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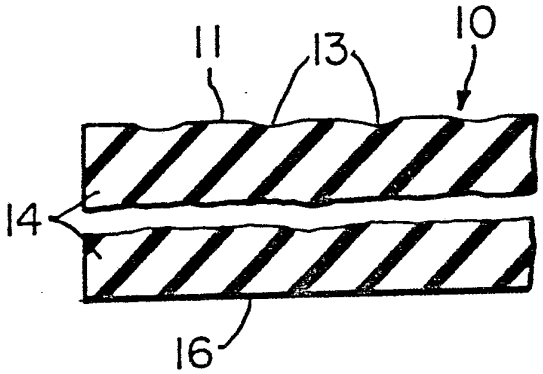
(54) Title: TEXTILE FIBER DRAFTING APRON



(57) Abstract

A textile fiber drafting apron (10) and method of manufacture, wherein the apron (10) is free of cord reinforcement and is formed of a single extruded layer of material (14). The outer fiber working surface (11), has a smoothness comparable to a conventional ground surface, and is expressed in terms of average depth of remaining depressions (13), as measured on a standard measuring device.

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TEXTILE FIBER DRAFTING APRON

Technical Field

This invention relates to textile fiber drafting aprons, as well as a method of manufacturing the aprons.

Aprons of this type are used in the process known as drafting or texturing, in which bundles of discontinuous natural or synthetic fibers are passed between pairs of nearly contacting aprons to draw them out into long strands. These strands have superior physical characteristics, particularly increased tensile strength, and have uniform properties that enable them to be further used in textile processing.

Background Art

Conventional aprons are formed of two different elastomeric compounds, each formed into a separate layer which are laminated together to form the finished product. Normally, the apron must be reinforced with cords which are located between the laminated layers and extend longitudinally of the circumference of the apron. It has also been known to reinforce aprons with fibrous materials in the two layers, and also to form the apron from a single layer of elastomeric material into which reinforcing fibers have been incorporated.

These prior art concepts are set forth in the following U.S. Patents:

Bacon	2,362,340	November 7, 1944
Howell	3,011,221	December 5, 1961
Meadows	4,143,559	March 13, 1979

Bendix Corporation Manual on Profilometer® Type VEG Model 22, Manual No. 70467307

The two layer reinforced cord construction is shown in the Howell Patent; the two layer fiber reinforcement in the Bacon patent; and the single layer fiber reinforcement in the Meadows et al patent. It should be

noted that in all these prior art patents, the finished product must have a finish grinding operation on the outer surface in order to provide a desirable smooth surface for contacting the fibers which are being drafted. Thus, none of these patents suggest the concept of a non-reinforced, single layer apron having an unground fiber working surface. The Profilometer® is used to measure surface roughness as a comparison of the novel apron and standard aprons.

Disclosure of the Invention

The present invention features a monolithic drafting apron without reinforcement, which is formed of a single layer of elastomeric material, and has an outer fiber working surface that has a smoothness without grinding, equivalent to the smoothness of a conventional ground surface.

This invention provides an important contribution to the textile art by eliminating the cost of grinding, while also taking advantage of a single layer concept to avoid the costly step of laminating two layers.

The cord reinforcing concept was based on the assumption that these cords were necessary to stabilize the apron, so that such problems as stretching, distorting or creeping, would not occur during operation. As noted above, later attempts to eliminate the cord reinforcement included the use of fibers. The present invention eliminates either type of reinforcement, at a huge cost saving and a simplified production procedure.

The conventional surface grinding procedure has always been deemed necessary to achieve close dimensional tolerances, and to provide the smooth working surface that is needed to process the fibers. Applicants have found, however, that grinding can have certain drawbacks, in addition to the cost. Where thin-walled aprons are involved, the grinding process often induces distortion in the surface, which could adversely affect the important dimensional tolerances.

The improved apron described and claimed herein provides an important part of the textile fiber process, and the novel method of making this apron is also of great importance.

Brief Description of the Drawing

The features of the invention, and its technical advantages, can be seen from the following description of a preferred embodiment, together with the claims and the accompanying drawing, in which:

FIG. 1 is a perspective view illustrating a pair of exemplary textile aprons of this invention mounted on associated components comprising a typical double apron system;

FIG. 2 is a perspective view illustrating a single exemplary textile apron mounted on associated components comprising a single apron system;

FIG. 3 is a perspective view of the novel apron made in accordance with the present invention;

FIG. 4 is a perspective view of a typical extruder for forming the novel apron; and

FIG. 5 is a greatly enlarged fragmentary cross-section of the novel apron, taken along lines 5-5 of FIG. 3, illustrating the nature of the material and the smoothness of the outer surface.

Best Mode for Carrying Out the Invention

Reference is now made to FIGS 1,2, and 3 of the drawing for presentations of typical texturing or drafting aprons as used in a double apron system (FIG.1), and as used in single apron systems (FIG.2). Each of these aprons, though of different physical size, is of the same construction. Therefore, for simplicity and ease of presentation, each of these aprons is designated by the same general reference numeral 10.

The apron 10 is particularly adapted to be operated in an endless path which is parallel to a central longitudinal axis of such apron 10. As seen in FIG. 5,

the apron 10 comprises a polymeric matrix material 14 which is shown by cross-hatching as being in the form of a rubber compound, which may be either a natural rubber compound or a synthetic rubber compound.

The apron 10 is in the form of a tubular member having an outer surface 11 and an inner surface 16. The apron is flexible, similar to a belt, so that it can be readily stretched over the mechanism shown in FIG. 1 or 2. There are many processes of forming the apron, one of which is illustrated in FIG. 4. An extruder 15 of conventional design is used to extrude the polymeric material, which is supplied by means of the hopper 12, to form a monolithic continuous sleeve 17 having a wall of uniform thickness. This sleeve is then severed by a conventional cutting device 18 to form the aprons 10 of desired length. As indicated above, the polymeric material is preferably a natural or synthetic rubber, but may be an appropriate plastic material such as vinyl. The rubber compounds may be any conventional curable rubber, such as acrylonitrile-butadiene, chloroprene, EPDM, Hypalon, or blends thereof.

The aprons may be cured either prior to or after cutting, and are cured by conventional processes known in the industry. For example, the sleeve or aprons may be blown on a mandrel and wrapped with fabric or other wrapping material, placed in a heater at 270° to 300°F for about 30 minutes, and the wrap removed. The sleeve or aprons are removed from the mandrel and cooled. The finished aprons may have a variety of dimensions; typical aprons may have a nominal diameter of about 1.25 inches to 3.2 inches, a width of about 0.8 inches to 1.5 inches, and a wall thickness of about .03 inches to .06 inches.

The extruded sleeve achieves a smooth surface by virtue of closely controlled tolerances in the extruder die, and also by selecting a wrapping material during curing that controls such tolerances. Thus,

neither the finished sleeve or cut-off apron needs to be ground to provide the useable working surface 11. While microscopic indentations or depressions 13 do remain in the surface 11, they are not of sufficient magnitude to seriously affect the smoothness.

In order to compare the smoothness of surface 11, it was compared with a conventionally manufactured apron that was ground with a carborundum grinding wheel at 1025 RPM. The comparison was made by measuring the surfaces with a machine known as a PROFILOMETER®, Type VEG, Model 22, manufactured by Bendix Corporation, Automation and Measurement Division, Dayton, Ohio. This machine records an arithmetic average roughness height in micro-inches, and this is done according to ANSI Standard B46.1 (R-1971) of the American National Standards Institute. The readings provided the following results:

	AVERAGE ROUGHNESS
STANDARD APRON	9.8 Micro-inches
NOVEL APRON	10.0 Micro-inches

These results indicate that the two products are comparable in smoothness (roughness), and that the novel apron has an outer surface that is quite acceptable in the trade.

While the exemplary embodiments of the invention are described above, other forms of the invention may also be utilized within the scope of the appended claims.

CLAIMS:

1. A textile fiber drafting apron in the form of a flexible sleeve having an outer fiber working surface and an inner work member contacting surface, the improvement characterized in that said apron (10) is comprised of a single layer of polymeric material (14) which is free of reinforcement.

2. The apron of claim 1, characterized in that said outer surface (11) is smooth and unground, and provides an acceptable fiber working surface.

3. The apron of claim 1, characterized in that said outer surface (11) has depressions (13) averaging about 10 micro-inches in depth.

4. The apron of claim 1, characterized in that said polymeric material (14) is a rubber compound or a plastic.

5. A method of making a textile fiber drafting apron having an outer fiber working surface and an inner work member contacting surface, the improvement characterized by the steps of providing a polymeric material, and forming said material into a flexible monolithic sleeve which is free of reinforcement.

6. The method of claim 5, characterized by the further step of curing said sleeve.

7. The method of claim 6, characterized by the further step of severing said sleeve into at least one drafting apron.

8. The method of claim 7, characterized by the further step of cooling said apron.

9. The method of claim 5, characterized in that said forming step maintains said outer surface smooth without the necessity of grinding; said smooth outer surface providing an acceptable surface for fiber working.

10. The method of claim 5, characterized in that said forming step comprises extruding said material to form said sleeve.

11. The method of claim 5, characterized in that said providing step comprises providing said polymeric material in the form of rubber or plastic.

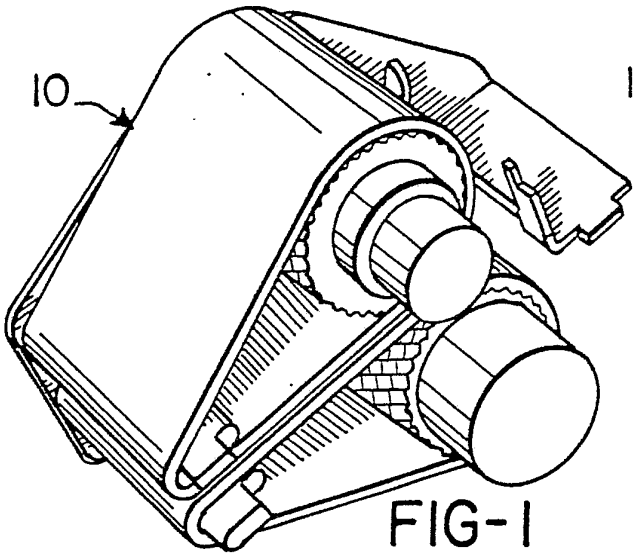

FIG-1

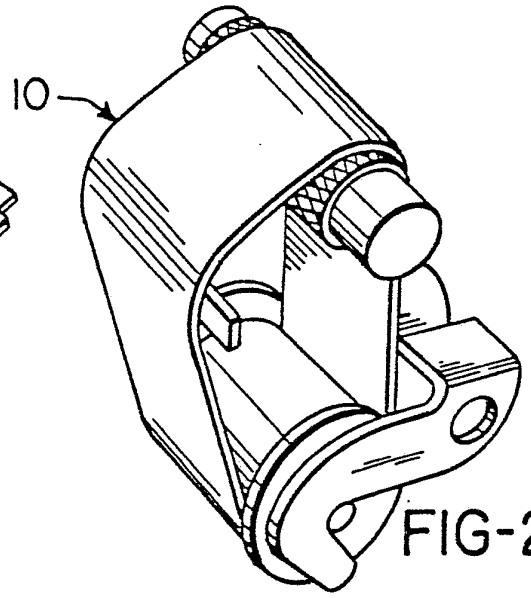

FIG-2

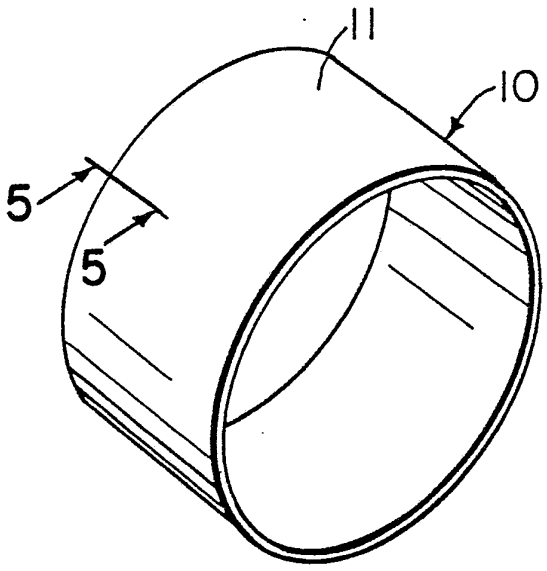

FIG-3

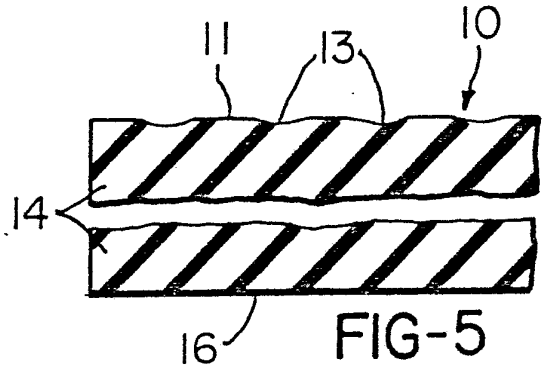

FIG-5

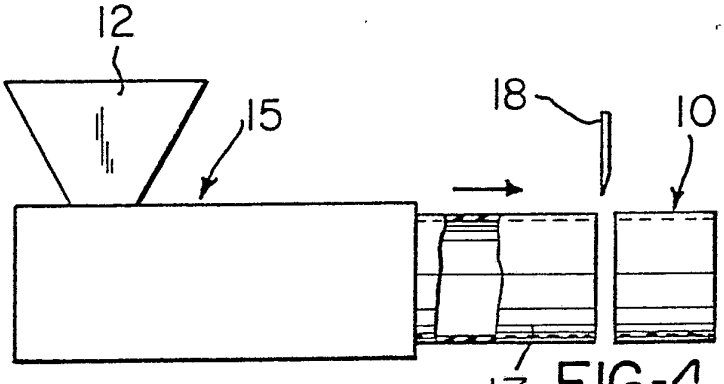

FIG-4

INTERNATIONAL SEARCH REPORT

International Application No PCT/US83/00811

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL. [3] D01H 5/86; B29C 25/00
U.S. CL. 19/244; 264/514; 474/237, 239

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U.S.	19/244 474/237, 239 264/514

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US, A, 2,226,768 (Harrison) 31 December 1940 Figure 1	1-11
A	US, A, 2,341,656 (Rockoff) 15 February 1944	1-11
Y	US, A, 2,912,722 (Howell) 17 November 1959 col. 1, lines 67-71	1-11
A	US, A, 3,900,545 (Korejwa et al) 19 August 1975	1-11
A	US, A, 4,012,962 (Ballou et al) 22 March 1977	1-11
A	US, A, 4,286,429 (Lin) 01 September 1981	1-11
Y	US, A, 4,327,044 (Dolan et al) 27 April 1982	1-11

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
14 July 1983	26 JUL 1983
International Searching Authority [1]	Signature of Authorized Officer [20]
ISA/US	Louis Rimrodt L. Rimrodt