

TEMPORARY FIXTURE FOR MESH PROCESSING AND MESH CARPET

Technical Field

[0001] This disclosure relates generally to a wire mesh construct, and more particularly to a Milanese wire mesh construct having an end structure that tightly mates with an accessory.

5 Background

[0002] A Milanese mesh construct (also referred to as a “carpet”), as illustrated for example in FIG. 1, is a decorative mesh typically made from a coiled wire with multiple coils threaded together. The threading of the multiple wire coils permits movement between separate coils. The mesh carpet is sometimes used to make necklaces, bracelets and other jewelry or
10 jewelry components.

[0003] To manufacture a Milanese carpet, a spool containing wire material typically is set into a machine. The machine runs the wire material into a mandrel apparatus that forms the wire material into a coil. The coil is then forced forward and cut off at a certain length. After this, the machine makes the next coil. The machine threads this new coil into the previously
15 made coil such that the two coils are side by side. Once threaded, the machine cuts off the new coil. This process is continually repeated until a mesh carpet is formed. The mesh carpet consists of multiple wire coils (also called “spirals” herein) that have been threaded into one other.

[0004] Once the mesh carpet is formed, it is cut into various shapes; the shape that is
20 formed may depend on the end product into which the mesh is incorporated. Typically, the product is formed from short pieces of the mesh carpet. Short pieces of mesh carpet may be manually bound into a longer strip by another coil that joins the separate mesh carpets together. Such a joining element may extend perpendicularly to the other coils in the carpet and through the other coils.

[0005] The edges may then be processed to remove sharp and uneven coil ends. In this
25 form the mesh is unstable as the individual coils can be removed. As such, the material may be locked so that the individual coils movement is significantly limited and the mesh carpet is secure. The locking is accomplished by pressing the strip flat and deforming the shape of the round coils.

[0006] Once the individual strips are locked together, the mesh product may be further
30 processed to provide flexibility. The mesh product may pass through a machine with cylinders that gyrate up and down, thereby forcing the mesh strip to bend back and forth. This treatment makes the mesh flexible but may also leave visible marks (such as lines) in the mesh from contact with the internal cylinders of the machine.

[0007] Various processing steps may be used to improve the overall aesthetics of the mesh. For example, an accessory such as a folding clasp, end pieces or end cap may be added to the mesh carpet. The accessory may be applied, as shown in FIGs. 2A-B, by joining the accessory 104 to the mesh carpet 100. Solder 103 may then fill the gap between one or more coils (e.g. coil 102) of the mesh carpet 100 and accessory 104. This soldered joint, shown in the region denoted between arrows "A," may frequently be visible in a finished end product. This attachment between the mesh carpet 100 and the accessory 104 may be a visual flaw in what is otherwise a cosmetic accessory. Further, the exposed joint between carpet and accessory may be vulnerable to impacts and pressure, and thus may be a common point of failure or breakage.

Summary

[0008] Embodiments for removing material from mesh carpets to provide enhanced connection between a mesh carpet and an accessory are described herein. Various embodiments described herein encompass the use of a temporary support structure on a mesh carpet. The temporary support structures are utilized to form a composite block of material on a portion of a mesh carpet. Material may then be removed from the solid block of material through some secondary processing. The removal of material from the mesh carpet would otherwise be difficult, if not impossible, in the absence of the temporary support structure. The processed portion may then engage the accessory in a more fitted, tighter fashion than if the material were not removed.

[0009] In accordance with various embodiments, a method of removing material from an enhanced mesh carpet may include applying a temporary support structure to a portion of an existing mesh carpet. The combination of the mesh carpet and the temporary support structure may form a composite carpet. The composite carpet may be sufficiently rigid to permit the removal of material from a portion of the existing mesh carpet without unduly impacting the non-removed portion. As such, a processing operation for material removal may be performed on the portion of the composite mesh carpet, thereby creating a processed portion.

[0010] In accordance with various embodiments, a mesh carpet may be configured to permit the removal of material without damage to or impact on the remaining portion of the mesh carpet. For example, the mesh carpet may include a plurality of intertwined coils with an upper and lower surface. The plurality of coils may have a temporary support structure substantially filling the interstitial space between a portion of the intertwined coils, thus forming a block of composite material. The block of composite material may have one or more boundaries defined by one or more surfaces of cut coils and cut temporary support

structure. The boundaries may be shaped to correspond to the mating surfaces of a fixture for close attachment to the fixture.

[0011] In accordance with various embodiments, a mesh carpet may have a structure suitable for assembly with an accessory. For example, a mesh carpet assembly may include a mesh carpet and a fixture. The mesh carpet may include a plurality of intertwined coils. A portion of the mesh carpet may include one or more surfaces defined by a region of cut coils. The surfaces may be shaped for uniform attachment to a fixture. One or more of the surfaces mate with one or more surfaces of the fixture. There may be an exterior seam between the surfaces of the mesh carpet and the surfaces of the fixture. At least one exterior seam may have a mesh carpet surface and a fixture surface meeting substantially flush.

[0012] It is to be understood that both the foregoing general description and the following detailed description are for purposes of example and explanation and do not necessarily limit the present disclosure. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate subject matter of the disclosure. Together, the descriptions and the drawings serve to explain the principles of the disclosure.

Brief Description of the Drawings

[0013] FIG. 1 shows an example of a prior art strip of mesh with an end cap.

[0014] FIG. 2A shows an example of a prior art strip of mesh viewed from the top.

[0015] FIG. 2B shows an example of a prior art strip of mesh viewed from the side.

[0016] FIG. 3A shows an example of a strip of mesh with an end cap viewed from the top.

[0017] FIG. 3B shows an example of a strip of mesh with an end cap viewed from the side.

[0018] FIG. 3C shows an example of a cross-section view of a strip of mesh with an end cap viewed from the side.

[0019] FIG. 4A shows at top view of a strip of mesh with portions of the mesh suspended in a temporary support structure.

[0020] FIG. 4B shows at side view of a strip of mesh with portions of the mesh suspended in a temporary support structure.

[0021] FIG. 5A shows at top view of a strip of mesh with portions of the mesh machined in an area that previously had a temporary support structure.

[0022] FIG. 5B shows at side view of a strip of mesh with portions of the mesh machined in an area that previously had the temporary support structure.

[0023] FIG. 6A shows at top view of a strip of mesh with one end of the mesh captured in an end cap and another portion of the mesh having an additional accessory attached.

[0024] FIG. 6B shows at side view of a strip of mesh with one end of the mesh captured in an end cap and another portion of the mesh having an additional accessory attached.

5 [0025] FIG. 6C shows an example of a cross-section view of a strip of mesh with one end of the mesh captured in an end cap.

[0026] FIG. 7 shows a flow chart illustrating an example method of machining a mesh carpet.

10 [0027] FIG. 8 shows a flow chart illustrating an example method of forming a mesh carpet assembly.

Detailed Description

[0028] Embodiments for fastening an accessory to a mesh material are disclosed herein. In some embodiments, a temporary fixture may be applied to a Milanese mesh material to attach an accessory to the Milanese mesh. One embodiment includes the operation of
15 applying an adhesive to the end of a cut Milanese mesh product. Once solidified, the adhesive and Milanese mesh composite may be machined into a shape suitable to engagement with an accessory. The adhesive may then be removed in the process of soldering the accessory to the end of the Milanese mesh product.

20 [0029] As used herein, a “mesh carpet” may be any structure of associated coils, bands, rings, threads, or the like that, when linked, intertwined or woven, form a continuous mesh. For example, a mesh carpet may include a woven fabric, a Milanese mesh, a chain mail mesh or the like.

[0030] Certain challenges arise when working with a mesh carpet. Particularly, due to the loose association between the components (such as the intertwined spirals in a Milanese mesh), it can be difficult to retain and perform certain processing operations on the mesh carpet. In various embodiments, this may be addressed by mechanically deforming the ends of the mesh carpet. For example, as shown in FIGs. 3A-C, one end of the mesh carpet may be deformed to be inserted into an accessory. One example of an accessory into which such a deformation may be inserted is an end cap (although as discussed herein, the same
25 is applicable to any accessory). Any length of the mesh may be so deformed.

[0031] In one embodiment and as shown in FIGs. 3B and 3C, the first spiral 202 of the mesh carpet is deformed. However, any number of spirals may be deformed in order to form an attachment with the accessory, and the first spiral or end spiral need not be so deformed in some embodiments. In accordance with one embodiment, an end of the mesh carpet 200

may be stamped in order to deform one or more coils (see coil 202 as an example) to be flatter than the other coils in the mesh carpet 200. An end cap 204 then may be attached over the end of these flattened coils. Once installed, the end cap may be soldered to the end of the mesh carpet, thereby rigidly attaching the end cap 204 to at least a component of the mesh carpet (herein shown as coil 202) with a solder joint 206, as shown in FIGs. 3B and 3C. Deforming the mesh carpet to fit within the accessory may cause a deformed transition 208/209, as shown between brackets A and B of FIG. 3C. While this method may improve on traditional attachments, an aesthetically unappealing interface (e.g. transition 208/209 as shown between brackets A and B) between the mesh carpet and the accessory may remain. Further, the transition point may be mechanically vulnerable as compared to the accessory and/or rest of the mesh carpet.

[0032] One way to limit the interface between the mesh carpet and the accessory may be to remove material from the mesh carpet in order to form a profile having tight tolerances when engaging an accessory. Material removal processes may include machining, grinding, drilling, laser cutting, polishing, or the like.

[0033] Typically, a material is retained in a fixed location prior to performing a processing operation such as removing material. It may be difficult to selectively remove material from the mesh carpet while maintaining the carpet's integrity, as individual components of a mesh carpet are loosely associated. As such, it can be difficult to retain a portion of the elements together in such a way as to perform a processing operation for removal of material. Furthermore, once material is cut away from a mesh carpet, the individual components may become even more loosely associated, with components separating from the rest of the carpet due to bonds between coils being broken by the removal of the material. As discussed above, these difficulties can be avoided by stamping the material into a desired shape. However, this process may fail to provide a tight, mechanically secure and aesthetically pleasing fit between the mesh carpet and accessories.

[0034] In accordance with the various embodiments described herein, the mesh carpet may be mated or configured with a temporary support structure to enable material removal from the mesh carpet. The temporary support structure may be applied to form a composite block of material on a portion of a mesh carpet. Material may then be removed from the composite block of material through various processing operations (e.g. machining, grinding, drilling, laser cutting, polishing, etching, and the like). The temporary support structure facilitates the removal of material from the mesh carpet by limiting the motion of the individual coils of the mesh with respect to one another. By maintaining the coils in a fixed relative position, or by reducing their relative movement, the precision of the material removal operations may be enhanced.

[0035] As indicated above, the temporary support structure may be any material that can secure the various components of the mesh carpet relative to one another and then be removed after processing occurs. The temporary support structure may also be sufficiently hard to enable the precise processing discussed above. In accordance with various
5 embodiments, the temporary support structure may be introduced in a liquid or gel state so it can fill all the interstitial voids within at least a portion of the mesh carpet. Once the interstitial voids are filled the liquid or gel may be hardened. The hardening of the material filling the interstitial voids in the mesh carpet may result in limited movement of the individual components of the mesh carpet. In one embodiment, an adhesive may function as the
10 temporary support structure. The adhesives may include any of a variety of reactive or non-reactive adhesives. In one example, a moisture curing adhesive such as a Cyanoacrylate may be used. For example, the adhesive may be a general purpose Ethyl 2-Cyanoacrylate such as Aron Alpha 201. Generally, curable adhesives or resins and/or quick-set adhesives or resins may be used to form the temporary support structure. It should be appreciated that
15 the adhesive or resin need not harden completely, but may instead achieve a viscous or semi-solid state that may still maintain (or nearly maintain) the relative alignment of the coils during removal of material.

[0036] In another embodiment, the temporary support structure may be a soldering agent or a brazing agent.

20 [0037] In still another embodiment, the temporary support structure may be a freezable liquid. For example, the mesh carpet may be dipped in and frozen in a liquid (such as water). The freezing may occur while the mesh is submerged, or when the mesh is removed. In the latter case, the residual liquid clinging to the mesh may be sufficient to form the temporary support structure, once frozen.

25 [0038] Solidified liquid from freezing may be sufficient to restrain the mesh carpet components for subsequent processing. The frozen liquid may then be removed in the final stages when the accessory is permanently attached to the mesh carpet. In some embodiments, selective application of heat to the attachment region of the mesh carpet may free only a portion of the carpet from the support structure, thereby permitting that portion to
30 be joined to an accessory.

[0039] In accordance with various embodiments, as shown for example in FIG. 4A and 4B, a composite mesh carpet 400 may include a mesh carpet 405 and a temporary support structure 410. The composite mesh carpet 400 may have a limited portion that is a composite portion 412. The temporary support structure 410 may substantially fill the
35 interstitial region inside the composite portion 412 of the composite mesh carpet 400.

[0040] The location of the composite portion 412 may depend on the type of accessory to be attached to the mesh carpet. The accessory (also referred to as a “fixture”) may be any manner of bracket, ornament, device, or attachment utilized with any mesh carpet such as a folding clasp, end pieces, ornament mounts, devices, electronics, magnets or the like.

5 [0041] For example, the fixture may be an end cap. To attach an end cap, an end of the mesh carpet 405 may be interstitially filled with a temporary support structure 410 as shown in FIG. 4A and 4B. As clasps may similarly be attached to the end of a mesh carpet, a similar process may be used to attach a clasp or any other fixture. Alternatively or
10 additionally, other portions of the mesh carpet could also be potentially processed. For example, if the fixture is an ornament mount a centralized portion of the mesh carpet might be interstitially filled with the temporary support structure such as support structure 410a. Accordingly, any portion of the mesh carpet may be interstitially filled with a temporary support structure in order to accommodate the location and type of fixture to be attached.

[0042] The temporary support structure may be applied to any volume or region of the mesh
15 carpet. For example, the support structure may be applied only to a discrete portion of the mesh carpet. Alternatively, the support structure may be applied to the entirety of the mesh carpet.

[0043] As explained in greater detail elsewhere herein, the temporary support structure can be removed from the mesh carpet once its purpose is served. However, for sake of
20 efficiency and economy, the temporary support structure may be limited to the portion of the mesh carpet that may have material removed or the portion that is restrained during the material removing process. For example, as shown in FIG. 4A and 4B, the temporary support structure 412 may interstitially fill an end portion of the mesh carpet so that material may be removed from this location. FIGs. 4A and 4B show approximately two rows of coils
25 420 and 430 encased in the temporary support structure 412, while row 440 is only partially encased. However, the example is intended to illustrate a general principle; thus, any amount of the mesh carpet may be encased by the support structure as necessary or desired. The number of coils may be limited or increased depending on the material removal requirements.

30 [0044] Once the mesh carpet is interstitially filled with the temporary support structure as detailed above with regard to FIGs. 4A and 4B, the composite mesh carpet may then be restrained. Once restrained, material may be removed from the mesh carpet to form any of a variety of shapes or profiles. Again as indicated above, the type and location of the fixture to be attached may influence the particular profile formed. The removal of material from the
35 composite mesh carpet yields a processed composite mesh carpet. Once the processed

composite mesh carpet is shaped, the temporary support structure may be removed (as discussed in more detail below) to yield a shaped mesh carpet.

[0045] For example, FIGs. 5A and 5B show a mesh carpet 405 with one end of the mesh carpet 405 suspended in a temporary support structure 410 forming the composite portion 412 a described in FIG. 4A and 4B. FIGs. 5A and 5B additionally show areas of material removal in accordance with one embodiment. As shown to best effect in FIG. 5b, an upper and lower segment of composite portion 412 is removed, thereby forming processed region 510, which has a thinner profile along the Z-axis than the unprocessed mesh carpet.

[0046] As such, a processed composite mesh carpet 500 may include a first end of a mesh carpet operable to receive a fixture. For example, the composite portion 412 may be shaped in the form of a tongue operable to engage a fixture such as an end cap. The first end of the processed composite mesh carpet 500 may have a first horizontal surface 510 which may abut a first vertical surface 515 and cooperating therewith to form a first reduced-height profile of the first end as compared to an unprocessed segment of the mesh carpet. In the example shown in FIG. 5B, the intersection of the first vertical surface 515 and the first horizontal surface 510 may form a 90 degree angle at transition 516. The first vertical surface 515 may have a second transition 512 where the first vertical surface 515 intersects the upper surface 520 of the mesh carpet.

[0047] The first end may also have a second horizontal surface 506 and a second vertical surface 519 cooperating to form a second reduced-height profile of the first end. This second reduced-height profile may be formed on a surface (or from a surface) opposite the first reduced-height profile. Thus, it should be appreciated that a single support structure may be used with the mesh to remove material from more than one volume or region and to form shapes of varying profile.

[0048] The second horizontal surface 506 and the second vertical surface 519 may intersect at transition 518. Transition 518 may also be a 90 degree angle between the second horizontal surface 506 and the second vertical surface 519. The second vertical surface 519 may have a transition 514 where the second vertical surface 519 intersects the lower exterior surface 522 of the mesh carpet. The first horizontal surface 510 may end at transition 511. Similarly, the second horizontal surface 506 may end at transition 513. The first horizontal surface 510 and the second horizontal surface 506 may intersect vertical surface 509 at third and fourth transitions 511 and 513 respectively.

[0049] Removing material from a mesh carpet, as compared to other operations such as deforming (e.g. by stamping or the like), may create sharp, crisp transition edges. For example, transitions 511, 512, 513, and 514 may all be sharp edges. This stands in contrast to the deformity of the upper surface of the mesh carpet as shown, for example, in FIG. 3C

(see e.g. coil deformation in at brackets A and B) and the traditional process of merely soldering the end of the mesh carpet to the accessory as shown in FIGs. 2A-B.

[0050] In accordance with various embodiments, similar transitions may be made by removal of material from other areas of the mesh carpet such as shown in FIG. 5B. Here
5 transitions 512a, 516a (vertical wall 515a and horizontal surface 510a), 512b (top of the mesh carpet 500 and vertical wall 515b), or 516b (horizontal surface 510a and vertical wall 515b) may have sharp edges. These sharp edges may be formed by any suitable processing operation, one example of which is a machining operation. For example, by cutting the vertical surfaces (e.g. 515, 519, 515a or 515b) into the composite portion with a
10 mill, the transitions (e.g. 511, 512, 513, 514, 512a, 116a, 512b, or 516b) are not deformed but may instead remain as well-defined intersections of the vertical surfaces 515, 519, 515a or 515b and the upper and lower surface of the one or more mesh carpet coils 520/522 into which the cut is made.

[0051] While described herein and shown in FIGs. 5-6 as a tongue shaped protrusion or the
15 circular cut, it may be understood that any region of the mesh carpet may form a composite portion with the temporary support structure and that any region of the mesh carpet may have material removed in order to form a precise attachment feature with a fixture (e.g., a shaped mesh carpet).

[0052] As the preceding description and FIGs. 4 and 5 are directed to example structures to
20 attach to a fixture, it should be understood that a mesh carpet assembly 600 may include a fixture 604 as shown in FIGs. 6A-C. The fixture 604 may be attached to the processed region of the shaped mesh carpet, such as the stepped region shown in FIGs. 5A-B.

[0053] The fixture may be any component or assembly operable to add functionality, aesthetic appeal, or improvement to a mesh carpet. For example, the fixture may be a
25 folding clasp, end pieces, end caps, ornament mounts, ornaments, devices, or any other manner of bracket or accessory utilized with any mesh carpet.

[0054] As shown in FIGs. 6A-C, the mesh carpet 600 may include an end cap 604 mounted over the processed portion of the mesh. To attach to an end cap, the mesh carpet may have a tongue-shaped protrusion formed through processes described herein, examples of which
30 are given above with respect to FIGs. 5A-5B. The protrusion may be substantially the same size or profile as the interior portion of the end cap, or maybe slightly smaller in one or more dimensions.

[0055] As shown in FIG. 6C, an end cap may define an interior cavity between lower interior surface 652 and upper interior surface 650. The interior cavity, which may be bounded by a
35 back sidewall 609, may accept the processed region 510 of the mesh carpet structure.

[0056] The end cap of FIG. 6C may have an upper exterior surface 630 and a lower exterior surface 632, and an upper end surface 640 and a lower end surface 642. The upper end surface 640 and the upper exterior surface 630 may intersect at a transition 622. A lower end surface 642 and a lower exterior surface 632 may intersect at a transition 620.

5 Similarly, the upper end surface 640 and the upper interior surface 650 may intersect at a transition 612. The lower end surface 642 and lower interior surface 652 may intersect at a transition 614. The end cap may have a front interior surface 609 which may connect with the upper interior surface 650 and the lower interior surface 652 at transitions 611 and 613 respectively. Each of these surfaces may variously align with surfaces of the processed
10 mesh carpet in order to create a mesh carpet assembly 600 with aesthetically pleasing transitions between the accessory and the mesh carpet or transitions with close tolerances. It should be appreciated that a variety of end caps or other fixtures may be used, and such other end caps or fixtures may have different shapes, geometries, sidewalls, intersections, and the like.

15 [0057] In attaching the mesh carpet 405 to the accessory 604 (shown as an end cap in FIG. 6C) to form mesh carpet assembly 600, the upper and lower surfaces 520, 522 of the mesh carpet 600 may be flush (or nearly flush) with the top and bottom surfaces 630, 632 of the end cap. Moreover, the endpoints of the upper and lower surfaces 520, 522 of the mesh carpet 600 and the top and bottom surfaces 630/632 of the end cap may also be in close
20 proximity, thereby creating a smooth transition from the accessory 604 to the mesh carpet 405. For example, transitions 512 and 622 may be in close proximity, may align or may contact one another; likewise transitions 514 and 620 may be in close proximity, may align or may contact one another.

[0058] The fixture 604 may be permanently or semi-permanently bonded to the mesh carpet
25 by a bonding agent. For example, in FIG. 6C the shaded area 610 may be a soldering agent which keeps the components substantially in place after the temporary support structure is removed. In other embodiments, an adhesive may be used instead of a soldering agent.

[0059] It should be appreciated that the application of a bonding agent may simultaneously remove the temporary support structure. This may occur when the temporary mesh fixture is
30 formed from a frozen liquid and the bonding agent is either hot or applied through heating.

[0060] In some embodiments, the temporary support structure may be removed before the bonding agent is applied while in others it may be removed after the bonding agent is applied. A chemical solvent or wash may remove an adhesive that served as a temporary support structure, for example.

35 [0061] In still other embodiments, the temporary support structure may not be removed but may instead double as the bonding agent. Certain adhesives may operate both as a

temporary support structure and bond the mesh carpet (post-processing) to the fixture, for example. In some embodiments, an adhesive that was used as a temporary support structure may be reflowed, melted, or otherwise processed to both eliminate its support for the mesh and bond the mesh carpet to a fixture.

5 [0062] It should be noted that in each of the various structures discussed above, the removal of material may remove only a portion of a mesh carpet component (for example, a region of a single coil in a Milanese mesh) such that the mesh carpet component remains substantially intact. Alternatively or additionally, the process may remove enough of the mesh carpet component such that sections of the mesh carpet would be detached from the
10 overall structure in the absence of any material or bonding agent.

[0063] Regardless, the temporary support structure may keep these “detached sections” intact until the temporary support structure is removed, which may occur after an accessory is attached to the mesh carpet. At such time, the accessory and/or material used to attach the accessory and mesh carpet may keep the detached sections affixed to the mesh carpet.
15 For example, a soldering agent may connect the mesh carpet not only to the accessory, but also to a detached section.

[0064] In accordance with various embodiments, accessories need not only be attached to an end of a mesh carpet, and regions of a mesh carpet other than an end may be processed as discussed herein. For example, FIG. 6B shows an accessory 604a attached to an interior
20 region of a mesh carpet.

[0065] As discussed above, a mesh carpet may have particular features, which may be formed by removing material, in order to permit better attachment to an accessory. FIG. 7 generally shows an example method for removing material from a mesh carpet. In order to process a mesh carpet to mate with an accessory, the mesh carpet may be obtained or
25 created, as shown in operation 700. As indicated above, the mesh carpet may be any type of mesh. It may be sourced from any manufacturer of such items. Alternatively, the mesh carpet may be formed locally as part of the process for improving the mesh carpets fit with various accessories.

[0066] In operation 710, the type of accessory and/or location for attaching the accessory
30 may be identified. As the various steps herein may be applied to any portion or the entirety of a mesh carpet, the location that the material may be removed from the mesh carpet may be identified. For example, as shown in FIGs. 4-6, one portion of the mesh carpet selected for material removal may be an end of the mesh carpet to permit an end cap or other accessory to be attached thereto. Additionally or alternatively, a different portion (e.g. the
35 area associated with composite 410a) of the mesh carpet could be selected as shown in FIGs. 4-6.

[0067] Once the location is selected a temporary support structure may be applied in operation 720. The temporary support structure may be applied in any manner. In one example, the mesh carpet may be submerged in a liquid or semi-solid state of the temporary support structure and then the structure may be allowed to dry and/or harden. In another
5 example, the temporary support structure may be painted on, dripped on, or similarly applied and then allowed to seep into the mesh. In various examples, instead of drying or hardening, the temporary support structure may be frozen after it has filled the interstitial regions of the mesh. The application of the support structure may be similar to a potting process as used with electronics manufacturing and the like. In still other embodiments, the
10 temporary support structure may be cured or heated to harden or solidify it. For example, an ultraviolet or infrared curable adhesive may be used as a temporary support structure.

[0068] Regardless of the process, applying the temporary support structure may include substantially filling the interstitial region of the selected location on the mesh carpet and allowing the temporary support structure to harden to a sufficient degree to hold the mesh
15 components in place during a material removal operation. This process of adding the temporary support structure to the mesh carpet may form a composite portion of the mesh carpet.

[0069] With the temporary support structure hardened in the composite portion of the mesh carpet, the mesh carpet components (such as the coils of a Milanese mesh carpet) may be
20 restrained in accordance with operation 730. The composite portion of the mesh carpet may be restrained in order to keep the mesh carpet from moving during the material removal process.

[0070] Once restrained, material may be removed from the composite portion of the mesh carpet as indicated in operation 740. The material may be removed to form a profile
25 suitable to attach to the accessory. For example, if the accessory is an end cap, a tongue shaped protrusion may be machined (or any other material removal process may be utilized) into the first end of the mesh carpet. It may also be noted that the material removal may be performed in a separate process that merely utilizes the composite mesh carpet formed in operation 730.

[0071] FIG. 8 shows a flow chart illustrating an example method of forming a mesh carpet assembly. As shown in operation 800, a mesh carpet with a temporary support structure may be obtained. For example, the mesh carpet may be obtained in accordance with the method associated with FIG. 7. As indicated above, the material removal from the composite mesh carpet that forms a processed portion may be performed any time, in any
30 step, or in any process after formation of the composite carpet and prior to applying the accessory to the composite mesh carpet. As such, after obtaining a mesh carpet with a
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temporary support structure forming a composite mesh carpet in accordance with operation 800, material may then be removed from the composite portion of the mesh carpet forming a processed portion.

[0072] By utilizing the processed portion of the mesh carpet, an accessory may be applied to the mesh carpet maintaining tight seams between the mesh carpet and the accessory as indicated in operation 810. For example, if the accessory is an end cap, the processed portion may be a tongue shaped protrusion. This protrusion may be inserted into an interior portion of the end cap. The protrusion may also be specifically formed by removing material such that the transitions of the mesh carpet and the edges of the accessory are flush. This may be accomplished while inserting the tongue portion into the end cap. It may be noted that other accessories may similarly be applied to the mesh carpet. The processed portion of the mesh carpet may similarly be formed (by the material removal) to mate with these other accessories such that a close fit is obtained.

[0073] Once applied, as shown in operation 820, the accessory may be attached to the processed portion. The attachment may be any mechanical attachment, chemical attachment, or other suitable attachment mechanism. In one embodiment, the accessory may be attached to the processed portion of the carpet by soldering the mesh carpet to the accessory. For example, an end cap that is applied over the processed portion of the mesh carpet may be soldered on the interior of the end cap. The presence of solder on the exterior of the end cap or on the exposed area of the mesh carpet may be minimized in order to maintain an aesthetically pleasing appearance.

[0074] After the accessory is attached or while the accessory is being attached, as shown in operation 830, the temporary support structure may be removed. Applying heat the composite portion of the mesh carpet may be one method of removing the temporary support structure. It may be noted that the heat from the attachment operation 820 may remove some of the temporary support structure. However, as this step may be mechanical or not all of the temporary support structure may be removed, additional heat may be added. This may melt away, burn away, or otherwise remove the remaining temporary support structure from the assembly.

[0075] The embodiments of the methods exemplified in FIGs. 7 and 8 may be performed separately such as in two separate manufacturing facilities by separate entities or they may be performed sequentially by a single manufacturer.

[0076] As used throughout this document in each of the embodiments, aspects, examples, lists and various descriptions of the subject matter contained herein, the word "or" is intended to be interpreted in its inclusive form (e.g. and/or) not in its exclusive form (e.g. only one of) unless explicitly modified to indicate only one item in a list is intended (e.g. only one

of A, B, or C). For example, the phrase A, B, or C is intended to include any combination of the listed elements. The phrase can mean only A. The phrase can mean only B. The phrase can mean only C. The phrase can mean A and B. The phrase can mean A and C. The phrase can mean B and C. The phrase can mean A and B and C. This concept
5 extends to any length of list (e.g. 1, 2, 3...n) used herein.

[0077] Although the foregoing discussion has presented specific embodiments, the foregoing merely illustrates the principles of the invention. Persons skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the disclosure as various modifications and alterations to the described
10 embodiments will be apparent to those skilled in the art, in view of the teachings herein. For example, the processing steps may be performed in another order, or in different combinations. It will thus be appreciated that those having skill in the art will be able to devise numerous systems, arrangements and methods which, although not explicitly shown or described herein, embody the principles of the disclosure and are thus within the spirit
15 and scope of the present invention. From the above description and drawings, it will be understood by those of ordinary skill in the art that the particular embodiments shown and described are for purposes of illustration only, and references to details of particular embodiments are not intended to limit the scope of the present invention, as defined by the appended claims.

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CLAIMS

We claim:

1. A method of removing material from a mesh carpet comprising
applying a temporary support structure to a portion of the mesh carpet, thereby
forming a composite carpet;
removing material from the portion of the composite mesh carpet, thereby creating a
5 processed portion of the mesh carpet; and
removing the temporary support structure.
2. The method of claim 1, wherein the portion of the mesh carpet is a first end of
the mesh carpet.
3. The method of claim 1, wherein the temporary support structure restrains the
composite carpet prior to the operation of removing material.
4. The method of claim 3, wherein the removing material comprises:
machining a tongue shaped protrusion having a first vertical surface, a
second vertical surface, a first horizontal surface and a second horizontal surface onto the
first end of the mesh carpet.
5. A method of making a mesh carpet assembly comprising:
obtaining a mesh carpet having a composite portion, the composite portion
comprising:
a plurality of mesh carpet components; and
5 a temporary support structure filling the interstitial space between at least a portion of
the plurality of mesh carpet components, thereby forming a composite portion; wherein
a region of the composite portion has a cross-sectional profile different in at
least one dimension from a region of a remainder of the mesh carpet;
attaching a fixture to the composite portion; and
10 removing the temporary support structure by applying heat to the fixture or the
composite portion.
6. The method of claim 5, wherein the fixture is an end cap.
7. The method of claim 6, wherein the composite portion forms a tongue shaped
protrusion having a first vertical surface, a second vertical surface, a first horizontal surface
and a second horizontal surface.
8. The method of claim 7, wherein applying a fixture comprises:

inserting the tongue shaped protrusion into an interior portion of the end cap; wherein the tongue shaped protrusion is substantially the same size as the interior portion of the end cap; and

5 outside surfaces of the mesh carpet are flush with the top and bottom of the end cap.

9. The method of claim 5, wherein the operation of applying heat is performed by soldering the fixture to the mesh carpet.

10. A mesh carpet assembly comprising:
a plurality of intertwined coils;
a region comprising one or more flat surfaces defined by a region of cut coils, the region formed from a segment of the plurality of intertwined coils; and
5 a fixture attached to the region comprising one or more flat surfaces.

11. The mesh assembly of claim 10, wherein the fixture is at least one of an end cap, a clasp, or an ornament mount.

12. The mesh assembly of claim 11, wherein the region comprising one or more flat surfaces is not adjacent an end of the mesh carpet assembly.

13. The mesh carpet assembly of claim 11, wherein:
the region comprising one or more flat surfaces forms a tongue shaped protrusion;
and
the tongue shaped protrusion is received within an interior portion of the fixture.

14. The mesh assembly of claim 10, wherein the fixture is soldered to the processed portion.

15. The mesh assembly of claim 10, wherein the mesh carpet is a Milanese mesh.

16. A mesh carpet comprising:
a plurality of intertwined coils having an upper surface and a lower surface;
a temporary support structure filling the interstitial space between a portion of the plurality of coils, thereby forming a composite material, wherein
5 the composite material includes one or more boundaries defined by one or more surfaces of cut coils and cut temporary support structure.

17. The mesh carpet of claim 16, wherein the composite material comprises a tongue shaped protrusion with a first vertical surface, second vertical surface, a first horizontal surface and a second horizontal surface.

18. The mesh carpet of claim 16, wherein the first vertical surface and the top surface intersect at substantially a 90 degree corner forming a sharp edge.

19. The mesh carpet of claim 16, wherein the temporary support structure is one of an adhesive or ice.

20. The mesh carpet of claim 16, wherein the temporary support structure is Ethyl 2-Cyanoacrylate adhesive.

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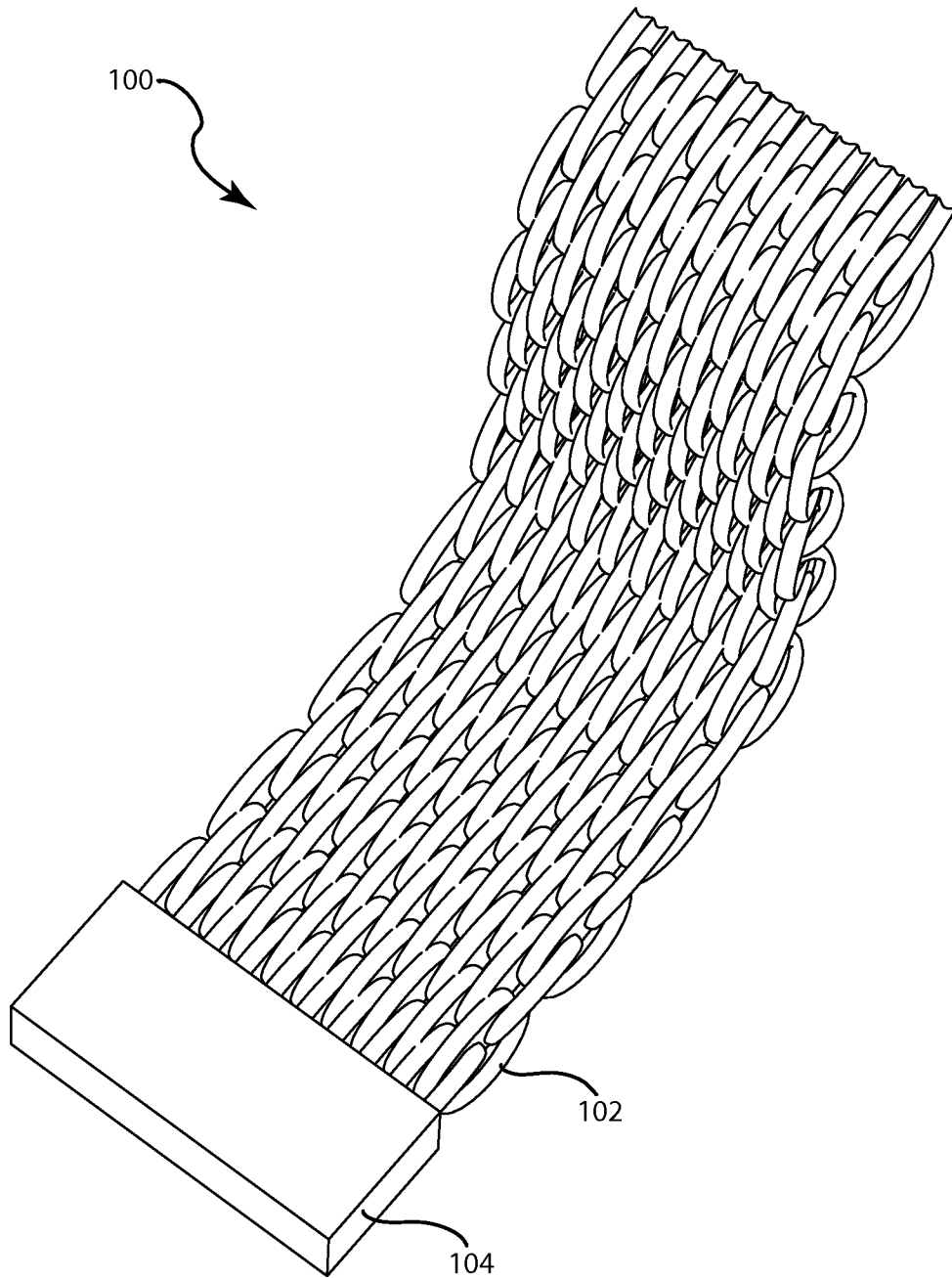
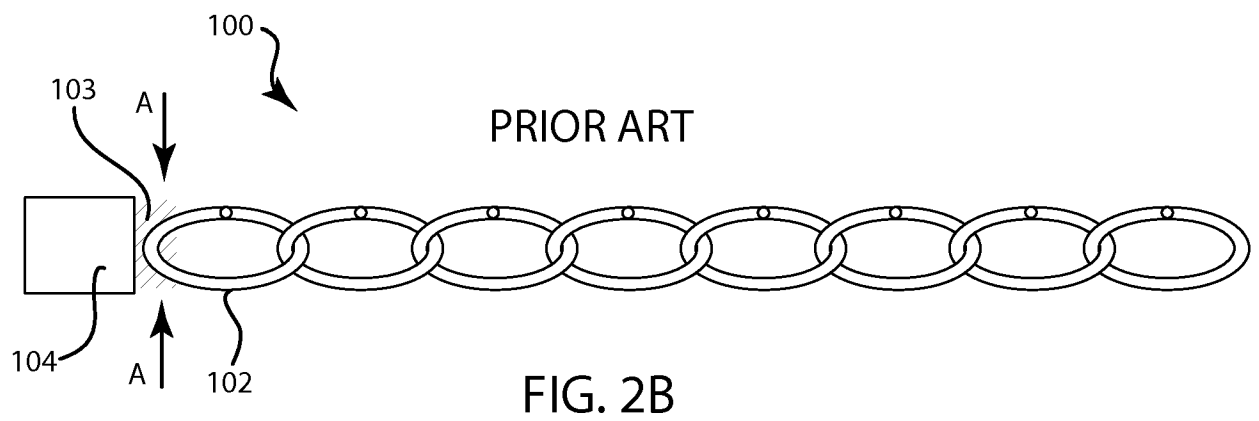
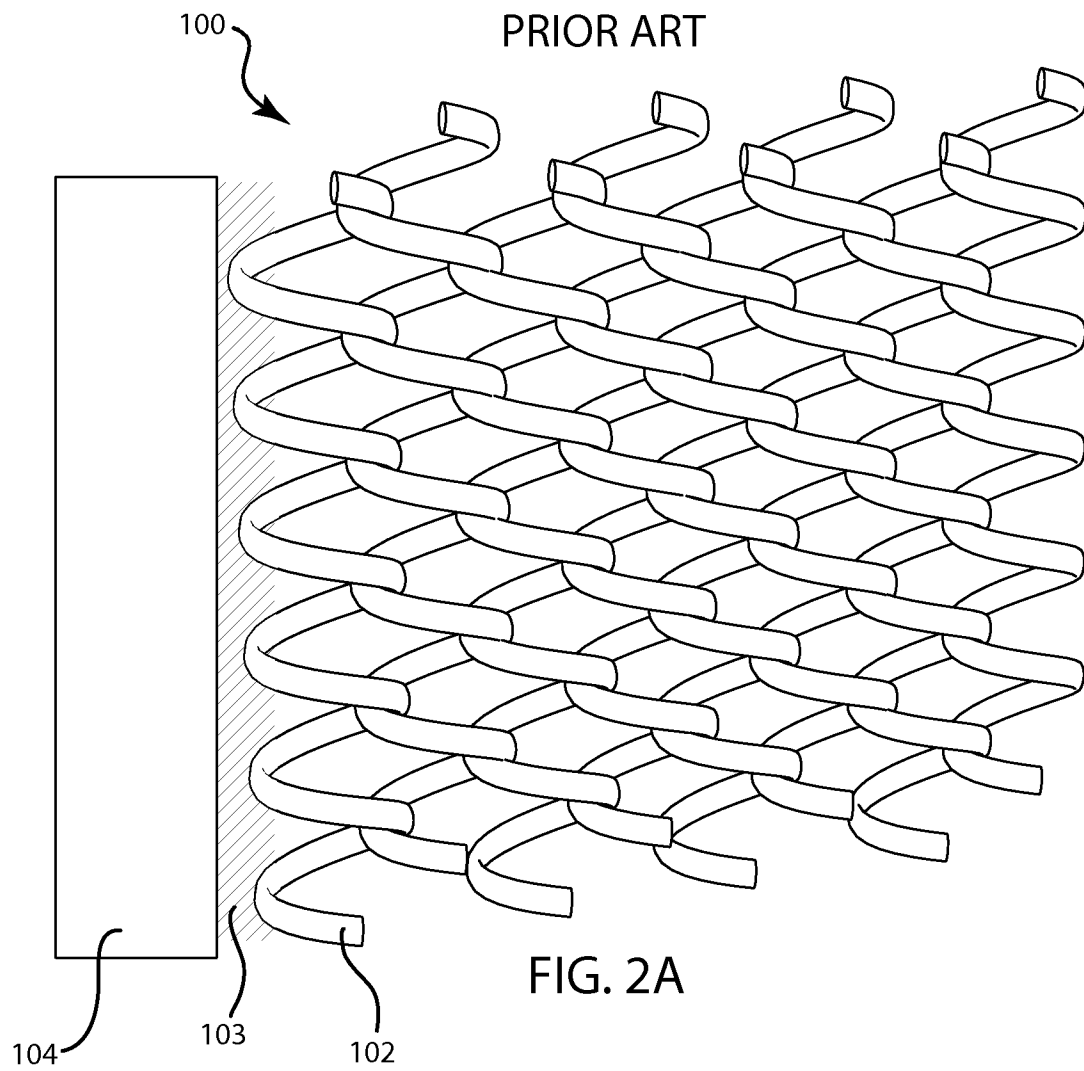


FIG. 1

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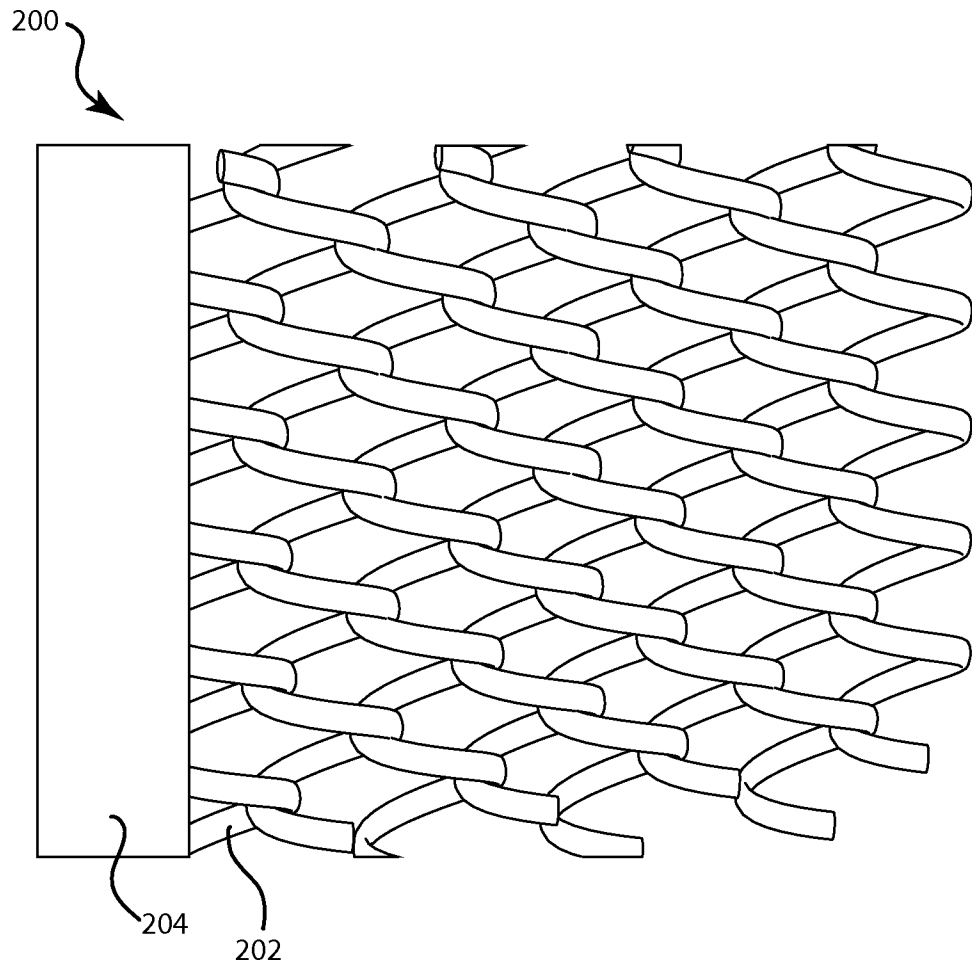


FIG. 3A

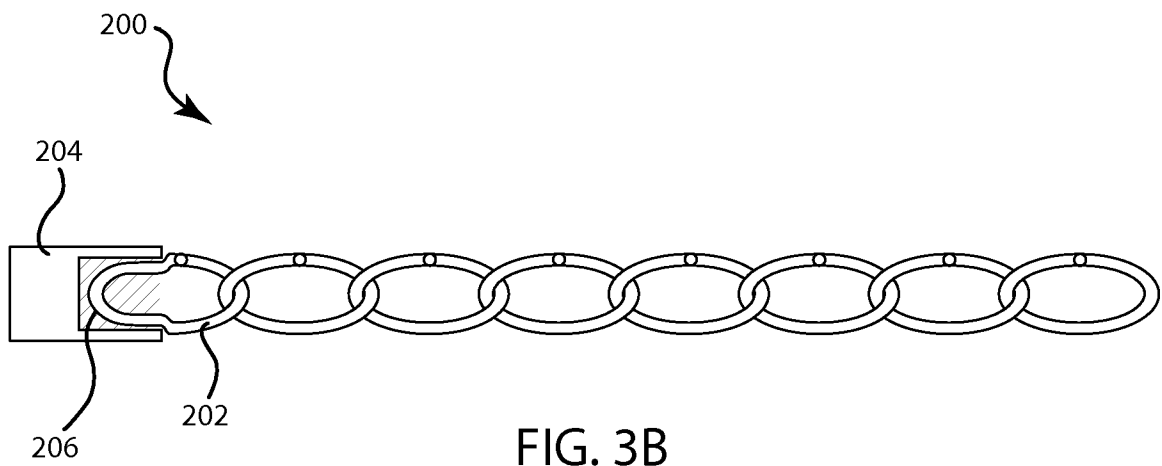


FIG. 3B

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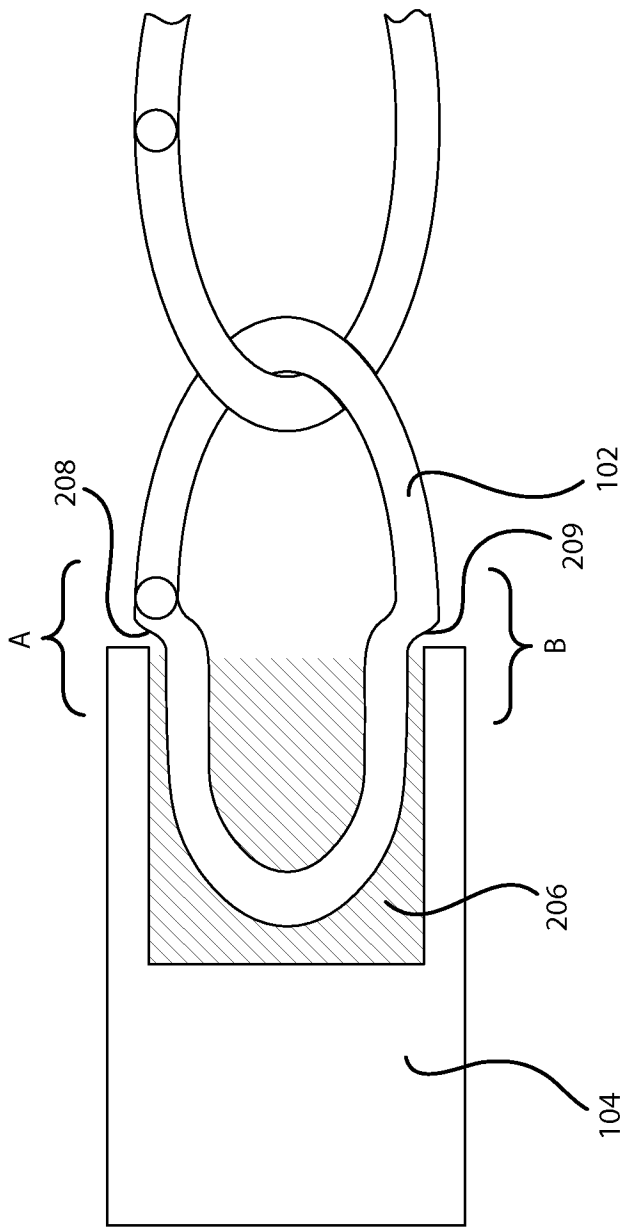
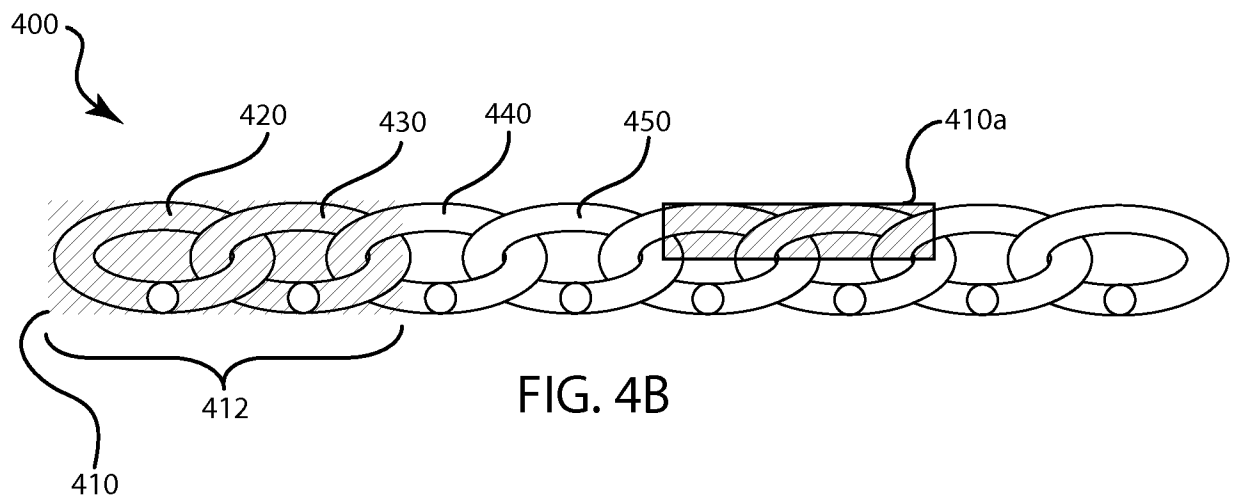
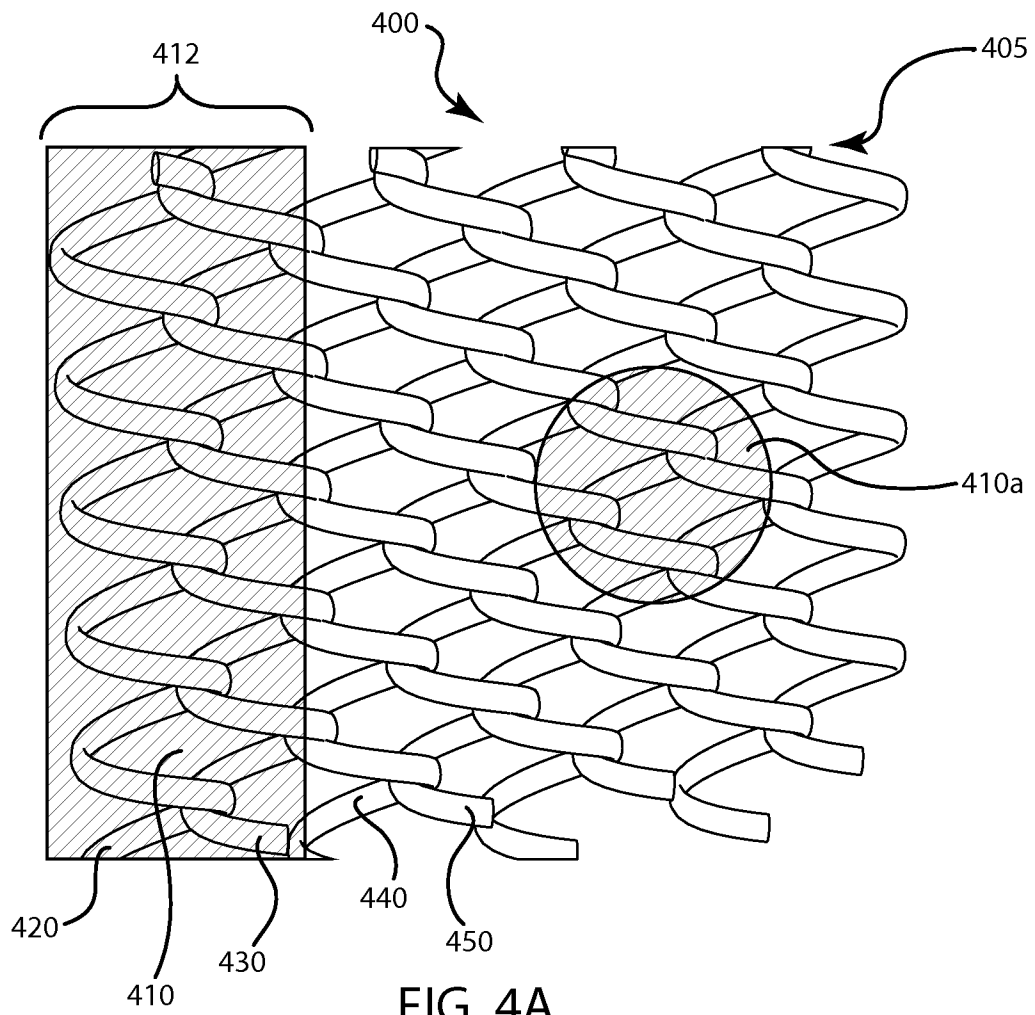
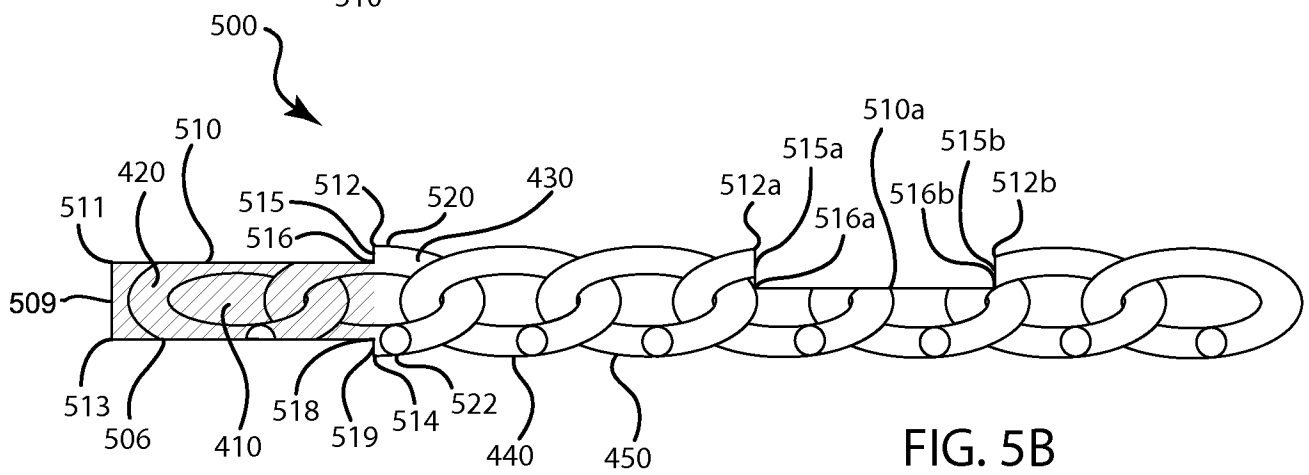
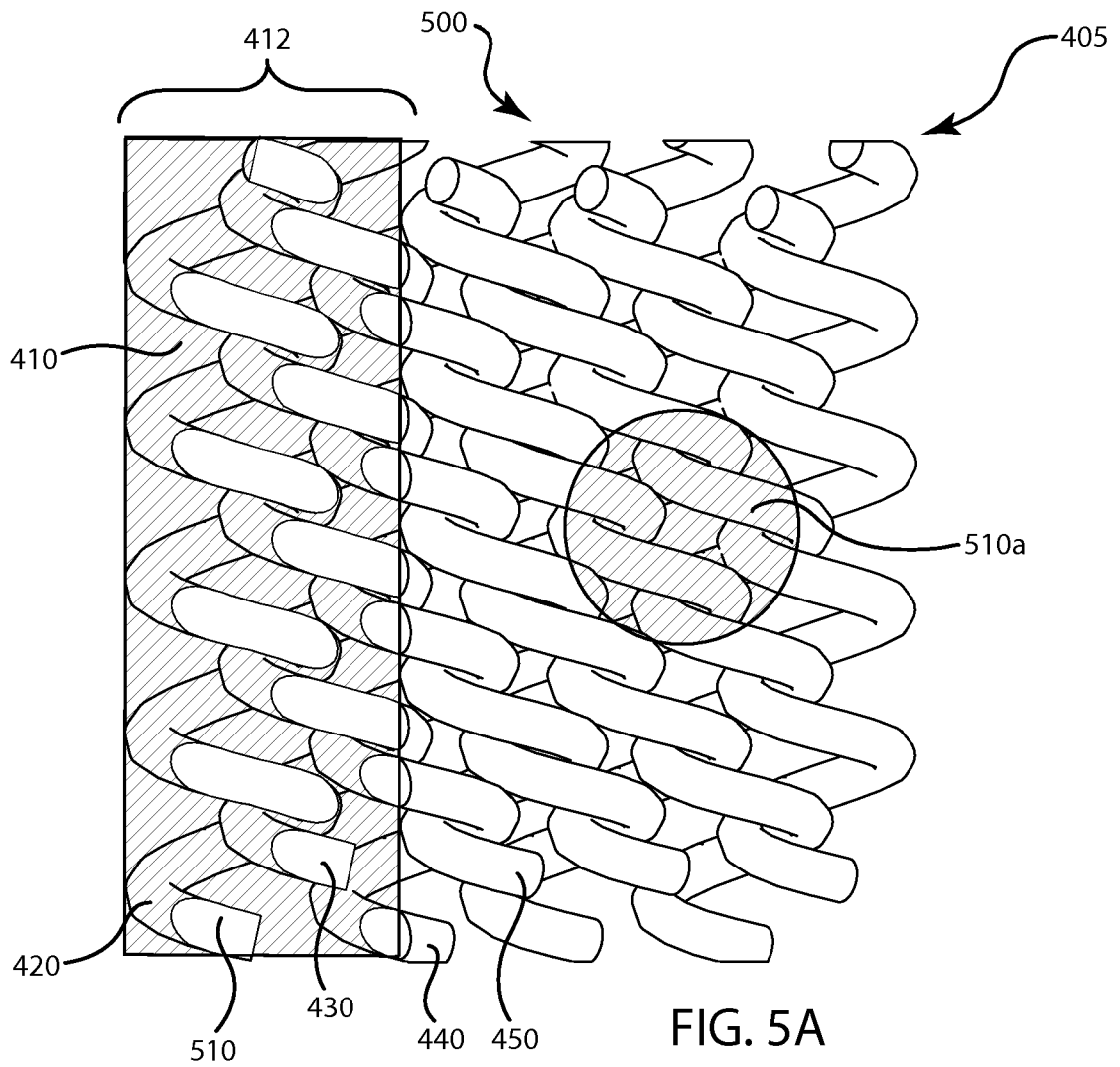


FIG. 3C

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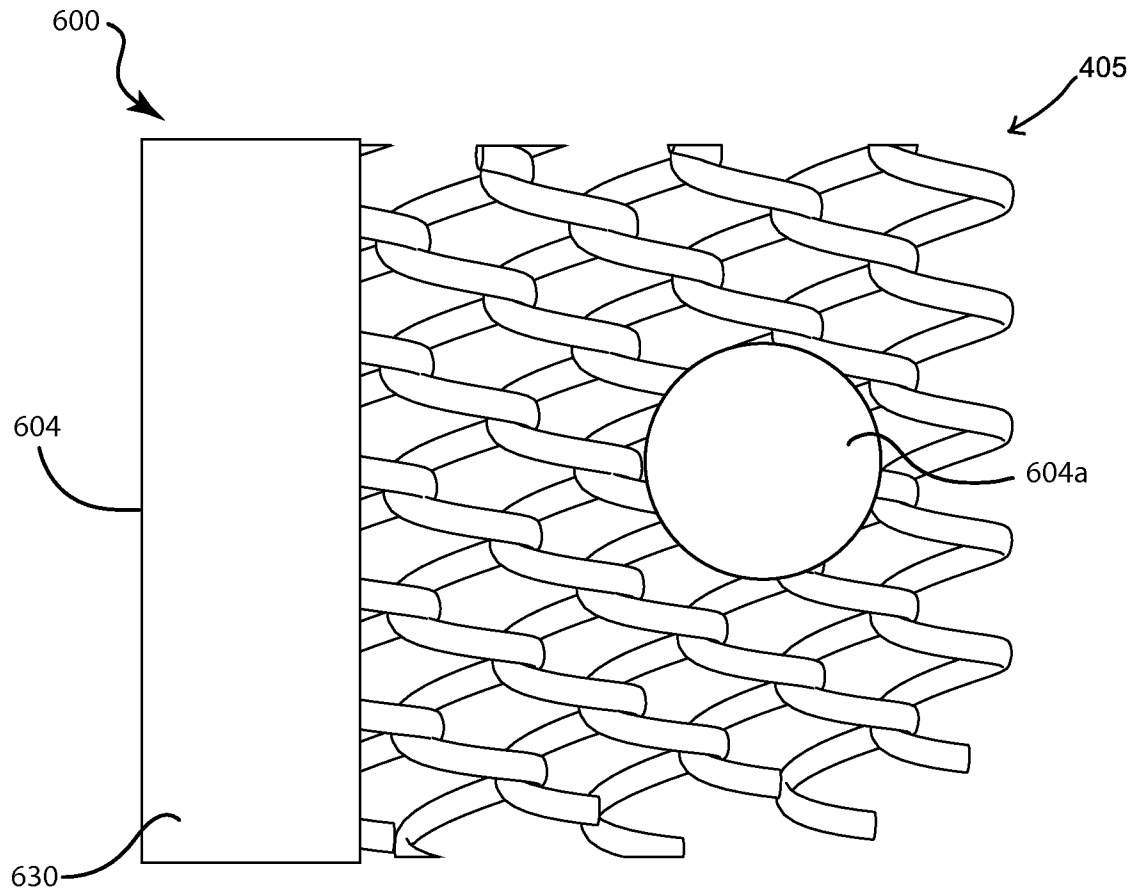


FIG. 6A

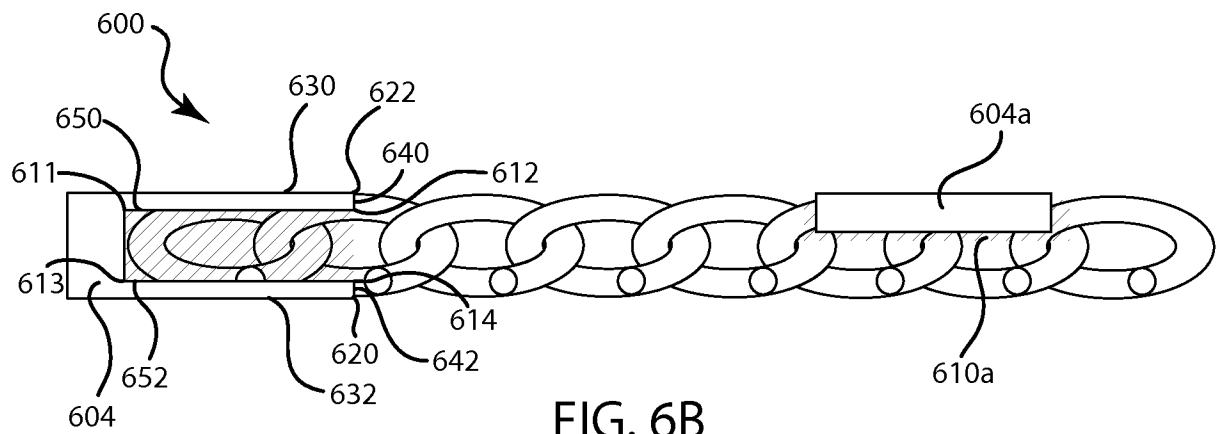


FIG. 6B

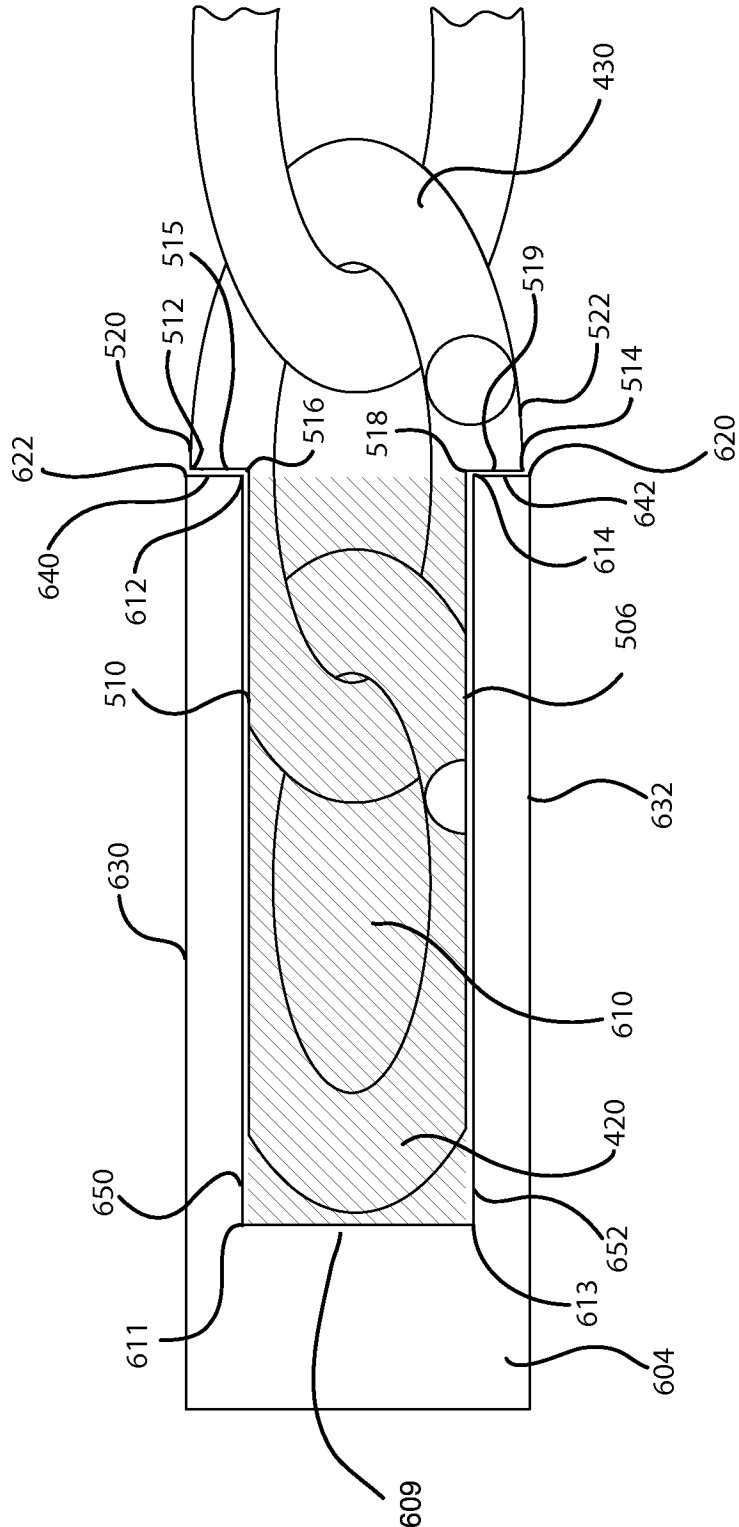


FIG. 6C

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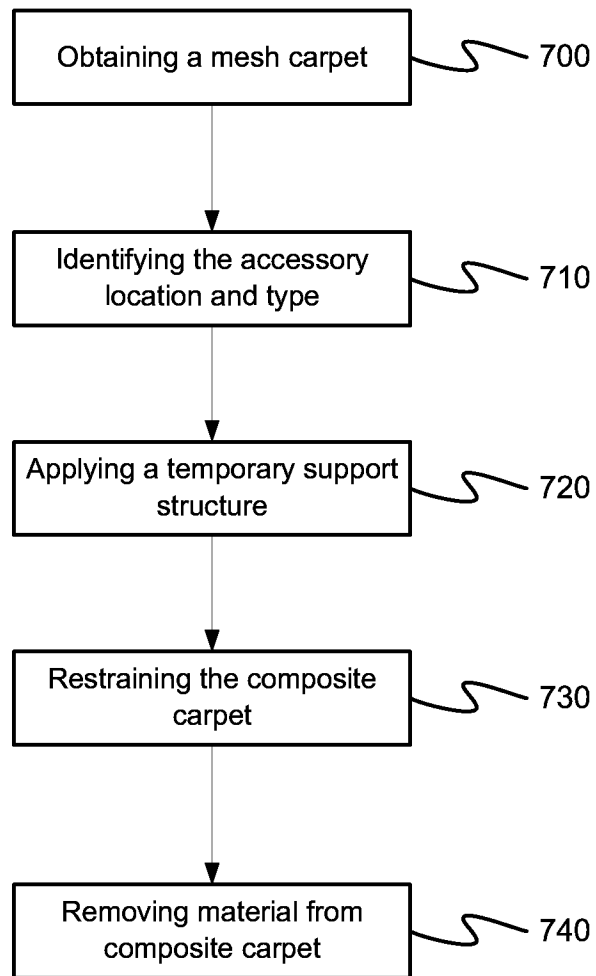


FIG. 7

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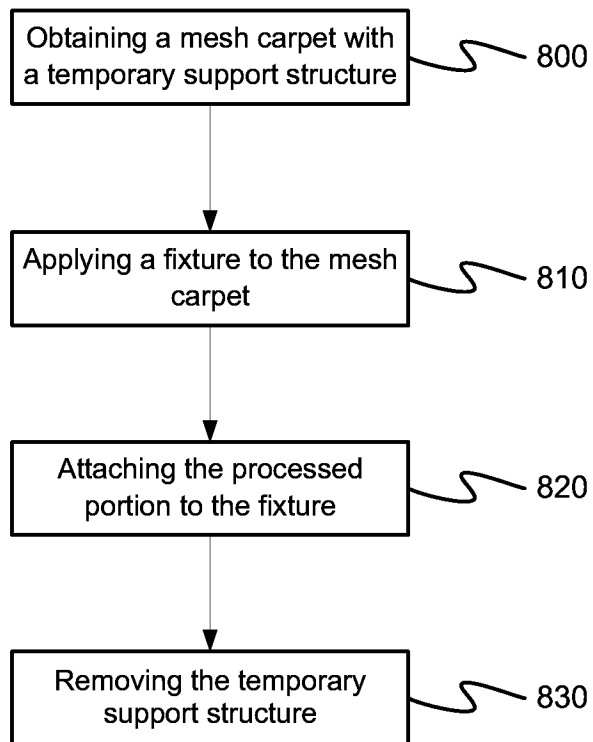


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/062513

A. CLASSIFICATION OF SUBJECT MATTER

INV. B21F43/00 A44C5/00 A44C15/00 B21F33/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B21F A44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 272 357 A (FRIEDRICH DOEPPENSCHMITT) 16 June 1927 (1927-06-16) the whole document	1,5,10, 16
A	US 410 250 A (T. MIDGLEY) 3 September 1889 (1889-09-03) the whole document	1,5,10, 16
A	US 3 094 302 A (STAUFFER ARTHUR L) 18 June 1963 (1963-06-18) the whole document	1,5,10, 16
A	US 2 718 791 A (HOSE ALFRED G ET AL) 27 September 1955 (1955-09-27) the whole document	1,5,10, 16
A	FR 1 193 265 A (. SERGE ROUGEAUX) 2 November 1959 (1959-11-02) the whole document	1,10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

25 June 2014

Date of mailing of the international search report

07/07/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Ritter, Florian

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/062513

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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