

Dec. 15, 1959

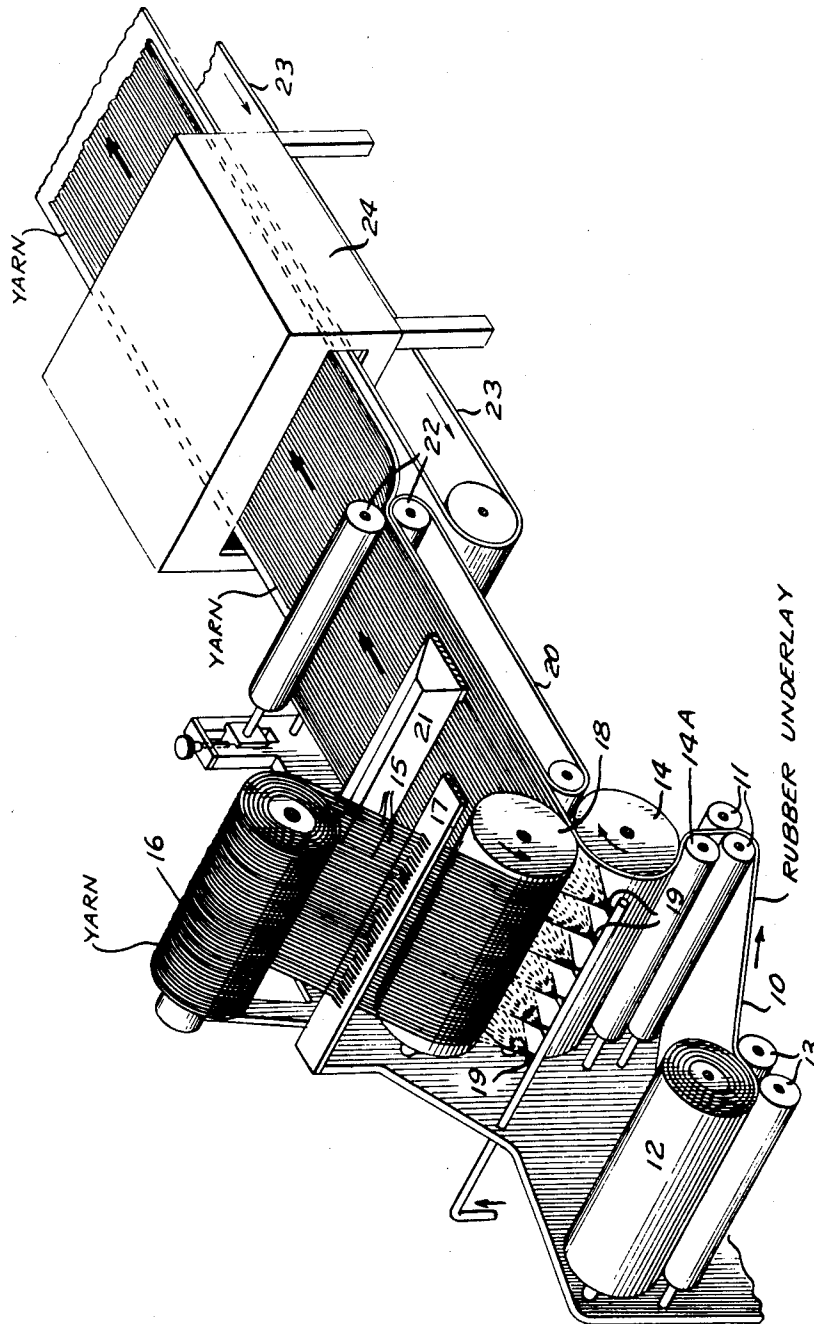
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NON-WOVEN FABRIC

2,917,421

Original Filed July 14, 1954

3 Sheets-Sheet 1

Fig. 1



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Fig. 2.

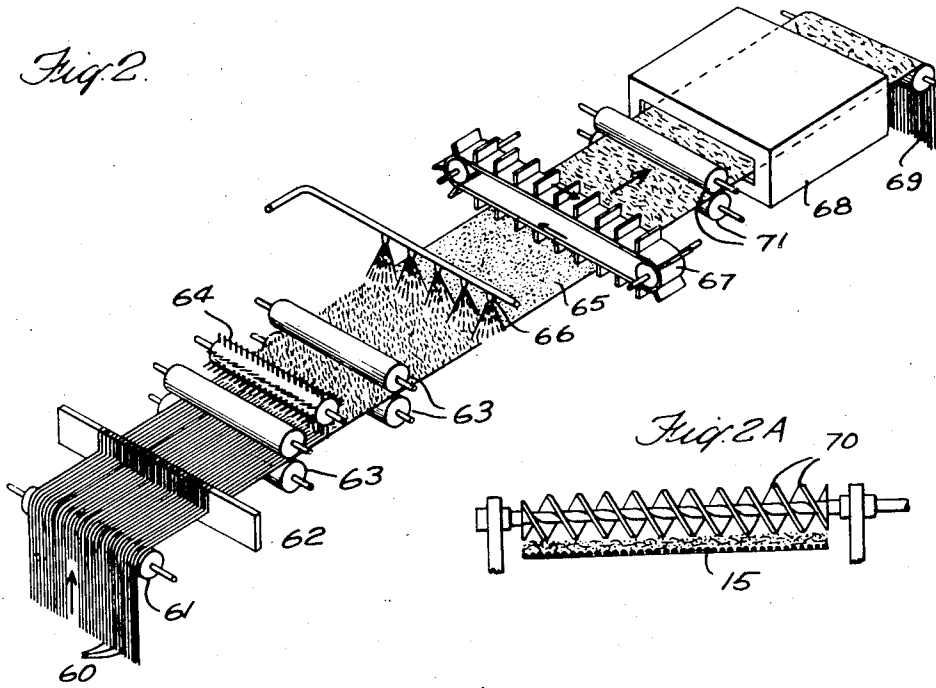


Fig. 2A

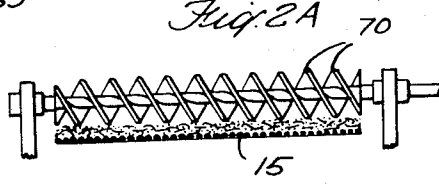


Fig. 4.

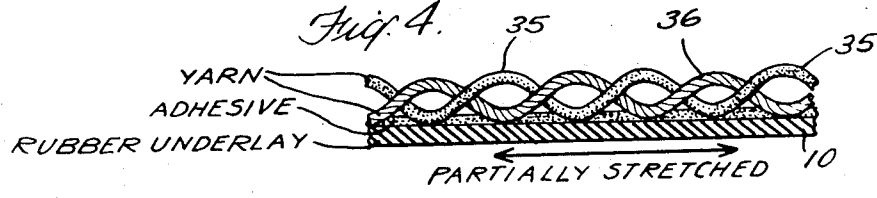


Fig. 3.

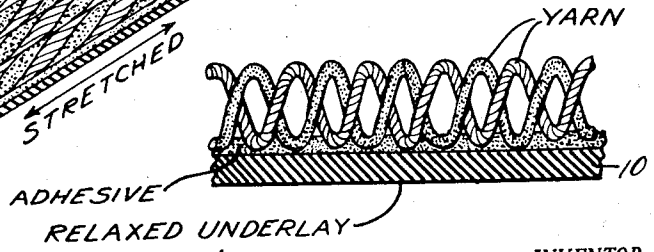
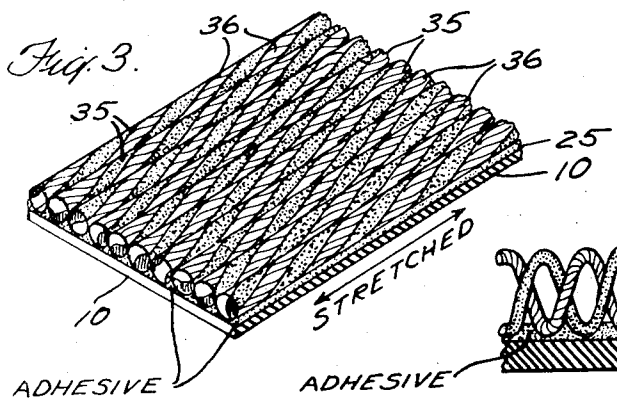


Fig. 5

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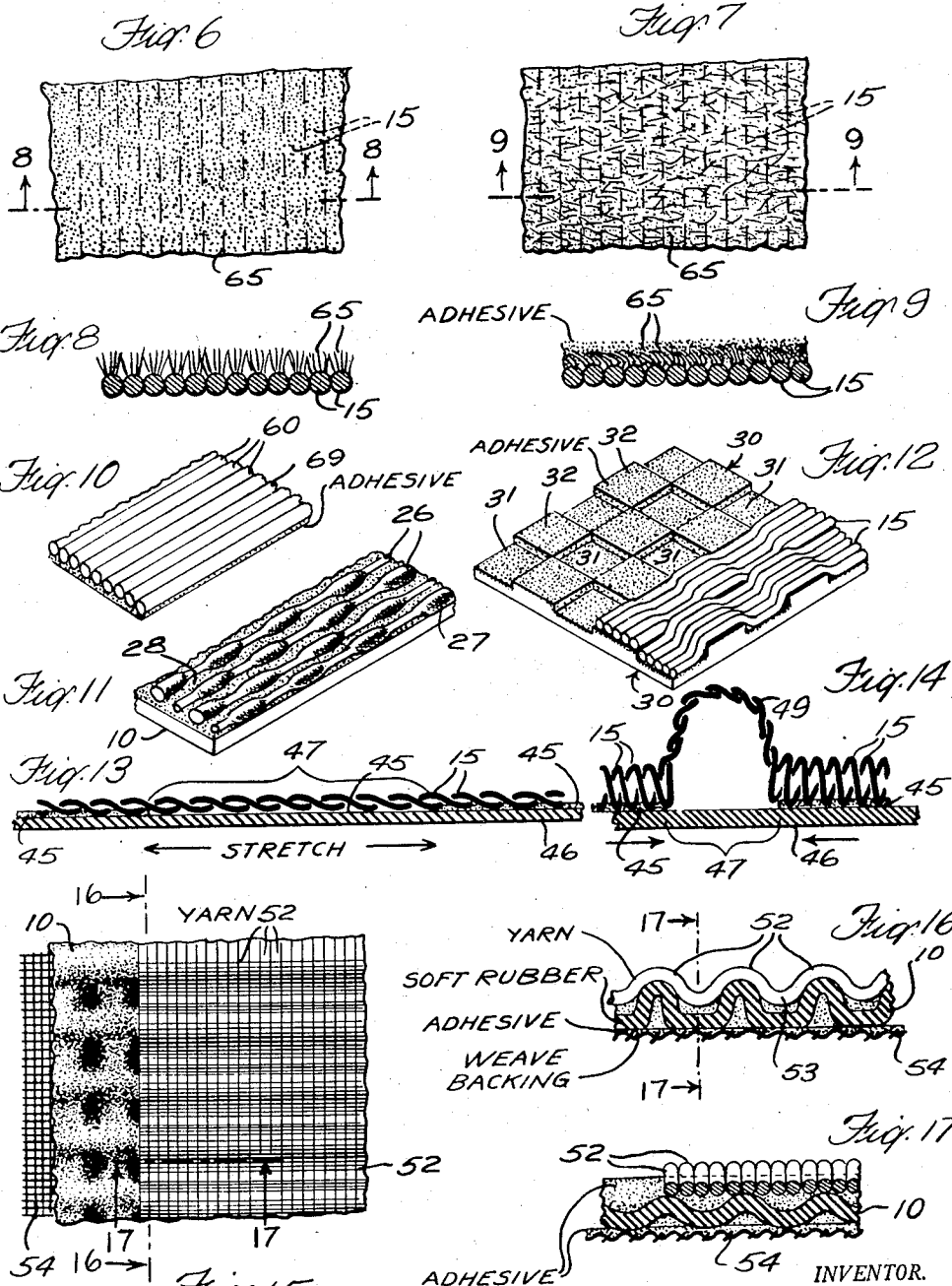
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3 Sheets-Sheet 3



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2,917,421

NON-WOVEN FABRIC

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Original application July 14, 1954, Serial No. 443,402, now Patent No. 2,787,571, dated April 2, 1957. Divided and this application July 13, 1956, Serial No. 597,824

1 Claim. (Cl. 154-48)

This invention relates to fabrics and more particularly to a fabric composed of a non-woven layer of yarn attached to a backing which may be woven or non-woven. In the case of a floor covering the backing may be composed of rubber or rubber-like material or of other materials which are commonly used for underlays. For thinner fabrics the backing may be composed of one or more layers of paper or paper-like material or may constitute a layer of felted or woven material. Such fabric may be used for various purposes such as upholstery, draperies and clothing.

This application is a division of my copending application Serial No. 443,402, filed July 14, 1954, which issued April 2, 1957, as Patent No. 2,787,571.

An object of the invention is to provide a fabric of the above type which may be produced inexpensively and at a comparatively rapid rate and is suited to uses wherein pile fabrics, felted fabrics, or heavy flat fabrics are normally employed.

Another object is to produce a floor covering having novel and improved characteristics.

Another object is to provide a novel and improved method for producing a fabric of the above type.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The fabric is produced by laying a sheet of parallel ends of yarn on a backing material and securing the yarn to the backing material with a suitable adhesive. In the finished fabric the parallel yarn ends form the exposed surface. Novelty effects may be produced by using yarn having alternate thick and thin sections or including nubs at spaced intervals, or by napping. Textured effects are produced by using a corrugated or embossed backing.

The yarn may be applied to the backing while the backing is in a stretched condition so that when the backing is relaxed the yarn is forced up into upstanding pile loops which may be sheared to form cut pile. The backing may be stretched according to a pattern to produce design effects.

The various features which are characteristic of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings in which certain specific embodiments thereof have been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a diagrammatic view illustrating successive steps in one method for producing a fabric embodying this invention;

Fig. 2 is a similar diagrammatic view illustrating another embodiment of the invention;

Fig. 2a is a detail view of a modified form of doctor blade to be used in the method of Fig. 2;

Fig. 3 is a perspective view showing the yarn attached to the stretched backing;

Fig. 4 is a side elevation illustrating an intermediate

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step in the production of a fabric having upstanding pile loops;

Fig. 5 is a similar side elevation illustrating the finished loop fabric;

Figs. 6 and 7 are detail views illustrating intermediate stages in the method of Fig. 2;

Figs. 8 and 9 are sections taken on the lines 8-8 and 9-9 respectively of Figs. 6 and 7;

Fig. 10 is a perspective view of the product of the method of Fig. 2;

Fig. 11 is a perspective view of a novelty fabric made by the use of nub yarn;

Fig. 12 is a perspective view illustrating a textured surface wherein the yarn is secured on an embossed underlay;

Fig. 13 is a side elevation illustrating an intermediate step in the production of another type of looped fabric;

Fig. 14 is a similar side elevation showing the finished looped fabric produced by the step of Fig. 13;

Fig. 15 is a view of another textured fabric made in accordance with this invention;

Fig. 16 is an enlarged vertical section taken on the line 16-16 of Fig. 15; and

Fig. 17 is an enlarged horizontal section taken on the line 17-17 of Fig. 15.

Referring first to the embodiment of the invention illustrated in Fig. 1, a backing 10 which may constitute a rubber or rubber-like underlay or other woven or non-woven material such as foam or sponge rubber, flexible plastic, felt, burlap, net or the like, is fed by feed rolls 11 from a supply roll 12 supported on idler rolls 13, thence between a pressure roll 14a and a lower guide roll 14. A sheet of yarn ends 15 is fed to an upper guide roll 18 from a beam 16 through a reed 17 by which the ends are laid parallel. A layer of adhesive such as latex, preferably of the quick drying type is applied to the yarn 15 and the underlay 10 where they are contacted at the bite of the guide rolls 14 and 18 by spray nozzles 19. The underlay with the yarn adhering thereto is carried by a conveyor belt 20 under a heater 21 such as a bank of lights for setting the adhesive, and between a pair of feed rolls 22. It is then carried by a conveyor belt 23 through a dryer 24 which is of a suitable length and temperature to dry or cure the adhesive. From the dryer 24 the fabric may pass to a finishing station or may be rolled as desired.

In the case of a quick drying adhesive the dryer 24 may be omitted provided sufficient time is provided for the adhesive to set before the fabric is taken to the finishing station. In the case of a thermosetting adhesive the dryer 24 may be provided with a means for heating the fabric to the temperature required to cure the adhesive. The amount of adhesive is controlled by adjusting the quantity of adhesive sprayed by the nozzles 19.

When a stretchable backing 10 is used the backing is stretched between the bite of the feed rolls 11 and the bite of the rolls 14 and 14a by an amount determined by the relative rates of feed of the respective rolls, and is held stretched until it passes the feed rolls 22 so that the yarn 15 is laid and secured to the backing while the latter is stretched.

For novelty effects the backing 10 may or may not be stretched when the yarn is applied thereto, depending upon the product to be obtained.

The fabric as it appears after leaving the rolls 14 and 18 with the backing 10 in stretched condition is shown in Fig. 3 wherein the yarn ends 15 are shown as lying parallel on and secured to the underlay 10 by a suitable layer of adhesive 25.

The yarn ends 15 in the fabric are shown in Fig. 3 as closely spaced to form the entire exposed surface. They may, however, be separated by a suitable spacing

depending upon the type of surface desired. If the yarn ends are spaced on the backing a coloring matter may be added to the adhesive or applied to the backing so as to cause the exposed portions of the backing to have the same color as the yarn or to have a selected contrasting color according to the effect desired.

A pile loop effect may be obtained by using a plied yarn or a cabled yarn having two or more components 35 and 36 somewhat loosely twisted together to form a helical effect, each component having two or more plies and being tightly or loosely twisted or composed of novelty yarns. This yarn is laid upon the backing 10 while the backing is held in stretched condition. A loop effect can also be obtained by using a helically coiled single yarn.

With a quick setting pressure-sensitive adhesive, the top roll 22 can be omitted and the backing relaxed to contract as it leaves the strip between rolls 14 and 18. The pressure between rolls 14 and 18 is sufficient to cause intimate contact between the yarn, the adhesive and the underlay but not sufficient to cause appreciable permanent flatness of the yarn.

The yarn is thus attached to the stretched rubber-like underlay at the various points of contact of the helical plies 35 and 36 with the underlay. After the adhesive has been set but not necessarily cured, the underlay is relaxed and allowed to return to its normal position, thereby causing the plies 35 and 36 to separate as shown in Fig. 4 and form upstanding loops 40 and 41 as indicated in Fig. 5. The fabric is passed through the dryer 24 in this form.

The loop pile effect can also be obtained by using a thin stretchable backing 10 which may be attached, after relaxation, to a heavy non-stretchable backing or underlay. Different portions of the backing may be stretched by different amounts to produce pile loops of different heights in a pattern effect.

A somewhat more pronounced loop effect may be obtained as illustrated in Figs. 13 and 14 by applying the adhesive to spaced banks or areas 45 of a rubber-like underlay 46 while the underlay is in stretched condition, leaving bands or areas 47 where no adhesive is applied. The bands 45 may extend in strips across the underlay 46 or the adhesive may be printed on the underlay in the form of a pattern. In any event the yarn 15 is applied to the underlay 46 in the manner indicated in Fig. 1 and is secured thereto at the area 45. After the adhesive has been set the rubber-like underlay 46 is relaxed to cause the portions of the yarn between adhesive areas 45 to rise up into loops 49 as indicated in Fig. 14.

In a further embodiment as shown in Figs. 15 to 17 the yarn 15 and backing 10, secured together as indicated in Fig. 3 are fluted or corrugated to form raised areas 52 and depressed areas 53. The depressions between the raised areas form voids or cavities which gives the underlay the appearance of a grid and adds to the resiliency of the tread or underlay. The depressed areas 53 are secured by suitable adhesive to a backing 54 to provide a resilient fluted surface. This embodiment may be produced by bonding the yarn to a corrugated rubber underlay while held flat by pressure or by stretching, and then relaxing the underlay into its original corrugated form and, if desired, attaching a backing sheet 54, such as fabric or a heavy paper.

A novelty effect as shown in Fig. 11 may be produced by laying novelty yarn 26 having nubs 27 at spaced intervals on the underlay 10. The novelty yarns 26 may be spaced apart to leave spaces 28 therebetween in which the underlay 10 or the adhesive film 25, which may be of a like or a contrasting color, is exposed or the yarns may be closely spaced as in Fig. 3. Other types of novelty yarn such as yarn having alternate thick and thin portions or yarn having various colors may be used to produce a textured fabric. In this case the backing may be unstretched.

A further novelty effect may be obtained as indicated in Fig. 12 by providing an embossed underlay 30 having alternate depressed portions 31 and raised portions 32. The yarn 15 may be laid across the embossed surface of the underlay and secured to both the depressed and raised portions to produce a textured effect. The surface may be embossed in any desired pattern.

In the embodiment of Fig. 2 a sheet of yarn ends 60 is passed over an idler roller 61, through a reed 62 by which the ends are laid parallel and between feed rollers 63, thence under a napping roll 64 which serves to nap the upper surface of the yarn ends 60 to form upstanding fibers 65 as shown in Figs. 6 and 8.

The napped yarn then passes under an adhesive spray 66 and under a doctor blade 67 which is shifted laterally as the sheet of yarn ends 60 passes thereunder so as to lay the fibers 65 from one yarn onto the adjacent yarn as indicated in Figs. 7 and 9, to form a more effective bond between adjacent yarn ends. The sheet of yarn ends 60 carrying the adhesive are fed by pull rolls 71 to dryer 68 for setting the adhesive and forming a finished fabric as shown in Fig. 10. This fabric may or may not have a backing or underlay as the adjacent yarns are secured together by the napped and crossed fibers 65 which result in increased transverse tear strength. The adhesive may be heat drying or thermo-setting as desired.

The oscillating doctor blade 67 of Fig. 2 may be replaced by a helical rotating doctor blade 70 as indicated in Fig. 2a or other means may be used for laying the nap in a transverse direction and spreading the adhesive thereover in a layer for setting.

The exposed surface of the fabric of Figs. 3, 10 to 12 or 15 to 17 may be napped to provide a felt-like finish.

Further design effects may be produced by oscillating the reed so as to lay the yarns in an undulating or zigzag form on the backing. With a stretchable backing varying loop heights can thus be obtained.

In the case of a fabric made as above and having thermoplastic adhesive the fabric may be cut in desired shapes such as tile by the use of a heated die which serves to seal the cut ends to the underlay as the fabric is cut, or if desired the die may be dipped into a sealing solution of the drying type or of the heat-sealing type to bind the cut ends at the time of cutting.

For various embodiments any woven or non-woven backing may be used. Products may range from floor covering weights to upholstery, draperies or clothing fabrics. For the latter finer denier yarns may be used to produce the desired effects. The surface of the fabric may be further ornamented by the use of multi-colored yarns, spray-dyeing, or by conventional methods of printing for obtaining decorative effects. The use of the sealed edge cut tile is convenient for home installations. The yarn may be laid in wavy or zigzag form on the backing to produce a textured effect. Since all of the yarn is exposed to the wear surface as distinguished from being buried in the backing for binding purposes as in conventional woven pile fabric, a greater wear is obtained for an equivalent weight of surface yarn.

The fabric may be either wet or dry finished, as by dyeing, wet beating, shearing or napping. The flat surface yarn with or without backing may be napped to give a felted effect. The looped pile of Fig. 5 can be sheared to form a cut pile.

The adhesive may be applied by a roller or doctor blade or by extrusion according to the characteristics of the particular adhesive.

Although certain specific embodiments of the invention have been shown it is to be understood that the various adaptations may be made therein as will be obvious to a person skilled in the art.

What is claimed is:

75 A non-woven fabric comprising a backing composed of

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stretchable material and a sheet of parallel yarn ends disposed on one surface thereof, each of said yarn ends being composed of a plied yarn having at least two components loosely twisted together to form a helical effect, each component having at least two twisted plies, said plied yarns being adhesively secured to said backing at spaced points of contact and being separated from each other, the construction and arrangement of said non-woven fabric being such that when the backing material is in unstretched state the plied yarns form upstanding loops between the points of contact where the plies are adhesively secured to the backing and when the backing is in stretched state the plied yarns lie flat along the backing.

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