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CARPET SEAM

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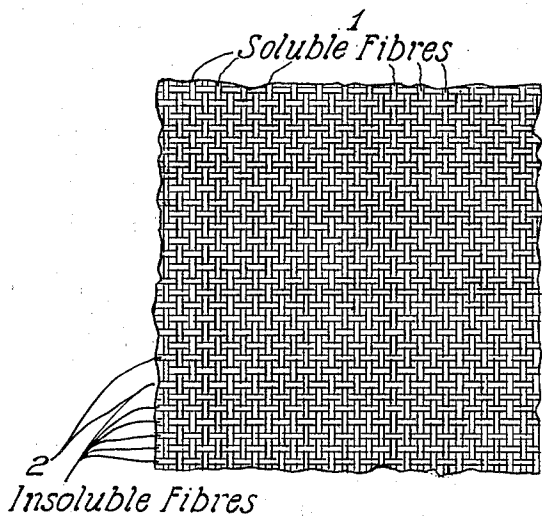


FIG. 1

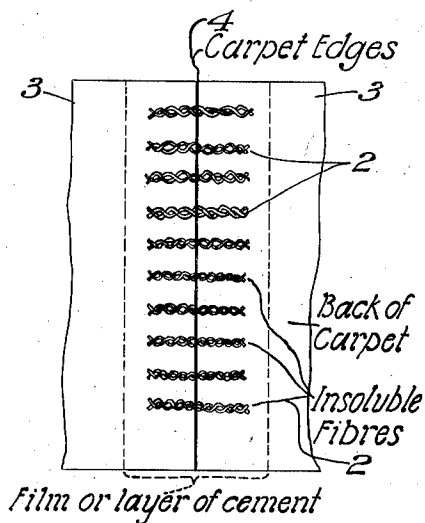


FIG. 2

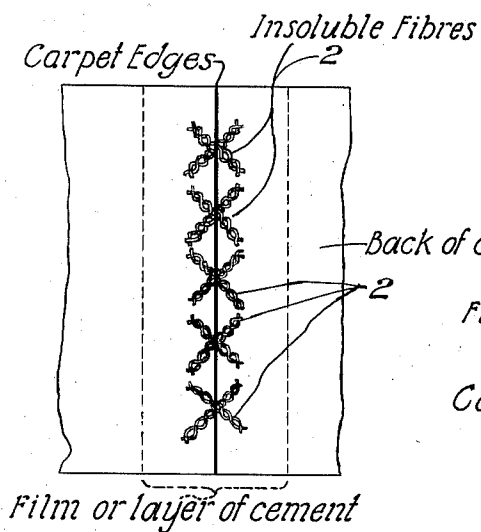


FIG. 3

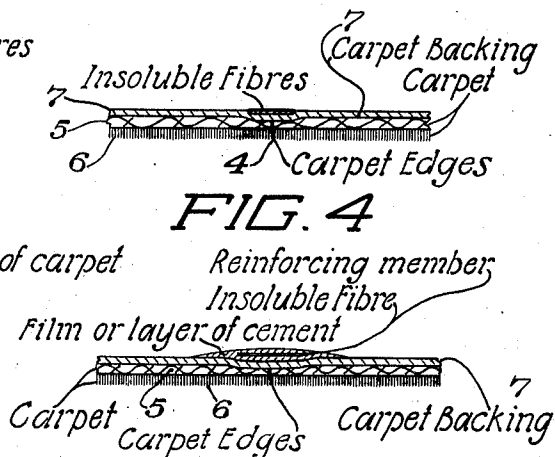


FIG. 4

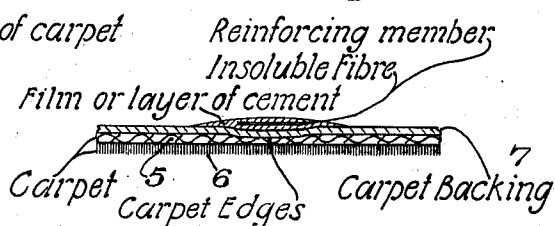


FIG. 5

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CARPET SEAM

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10 Claims. (Cl. 154—42)

This invention relates to a process for joining sections of carpeting, and more particularly to a carpeting which, although comprising a plurality of sections, has the appearance and effect of a continuous pile area.

The usual practice in the manufacture of carpeting of the type comprising a plurality of sections provides for the sewing of the edges of these sections together. This method, however, produces an unsightly seam at the junction of the joined edges and allows undue seepage of dust and dirt at this point. These conditions are also conducive to excessive wear of the pile at the seam. Many attempts have been made to devise a means for uniting adjacent edges of sections of carpeting to eliminate the need for sewing with its attendant undesirable results. The edges have been joined with metal staples; fine metal wire has been woven back and forth across the seam through the fabric weave and a heavy coat of adhesive has been applied to the back of the carpet across the seam in previous efforts to provide a joint with the desired properties. Sewing and adhesive coatings have likewise been combined in attempts to secure an acceptable seam. An alternative method provides for a woven fabric strip adhesively affixed across the adjacent edges of the carpet sections. Certain specific defects characterize this device, chief of which is a tendency to excessive wear at the seam because of the greater thickness of the carpet due to the added thickness of the fabric strip on the back of the rug, the lack of desired tear strength as occasioned by the dependence of each individual thread on other threads of the composite woven fabric and adverse stretching tendencies.

This invention has as an object the provision of a composition which when applied to carpet seams or adjacent edges of designs or other decorations set in the carpeting affords a joint that is not distinguishable from the regular weave of the carpet, but gives an effect of continuous pile area.

Another object is the provision of a composition which serves to provide a strong joint at the seam which is highly resistant to tearing or otherwise separating the adjacent edges under normal conditions of usage.

Another object of the invention is the provision of a composition which when applied across the adjacent edges of carpet sections and suitably processed blends into the carpet backing and becomes substantially a part thereof.

Another object is the provision of an adhesive

film which may be activated just prior to joining the edges to be joined.

A further object of the invention is the provision of a film of adhesive material in which is embedded a reinforcing structure comprising parallel threads or the like laid transverse or oblique to length of the strip or film.

A further object of the invention is the provision of a process whereby a commercially acceptable joint for carpet seams may be obtained.

A still further object is the provision of a process for joining carpet seams which eliminates raveling tendencies at the seams so joined.

A still further object of the invention is the provision of a process for joining carpet seams that is quite flexible in practice and that may be readily utilized practically during laying of the carpeting.

Another object of the invention is the provision of an improved carpeting wherein the seams are indistinguishable and are characterized by great resistance to tearing apart along the seam and which are quite durable under ordinary conditions of use.

A further object of the invention is the provision of an improved carpeting built up of sections wherein the stretching tendencies at the seam are greatly reduced.

Other objects will appear as the description of the invention proceeds.

These objects are accomplished by the application of a film of a composition consisting essentially of nitrocellulose or equivalent and preferably containing a reinforcing structure comprising relatively strong threads or equivalent embedded in or forming part of the film parallel to each other and transverse or oblique to the length of the strip, to the back of the carpeting and across the seam and activated by the use of a suitable medium having solvent action to provide the necessary adhesive qualities.

In the drawing, Figure 1 represents a broken plan view of a fabric prepared according to the present invention. Figure 2 represents a plan view of a carpet seam in which insoluble fibers cross the line of abutment. Figure 3 is a plan view similar to Figure 2 except that the insoluble fibers cross the line of abutment at an angle. Figure 4 is a section through a piece of carpet including the carpet seam. Figure 5 is also a section through a carpet similar to Figure 4 and represents a modification in which the transverse fibers are embedded in an adhesive.

In all the figures, 1 represents soluble fibers, 2 indicates insoluble fibers, 3 indicates portions of

carpet the edges of which are shown as 4. In Figures 4 and 5, the fabric of the carpet is shown as 5, the pile is shown as 6, and the backing is indicated as 7.

- 5 The preferred embodiment of the invention comprehends the utilization of a strip of woven fabric, the majority of the fibres of which are of the soluble type, which are activated by means of a suitable solvent and blended into the carpet backing by mutual dissolution. The original fabric strip is placed over the united edges of the carpet sections in such a manner as to permit the insoluble portion of the fabric strip to lie entirely across the seam, thus supplying reenforcement for the joint, after the soluble portion has blended into the carpet backing.

- For example, a suitable woven fabric may be prepared from 600 denier nitrate rayon (a thread consisting of a plurality of spun nitrocellulose filaments) in combination with an insoluble type of fibre such as #14 jute. Jute threads are preferred because of their non-stretching characteristics. The fibres are woven at a spacing of preferably about $\frac{1}{4}$ " or $\frac{1}{8}$ " although a closer spacing is not precluded and successful results may also be obtained with a spacing of $\frac{1}{4}$ " or greater.

- It is immaterial which of the two types of material is warp or weft in the fabric, but it is essential that in one direction, all of the threads be of the soluble type. In the other direction, the fibres may consist entirely of the insoluble type or soluble fibres may be interspaced therewith at suitable intervals. For convenience it is usually desirable that the warp threads be of the soluble type.

- While a nitrate rayon of 600 denier weight is indicated in the example shown above, weights between 150 and 1000 denier are suitable. Weights above and below this limit are not, however, precluded from the scope of the invention, since the primary function of this portion of the fabric is to anchor the insoluble jute threads across the seam and to aid in providing an improved joint. Thus any weight of material that is manufactured commercially may be utilized in practicing the invention.

- In applying the woven fabric strip composed of soluble nitrocellulose fibres and insoluble jute fibres as described above to the butted edges of a carpet section, it is desirable to utilize also a suitable pyroxylin cement. The following example of a suitable cement is illustrative only since many other cements of this type commercially available would function similarly:

	Percent
Pyroxylin	12.0
Denatured alcohol	16.0
Ethyl acetate	54.0
Toluol	3.0
Castor oil	15.0
	100.0

- A coating of this cement is applied by means of a brush or other suitable means along the marginal edges of the butted carpet sections on an area slightly greater than the width of the woven fabric, or, if desired, this cement coat may be applied to the woven fabric itself. In either event the fabric cut to a width to extend approximately two inches on either side of the seam is laid along the butted edges of the carpet section and a second coat of the above cement, preferably in a more dilute condition, for example, cut 50% with ethyl acetate, is applied over the area

covered by the fabric-cement layers. This serves to blend the soluble nitrate rayon fibres and first coat of cement into the carpet backing, becoming substantially an integral part thereof and creating an exceptionally strong joint at the carpet seam. The insoluble fibres, of course, remain as such, but are embedded into the colloided base material and serve to reenforce the seam joint.

In order to reduce the ultimate combined thickness of the insoluble reenforcing members embedded in the carpet backing and dissolved nitrate rayon across the carpet seam, this woven fabric may be calendered although this treatment is optional.

A suitable woven fabric may be prepared from acetate rayon or from threads formed from spun filaments of cellulose ethers such as ethyl or benzyl cellulose as the soluble portion.

The following compositions are suited for use with cellulose acetate rayon-insoluble fibre woven fabric, and may be utilized in the same manner as that described above for the composition designed specifically for the cellulose nitrate modified woven fabric.

	Percent
Cellulose nitrate (15-20 sec. viscosity)	14.2
Ethyl alcohol (S. D.—23—A)	6.1
Methyl alcohol	10.0
Acetone	41.9
Diacetone alcohol	15.0
Dimethyl cellosolve phthalate	12.8
	100.0

This composition may also be used with the cellulose nitrate modified woven fabric.

	Percent
Cellulose acetate (high viscosity)	13.5
Methyl alcohol	10.0
Acetone	53.0
Diacetone alcohol	10.0
Dibutyl phthalate	3.4
Dimethyl cellosolve phthalate	10.1
	100.0

Similarly, cement compositions may be prepared for use with cellulose ether modified woven fabrics, preferably containing as one of the ingredients a proportion of the same cellulose ether used in the fabric, and, of course, suitable proportions of active solvents, so that the soluble fibres may be dissolved and blended into the carpet backing.

For the heavier types of woven fabric an alternative procedure may be used. The fabric may be laid along the butted edges of the carpet sections and an active solvent such as acetone or ethyl acetate applied in amounts sufficient to dissolve the soluble fibres and blend them into a previously applied carpet backing or cement coating.

An alternative material which may be utilized in the same manner includes a film of a soluble cellulose derivative which may optionally contain strong unjoined substantially parallel fibres such as jute, spaced at suitable intervals as indicated in the preferred spacing for the woven fabric strip. This film may be cast by any convenient means, such as is carried out in the preparation of moving picture film base or it may consist of sheet celluloid or be prepared in any manner known in the art.

Although in its preferred form, the invention contemplates the inclusion of a suitable coating

on the back of the carpet, which in a sense may aid in providing a superior joint at the seam, the utilization of the compositions described herein for joining the seams of carpeting which is so fabricated as to avoid the necessity of a reinforcing backing is in nowise precluded. In fact, the compositions are readily adapted to considerable advantage for use in connection with carpeting which bears no backing, since the adhesive portion of the composition when suitably activated will readily penetrate the interstices between the weave of the carpet and develop a strong joint. In this case it is desirable, however, to coat the edges of the carpet sections with a suitable composition such as is generally used as a carpet backing, prior to uniting the edges, in order to prevent raveling.

Films suitable for the present purpose may be composed of nitrocellulose, castor oil, with or without plasticizers, such as tricresyl phosphate and with or without resins. Flexible types of commonly available celluloid are satisfactory as is also moving picture film base, but some stiffening effects may be encountered in this case.

Also films composed of other cellulose derivatives such as cellulose acetate, cellulose ethers (ethyl or benzyl cellulose), preferably softened with a suitable modifier, are likewise operative. Raw rubber and synthetic or modified rubber "Du-prene" (a synthetic rubber-like product), which may be dissolved with a suitable solvent and preferably containing reinforcing members, are also within the purview of this invention. In this instance the carpet backing, if employed, should preferably consist of a similar type composition in order that the maximum adhesion be obtained, although some latitude in this respect is permissible where the solvent used is mutual to both the carpet backing and the film utilized in joining the section edges such as for example benzyl cellulose and rubber type materials, where toluol may be used as a mutual solvent.

An alternative procedure provides for the application of a layer of suitable cement along the marginal edges of the seam and the placing of individual reinforcing cross members in one of the several forms herein described on and in the body of the cement film while the cement is softened and the application of a second coat of cement preferably more dilute to cause the reinforcing members to become embedded and anchored and to blend the soluble portion of the film into the carpet backing.

In addition to joining the seams of rugs and carpeting, the process may be utilized for "setting in" designs or other decorations in related or contrasting colors, which closely simulate the results obtained when the designs or decorations are actually woven in.

The reinforcing members may be laid transverse or oblique across the seam substantially parallel to each other or they may form a series of individual X units so spaced as to avoid any continuity of connection through the length of the seam, since forces applied in this direction do not tend to destroy the seam joint and any attempted reinforcement in this direction is superfluous. The insoluble threads may also be arranged so that any alternate pairs of threads are parallel or oblique. In any event it is desired to avoid a continuity of insoluble threads since if one should come loose it may unravel from wear to the extent that the joint may be weakened.

The reinforcing members may be such materials as strong, fibrous threads, or fine, metal wires, preferably etched, to increase the strength of the joint and resistance to tearing through the length of the seam or from the cement.

According to my invention a soluble film with or without suitable reinforcement may be practically utilized in joining the edges of sections of carpeting. In contradistinction to the results secured in prior art practices, this film when activated with solvents blends into and becomes substantially an integral part of the carpet backing when one is used and loses its identity as a film. This is of particular advantage in that there is practically no greater thickness developed at the carpet seam to cause undue wear at this point. In the preferred embodiment of the invention where transverse reinforcing members are included, resistance to the tear through the length of the seam is greatly enhanced. This result holds, of course, whether the reinforcing members are embedded in a continuous film of a cellulose derivative or whether they form a part of a woven fabric a portion of which is made up of soluble fibres. In any event the soluble portion of the joining medium blends into the carpet backing composition at the area near the seam and aids in improving the strength of the joint.

The invention is also operable for carpeting of such construction that no backing is required. In this instance the soluble portion of the joining medium when suitably activated penetrates into and throughout the interstices of the carpet weave and thus serves to hold the edges in close and permanent contact.

The adaptation of the present invention is not restricted to the joining of sections of carpeting, but is likewise operable in "setting in" of designs and decorations in related or contrasting colors to afford an effect of a unitary construction as though the decorative effects were actually woven into the carpet during its original fabrication. Other uses will be obvious since the seams of practically any woven or felted fabric may be so joined.

The carpet of the present invention has the advantage that although constructed of a plurality of similar or contrasting units, it has the appearance of an integrally woven carpet and the seams normally clearly visible in products of the prior art are indistinguishable under ordinary observation; furthermore, the continuous nature of resultant joint secured by blending the joining medium into the carpet backing insures a stronger union of the carpet sections.

Another advantage is that the joint produced according to this invention is quite flexible and, therefore, does not cause stiffening of the carpeting at the seam. A further advantage is that the penetration of the activated joining medium also serves to bind the weave at the edge of the seam, thus reducing raveling tendencies and excessive wear at this point.

The process disclosed is commercially practicable and may be employed either during the original manufacture of the rug or by an operator while laying the carpet. Stretching tendencies at the seam, a defect in carpeting of this type heretofore available, are also greatly reduced in the present invention.

When employing the reinforcing members embedded parallel to each other and across the seam, it will be noted that each member acts

independently to provide a cooperative result but, if any member is inadvertently broken or pulled out, the effect on the total strength of the joint is practically negligible, since the remaining members still serve to reenforce the joint and are individually not affected by the broken member.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. The process of joining abutted edges of textile material which comprises applying a cement along the said edges and joining thereto a fabric strip having soluble and insoluble members, each of the latter crossing the abutted joint said cement containing at least one ingredient which is a solvent for the said soluble members, the solvent being present in amount sufficient to render the soluble members soft and adhesive.

2. Process of claim 1 in which the textile material is carpet.

3. Process of claim 1 in which the soluble fibres are prepared from a cellulose derivative.

4. Process of claim 1 in which the soluble fibres are prepared from cellulose nitrate.

5. Process of joining abutted edges of a carpet which comprises applying a cellulose derivative backing composition to the said carpet, cementing thereto along the abutted edges forming the seam a strip of fabric having a set of members which are soluble and a set which are insoluble in cellulose derivative solvents each of the latter set crossing the line of abutment, and dissolving the soluble members.

6. Process of claim 5 in which the soluble members contain cellulose nitrate.

7. Process of claim 5 in which the insoluble fibres are of jute.

8. The method of reinforcing carpet seams which comprises applying to the said carpet along

the edges to be joined a composition having approximately the following formula:

	Per cent	
Pyroxylin	12.0	
Denatured alcohol	16.0	5
Ethyl acetate	54.0	
Toluol	3.0	
Castor oil	15.0	
	100.0	10

applying a strip of fabric about four inches wide to the seam, said fabric having insoluble fibres running transversely to the seam and fibres soluble in cellulose derivative solvents running parallel to the said seam, and applying a coat of the same cement cut 50% with ethyl acetate to the exposed side of the said strip of fabric.

9. The method of reinforcing carpet seams which comprises applying to the said carpet along the edges to be joined a composition having approximately the following formula:

	Per cent	
Cellulose acetate (high viscosity)	13.5	
Methyl alcohol	10.0	
Acetone	53.0	25
Diacetone alcohol	10.0	
Dibutyl phthalate	3.4	
Dimethyl cellosolve phthalate	10.1	
	100.0	30

applying a strip of fabric about four inches wide to the seam, said fabric having insoluble fibres running transversely to the seam and fibres soluble in cellulose derivative solvents running parallel to the said seam, and applying a coat of the same cement cut 50% with ethyl acetate to the exposed side of the said strip of fabric.

10. Process of joining abutted edges of textile material which comprises applying along the said edges a fabric strip having soluble and insoluble members, each of the latter crossing the abutted joint and applying thereto a solvent for the said soluble members thereby forming a cement having embedded therein the insoluble members.

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