

March 21, 1944.

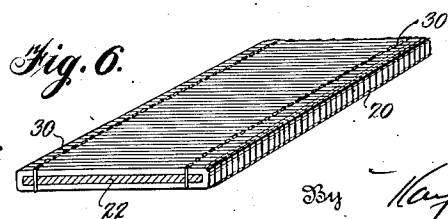
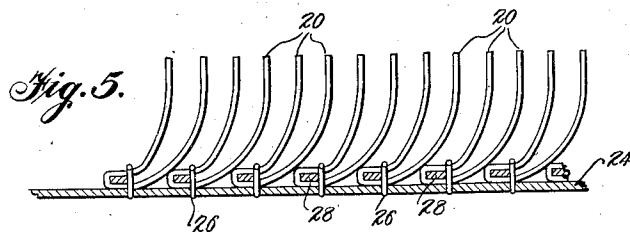
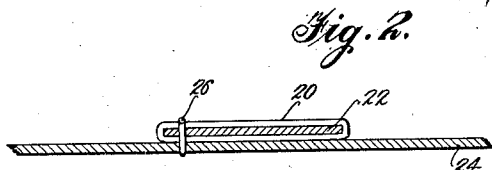
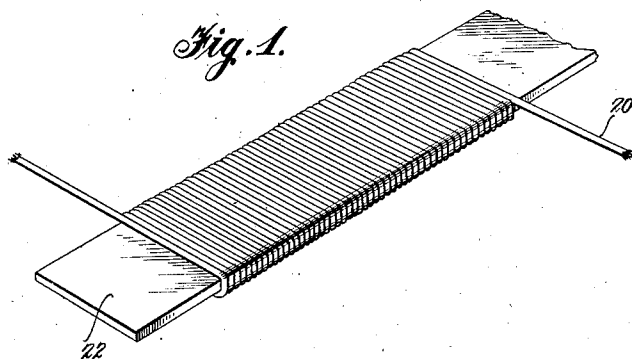
R. R. CONE

2,344,537

PILE FABRIC

Filed Nov. 27, 1943

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 7.



Fig. 8.

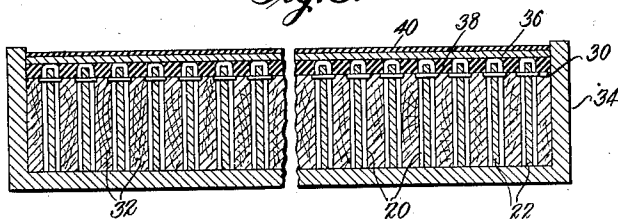


Fig. 9.

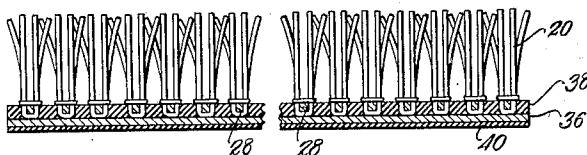


Fig. 11.

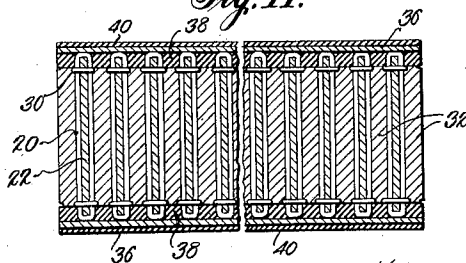


Fig. 10.

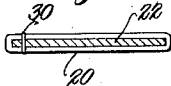


Fig. 13.

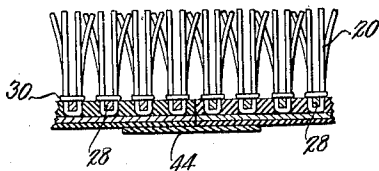
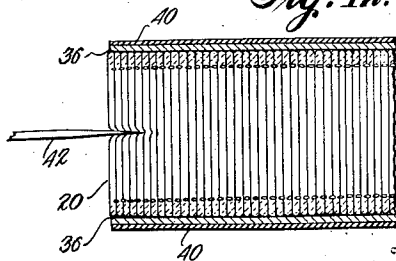


Fig. 12.



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UNITED STATES PATENT OFFICE

2,344,537

PILE FABRIC

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Application November 27, 1943, Serial No. 512,035

9 Claims. (Cl. 154—2)

This invention relates to pile fabrics, embracing the finished articles themselves, elements utilized in their production and the method of making the same.

It has been well known in the art for centuries to manufacture rugs and other pile fabrics by various weaving processes. Up to the present time, however, the production of woven pile fabrics has required a great amount of labor or complicated and expensive machinery, so that the cost of quality products has been beyond the reach of consumers of average means. Moreover, most woven articles of this type appearing on the market are susceptible to shedding, particularly when subjected to cleaning operations utilizing brushing or suction, and this objection is by no means limited to the less expensive grades. Efforts have been made to overcome this undesirable shedding by the application of rubber and other cementing compositions for additionally securing the pile to its backing, and while the woven products are undoubtedly improved by such a cementing operation, their already appreciable cost is increased proportionally.

Several attempts have been made to dispense with the weaving operation entirely by attaching pile to a backing through the use of cement alone. Thus far, however, no pile fabric of this type has appeared on the market or in the patented art, which will stand up under normal wear and cleaning operations as satisfactorily as the better grades of woven materials. The fault undoubtedly has been due to an inadequate bond between the pile and its backing, resulting in even a more pronounced shedding than has been encountered with woven pile fabrics.

There have also been efforts to produce pile fabrics by the simple expedient of sewing pile to a backing. But here the operating difficulties have been even greater, and from the standpoint of shedding, the results have been far from satisfactory, since a slight pull on the filaments constituting the pile will separate them from their backing, and after the first of such threads or filaments have been thus removed, others in their immediate vicinity, being less tightly held, will be even more readily detached. When this sewing process has been utilized primarily in the production of ornamental goods such as chenille rugs, candle-wick spreads, fringe, etc., the objectionable features are not so evident, but articles so produced are definitely inferior in wearing and shedding properties and are thus not so well suited for utilitarian purposes.

In accordance with the present invention it is

proposed to overcome the inherent faults and limitations of known constructions and methods by producing pile fabrics of the unwoven type through the use of a plastic composition or cement for assembling the pile with a definite locking action so that it is extremely difficult to remove, thus obviating shedding to a substantial degree. At the same time, it is contemplated to produce such an article simply and inexpensively as compared with existing methods and products.

The textile thread or filament to be used for the pile, is according to the present invention, wound upon a strip of rendible sheet material, with the consecutive turns of the filament substantially in contact or spaced in accordance with the pile density desired in the ultimate product. Stitching is then applied to the wound strip adjacent one or both edges thereof so as to securely attach the turns of the filament to the strip, the needle at the same time perforating the strip along the line or lines of stitching.

This stitching may merely attach the filament or filaments to the strip, or it may simultaneously attach the wound strip to a suitable backing sheet. In the latter case, as many of such wound strips as desired may be stitched in suitably spaced relationship upon the backing, following which, the filaments may be severed at points remote from the backing and the strips removed along the line of perforation formed by the stitching, thus leaving a locking element in the form of a narrow section of the strip lying between the filament loops and the line of stitching. Alternatively, the filaments need not be severed, in which case, one section of the strip will be removed along the line of perforations and the other section retained to serve as a locking element.

Where it is desired to attach the pile to a backing by means of rubber or other cement, the wound strips are stitched adjacent one or both edges as before, to secure the filaments thereto, whereupon the strips will be arranged in rows with their stitched edges coplanar, and while held in this position, secured to a backing and/or to one another by means of a desired plastic composition which will embed not only the loop ends of the filaments themselves, but likewise the contiguous portions of the strips lying between the lines of stitching and the loops. After the composition has set, the filaments are severed, if this operation has not been performed previously, at points remote from their stitched edge or edges and the portions of the strips lying between the lines of stitching and points of severance will be removed by the simple operation of separating

them along their lines of perforation formed during the stitching operation.

Where both edges of the strips are stitched, the strips may be cut prior to the application of the backing, to form in effect, two strips each having loops of thread at one edge and free ends at the other. Or, if preferred, such strips may have a backing applied to each of their stitched edges and after the composition has set, the strips and filaments may be severed, and in either case, two pile fabric articles will be produced.

Whereas the backing material employed in conjunction with the present invention may be impervious to the plastic composition used in the cementing operation, it is also contemplated to utilize a loosely woven or otherwise foraminous material which can be applied to the edges of the strips, whereupon the plastic composition can be introduced through the rear surface of the backing, simultaneously embedding the ends of the strips and filaments and producing a friction surface on the outer surface of the backing, which in the case of rugs, will render them non-slipping. Or, if desired, the backing may be omitted and the plastic composition itself may constitute the ultimate backing.

Rugs produced in accordance with the present construction, particularly where the plastic composition is employed for uniting the pile to the backing, are admirably adapted to splicing, since almost invisible seams of appreciable strength can be produced in a simple manner. Adjacent edges of such rugs may be united through the use of a cement comprising a solvent for the rubber or other plastic composition employed in binding the pile to the backing and, if desired, a thin sheet of rubber or fabric may be used additionally to bridge the seam.

Where a rubber composition is used as the cement in the present invention, it is contemplated that it be vulcanized after application for the production of a firm bond between the materials.

It has already been proposed to wind a filament about a strip of sheet material for decorative purposes as in the patent to Finkelstein, No. 440,876, patented November 18, 1890. It has also been proposed to wind a filament about a strip of sheet material and attach the same thereto by stitching as in the patent to Ludlow, No. 336,524, patented February 16, 1886. The prior art has not disclosed, however, the retention of a portion of such a strip in the finished article so as to constitute a locking element for the pile in the manner contemplated herein.

An example of a woven pile fabric proposing the addition of a rubber composition to bind the pile to its backing will be found in the patent to Curtis, No. 1,788,084, patented January 6, 1931. Examples of unwoven pile fabrics wherein the pile is attached to its backing by a rubber adhesive are disclosed in the patents to Ward et al., No. 1,869,531, granted August 2, 1932, and Smith, No. 1,914,962, patented June 20, 1933. None of these disclosures suggests the technique or product of the present invention, and it is with a view towards improving known constructions of the types found in these various patents that the present invention is proposed.

A more complete understanding of the invention and its objects will follow from a description based upon the attached drawings wherein:

Fig. 1 is a perspective showing a partially wound strip;

Fig. 2 is an elevation in section showing a wound strip stitched to a backing;

Fig. 3 is an elevation in section showing the assembly of Fig. 2 with the filament turns severed along one edge of the strip;

Fig. 4 is an elevation in section illustrating the same construction after a portion of the strip has been removed;

Fig. 5 is a sectional elevation of a pile fabric produced in accordance with the operations depicted in Figs. 1 to 4;

Fig. 6 is a perspective view of a wound strip wherein the filament turns are stitched adjacent both edges of the strip;

Fig. 7 is a sectional elevation of a strip of the type shown in Fig. 6 which has been medially severed;

Fig. 8 is a sectional elevation of a plurality of stitched wound strips clamped in specific relationship and having a backing cemented thereto;

Fig. 9 is a sectional elevation of the finished fabric of Fig. 8 after it has been removed from the clamp and the spacing elements and portions of the strips removed;

Fig. 10 is a sectional elevation of a wound strip stitched adjacent one edge thereof;

Fig. 11 is an elevation showing strips of the type illustrated in Fig. 6, arranged in rows for the application of backing and plastic materials to both edges thereof;

Fig. 12 is an elevation at right angles to and depicting the manner of splitting the assembly of Fig. 11 to form two articles; and

Fig. 13 is an elevation showing the manner of producing a joint or seam between adjacent edges of fabric produced in accordance with the present invention.

A textile filament 20 of worsted, cotton, silk, rayon or mixtures thereof or any other type of textile yarn, natural or artificial, is wound in a suitable manner upon a strip 22 of sheet material such as paper, cardboard, or other material which can be readily parted along a line of perforations. It is preferred that the strip be flexible, yet rigid enough to support the filaments turns and of such texture as to permit a needle to pass therethrough for the stitching operation. The consecutive turns of the filament may be arranged substantially in contact as clearly shown in Fig. 1 of the drawings, or they may be spaced to produce any desired pile density in the finished product. After the strip has been wound it may be placed upon a backing 24 and attached thereto by a line of stitching 26 passing through the filament, strip and backing near one edge of the strip as depicted in Fig. 2. The next operation, illustrated in Fig. 3, comprises severing the turns of the filament remote from the stitched edge of the strip, which may be along the unstitched edge. Inasmuch as the stitching operation not only secures the parts together, but perforates the strip 22 along the line of stitching, after the threads or filaments have been severed, the portion of the strip 22 lying between the stitching and the points of severance can be removed readily. As indicated in Fig. 4 of the drawings, there is retained in the assembly, a narrow section 28 of the strip lying between the loop ends of the thread and the line of stitching. This retained narrow section of the strip serves as a locking or anchoring ele-

ment whereby the pile is firmly secured to its backing and shedding substantially obviated.

A plurality of such wound strips may be applied to a backing in a similar manner, and as indicated in Fig. 5 of the drawings, the spacing between the elements may be varied to produce a finished article of the pile density desired.

Alternatively, the wound strip produced in accordance with the showing of Fig. 1 may receive lines of stitching 30 adjacent both of its edges as shown in Fig. 6. A wound strip thus stitched may then be severed medially or otherwise to produce a pair of strips on which filaments are arranged with loops at one edge and free ends at the opposite edge of each strip as clearly shown in Fig. 7 of the drawings.

Strips of the type shown in Fig. 7 may be arranged in rows with their stitched edges exposed and substantially coplanar, and may be clamped in this position in much the manner that type is locked in a chase. Depending upon the pile density desired, spacing elements 32 of suitable dimensions may be arranged alternately with the strips in the manner shown in Fig. 8 of the drawings. These spacing elements are of such a height as will permit a suitable cement to flow around the loop ends of the filaments and their locking elements, and at the same time preventing the cement from flowing appreciably beyond the line of stitching. After the elements have been arranged in this manner in a suitable clamping device 34, a sheet of backing material 36 may be applied to the loop ends and secured thereto by means of a suitable plastic composition 38, such as a rubber composition, which will embed the loops of the filaments as well as the locking portions of the strips which lie between the loop ends of the filaments and the line of stitching. If the backing material is closely woven or otherwise impervious, the adhesive composition may be coated upon the exposed edges of the strips and/or the backing, followed by application of the backing. In the event a loosely woven or foraminous backing sheet is used, it may be stretched over the loop ends of the filaments and the plastic composition applied through the backing to secure the filaments, locking elements and backing together. Under these latter conditions, it will be evident that a portion of the plastic composition will remain on the exposed surface on the backing sheet. This is particularly desirable where the plastic composition comprises rubber or other friction material so as to constitute a non-slipping surface on the finished article, which in the case of a rug prevents slipping on a highly polished floor surface. In case the composition comprises rubber, it preferably will be subjected to vulcanization following the assembly. In any event, the cement will be permitted to set prior to removing the article from the clamping device 34. Various resin compositions, cellulose derivatives and other materials displaying suitable properties may be used in lieu of rubber, if desired, water insoluble materials being generally preferred.

After the article has been removed from the clamp, the spacing elements 32 and the portions of the strips 22 lying beyond the lines of stitching are removed. The article now assumes the form shown in Fig. 9 of the drawings which represents a finished pile fabric having locking elements 28 remaining between the lines of stitching and loop ends of the filaments and embedded in the hardened or semi-hardened plastic com-

position 38. The exposed layer 40 of rubber or other composition constitutes the non-slipping surface already referred to.

Whereas the strips described for use in the foregoing process were severed prior to the cementing operation, it is also feasible to use wound strips of the type shown in Fig. 10 of the drawings wherein the filament is wound upon a strip 22 and attached by a single line of stitching 30 near one edge of the strip. In this case, a plurality of such strips may be assembled in a manner similar to that described in conjunction with Fig. 8 of the drawings, and the filaments severed after the clamping device has been removed.

As shown in Fig. 11 of the drawings, strips of the type shown in Fig. 6, having lines of stitching along both edges, may be arranged between spacing elements 32 which extend approximately the distance between the two lines of stitching. Under these conditions, a backing material 36 may be applied to both exposed edges of the strips, simultaneously or consecutively, in the general manner described with reference to Figs. 8 and 9. Following this procedure, and after the cement has set, the pile defined by the filaments 20 may be split by means of a suitable cutting tool 42, thus producing two similar pile fabric articles. After the splitting operation, the spacing element and the portions of the strips lying between the lines of stitching and points of severance will be removed and the completed articles will assume the same general form as illustrated in Fig. 9.

Fig. 13 depicts a joint formed between adjacent sections of pile fabric produced in accordance with the foregoing operations. Since the plastic material utilized, such as rubber, embeds the loop ends of the filaments and their locking elements for a substantial depth, the abutting surfaces of the fabric sections will be sufficiently large to permit the production of a good bond. The contiguous surfaces may be coated with a rubber or other cement, comprising a solvent, which will in effect weld the two sections of fabric together. If desired, a thin sheet of rubber or other fabric 44 may be cemented in place to bridge the joint and thus further strengthen it without causing undue bulging.

In accordance with the present invention, it is possible to unite the wound strips and their locking elements by the use of an adhesive composition alone, without the need of a backing sheet. Where such a construction is desired, the rubber or other cementing composition is applied to the looped ends while they are suitably clamped in position and allowed to set or harden.

The backing sheets contemplated, to which the narrow elongated elements, comprising loops of filaments, are bonded, may be woven or molded, sized or unsized, heavy or light and they may be flexible, semi-rigid or rigid, depending upon the use to which they are to be put.

The foregoing examples constitute but a few of the methods and constructions falling within the scope of the present invention, and, accordingly, they are to be construed as illustrations as distinguished from limitations.

This application is a refile of forfeited application Serial #253,427.

I claim:

1. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a strip of sheet material with the turns of said filament stitched to said strip near an edge thereof, in a row with their edges substantially coplanar and

said strips arranged in planes located transversely of the plane of said edges, applying a backing to the edges adjacent said stitching, applying a plastic composition to the contiguous portions of the wound strips and backing to partially embed said strips, allowing said composition to set, and removing the portions of said strips beyond said stitching and retaining the portions of said strips between said backing and stitching.

2. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a strip of sheet material with the turns of said filament stitched to said strip near an edge thereof, in a row with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges, applying a loosely woven backing to the edges adjacent said stitching, applying a plastic composition through said backing to the contiguous portions of the wound strips and backing to partially embed said strips, allowing said composition to set, severing the filaments at points remote from said backing and removing the portions of said strips between said stitching and points of severance while retaining the portions of said strips between the backing and stitching.

3. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a strip of sheet material with the turns of said filament stitched to said strip near each edge thereof, in a row with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges, applying backing sheets to said edges, applying a plastic composition to the contiguous portions of the wound strips and backing to partially embed said strips, allowing said composition to set, severing the filaments at points intermediate said backing sheet and removing the portions of said strips between said stitching and points of severance while retaining the portions of said strips between the backing and stitching.

4. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a strip of sheet material with the turns of said filament stitched to said strip which is perforated by the stitching near an edge thereof, and clamping a plurality of such strips in spaced parallel position with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges, applying a foraminous backing to the edges of said wound strips adjacent said stitching, applying a rubber composition through said backing to the contiguous portions of the wound strips and backing to partially embed said filaments and strips, vulcanizing said composition, severing the filaments at points remote from said backing, unclamping the structure and removing only the portions of said strips lying between said stitching and points of severance.

5. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a flexible paper strip with consecutive turns substantially

in contact and with the turns of said filament stitched to said strip near an edge thereof, in a row with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges and spacing elements separating said strips, applying a backing to the edges adjacent said stitching, applying a plastic composition to the contiguous portions of the wound strips and backing to partially embed said strips, allowing said composition to set, severing the filaments at points remote from said backing and removing said spacing elements and the portions of said strips between said stitching and points of severance.

6. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile thread on a strip of sheet material forming loops adjacent an edge of said strip stitched to said strip near an edge thereof, in a row with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges, applying a backing to the edges adjacent said stitching, applying a plastic composition to the contiguous portions of the strips and backing to partially embed said strips, allowing said composition to set, removing the portions of said strips beyond said stitching and retaining the portions of said strips embraced by said loops and stitching.

7. A method of forming a pile fabric comprising arranging a plurality of strips, each having windings of a textile filament about a strip of sheet material with the turns of said filament stitched to said strips near an edge thereof, said turns then being severed at a point remote from said stitching, in a row with their edges substantially coplanar and said strips arranged in planes located transversely of the plane of said edges, applying a backing to the edges adjacent said stitching, applying cement to the backing and embedding a section of said strips, and removing the unembedded portions of said strips while retaining the portions of said strips between the backing and stitching.

8. A pile fabric containing a plurality of adjacent narrow strip elements arranged face to face and bonded together with a backing, by an adhesive, at the outer edge of each of the same, each of said elements comprising textile filaments, each of which is substantially U-shaped, having parallel portions, and having a connecting loop therebetween, and each of said elements having a row of stitching adjacent to the loops of said filaments passing only through the textile filaments near the bonded edge thereof.

9. A pile fabric containing a sheet of fabric backing having bonded together therewith, by an adhesive, at their outer edges, a plurality of adjacent narrow strip elements, each of said elements comprising textile filaments, each of which is substantially U-shaped, having parallel portions, and having a connecting loop therebetween, and each of said elements having a row of stitching adjacent the loops of said filaments passing only through the textile filaments near the bonded edge thereof.

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