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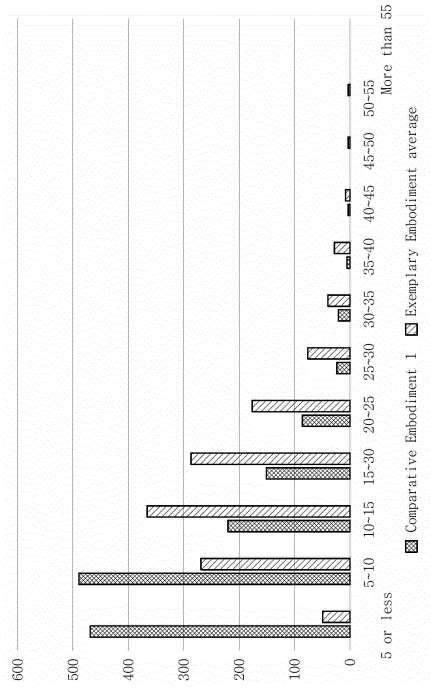
(54) LEATHER FIBER FOR LEATHER SPUN YARN HAVING IMPROVED PHYSICAL PROPERTIES

(57) The present invention relates to leather spun yarn with improved physical properties of the leather spun yarn by containing leather fibers longer than conventional leather fibers, in which the leather fiber has an average length of 15 mm or more and 40% or more of the content of fibers of more than 15 mm, in the leather fibers for the leather spun yarn contained in the leather spun yarn formed by containing the leather fibers and synthetic fibers.

[FIG. 1]



EP 4 163 399 A1

Description

[Technical Field]

[0001] The present invention relates to leather spun yarn with improved physical properties, and more particularly, to leather spun yarn with improved physical properties by containing leather fibers contained in the leather spun yarn which are longer than conventional leather fibers as the leather fibers contained in the leather spun yarn.

[Background Art]

[0002] Natural leather as a tough shell wrapping the animal's body is widely used in various fields such as bags, shoes and furniture with excellent physical properties. The natural leather is made into products through chemical and physical processing processes after being separated from the animal's body, and a cutting process according to a design of a desired product among several processes is required. However, a large amount of leather waste is generated through the cutting process, and most of the leather waste is incinerated and buried, and as a result, environmental problems are seriously emerging. Therefore, various research and development related to a recycling method of the leather waste is required.

[0003] As a conventional method using leather waste, like Korean Patent Registration No. 765549 and Korean Patent Publication No. 2018-0118386, a method of using a shaving scrap generated in a leather manufacturing process as a spinning material or manufacturing a web-shaped regenerated leather sheet using a shaving scrap, has been mainly used.

[0004] The conventional technique is to use a shaving scrap generated in the leather manufacturing process and is a technique using process byproducts that are generated in an early step of forming raw hide and skin to leather, not a method of using flat/flaked leather waste discharged as cutting waste that is substantially generated by a cutting process.

[0005] In addition, in Korea Registration Patent No. 2034218, there is disclosed spun leather yarn including leather fibers manufactured by carding blended fibers made by blending leather fibers, general fibers and polymer fibers to produce a sliver and twisting and drafting the sliver.

[0006] However, the conventional leather fiber has a problem that it is difficult to be manufactured to leather spun yarn due to an average of about 10 mm in length, and the physical properties such as tensile strength are not high due to the short length of the leather fiber.

[0007] Accordingly, the present inventors developed a leather fiber capable of manufacturing leather spun yarn from leather waste to manufacture fabrics, knits, and laces including the property of leather, found that the leather fibers were produced without being affected by the season by replacing a leather material used for existing bags, running shoes, and the like to manufacture high-quality leather spun yarn including warmth and general flame resistance of natural leather, and then completed the present invention.

[Disclosure]

[Technical Problem]

[0008] The present invention is invented to solve the problems in the related art and an object of the present invention is to provide a leather fiber capable of manufacturing leather spun yarn with improved physical properties by containing leather fibers longer than conventional leather fibers by improving the length, thickness, strength, fineness, and the like of the leather fibers contained in the leather spun yarn together with synthetic fibers.

[0009] Further, an object of the present invention is to provide a leather fiber capable of manufacturing leather spun yarn with improved physical properties capable of adjusting the thickness due to an excellent length/thickness ratio of the leather fibers contained in the leather spun yarn.

[Technical Solution]

[0010] The present invention provides a leather fiber for leather spun yarn with improved physical properties, in which the leather fiber has an average length of 15 mm or more and 40% or more of the content of fibers of more than 15 mm, in the leather fibers for the leather spun yarn contained in the leather spun yarn formed by containing the leather fibers and synthetic fibers.

[0011] The leather fiber may have an average thickness of 0.05 to 0.15 mm.

[0012] The leather fiber may have a length/thickness ratio of average 130 or more.

[0013] The leather fiber may have 15% or more of the content of fibers having the length/thickness ratio of more than 200.

[0014] The leather spun yarn may contain 10 wt% or more of the leather fibers.

[0015] The synthetic fibers may be any one or two or more of polyamide fibers, polyester fibers, polyurethane fibers,

polyurea fibers, polyacryl fibers, polyvinyl alcohol fibers, polyvinyl chloride fibers, polyvinylidene chloride fibers, polypropylene fibers, polyethylene fibers, polystyrene fibers, and polyfluoroethylene fibers.

[0016] The leather fibers may be contained in 10 wt% or more in the leather spun yarn.

[0017] Further, the present invention provides a leather product including the leather fibers for the leather spun yarn.

[Advantageous Effects]

[0018] According to the present invention, the leather spun yarn with improved physical properties has an effect of improving physical properties such as tensile strength and the like by improving the length of the leather fibers contained the leather spun yarn to contain leather fibers longer than conventional leather fibers together with synthetic fibers.

[0019] Further, there is an effect of adjusting the thickness due to an excellent length/thickness ratio of the leather fiber contained in the leather spun yarn.

[0020] Further, since wasted leather may be used as leather fiber after the leather fiber used in the present invention is cut, there is a beneficial effect on an environment.

[Description of Drawings]

[0021]

FIG. 1 is a diagram illustrating a length distribution of leather fibers according to the present invention.

FIG. 2 is a diagram illustrating a thickness distribution of leather fibers according to the present invention.

FIG. 3 is a diagram illustrating a length/thickness ratio distribution of leather fibers according to the present invention.

[Best Mode]

[0022] Hereinafter, a preferred exemplary embodiment of the present invention will be described in detail with reference to the accompanying drawings. First, among drawings, it should be noted that like constituent elements or components are represented by like reference numerals. In describing the present invention, a detailed description of known functions and configurations incorporated will be omitted so as to avoid obscuring the gist of the present invention.

[0023] The terms "about", "substantially", and the like used herein are used as a numerical value or a value close to the numerical value when inherent manufacturing and material tolerances are presented in the stated meaning, and used to prevent an unscrupulous infringer from unfairly using disclosed contents in which precise or absolute numerical values are mentioned to help in the understanding of the present invention.

[0024] The 'leather fiber' in the leather fiber for leather spun yarn of the present invention means a set of leather fibers contained in the leather spun yarn.

[0025] In the present invention, when the numerical range is described in the range of 'X to Y(Y > X)', unless the limited words such as less than, or less, or more, more than, and the like after X and Y are disclosed, it is defined as 'more than X and Y or less'.

[0026] In addition, in the present invention, when the content of fibers is shown as '%', unless the limited words such as 'weight', 'volume', and the like are disclosed, it means a content ratio according to the total number of fibers.

[0027] The present invention relates to a leather fiber for leather spun yarn contained in the leather spun yarn formed by containing the leather fibers and synthetic fibers, in which the leather fiber contained in the leather spun yarn has an average length of 15 mm or more and 40% or more of the content of fibers of more than 15 mm.

[0028] Generally, in the spun yarn, it is prevented threads from being released with frictional force between the fibers to maintain a state of the threads, and as the length of the fibers contained is increased, the frictional force is increased, and the strength is improved.

[0029] The average length of the leather fibers contained in the leather spun yarn of the present invention is 15 mm or more to improve the frictional force between the leather fibers contained in the leather spun yarn.

[0030] Further, since the leather fiber contained in the leather spun yarn of the present invention has 40% or more of the content of leather fibers of more than 15 mm, a large amount of longer leather fibers is contained to further improve the frictional force between the fibers.

[0031] Further, the leather fiber contained in the leather spun yarn of the present invention has an average thickness of 0.05 to 0.15 mm and a length/thickness ratio is average 130 or more.

[0032] When the thickness of the leather fiber is too thick, it is difficult to adjust the thickness of the leather spun yarn and the texture of the leather spun yarn may deteriorate, and when the thickness of the leather fiber is too thin, the processibility may deteriorate. Accordingly, it is preferred that the leather fiber contained in the leather spun yarn has the average thickness of 0.05 to 0.15 mm.

[0033] Further, as the length/thickness ratio of the leather fiber contained in the leather spun yarn is increased, the

fiber refers to a long and thin leather fiber, the processibility is improved, and it is easy to adjust the thickness of the leather spun yarn. Accordingly, it is preferred that the length/thickness ratio of the leather fiber is average 130 or more.

[0034] In the leather fiber contained in the leather spun yarn of the present invention, in order to improve the facilitation of adjusting the thickness of the leather spun yarn and the physical properties, it is preferred that the content of fibers having the length/thickness ratio of more than 200 is 15% or more.

[0035] As the content of leather fibers having the length/thickness ratio of more than 200 is increased, it is meant that a large amount of long and thin leather fibers is contained, the processibility is improved, and the physical properties are improved.

[0036] The leather fibers used in the present invention are obtained from the leather, and the leather has a constant length as a flaked/flat scrap to enable the extraction of fiber form.

[0037] In the method of obtaining the leather fiber, the leather is crushed by a leather waste treating apparatus of Korean Patent Registration No. 1804099 to break the binding force between the fibers and then the crushed leather may be separated and obtained into leather fibers through a separation process.

[0038] In the leather fibers of the present invention, in order to obtain the long leather fibers, it is preferred to obtain leather fibers using a scrap having a length of one surface of about 100 mm or more and an area of 50 to 250 cm^2.

[0039] The separation process separates the leather fibers and separates uniform leather fibers to improve the physical properties of the leather spun yarn and the uniformity ratio in a leather product including the leather spun yarn.

[0040] Since in the micronized leather formed by the leather waste treating apparatus, powder-like leather and irregular leather fibers having the thickness of several μm to hundreds μm are mixed, they need to separate leather fibers having uniform length and thickness through the separation process.

[0041] The separation process is a process of separating leather fibers through air pressure to apply the air pressure to the leather fibers and separate the leather fibers through a moving distance of the leather fiber due to the air pressure.

[0042] The separation process may be performed by separating the leather fibers by moving the leather fibers vertically or horizontally to the ground through the air pressure and obtaining the leather fibers lifted at a constant height by moving the leather fibers vertically.

[0043] The air pressure of the separation process is preferably 4 to 10 bar, more preferably 5 to 8 bar.

[0044] As the number of times of the separation process is increased, it is possible to classify the uniform thickness and length of the fibers, but the separation process is performed preferably 2 to 8 times, more preferably 3 to 5 times for process efficiency.

[0045] As an example of the separation process, the separation process may be performed by lifting leather fibers at air pressure of 4 to 10 bar on a pipe formed vertically to the ground and then obtaining the leather fibers lifted to 1 to 4 m.

[0046] In the present invention, the leather fibers are obtained by a method of suctioning the lifted and separated leather fibers by a suction device of 2 to 8 bar to obtain thin and long leather fibers.

[0047] The leather that may be used in the present invention may use various leather such as cow leather, sheep leather, pig leather, and the like, but the sheep leather or the pig leather is thinner than the cow leather and has low strength to form too short leather fibers, and thus, it is difficult to be manufactured as spun yarn. Accordingly, it is preferred to extract the leather fibers from the cow leather.

[0048] The synthetic fibers contained in the leather spun yarn together with the leather fibers may use polyamide fibers, polyester fibers, polyurethane fibers, polyurea fibers, polyacryl fibers, polyvinyl alcohol fibers, polyvinyl chloride fibers, polyvinylidene chloride fibers, polypropylene fibers, polyethylene fibers, polystyrene fibers, polyfluoroethylene fibers, and the like, and may use various synthetic fibers according to the usage and the purpose, and may be used with one or two or more synthetic fibers.

[0049] The synthetic fibers use preferably regenerated synthetic fibers for ecofriendliness.

[0050] The leather spun yarn of the present invention is formed by including the leather fibers and the synthetic fibers, but may be manufactured by using natural fibers and regenerated fibers together according to the usage and the purpose of the leather spun yarn.

[0051] The leather fibers contained in the leather spun yarn are preferably contained in 10 wt% or more, and when the leather fibers are contained in less than 10 wt%, sensibility such as leather-specific texture may deteriorate.

[0052] The leather spun yarn of the present invention may be manufactured using leather fibers and synthetic fibers by using a carding machine, a drawing frame, a fly frame, and a spinning machine, and may be manufactured by a general spun yarn manufacturing process.

[0053] As described above, the leather spun yarn with improved physical properties of the present invention containing the long leather fibers may be used for various leather products due to the improved physical properties.

[0054] Hereinafter, as Exemplary Embodiments according to the present invention, leather fibers for leather spun yarn with improved physical properties and leather spun yarn were manufactured. The present invention is not limited to these Exemplary Embodiments.

Exemplary Embodiment 1

[0055] A cow leather scrap was micronized using a leather waste treating apparatus and then each leather fiber was obtained by a separation process.

[0056] The cow leather scrap used a scrap having one surface of 100 mm or more and an area of about 50 to 200 cm^2.

[0057] The separation process was performed total twice by lifting the leather fibers at air pressure of about 6 bar in a pipe formed vertically to the ground and then suctioning the leather fibers lifted to about 1.8 m or more by a suction device of about 4 bar to obtain the leather fibers to obtain the leather fibers.

[0058] The obtained leather fibers and polyester short fibers having the fineness of 1.5 deniers and the fiber length of 51 mm were blended at a weight ratio of 35 : 65 to manufacture the leather spun yarn of 600 deniers (Nm 15).

Exemplary Embodiment 2

[0059] Exemplary Embodiment 2 was manufactured in the same manner as Exemplary Embodiment 1, but in the separation process, the leather fibers were lifted at air pressure of about 7 bar and then the leather fibers lifted to about 2 m or more were suctioned by a suction device of about 4.5 bar to obtain the leather spun yarn.

Exemplary Embodiment 3

[0060] Exemplary Embodiment 3 was manufactured in the same manner as Exemplary Embodiment 1, but in the separation process, the leather fibers were lifted at air pressure of about 8 bar and then the leather fibers lifted to about 2.2 m or more were suctioned by a suction device of about 4.5 bar to obtain the leather spun yarn.

Comparative Embodiment

[0061] Comparative Embodiment was manufactured in the same manner as Exemplary Embodiment 1, but in the separation process, the leather fibers were lifted at air pressure of about 5 bar and then the leather fibers lifted to about 2 m or more were obtained to manufacture the leather spun yarn.

◈ 1.5 g of the leather fibers obtained in Exemplary Embodiments 1 to 3 and Comparative Embodiment were taken and the number of leather fibers contained in 1.5 g and the length and the thickness of each leather fiber were measured. Table 1 illustrated lengths, Table 2 illustrated thicknesses, and Table 3 illustrated length/thickness ratios.

[Table 1]

Length (mm)	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3	Exemplary Embodiment average
5 or less	469	76	32	39	49
5~10	489	249	237	322	269.33
10~15	221	358	341	402	367
15~20	152	265	305	293	287.67
20~25	86	171	140	221	177.33
25~30	25	59	113	59	77
30~35	23	13	58	51	40.67
35~40	6	51	19	14	28
40~45	3	17	5	3	8.33
45~50	0	1	5	3	3
50~55	1	2	6	0	2.67
More than 55	0	2	2	1	1.67
Total number of fibers	1475	1264	1252	1408	1308
Average	9.52	15.21	15.65	15.36	15.41

(continued)

Length (mm)	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3	Exemplary Embodiment average
Fiber content (%) of more than 15 mm	20.07	45.97	52.16	45.81	47.89

[0062] FIG. 1 is a graph showing a length distribution of leather fibers according to the present invention. As illustrated in Table 1 and FIG. 1, it can be seen that in the leather fibers according to the present invention, the most leather fibers having the length of 10 to 15 mm are contained and the leather fibers of more than 15 mm are contained in 40% or more. In the leather fibers of Comparative Embodiment, it can be seen that the most leather fibers of 5 to 10 mm are contained, many leather fibers of 5 mm or less are also contained, and the leather fibers of more than 15 mm are contained in 20.07%, and thus, there is a large difference from the leather fibers of Exemplary Embodiments.

[0063] It can be seen that the leather fibers of the present invention of an average of 15.41 mm are much longer than the leather fibers of Comparative Embodiment of 9.52 mm.

[Table 2]

Thickness (mm)	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3	Exemplary Embodiment average
0.05 or less	13	2	9	1	4
0.05~0.1	309	273	323	285	293.67
0.10~0.15	902	785	696	889	790
0.15~0.2	222	165	182	221	189.33
0.20.25	28	32	34	9	25
0.25~0.3	1	7	6	2	5
More than 0.3	0	0	2	1	1
Total number of fibers	1475	1264	1252	1408	1308
Average	0.122	0.1154	0.1205	0.124	0.12

[0064] FIG. 2 is a graph showing a thickness distribution of leather fibers according to the present invention. As illustrated in Table 2 and FIG. 2, it can be seen that in both the leather fibers according to the present invention and the leather fibers of Comparative Embodiment, the most leather fibers having the thickness of 0.1 to 0.15 mm are contained and in both Exemplary Embodiments and Comparative Embodiment, the leather fibers have an average thickness of about 0.115 to 0.125 mm and have similar thicknesses thereto.

[Table 3]

Length/thic kness ratio	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3	Exemplary Embodiment average
50 or less	205	96	89	102	95.67
50~100	332	325	342	356	351
100~150	435	406	375	401	394
150~200	305	215	223	258	232
200~250	139	99	162	130	120.33
250~300	45	64	35	102	67

(continued)

Length/thic kness ratio	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3	Exemplary Embodiment average
300~350	13	29	18	29	25.33
350~400	0	18	2	23	14.33
400~450	1	4	3	4	3.67
450~500	0	6	2	1	3
500~550	0	2	0	1	1
More than 550	0	0	1	1	0.67
Total number of fibers	1475	1264	1252	1408	1308
Average	115.05	140.58	132.47	135.1	136.05
Fiber content (%) of length/thick ness ratio of more than 200	13.42	17.56	17.81	20.67	17.99

[0065] FIG. 3 is a graph showing a length/thickness ratio distribution of leather fibers according to the present invention. As illustrated in Table 3 and FIG. 3, it can be seen that in both the leather fibers according to the present invention and the leather fibers of Comparative Embodiment, the most leather fibers having the length/thickness ratio of 150 to 200 are contained. In the leather fibers of Exemplary Embodiments, it can be seen that the number of leather fibers having the length/thickness ratio of 50 or less is small, the number of leather fibers having the large length/thickness ratio is large, and the content of fibers having the average length/thickness ratio of 130 or more and the length/thickness ratio of more than 200 is 15% or more.

[0066] However, in Comparative Embodiment, it can be seen that the number of leather fibers having the length/thickness ratio of 50 or less is large, the number of fibers is greatly decreased as the length/thickness ratio is increased, and thus the average length/thickness ratio is 115.05, which are a large difference from Exemplary Embodiments, and the content of fibers having the length/thickness ratio of more than 200 is 13.42%, which is greatly lower than Exemplary Embodiments.

◈ The tensile strengths of the leather spun yarn manufactured in Exemplary Embodiments 1 to 3 and Comparative Embodiment were measured and illustrated in Table 4.

[0067] The tensile strength was measured as the spun yarn strength using a universal testing machine (UTM) of Instron under a measurement temperature of 20°C and the humidity of 65% according to ASTM D2256 standard.

[Table 4]

Classification	Comparative Embodiment	Exemplary Embodiment 1	Exemplary Embodiment 2	Exemplary Embodiment 3
Tensile strength (g/d)	0.8	2.7	2.5	3.0

[0068] As shown in Table 4, it can be seen that the tensile strength with improved physical properties according to the present invention is 2.5 to 3.0 g/d, which is very greater than 0.8 g/d of Comparative Embodiment. It can be seen that in the leather fibers contained in the leather spun yarn of the present invention, many leather fibers having the long length and the large length/thickness ratio exist to increase the frictional force between the fibers forming the leather spun yarn, thereby greatly improving the tensile strength of the leather spun yarn.

Claims

1. A leather fiber for leather spun yarn with improved physical properties, wherein the leather fiber has an average

length of 15 mm or more and 40% or more of a content of fibers of more than 15 mm, in the leather fibers for the leather spun yarn contained in the leather spun yarn formed by containing the leather fibers and synthetic fibers.

2. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the leather fiber has an average thickness of 0.05 to 0.15 mm.

3. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the leather fiber has a length/thickness ratio of average 130 or more.

4. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the leather fiber has 15% or more of the content of fibers having a length/thickness ratio of more than 200.

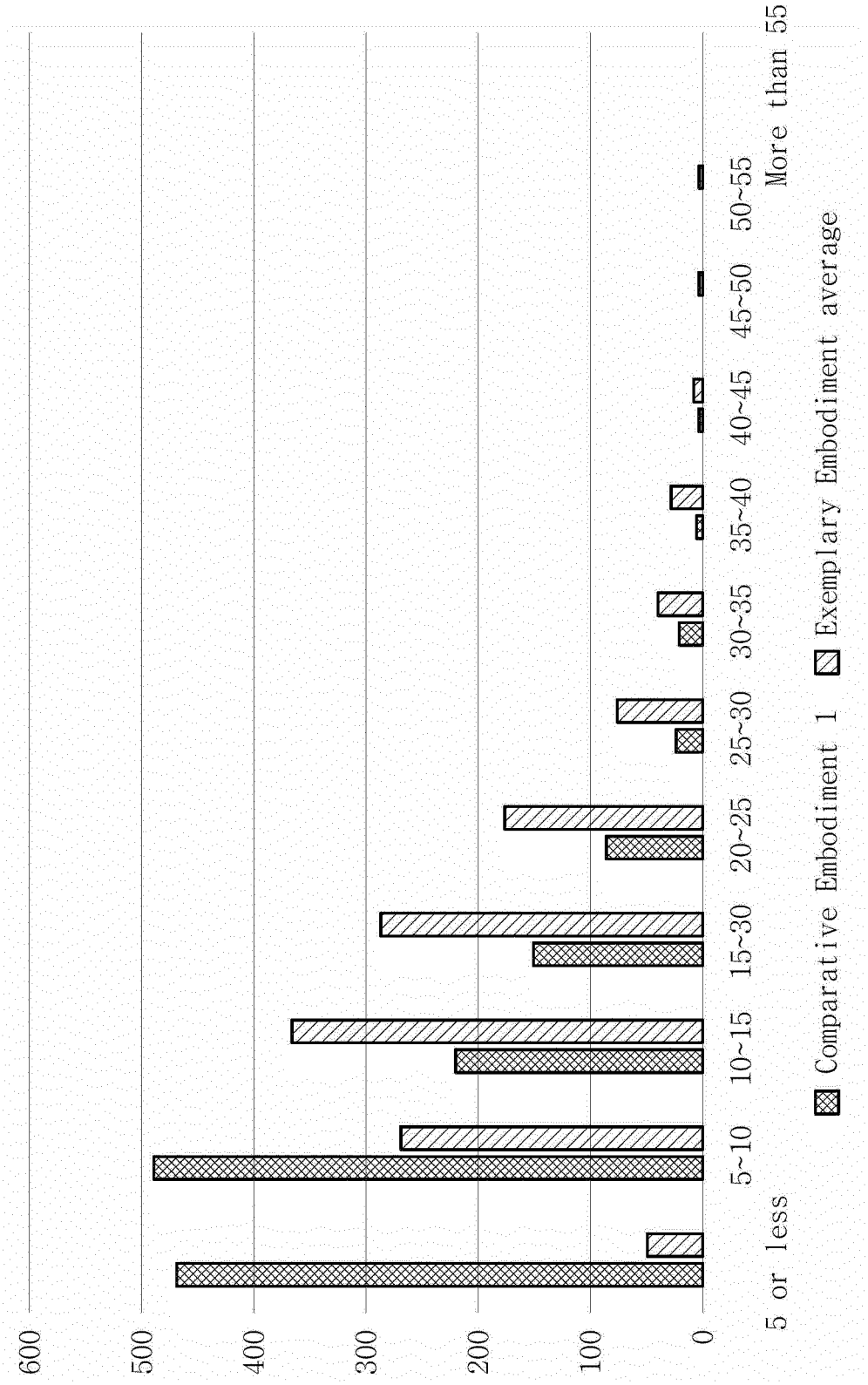
5. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the leather spun yarn contains 10 wt% or more of the leather fibers.

6. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the synthetic fibers are any one or two or more of polyamide fibers, polyester fibers, polyurethane fibers, polyurea fibers, polyacryl fibers, polyvinyl alcohol fibers, polyvinyl chloride fibers, polyvinylidene chloride fibers, polypropylene fibers, polyethylene fibers, polystyrene fibers, and polyfluoroethylene fibers.

7. The leather fiber for leather spun yarn with improved physical properties of claim 1, wherein the leather fibers are contained in 10 wt% or more in the leather spun yarn.

8. A leather product comprising the leather spun yarn of any one of claims 1 to 7.

[FIG. 1]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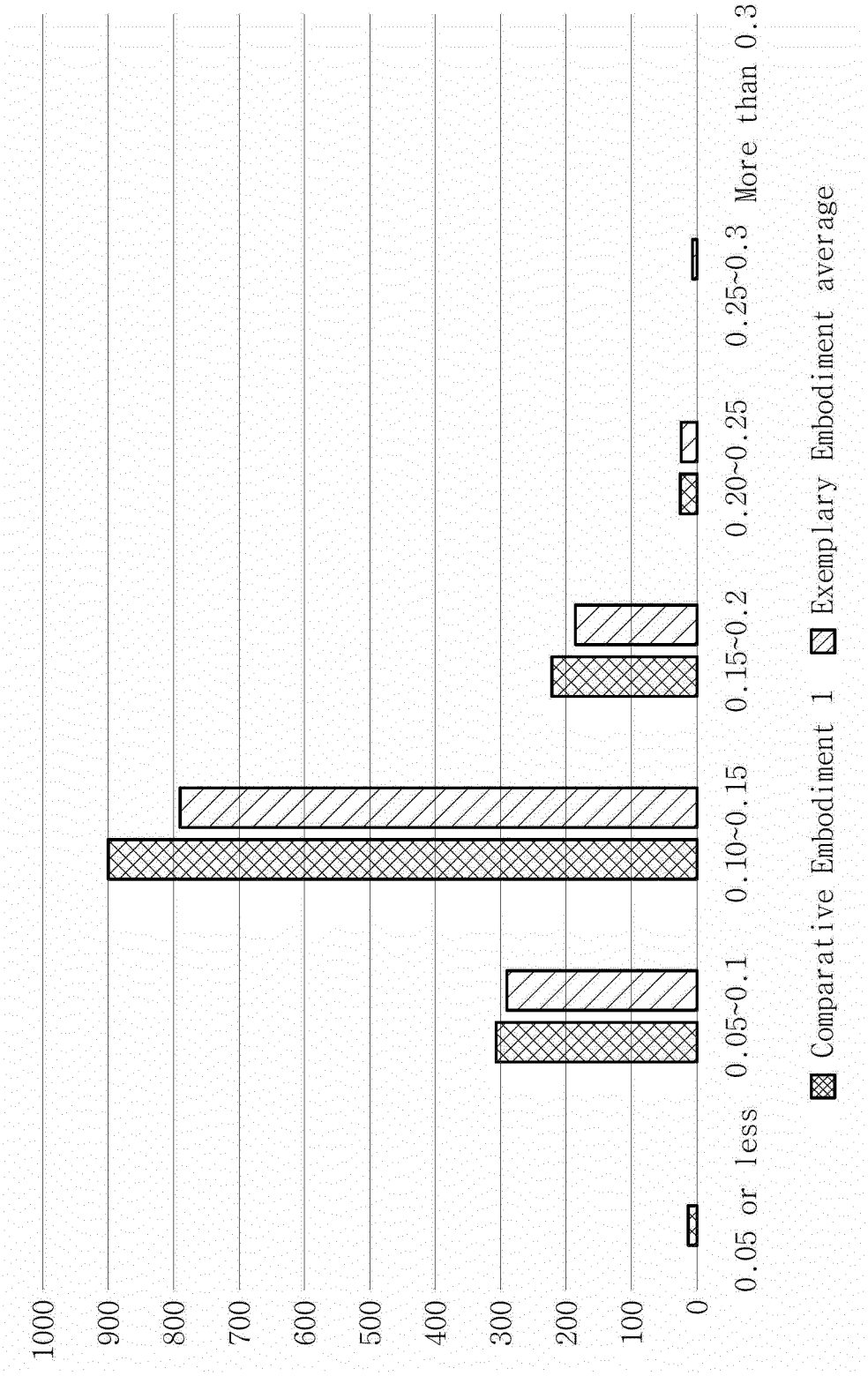
More than 55
Comparative Embodiment 1
Exemplary Embodiment average

[FIG. 2]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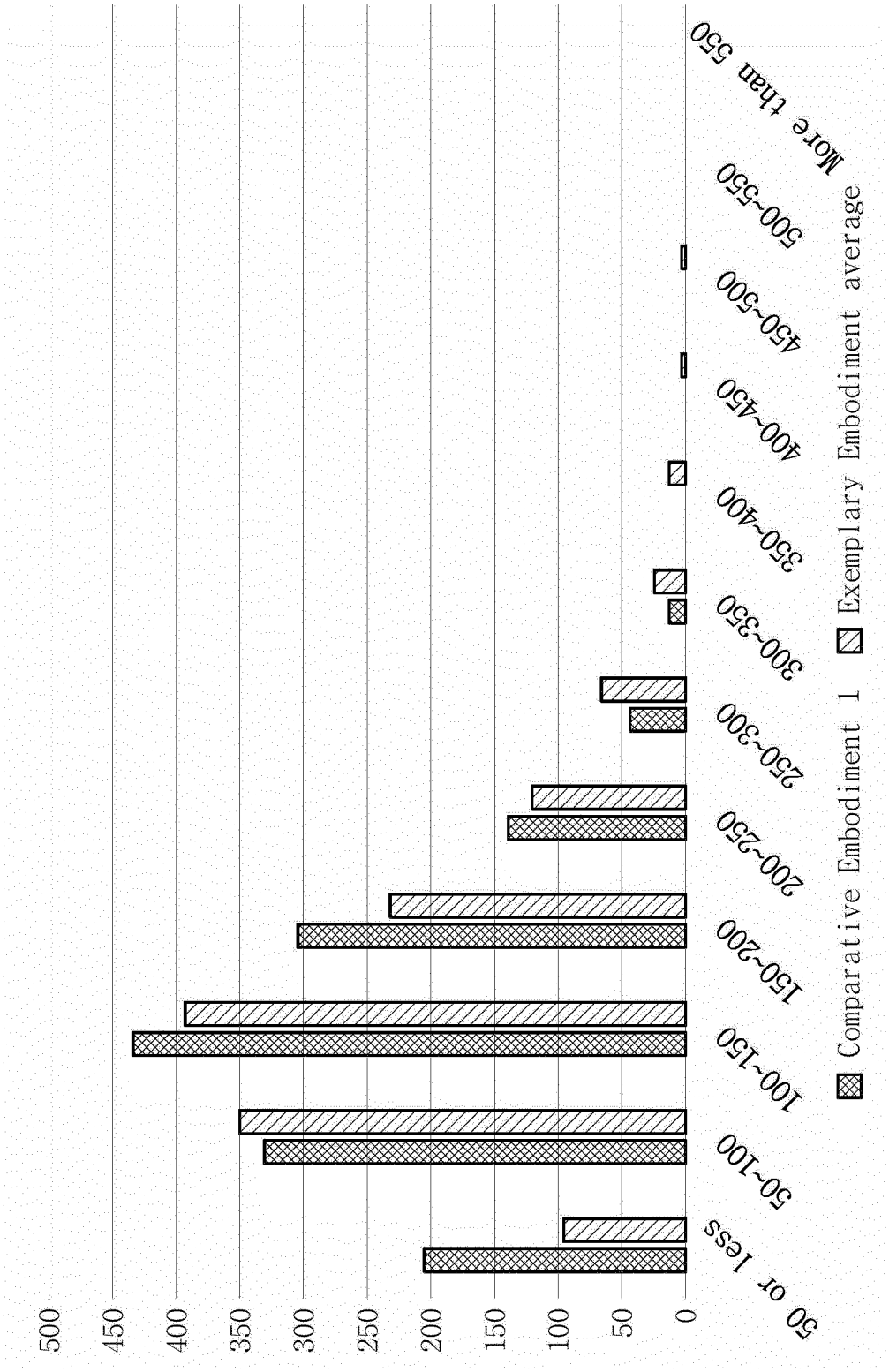
Comparative Embodiment 1
Exemplary Embodiment average

[FIG. 3]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More than 550
Comparative Embodiment 1
Exemplary Embodiment average

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2021/018026

A. CLASSIFICATION OF SUBJECT MATTER

C14B 7/02(2006.01)i; **C14B 7/06**(2006.01)i; **D02G 3/04**(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C14B 7/02(2006.01); C14B 7/00(2006.01); D01G 11/00(2006.01); D02G 3/00(2006.01); D02G 3/02(2006.01); D02G 3/04(2006.01); D02G 3/06(2006.01); D04B 1/14(2006.01); D04B 39/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 가죽섬유 (leather fiber), 방적사 (spun yarn), 합성섬유 (synthetic fiber)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008-0072628 A1 (LIU, L.) 27 March 2008 (2008-03-27) See claims 1-2 and 7; and pages 3-4.	1-8
A	KR 10-2021-0091042 A (ATKOPLANNING INC) 21 July 2021 (2021-07-21) See claims 1-6.	1-8
A	KR 10-2006-0133027 A (ZHANG, Liwen) 22 December 2006 (2006-12-22) See entire document.	1-8
A	KR 10-2282044 B1 (KOREA HIGH TECH TEXTILE RESEARCH INSTITUTE) 27 July 2021 (2021-07-27) See entire document.	1-8
A	KR 10-2034218 B1 (ATKOPLANNING INC) 18 October 2019 (2019-10-18) See entire document.	1-8

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
24 May 2022	**24 May 2022**
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Information on patent family members

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