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PAPER MAKER'S DRIER FELT

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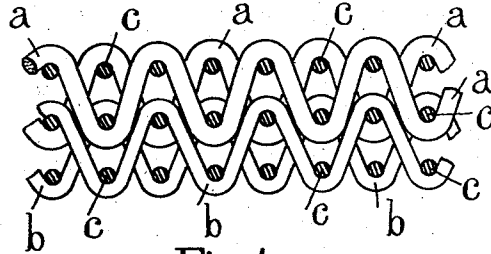


Fig. 1.

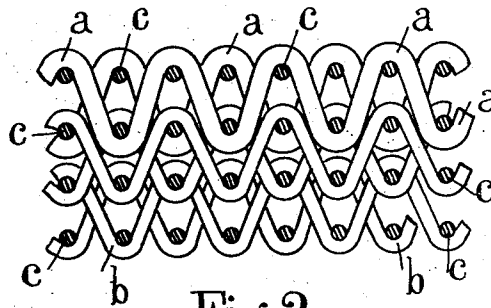


Fig. 2.

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PAPER MAKER'S DRIER FELT

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The invention relates to drier felts by which the wet web of paper is carried through and pressed against the drying cylinders in paper making machines.

5 A drier felt on a paper machine making paper acts to press the wet web of paper successively against the steam heated revolving cylinders. The drier felt is thus subject to the combined effects of heat and chemicals absorbed from the paper and to mechanical wear and tear by reverse bending around the drying cylinders and the smaller intermediate rollers. Cotton is comparatively quickly hydrolyzed by the combined effects of heat and chemical action and so loses its strength to 10 such a degree that it is unable to withstand the mechanical strains at which stage the cotton drier felt must be renewed.

It has been proposed to make drier felts 20 wholly of wool since this fibre will withstand heat and certain chemical action to a far greater degree than is the case with cotton. However, such woolen drier felts are necessarily of considerable thickness also they are 25 heavy and relatively very expensive. They do not possess the desirable degree of porosity, and the large amount of wool involved too readily retains an excessive amount of moisture, so retarding the efficient and rapid drying of the paper. Such woolen felts in consequence of their thickness, are generally 30 made endless, either during weaving or prior to the milling process. Their excessive thickness prevents a sewn-joint or seam being used as is desirable for ease of fitting in the case 35 of drier felts intended for wide, fast running paper machines. A drier felt of reasonable thickness is required if the sewn-joint is to be used, otherwise the joint is too thick and clumsy, and is liable to mark the paper. It 40 has also been proposed to make a drier felt with a wool weft but with a cotton warp.

The object of this invention is to provide an improved drier felt which will have the 45 resistance of wool to heat and chemical and mechanical actions without the disadvantageous large moisture holding effect of the known woolen drier felt and very pronounced porosity, while ample strength may be provided with a reasonable thickness thus en-

abling a sewn-joint to be used effectively and in which shrinkage in width, stretch in length, and creasing or "roping" are all reduced to negligible proportions, and which is relatively inexpensive to manufacture.

The invention comprises a drier felt for 55 paper making machines constructed with the front or working surface wholly of worsted warp yarns and the back of cotton warp and the weft wholly of cotton yarns.

It will be fully described with reference to the accompanying drawings:—

Fig. 1 is a longitudinal section across the weft yarns.

Fig. 2, longitudinal section showing additional cotton warp yarns.

The drier felt shown in Fig. 1 is of known four-shaft weave woven with face warp threads *a* wholly of worsted yarn, back warp threads *b* wholly of cotton yarn and weft 70 threads *c* wholly of cotton yarn. The warp threads *a* are of single or multi-ply worsted yarn, the warp threads threads *B* are of multi-ply cotton yarn and the weft threads *c* are of multi-ply cotton yarn. The resulting drier 75 felt has one face wholly of worsted warp yarn and a back wholly of cotton warp the former of which contacts with paper when in use on the paper machine.

About one-third of the drier felt shown 80 in Fig. 1 consists of worsted warp, the remaining two-thirds being cotton. The worsted used is employed to the very best advantage as it is in intimate contact with the paper, and serves to protect the cotton 85 back warp and the cotton weft threads from rapid deterioration. Since only one-third of the drier felt consists of worsted, the felt is considerably lighter in weight than the ordinary all-woolen drier felt and the 90 moisture holding capacity of the improved drier felt is relatively very small. Furthermore, the cotton backing warp and weft act to take up the moisture from the worsted face, being in close contact therewith, the 95 cotton back dissipating the moisture very readily into the atmosphere.

The drier felt shown in Fig. 2 is of known six-shaft weave woven with face warp 100 threads *a* wholly of worsted yarn back warp

threads *b* wholly of cotton yarns forming the middle and back layers and weft threads *c* wholly of cotton yarns about two-ninths of the drier felt shown in Fig. 2 consists of worsted, the remaining seven-ninths being cotton. The moisture holding capacity is therefore even less than with the form shown in Fig. 1.

In either example Fig. 1 or Fig. 2 the worsted warp threads *a* are much coarser or thicker than the cotton warp threads *b* and the cotton weft threads *c* thereby producing a dense or crowded worsted face for the working surface of warp yarn and an open or porous cotton back due to the clearance provided between the adjacent threads. The worsted warp threads *a* are so proportioned that the diameter of the threads multiplied by the number of threads per inch is greater than unity and the cotton warp threads *b* are so proportioned that the diameter of the threads multiplied by the number of threads per inch is equal to or less than unity.

The weft or transverse threads *c* are wholly of cotton, but the worsted warp yarns *a*, when proportioned as above, completely cover the cotton weft, which is therefore protected since the weft cannot contact with the paper or cylinders. The above proportions also ensure such a density or crowding of the worsted warp yarns *a* that shrinkage in width is negligible—not more than 1½ per cent—when the drier felt is running on the paper machine. To secure these advantages, and to limit stretch longitudinally, it is essential that the drier felt should be woven on a loom of suitable strength and rigidity, as the warp yarns must be maintained under very great tension during weaving.

The crowding of the worsted warp threads, resulting from the above described proportions, gives the drier felt pronounced transverse rigidity, which effectively prevents the drier felt running into a crease, so that "roping" is completely avoided.

As will be apparent to those skilled in the trade, both forms of drier felt herein described can be woven from warp drawn from a bobbin creel directly to the loom.

The improved drier felt, after weaving, is ready for immediate use on the paper machine, no milling or other finishing process being required.

What I claim as my invention and desire to protect by Letters Patent is:—

1. An improved drier felt comprising a working face wholly of worsted warp yarns coarser and thicker than the back cotton warp yarns, a back of cotton warp yarns finer and thinner than the worsted face yarns and a weft wholly of cotton yarn finer than the worsted warp yarns constituting a dense or crowded worsted face of warp yarn for the

working surface and an open or porous cotton back.

2. An improved drier felt having the working surface consisting wholly of worsted warp yarns, and the back warps and weft consisting wholly of cotton yarns, thinner and finer than the worsted warp yarns in which the worsted yarns are so proportioned that the yarn diameter multiplied by the number of warp threads per inch is greater than unity, and the cotton yarns are so proportioned that the yarn diameter multiplied by the number of warp threads per inch is equal to or less than unity.

In testimony whereof I have hereunto set my hand.

THOMAS HINDLE.

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