

April 1, 1941.

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2,237,115

DRIER FELT

Filed May 16, 1939

2 Sheets-Sheet 1

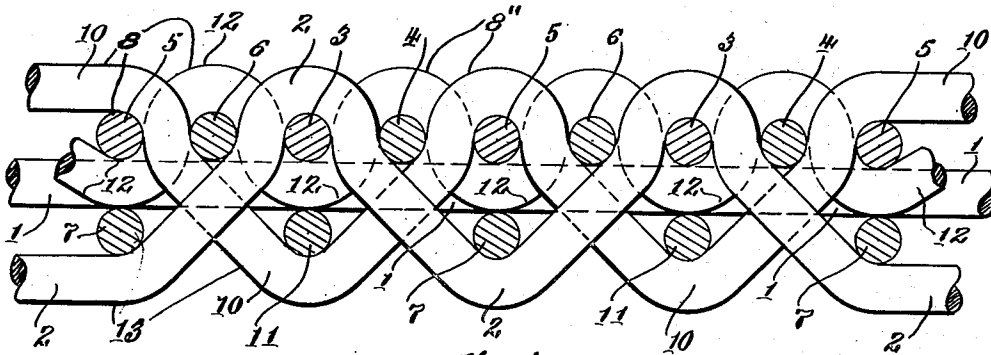


Fig. 1.

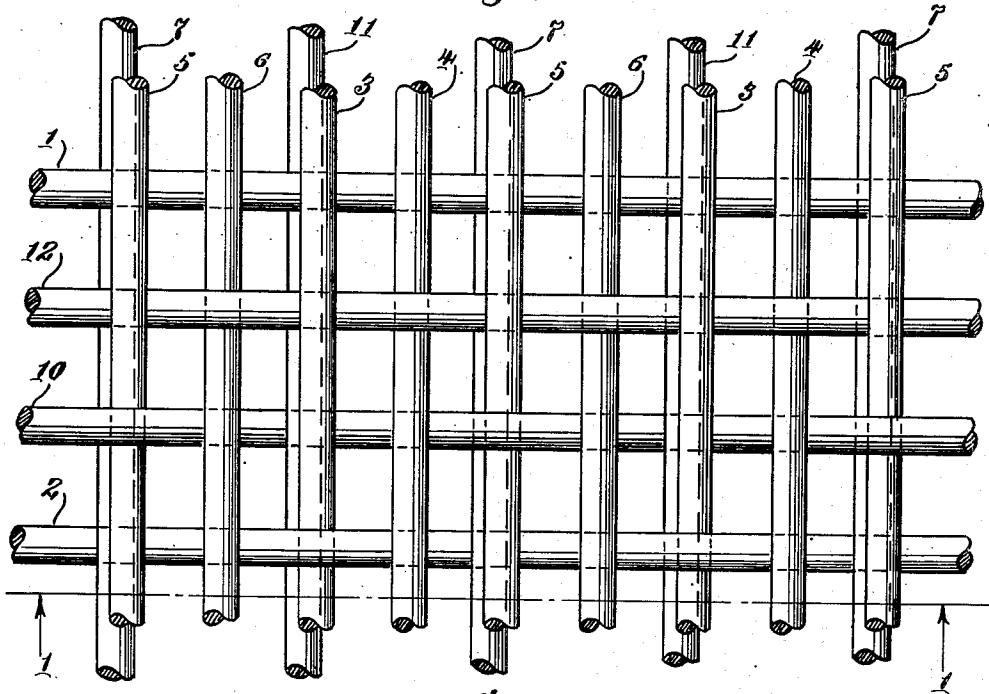


Fig. 2.

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2 Sheets-Sheet 2

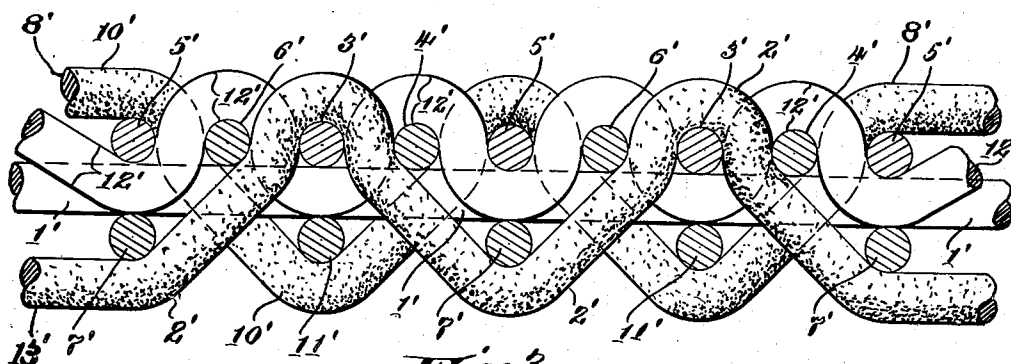


Fig. 3.

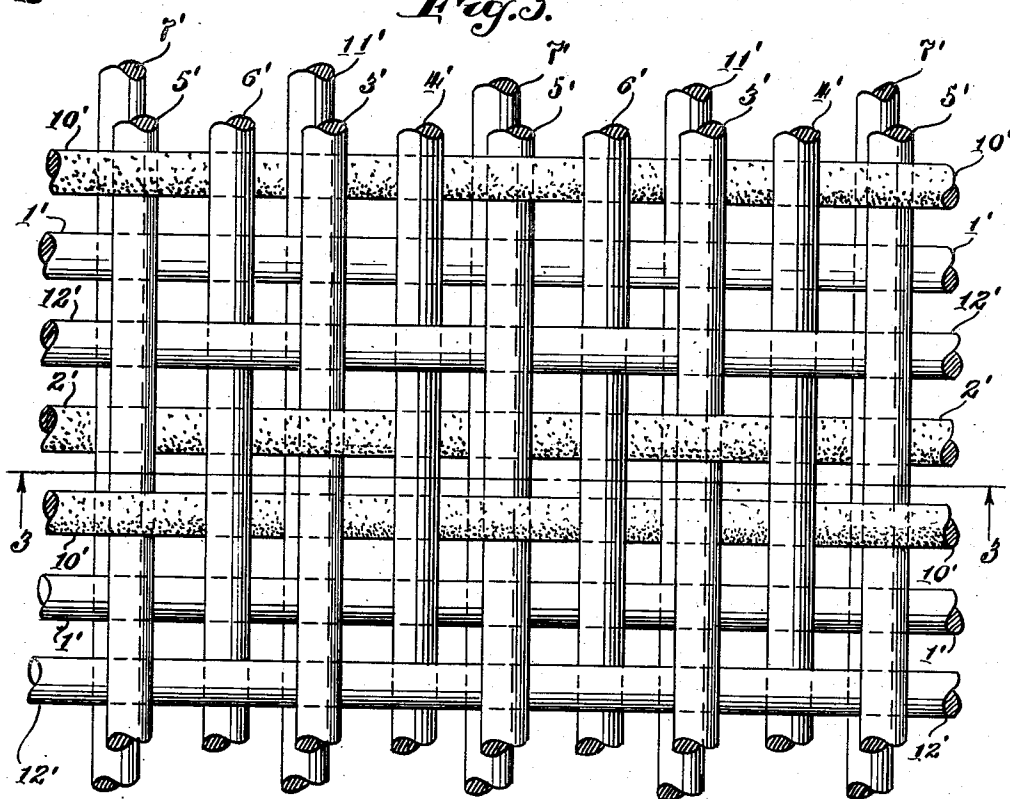


Fig. 4.

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## UNITED STATES PATENT OFFICE

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## DRIER FELT

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3 Claims. (Cl. 139—415)

The invention relates to a fabric for use as a drier felt primarily for paper making machines but also capable of use on laundry ironers and other machines requiring such a felt.

In the paper making art to which the drier felt of the invention is applied, the paper pulp, after being distributed and partially drained is dried by passing it, while on the felt, in contact with heated drums, the pulp passing between the drums and the felt; and the laundry ironing operation to which the drier felt may be applied is similar in that the fabric to be ironed is carried by the drier felt in contact with heated drums. The water and acid from the pulp mixture and likewise the water and some of the solvent from the fabrics treated in laundry ironing machines, are driven off as vapors and the greater portion of this vapor must escape by penetrating and passing through the felt.

Among the important features of a satisfactory drier felt are (1) a degree of permeability sufficient to insure efficient drying (2) tensile strength sufficient to prevent stretching or breaking (3) a smooth surface which is presented to and serves to support the paper pulp or web (4) resistance to acids and heat.

Resistance to acids and heat is obtainable without special fibers to meet the average conditions in paper making. However, increased resistance to acids and heat are desirable under certain conditions. This increased resistance may be attained by the use of mineral yarn such as asbestos and the present invention includes as one of its of secondary importance features a combination of asbestos and cotton which is highly efficient in its resistance to heat and excessive acid conditions.

To meet the conditions presented in the treatment of paper pulp and in the drying of other materials which can be handled in this way by means of a drier felt passing the material in contact with the heated drums, the felt of the invention has a smooth surface which is presented to and supports the paper. The drier felt of the invention is also highly permeable and thus insures satisfactory drying; it further possesses a high degree of tensile strength in proportion to the weight of the fabric and the expense involved in producing it.

In the past drier felts have been made of two or more layers but it is found that the majority of multiple layer fabrics which present a smooth surface to the pulp are relatively impermeable and therefore not adapted to drying, and that such fabrics are of complicated weaves and rela-

tively heavy. Such fabrics are expensive on account of their complicated construction and their excess weight.

The drier felt of the invention has the advantages first of a high degree of tensile strength in proportion to its weight, second, that the face of the felt formed by one of the plies or layers is specially woven for presenting the required smooth surface to support the pulp or similar material, third, that the second layer is of an open weave constituting the back of the drier felt and providing for the escape of vapors which have passed through the first layer and are thus released with very little additional resistance, and, fourth, the fabric is of a relatively low cost because of its simple weave, light weight in proportion to its tensile strength and resistance to absorption.

The fabric of the invention, as above suggested, has a central core warp with two layers or plies of filling, the terms layer and ply being used interchangeably. One layer of filling is above the core warp and the other below, and the top layer of the filling contains twice as many fillings as the bottom layer and there is an additional warp, and the fillings of the top layer are interwoven by and with this latter warp which is not interwoven with the bottom layer.

While an alternative construction of cotton in combination with asbestos is disclosed for use where asbestos is found desirable, the proportion of mineral yarns may be further increased if it is found essential on account of intensely acid conditions but in the majority of installations the use of such special fibers is unnecessary, the felt being made of cotton or similar vegetable fibers.

In the accompanying drawings, I have illustrated a drier felt fabric made of cotton or similar fiber in accordance with my invention, also the drier felt fabric of the same construction composed in part of cotton yarn and in part of asbestos yarn combined and arranged in accordance with the feature of my invention which relates to this combination of material.

In the drawings:

Fig. 1 is a longitudinal section through the fabric on the line 1—1 in Fig. 2, looking in the direction of the arrow.

Fig. 2 is a top plan view of the same, the warp and filling being separated or spaced apart for convenience of illustration.

Fig. 3 is a section similar to Fig. 1, taken on the line 3—3 in Fig. 4, showing a fabric having an

asbestos warp, a cotton core, and a cotton filling.

Fig. 4 is a top plan view of the same, the warp and weft thread being spaced apart for convenience of illustration. Figs. 2 and 4 being diagrammatic in nature.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the fabric shown in Fig. 1 comprises a core or stuffer warp 1, and in the fabric shown, there is one core warp in every four warp threads comprising a set of binder warp threads, such sets being repeated an indefinite number of times in the fabric. The other warp threads in the set shown in Fig. 1 comprise the warp thread 2, which is at the bottom in Fig. 2 and closest to the observer in Fig. 1. This warp 2 passes over every fourth top weft or filling 3 in the top layer 8, as seen in Figs. 1 and 2, so that there are three top wefts or fillings 4, 5, and 6, between each filling 3, the wefts or filling threads 3, 4, 5 and 6 comprise a set of top wefts which is indefinitely repeated, the warp thread 2 also passes under every alternate weft or filling 7 in the bottom layer. It is of importance that there are but half as many wefts or fillings in the bottom layer as in the top layer, the wefts or filling threads of which bottom layer 13 are in sets of twos indicated by reference characters 7 and 11, such sets being indefinitely repeated. The bottom wefts or fillings 7 and 11 are directly beneath the wefts or fillings 5 and 3 respectively of the set 3, 4, 5, and 6 of the top layer. A second warp 10 is arranged similarly to the warp 2, except that it passes over every fourth weft or filling 5 of the top layer and under every alternate weft or filling 11 of the bottom layer. The top layer 8 differs from the bottom layer 13 in that it contains two additional fillings 4 and 6, in each set between the fillings 3—5 and 5—3 respectively and, the top layer further differs from the bottom layer in that each set of warps contains a surface warp 12 the third from the front in Fig. 1 and from the bottom in Fig. 2, which warp 12 in the form shown passes alternately over and under the wefts or filling threads 3, 4, 5 and 6 of the top layer, but does not cross to the bottom layer.

This construction provides a relatively smooth surface 8'' to support the paper or other material being treated and at the same time the high permeability of the bottom layer permits the steam and acid vapors to be discharged with great freedom giving quick and satisfactory drying. The fabric also possesses high tensile strength and high resistance to elongation in proportion to its weight. This feature and the simple nature of the weave greatly reduce the cost as compared to the prior fabrics for the same installations.

A highly satisfactory arrangement of asbestos or similar fiber to reduce and prevent deterioration on account of conditions of increased acidity encountered in some classes of paper making the asbestos being used in combination with sufficient cotton to give the desired tensile strength and keep the cost at a satisfactory figure is illustrated in Figs. 3 and 4. In the construction shown in these figures, the core warp 1' is of cotton, likewise the warp 12' which is interwoven above and below the fillings 3', 4', 5' and 6' of the top layer, and assists in giving a smooth top surface which supports the paper pulp or other material to be dried. The remaining warps

2' and 10', in the form shown in these figures are of asbestos and being the warps which are most exposed, particularly, those passed over and under the alternate fillings 3', 7' and 5', 11' of both the top and bottom layers serve to protect the core 1' and to preserve the construction of the fabric and give it strength and body even when the cotton is attacked by acid which may happen under excessively acid conditions. This fabric is otherwise similar to that of Figs. 1 and 2.

It is of interest that the fabric disclosed except for the extra fillings 4, 6, and the additional warp 12, all being confined to the top layer, is a two layer, interwoven by three separate warp threads fabric. The extra fillings 4 and 6 between each of the fillings 3 and 5 and the addition of the warp 12 interwoven with all the fillings of the top layer give a smooth top supporting surface adapted to support the paper pulp or web, and the relatively open bottom layer provides an easily permeable back. This construction with the longitudinal core also gives a weave in which the strength of the fabric in proportion to its weight and its resistance to elongation are greatly increased without appreciably decreasing the permeability of the fabric.

Under certain circumstances, as already pointed out, the proportion of asbestos may, if desired, be increased in correspondence with increased acidity, even to the extent of all of the warp and filling yarns being made of asbestos. Under ordinary conditions, the cotton fabric serves the purpose to such a high degree of satisfaction as to make the expense of other fibers unwarranted.

Having thus described a preferred and modified form of the invention, one to meet standard conditions, and the other to meet conditions of increased acidity, I would have it understood that the specific terms herein are used in a descriptive sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. A drier felt having two layers of filling comprising a top layer having closely spaced filling threads, a bottom layer consisting of fillings in number equal to one filling thread for each two filling threads of the top layer, two sets of warp threads by which the alternate fillings of the top layer are interwoven with all the fillings of the bottom layer, an additional set of warp threads interwoven with and passing alternately over and under all the consecutive top filling threads and being free of the bottom layer, and a set of core warp threads passing between the fillings of the top layer and the fillings of the bottom layer.

2. A drier felt fabric comprising a core of stuffer warp threads, a top layer of filling threads on one side of said core of stuffer warp threads and a relatively open bottom layer of filling threads on the other side of the core warp threads, the top layer consisting of two filling threads for each filling thread of the bottom layer and two sets of binder warp threads by which alternate top filling threads and all of the bottom filling threads are interwoven, leaving the top remaining intervening filling threads not interwoven with said latter sets of warp threads and an additional set of surface warp threads interwoven with all of the top layer of filling threads whereby all the filling threads are in-

terwoven into the fabric, the warp threads of said latter set passing over the intervening filling threads of the top layer which are not interwoven with said warp threads which interweave the top and bottom layers.

3. A drier felt fabric comprising a core of stuffer warp threads, a top layer of filling threads on one side of said core of stuffer warp threads and a relatively open bottom layer of filling threads on the other side of the core warp threads, the top layer consisting of two filling threads for each filling thread of the bottom layer and two sets of binder warp threads by which alternate top filling threads and all of the

bottom filling threads are interwoven, leaving the top remaining intervening filling threads not interwoven with said latter sets of warp threads and an additional set of surface warp threads interwoven with all of the top layer of filling threads whereby all the filling threads are interwoven into the fabric, the warp threads of said latter set passing over the intervening filling threads of the top layer which are not interwoven with said warp threads which interweave the top and bottom layers, there being one stuffer warp thread and one surface warp thread and two binder warp threads in each warp repeat.

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