May 9, 1950 E. H. HALL 2,506,667

COMPOSITE TEXTILE YARN FOR USE IN PAPERMAKING FELTS

Filed Nov. 24, 1948

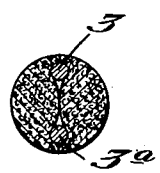


Fig. 2

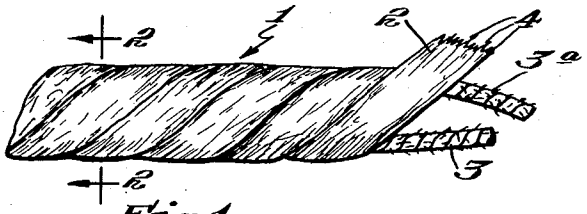


Fig. 1

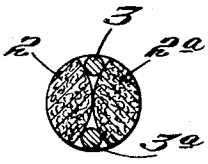


Fig. 4

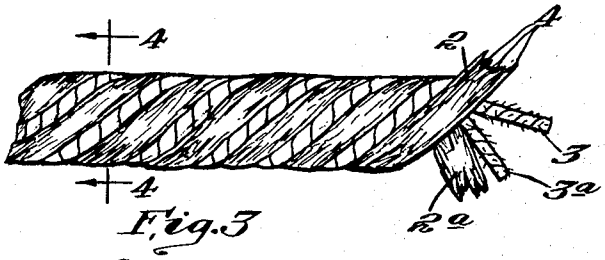


Fig. 3

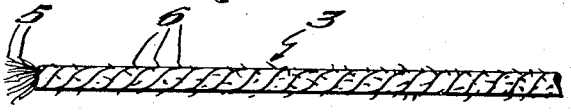


Fig. 5

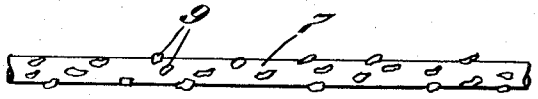


Fig. 6



Fig. 7

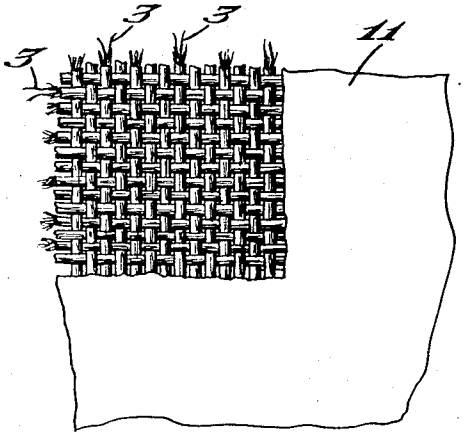


Fig. 8

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COMPOSITE TEXTILE YARN FOR USE IN PAPERMAKING FELTS

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5 Claims. (Cl. 57—140)

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This invention pertains to textile yarn for use in the manufacture of paper drying felts or the like and to a novel method of making this yarn.

Paper makers' drying felts, when used in the manufacture of kraft papers, fiber board, and similar products, are subjected to very high temperatures and, if made of cotton yarn, deteriorate very rapidly. To overcome this difficulty, it has been proposed to make such felts of so-called asbestos yarn. However, since asbestos fiber is not strong enough when used alone to make a yarn acceptable for use in weaving such felts, the yarns actually employed ordinarily are formed by twisting or plying one or more fine cotton yarns (for example, yarn of the order of from No. 14 to No. 20, cotton count) with an asbestos roving. While felts made from such composite yarns are much longer lived than those made from cotton alone, so far as resistance to heat is concerned, they do not have as great initial tensile strength as felts made solely from cotton. As these felts are very wide and heavy and are driven at very high linear velocities, they do not last long, and the expense of replacing them constitutes a substantial item in paper manufacture.

It has heretofore been proposed to substitute rayon for the cotton in such felts but as the strength of rayon is very small when wet, it is of no practical value for this purpose. It has likewise been proposed to employ filament nylon in place of the cotton in the manufacture of the composite asbestos yarn, but filament nylon has a very smooth slippery surface and when such filament nylon is used as a reinforce for an asbestos roving, the asbestos is scraped off from the nylon reinforce element during the passage of the composite yarn through the loom and the asbestos plugs up the loom reed, resulting in an imperfect and substantially valueless product.

Nylon has manifest advantages as compared with cotton if it could be used as the reinforce element for a composite asbestos yarn, in particular, its great tensile strength and its resistance to heat and to the action of oil and grease.

A principal object of the present invention is to provide a novel composite yarn in which the bulk of the yarn consists of asbestos fiber, but having a reinforce element of nylon, and which is capable of being woven without substantial separation of the asbestos fiber from its reinforce element in the weaving of a paper maker's felt. A further object is to provide a novel method of

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making such a composite yarn in which nylon constitutes the reinforcing element. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings wherein:

Fig. 1 is a fragmentary elevation, to large scale, of a composite yarn in accordance with one embodiment of the present invention;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1, illustrating a modification;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary elevation, to large scale, diagrammatically illustrating a nylon reinforcing yarn useful in the practice of the present invention;

Fig. 6 is a similar elevation diagrammatically illustrating a nylon yarn of a different type useful in making the composite yarn of the present invention;

Fig. 7 is a fragmentary elevation diagrammatically illustrating another form of nylon yarn useful for the purpose; and

Fig. 8 is a fragmentary plan view of a woven paper drier's felt in which the improved yarn of the present invention is used as the warp yarn.

Referring to the drawings, the numeral 1 designates a composite yarn made in accordance with one embodiment of the present invention. This yarn comprises asbestos roving 2 wrapped about a plurality of nylon reinforcing yarns 3, 3a. Two such nylon yarns are here illustrated but it is contemplated, as within the scope of the invention, that one or any desired number of such reinforce yarns may be used. Ordinarily, the asbestos roving will be of much larger diameter than the reinforce yarns and in the completed composite yarn the asbestos fibers 4 will constitue the major and predominating material, the purpose of the nylon yarns being to add the requiste tensile strength to the asbestos. The asbestos roving may be made in accordance with any usual practice employed for making such roving and this roving is then plied with the nylon yarn. As illustrated in Figs. 3 and 4, two asbestos rovings 2, 2a are twisted together with two nylon yarns 3, 3a. This assembly of the asbestos roving and the nylon yarns may be carried out in any suitable manner. It is contemplated that they may be plied by passing them through an ordinary twisting frame. Although, as just suggested,

the composite yarn may consist of a preformed asbestos roving twisted or otherwise plied with the reinforcing yarn or yarns, it is also contemplated that the asbestos fiber may otherwise be assembled and associated with the nylon reinforcing yarn.

In accordance with the present invention, the nylon yarn employed is so constructed and arranged as to afford an anchorage for the asbestos fibers so that when the composite yarn is used in weaving, the asbestos and the nylon constituents will substantially maintain their initial relation as they pass through the loom structure so that the asbestos will not be scraped off and separated from the reinforcing strand. For example, the nylon yarn may be a spun yarn in which short nylon fibers 5 of usual cotton staple lengths, for example, from ⅞ inch to 1¼ inches, are spun together according to customary methods and by means used, for example, in the spinning of cotton so as to produce the desired spun yarn. Such a yarn differs from filament nylon in having a multitude of fiber ends 6 projecting from its surface so that microscopically its surface is rough and hairy. When such a spun nylon yarn is associated with asbestos fibers in any of the ways above suggested, the projecting fiber ends 6 of the nylon interengage and frictionally grip the asbestos fibers so as to maintain the initial relation of the various fibers of the composite yarn during the weaving operation.

While spun nylon is very desirable and preferable for the purpose, it is contemplated that a nylon yarn having a friction surface provided in other ways may likewise be employed for this purpose. Thus, for example as diagrammatically indicated in Fig. 5, the yarn 7 is of filament nylon which has been treated either mechanically or chemically so as to have a rough surface, for example, a surface distinguished by a multitude of pits, or by tiny scale-like projections 9, so formed that they do not weaken the filament substantially, but nevertheless effectively change the character of the surface of the filament so that it is no longer smooth and slippery but is rough and capable of frictionally gripping the asbestos fibers with which it is associated.

In Fig. 6 a further form of nylon yarn is illustrated wherein the yarn 10, which may be of filament nylon or spun nylon, as desired, is finely crinkled so as closely to resemble a natural woolen fiber. This crinkling may be accomplished by mechanical means or by chemical treatment, and by reason of the crinkle or curliness of this yarn, it grips the asbestos fibers, with which it is associated, so as firmly to bond the asbestos to the nylon reinforce.

In Fig. 8, a small section of woven papermaker's felt is illustrated, wherein both warps and wefts are composite yarns such as above described, the bulk of the yarn being asbestos fiber, and each yarn having one or more reinforce yarns of nylon.

While various ways of providing a firm anchorage between the asbestos fibers and the nylon reinforce have been suggested, it is to be understood that any equivalent means, whereby the asbestos fiber and nylon are mechanically but firmly united, is to be regarded as coming within the scope of the present invention, as defined in the appended claims. Nylon is at present the material which seems to have the above desirable characteristics in highest degree, but it is contemplated that other long-molecular-chain, filament-forming synthetics, which are found to have the above-described desirable characteristics, may be substituted for nylon within the scope of the invention.

It is further suggested that when, as illustrated for example in Fig. 3, more than one of the fine reinforce or core yarns is employed, certain of said reinforce yarns may be of a material which is cheaper than nylon, for instance, cotton, wool or the like. However, in any event, a sufficient number of the nylon yarns should be employed to insure the advantages inherent in the use of nylon as a reinforce element as above pointed out.

I claim:

1. A composite textile yarn for use in weaving, comprising a roving of asbestos fiber plied with a reinforcing yarn of nylon, the nylon yarn being so constructed and arranged as to provide anchorage for the constituent fibers of the asbestos roving, thereby substantially to maintain the initial relation of the roving and yarn during weaving.

2. A composite textile yarn for use in weaving, comprising a roving of asbestos fiber plied with a reinforcing yarn of spun nylon, the nylon yarn being so constructed and arranged as frictionally to grip the constituent fibers of the asbestos roving.

3. A composite textile yarn for use in weaving, comprising a roving of asbestos fiber plied with a reinforcing yarn of spun nylon having projecting fiber ends which interengage with the asbestos fibers of the roving so as to maintain the initial relation of the roving and yarn during weaving.

4. A composite textile yarn for use in weaving, comprising a roving of asbestos fiber plied with a reinforcing yarn of nylon, the nylon yarn having a rough surface operative frictionally to engage the asbestos fibers of the roving.

5. A composite textile yarn for use in weaving, comprising a roving of asbestos fiber plied with a reinforcing yarn of nylon, the nylon yarn being crinkled, thereby frictionally to grip the asbestos roving so as to maintain the initial relation of the roving and yarn during weaving.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,199,400	Geier et al.	May 7, 1940
2,306,781	Francis, Jr.	Dec. 29, 1942
2,313,058	Francis, Jr.	Mar. 9, 1943
2,350,504	Geier et al.	June 6, 1944