Oct. 30, 1962 D. G. MacBEAN 3,060,547

WOVEN MESH JOINT FORMING

Filed June 15, 1960 2 Sheets-Sheet 1

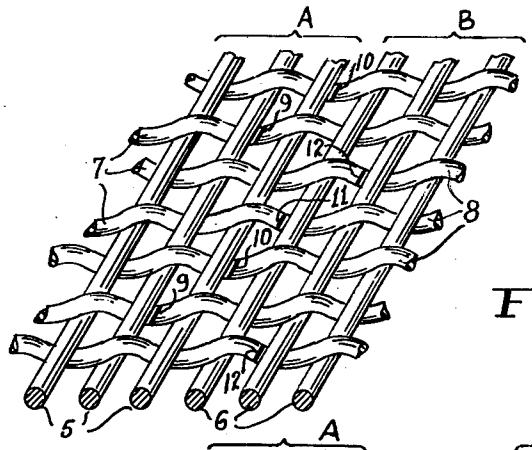


Fig. 1

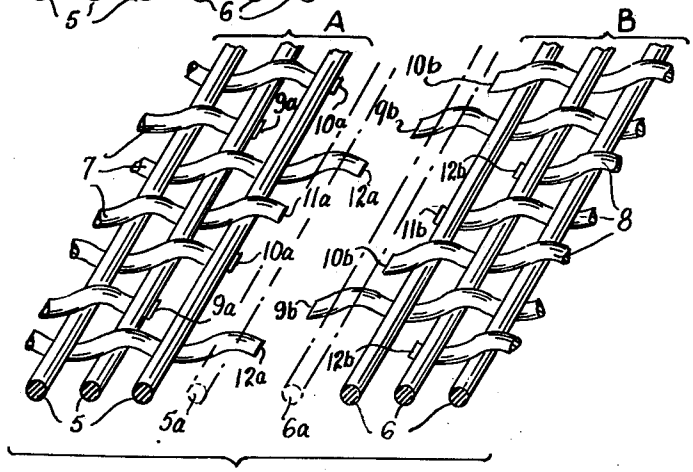


Fig. 2

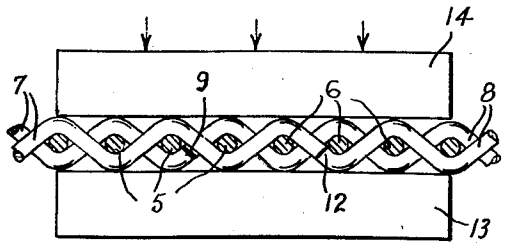


Fig. 3

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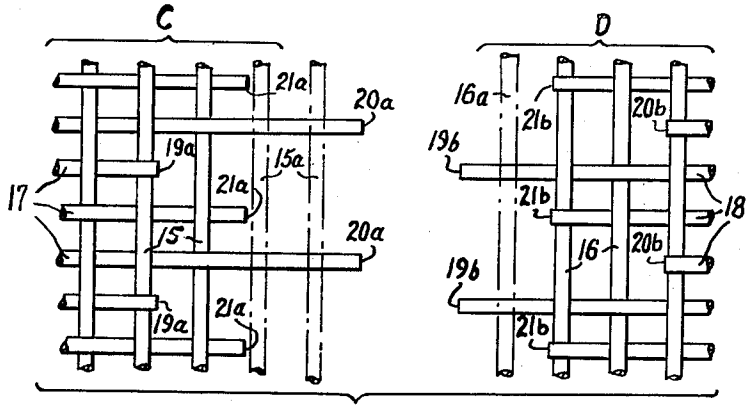


Fig. 4

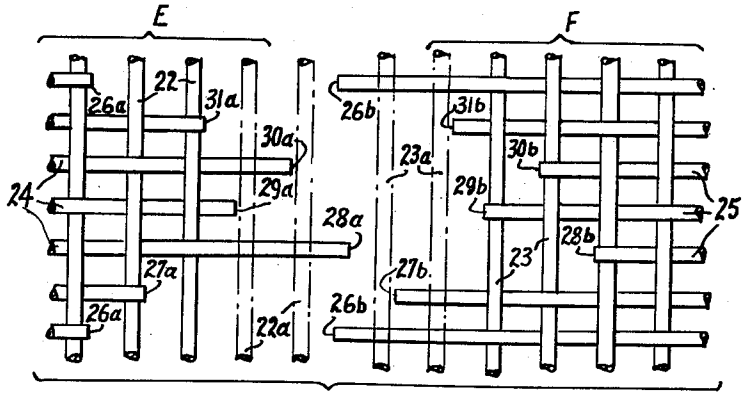


Fig. 5

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WOVEN MESH JOINT FORMING

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9 Claims. (Cl. 28—72)

This invention relates to the method of forming a joint between the ends of woven mesh material and particularly to the method of forming a smooth, non-thickened joint between the ends of a mesh formed from strands of woven material.

Considerable difficulty has been experienced in forming a satisfactory joint between sections of woven material without overlapping the material and thereby providing a joint of double thickness, and also in disposing or otherwise concealing the exposed ends of the warp strands.

The invention consists essentially in first trimming the opposing ends of the woven mesh to be joined so that the ends of the mesh present a straight transverse edge to each other, and then cutting back the warp strands in one end of the woven mesh in staggered relation to each other so that a few of the weft strands adjacent the end of the woven mesh are supported by some only of the warp strands, and cutting back the warp strands of the opposing end of the woven mesh in the same manner so that the staggered ends of the warp strands, when the two ends of the woven mesh are brought together and the warp strands of one end are interwoven with the partly supported weft strands of the other end of woven mesh, the staggered ends of the opposing warp strands will be brought into butting engagement with each other without any thickening of the interwoven joint and the abutting ends of the warp strands will be completely concealed within the interwoven mesh joint. The interwoven mesh joint is then sealed in any suitable manner in order to weld the abutting ends of the warp strands and the interwoven warp and weft strands together to form an invisible joint.

The object of the invention is to provide an efficient and durable joint of minimum thickness in woven mesh material.

A further object of the invention is to provide an interwoven joint in woven material in which the ends of the warp strands in the joining ends butt against each other in staggered relation.

A further object of the invention is to form adjacent ends of a woven mesh so that the ends of the warp strands of one joining end of mesh material can be locked with the weft strands of the adjacent joining end of mesh material, bringing the ends of the opposing warp strands into butting engagement with each other.

A further object of the invention is to provide a mesh joint which can be sealed in the thickness of the mesh material being joined.

These and other objects of the invention will be apparent from the following detailed specification and the accompanying drawings in which:

FIG. 1 is a partial perspective view of a typical plain interwoven mesh joint showing the staggered butt arrangement of the warp strands.

FIG. 2 is a perspective view of the ends of the interwoven mesh joint shown in FIG. 1 separated from each other and showing the method of staggered cutting of the ends of the warp strands.

FIG. 3 is a vertical section of the interwoven joint of the material placed between upper and lower press platens as one form of sealing the interwoven joint.

FIG. 4 is a partial plan view of a woven mesh structure similar to FIG. 2, but showing a twill weave with a distinctive pattern of staggered warp strand ends.

FIG. 5 is a partial plan view similar to FIG. 4 but showing a different pattern of staggered warp strand ends.

Referring to the drawings and particularly to FIGS. 1 and 2, FIG. 1 illustrates a portion of the joint between the right hand end of woven mesh material A and the left hand end of woven mesh material B, while FIG. 2 shows the same ends of material A and B spaced apart from each other but ready to be joined together.

In preparing the ends of the woven mesh material for joining together, the adjacent ends of material A and B are trimmed square and parallel with the weft strands **5** in the case of the material A and the weft strands **6** in the case of the material B.

After the ends of the material A and B have been trimmed square, the warp strands **7** of the material A and the warp strands **8** of the material B are cut according to the pattern of butt joints indicated at **9**, **10**, **11** and **12** in FIG. 1. This pattern of cut warp ends on the material A is indicated at **9***a*, **10***a*, **11***a* and **12***a*, and in the material B is indicated at **9***b*, **10***b*, **11***b*, and **12***b*. After the ends of the warp strands **7** and **8** have been cut to length according to the pattern established in FIG. 1, the end weft strands **5***a* and **6***a* shown in FIG. 2 are withdrawn from the woven mesh leaving the waved warp ends **12***a* of the material A and the waved ends **9***b* of the material B free of contact with a weft strand.

The material A and B can now be brought into joining contact with each other. This is accomplished by drawing the two materials A and B together so that the warp ends **12***a* of the material A ride over the first adjacent weft strand **6** of the material B and the warp ends **9***b* of the material B ride over the first adjacent weft strand **5** of the material A to bring all of the warp ends **9***a*—**9***b*, **10***a*—**10***b*, **11***a*—**11***b* and **12***a*—**12***b* into abutment with each other in the manner shown in FIG. 1.

After the ends of material A and B are joined together as above described the jointed material is laid between two press plates **13** and **14**, as shown in FIG. 3 and subjected to heat and pressure to weld the interlocking warp and weft strands together. It will be noted that the warp strand butt joints **9**, **10**, **11** and **12** are shown in FIG. 1 as being located close to a weft strand. It is preferred that these butt joints **9**, **10**, **11** and **12** be as close as possible to a weft strand so that on the application of heat and pressure to the interlocked joint between materials A and B that, under heat and pressure a solid weld will be established between the joints of the warp strands and the adjacent weft strands.

An alternative to the placing of the joined material A and B between the press plates **13** and **14**, each abutting joint **9**, **10**, **11** and **12** can be welded with the adjacent weft strand either singly or in a group. Another alternative is to apply adhesive to the interlocking ends of material A and B and allow the adhesive to set, and blowing the excess adhesive out of the openings in the mesh.

In FIG. 4 the invention is shown applied to a twill weave. In this application the two weft strands **15***a* are withdrawn from the left hand material C and one weft strand **16***c* from the right hand material D. The warp strands **17** of the material C and the warp strands **18** of the material D are cut to a pattern of three staggered lengths so that the warp ends **19***a*, **20***a*, and **21***a* of the material C abut with the warp ends **19***b*, **20***b*, and **21***b* of the material D. In this application, when the materials C and D are brought together, the warp ends **19***b* underride the first adjacent weft strand **15**, the warp ends **20***a* under-ride the first two adjacent weft strands **16**, while the warp ends **21***a* and **21***b* merely butt against each other.

In FIG. 5 the invention is shown applied also to a twill

weave. In this application the two weft strands 22*a* are withdrawn from the left hand material E and two weft strands 23*a* are withdrawn from the right hand material F. The warp strands 24 of the material E and the warp strands 25 of the material F are cut to a pattern of six staggered lengths so that the warp ends 26*a*, 27*a*, 28*a*, 29*a*, 30*a* and 31*a* of the material E abut with the warp ends 26*b*, 27*b*, 28*b*, 29*b*, 30*b* and 31*b* of the material F. In this application, when the materials E and F are brought together, the warp ends 26*b* under-ride two adjacent weft strands 22, the warp ends 27*b* under-ride one adjacent weft strand 22, the warp ends 28*a* under-ride two adjacent weft strands 23, the warp ends 29*a* and 29*b* abut each other, the warp ends 30*a* under-ride one adjacent weft strand 23, the warp ends 31*b* under-ride two adjacent weft strands 22.

The pattern of abutment of the warp strands will depend to some extent on the type of weave of the material being joined and also on the strength of joint desired. In the plain weave illustrated in FIGS. 1 and 2, relatively short cut back lengths of warp end are necessary, generally requiring the withdrawal of only one weft strand at each end to be joined, whereas, in the twill weaves illustrated in FIGS. 4 and 5, the cut back ends of the warp strands require to be long enough so that when the ends are interweaved with each other, the twill pattern will be maintained in the joint. To obtain this condition, two weft strands require to be withdrawn from each end of the material to be joined.

It is to be understood that this method of joining woven material can be applied to forms of weaving other than those illustrated and that the pattern of abutment of the ends of the warp strands will be established which will best suit the type of weave and the strength of joint required.

In joining one end of material to another the waved ends of the warp strands are eased over and under the adjacent weft strands until the end of the warp strands butt against each other. After the joint has been inspected to see that the ends are properly intermeshed and an undistorted pattern of weave has been formed, the joint of the material is suitably welded to ensure that the individual points of contact between the butting ends of the warp strands and between the warp and weft strands throughout the area of the joint will become permanently welded to each other.

In the case of woven plastic material, the heat and pressure applied to the area of the joint will be such that the joint will be thoroughly welded without undue decrease in the thickness of the material along the joint.

By the use of this method of joining woven materials in which staggered length of warp ends, already in weave form after withdrawal of one or more weft strands, ensures that the joining ends of the material can be brought together in a continuation of the weave pattern at the uniform thickness of the material without overlap of one length of material on the other. The resulting joint takes on the exact woven appearance of the body of the material and the joint itself is practically undistinguishable.

What I claim is:

1. The method of forming a joint in material made up of woven warp and weft strands comprising trimming the joining edges of the material, cutting back the ends of the warp strands at the trimmed edges, the said warp strands being cut back in staggered relation to each other to a predetermined pattern so that, when the ends to be joined are brought together, the cut back staggered ends of the warp strands in one joining edge of material will butt against the cut back staggered ends of the corresponding warp strands in the other joining edge of material, withdrawing one or more weft strands at the trimmed edges of the material, interweaving the staggered cut back length of warp strands in one joining edge of material with the adjacent weft strands in the other joining edge of material, and sealing the interwoven joint so formed.

2. The method of forming a joint in material made up of woven warp and weft strands, in which the wave pattern of the individual warp and weft strands is retained in the finished joint, comprising, trimming the joining edges of the material, cutting back the ends of the warp strands at the trimmed edges, the said warp strands being cut back in staggered relation to each other to a predetermined pattern so that, when the ends to be joined are brought together, the cut back staggered ends of the warp strands in one joining edge of material will butt against the cut back staggered ends of the corresponding warp strands in the other joining edge of material, withdrawing one or more weft strands at the trimmed edges of each joining edge of material, interweaving the staggered cut back lengths of warp strands in one joining edge of material with the adjacent weft strands in the other joining edge of material, and sealing the interwoven joint so formed.

3. The method of forming a joint in material made up of woven warp and weft strands in which the wave pattern of the individual warp and weft strands is retained in the finished joint comprising, trimming the joining edges of the material, cutting back the ends of the warp strands at the trimmed edges, the said warp strands being cut back in staggered relation to each other to a predetermined pattern so that, when the ends to be joined are brought together, the cut back staggered ends of the warp strands in one joining edge of material will butt against the cut back staggered ends of the corresponding warp strands in the other joining edge of material, withdrawing one end weft strand at the trimmed edges of each joining edge of material, interweaving the staggered cut back length of warp strands in one joining end of material with the first adjacent weft strand in the other joining edge of material, the interweaved warp strands of one joining edge of material being brought into butt contact with the warp strands of the other joining edge of material and with the first adjacent weft strands in each joining edge of material completing a woven joint pattern similar to that of the material being joined, and sealing the joint so formed.

4. The method of forming a joint in material made up of woven warp and weft strands in which the wave pattern of the individual warp and weft strands is retained in the finished joint comprising, trimming the joining edges of the material, cutting back the ends of the warp strands at the trimmed edges, the said warp strands being cut back in staggered relation to each other to a predetermined pattern so that when the ends to be joined are brought together, the cut back staggered ends of the warp strands in one joining edge of material will butt against the cut back staggered ends of the corresponding warp strands in the other joining edge of material, withdrawing two end weft strands at the trimmed edges of each joining edge of material, interweaving the staggered cut back length of warp strands in one joining edge of material with the first adjacent pair of weft strands in the other joining edge of material, the interweaved warp strands of one joining edge of material being brought into butt contact with the warp strands of the other joining edge of material and, with the first adjacent pair of weft strands in each joining edge of material completing a woven joint pattern similar to that of the material being joined, and sealing the joint so formed.

5. The method of forming a joint in woven mesh material as set forth in claim 4 in which the material has a twill weave and the staggered lengths of warp strands when interwoven with the adjacent weft strands complete a twill weave in the joint.

6. The method of forming a joint in woven mesh material as set forth in claim 1 in which the predetermined pattern of cut back ends of warp strands consists of three individual strands, the pattern being repeated across the width of the joint in the material.

7. The method of forming a joint in woven mesh material as set forth in claim 1 in which the predetermined pattern of cut back ends of warp strands is made up of from three to six strands, the pattern being repeated across the width of the joint in the material.

8. The method of forming a joint in woven mesh material as set forth in claim 1 in which the sealing of the joint is effected under heat and pressure.

9. The method of forming a joint in woven mesh material as set forth in claim 5 in which the predetermined pattern of cut back ends of warp strands is made up of six strands, the first of said strands being cut back a length equal to five mesh openings, a second strand being cut back a length equal to four mesh openings, a third strand of original length, a fourth strand being cut back a length equal to two mesh openings, a fifth strand being cut back a length equal to one mesh opening, and the sixth strand being cut back a length equal to three mesh openings, the pattern being repeated across the width of the joint in the material.

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