April 26, 1966 R. V. MATHISON 3,247,847

BANDAGE STRUCTURES

Filed Jan. 27, 1964

FIG. 1

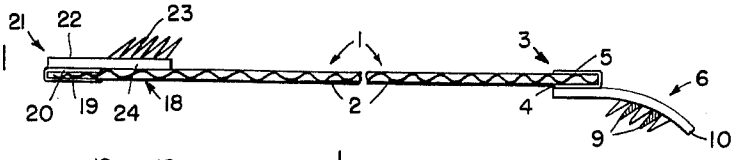


FIG. 2

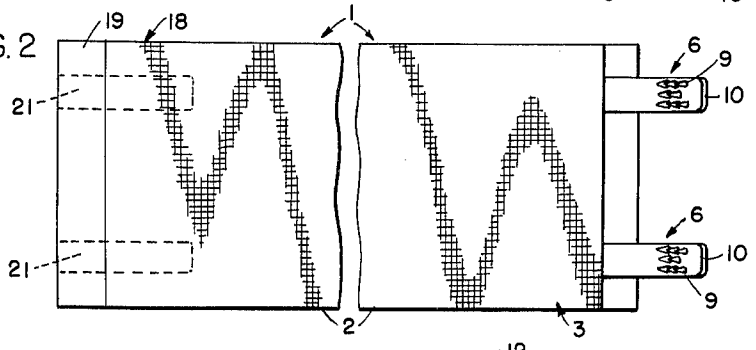


FIG. 3

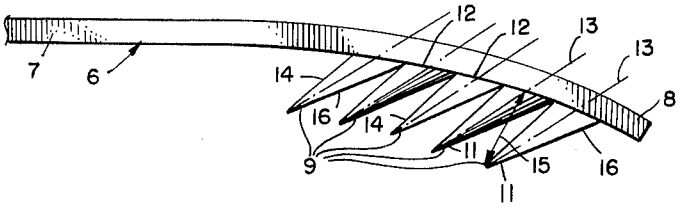


FIG. 4

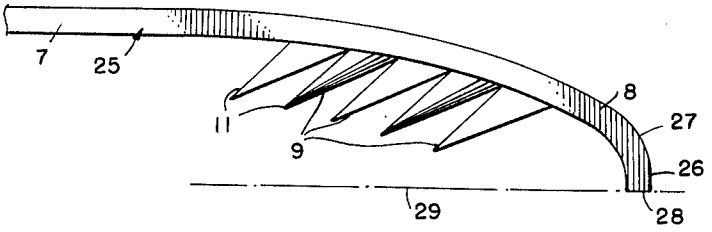


FIG. 5

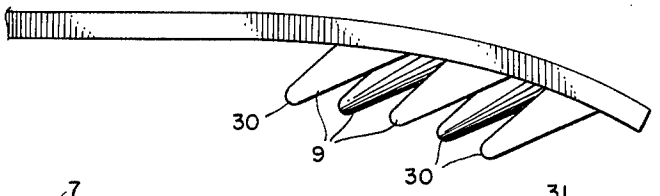
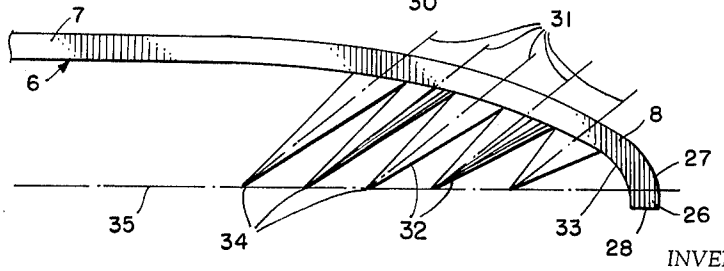


FIG. 6



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BANDAGE STRUCTURES

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This invention, in general, relates to fabric bandages and fasteners therefor. An important aspect of the invention pertains to elastic bandages comprising elastic, fabric strips having embodied at an end thereof at least one fastener member adapted to catch and grip on a winding or wrap of the elastic fabric strip and hold the free end of said strip in place.

Elastic bandages or wraps made from elastic fabric strips are well known as bandaging devices for sprained joints, joints with cartilage damage (e.g., the so-called "trick knee"), etc., as well as for general bandaging purposes wherein a tightly-applied bandage is desired. The bandage strip is applied by wrapping it relatively tightly about the affected area, usually with enough tension to longitudinally stretch the elastic strip at least slightly as it is wound about the affected area. The free end of the bandage must be secured in some manner to prevent the wrapping from unwinding. One common method of doing this is to provide a separate clip having teeth at each end. The teeth at one end are used to penetrate and grip the elastic fabric at the free end of the strip while the teeth at the other end of the clip penetrate and grip the elastic fabric of the winding or wrapping immediately beneath the free end, the clip forming a bridge across the free end of the bandage. The opposite end of the elastic fabric strip is held in place by the windings formed thereover as the bandage is wound about the affected area of the body.

As is well known by users of the aforedescribed bandages, the separate clip or clips are somewhat inconvenient both in application to the wrapped bandage and in the fact that they are often misplaced or lost during periods when the bandage is not in use. Furthermore, these clips sometimes work loose and fall off without the user's being immediately aware thereof and consequently become lost.

This invention pertains to improvements in elastic bandage structures in which the clip or clips are made of synthetic plastic tabs with plastic gripper teeth and are fixedly attached to an end of the elastic fabric strip with the teeth projecting beyond said end. Plastic tabs and integral teeth made from synthetic, themoplastic resins which are sealable by heat sealing or dielectric sealing methods are especially preferred because the tabs can be attached by said methods to the strip, preferably on a transverse, synthetic, thermoplastic resin strip adhered along the edge of the fabric strip.

If desired, the aforesaid fastener tabs may be provided at both ends of the elastic fabric bandage strip. This allows not only the outer, free end of the applied bandage to be fastened securely but also permits the end used to begin the wrapping to be secured to an overlapping winding by a fastener member or members after the initial winding or the first few windings, in lieu of relying only on the overlapping windings to hold said end in place.

In any case, the fastener tabs are secured on the end(s) of the elastic fabric strip with the teeth, which project from a surface of said tabs, sloping in a direction toward the longitudinal mid-portion of the fabric strip. Thus, when the elastic strip is stretched and the teeth, facing the underlying or overlaying winding (as the case may be), are pushed into and penetrate the fabric interstices, the elastic recovery of the tensed strip tends to drive the teeth more deeply into the fabric interstices. Similarly, when the applied bandage is stretched, e.g., by the flexing

of a joint about which the bandage is wrapped, there also may occur the same type of deeper seating of the teeth.

It is, therefore, a primary object of this invention to provide elastic bandage structures embodying one or more synthetic resin tabs having integrally formed teeth adapted to fasten an end of said bandage strip to an adjacent winding of said strip.

Another primary objective of the invention is to provide in said elastic bandages fastener structures of a character which are attached readily to the elastic bandage in a novel and expeditious manner.

Still another object of the invention is to provide elastic bandage strips on at least one end of which are fixedly mounted at least one synthetic thermoplastic resin tab having integrally formed, relatively sharp, tapered teeth sloping outwardly and in a direction toward the longitudinal mid-portions of said strips.

These, as well as further objects, advantages and improvements, may be realized in the practice of the generic concepts of the invention in the preferred embodiments thereof illustrated in the drawings, wherein:

FIG. 1 is a broken, side elevation of one preferred embodiment of an elastic bandage of the invention;

FIG. 2 is a broken, top plan view of the embodiment of FIG. 1;

FIG. 3 is an enlarged, side elevation of a fastener tab shown in FIGS. 1 and 2; and

FIGS. 4, 5 and 6 are side elevations of three additional embodiments of fastener tabs adapted to be used on elastic bandages in lieu of the embodiment illustrated in FIG. 3.

Referring to the drawings, there is shown in FIGS. 1 and 2 in broken view an elongated, elastic bandage comprising an elongated elastic strip **1** which preferably is made of a fabric **2** of resilient, elastomer threads. Such fabrics are well known. The fabric **2** is knitted or otherwise fabricated so that the strip can be stretched elastically in the longitudinal directions. The end **3** of the strip **1** is the end which is the free, outermost end of the elastic bandage when it is wrapped about the body part to be bandaged thereby. When the strip is rolled up for convenient storage thereof, the end **3** forms the innermost part of the coil or roll so that it is the last part to be un rolled when the rolled strip is wound about the affected body part.

The outermost edge of end **3** has applied fixedly thereto a transverse strip **4** of synthetic, thermoplastic resin which is heat sealed, adhesively sealed, vulcanized, etc., in a tight bond to the end **3** of the fabric strip. The edge of end **3** preferably has another, similar strip **5** applied fixedly to the opposite side of the fabric. The strips **4** and **5** may be made of a single thermoplastic resin strip folded longitudinally to provide opposing strips **4** and **5** with the edge of the end **3** compressed therebetween or may be separate strips having edges overlapping the outer edge of end **3**, the overlapping edges of strips **4** and **5** preferably being bonded together. The double strips **4** and **5** are preferred because the bond of the strip **4** to the end **3** is more secure.

In any case, the strip **4**, or the strip **5** if desired, has heat sealed thereto at least one fastener tab **6** comprising a unitary molding of a synthetic, thermoplastic resin. The fastener tab **6** comprises a substantially planar base **7** and an integrally-formed, longitudinally-curved portion **8**. The planar base **7** is the portion of the fastener which is heat sealed or otherwise fixedly secured on the strip **4** or **5**, as the case may be. The longitudinally-curved portion **8** preferably, though not essentially, projects beyond the outer edge of strips **4** and **5**.

The concave face of portion **8** has a plurality of integrally formed, tapered, relatively sharply pointed projections **9** made of the same synthetic, thermoplastic resin as the base **7** and curved portion **8**. The pro-

jections 9 slope from the concave face at an acute angle to the tangent on the curve of the inner face of portion 8 where the center line of each of the projections intersects the inner face. The projections 9 slope in a direction away from the outer edge 10 of the tabs 6 toward the longitudinal mid-portion of the strip 1.

The projections 9 together comprise the elements which penetrate the interstices of the fabric in the underlying layer or layers of the applied bandage. These projections are smooth sided, substantially rigid, and closely spaced and taper from their bases at the concave face to relatively sharp tips. For the most secure seating of the tips in said interstices, the projections are arranged in rows extending longitudinally along the concave faces of the tabs 6. In the illustrated embodiment, the projections are arranged in three longitudinal rows composed of outer rows with three projections and a middle row with two projections. The projections in each longitudinal row are sufficiently closely spaced and sufficiently sloped so that the tips 11 at least approximately overlie the bases 12 of the next adjacent projections in the respective rows. This relationship can best be seen in FIG. 2. Thus, if a vertical line which is at a right angle to the plane of base 7 were drawn from the tip of one projection, it would intersect or approximately intersect the side of the next adjacent projection of the respective longitudinal row.

The projections preferably have the shape of oblique cones or oblique pyramids. The size of the bases of the projections is preferably at least 0.02" in the smallest dimension. The preferred longest dimension of the bases is about 0.045±0.020". The length of the longest sides 16 of the sloping projections from base to tip is subject to variation, the preferred range being about 0.095±0.030". The acute angle betwen the axes or center lines 13 of the projections and the plane of the base 7 is in the range of about 25° to 40° while the acute angle between the shortest sides 14 of the sloping projections and the plane of the base 6 is in the range of about 35°–50°.

The tips of the projections are not necessarily pointed. They may be flat or rounded at a tip diameter or linear side dimension in the range of about 0.010±0.05", for example. The shortest line distance 15 between the tips of the projections and the concave face of the tab portion 8 is preferably in the range of about 0.03" to 0.150".

It will be appreciated from the foregoing dimensions that the over-all size of the tabs 6 may be very small. As an example, the width of the tabs may be about 0.25" with an over-all length of about 0.625". The base 7 may be only about 0.25" in each dimension. The key element in these small tabs is the closely spaced, small projections, which are concentrated at an equivalent to about 125 to 400 projections per square inch of surface occupied by the bases thereof plus the spacings therebetween.

The synthetic, thermoplastic resin or polymer used to form tabs 6 may be selected from a wide variety of molding resins. Homopolymers such as polymers of formaldehyde (e.g., Delrin), polyethylene, polypropylene, polyacrylate, polyacrylonitrile, etc., or copolymers such as nylons derived from caprolactam or from diamines and dicarboxylic acids, polyethylene glycol terephthalate, etc., may be used.

The opposite end 18 may have thereon a pair of opposed, transverse strips 19 and 20 of the same character and applied in the same manner as strips 4 and 5. The strip 20 may have securely fastened thereon at least one fastener tab 21. The tab or tabs 21 are of essentially the same character and structure as the tabs 6 but with minor structural differences. The bases 22 of tabs 21 are heat sealed or otherwise fixedly secured to the thermoplastic resin, transverse strip 29. In the illustrated case, the tabs 21 are oriented so that the entire tabs overlie the end 18 of the elastic bandage. This is done to eliminate possible chafing of the skin of the wearer of the bandage which might occur if the tab portion 24, which carries the tapered, sloping, integrally molded projections 23, were to extend beyond the edge of end 18. The latter arrangement may be used, however, if desired.

The projections 23 are of the same character, size, etc., as are the projections 9, heretofore described. They slope outwardly away from the elastic bandage strip 1 opposite to the outward direction of the projections 9 when the strip 1 is laid flat. The lateral directions of slope of projections 9 and 23 is that of slopings toward each other when the strip is laid flat.

The bandage is coiled or rolled beginning with end 3 with projections 9 facing the center of the coil. The end 18 will form the last coil of the roll or winding, the projections 23 extending away from the center of the coil. When the rolled elastic bandage is applied, the end 18 is held by hand against the affected body part to be bandaged, and the roll is uncoiled as the winding of the bandage progresses. After the first complete layer of winding, the overlying second layer (or a subsequent layer) can be laid over the tabs 21 so that the projections 23 will enter the interstices of the fabric strip and tightly secure the end 18 under the initial winding or windings. The bandaging is continued until end 3 is reached, whereupon the projections 9 on tabs 6 are pressed against a layer or adjacent layers of the applied bandage. When this is done with the bandage strip at least slightly stretched longitudinally, the sloping projections 9 act against longitudinal elastic recovery forces and are thus seated securely in the fabric interstices. They are unseated by pulling outwardly and/or longitudinally on the end 3 of the bandage strip.

The embodiments of tab fasteners in FIGS. 4–6 are applied to the bandages and used in a similar manner to the above description for tabs 6. In FIG. 4, like numerals have been used to designate like parts. The fastener tab 25 comprises a thermoplastic resin, planar base 6 and a thermoplastic resin, curved tab portion 8 having tapered, sloping projections integrally molded on the concave face. The relationship and sizes of said projections are the same as those described above for projections 9. The essential difference between fastener tabs 25 and 6 is the longitudinal extension 26 formed with the relatively sharp curve 27 at the outer longitudinal end of tab portion 8. The tip 28 of the extension 26 is located relative to the planar base 7 a distance sufficient so that all of the tips 11 are between the plane of the base 7 and an imaginary plane 29 which is parallel to the plane of base 7 and intersects the tip 28. In this embodiment, the tip 28 will lie tightly against the bandage fabric when the projections are seated in the interstices thereof to preclude essentially all possibility of an accidental snagging or catching of the end of the tab portion 8 and resultant accidental unseating of the projections.

The embodiment of FIG. 5 is essentially the same as that of FIG. 3, and again like numerals have been used to designate like parts. The essential difference in FIG. 5 is that the tips 30 of projections 9 are slightly rounded or blunted to present somewhat less sharp tips.

The embodiment of FIG. 6 is similar in most respects to that of FIG. 4 and again like numerals have been used to designate like parts. The essential difference in FIG. 6 is that the lengths of the axes 31 of the projections 32, which preferably are substantially parallel as in the other embodiments, are not the same from the base of the projections at the concave face 33 to the tips 34. Rather, these lengths become progressively greater from the projections nearest the extension 26 toward those farthest away. In such cases, the bases of the projections may become progressively larger and/or the degree of taper may become progressively smaller from the nearest to the farthest projections. The tips 34 may in this embodiment lie in a common, imaginary plane 35 substantially parallel to the plane of base 7 or in an imaginary plane which intersects the plane of base 7. The progressively

longer propjections provide for deeper penetration and seating of those projections which are nearest the end 3 of the elastic bandage.

The invention is hereby claimed as follows:

1. A bandage comprising a fabric strip elastically stretchable in the longitudinal direction and having secured to a longitudinal end thereof at least one synthetic resin fastener tab, which fastener tab includes a molded body portion fixedly secured to said strip, said body portion being longitudinally curved, and a plurality of integrally molded, closely spaced, small projections which taper to relatively pointed tips and which slope outwardly from the concave face of said body portion and away from the outer edge thereof toward the mid-portion of said strip.

2. A bandage comprising a fabric strip elastically stretchable in the longitudinal direction and having secured to a longitudinal end thereof at least one synthetic resin fastener tab, which fastener tab includes a body portion with a base, and an integrally molded, longitudinally curved tab portion projecting beyond the edge of said end, said base being secured fixedly to said end of said strip, and a plurality of integrally molded, closely spaced, small projections which taper to relatively pointed tips and which slope outwardly from the concave face of said body portion and away from the outer edge thereof toward the mid-portion of said strip.

3. A bandage comprising a fabric strip elastically stretchable in the longitudinal direction and having secured to a longitudinal end thereof at least one synthetic resin fastener tab, which fastener tab includes a body portion with a planar base and a longitudinally curved portion extending beyond the outer edge of said end of said strip, a plurality of integrally molded, closely spaced, small projections on the concave face of said curved portion, said projections tapering to relatively pointed tips and which slope outwardly from said face away from the outer end of said curved portion in a direction toward said edge.

4. A bandage as claimed in claim 3 wherein said edge of said strip has secured thereon a transverse strip of a synthetic, thermoplastic resin, and said base of said tab is heat sealed to said transverse strip.

5. A bandage as claimed in claim 3 wherein said closely spaced projections are provided at a spacing equivalent to 150 to 400 projections per square inch.

6. A bandage as claimed in claim 1 wherein the opposite longitudinal end has thereon at least one fastener tab molded from a synthetic resin and comprising a body portion secured to said opposite end and a plurality of integrally molded, closely spaced, small projections which taper to relatively pointed tips and which slope outwardly from said body portion and away from the outer edge thereof toward the mid-portion of said strip, said projections of the respective tabs at each of said ends of said strip extending in opposite outward directions when said strip is laid flat.

7. A bandage as claimed in claim 3 wherein said tab has a longitudinally curved extension free from projections at the outermost end of said tab, which extension has an outermost edge displaced a sufficient distance relative ot said base so that the tips of all of said projections lie between the plane of said planar base and a plane parallel thereto which intersects the outermost edge of said extension.

8. A bandage as claimed in claim 2 wherein the lengths of the projections nearest said base are greater than the lengths of said projections farthest from said base.

9. A bandage as claimed in claim 1 wherein the tips of said projections are rounded.

10. A fastener tab comprising a body portion made of a molded synthetic resin, said body portion including a longitudinally curved, concave face, and a plurality of integrally molded, closely spaced, small projections arranged in transverse rows on said concave face, said projections tapering to relatively pointed tips and sloping outwardly in a common direction away from said face and at right angles to said rows.

11. A tab as claimed in claim 10 wherein said closely spaced projections are provided at a spacing equivalent to 150 to 400 projections per square inch.

12. A fastener tab comprising a body portion made of a molded synthetic resin, said body portion including a substantially planar base and a portion integrally formed with said base and including a longitudinally curved, concave face, and a plurality of integrally molded, closely spaced, small projections arranged in transverse rows on said concave face, said projections tapering to relatively pointed tips and sloping outwardly from said face in a common direction toward said base and at right angles to said rows.

13. A tab as claimed in claim 12 wherein said tab has a longitudinally curved extension free from projections at the outermost end of said tab, which extension has an outermost edge displaced a sufficient distance relative to said base so that the tips of all of said projections lie between the plane of said planar base and a plane parallel thereto which intersects the outermost edge of said extension.

14. A tab as claimed in claim 12 wherein the lengths of the projections nearest said base are greater than the lengths of said projections farthest from said base.

15. A tab as claimed in claim 10 wherein the tips of said projections are rounded.

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