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SPINNING ROLL COVER

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FIG. 1.

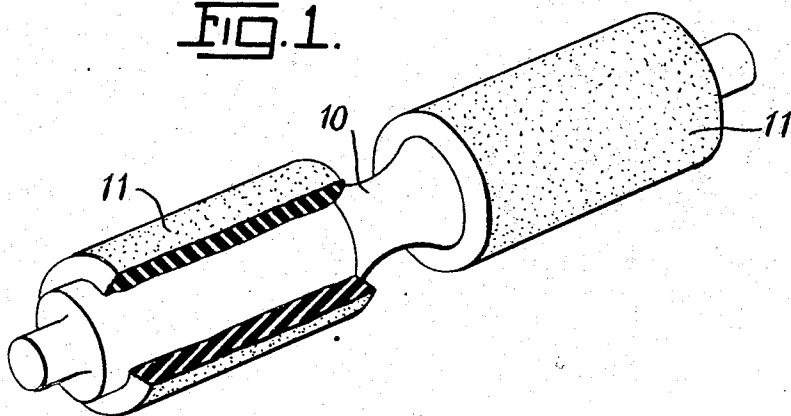


FIG. 2.

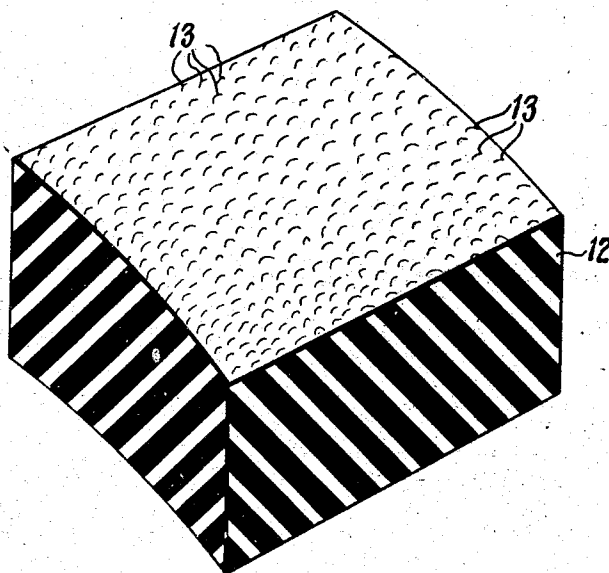
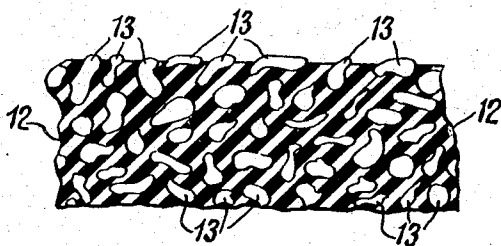


FIG. 3.



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SPINNING ROLL COVER

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13 Claims. (Cl. 19-143)

This invention relates to textile machinery.

More particularly, it deals with cots for spinning and card room rolls, and while it will be described in connection with the making of spinning roll cots, it will be understood by those skilled in the art that this invention is also adapted for forming other rolls commonly used in textile working machines, such as temple rolls, loom take-up roll coverings, and the like.

The improved spinning roller or cot which is the subject matter of the present invention possesses good fiber drafting characteristics, exhibits low static charge build up, is resistant to attack by oil and abrasive substances, and has good aging and wear resisting properties. In addition, it is characterized by a surface which exhibits no tendency to "eyebrowing" and which retains its original finish or condition in spite of normal wear through abrasion.

Many attempts to substitute natural rubber compositions in the manufacture of spinning rollers and cots have been made, but they have proved unsuccessful primarily because natural rubber is readily attacked by oil and tends to develop a gummy or tacky surface when used in fiber working. As a result of extended research and experimental testing of a large number of cots made of various compositions, including large scale commercial tests conducted in textile mills, it was discovered that the use of synthetic rubber-like materials comprising butadiene copolymers of acrylic nitriles when compounded with other ingredients and vulcanized produce a cot which can be ground to give a fiber working surface possessing the characteristics of calfskin or the best leather covered cots. Such cots have excellent fiber drafting properties and exhibit substantially no tendency to collect fiber on the surface thereof. They do not exhibit a tendency of grooving, do not collect static charge in substantial amount, are practically unaffected by oils and greases, and possess high resistance to eyebrowing.

More recently, and as a result of further extensive research and practical experimentation, there has been invented and developed an improved cot or roller which exhibits still greater resistance to eyebrowing, and it is this improved cot or roller that is the subject matter of the present invention.

Among the essential or desirable properties of a spinning cot are those of being substantially static free and resistant to oils and greases. Synthetic rubbers, such as neoprene and other similar butadiene polymers of which methyl rub-

ber is typical, possess these essential or desirable properties, but when these materials are employed in the manufacture of cots or rollers, they are found unsatisfactory because they exhibit excessive eyebrowing and have a tendency to "lap up" the fiber being worked. Thiokol, another synthetic rubber, has extremely high oil resistance. However, spinning cots and rollers made with this material exhibit the same undesirable lapping and eyebrowing. Koroseal, a polyvinyl chloride synthetic rubber, is also resistant to oil and forms a smooth surface cot, but this material develops the same defects as neoprene and Thiokol. Flexible glyptal resins exhibit the same tendency to lapping and eyebrowing which is found with synthetic rubbers and which is undesirable in textile working operation.

With such poor results obtained with spinning cots and rollers made of synthetic rubber-like substances, it was unexpected and surprising that spinning cots and rollers made of butadiene-acrylic nitrile copolymers would not develop any of the defects or deficiencies which characterize other synthetic rubberlike substances. It was discovered, however, that when butadiene-acrylic nitrile co-polymers were compounded and employed in producing cots, the resulting article possessed all of the desirable characteristics found in other synthetic rubberlike substances, and, in addition, a very great resistance to lapping and eyebrowing, and that while the cots possessed substantially the same spinning qualities of calfskin in industrial or commercial use, they had, in addition, greater durability.

I give the following as a typical example of a spinning cot composition:

Example I

	Parts by weight
Butadiene-acrylic nitrile copolymer-----	80-125
Dibenzyl ether-----	10-25
Cumarone resin-----	6-12
Zinc oxide-----	4-8
Whiting-----	40-70
Sulfur-----	1-2
Benzothiazyl disulphide-----	0.9-1.5

It has been found that if the composition of Example I is further compounded in its uncured state with a fine granular material it is possible to produce with such composition spinning cots and rollers which are substantially devoid of any tendency to lap up or eyebrow. Fine salt and sand have been suggested as the granular material to be incorporated in such a composition but both of these have certain disadvantages.

Salt, for example, will deliquesce in the humid atmosphere of a spinning room with the result that the surface of the cot or roller becomes somewhat gummy and moist to the touch. Sand, on the other hand, is extremely abrasive and will cause damage when in contact with bearings and other closely fitted moving parts of machinery.

According to the present invention, I am able successfully to obtain the desirable physical characteristics resulting from the incorporation of fine granular material in the composition of Example I without thereby obtaining the undesirable features of fine salt and sand. I have found that if I incorporate a quantity of finely divided rubber or similar rubber-like material of a dissimilar degree of hardness than is produced by the rubber composition of Example I in such a rubber composition, I obtain a dispersion of finely divided rubber of dissimilar hardness throughout the body of rubber composition. This dispersion of rubber-in-rubber provides the same characteristics hitherto obtainable by the addition of fine salt or sand, but since the fine granules of rubber are neither water-absorbent nor abrasive, their use does not lead to gumminess on the surface of the roll cover as is the case with salt nor is there any possibility of damaging bearings and other moving parts as is the case with sand.

Example II

	Parts by weight
Composition of Example I.....	100
Finely divided rubber (ground buffings)...	30-70

The ingredients of the composition of Example I are compounded in the usual manner using suitable rubber mixing and compounding equipment. The finely divided rubber (such as ground buffings) may be added during the same operation or in a subsequent mixing or compounding operation. After the materials are thoroughly mixed, the mixture is molded and vulcanized to form a cot of the desired shape.

In Example I the butadiene-acrylic acid copolymer may be used in different amounts, preferably on the order of from 30 to 55 per cent by weight of the composition. The composition of Example II may be vulcanized as is ordinarily done in the case of natural rubber compositions. The hardness of the cots may be preferably within the range of 50 to 95 as measured on the Shore type "A" durometer. The hardness or toughness of the finished article, and its resiliency, may be modified by suitable additions of carbon black, zinc oxide, clays and other materials as is well known to those skilled in the compounding of natural rubber.

A great variety of fillers, accelerators and different resins may be employed with good results, but it is essential to use an acrylic copolymer of butadiene in order to obtain the highly desirable results to which reference has been made hereinbefore. While the butadiene-acrylic nitrile copolymer has been found to be the most satisfactory, I do not limit myself to its use nor preclude the use of other acrylic compounds. For example, the copolymers of butadiene with acrylic acid esters or styrene may be employed satisfactorily.

The nature of the spinning roller or cot of my invention will be better understood by reference to the annexed drawing in which:

Fig. 1 is a perspective of a top spinning roller or cot with the covering partially broken away at one end;

Fig. 2 is an exaggerated diagrammatic view of the surface appearance of the material forming the roll cover; and

Fig. 3 is an exaggerated diagrammatic view of a cross section of the rubber composition including particles of rubber of dissimilar hardness showing the distribution of the rubber granules throughout the rubber body and the manner in which they appear adjacent the surface of the roll cover.

In the drawing, the numeral 10 represents the body of the spinning roller and the numeral 11 indicates the vulcanized cover of acrylic nitrile and butadiene copolymer having dispersed therein a finely divided rubber material.

In Figs. 2 and 3 the rubber body forming the roll cover is generally designated as 12 and the particles of rubber therein are designated as 13.

As has been noted hereinbefore, large scale industrial and commercial tests run over considerable lengths of time have definitely established that cots made from compositions substantially as set forth in Example II possess a fiber working surface which is fully equal to calfskin in spinning qualities and which is substantially devoid of any tendency to lap up or eyebrow. The cot surface is dry and possesses a smooth, velvety feel, and what is more, it retains this smoothness and velvetiness. The frictional effect of the fiber on the roll cover abrades and wears away the rubber body of the cot and the rubber material dispersed therein at dissimilar rates, thus leaving behind a macroscopically pitted or pock-marked surface which nevertheless is substantially smooth and velvetlike to the touch.

Wear and regrinding of the cot surface will not destroy the desirable texture thereof, since the composition is homogeneous and new grains of finely divided material are brought to the surface and fall off when the surface is ground and during use. The surface of the cots remains tough, resilient and resistant to oxidation. The cots possess a very low static charge build-up and high resistance to abrasion and to attack by oil and grease. They are greatly superior to similar cots made with chloroprene and other known oil resisting synthetic rubberlike substances.

It will be understood by those skilled in the art that my improved butadiene-acrylic nitrile copolymer composition containing homogeneously dispersed grains of finely granulated material such as rubber or similar rubber-like material may be used in making a great variety of fiber-working machine elements for use in the textile industry. For example, various types of rolls, covers, jackets, aprons and the like used in drafting, conveying and fiber-working may be manufactured using my improved compound.

It will be also understood by those skilled in the art that the degree of vulcanization or curing may be so controlled as to produce any specific physical property which may be found desirable in the finished product. Proportionate amounts of different ingredients may be substituted for those enumerated in order to produce a product of any desired degree of hardness, elasticity and frictional characteristics. In each case, the ingredients will be compounded with the butadiene-acrylic nitrile copolymer and the granulated substance, molded to the desired shape or form, and then vulcanized, and if it is so required, the surface may be ground, buffed, abraded, or otherwise machined or processed to give it any desirable surface characteristics.

In addition, it will be understood that while I

have set forth certain embodiments of my invention, it is not my intention to have it limited to or circumscribed by the specific details of proportions, procedure and substances herein set forth, in view of the fact that my invention is susceptible to many and varied modifications without departing from the spirit of this disclosure and the scope of the appended claims.

I claim:

1. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a vulcanized fiber contacting surface layer of pitted structure consisting of a resilient composition comprising acrylic nitrile and butadiene copolymer, and fine particles of granular rubber substance of dissimilar relative hardness homogeneously dispersed therein.

2. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a vulcanized fiber contacting surface layer of pitted structure consisting of a resilient composition comprising acrylic nitrile and butadiene copolymer, and finely divided granular rubber substance of dissimilar relative hardness homogeneously dispersed therein.

3. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a vulcanized fiber contacting surface layer of pitted structure consisting of a resilient composition comprising acrylic nitrile and butadiene copolymer, fine particles of granular rubber substance of dissimilar relative hardness, and a filler.

4. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a vulcanized fiber contacting surface layer of pitted structure consisting of a resilient composition comprising acrylic nitrile and butadiene copolymer, a finely divided granular rubber substance of dissimilar relative hardness, and a filler.

5. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber contacting surface layer of pitted structure consisting of a vulcanized resilient composition comprising acrylic nitrile and butadiene copolymer, fine particles of granular rubber substance of dissimilar relative hardness, a filler, and resinous ingredients, said surface layer being resistant to abrasion and having substantially no tendency to cause sticking of the fiber thereto.

6. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber contacting surface layer of pitted structure consisting of a vulcanized resilient composition comprising acrylic nitrile and butadiene copolymer, a finely divided granular rubber substance of dissimilar relative hardness, a filler, and resinous ingredients, said surface layer being resistant to abrasion and having substantially no tendency to cause sticking of the fiber thereto.

7. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber engaging surface of pitted structure comprising acrylic nitrile and butadiene copolymer, fine particles of granular rubber substance of dissimilar relative hardness, calcium carbonate, and cumarone resin, said fiber engaging surface being substantially static free and possessing a friction resistant wearing surface.

8. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber engaging surface of pitted structure comprising acrylic nitrile and butadiene copolymer, a finely divided granular rubber substance of dissimilar relative hardness, calcium carbonate, and cumarone resin, said fiber engaging surface being substantially static free and possessing a friction resistant wearing surface.

9. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber working surface of pitted structure comprising acrylic nitrile and butadiene copolymer, fine particles of granular rubber substance of dissimilar relative hardness, filler, resin, and sulfur, said fiber working surface being vulcanized and exhibiting oil resistance and substantial freedom from static.

10. As a new article of manufacture, a textile machine unit adapted for drafting fibers having a fiber working surface of pitted structure comprising acrylic nitrile and butadiene copolymer, a finely divided granular rubber substance of dissimilar relative hardness, filler, resin, and sulfur, said fiber working surface being vulcanized and exhibiting oil resistance and substantial freedom from static.

11. As a new article of manufacture, a textile machine fiber working element having a pitted surface and comprising acrylic nitrile and butadiene copolymer, and a finely divided granular rubber substance of dissimilar relative hardness, said element being vulcanized and exhibiting hardness, wearing qualities, and substantial freedom from static under ordinary working conditions.

12. As a new article of manufacture, a textile machine fiber working element having a pitted surface and comprising acrylic nitrile and butadiene copolymer, and fine particles of granular rubber substance of dissimilar relative hardness, said element being vulcanized and exhibiting hardness, wearing qualities, and substantial freedom from static under ordinary working conditions.

13. As a new article of manufacture, a spinning cot having a pitted surface and consisting of a vulcanized body comprising acrylic nitrile and butadiene copolymer, and fine particles of rubber substance of dissimilar relative hardness dispersed therein.

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