April 27, 1943. H. N. HILL 2,317,910

DRIER FELT

Filed Jan. 17, 1941

Fig. 1.

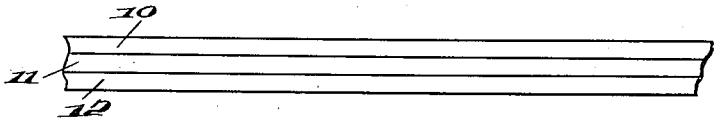


Fig. 2.

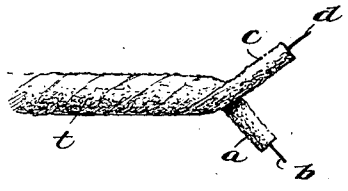
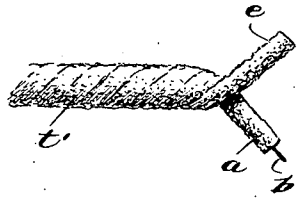


Fig. 3.



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DRIER FELT

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8 Claims. (Cl. 139—408)

This invention relates to drier felts employed to conduct wet materials through heated drying rolls, particularly felts for paper drying machinery and aprons employed in other types of driers. It is particularly concerned with felts incorporating asbestos fibers in improved form.

It has heretofore been proposed in Asten Patent No. 1,574,592, dated February 23, 1926, to incorporate asbestos fibers in a drier felt in the form of threads having a strengthening core of textile fibers around which the asbestos fibers are wrapped as a more or less loosely constituted envelope having a relatively low twist because of the natural brittleness of the asbestos fibers. Such type cored asbestos threads have been used extensively commercially in drier felts. However, it has been found that with such threads the asbestos fiber envelope tends to sluff and disintegrate to a degree due to the relatively low twist with which the fibers are incorporated in the thread. As a result, a drier felt incorporating such threads deteriorates more rapidly than might be desired. Ordinarily the cored asbestos threads are used at least in the working surface of the felt, and it is obvious that the deterioration of such surface is highly objectionable.

According to the present invention, the drier felt is made to incorporate composite threads composed of a plurality of individually twisted yarns of asbestos fibers, which yarns are in turn intertwisted with each other to form a thread in which the asbestos fibers are better adhered together so that the thread will not disintegrate and loosen as in the case of the prior asbestos thread above referred to. The composite thread is strengthened with vegetable fibers which, instead of being formed as a central core in a surrounding envelope of asbestos fibers, extend spirally interiorly of the thread so as to exert a binding action on the asbestos fibers and retard disintegration as well as increasing the tensile strength of the thread. A thread of animal or vegetable textile fibers, or of suitable synthetic material, will be incorporated in at least one, and preferably in all, of the individual asbestos yarns during the formation thereof so as to be embedded in and protected by the asbestos fibers.

The invention will be understood by reference to the accompanying drawing wherein:

Fig. 1 is a diagrammatic view illustrating a section of a drier felt;

Fig. 2 illustrates on a greatly enlarged scale a preferred embodiment of composite asbestos thread as used in the drier felt; and

Fig. 3 is a view similar to Figure 2 of a modified form of composite asbestos thread.

The composite thread *t* of Figure 2 is composed of two individual yarns *a* and *c* of asbestos fibers. Yarn *a* is formed with a central core *b* of suitable textile fibers such as above referred to about which the asbestos fibers are loosely twisted as a surrounding envelope. Yarn *c* is similarly formed with a strengthening core *d* of suitable textile fibers surrounded by an envelope of asbestos fibers. The two yarns are twisted together with a relatively low twist to form the composite thread *t*, wherein because of the yarn twist and the thread twist the asbestos fibers are adhered together in a manner such as to resist the tendency of the asbestos fibers to loosen and sluff off and thereby provide a durable asbestos thread which is highly resistant to deterioration.

The composite thread may, if desired, be made of the same size as the cored asbestos yarn of Asten Patent No. 1,574,592 merely by proper regulation of the quantity of asbestos fibers composing the individual asbestos yarns *a* and *c*. While Figure 2 shows thread *t* as composed of two asbestos yarns, it will be understood that a larger number of abestos yarns may be employed where desired. The asbestos fibers constituting the individual strands may be very loosely twisted on the cores of the strands,—more loosely than where the thread is composed merely of one cored asbestos strand as in the Asten patent, this by reason of the fact that the subsequent intertwisting of the strands into the thread serve to provide a binding action as between the asbestos fibers of each yarn in relation to the asbestos fibers of each other yarn.

It will further be evident that the core *b* of yarn *a* extends spirally through the composite thread *t* in twisted relation with yarn *c*, and similarly that the core *d* of the latter yarn extends spirally through the thread in twisted relation with yarn *a*. Thus, in addition to increasing the tensile strength of the composite thread, the textile fiber cores *b* and *d* function to anchor the asbestos fibers in the thread.

The individual twisted asbestos yarns making up the composite thread need not all incorporate a reinforcing core. This is illustrated in the modified composite thread *t'* of Figure 3. Therein yarn *a* as in the embodiment of Figure 2 is composed of an envelope of asbestos fibers loosely twisted about a core *b* of vegetable, animal, or synthetic textile fibers having greater tensile strength than the asbestos fibers. A second yarn *e* is composed of twisted asbestos fibers in the

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absence of a core. The respective yarns are intertwisted to make up the composite thread *t'*. Such thread in many instances will be found entirely satisfactory. Where core *b* in thread *t'* is of the same character and strength as the corresponding core *b* in thread *t* of Figure 2, such thread will have somewhat less tensile strength than in the earlier embodiment because of the absence of a strengthening core in yarn *e*. However, the tensile strength of yarn *t'* may be increased without incorporating a core in yarn *e* by either using a stronger reinforcing core in yarn *a*, or incorporating a plurality of cores in yarn *a*.

In Figure 1 is diagrammatically represented a section of a woven drier felt comprising a plurality of interwoven plies. While the number of plies may be varied according to the thickness desired, it is usual, as illustrated, to form the felt of three interwoven plies including a working surface ply 10 backed by two underplies 11 and 12 integrally woven therewith. The composite asbestos yarns above described may be incorporated as the warp and weft threads in all of the plies of the felt if so desired, although for economy in manufacture it is ordinarily preferable to form plies 11 and 12 in whole or in part of cotton or other threads which are cheaper than asbestos threads, and to limit the use of the asbestos threads to the working surface ply 10. In such ply the special composite asbestos threads herein described will be used as the weft and/or the warp. They may be used, for example, as the weft, in combination with asbestos warp threads of other form, and again may be used as the warp threads with asbestos weft threads of other form. In any event the incorporation of the composite asbestos threads will provide a greater durability in the drier felt than in the case of previously known asbestos threads.

I claim:

1. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective composite threads being composed of a plurality of asbestos yarns having individual yarn twists and combined with a thread twist, and textile fiber reinforcing means in the thread embedded as a core in at least one of the individual asbestos yarns with the asbestos fibers of the surrounding yarn twisted around the textile fiber core as a protective envelope.

2. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective composite threads being composed of asbestos yarns having individual yarn twists and combined with a thread twist, and textile fiber core means embedded in one of the individual asbestos yarns with the asbestos fibers of the surrounding yarn twisted around the textile fiber core as a protective envelope and extending spirally of the thread in intertwisted relation with another of the asbestos yarns.

3. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective composite threads comprising a plurality of individual yarns each of twisted asbestos fibers loosely combined with a low yarn twist, said twisted yarns being twisted together with a low thread twist, and combined means for increasing the tensile strength of the thread and binding together the asbestos fibers of the different yarns in the form of a textile fiber strand means, said strand means extending internally of one at least of the asbestos yarns with the asbestos fibers of the surrounding yarn twisted around the textile fiber core as a protective envelope.

4. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective threads being composed of a plurality of asbestos yarns having individual yarn twists and combined with a thread twist, and a plurality of strengthening strands of vegetable fibers extending spirally through the thread in intertwisted relation, said strengthening strands being combined with different individual yarns of asbestos fibers with the vegetable fibers of the strands surrounded and protected by the asbestos fibers.

5. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective threads comprising a plurality of individual yarns of asbestos fibers and a plurality of strands of textile fibers, all extending spirally in the thread, the asbestos yarns being individually twisted and also twisted together, and the textile fiber strands being embedded as cores in the different yarns with the asbestos fibers of the surrounding yarn twisted around the textile fiber core as a protective envelope.

6. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective threads being composed of asbestos yarns having individual yarn twists and combined with a thread twist, each individual yarn comprising in inner core of textile fibers surrounded by an outer protective envelope of asbestos fibers twisted about the core.

7. In a drier felt having a working surface ply comprising interwoven warp threads and weft threads, the feature of composite asbestos threads incorporated in said surface ply as the threads of at least one of said thread groups, said respective threads being composed of asbestos yarns having individual yarn twists and combined with a thread twist, one of the yarns comprising an inner core of textile fibers surrounded by an outer protective envelope of asbestos fibers twisted thereabout, and another of the yarns being coreless and consisting of twisted asbestos fibers.

8. In a multiply drier felt having a working surface ply woven of a group of warp threads and a group of weft threads, the feature of the threads of at least one of said groups in the working surface ply being of composite character, the respective composite threads comprising a plurality of asbestos yarns having individual yarn twists and combined with a thread twist, and there being a reinforcing core of textile fibers embedded in at least one of said intertwisted individual yarns with the asbestos fibers of the surrounding yarn twisted around the textile fiber core as a protective envelope.

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