oil-resistant synthetic rubber could be sufficient. The amount of the gum present in the rubber composition should not exceed that which would render the composition unduly hard and for this reason usually does not exceed 80 parts by weight of colloidal water-soluble vegetable gum to 100 part by weight of oil-resistant synthetic rubber.

The gum is first made into a thick paste with water and the paste is added to the synthetic rubber on the mixing mill in the normal course of mixing the synthetic rubber composition. The other usual ingredients such as zinc oxide, sulphur, vulcanising accelerators, and fillers such as carbon black or whiting, together with, for finely cellular rubber, a gassing agent, such as sodium bicarbonate, are added. The water in the paste gradually evaporates off.

It has been found that water-soluble vegetable gums blend very well with oil-resistant synthetic rubbers, such as butadiene-acrylic nitrile.

After the mixing, the composition is processed in the usual way, for example by being extruded, and is vulcanised in steam or in a hydraulic press, to make a draft roller cot or a draft apron.

The gum exercises a stiffening effect on the final vulcanised product. More or less than 50 parts by weight of gum to 100 parts by weight of synthetic rubber can be used depending on the type of vulcanised product required.

When the synthetic rubber drafting element is finely cellular, the cells thereof are unbroken gas-filled cells. The cellular structure is exposed at the fibre-drafting surface, by trimming off the smooth surface left on vulcanisation. Usually and conveniently, the surface is trimmed-off by grinding, but other methods, including even wear during initial use, are not excluded.

Representative examples of fibre-drafting elements to which the invention is applied are shown in the accompanying drawings, in which—

Fig. 1 is a perspective view of an unmounted roller cot of plain gun-containing oil-resistant synthetic rubber, and

Fig. 2 is a similar perspective view of an unmounted finely cellular gum-containing oil-resistant synthetic rubber roller cot, after the outer periphery has been ground to expose the cellular structure and the ends have been trimmed.

Fig. 3 is a perspective view of a double boss roller with two mounted finely cellular gum-containing oil-resistant synthetic rubber roller cots, one of which is cut away to expose longitudinal sections of the cot.

Fig. 4 is an isometric view of an unmounted oil-resistant synthetic rubber draft apron with an intermediate textile fabric reinforcement and a plain gum-containing oil-resistant synthetic rubber fibre-drafting surface layer.

Fig. 5 is an isometric view similar to Fig. 4 and showing a similar unmounted draft apron but with a finely cellular fibre-drafting surface layer.

Fig. 6 is a perspective view showing in the operative position a pair of plain surfaced draft aprons like that shown in Fig. 4, but on a smaller scale.

An unmounted roller covering or roller cot *a* composed of plain gum-containing oil-resistant synthetic rubber is shown in Fig. 1. A similar but finely cellular roller covering or roller cot *b* is shown in Fig. 2. These roller coverings are mounted on metal spindles, a pair of finely cellular roller coverings *b* being shown in Fig. 3, each mounted on a separate boss *c* of a metal spindle *d*.

An unmounted draft apron *e* composed of plain gum-containing oil-resistant synthetic rubber with an intermedate textile fabric reinforcement *f*, is shown in Fig. 4. A similar draft apron, but with a finely cellular gum-containing oil-resistant synthetic rubber fibre-drafting surface layer *g*, is shown in Fig. 5. In use a pair of draft aprons *e* are, as shown in Fig. 6, each led around a separate roller *h* of a pair of opposed rollers and are extended to run in mutual contact along a portion of their travel, by each passing loosely around the respective arm *i* of the device, called a tensor, which holds together the fibre-conveying portions of the two draft aprons *e*.

We claim:

1. A fibre-drafting element having a fibre-drafting surface layer consisting of an oil-resistant synthetic rubber composition having permanently blended with the rubber phase of said composition a colloidal water-soluble vegetable gum in the proportion of at least 10 parts by weight of said gum to 100 parts by weight of said rubber.

2. A fibre-drafting element according to claim 1 in which said fibre-drafting surface layer is finely celluular.

3. A fibre-drafting element having a fibre-drafting surface layer consisting of an oil-resistant synthetic rubber composition having permanently blended with the rubber phase of said composition a colloidal water-soluble vegetable gum in the proportion of at least 50 and under 80 parts by weight of said gum to 100 parts by weight of said rubber.

4. A fibre-drafting element according to claim 3 in which said fibre-drafting surface layer is finely cellular.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,175,798	Hauser	Oct. 10, 1939
2,304,656	Rockoff	Dec. 8, 1942
2,343,559	Kirby et al.	Mar. 7, 1944
2,381,706	Wilson	Aug. 7, 1945
2,385,319	Eustis et al.	Sept. 18, 1945
2,457,542	Golden	Dec. 28, 1948
2,507,869	Rothermel	May 16, 1950