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CARD CLOTHING

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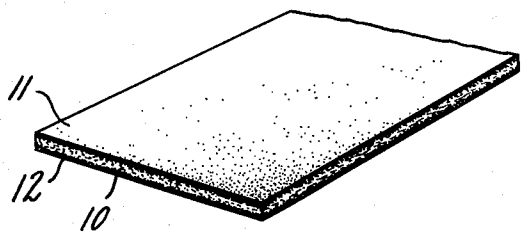


Fig. 1

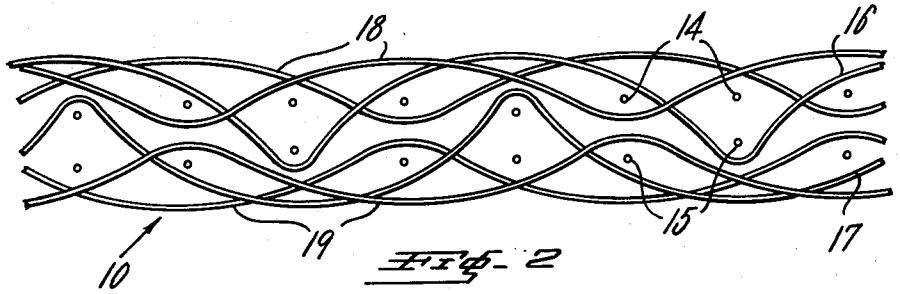


Fig. 2



Fig. 3

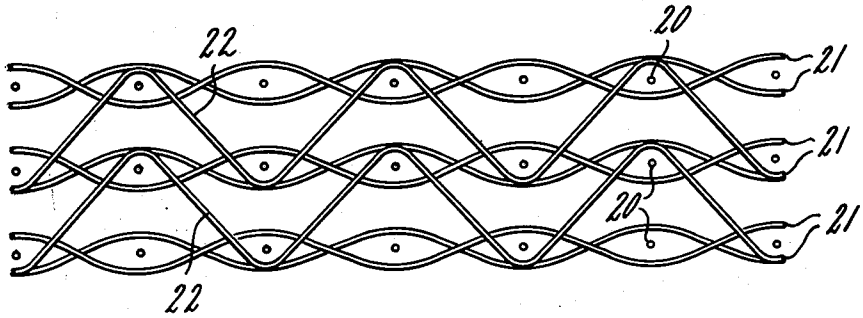


Fig. 4

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CARD CLOTHING

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This invention relates to card clothing formed of a strip of card cloth foundation having wire teeth set therein, and more particularly to card clothing formed of a unit or single woven fabric foundation.

In the early development of card clothing, leather was used to form the card cloth foundation, and while this provided a homogeneous foundation for supporting the wire teeth, the leather had several natural shortcomings, such as high stretch, non-uniformity of stretch in a given piece of leather, non-uniformity of density and high cost. This led to the development of woven multiple fabric foundations in which two or more woven fabrics are adhesively bonded together, and these fabric constructions formed of two, three or more separate woven fabrics bonded together are in general use today. When the wire teeth are inserted in card cloth foundation, formed as just described of two or more woven sheets of fabric adhesively bonded together, some of the prongs of such wire teeth will penetrate through one or more threads of the weave, while other prongs will pass between the threads without piercing them. This will cause some wire teeth to be more firmly anchored in the card clothing than other teeth.

The present invention contemplates a unit or single fabric having what is herein called a "multiple weave" to give it strength, body and thickness, and which multiple weave fabric is felted or fulled to increase the density and compactness of its weave to thereby provide a substantially homogeneous card cloth foundation into which the wire teeth may be firmly inserted. In this manner a more compact and uniform woven foundation is secured than has been available heretofore.

The present invention also contemplates a construction in which one or both faces of the felted woven fabric are impregnated with a tough bonding agent to thereby stiffen such surface so that it will more firmly support the wire teeth.

Card clothing having the single fabric weave and otherwise formed as herein contemplated, because of its homogeneous construction permits the use of a wider range of wire sizes for the wire teeth than will a multiple fabric foundation such as used heretofore of corresponding thickness. The present construction also eliminates the necessity of laminating or bonding several fabric sheets together, and avoids the possibility of ply separation, such as may occur in a multiple fabric foundation. The present homogeneous foundation provides each wire with a firm highly

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uniform support, is of simple construction, and makes unnecessary the weaving of several fabrics and then bonding them together.

Card clothing such as contemplated by the present invention may vary in thickness from about .08" to about .175", and is formed of two, three or more layers of strong warp threads disposed one layer above the other to form a multiple weave having interlocked with these warp threads binding weft threads and floating or surface weft threads. The warp threads are preferably formed of relatively large high tensile and low stretch threads, such as highly stretched mercerized cotton threads, and have interwoven therewith relatively large floating weft threads formed of wool, or other fibers that can be felted or fulled and binder weft threads that are strong enough to hold the threads of the fabric firmly together.

The fabric thus constructed is preferably felted throughout to shrink the fabric and make it thicker, more compact and relatively homogeneous, and the bonding material applied to one or both faces of the felted fabric is preferably tough, durable and yieldable to some extent, so that the wire teeth inserted in this card cloth foundation will be strongly supported, but will be able to move relatively to each other in the foundation where this is necessary to prevent such wires from being damaged. It is contemplated that the card clothing of the present invention may be used in any field where conventional or known types of card clothing are now used.

While a multiple-ply weave is required to form the construction contemplated by the present invention, the particular construction of such weave is not important provided it is such that the warp threads will impart the desired longitudinal strength and low stretch to the fabric so that the card clothing will remain tightly in place over a long period of use when secured about the supporting drum where it is used. The binding weft threads should be so interlocked as to form a strong fabric, and the weft threads should contain sufficient wool or other feltable fiber to enable the fabric to be fulled and felted throughout to make it more dense and uniform.

The above and other features of the present invention will be further understood from the following description when read in connection with the accompanying drawing illustrating two good practical embodiments of the invention.

In the drawing,

Fig. 1 is a perspective view of a piece of unit woven card cloth foundation that is felted and

has its faces impregnated in accordance with the present invention;

Fig. 2 on an enlarged scale is a sectional view of the fabric of Fig. 1 before it is felted and impregnated;

Fig. 3 is an edge view of a piece of card cloth foundation such as shown in Fig. 1 and having the wire teeth inserted therein; and

Fig. 4 is a view similar to Fig. 2 illustrating a modification of the invention.

Referring to Figs. 1 and 3 of the drawing, the unit or single card cloth foundation is indicated by the numeral 10. This fabric is felted or fulled to make it firmer and more homogeneous, and, as shown, the opposite faces are coated or impregnated with a tough bonding agent as indicated at 11 and 12. This bonding agent which may be applied to one or both faces of the fabric, as desired, may be a slightly elastic resin or other tough durable coating material that will lay the felted fibers and form a smooth tough surface that will firmly support the wire teeth 13. This bonding agent preferably penetrates into the felted faces of the fabric 10 as indicated by 11 and 12 in Fig. 1.

After the card cloth foundation is woven so that it contains two, three or more layers of warp threads, depending upon the thickness and strength desired in such fabric, and after it has been felted and its faces have been impregnated as indicated by 11 and 12, this foundation is cut warpwise or longitudinally into narrow strips, whereupon the wire teeth 13 may be inserted therein as heretofore to form the card clothing shown in Fig. 3.

It will be noted that Fig. 2 shows a two-ply weave formed of the upper layer of warp threads 14 and lower layer of warp threads 15, and have inter-woven therewith the binder weft threads 16 and 17 and the floating or surface weft threads 18 and 19. It is desired to point out that while these threads are shown as disposed a substantial distance apart in Fig. 2 in order that each thread may be clearly seen, they will be crowded close together in the actual weave. All of these threads are preferably relatively coarse and all may be substantially the same size. All warp threads lie approximately straight and parallel in the finished fabric to give the fabric the desired strength and low stretch and to make it practical to cut the fabric longitudinally into straight narrow foundation strips.

In the modified construction on Fig. 4, there are shown three layers of warp threads 20 and each layer has interwoven therewith the floating or surface weft threads 21, to form the three fabrics shown. These three plies or fabrics formed of the threads 20 and 21 are firmly secured together by the binder wefts 22. This multiple fabric shown in Fig. 4 is preferably felted throughout, as above described, and its faces are then treated with a suitable bonding agent, whereupon it is cut into long strips into which wire teeth are inserted to form the desired card clothing. The weft threads 21 are not floated at the face of the fabric as are the weft threads 18 and 19 of Fig. 2, but they do form the major portion of the face of the fabric in Fig. 4 and are therefore called surface weft threads.

The weave of the fabric, the felting of the same, and the bonding agent used at its faces should all be such as to provide a strong durable card cloth foundation having a unit weave and homogeneous construction which will retain the wire teeth relatively rigidly in place, but it should be sufficiently resilient to allow these wires to yield slightly in the fabric, as above mentioned, so as to secure long life of these wires in action.

After the multiple weave or unit fabric shown in the drawing and above described has been formed, it is preferably felted or fulled throughout so as to shrink the fabric and bring the threads forming the same more closely together and make the fabric more homogeneous. The fabric is then impregnated at one or both faces by spreading, dipping, roller-coating or by other conventional impregnating methods with a tough durable bonding agent in the form of a solution, emulsion or dispersion of tars, asphalts, non-brittle glue, plastics, elastomers or combinations thereof, such as an elastomer-plastic combination. Plastics which may be used include polymers or copolymers of vinylchloride, polymers or copolymers of vinylidene chloride, polyesters, copolymers of styrene and butadiene, copolymers of styrene and acrylonitrile, polyethylene, synthetic linear polyamides, cellulose esters, cellulose ethers and the like. Elastomers which may be used include natural rubber, copolymers of butadiene and styrene, polychloroprene, polyisobutylene, copolymers of butadiene and acrylonitrile, copolymers of isobutylene and isoprene, copolymers of isobutylene and butadiene, polybutadiene and the like. Elastomer-plastic combinations may include any combination of the above listed plastics or elastomers having mutual compatibility. The coating operation may be performed so as to limit the degree and/or depth of impregnation. After impregnation, the fabric may be treated in such a way as to produce a smooth surface. This may be done by conventional means such as calendering or ironing the impregnated surface or by calendering, spreading, or laminating the coating material onto the face of the fabric. The impregnating and/or coating materials should have good aging properties, afford protection against the oils and emulsions frequently encountered in carding operations and should preferably provide a relatively smooth finish to assist in releasing the fibers from the face of the card clothing during the carding operation.

While the multiple weave used in constructing the fabric herein contemplated may vary extensively, and the number of layers of warp threads used in such weave will depend largely upon the thickness and strength of the fabric desired, the following is an analysis of a fabric constructed substantially as shown in Fig. 2 of the drawing, after the fabric had been felted but not treated with the bonding agent.

1. Weight per square yard, 64.2 ounces.
2. Guage (standard felt guage use), 0.165" to 0.175"
3. Warp threads, 3/2/mercerized cotton
4. Binder weft threads—coarse singles wool yarn
5. Floating weft threads—coarse singles wool yarn

The following impregnating solution is one of a number of solutions that may be used satisfactorily to impregnate or coat the felted faces of the fabric, the parts being given by weight.

Compound A

Polyvinyl chloride resin	60.0
Lead stearate (stabilizer)	2.0
Dioctyl phthalate	15.0
	77.0

Compound B

Rubbery copolymer of butadiene and acrylonitrile	40.0
Stearic acid	1.5
Iron oxide	5.0
Carbon black	.5
Clay	25.0
	72.0

Compound C

Compound A	77.0
Compound B	72.0
	149.0

Compound A is mixed on a hot plastic mill after blending the plasticizer and stabilizer with the dry powdered resin. Compound B is mixed on a cool rubber mill and then blended with Compound A to form Compound C. This Compound C is dissolved in twice its weight of methylethylketone to give the final impregnating solution, which may be applied to each felted face of the fabric as above described. After the thus impregnated fabric has been dried, it may be cut longitudinally or warpwise into narrow strips, whereupon the wire teeth 13 may be inserted as heretofore. This completes the operation of forming one type of single integral strip of card clothing such as contemplated by the present invention.

It will be seen from the foregoing that card clothing formed of a unit or single woven fabric foundation and then felted in accordance with the present invention is compact and substantially homogeneous and should give good service for a long time.

While two embodiments of this invention have been shown and described in detail, it will be understood that I am not limited thereto and that other embodiments may be made without departing from the spirit and scope of this invention as set forth in the following claims.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. Card clothing consisting of a single integral strip of woven card cloth foundation having wire teeth set therein, and formed of a plurality of layers of strong approximately straight warp threads disposed one above the other in a multiple weave and having interwoven therewith surface weft threads that form with each warp layer a complete woven ply, and binding weft threads that secure said plies together, said woven fabric being felted to increase its denseness and having on and anchored into at least one face thereof a tough bonding agent that helps support the wire teeth and promotes easy release of the carded fibers, and cut warp-wise from a fabric into a narrower card clothing strip into which the wire teeth are set.

2. Card clothing consisting of a single integral strip of woven card cloth foundation having wire teeth set therein, and formed of an upper and lower layer of strong approximately straight warp threads disposed one above the other in a multiple weave and having interwoven therewith surface weft threads that form with each warp layer a complete woven ply, and binding weft threads that secure said plies together, said woven fabric being felted throughout to increase its denseness and having on and anchored into its felted faces a tough bonding agent that helps support the wire teeth and promotes easy release of the carded fibers, and cut warp-wise from a fabric into a narrower card clothing strip into which the wire teeth are set.

3. Card clothing consisting of a single integral strip of woven card cloth foundation having wire teeth set therein, and formed of a plurality of layers of strong approximately straight warp threads disposed one above the other in the fabric and having interwoven therewith surface weft threads that form with each warp layer a complete woven ply, and binding weft threads that secure said plies together to form a multiple weave, some of said weft threads being formed of wool and the fabric being felted to increase its denseness, and having on and anchored into at least one face thereof a tough bonding agent that helps support the wire teeth and promotes easy release of the carded fibers, and cut warp-wise from a fabric into a narrower card clothing strip into which the wire teeth are inserted.

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