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(54) **THREADED FASTENER**

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to fasteners, and more particularly to threaded fasteners having threads that diminish the likelihood of the fasteners becoming loose after installation.

Description of Related Art

[0002] With presently available screws that are used to fasten thin metal materials together, the difference between drive torque and strip torque is typically very small. Due to this small differential, it is difficult to install these screws with an effective clamping torque range using a power screwdriver. During installation, tapping torque and clamping torque is generated by friction from the flank portion and root of the thread contacting the thin metal. When the fastener is tightened, the hole in the thin metal begins to enlarge from the root of the thread, and torque beings to drop. This results in many screws being installed with a low clamping force. In applications where the fastener is secured in wood, the wood fibers shrink and lose their ability to hold the thread engagement securely. This results in fastener backout, which causes failure of the fastened joint. Many different forces affect a screw fastened joint during service, and low clamping torque is the primary reason screws loosen, A threaded fastener that loosens creates a condition that adversely affects the performance of joints and causes fastener and joint failures.

[0003] United States Patent No. 2,177,004 to Purtell discloses a screw having locking means formed in the thread, whereby the screw is effectually prevented from loosening when threaded into a companion member.

[0004] United States Patent No. 3,661,194 to Macfarlane et al. discloses a prevailing torque fastener of the type that generally includes a threaded section having axially extending projections spaced along a flank of the thread, which projections engage the thread of a mating member with an interference fit.

GB1 209 225 discloses external helical screw threads and methods of making the same.

SUMMARY OF THE INVENTION

[0005] In one embodiment, a fastener is provided including an elongated body having a first end and a second end, and a helical thread formed on at least a portion of the elongated body where the thread has a crest, a root, and flank portions. The helical thread has at least one protrusion extending from the crest and flank portions toward the first end of the elongated body, and each protrusion has a pointed peak that extends to the root of the thread. Each protrusion may have a first side and a second side, where the first side has an angle of at least about 90 degrees with respect to an upper portion of the helical thread adjacent to each protrusion, and the second side has an angle of at least about 90 degrees with respect to a lower portion of the helical thread adjacent to each protrusion. The pointed peak of each protrusion may have a height of at least 50 percent of the root length from an intersection point of the root and flank portion closest to the first end of the elongated body. Each protrusion may be a V-shaped extension of the crest and flank portions of the helical thread. Further, each protrusion may define an interruption in the helical thread. The first end of the elongated body may include a head for driving the fastener.

[0006] In certain embodiments, the helical thread includes a plurality of protrusions spaced equally apart around the circumference of the elongated body on a first full thread beginning at the first end of the elongated body. The helical thread may also have at least one set of protrusions, with each set having a plurality of protrusions spaced equally apart around the circumference of the elongated body. The first set of protrusions may be located on a first full thread at the first end of the elongated body with the remaining sets of protrusions located on adjacent threads. Further, each protrusion of each set may be aligned with a corresponding protrusion of the other sets of protrusions, such that corresponding protrusions of the sets of protrusions are aligned with a longitudinal axis extending from the first end of the elongate body to the second end of the elongate body.

[0007] In another embodiment, the helical thread of the fastener may include at least one downward protrusion extending from the crest and flank portions toward the second end of the elongated body, and each downward protrusion has a peak that extends to the root of the thread. Each downward protrusion may be provided on a last full thread at the second end of the elongated body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a side view of a threaded fastener pursuant to one embodiment;

Fig. 2 is a top view of the fastener shown in Fig. 1;

Fig. 3 is a cross-sectional view of the fastener taken along the line A-A in Fig. 1;

Fig. 4 is a partial front view of the fastener shown in Fig. 1;

Fig. 5 is a partial front view of two of the fasteners shown in Fig. 1, showing the fasteners engaging a

cross-section of thin gauge metal;

Fig. 6 is a front view of two of the fasteners shown in Fig. 1, showing the fasteners engaging thin gauge metal;

Fig. 7 is a front view of two of the fasteners shown in Fig. 1, showing the fasteners engaging a cross-section of thin gauge metal;

Fig. 8 is a front view of a threaded fastener pursuant to another embodiment, showing the fastener engaging a cross-section of wood;

Fig. 9 is a partial front view of the fastener engaging wood as shown in Fig. 8;

Fig. 10 is a front view of a threaded fastener pursuant to a further embodiment, showing the fastener at two different rotation angles;

Fig. 11 is a partial front view of the fastener shown in Fig. 10;

Fig. 12 is a partial front view of two of the fasteners shown in Fig. 10, showing the fasteners engaging a cross-section of metal;

Fig. 13 is a front view of two of the fasteners shown in Fig. 10, showing the fasteners engaging metal;

Fig. 14 is a front view of two of the fasteners shown in Fig. 10, showing the fasteners engaging a cross-section of metal;

Fig. 15 is a front view of two of the fasteners shown in Fig. 10, showing the fasteners engaging a cross-section of wood;

Fig. 16 is a partial front view of the fastener shown in Fig. 10, showing the fastener engaging a cross-section of wood;

Fig. 17 is a side view of a threaded fastener pursuant to another embodiment;

Fig. 18 is a partial front view of the fastener shown in Fig. 17; and

Fig. 19 is a top view of the fastener shown in Fig. 17.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0009] For purposes of the description hereinafter, spatial orientation terms, if used, shall relate to the referenced embodiment as it is oriented in the accompanying drawing figures or otherwise described in the following detailed description. However, it is to be understood that the embodiments described hereinafter may assume many alternative variations and embodiments. It is also to be understood that the specific fasteners illustrated in the accompanying drawing figures and described herein are simply exemplary and should not be considered as limiting.

[0010] In one embodiment, shown in Figs. 1-7, a fastener 1 including an elongated body 10 with a first end 11 and a second end 12, and a helical thread 20 formed on at least a portion of the elongated body 10 is provided. The helical thread 20 has a crest 22, a root 25, and flank portions 28. Further, the helical thread 20 has at least one protrusion 50 extending from the crest 22 and flank portions 28 toward the first end 11 of the elongated body 10. As more clearly shown in Fig. 5, each of the protrusions 50 has a peak 52 that extends to the root 25 of the thread 20. The peak 52 of each protrusion 50 has a height of at least 50 percent of a root length 26 measured from an intersection point 57 of the root 25 and the flank portion 28 closest to the first end 11 of the elongated body 10. Each protrusion 50 extending from the crest 22 and the flank portions 28 of the thread 20 has a first side 55 and a second side 56. The first side 55 of each protrusion 50 has an angle that is at least on the order of 90 degrees with respect to an upper portion 23 of the helical thread 20 adjacent to each protrusion 50. The second side 56 of each protrusion 50 has an angle that is at least on the order of 90 degrees with respect to a lower portion 24 of the helical thread 20 adjacent to each protrusion 50. In certain embodiments, as shown in Figs. 1-7, each protrusion 50 is an inverted V-shaped extension of the crest 22 and flank portions 28 of the thread 20, and the peak 52 of each protrusion 50 is pointed.

[0011] The helical thread 20 of the fastener 1, shown in Figs. 1-7, is exemplary with three sets of three protrusions 50 with each protrusion 50 of a set being spaced 120 degrees apart on the helical thread 20. A first set of protrusions 50 is located on a first full thread 30 at the first end 11 of the elongated body 10 with the other sets of protrusions 50 located on the adjacent threads. The protrusions 50 of each set are aligned with corresponding protrusions 50 of the other sets located on adjacent threads, such that corresponding protrusions are aligned with one another along a longitudinal axis extending from the first end 11 to the second end 12 of the elongated body 10. The first end 11 of the elongated body 10 may include a head 15 for driving the fastener 1 into a work piece or material. Although the head 15 shown in Fig. 2 discloses a flanged hexagonal head for engagement with a driving tool, other types of drive arrangements known in the art may be used, including, but not limited to, slotted, Phillips, Allen, or hex-socket drive types. Further, as shown in Figs. 1, 6, and 7, the second end 12 of the elongated body 10 may be provided with a drill point.

[0012] During installation of the fastener 1, the tapping torque and the clamping torque are increased by friction caused by the protrusions 50 of the helical thread 20 compressing the thin gauge metal 60 between the flank portions 28 of the helical thread 20. After the fastener is tightened and vibrations or other forces cause the fastener to start to loosen, the protrusions 50 of the thread 20 compress the thin gauge metal 60 between the flank portions 28 producing friction and thus increasing the back-out torque of the fastener 1.

[0013] In another embodiment, shown in Figs. 8 and 9, a fastener 101 including an elongated body 110 with a first end 11 and a second end 112, and a helical thread 120 formed on at least a portion of the elongated body 110 is provided. The helical thread 120 has a crest 122, a root 125, and flank portions 128. Similar to the embodiment discussed above, the helical thread 120 has at least one protrusion 150 extending from the crest 122 and flank

portions 128 toward the first end 111 of the elongated body 110. Each protrusion 150 extending from the crest 122 and the flank portions 128 of the thread 120 has a first side 155 and a second side 156. The first side 155 of each protrusion 150 has an angle that is at least on the order of 90 degrees with respect to an upper portion 123 of the helical thread 120 adjacent to each protrusion 150. The second side 156 of each protrusion 150 has an angle that is at least on the order of 90 degrees with respect to a lower portion 124 of the helical thread 120 adjacent to each protrusion 150.

[0014] In particular, the helical thread 120 of the fastener 101, shown in Figs. 8 and 9, is exemplary with four protrusions 150 located on a middle portion 113 of the elongated body 110. The fastener 101 may also be provided with four sets of three protrusions 150 in this example, with each protrusion 150 within a set spaced 120 degrees apart from one another. The protrusions 150 may be aligned with the protrusions 150 located on adjacent threads of the helical thread 120, such that the protrusions 150 are aligned with one another along a longitudinal axis extending from the first end 111 to the second end 112 of the elongated body 110. The first end 111 of the elongated body 110 may include a head 115 for driving the fastener 101 into a work piece or material. Further, the second end 112 of the elongated body 110 may be tapered substantially to a point for engaging a material, such as wood 165 shown in Figs. 8 and 9.

[0015] During installation of the fastener 101 into the wood material 165, more clearly shown in Fig. 9, the protrusions 150 redirect and compress the wood fibers, thereby increasing the tapping torque and the clamping torque of the fastener 101. After the fastener 101 is tightened and the wood material 165 beings to shrink, the protrusions 150 of the thread 120 must re-tap the wood, which increases the back-out torque of the fastener 101.

[0016] In a further embodiment, shown in Figs. 10-16, a fastener 201 including an elongated body 210 with a first end 211 and a second end 212, and a helical thread 220 formed on at least a portion of the elongated body 210 is provided. The helical thread 220 has a crest 222, a root 225, and flank portions 228. Similar to the embodiments discussed above, the helical thread 220 has at least one protrusion 250 extending from the crest 222 and flank portions 228 toward the first end 211 of the elongated body 210. However, as more clearly shown in Figs. 11, 12, and 16, each of the protrusions 250 defines an interruption 254 in the helical thread 220. Also, each of the protrusions 250 has a peak 252 that extends to the root 225 of the thread 220. The peak 252 of each protrusion 250 has a height of at least 50 percent of a root length 226 measured from an intersection point 257 of the root 225 and the flank portion 228 closest to the first end 211 of the elongated body 210. Each protrusion 250 extending from the crest 222 and the flank portions 228 of the thread 220 has a first side 255 and a second side 256. The first side 255 of each protrusion 250 is located adjacent to the interruption 254 in the helical thread 220. Although the first side 255 of each protrusion 250 shown in Fig. 11 is substantially vertical, the first side 255 may be sloped or angled. The second side 256 of each protrusion 250 has an angle that is at least on the order of 90 degrees with respect to a lower portion 224 of the helical thread 220 adjacent to each protrusion 250.

[0017] The helical thread 220 of the fastener 201, shown in Figs. 10-16, is provided with four protrusions 250 defining interruptions 254 located on a middle portion 213 of the elongated body 210. The fastener 201 may also be provided with four sets of three protrusions 250 in this example, with each protrusion 250 within a set spaced 120 degrees apart from one another. The protrusions 250 may be aligned with the protrusions 250 located on adjacent threads of the helical thread 220, such that the protrusions 250 and the interruptions 254 are aligned with one another along a longitudinal axis extending from the first end 211 to the second end 212 of the elongated body 210. The peak 252 of each protrusion 250 may be pointed. The first end 211 of the elongated body 210 may include a head 215 for driving the fastener 201 into a work piece or material. Further, the second end 212 of the elongated body 210 may be tapered substantially to a point for engaging a material, such as metal 260 or wood 265.

[0018] During installation of the fastener 201 into a metal material 260, shown in Figs. 12-14, the tapping torque and the clamping torque are increased by friction caused by the protrusions 250 of the helical thread 220 compressing the thin gauge metal 260 between the flank portions 228 of the helical thread 220. After the fastener is tightened and vibrations or other forces cause the fastener to start to loosen, the protrusions 250 of the thread 220 compress the thin gauge metal 260 between the flank portions 228 producing friction and thus increasing the back-out torque of the fastener 201. During installation of the fastener 201 into a wood material 265, more clearly shown in Figs. 15 and 16, the protrusions 250 redirect and compress the wood fibers, thereby increasing the tapping torque and the clamping torque of the fastener 201. After the fastener 201 is tightened and the wood material 265 beings to shrink, the protrusions 250 of the thread 220 must re-tap the wood 265, which increases the back-out torque of the fastener 201.

[0019] In yet another embodiment, shown in Figs. 17-19, a fastener 301 including an elongated body 310 with a first end 311 and a second end 312, and a helical thread 320 formed on at least a portion of the elongated body 310 is provided. The helical thread 320 has a crest 322, a root 325, and flank portions 328. Similar to the embodiments discussed above, the helical thread 320 has at least one protrusion 350 extending from the crest 322 and flank portions 328 toward the first end 311 of the elongated body 310.

[0020] As more clearly shown in Fig. 18, each of the protrusions 350 defines an interruption 354 in the helical thread 320. Each of the protrusions 350 has a peak 352 that extends to the root 325 of the thread 320. The peak

352 of each protrusion 350 has a height of at least 50 percent of a root length 326 measured from an intersection point 357 of the root 325 and the flank portion 328 closest to the first end 311 of the elongated body 310. Each protrusion 350 extending from the crest 322 and the flank portions 328 of the thread 320 has a first side 355 and a second side 356. The first side 355 of each protrusion 350 is located adjacent to the interruption 354 in the helical thread 320. Although the first side 355 of each protrusion 350 shown in Fig. 18 is substantially vertical, the first side 355 may be sloped or angled. The second side 356 of each protrusion 350 has an angle that is at least on the order of 90 degrees with respect to a lower portion 324 of the helical thread 320 adjacent to each protrusion 350. The fastener 301 further includes at least one downward protrusion 370, which extends from the crest 322 and flank portions 328 toward the second end 312 of the elongated body 310. The downward protrusion 370 has a peak 372 that extends to the root 325 of the thread 320. As shown in Figs. 17-19, the peak 352 of each protrusion 350 and the peak 372 of each downward protrusion 370 may be pointed

[0021] The fastener 301, shown in Figs. 17-19, may include three protrusions 350 defining interruptions 354 located on a middle portion 313 of the elongated body 310. The fastener 301 may also be provided with three sets of two protrusions 350 in this example, with each protrusion 350 within a set spaced 180 degrees apart from one another. The protrusions 350 may be aligned with the protrusions 350 located on adjacent threads of the helical thread 320, such that the protrusions 350 and the interruptions 354 are aligned with one another along a longitudinal axis extending from the first end 311 to the second end 312 of the elongated body 310. The downward protrusion 370 may be provided on the last full thread 335 of the helical thread 320. The fastener 301 may be provided with two downward protrusions 370 spaced 180 degrees apart from one another. The first end 311 of the elongated body 310 may include a head 315 for driving the fastener 301 into a work piece or material. Further, the second end 312 of the elongated body 310 may be tapered substantially to a point for engaging a material, such as metal or wood.

[0022] During installation of the fastener 301 into a material, the downward protrusion 370 engages the material and helps prevent the formation of burrs in the material. Further, the tapping torque and the clamping torque are increased by friction caused by the protrusions 350 of the helical thread 320 compressing the material between the flank portions 328 of the helical thread 320. After the fastener is tightened, the protrusions 350 of the thread 320 compress the material between the flank portions 328 producing friction and thus increasing the back-out torque of the fastener 301.

[0023] While certain embodiments of the threaded fastener were described in the foregoing detailed description, those skilled in the art may make modifications and alterations to these embodiments without departing from the scope and spirit of the invention. Accordingly, the foregoing description is intended to be illustrative rather than restrictive. The invention described hereinabove is defined by the appended claims and all changes to the invention that fall within the meaning and the range of equivalency of the claims are to be embraced within their scope.

Claims

1. Afastener (1, 101, 201, 301) comprising:

   an elongated body (10, 110, 210, 210) having a first end (11, 111, 211, 311) and a second end (12, 112, 212, 312); and
   a helical thread (20, 120, 220, 320) formed on at least a portion of the elongated body, the thread comprising a crest (22, 122, 222, 322), a root (25, 125, 225, 325), and flank (28, 128, 228, 328) portions,
   wherein the helical thread (20, 120, 220, 320) comprises at least one protrusion (50, 150, 250, 350) extending from the crest (22, 122, 222, 322) and flank (28, 128, 228, 328) portions toward the first end (11, 111, 211, 311) of the elongated body (10, 110, 210, 210), **characterised in that** each protrusion comprises a pointed peak (52, 152, 252, 352) that extends from the crest (22, 122, 222, 322) to the root (25, 125, 225, 325) of the thread.

2. The fastener as claimed in claim 1, wherein each protrusion (50, 150) has a first side (55, 155) and a second side (56, 156), the first side having an angle of at least about 90 degrees with respect to an upper portion (23, 123) of the helical thread (20, 120) adjacent to each protrusion (50, 150), the second side (56, 156) having an angle of at least about 90 degrees with respect to a lower portion (24, 124) of the helical thread (20, 120) adjacent to each protrusion (50, 150).

3. The fastener as claimed in claim 1 or claim 2, wherein the pointed peak (52, 152, 252, 352) of each protrusion (50, 150, 250, 350) has a height of at least 50 percent of the root length (26, 126, 226, 326) from an intersection point (57, 157, 257, 357) of the root and flank portion closest to the first end (11, 111, 211, 311) of the elongated body (10, 110, 210, 210).

4. The fastener as claimed in any preceding claim, wherein each protrusion (50, 150, 350) is a V-shaped extension of the crest and flank portions of the helical thread (20, 120, 320).

5. The fastener as claimed in any preceding claim, wherein each protrusion (250, 350) defines an inter-

ruption (254, 354) in the helical thread (220, 320).

6. The fastener as claimed in any preceding claim, wherein the helical thread (20, 120, 220, 320) includes a plurality of protrusions (50, 150, 250, 350) spaced equally apart around the circumference of the elongated body (10, 110, 210, 210) on a first full thread beginning at the first end (11, 111, 211, 311) of the elongated body.

7. The fastener as claimed in any one of claims 1 to 5, wherein the helical thread (20, 120, 220, 320) includes at least one set of protrusions (50, 150, 250, 350), each set having a plurality of protrusions (50, 150, 250, 350) spaced equally apart around the circumference of the elongated body (10, 110, 210, 210).

8. The fastener as claimed in claim 7, wherein a first set of protrusions (50) is located on a first full thread at the first end (11) of the elongated body (10) with the remaining sets of protrusions (50) located on adjacent threads.

9. The fastener as claimed in claim 8, wherein each protrusion (50) of each set is aligned with a corresponding protrusion (50) of the other sets of protrusions (50), such that corresponding protrusions (50) are aligned with a longitudinal axis extending from the first end (11) of the elongated body (10) to the second end (12) of the elongated body (10).

10. The fastener as claimed in any preceding claim, wherein the helical thread (320) further includes at least one downward protrusion (370) extending from the crest (322) and flank (328) portions toward the second end (312) of the elongated body (310), and each downward protrusion (370) has a peak (372) that extends to the root (325) of the thread (320).

11. The fastener as claimed in claim 10, wherein each downward protrusion (370) is provided on a last full thread at the second end (312) of the elongated body (310).

12. The fastener as claimed in any preceding claim, wherein the first end (11, 111, 211, 311) of the elongated body (10, 110, 210, 310) includes a head (15, 115, 215, 315) for driving the fastener.

Patentansprüche

1. Befestigungsmittel (1, 101, 201, 301), umfassend:

einen länglichen Körper (10, 110, 210, 210) mit einem ersten Ende (11, 111, 211, 311) und einem zweiten Ende (12, 112, 212, 312); sowie

ein schraubenförmiges Gewinde (20, 120, 220, 320), das auf zumindest einem Abschnitt des länglichen Körpers ausgebildet ist, wobei das Gewinde eine Spitze (22, 122, 222, 322), einen Grund (25, 125, 225, 325) und Flankenabschnitte (28, 128, 228, 328) umfasst,
worin das schraubenförmige Gewinde (20, 120, 220, 320) zumindest einen Vorsprung (50, 150, 250, 350) umfasst, der sich von der Spitze (22, 122, 222, 322) und den Flankenabschnitten (28, 128, 228, 328) hin zum ersten Ende (11, 111, 211, 311) des länglichen Körpers (10, 110, 210, 210) erstreckt, **dadurch gekennzeichnet, dass** jeder Vorsprung eine spitze Zacke (52, 152, 252, 352) umfasst, die sich von der Spitze (22, 122, 222, 322) zum Grund (25, 125, 225, 325) des Gewindes erstreckt.

2. Befestigungsmittel nach Anspruch 1, worin jeder Vorsprung (50, 150) eine erste Seite (55, 155) und eine zweite Seite (56, 156) aufweist, wobei die erste Seite in Bezug auf einen oberen Abschnitt (23, 123) des schraubenförmigen Gewindes (20, 120), der an jeden Vorsprung (50, 150) angrenzt, einen Winkel von zumindest etwa 90 Grad aufweist, und die zweite Seite (56, 156) in Bezug auf einen unteren Abschnitt (24, 124) des schraubenförmigen Gewindes (20, 120), der an jeden Vorsprung (50, 150) angrenzt, einen Winkel von zumindest etwa 90 Grad aufweist.

3. Befestigungsmittel nach Anspruch 1 oder Anspruch 2, worin die spitze Zacke (52, 152, 252, 352) jedes Vorsprungs (50, 150, 250, 350) von einem Schnittpunkt (57, 157, 257, 357) des Grundes und des Flankenabschnittes, der am nächsten zum ersten Ende (11, 111, 211, 311) des länglichen Körpers (10, 110, 210, 210) ist, eine Höhe von zumindest 50 Prozent der Grundlänge (26, 126, 226, 326) aufweist.

4. Befestigungsmittel nach einem der vorangehenden Ansprüche, worin jeder Vorsprung (50, 150, 350) eine V-förmige Erweiterung der Spitze und der Flankenabschnitte des schraubenförmigen Gewindes (20, 120, 320) ist.

5. Befestigungsmittel nach einem der vorangehenden Ansprüche, worin jeder Vorsprung (250, 350) eine Unterbrechung (245, 345) im schraubenförmigen Gewinde (220, 320) definiert.

6. Befestigungsmittel nach einem der vorangehenden Ansprüche, worin das schraubenförmige Gewinde (20, 120, 220, 320) eine Vielzahl von Vorsprüngen (50, 150, 250, 350) umfasst, die um den Umfang des länglichen Körpers (10, 110, 210, 210) verteilt auf einem ersten vollen Gewindegang beginnend am ersten Ende (11, 111, 211, 311) des länglichen Körpers gleichmäßig voneinander beabstandet sind.

7. Befestigungsmittel nach einem der vorangehenden Ansprüche 1 bis 5, worin das schraubenförmige Gewinde (20, 120, 220, 320) zumindest einen Satz von Vorsprüngen (50, 150, 250, 350) umfasst, wobei jeder Satz eine Vielzahl von Vorsprüngen (50, 150, 250, 350) umfasst, die um den Umfang des länglichen Körpers (10, 110, 210, 210) verteilt gleichmäßig voneinander beabstandet sind.

8. Befestigungsmittel nach Anspruch 7, worin ein erster Satz von Vorsprüngen (50) auf einem ersten vollen Gewindegang am ersten Ende (11) des länglichen Körpers (10) angeordnet ist, wobei die restlichen Sätze von Vorsprüngen (50) auf angrenzenden vollen Gewindegängen angeordnet sind.

9. Befestigungsmittel nach Anspruch 8, worin jeder Vorsprung (50) jedes Satzes zu einem entsprechenden Vorsprung (50) der anderen Sätze von Vorsprüngen (50) fluchtend ausgerichtet ist, sodass entsprechende Vorsprünge (50) fluchtend zu einer Längsachse ausgerichtet sind, die sich von dem ersten Ende (11) des länglichen Körpers (10) zu dem zweiten Ende (12) des länglichen Körpers (10) erstreckt.

10. Befestigungsmittel nach einem der vorangehenden Ansprüche, worin das schraubenförmige Gewinde (320) ferner zumindest einen nach unten gerichteten Vorsprung (370) umfasst, der sich von der Spitze (322) und den Flankenabschnitten (328) hin zum zweiten Ende (312) des länglichen Körpers (310) erstreckt, und jeder nach unten gerichtete Vorsprung (370) eine Zacke (372) aufweist, die sich zum Grund (325) des Gewindes (320) erstreckt.

11. Befestigungsmittel nach Anspruch 10, worin jeder nach unten gerichtete Vorsprung (370) auf einem letzten vollen Gewindegang am zweiten Ende (312) des länglichen Körpers (310) bereitgestellt ist.

12. Befestigungsmittel nach einem der vorangehenden Ansprüche, worin das erste Ende (11, 111, 211, 311) des länglichen Körpers (10, 110, 210, 310) ein Kopfstück (15, 115, 215, 315) zum Vorantreiben des Befestigungsmittels umfasst.

Revendications

1. Elément de fixation (1, 101, 201, 301), comprenant :

   un corps allongé (10, 110, 210, 210) ayant une première extrémité (11, 111, 211, 311) et une seconde extrémité (12, 112, 212, 312) ; et
   un filet hélicoïdal (20, 120, 220, 320) formé sur au moins une partie du corps allongé, le filet comportant une crête (22, 122, 222, 322), un fond (25, 125, 225, 325), et des parties de flanc (28, 128, 228, 328),
   dans lequel le filet hélicoïdal (20, 120, 220, 320) comprend au moins une saillie (50, 150, 250, 350) s'étendant depuis la crête (22, 122, 222, 322) et les parties de flanc (28, 128, 228, 328) vers la première extrémité (11, 111, 211, 311) du corps allongé (10, 110, 210, 210), **caractérisé en ce que** chaque saillie comprend un sommet pointu (52, 152, 252, 352) qui s'étend à partir de la crête (22, 122, 222, 322) vers le fond (25, 125, 225, 325) du filet.

2. Elément de fixation selon la revendication 1, dans lequel chaque saillie (50, 150) présente un premier côté (55, 155) et un second côté (56, 156), le premier côté ayant un angle d'au moins environ 90 degrés par rapport à une partie supérieure (23, 123) du filet hélicoïdal (20, 120) adjacente à chaque saillie (50, 150), le second côté (56, 156) ayant un angle d'au moins environ 90 degrés par rapport à une partie inférieure (24, 124) du filet hélicoïdal (20, 120) adjacente à chaque saillie (50, 150).

3. Elément de fixation selon la revendication 1 ou la revendication 2, dans lequel le sommet pointu (52, 152, 252, 352) de chaque saillie (50, 150, 250, 350) a une hauteur d'au moins 50 pour cent de la longueur de fond (26, 126, 226, 326) à partir d'un point d'intersection (57, 157, 257, 357) du fond et de la partie de flanc le plus proche de la première extrémité (11, 111, 211, 311) du corps allongé (10, 110 , 210, 210).

4. Elément de fixation selon l'une quelconque des revendications précédentes, dans lequel chaque saillie (50, 150, 350) est une extension en forme de V de la crête et des parties de flanc du filet hélicoïdal (20, 120, 320).

5. Elément de fixation selon l'une quelconque des revendications précédentes, dans lequel chaque saillie (250, 350) définit une interruption (254, 354) dans le filet hélicoïdal (220, 320).

6. Elément de fixation selon l'une quelconque des revendications précédentes, dans lequel le filet hélicoïdal (20, 120, 220, 320) comprend une pluralité de saillies (50, 150, 250, 350) espacées de manière égale autour de la circonférence du corps allongé (10 , 110, 210, 210) sur un premier filet complet commençant au niveau de la première extrémité (11, 111, 211, 311) du corps allongé.

7. Elément de fixation selon l'une quelconque des revendications 1 à 5, dans lequel le filet hélicoïdal (20, 120, 220, 320) comprend au moins un ensemble de saillies (50, 150, 250, 350), chaque ensemble ayant une pluralité de saillies (50, 150, 250, 350) espacées

de manière égale autour de la circonférence du corps allongé (10, 110, 210, 210) .

8. Elément de fixation selon la revendication 7, dans lequel un premier ensemble de saillies (50) est situé sur un premier filet complet au niveau de la première extrémité (11) du corps allongé (10), les autres ensembles de saillies (50) étant situés sur des filets adjacents.

9. Elément de fixation selon la revendication 8, dans lequel chaque saillie (50) de chaque ensemble est alignée avec une saillie correspondante (50) des autres ensembles de saillies (50), de telle sorte que des saillies correspondantes (50) sont alignées avec un axe longitudinal s'étendant depuis la première extrémité (11) du corps allongé (10) vers la seconde extrémité (12) du corps allongé (10).

10. Elément de fixation selon l'une quelconque des revendications précédentes, dans lequel le filet hélicoïdal (320) comprend en outre au moins une saillie vers le bas (370) s'étendant depuis la crête (322) et les parties de flanc (328) vers la seconde extrémité (312) du corps allongé (310), et chaque saillie vers le bas (370) a un sommet (372) qui s'étend vers le fond (325) du filet (320).

11. Elément de fixation selon la revendication 10, dans lequel chaque saillie vers le bas (370) est prévue sur un dernier filet complet au niveau de la seconde extrémité (312) du corps allongé (310).

12. Elément de fixation selon l'une quelconque des revendications précédentes, dans lequel la première extrémité (11, 111, 211, 311) du corps allongé (10, 110, 210, 310) comprend une tête (15, 115, 215, 315) pour entraîner l'élément de fixation.

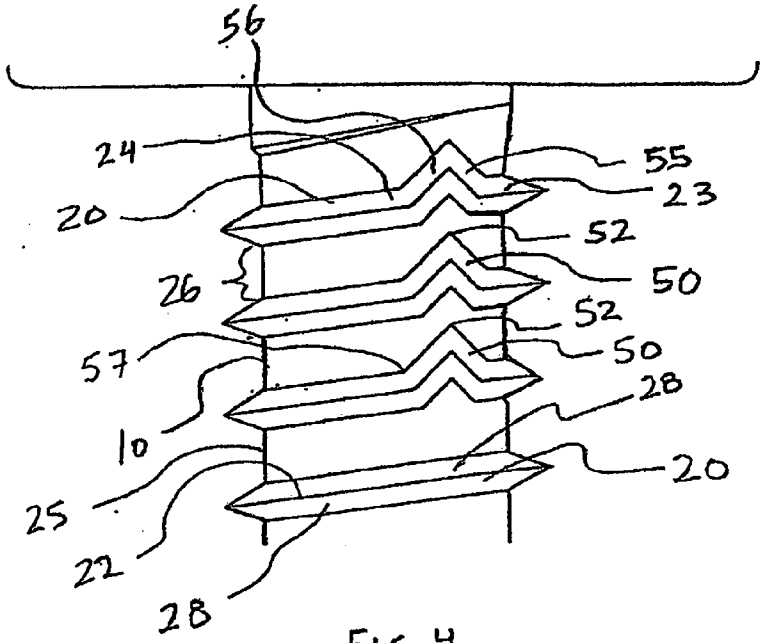


FIG. 4

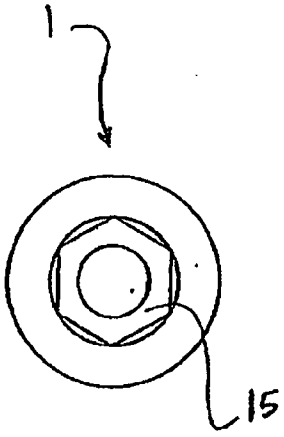


FIG. 2

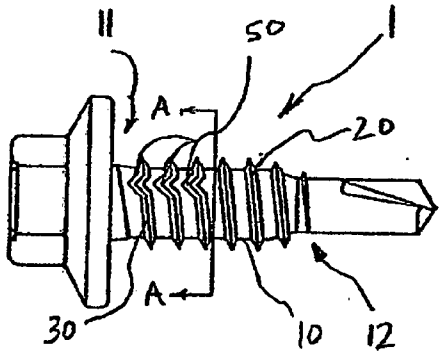


FIG. 1

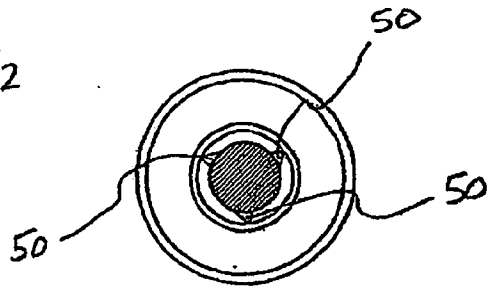


FIG. 3

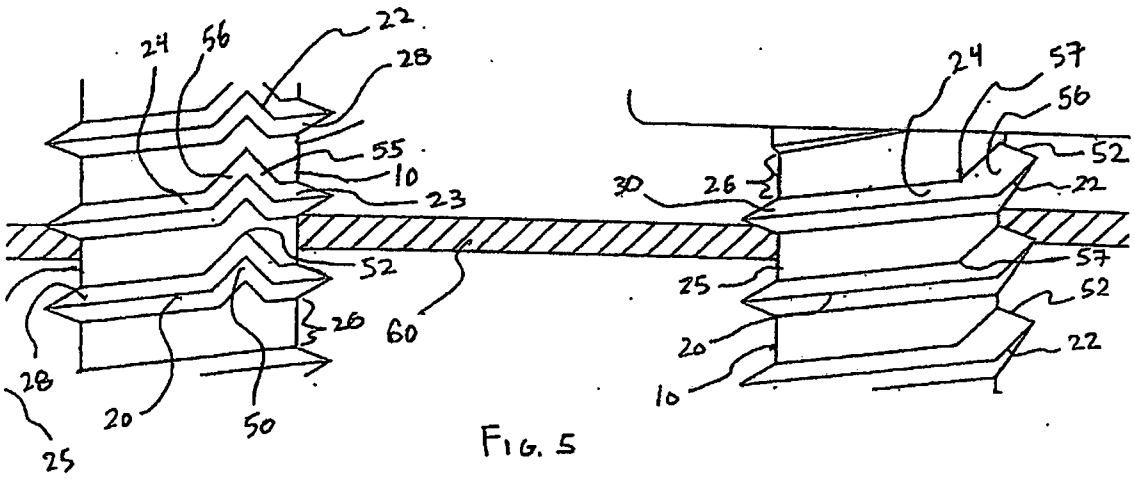


FIG. 5

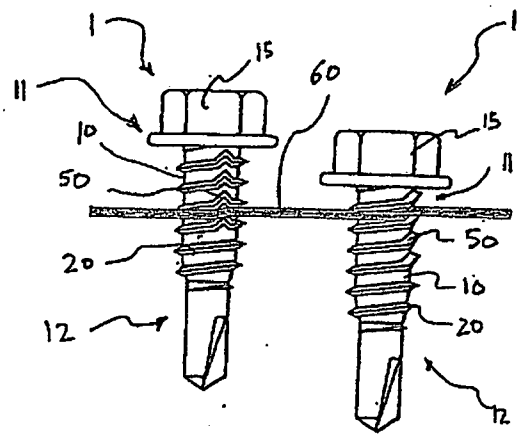


FIG. 6

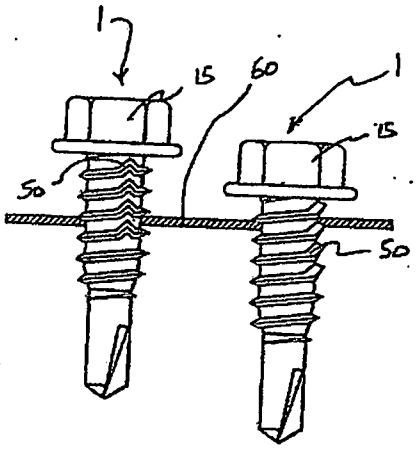


FIG. 7

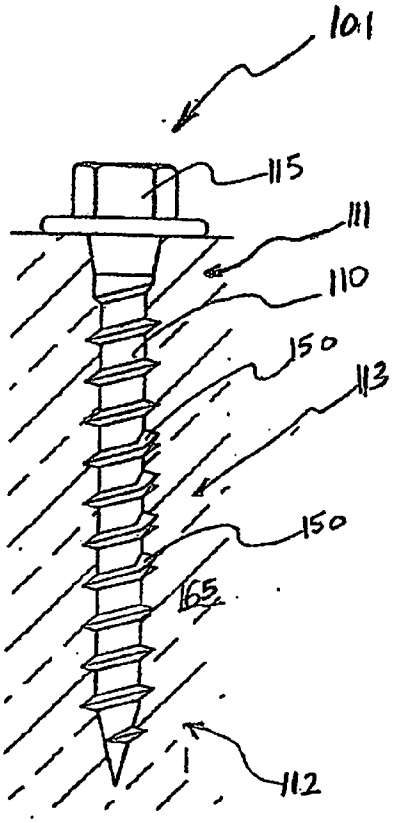
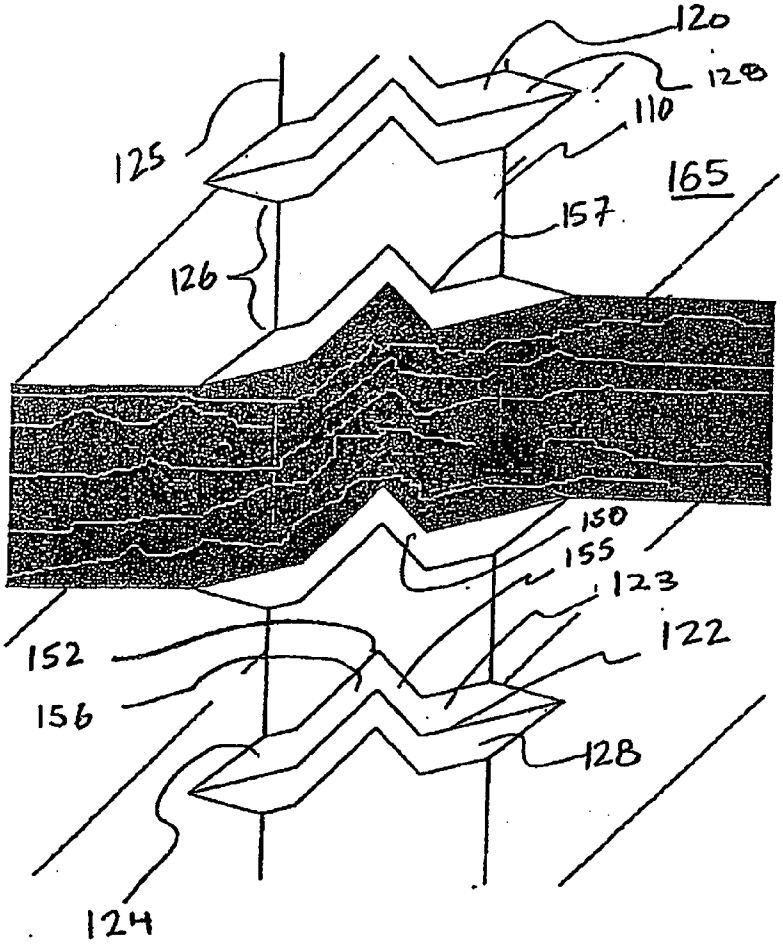

101
115
111
110
150
113
150
165
112

FIG. 8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128
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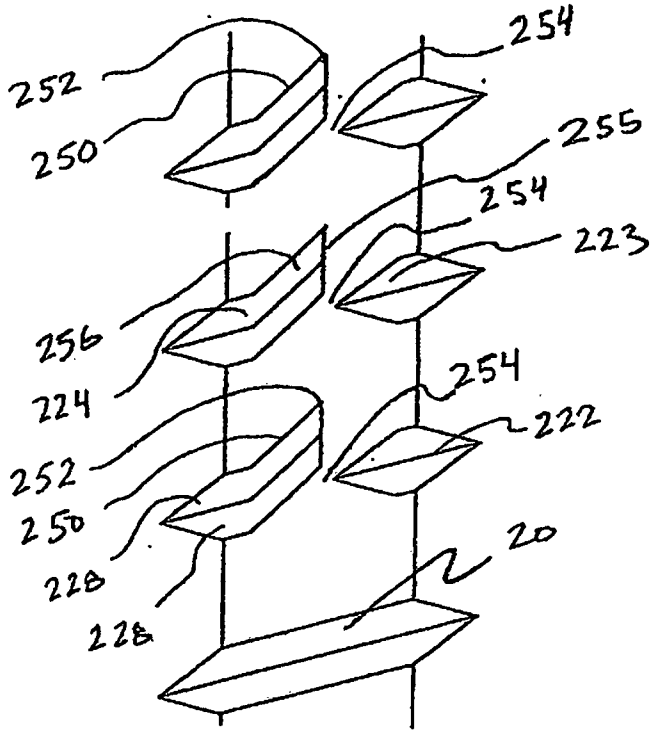
152
156
128
124

FIG. 9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223
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224
254
222
252
250
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20
228

FIG. 11

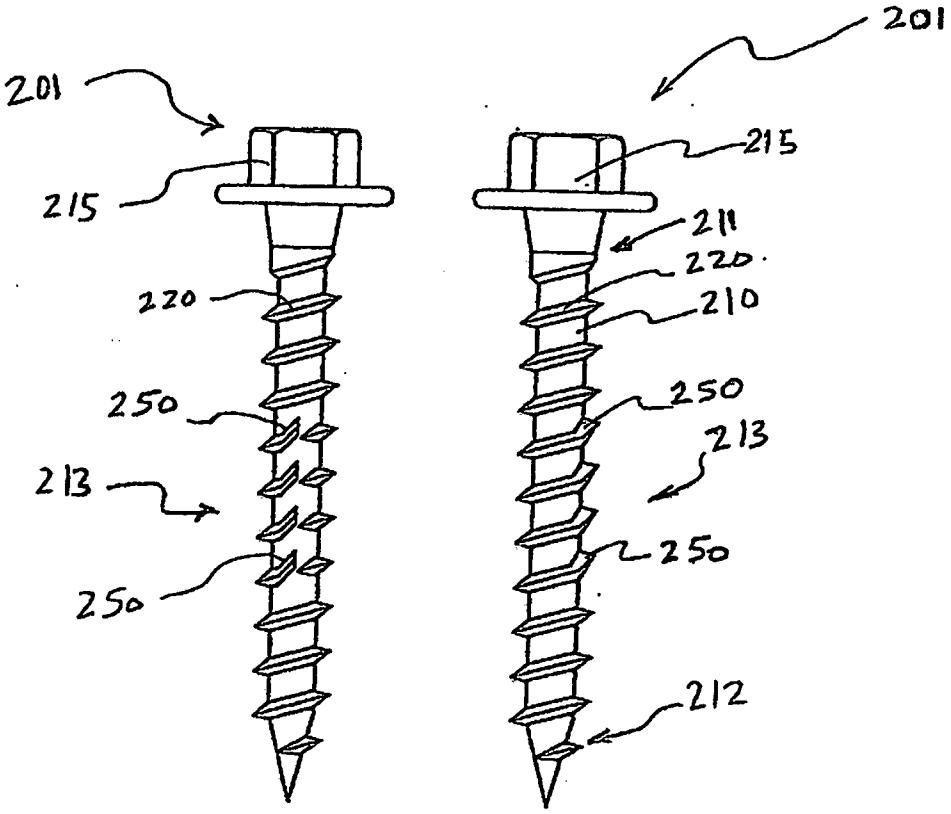
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FIG. 10

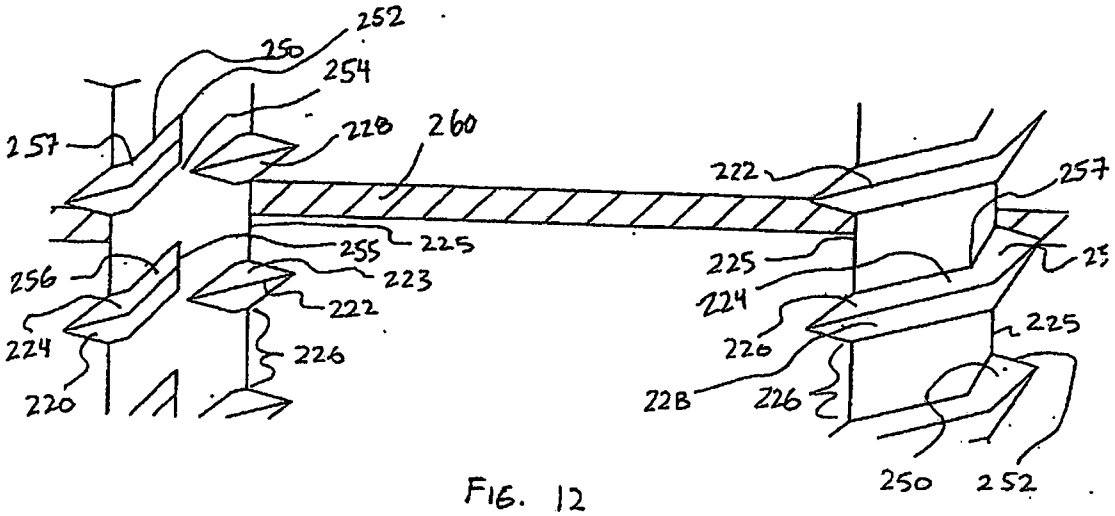

FIG. 12

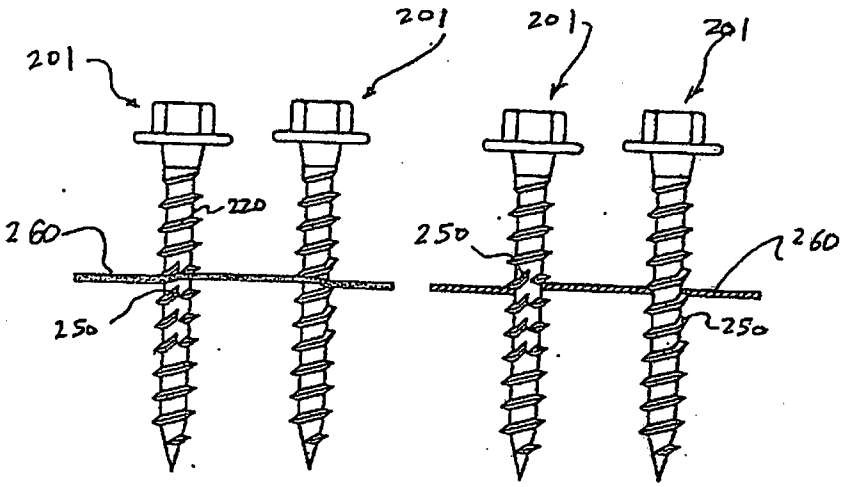

FIG. 13

FIG. 14

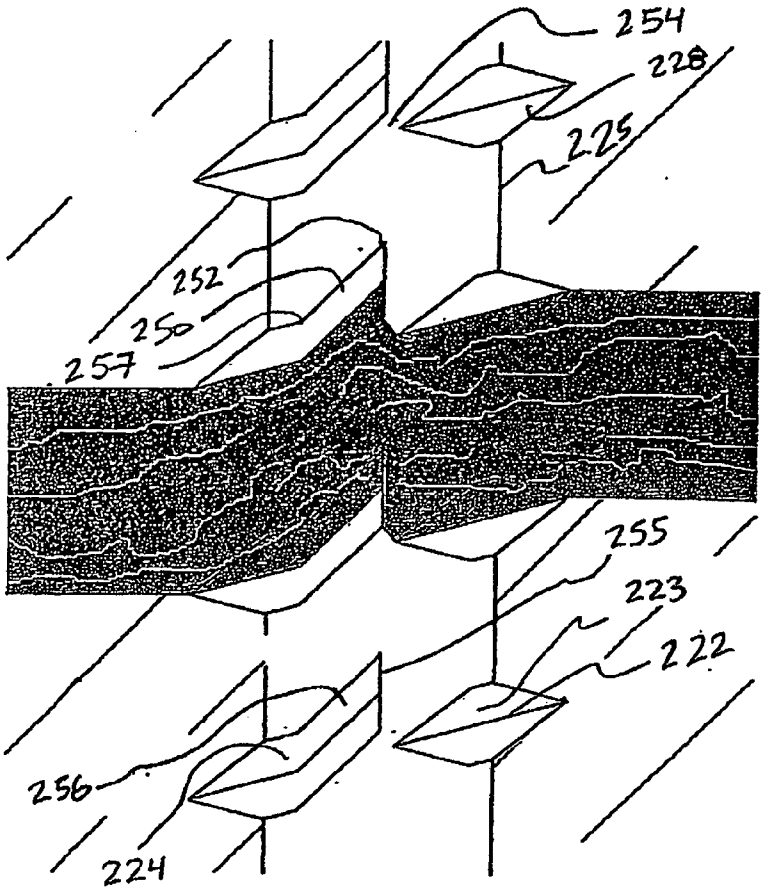
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FIG. 16

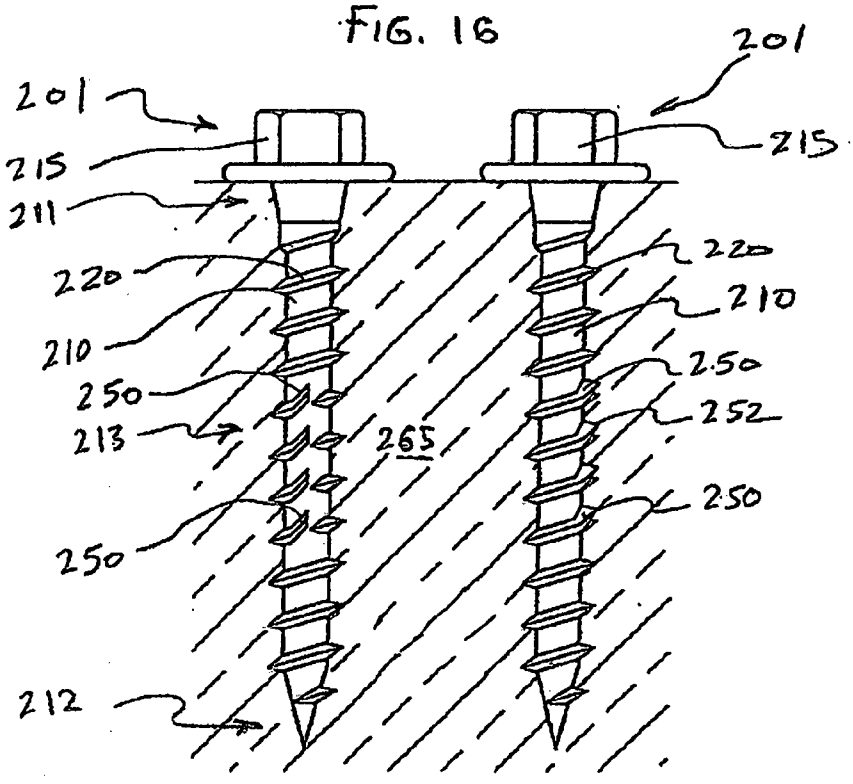
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FIG. 15

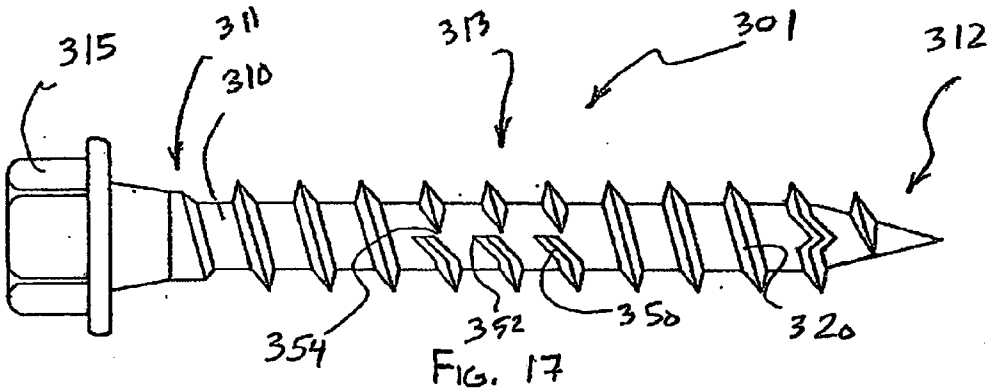


FIG. 17

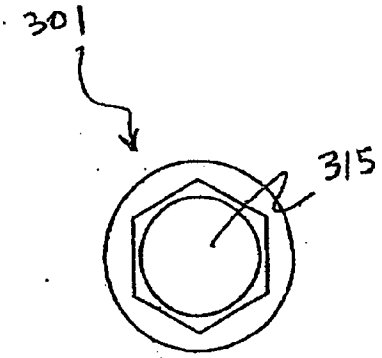
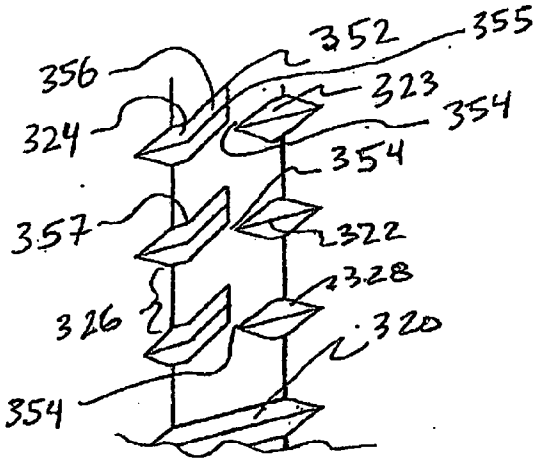


FIG. 19



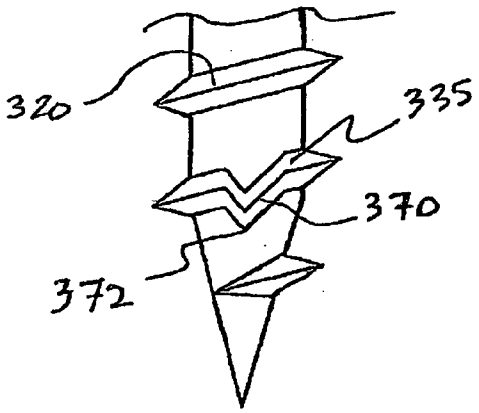


FIG. 18

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 3661194 A, Macfarlane **[0004]**
- GB 1209225 A **[0004]**

Szabadalmi igénypontok

1. Rögzítőelem (1, 101, 201, 301), amely tartalmaz

hosszúkás testet (10, 110, 210, 210), amelynek első vége (11, 111, 211, 311) és második vége (12, 112, 212, 312) van; és

csavarvonalas menetet (20, 120, 220, 320), amely a hosszúkás test legalább egy részén van kialakítva, a menet tartalmaz menetgerincet (22, 122, 222, 322), menetszelvénytövet (25, 125, 225, 325) és menetoldal (28, 128, 228, 328) részeket,

ahol a csavarvonalas menet (20, 120, 220, 320) tartalmaz legalább egy kiálló részt (50, 150, 250, 350), amely a menetgerinctől (22, 122, 222, 322) és a menetoldal (28, 128, 228, 328) részektől a hosszúkás test (10, 110, 210, 210) első vége (11, 111, 211, 311) felé nyúlik, **azzal jellemezve, hogy** mindegyik kiálló rész tartalmaz hegyes csúcsot (52, 152, 252, 352), amely a menet menetgerincétől (22, 122, 222, 322) a menet menetszelvénytöve (25, 125, 225, 325) felé nyúlik.

2. Az 1. igénypont szerinti rögzítőelem, amelyben mindegyik kiálló résznek (50, 150) van első oldala (55, 155) és második oldala (56, 156), az első oldalnak legalább közelítőleg 90 fokos szöge van a mindegyik kiálló rész (50, 150) szomszédságában lévő csavarvonalas menet (20, 120) felső szakaszához (23, 123) képest, a második oldalnak (56, 156) legalább közelítőleg 90 fokos szöge van mindegyik kiálló rész (50, 150) szomszédságában lévő csavarvonalas menet (20, 120) alsó szakaszához (24, 124) képest.

3. Az 1. vagy 2. igénypont szerinti rögzítőelem, amelyben mindegyik kiálló rész (50, 150, 250, 350) hegyes csúcsának (52, 152, 252, 352) magassága a menetszelvénytő és a menetoldal rész metszéspontjától (57, 157, 257, 357), amely a hosszúkás test (10, 110, 210, 210) első végéhez (11, 111, 211, 311) a legközelebb van, legalább 50%-a a menetszelvénytő hosszának (26, 126, 226, 326).

4. Az előző igénypontok bármelyike szerinti rögzítőelem, amelyben mindegyik kiálló rész (50, 150, 350) a csavarvonalas menet (20, 120, 320) menetgerincének és menetoldal részeinek V-alakú meghosszabbítása.

5. Az előző igénypontok bármelyike szerinti rögzítőelem, amelyben mindegyik kiálló rész (250, 350) egy megszakítást (254, 354) határoz meg a csavarvonalas menetben (220, 320).

6. Az előző igénypontok bármelyike szerinti rögzítőelem, amelyben a csavarvonalas menet (20, 120, 220, 320) több kiálló részt (50, 150, 250, 350) tartalmaz, amelyek egyenletesen vannak elosztva a hosszúkás test (10, 110, 210, 210) kerülete mentén egy első teljes meneten, amely a hosszúkás test első végénél (11, 111, 211, 311) kezdődik.

7. Az 1–5. igénypontok bármelyike szerinti rögzítőelem, amelyben a csavarvonalas menet (20, 120, 220, 320) tartalmazza a kiálló részek (50, 150, 250, 350) legalább egy készletét, mindegyik készletnek több kiálló része (50, 150, 250, 350) van, amelyek egyenletesen vannak elosztva a hosszúkás test (10, 110, 210, 210) kerülete mentén.

8. A 7. igénypont szerinti rögzítőelem, amelyben a kiálló részek (50) első készlete a hosszúkás test (10) első végénél (11) lévő első teljes meneten van elhelyezve, a kiálló részek (50) többi készletei szomszédos meneteken vannak elhelyezve.

9. A 8. igénypont szerinti rögzítőelem, amelyben mindegyik készlet mindegyik kiálló része (50) egy vonalban van a kiálló részek (50) más készleteinek megfelelő kiálló részével (50) úgy, hogy a megfelelő kiálló részek (50) egy vonalba vannak állítva egy hosszirányú tengellyel, amely a hosszúkás test (10) első végétől (11) a hosszúkás test (10) második végéig (12) terjed.

10. Az előző igénypontok bármelyike szerinti rögzítőelem, amelyben a csavarvonalas menet (320) tartalmaz továbbá legalább egy lefelé irányuló kiálló részt (370), amely a menetgerinctől (322) és a menetoldal (328) részektől a hosszúkás test (310) második vége (312) felé nyúlik, és mindegyik lefelé irányuló kiálló résznek

(370) van egy csúcsa (372), amely a menet (320) menetszelvénytöve (325) felé nyúlik.

11. A 10. igénypont szerinti rögzítőelem, amelyben mindegyik lefelé irányuló kiálló rész (370) a hosszúkás test (310) második végénél (312) lévő utolsó teljes meneten van.

12. Az előző igénypontok bármelyike szerinti rögzítőelem, amelyben a hosszúkás test (10, 110, 210, 310) első vége (11, 111, 211, 311) tartalmaz egy fejet (15, 115, 215, 315) a rögzítőelem becsavarásához.