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(54) **THREADED SCREW FASTENER CHARACTERIZED BY HIGH PULL-OUT RESISTANCE, REDUCED INSTALLATION TORQUE, AND UNIQUE HEAD STRUCTURE AND DRIVE SOCKET IMPLEMENT OR TOOL THEREFOR**

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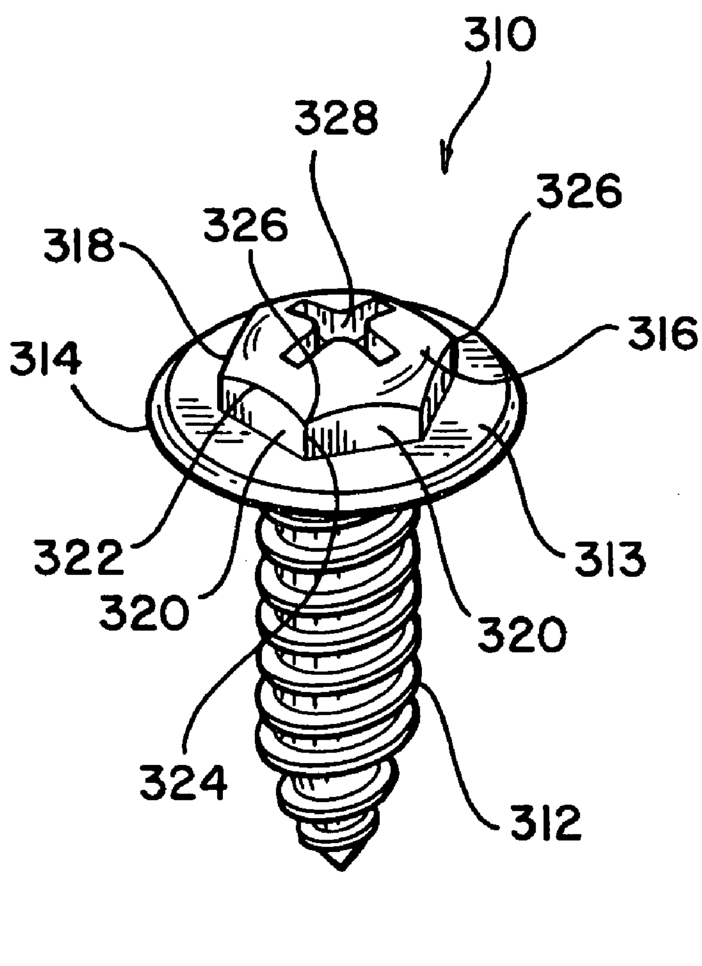
(52) **U.S. Cl.** **411/378**

(57) **ABSTRACT**

A threaded screw fastener is provided with thread structure wherein each thread of the threaded screw fastener comprises rearward and forward flank surfaces which effectively serve to enhance the pull-out resistance characteristics or properties of the threaded screw fastener while reducing the installation or insertion torque characteristics or properties of the threaded screw fastener. In addition, the forward and rearward flank surfaces of adjacent threads are separated from each other a predetermined amount so as to effectively capture overlapped edge portions of adjacent roofing panels in order to prevent backing out of the threaded screw fasteners even when the roofing panels undergo expansion and contraction as a result of being exposed to cyclically varying environmental or weather conditions.



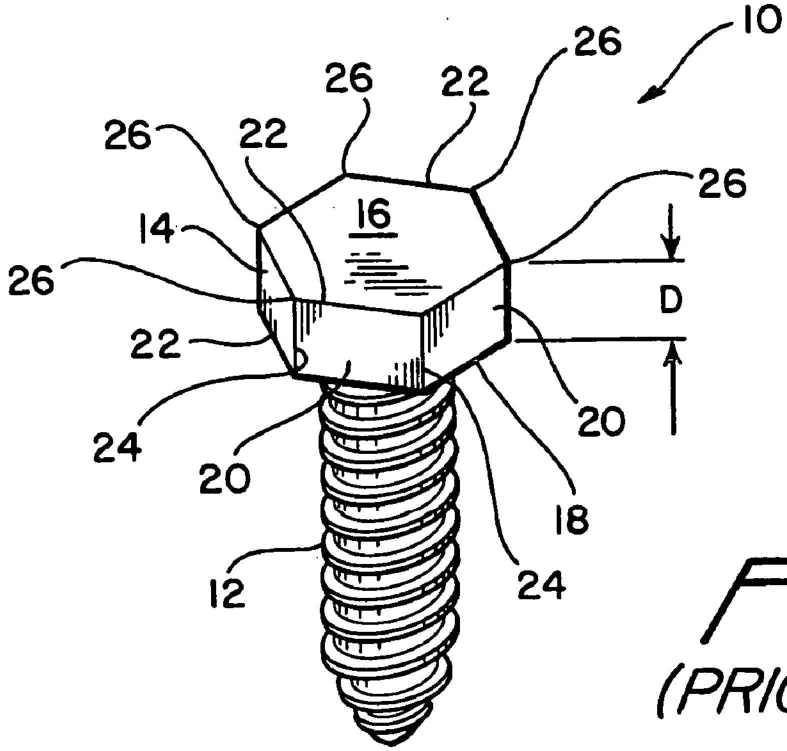


FIG. 1
(PRIOR ART)

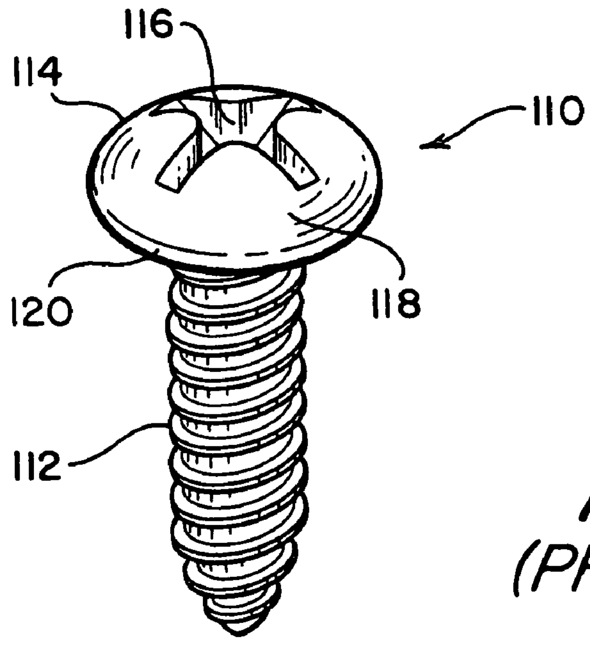


FIG. 2
(PRIOR ART)

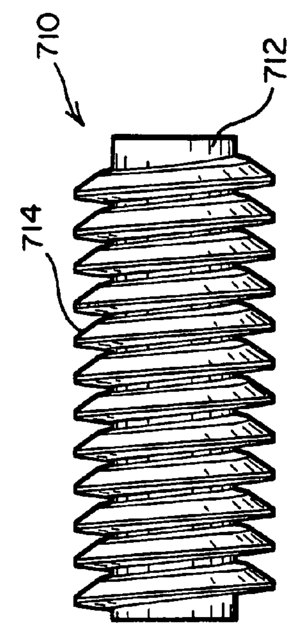


FIG. 10

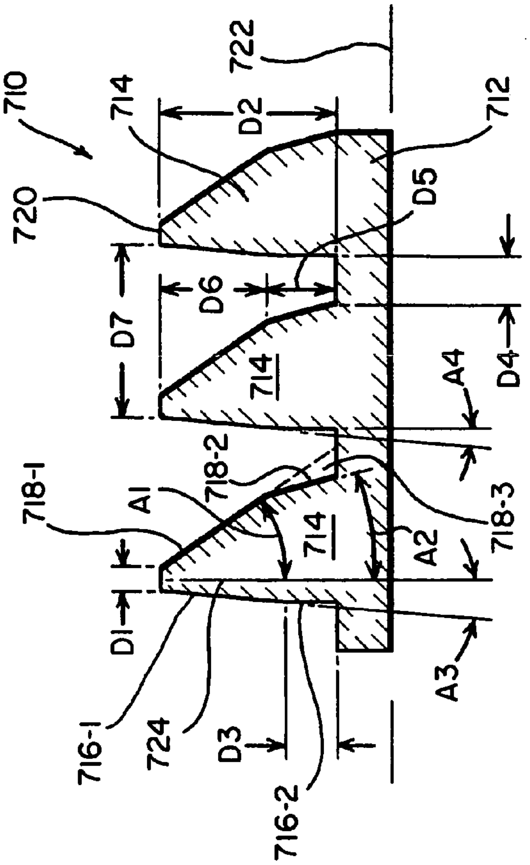


FIG. 11

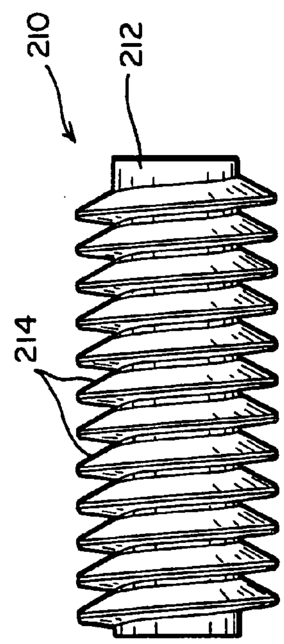


FIG. 3
(PRIOR ART)

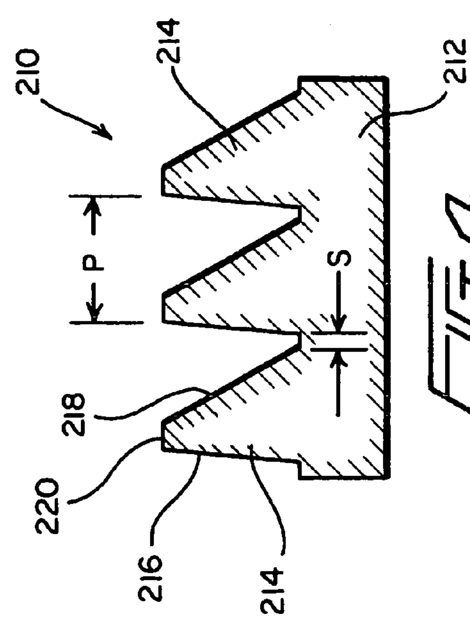


FIG. 4
(PRIOR ART)

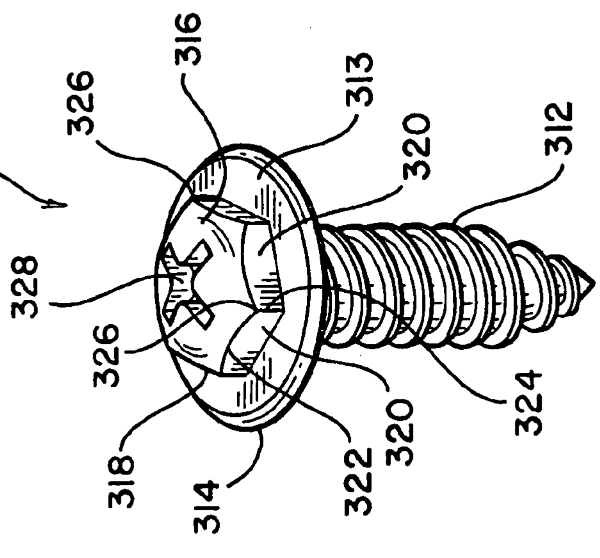


FIG. 5

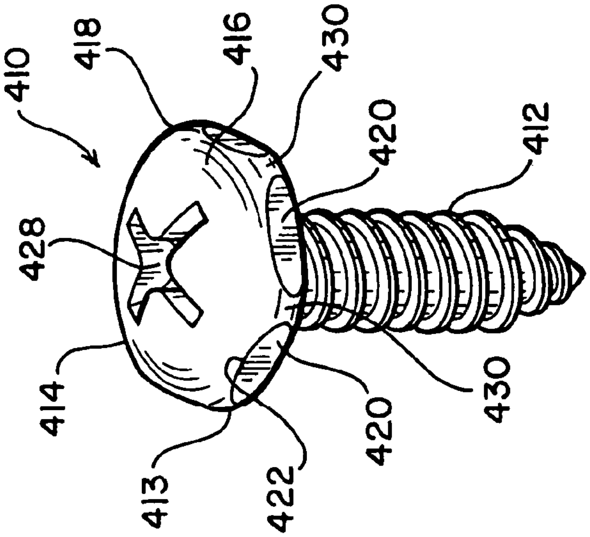


FIG. 6

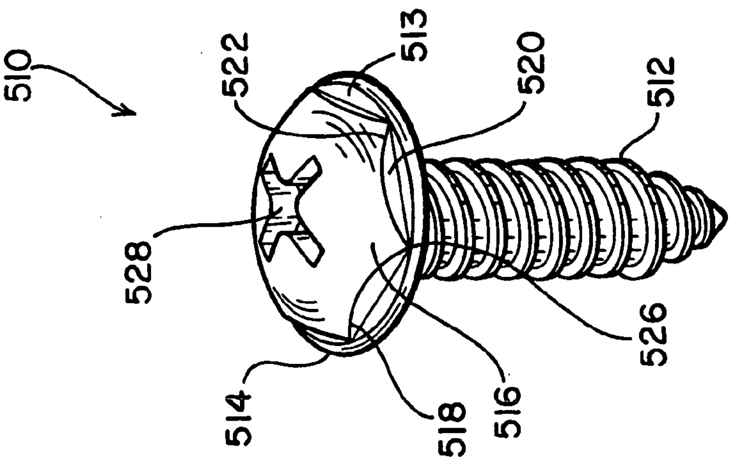
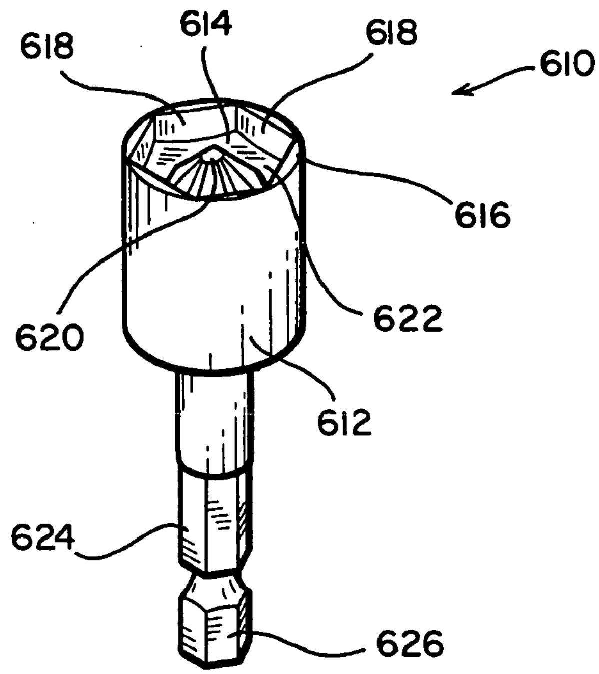
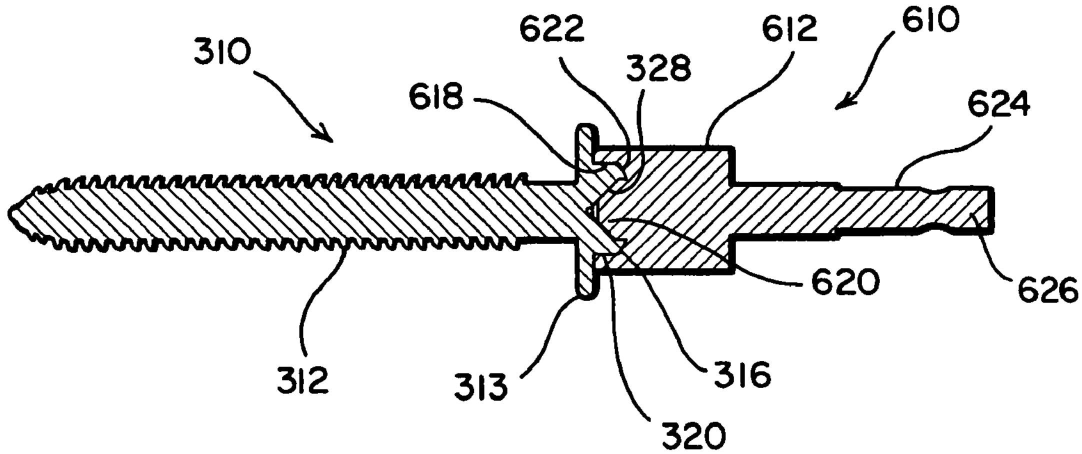


FIG. 7



614
618
618
610
616
620
622
612
624
626

FIG. 8



622
612
610
310
328
618
624
620
626
312
313
316
320

FIG. 9

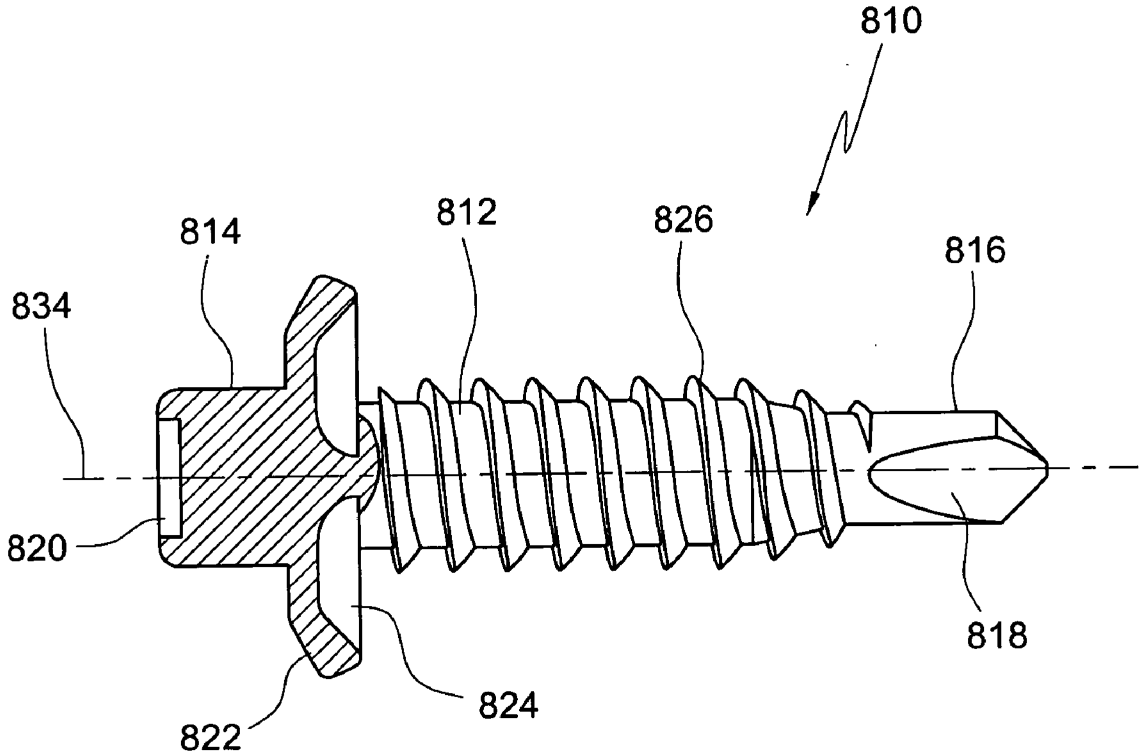


FIG. 12

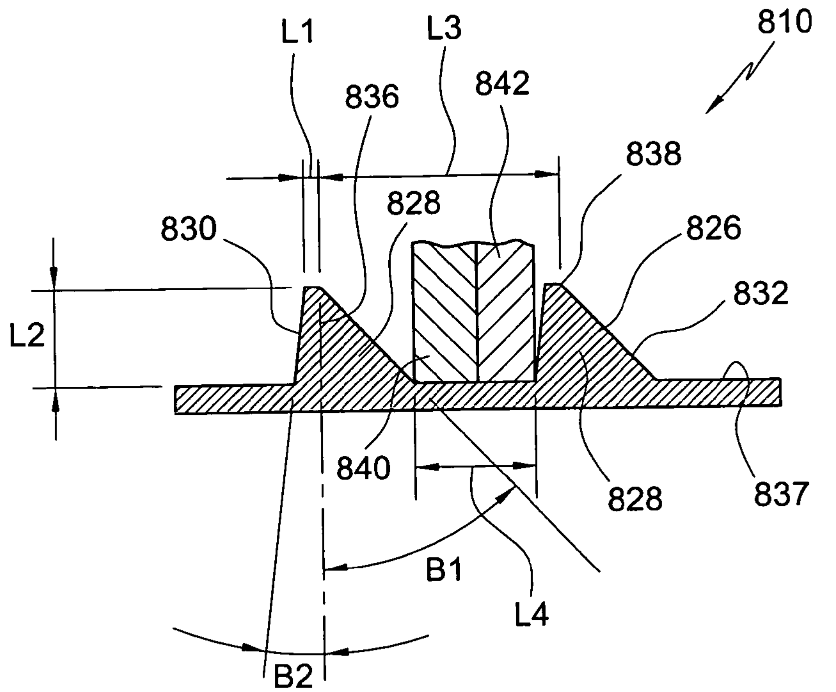

L1
L3
810
836
842
838
828
830
826
832
L2
840
828
837
B1
L4
B2

FIG. 13

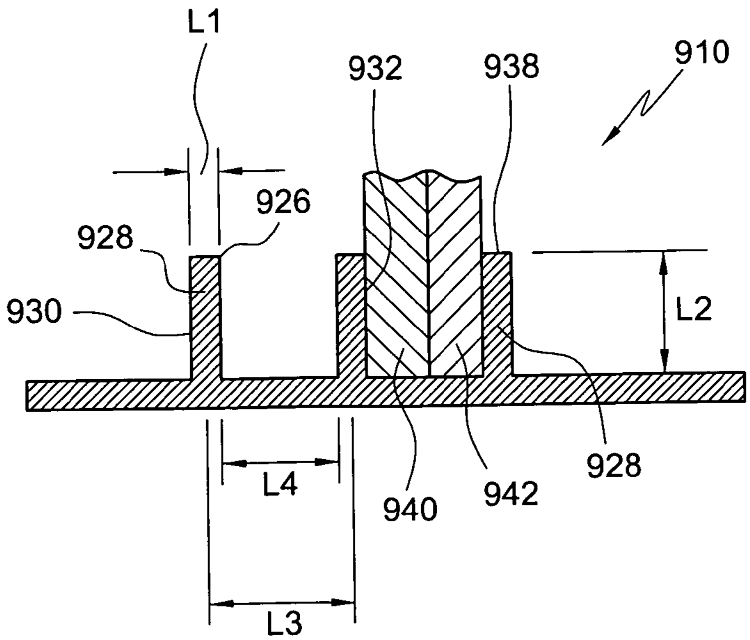

L1
932
938
910
926
928
930
L2
L4
940
942
928
L3

FIG. 14

THREADED SCREW FASTENER CHARACTERIZED BY HIGH PULL-OUT RESISTANCE, REDUCED INSTALLATION TORQUE, AND UNIQUE HEAD STRUCTURE AND DRIVE SOCKET IMPLEMENT OR TOOL THEREFOR

CROSS REFERENCE TO RELATED PATENT APPLICATION

[0001] This patent application is a Continuation-in-Part (CIP) patent application of U.S. patent application Ser. No. 10/681,193 which was filed on Oct. 9, 2003.

FIELD OF THE INVENTION

[0002] The present invention relates generally to threaded screw fasteners, and more particularly to a new and improved threaded screw fastener which has unique and novel buttress thread structure which effectively provides the new and improved threaded screw fastener with reduced installation or insertion torque characteristics, and which also effectively provides the new and improved threaded screw fastener with enhanced pull-out resistance characteristics, whereby the new and improved threaded screw fastener can be easily and readily inserted or installed, and retained, within various different substrates, such as, for example, steel, concrete, aluminum, wood, and thermoplastic materials. Still further, the new and improved threaded screw fastener has unique and novel head structure which not only enables the new and improved threaded screw fastener to be inserted or installed within a substrate as a result of being capable of being alternatively utilized either with a Phillips head drive socket implement or tool, or with a hexagonal drive socket implement or tool, but in addition, the head structure comprises low-profile domed structure such that when the new and improved threaded screw fastener is utilized to secure waterproof or environmental membranes upon roof decking assemblies, the new and improved head structure will not present any raised edge or sharply pointed corner structure which would otherwise tend to cut or pierce the waterproof or environmental membranes whereby the structural integrity of the waterproof or environmental membranes would be adversely affected as a result of propagated tearing or shredding of the same, particularly under high-wind, uplifting force conditions. A last embodiment of the threaded screw fastener also incorporates specific structure which not only enables its usage in connection with the seaming together of overlapped edge portions of adjacent roofing panels, but in addition enhances the back-out resistance of the threaded screw fasteners with respect to the roofing panels.

BACKGROUND OF THE INVENTION

[0003] When a threaded screw fastener is to be inserted or installed within a particular substrate, the threaded screw fastener must obviously be rotated in order to enable the threaded screw fastener to threadedly engage the substrate material. Accordingly, a rotational drive force must be imparted to the threaded screw fastener. Conventionally, the two most common means for imparting rotational drive forces to threaded screw fasteners is either by means of a hexagonal drive socket implement or tool which is adapted to engage a corresponding hexagonally configured head portion of the fastener, or alternatively, by means of a Phillips head drive socket implement or tool which is adapted to engage a correspondingly configured Phillips head portion of the fastener. Typical threaded screw fasteners, respectively having such a hexagonally configured head portion, or a Phillips head portion, are disclosed within **FIGS. 1 and 2**. More particularly, a first conventional PRIOR ART threaded fastener is disclosed within **FIG. 1** and is generally indicated by the reference character **10**.

[0004] The threaded fastener **10** is seen to comprise a threaded shank portion **12**, and a head portion **14**. The head portion **14** has a hexagonal cross-sectional configuration, and it is also seen that the hexagonally-configured head portion **14** has a constant depth dimension D, as defined between vertically spaced, horizontally disposed, upper and lower planar surfaces **16**,**18**. As a result of such structure, the hexagonally-configured head portion **14** exhibits a relatively large profile. Alternatively, a second conventional PRIOR ART threaded fastener is disclosed within **FIG. 2** and is generally indicated by the reference character **110**. The threaded fastener **110** is seen to comprise a similarly threaded shank portion **112**, and a head portion **114**. The head portion **114** is provided with a substantially X-shaped slotted region **116** which is recessed within the head portion **114** so as to be capable of accommodating a Phillips head drive socket implement or tool, and it is additionally seen that the upper surface **118** of the head portion **114** has a substantially domed configuration which circumferentially slopes downwardly so as to terminate in a relatively thin-dimensioned peripheral surface **120**.

[0005] While the conventional PRIOR ART threaded fasteners **10**,**110** normally exhibit satisfactory operational or performance characteristics, the conventional PRIOR ART threaded fasteners **10**,**110** do in fact exhibit some significant operational drawbacks. For example, different field personnel usually prefer to use a particular one of the two different types of conventional PRIOR ART threaded screw fasteners, and accordingly have suitable drive socket implements or tools for drivingly engaging the head portions of the particular threaded screw fasteners. The obvious problem with the existence or availability of the two different types of conventional PRIOR ART threaded screw fasteners resides in the manufacture and distribution of such threaded screw fasteners, that is, the threaded screw fastener manufacturers need to manufacture or fabricate the two different types of threaded screw fasteners, they need to stock the two different types of threaded screw fasteners in their available inventories, and they need to maintain proper and appropriate records in connection with the distribution of such different types of threaded screw fasteners to different distribution centers or end-use customers. Similar manufacturing, fabrication, inventory, distribution, and logistical problems correspondingly exist in connection with the availability of the suitable drive socket implements or tools for drivingly engaging the head portions of the different threaded screw fasteners. A need therefore exists in the art for a new and improved threaded screw fastener which is provided with a head portion that has integrally incorporated therein both hexagonal and Phillips head structure so as to be capable of being rotationally driven by means of a new and improved single drive socket implement or tool which likewise has integrally incorporated therein structure which is uniquely adapted to engage either one of the hexagonal and Phillips head structures integrally disposed upon the head portion of the threaded screw fastener.

[0006] In addition, it is seen that the vertically spaced, horizontally disposed, upper and lower planar surfaces **16**,**18**, together with the six, vertically oriented side surfaces or facets **20** of the head portion **14**, define a plurality of vertically spaced, upper and lower peripheral edge portions **22**, wherein each one of the upper and lower peripheral edge portions **22** defines, includes, or comprises a 90° angle. It is also seen that adjacent pairs of the side surfaces or facets **20**,**20** define a plurality of vertically oriented edge regions or loci **24** therebetween, whereby the upper and lower termini of the vertically oriented edge regions or loci **24** define sharply pointed corner loci **26**. Accordingly, when the threaded screw fasteners **10** are utilized, for example, in connection with the fastening or securing of waterproof or environmental membranes to underlying roof decking assemblies, the peripheral edge portions **22**, defined between the vertically oriented side surfaces or facets **20** and the upper planar surface **16**, as well as the upper corner loci **26** disposed within the plane of the upper planar surface **16**, present sharply configured structures.

[0007] It has been found that such sharply configured structures can effectively cut or pierce the waterproof or environmental membranes when, for example, the waterproof or environmental membranes are forced into contact with the fastener head portions **14** as a result of, for example, workmen walking upon the upper surface portion of the roof decking assembly. Accordingly, once the waterproof or environmental membranes are cut or pierced, the waterproof or environmental membranes tend to undergo further structural deterioration, such as, for example, propagated shredding or tearing, particularly under high-wind lift force conditions, thereby effectively compromising the structural integrity of the waterproof or environmental membranes and of course the protective properties of the waterproof or environmental membranes with respect to the underlying roof decking and insulation substrates. This is obviously not a desirable situation from the viewpoint of installing a proper, environmentally protected roof decking system. A need therefore exists in the art for a new and improved threaded screw fastener which is provided with a head portion that not only has integrally incorporated therein both hexagonal and Phillips head structure so as to be capable of being rotationally driven by means of a single drive socket implement or tool which likewise has integrally incorporated therein structure which is uniquely adapted to engage either one of the hexagonal and Phillips head structures integrally disposed upon the head portion of the screw fastener, but in addition exhibits a relatively low profile.

[0008] Continuing further, and with reference now being made to **FIGS. 3 and 4**, an additional conventional PRIOR ART threaded screw fastener is partially disclosed and is generally indicated by the reference character **210**. The threaded screw fastener **210** comprises a shank portion **212** upon which a plurality of buttress-type threads **214** are formed. As can best be seen or appreciated from **FIG. 4**, each one of the conventional buttress-type threads **214** is seen to comprise a slightly inclined rearward flank surface **216** and a significantly inclined forward flank surface **218**, a predetermined thread pitch P, as measured between the same points of successive thread crest portions **220**, and a predetermined spacing S as determined between the root region of the rearward flank surface **216** of a particular thread and the root region of the forward flank surface **218** of the next or successive thread.

[0009] As is well-known in the art or industry, the rear flank surface **216**, as well as the pitch P, play critical roles in, or effectively determine, the pull-out resistance characteristics or properties of the fastener **210**, while the forward flank surface **218**, and the spacing S, likewise play critical roles in, or effectively determine, the installation or insertion torque characteristics or properties of the fastener **210**. As is further well-known in the art of industry, the ideal or perfectly designed fastener will exhibit relatively high pull-out resistance characteristics or properties, while concomitantly exhibiting relatively low installation or insertion torque characteristics or properties. Unfortunately, conventional or PRIOR ART fasteners, such as, for example, the fastener **210**, as disclosed within FIGS. **3** and **4** and characterized by means of the conventional or PRIOR ART buttress thread structure, cannot effectively simultaneously achieve the aforenoted relatively high pull-out resistance characteristics or properties and the relatively low insertion or installation torque characteristics or properties.

[0010] More particularly, in order to effectively increase the pull-out resistance characteristics or properties of the threaded screw fastener **210**, the diametrical extent of the threaded screw fastener **210** would have to be increased, that is, the external diametrical dimensions or extents of both the shank portion **212** and the threads **214** as determined by means of the crest portions **220** thereof. Increasing the diametrical dimension or extent of the threaded screw fastener **210**, however, is not desirable or viable for several reasons. Firstly, for example, increasing the diametrical dimension or extent of the threaded screw fastener **210** obviously increases the amount of material that is required to be structurally incorporated within each fastener **210**, and therefore the manufacturing or fabrication costs per fastener are correspondingly increased. In addition, or secondly, increasing the diametrical dimension or extent of the threaded screw fastener **210** also serves to increase the installation or insertion torque characteristics or properties of the fastener **210**, which, of course, is precisely the opposite objective that is sought to be achieved in connection with the threaded screw fastener **210**. Viewed from an opposite point of view, if, for example, the diametrical dimension or extent of the threaded screw fastener **210** was decreased so as to effectively reduce the torque installation or insertion characteristics or properties of the threaded screw fastener **210**, then the pull-out resistance characteristics or properties of the threaded screw fastener **210** would be correspondingly reduced, which, again, is precisely the opposite objective that is sought to be achieved in connection with the threaded screw fastener **210**. A need therefore exists in the art for a new and improved threaded screw fastener which can simultaneously achieve both enhanced pull-out resistance characteristics or properties, and reduced installation or insertion torque characteristics or properties, while also retaining manufacturing or fabrication costs at a viable or cost-effective level.

[0011] Continuing still further, and in connection with, for example, the securing together of overlapped edge portions of adjacent roofing panels, threaded screw fasteners are inserted through the overlapped edge portions of adjacent roofing panels, and rubber washers, or the like, are also disposed beneath the head portions of the fasteners so as to effectively seal the fastener sites against the penetration of water. As is well known, however, roofing systems are subjected to environmental conditions which cause the roofing panels to undergo expansion and contraction, and as a result of such expansion and contraction of the roofing panels, forces are impressed upon the threaded fasteners which cause them to become loose and back out from their fastened states or positions within the overlapped edge portions of the adjacent roofing panels. Accordingly, the rubber washers, or the like, will no longer be engaged with the overlapped edge portions of adjacent roofing panels whereby the fastener sites will no longer be properly sealed or protected against water penetration. A need therefore exists in the art for a new and improved threaded fastener which is specifically structured for securely fastening together the overlapped edge portions of adjacent roofing panels, and wherein further, the threaded fasteners will not exhibit back-out from their fastener sites even when the roofing panels are repeatedly or cyclically subjected to relatively hot and cold environmental conditions which would cause the roofing panels to undergo or experience expansion and contraction.

SUMMARY OF THE INVENTION

[0012] The foregoing and other objectives are achieved in accordance with the teachings and principles of the present invention through the provision of a new and improved threaded screw fastener which comprises a head portion that has low profile domed structure integrally incorporated therein, and wherein further, the head portion also has unique and novel combination structure which permits the threaded screw fastener to be rotatably driven either by means of a rotary drive tool having, for example, hexagonally configured drive structure integrally incorporated therein, or alternatively by means of a rotary drive tool having, for example, Phillips head drive structure integrally incorporated therein. In this manner, the threaded screw fastener, having such combination head structure, can be drivingly inserted or installed within substrates regardless of the particular drive socket implement or tool being utilized by field installation or job site personnel. Furthermore, in accordance with additional teachings and principles of the present invention, there is provided a new and improved drive socket implement or tool which has integrally incorporated therein both hexagonally configured drive structure, Phillips head drive structure, and domed contour structure for not only structurally accommodating both the hexagonally configured structure and the Phillips head structure integrally incorporated upon the head portion of the threaded screw fastener, but in addition, for accommodating the low profile domed structure of the head portion of the threaded screw fastener. Lastly, the threaded screw fastener also comprises thread structure wherein each thread of the threaded screw fastener comprises unique and novel rearward and forward flank surfaces which effectively serve to simultaneously enhance the pull-out resistance characteristics or properties of the threaded screw fastener while reducing the installation or insertion torque characteristics or properties of the threaded screw fastener. More particularly, in connection with the seaming together of overlapped edge portions of adjacent roofing panels, the threaded screw fasteners incorporate specific crest height, thread pitch, and rear and front face or flank structure which effectively enable the overlapped edge portions of adjacent roofing panels to effectively be trapped between successive threads of the fasteners so as to enhance the back-out resistance of the fasteners with respect to the roofing panels, even when the roofing panels experience expansion and contraction as a result of varying environmental or temperature conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Various other objects, features, and attendant advantages of the present invention will be more fully appreciated from the following detailed description when considered in connection with the accompanying drawings in which like reference characters designate like or corresponding parts throughout the several views, and wherein:

[0014] **FIG. 1** is a perspective view of a conventional, PRIOR ART threaded screw fastener wherein the head portion integrally formed thereon has a hexagonal cross-sectional configuration;

[0015] **FIG. 2** is a perspective view of a conventional, PRIOR ART threaded screw fastener wherein the head portion integrally formed thereon has Phillips head drive structure formed therewithin;

[0016] **FIG. 3** is a partial side elevational view of a conventional, PRIOR ART threaded screw fastener which is provided with standard buttress threads;

[0017] **FIG. 4** is an enlarged partial cross-sectional view of the conventional, PRIOR ART threaded screw fastener, as disclosed within **FIG. 3**, showing the detailed structure of several of the individual threads of the threaded screw fastener, particularly the rearward and forward flank surfaces thereof;

[0018] **FIG. 5** is a perspective view, similar to those of **FIGS. 1 and 2**, showing, however, a first embodiment of a new and improved threaded screw fastener constructed in accordance with the principles and teachings of the present invention wherein the head portion of the threaded screw fastener is integrally provided with combination structure which will permit the threaded screw fastener to be rotatably driven either by means of, for example, a hexagonally configured drive socket implement or tool, or alternatively, by means of, for example, a Phillips head drive socket implement or tool;

[0019] **FIG. 6** is a perspective view, similar to that of **FIG. 5**, showing, however, a second embodiment of a new and improved threaded screw fastener constructed in accordance with the principles and teachings of the present invention wherein the head portion of the threaded screw fastener is likewise integrally provided with combination structure which will permit the threaded screw fastener to be rotatably driven either by means of, for example, a hexagonally configured drive socket implement or tool, or alternatively, by means of, for example, a Phillips head drive socket implement or tool;

[0020] **FIG. 7** is a perspective view, similar to those of **FIGS. 5 and 6**, showing, however, a third embodiment of a new and improved threaded screw fastener constructed in accordance with the principles and teachings of the present invention wherein the head portion of the threaded screw fastener is also integrally provided with combination structure which will permit the threaded screw fastener to be rotatably driven either by means of, for example, a hexagonally configured drive socket implement or tool, or alternatively, by means of, for example, a Phillips head drive socket implement or tool;

[0021] **FIG. 8** is a perspective view of a new and improved drive socket implement or tool which has been constructed in accordance with the principles and teachings of the present invention and which has combination drive structure integrally incorporated therein which comprises hexagonally configured drive structure and Phillips head drive structure, as well as contoured mating surface structure, for accommodating and drivingly interfacing with, for example, the head portion of the first embodiment threaded screw fastener as disclosed within **FIG. 5**;

[0022] **FIG. 9** is a cross-sectional view of the new and improved drive socket implement or tool, as disclosed within **FIG. 8**, and as operationally mated or engaged with the head portion of, for example, the first embodiment threaded screw fastener as disclosed within **FIG. 5** so as to define therewith a drive socket implement or tool-fastener assembly;

[0023] **FIG. 10** is a partial side elevational view, similar to that of **FIG. 3**, showing, however, a fourth embodiment of a threaded screw fastener wherein the thread portion thereof has been constructed in accordance with the teachings and principles and teachings of the present invention in order to simultaneously achieve high pull-out resistance characteristics or properties, and low installation or insertion torque characteristics or properties;

[0024] **FIG. 11** is an enlarged partial cross-sectional view, similar to that of **FIG. 4**, showing, however, the detailed structure of several of the individual threads of the fourth embodiment threaded screw fastener as disclosed within **FIG. 10**, particularly the rearward and forward flank surfaces thereof, the thread pitch, and the axial spacing defined between the root portion of the rearward flank surface of a particular thread and the roof portion of the forward flank surface of the next successive thread;

[0025] **FIG. 12** is a side elevational view, partially in cross-section, of a fifth embodiment of a new and improved threaded screw fastener which has incorporated thereon a new and improved screw thread that has been specifically constructed in accordance with the principles and teachings of the present invention so as to permit the new and improved threaded screw fastener to be used in connection with the securing together of overlapped edge portions of adjacent roofing panels wherein the new and improved threaded screw fasteners will not experience back-out even when the roofing panels undergo expansion and contraction under varying weather and temperature conditions;

[0026] **FIG. 13** is an enlarged detailed view of the new and improved screw thread that has been incorporated upon the fifth embodiment of the new and improved threaded screw fastener, as illustrated within **FIG. 12**, such that the fastener will not experience back-out with respect to the roofing panels and will preserve the sealing integrity of the fastener sites; and

[0027] **FIG. 14** is an enlarged detailed view, similar to that of **FIG. 13**, showing, however, a sixth embodiment of a new and improved threaded screw fastener having a modified thread form, with respect to the thread form disclosed within **FIG. 13**, which may also be incorporated upon the new and improved threaded screw fastener as illustrated within **FIG. 12** for use in connection with the securing together of overlapped edge portions of adjacent roofing panels.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0028] Referring again to the drawings, and more particularly to **FIG. 5** thereof, a first embodiment of a new and improved threaded screw fastener, constructed in accordance with the principles and teachings of the present invention, is disclosed and is generally indicated by the reference character **310**. It is to be noted that, in view of the fact that the first embodiment of the new and improved threaded screw fastener **310** of the present invention has incorporated therein structural features which are somewhat similar to those structural features characteristic of the conventional PRIOR ART threaded screw fasteners **10**,**110** as respectively disclosed within **FIGS. 1 and 2**, such structural features of the first embodiment threaded screw fastener **310** will be designated by similar or corresponding reference characters except that they will be within the 300 series. Accordingly, the new and improved first embodiment threaded screw fastener **310** is seen to comprise a threaded shank portion **312**, and a head portion **314**, wherein the head portion **314** has integrally formed thereon a first embodiment of combination structure which permits the head portion **314** to be alternatively engaged either by means of a hexagonally configured drive socket implement or tool, or by means of a Phillips head drive socket implement or tool, whereby rotary drive can be imparted to the first embodiment threaded screw fastener **310** so as to drivingly install or insert the first embodiment threaded screw fastener **310** into a substrate. More particularly, it is seen that the head portion **314** of the first embodiment threaded screw fastener **310** comprises a circular washer member **313** integrally formed upon the upper end of the threaded shank portion **312**, and upstanding, combination fastener drive structure is disposed atop the circular washer member **313** such that the circular washer member **313** effectively forms an annular flanged or shoulder portion surrounding the upstanding, combination fastener drive structure.

[0029] The upstanding, combination fastener drive structure is seen to comprise a centrally located drive member **318** which comprises six vertically or axially oriented external sides or facets **320** such that the drive member **318** has a substantially hexagonal cross-sectional configuration, and a substantially X-shaped recessed section **328** is internally formed at an axially central location within the hexagonally configured drive member **318** so as to define a Phillips head drive member. It is further noted that the upper surface portion **316** of the centrally located hexagonally configured drive member **318**, which is disposed substantially transversely or perpendicular to the longitudinal axis of the threaded screw fastener **310**, actually has a domed configuration such that the upper surface portion **316** slopes downwardly in a circumferential manner from the axially located substantially X-shaped recessed section **328** toward the six vertically or axially oriented external sides or facets **320** which effectively form the outer periphery of the hexagonally configured drive member **318**. In this manner, the vertical height dimension of the hexagonally configured drive member **318**, as defined by means of the axial extent of the six vertically or axially oriented external sides or facets **320** of the hexagonally configured drive member **318**, is relatively small.

[0030] In addition, due to the circumferentially extending, downwardly sloped contour of the upper surface portion **316** of the hexagonally configured drive member **318**, the upper edge portions **322** of the six vertically or axially oriented external sides or facets **320** of the hexagonally configured drive member **318**, which substantially correspond to the upper edge portions **22** of the sides or facets **20** of the threaded screw fastener **10** as disclosed within **FIG. 1**, are not disposed at the uppermost elevational level of the threaded screw fastener **310**. Furthermore, since the upper surface portion **316** of the hex-agonally configured drive member **318** slopes downwardly in the aforenoted circumferential manner, the upper edge regions **322** of the hexagonally configured drive member **318**, as defined at the junctions of the upper surface portion **316** and each one of the external sides or facets **320** of the hexagonally con-figured drive member **318**, do not comprise 90° angles. Still further, and again due to the circumferentially extending, downwardly sloped contour of the upper surface portion **316** of the hexagonally configured drive member **318**, the upper corner regions **326**, as defined at the junctions of the vertically oriented edge regions or loci **324** and the upper edge regions **322** of the hexagonally configured drive member **318**, are likewise disposed at an elevational level which is beneath the uppermost elevational level of the threaded screw fastener **310**.

[0031] Accordingly, if portions of the waterproof or environmental membranes happen to be effectively forced into contact with the head portions **314** of the threaded screw fasteners **310** that secure the waterproof or environmental membranes to the underlying roof decking assembly, as a result of, for example, workmen personnel walking upon the upper surface portion of the roof decking assembly, then the waterproof or environmental membranes will be forced primarily into contact with and thereby encounter the circumferentially extending, downwardly sloped upper surface portions **316** of the threaded screw fasteners **310**, and will not be primarily forced into contact with or encounter the upper edge portions **322** of the six vertically or axially oriented external sides or facets of the hexagonally configured drive member **318**. Therefore, cutting, piercing, and ultimate shredding or tearing of the waterproof or environmental membranes is effectively prevented.

[0032] Still further, it is also to be appreciated that by means of providing the first embodiment threaded screw fastener **310** with the combination fastener drive structure **318**, **328** that permits the first embodiment threaded screw fastener **310** to be rotatably driven by means of alternative drive socket implements or tools, such as, for example, hexagonally configured socket implements or tools, or by means of Phillips head configured socket implements or tools, only a single type of threaded screw fastener **310** is needed at field installation or job site locations. This is because the single type of threaded screw fastener **310** can be inserted or installled within a substrate regardless of the type of drive socket implement or tool that a particular workman or field personnel may be using at the field installation or job site.

[0033] With reference now being made to **FIG. 6**, a second embodiment of a new and improved threaded screw fastener, constructed in accordance with the principles and teachings of the present invention so as to be functionally similar to the first embodiment of the new and improved threaded screw fastener **310** as disclosed within **FIG. 5**, is disclosed and is generally indicated by the reference character **410**. It is to be noted that in view of the fact that the second embodiment threaded screw fastener **410** is structurally similar to the first embodiment threaded screw fastener **310**, a detailed description of the same, except for those structural features unique to the second embodiment threaded screw fastener **410**, will be omitted for brevity purposes. It is additionally noted that those structural features characteristic of the second embodiment threaded screw fastener **410**, that correspond to similar structural features characteristic of the first embodiment threaded screw fastener **310**, will be designated by similar or corresponding reference characters except that the reference characters will be within the 400 series. Accordingly, it is seen, for example, that the new and improved second embodiment threaded screw fastener **410** is seen to comprise a threaded shank portion **412**, and a head portion **414**, wherein the head portion **414** has integrally formed thereon a second embodiment of combination structure which permits the head portion **414** to be alternatively engaged either by means of a hexagonally configured drive socket implement or tool, or by means of a Phillips head drive socket implement or tool, whereby rotary drive can be imparted to the second embodiment threaded screw fastener **410** so as to drivingly install or insert the second embodiment threaded screw fastener **410** into a substrate. More particularly, the head portion **414** of the second embodiment threaded screw fastener **410** comprises an upper surface portion **416** having a domed configuration which slopes downwardly in a circumferential manner from an axially central region of the head portion **414** toward the peripheral region of the head portion **414** as effectively defined by means of an underlying washer member **413**. In addition, in a manner similar to that of the first embodiment threaded screw fastener **310**, the combination fastener drive structure of the second embodiment threaded screw fastener **410** is seen to comprise substantially X-shaped recessed structure **428** which is defined within the axially central region of the head portion **414** so as to effectively define a Phillips head drive member, and six vertically or axially oriented external sides or facets **420** which are formed upon the external periphery of the washer member **413** whereby the external periphery of the head portion **414** effectively defines a drive member **418** which has a substantially hexagonal cross-sectional configuration. As a result of the aforenoted structure, as facilitated by means of the domed upper surface portion **416**, the vertical height dimension of the hexagonally configured drive member **418**, as defined by means of the axial extent of the six vertically or axially oriented external sides or facets **420** of the hexagonally configured drive member **418**, is relatively small.

[0034] Still further, due to the circumferentially extending, downwardly sloped contour of the upper surface portion **416** of the hexagonally configured drive member **418**, the upper edge portions **422** of the six vertically or axially oriented external sides or facets **420** of the hexagonally configured drive member **418**, which substantially correspond to the upper edge portions **322** of the sides or facets **320** of the threaded screw fastener **310** as disclosed within **FIG. 5**, are not disposed at the uppermost elevational level of the threaded screw fastener **410**. Furthermore, since the upper surface portion **416** of the hexagonally configured drive member **418** slopes downwardly in the aforenoted circumferential manner, the upper edge regions **422** of the hexagonally configured drive member **418**, as defined at the junctions of the upper surface portion **416** and each one of the external sides or facets **420** of the hexagonally con-figured drive member **418**, do not comprise 90° angles. Lastly, it is also seen that the individual vertically or axially oriented external sides or facets **420** of the hexagonally configured drive member **418** do not abut each other in a circumferential manner but, to the contrary, are effectively separated from each other by means of arcuate portions **430** of the washer member **413**. Accordingly, such structure, in combination with the circumferentially extending, downwardly sloped contour of the upper surface portion **416** of the hexagonally configured drive member **418**, effectively eliminates any sharply cornered or sharply edged regions upon the head portion **414** of the threaded screw fastener **410**.

[**0035**] In light of the foregoing, it can be readily appreciated that if portions of the waterproof or environmental membranes happen to be effectively forced into contact with the head portions **414** of the threaded screw fasteners **410** that secure the waterproof or environmental membranes to the underlying roof decking assembly, as a result of, for example, workmen personnel walking upon the upper surface portion of the roof decking assembly, then the waterproof or environmental membranes will be forced into contact with and thereby encounter the circumferentially extending, downwardly sloped upper surface portions **416** of the threaded screw fasteners **410**. In addition, since the sharp 90° edge portions, as defined between the upper edge portions **422** of the six vertically or axially oriented external sides or facets **420** of the hexagonally configured drive member **418** and the upper surface portion **416** of the head portion **414**, have effectively been eliminated, as have the upper sharply pointed corner regions as defined between adjacent ones of the six vertically or axially oriented external sides or facets **420** of the hexagonally configured drive member **418** and the upper surface portion **416** of the head portion **414**, then it follows that cutting, piercing, and ultimate shredding or tearing of the waterproof or environmental membranes is also effectively prevented.

[**0036**] Still further, it is also to be appreciated, as was the case with the first embodiment threaded screw fastener **310**, that by providing the second embodiment threaded screw fastener **410** with the combination fastener drive structure **418**,**428** that permits the second embodiment threaded screw fastener **410** to be rotatably driven by means of alternative drive socket implements or tools, such as, for example, hexagonally configured socket implements or tools, or by means of Phil-lips head configured socket implements or tools, only a single type of threaded screw fastener **410** is needed at field installation or job site locations. Again, this is because the single type of threaded screw fastener **410** can be inserted or installed within a substrate regardless of the type of drive socket implement or tool that a particular workman or field personnel may be using at the field installation or job site.

[**0037**] With reference now being made to **FIG. 7**, a third embodiment of a new and improved threaded screw fastener, also constructed in accordance with the principles and teachings of the present invention so as to be functionally similar to the first and second embodiments of the new and improved threaded screw fasteners **310**,**410** as disclosed within **FIGS. 5 and 6**, is disclosed and is generally indicated by the reference character **510**. It is to be noted that in view of the fact that the third embodiment threaded screw fastener **510** is structurally similar to the first and second embodiment threaded screw fasteners **310**,**410**, a detailed description of the same, except for those structural features unique to the second embodiment threaded screw fastener **510**, will be omitted for brevity purposes. It is additionally noted that those structural features characteristic of the third embodiment threaded screw fastener **510**, that correspond to similar structural features characteristic of the first and second embodiment threaded screw fasteners **310**,**410**, will be designated by similar or corresponding reference characters except that the reference characters will be within the 500 series.

[**0038**] Accordingly, it is seen, for example, that the new and improved third embodiment threaded screw fastener **510** is seen to comprise a threaded shank portion **512**, and a head portion **514**, wherein the head portion **514** has integrally formed thereon a third embodiment of combination structure which permits the head portion **514** to be alternatively engaged either by means of a hexagonally configured drive socket implement or tool, or by means of a Phillips head drive socket implement or tool, whereby rotary drive can be imparted to the third embodiment threaded screw fastener **510** so as to drivingly install or insert the third embodiment threaded screw fastener **510** into a substrate.

[**0039**] More particularly, it is seen that the head portion **514** of the third embodiment threaded screw fastener **510** effectively comprises hybrid structure with respect to the structure comprising the head portions **314**,**414** of the first and second embodiment threaded screw fasteners **310**,**410**. For example, it is seen that the head portion **514** of the third embodiment threaded screw fastener **510** comprises a circular washer member **513** which is integrally formed upon the upper end of the threaded shank portion **512**, and upstanding, combination fastener drive structure is disposed atop the circular washer member **513** such that the circular washer member **513** effectively forms an annular flanged portion which surrounds the upstanding, combination fastener drive structure. The upstanding, combination fastener drive structure is seen to comprise a first drive member **518** which comprises six vertically or axially oriented external sides or facets **520** such that the first drive member **518** has a substantially hexagonal cross-sectional configuration, and a second substantially X-shaped recessed section **528** is internally formed at an axially central location within the hexagonally configured drive member **518** so as to define a Phillips head drive member. It is further noted that the upper surface portion **516** of the centrally located hexagonally configured drive member **518**, which is disposed substantially transversely or perpendicular to the longitudinal axis of the threaded screw fastener **510**, has a domed configuration, similar to the upper surface portions **316**,**416** of the threaded screw fasteners **310**, **410**, such that the upper surface portion **516** slopes downwardly in a circumferential manner from the axially located substantially X-shaped recessed section **528** toward the six vertically or axially oriented external sides or facets **520** which effectively form the outer periphery of the hexagonally configured drive member **518**. However, as can be readily appreciated from **FIG. 7** in connection with the disclosure of the third embodiment threaded screw fastener **510**, particularly when compared to **FIGS. 5 and 6** and their respective disclosures of the first and second embodiment threaded screw fasteners **310**, **410**, it is noted that in lieu of the domed upper surface portion **516** effectively having a limited radial or diametrical extent which is somewhat less than that of the circular washer member **513**, as was the case of the domed upper surface portion **316** of the first embodiment threaded screw fastener **310** as compared to the radial or diametrical extent of the circular washer member **313**, the domed upper surface portion **516** of the third embodiment threaded screw fastener **510** has a radial or diametrical extent which is substantially the same as that of the circular washer member **513**.

[0040] In connection with such structure, it is therefore additionally appreciated that in lieu of the vertically or axially oriented external sides or facets **520** of the drive member **518** being defined within the peripheral surface of the circular washer member **513**, as was the case with the vertically or axially oriented external sides or facets **420** with respect to the outer peripheral surface of the circular washer member **413**, the vertically or axially oriented external sides or facets **520** of the drive member **518** are disposed atop the circular washer member **513** and are disposed slightly radially inwardly offset from the outer peripheral edge portion of the circular washer member **513**. Still further, it is also noted that the corner regions **526**, defined between adjacent ones of the vertically or axially oriented external facets or sides **520** of the drive member **518** are effectively disposed at the peripheral edge of and within the plane of the circular washer member **513**. Accordingly, the vertical height dimension of the hexagonally configured drive member **518**, as defined by means of the axial extent of the six vertically or axially oriented external facets or sides **520** of the hexagonally configured drive member **518**, is relatively small. In addition, as was characteristic of the head portions **314**,**414** of the first and second embodiment threaded screw fasteners **310**,**410**, due to the circumferentially extending, downwardly sloped contour of the upper surface portion **516** of the hexagonally configured drive member **518**, the upper edge portions **522** of the six vertically or axially oriented external sides or facets **520** of the hexagonally configured drive member **518** are not disposed at the uppermost elevational level of the threaded screw fastener **510**.

[0041] Furthermore, since the upper surface portion **516** of the hexagonally configured drive member **518** slopes downwardly in the aforenoted circumferential manner, the upper edge regions **522** of the hexagonally configured drive member **518**, as defined at the junctions of the upper surface portion **516** and each one of the external sides or facets **520** of the hexagonally configured drive member **518**, do not comprise 90° angles. Still further, and again due to the circumferentially extending, downwardly sloped contour of the upper surface portion **516** of the hexagonally configured drive member **518**, and in particular, due to the disposition of the corner regions **526**, as defined between adjacent ones of the vertically or axially oriented external facets or sides **520** of the drive member **518**, within the plane of the circular washer member **513**, the presence of such sharply cornered regions, at a relatively high elevational level upon the head portion **514** of the threaded screw fastener **510**, has effectively been eliminated. Accordingly, if portions of the waterproof or environmental membranes happen to be effectively forced into con-tact with the head portions **514** of the threaded screw fasteners **510** that secure the waterproof or environmental membranes to the underlying roof decking assembly, as a result of, for example, workmen personnel walking upon the upper surface portion of the roof decking assembly, then the waterproof or environmental membranes will be forced into contact with and thereby encounter the circumferentially extending, downwardly sloped upper surface portions **516** of the threaded screw fasteners **510**, and will not be forced into contact with or encounter any sharply pointed edge or corner regions of the six vertically or axially oriented external sides or facets of the hexagonally configured drive member **518**. Therefore, cutting, piercing, and ultimate shredding or tearing of the waterproof or environmental membranes is effectively prevented.

[0042] Still further, it is also to be appreciated that by means of providing the third embodiment threaded screw fastener **510** with the combination fastener drive structure **518**, **528** that permits the third embodiment threaded screw fastener **510** to be rotatably driven by means of alternative drive socket implements or tools, such as, for example, hexagonally configured socket implements or tools, or by means of Phillips head configured socket implements or tools, only a single type of threaded screw fastener **510** is needed at field installation or job site locations. This mode of operation is of course facilitated or enabled in view of the fact that the single type of threaded screw fastener **510** can be inserted or installed within a substrate regardless of the type of drive socket implement or tool that a particular workman or field personnel may be using at the field installation or job site.

[0043] With reference now being made to **FIGS. 8 and 9**, a new and improved drive socket implement or tool, for operatively engaging the head portion of any one of the threaded screw fasteners **310**,**410**,**510**, as disclosed within **FIGS. 5-7**, so as to impart a rotatable drive force thereto, is disclosed and is generally indicated by the reference character **610**. As can be readily appreciated, the new and improved drive socket implement or tool **610** is seen to comprise a cylindrical housing **612** which is open at the front end thereof so as to define a socket member **614** therewithin for accommodating and operatively mating with at least some of the drive structure defined upon the head portion of any one of the aforenoted threaded screw fasteners **310**,**410**, **510**. It is to be noted that while, for example, the new and improved drive socket implement or tool **610** is disclosed as being operatively engaged with the head portion **314** of the threaded screw fastener **310**, the new and improved drive socket implement or tool **610** can be structurally configured so as to appropriately operatively engage the head portions **414**,**514** of the threaded screw fasteners **410**,**510**. More particularly, it is seen that the socket member **614** of the new and improved drive socket implement or tool **610** is provided with an annular or peripheral front face **616** which is disposed within a plane that is substantially perpendicular to the longitudinal axis of the socket implement or tool **610**. Six inner peripheral wall members **618** of the socket member **614** are disposed within the immediate vicinity of the front face **616** of the socket implement or tool **610** so as to extend axially rearwardly from the front face **616** of the socket implement or tool **610**, and in addition, the six inner peripheral wall members **618** are disposed within a circumferential array so as to effectively circumscribe a region within the socket member **614** which has a substantially hexagonal configuration. In this manner, when the new and improved socket implement or tool **610** is operatively engaged with the head portion **314** of the threaded screw fastener **310**, the sides or facets **320** of the hexagonally configured drive member **318** can be drivingly engaged by means of the hexagonally arranged wall members **618** of the socket member **614**. At the same time, it can likewise be appreciated that the front face **616** of the socket member **614** is properly seated upon the upper surface portion of the circular washer member **313**, as can best be appreciated from **FIG. 9**, whereby the longitudinal axes of the socket implement or tool **610** and the threaded screw fastener **310** are coaxially aligned with respect to each other.

[**0044**] Continuing still further, it is appreciated that the socket member **614** is also provided with an axially located, forwardly extending, substantially X-shaped conical projection **620** which effectively defines a Phillips head screwdriver element which is adapted to operatively engage the X-shaped Phillips head recessed portion **328** defined within the head portion **314** of the threaded screw fastener **310** when, for example, the socket implement or tool **610** is operatively engaged with the head portion **314** of the threaded screw fastener **310** as disclosed within **FIG. 9**. Accordingly, the Phillips head screwdriver element **620** can be operatively used to engage the X-shaped Phillips head recessed portion **328** defined within the head portion **314** of the threaded screw fastener **310** in conjunction with the operative or driving engagement of the sides or facets **320** of the hexagonally configured drive member **318** of the head portion **314** of the threaded screw fastener **310** by means of the hexagonally arranged wall members **618** of the socket member **614**. Lastly, in connection with the internal structure comprising the socket member **614**, it is also seen that the socket member **614** comprises a concavely contoured mating surface **622** which is adapted to house or accommodate, for example, the domed upper surface portion **316** of the head portion **314** of the threaded screw fastener **310**.

[**0045**] It is to be noted that while the socket member **614** may be provided with both the hexagonal drive means comprising the plurality of side wall members **618**, as well as the Phillips head screwdriver element **620**, in conjunction with the contoured mating surface **622**, so as to properly drivingly engage the head portion **314** of the threaded screw fastener **310**, only a single one of the drive means **618**,**620** truly needs to be provided in view of the fact that the threaded screw fastener **310** is provided with the dual drivable means **320**, **328**. On the other hand, it is further noted that just as the dual drivable means **320**,**328** as provided upon the threaded screw fastener **310**, permits the same to be drivingly used and engaged by means of any drive socket implement or tool, the provision of the dual driving means **618**,**620**, upon the socket implement or tool **610**, permits it to drivingly engage any particular threaded screw fastener. It is lastly noted that in order to provide the socket implement or tool **610** with rotary drive motion to be appropriate or accordingly transmitted to the threaded screw fastener **310**, it is seen that the housing **612** is mounted upon the forward end of a shaft member **624**, and that the rear end of the shaft member **624** is provided with a stem portion **626** for insertion within, for example, a suitable collet member, not shown, of a rotary drive tool, also not shown.

[**0046**] With reference now being made to **FIGS. 10 and 11**, a fourth embodiment of a new and improved threaded screw fastener constructed in accordance with the teachings and principles of the present invention is disclosed and is generally indicated by the reference character **710**. As disclosed within **FIGS. 10 and 11**, the new and improved threaded screw fastener **710** comprises a shank portion **712** and a buttress thread portion **714**, however, if the new and improved threaded screw fastener **710**, as disclosed within **FIGS. 10 and 11**, is compared to the conventional PRIOR ART threaded screw fastener **210** as disclosed within **FIGS. 3 and 4**, it will be readily apparent that the structure of the individual threads **714** of the threaded screw fastener **710**, as constructed in accordance with the principles and teachings of the present invention, is quite different from the structure of the individual threads **214** of the conventional PRIOR ART threaded screw fastener **210**. More particularly, it is seen that in lieu of the conventional, PRIOR ART threaded screw fastener **210**, wherein the individual threads **214** comprise, in effect, a slightly inclined rearward planar flank surface **216**, and a significantly inclined forward planar flank surface **218**, the individual threads **714** of the threaded screw fastener **710** of the present invention comprise at least one, and preferably two, substantially perpendicular rearward planar flank surfaces **716-1**,**716-2**, and dual, inclined forward planar flank surfaces **718-1**,**718-2**.

[**0047**] It is to be noted that, in connection with the structural design of the screw threads upon threaded screw fasteners, and as is well-known in the art or industry, as has been discussed hereinbefore, the rearward flank surface structure of each individual thread, as well as the pitch defined between each pair of adjacent threads, play critical roles in, or effectively determine, the pull-out resistance characteristics or properties of the threaded screw fastener, while the forward flank surface structure of each individual thread, as well as the spacing defined between the root portion of the rearward flank surface of a particular thread and the root portion of the forward flank surface of an adjacent thread, likewise play critical roles in, or effectively determine, the installation or insertion torque characteristics or properties of the threaded screw fastener. In particular, for example, as the perpendicularity of the rearward flank surface of each individual thread with respect to the longitudinal axis of the threaded screw fastener is increased, then the pull-out resistance characteristics or properties of the threaded screw fastener are likewise or accordingly increased, whereas as the inclination of the forward flank surface of each individual thread with respect to the radius of the threaded screw fastener is decreased, then the insertion or installation torque characteristics or properties are accordingly or likewise decreased. In conjunction with the particularly fabricated structure of the rearward and forward flank surfaces of the individual threads, it is also noted that the aforenoted pitch and spacing dimensions will be accordingly varied in order to likewise affect the pull-out resistance and installation or insertion torque characteristics or properties of the threaded screw fastener.

[**0048**] With reference therefore being made more specifically to **FIG. 11**, the longitudinal axis of the threaded screw fastener **710** is disclosed at **722**, while a radius of the threaded screw fastener **710** is disclosed at **724**. Accordingly, it can be appreciated that the angular extent or inclination of the radially outer forward flank surface **718-1** with respect to the radius **724** is designated by means of the angle A**1**, while the angular extent or inclination of the radially inner forward flank surface **718-2** with respect to the radius **724** is designated by means of the angle A**2**. In a similar manner, the angular extent or inclination of the radially outer rearward flank surface **716-1** with respect to the radius **724** is designated by means of the angle A**3**, while the angular extent or inclination of the radially inner rearward flank surface **716-2** with respect to the radially outer rearward flank surface **716-1** is designated by means of the angle A**4**. Still further, the axial extent or length of the crest portion **720** of each thread **714** is denoted by means of the linear dimension D**1**, while the radial extent or width of each thread **714** is denoted by means of the linear dimension D**2**, the radial extent or width of the radially inner rearward flank surface **716-2** of each thread **714** is denoted by means of the linear dimension D**3**, and the axial extent or distance defined between the root portion of the rearward flank surface of a particular thread **714** and the root portion of the forward flank surface of an adjacent thread **714** is denoted by means of the linear space dimension D**4**. In a similar manner, the radial extent or width of the radially inner forward flank surface **718-2** of each thread **714** is denoted by means of the linear dimension D**5**, the radial extent or width of the radially outer forward flank surface **718-1** of each thread **714** is denoted by means of the linear dimension D**6**, and the axial extent or distance defined between each pair of adjacent threads **714**,**714** is denoted by means of the linear pitch dimension D**7**.

[**0049**] Continuing further with reference being made to **FIG. 11**, and in accordance with the unique and novel teachings and principles of the present invention, due to the provision of, for example, the radially inner forward flank surface **718-2**, wherein the same is disposed at the angular inclination A**2**, which is relatively steeper than the angular inclination A**1** at which the radially outer forward flank surface **718-1** is disposed with respect to the radius **724**, that is, the radially inner forward flank surface **718-2** is disposed so as to be more perpendicular with respect to the longitudinal axis **722** of the threaded screw fastener **710** than is the radially outer forward flank surface **718-1**, then it can be appreciated that a portion of the forward flank surface, as denoted in phantom lines at **718-3**, has in effect been removed when compared, for example, to the forward flank surface **218** of the standard buttress thread **210** as disclosed within **FIG. 4**. Accordingly, since less material is effectively present upon each composite forward flank surface **718-1**, **718-2** of each thread **714**, less material is effectively present in order to operatively engage the material comprising the substrate into which the threaded screw fastener **710** is being inserted. In this manner, the provision of the particularly structured radially inner forward flank surface **718-2** upon each thread **714** effectively reduces the installation or insertion torque characteristics or properties of the threaded screw fastener **710**.

[**0050**] In a corresponding manner, the provision of the particularly structured radially inner forward flank surface **718-2** upon each thread **714**, and the particular angular inclinations A**1**,A**2** of the radially outer forward flank surface **718-1** and the radially inner forward flank surface **718-2** upon each thread **714**, effectively affect or alter the axial extent or distance dimension D**4** as defined between the root portion of the rearward flank surface of a particular thread **714** and the root portion of the forward flank surface of an adjacent thread **714**. These factors correspondingly affect the installation torque characteristics or properties of the threaded screw fastener **710** in that as the axial extent or distance dimension D**4** is effectively increased, an increased amount of room or space is effectively provided in order to accommodate the material, comprising the substrate into which the threaded screw fastener **710** is being installed or inserted, thereby effectively reducing the installation or insertion torque characteristics or properties of the threaded screw fastener **710**. It will also be appreciated that as the angular inclinations A**1**,A**2** of the radially outer forward flank surface **718-1** and the radially inner forward flank surface **718-2** of each thread **714** are respectively varied, the radial extents D**6**,D**5** of the radially outer forward flank surface **718-1** and the radially inner forward flank surface **718-2** of each thread **714** will likewise be varied. Again, all of these factors effectively influence the amount of material which is effectively present upon the threads **714** of the threaded screw fastener **710** for operatively engaging the material comprising the substrate into which the threaded screw fastener **710** is being inserted.

[**0051**] Continuing still further, and in accordance with additionally unique and novel teachings and principles of the present invention, it is seen that the radially inner rearward flank surface **716-2** is disposed at the angular inclination A**4** with respect to the radially outer rearward flank surface **716-1**, and that the radially outer rearward flank surface **716-1** is disposed at the angular inclination A**3** with respect to the radius **724**. As a result of this structural relationship, it is further seen that the radially inner rearward flank surface **716-2** is disposed so as to be more perpendicular with respect to the longitudinal axis **722** of the threaded screw fastener **710** than is the radially outer rearward flank surface **716-1**. Since the degree of perpendicularity of the rearward flank surfaces of the threads of a threaded screw fastener is significantly determinative of the pull-out resistance characteristics or properties of the threaded screw fastener, it can be appreciated that by providing the radially inner rearward flank surface **716-2** as a distinctly separate planar surface with respect to or separate from the radially outer rearward flank surface **716-1**, and wherein, for example, the radially inner rearward flank surface **716-2** can be disposed substantially perpendicular to the longitudinal axis **722** of the threaded screw fastener **710** while the radially outer rearward flank surface **716-1** is disposed at some predetermined angle, other than 90° with respect to the longitudinal axis **722** of the threaded screw fastener **710**, then enhanced pull-out resistance characteristics or properties of the threaded screw fastener **710** can be achieved.

[**0052**] It is also noted in conjunction with the foregoing that by altering the radial extent or width dimension D**3** of the radially inner rearward flank surface **716-2**, the pull-out resistance characteristics or properties of the threaded screw fastener **710** can likewise be adjusted or altered. For example, as the radial extent or width dimension D**3** of the radially inner rearward flank surface **716-2** is increased, the pull-out resistance characteristics or properties of the threaded screw fastener **710** will likewise be increased. Similar pull-out resistance characteristics or properties of the threaded screw fastener **710** can also be achieved by correspondingly altering the radial extent or width dimension D**2** of the threads **714**, as defined between the root portions **726** of the threads **714** and the crest portions **720** of the threads **714**. In particular, by increasing the radial extent or width dimension D**2** of the threads **714**, the pull-out resistance characteristics or properties of the threaded screw fastener **710** will likewise be increased. In a still similar manner, the pull-out resistance characteristics or properties of the threaded screw fastener **710** can also be achieved by altering the axial extent or distance defined between identical points defined upon each pair of adjacent threads **714**,**714** as denoted by means of the linear pitch dimension

D7. More particularly, as the linear pitch dimension D7 is decreased, whereby an increased number of threads **714** per axial inch is effectively achieved, the pull-out resistance characteristics or properties of the threaded screw fastener **710** are correspondingly increased.

[**0053**] It is to be noted still further that while the separate planar radially outer and radially inner rearward flank surfaces **716-1**,**716-2** have been disclosed and discussed, it is not necessary to in fact provide such separate planar rearward flank surfaces in order to achieve the desired pull-out resistance characteristics or properties for the threaded screw fastener **710**. More particularly, since the degree of perpendicularity of the rearward flank surfaces of the threads of the threaded screw fastener is significantly determinative of the pull-out resistance characteristics or properties of the threaded screw fastener, the separate planar radially outer and radially inner rearward flank surfaces **716-1**,**716-2** can in effect be coplanar as a result, for example, where the angular inclination A**4**, as defined between the separate planar radially outer and radially inner rearward flank surfaces **716-1**,**716-2**, is effectively 0°. In this manner, the separate planar radially outer and radially inner rearward flank surfaces **716-1**,**716-2** effectively become a single planar rearward flank surface. This single planar rearward flank surface of the threaded screw fastener **710** of the present invention is noted as being significantly different from the conventional PRIOR ART planar rearward flank surface **216** of the threaded screw fastener **210** in that the angular inclination A**3** of such single planar rearward flank surface of the threaded screw fastener **710** of the present invention is such as to dispose the single planar rearward flank surface of the threaded screw fastener **710** of the present invention at an orientation which is substantially more perpendicular than that characteristic of the conventional PRIOR ART planar rearward flank surface **216** of the threaded screw fastener **210**. In particular, for example, the conventional PRIOR ART planar rearward flank surface **216** of each threaded screw fastener **210** is disposed at an angular inclination which is within the range of 8-10°. However, in accordance with the principles and teachings of the present invention, the single planar rearward flank surface of the threaded screw fastener **710** of the present invention is disposed at an angle which is within the range of 0-7°, with the preferred angular inclination being 5°.

[**0054**] It is lastly to be noted that while the unique and novel teachings of the present invention can be applied to various conventionally sized threaded screw fasteners, the following chart illustrates the various exemplary flank surface angles A**1**,A**2**,A**3**,A**4**, as well as the various radial and axial linear dimensions D**1**,D**2**,D**3**,D**4**,D**5**,D**6**,D**7**, that have been developed in connection with a Number 15 threaded screw fastener. It will of course be appreciated that the various angles and linear dimensions may therefore vary depending upon the size of the particular threaded screw fastener.

[**0055**] Example—A Number 15 Sized Threaded Screw Fastener

Angle of Radially Outer Forward Flank Surface	A1 -	20–40°
Angle of Radially Inner Forward Flank Surface	A2	0–35°

-continued

Angle of Radially Outer Rearward Flank Surface	A3	0–7°
Angle of Radially Inner Rearward Flank Surface	A4	0–7°
Axial Length of Thread Crest Portions	D1	0.005–0.015 inches
Radial or Width Extent of Fasteners Threads	D2	0.04–0.09 inches
Radial or Width Extent of Radially Inner Rearward Flank Surface	D3	0.00–0.09 inches
Axial Spacing Defined Between Root Portions of Adjacent Threads	D4	0.01–0.03 inches
Radial or Width Extent of Radially Inner Forward Flank Surface	D5	0.00–0.09 inches
Radial or Width Extent of Radially Outer Forward Flank Surface	D6	0.00–0.09 inches
Axial Length or Pitch Dimension Defined Between Identical Locations of Adjacent Threads	D7	0.067–0.091 inches

[**0056**] With reference now being made to **FIGS. 12 and 13**, another new and improved threaded screw fastener, specifically constructed in accordance with the principles and teachings of the present invention for use in connection with the securing together of overlapped edge portions of adjacent roofing panels such that the new and improved threaded screw fasteners will not experience back-out from their secured positions or sites at which the overlapped edge portions of the adjacent roofing panels are secured together, even when the roofing panels undergo expansion and contraction under varying weather and temperature conditions, is disclosed and is generally indicated by the reference character **810**. Firstly, with respect to the overall structure comprising the new and improved threaded screw fastener **810**, it is noted that the threaded screw fastener **810** comprises a shank portion **812**, a head member **814** formed upon a first end portion of the shank portion **812**, and a tip member **816** formed upon a second opposite end portion of the shank portion **812**. The tip member **816** is provided with at least one recessed region **818** upon a side wall portion thereof so as to provide the threaded screw fastener **810** with either a self-drilling or gimlet point.

[**0057**] In addition, it is seen that the head member **814** comprises an axially or centrally located recessed portion **820**, for accommodating a drive tool by means of which rotary torque may be impressed upon the threaded screw fastener **810** in order to install the same within a substrate, and an annular flanged or shoulder portion **822** which is provided with an annular recessed portion **824** upon the undersurface portion or side thereof for accommodating a sealing washer, not shown, fabricated from rubber or other similar material. Accordingly, when the threaded screw fastener **810** is inserted into, and fully tightened within, apertures formed within overlapped edge portions of adjacent roofing panels to be secured together, the rubber or similar material sealing washer will seal tightly against the location or site, at which the threaded screw fastener **810** has been inserted through the apertures formed within the overlapped edge portions of adjacent roofing panels, so as to ensure sealing of the location or site against the incursion or penetration of water.

[0058] Continuing further, and with particular reference now being made to **FIG. 13**, the external surface portion of the shank portion **812** of the threaded screw fastener **810** is provided with an annular buttress thread **826** which is specifically structured so as to prevent back-out of the threaded screw fastener **810** with respect to the overlapped edge portions of the roofing panels whereby the sealed integrity of the fastener sites will be preserved. More particularly, as has been noted hereinbefore, roofing systems are subjected to environmental and weather conditions which cause the roofing panels to undergo cyclical expansion and contraction, and as a result of such cyclical expansion and contraction of the roofing panels, forces are impressed upon the threaded fasteners that cause them to become loose and back out from their fastened states or positions within the overlapped edge portions of the adjacent roofing panels. Accordingly, at this point in time, the rubber washers, or the like, will no longer be engaged with the overlapped edge portions of adjacent roofing panels whereby, in turn, the fastener sites will no longer be properly sealed or protected against water incursion or penetration. In accordance with the principles and teachings of the present invention, the new and improved threaded screw fastener **810** comprises the new and improved buttress thread form **826** upon the external surface portion thereof such that the threaded fasteners **810** will not in fact become loose and back out from their fastened states or positions within the overlapped edge portions of the adjacent roofing panels. As can be seen from **FIG. 13**, the new and improved buttress thread form **826** is seen to comprise a thread form which is somewhat similar to that defined by means of the conventional threads **214** formed upon the conventional, PRIOR ART fastener **210** as disclosed within **FIG. 4**, however, if the new and improved thread form **826** of the new and improved threaded screw fastener **810**, as disclosed within **FIG. 13**, is compared to the conventional PRIOR ART threaded screw fastener **210** as disclosed within **FIG. 4**, it will be readily apparent that the structure of the individual threads **828** comprising the thread form **826** of the threaded screw fastener **810**, as constructed in accordance with the principles and teachings of the present invention, are quite different from the structure of the individual threads **214** of the conventional PRIOR ART threaded screw fastener **210**.

[0059] More particularly, it is seen that in lieu of the conventional, PRIOR ART threaded screw fastener **210**, wherein the individual threads **214** comprise, in effect, a slightly inclined rearward planar flank surface **216**, and a significantly inclined forward planar flank surface **218**, wherein the spacing S, as defined between the root portions of an adjacent forward flank surface **218** and an adjacent rearward flank surface **216**, is relatively small, the individual threads **828** of the thread form **826** of the threaded screw fastener **810** of the present invention comprise a substantially perpendicular rearward planar flank surfaces **830**, and an inclined, forward planar flank surface **832**. As has been noted hereinbefore, and as is well-known in the industry in connection with the structural design or formation of the screw threads upon threaded screw fasteners, the rearward flank surface structure of each individual thread, as well as the pitch defined between each pair of adjacent threads, play important roles in, or effectively determine, the pull-out resistance characteristics or properties of the threaded screw fastener.

[0060] In a similar manner, the forward flank surface structure of each individual thread, as well as the spacing defined between the root portion of the rearward flank surface of a particular thread and the root portion of the forward flank surface of an adjacent thread, likewise play important roles in, or effectively determine, the installation or insertion torque characteristics or properties of the threaded screw fastener. In particular, for example, as the perpendicularity of the rearward flank surface of each individual thread with respect to the longitudinal axis of the threaded screw fastener is increased, then the pull-out resistance characteristics or properties of the threaded screw fastener are likewise or accordingly increased, whereas as the inclination of the forward flank surface of each individual thread with respect to the radius of the threaded screw fastener is decreased, then the insertion or installation torque characteristics or properties are accordingly or likewise decreased. In conjunction with the particularly fabricated structure of the rearward and forward flank surfaces of the individual threads, it is also noted that the aforenoted pitch and spacing dimensions may accordingly be varied in order to likewise affect the pull-out resistance and installation or insertion torque characteristics or properties of the threaded screw fastener.

[0061] With reference therefore being made to **FIGS. 12 and 13**, the longitudinal axis of the threaded screw fastener **810** is disclosed at **834**, while a radius of the threaded screw fastener **810** is disclosed at **836**. Accordingly, it can be appreciated that the angular extent or inclination of the inclined, forward planar flank surface **832** with respect to the radius **836** is designated by means of the angle B**1**, while the angular extent or inclination of the rearward planar flank surface **830** with respect to the radius **836** is designated by means of the angle B**2**. Still further, the axial extent or length of the crest portion **838** of each thread **828** is denoted by means of the linear dimension L**1**, the radial extent or width of each one of the threads **828**, as defined between the root portion **837** of the thread **828** and the crest portion **838** of the thread **828**, is denoted by means of the linear dimension L**2**, the axial extent or distance defined between each pair of adjacent threads **828**,**828** is denoted by means of the linear pitch dimension L**3**, and the axial extent or distance defined between the root portion of the rearward planar flank surface of a particular thread **828** and the root portion of the inclined planar forward flank surface of an adjacent thread **828** is denoted by means of the linear space dimension L**4**. More particularly, the axial extent or length dimension L**1** of the crest portion **838** of each one of the threads **828** is preferably 0.005 inches, the radial extent or width dimension L**2** of each one of the threads **828** may be within the range of 0.010-0.085 inches, and the axial extent, distance, or pitch dimension L**3** defined between each pair of adjacent threads **828**,**828** may be within the range of 0.035-0.090 inches.

[0062] Continuing further, the axial extent or distance dimension L**4** defined between the root portion of the rearward planar flank surface of a particular thread **828** and the root portion of the inclined planar forward flank surface of an adjacent thread **828** may be within the range of 0.035-0.090 inches. The reason for this is that each one of the roofing panels is fabricated, for example, from 24 gauge metal stock wherein each roofing panel therefore has a thickness dimension of, for example, 0.024 inches. Accordingly, after each one of the threaded screw fasteners **810** has been inserted through the overlapped edge portions of the adjacent roofing panels, the overlapped edge portions **840**, **842** of the adjacent roofing panels will in fact be able to be tightly accommodated within the space defined between the root portion of the rearward planar flank surface of a particular thread **828** and the root portion of the inclined planar forward flank surface of an adjacent thread **828**, that is, the space having the axial extent or distance dimension L**4**. It can therefore be appreciated that the overlapped edge portions of the roofing panels will effectively be trapped between the surface comprising one of the rearward planar flank surfaces **830** and the root portion of the adjacent inclined forward planar flank surface **832**. It is of course to be appreciated further that depending upon the gauge thickness or dimension of the metal material from which the roofing panels are fabricated, then the space having the axial extent or distance dimension L**4** may accordingly be altered so as to effectively match or accommodate the gauge thickness of the metal material used to fabricate the roofing panels. In this manner, the overlapped edge portions of the roofing panels will always be substantially tightly disposed or effectively within the space defined between the surface comprising one of the rearward planar flank surfaces **830** and the root portion of the adjacent inclined forward planar flank surface **832** and having the axial extent or distance dimension L**4** such that the threaded screw fastener **810** will exhibit good back-out resistance even after being subjected to cyclical weather conditions which cause the roofing panels to undergo expansion and contraction. Along these lines, it is noted, for example, that the roofing panels may comprise overlapped **24** or **26** gauge panels with sealer tape interposed therebetween so as to effectively seal the overlapped seam defined between the pair of overlapped edge portions of the roofing panels, or alternatively 22 or 24 gauge panels with sealer tape interposed therebetween so as to effectively seal the overlapped seam defined between the pair of overlapped edge portions of the roofing panels. The roofing panels may also have pre-drilled pilot holes defined therein, and lastly, the roofing panels may be adapted for connection to, for example, 14 gauge roofing purlins that may be solid or may be provided with pre-drilled holes.

[0063] It is to be noted further that while, for example, the angle B**1** at which the inclined forward planar flank surface **832** extends with respect to the radius **836** may be within the range of, for example, 0°-60°, such an angle may be altered so as to, in turn, alter the torque insertion and pull-out resistance characteristics of the threaded screw fastener **810**, however, the thread rolling process is facilitated or enabled by means of such an angle B**1**. In fact, a variation of the threaded screw fastener **810** is disclosed within **FIG. 14**, as generally indicated by the reference character **910**, wherein it is to be appreciated that the various components of the threaded screw fastener **910**, which correspond to the various components of the threaded screw fastener **810**, will be designated by similar reference numbers except that they will be within the 900 series, and wherein it is seen that the angle B**1** has effectively become 0° so that the forward planar flank surface **932** will now be disposed substantially parallel to the rearward planar flank surface **930** which is also disposed, for example, at an angle B**2** of 0°. In addition, the axial extent or distance dimension L**4**, as well as the thread pitch axial extent or distance L**3**, will likewise be altered so as to still effectively substantially tightly accommodate the overlapped edge portions **940**,**942** of the roofing panels therebetween. While such a threaded screw fastener **910** may therefore exhibit good pull-out and back-out resistance properties, it is somewhat more difficult to manufacture and the torque insertion levels may be substantially increased. This may similarly be the case if the radial extent or width dimension L**2** of the threads **826**, as defined between the root portions **837** of the threads **826** and the crest portions **838** of the threads **826**, is altered, that is, increased.

[0064] In particular, by increasing the radial extent or width dimension L**2** of the threads **828**, the pull-out resistance characteristics or properties of the threaded screw fastener **810** will be increased however torque insertion levels will also be increased. In a still similar manner, particular pull-out resistance characteristics or properties of the threaded screw fastener **810** can also be achieved by altering the axial extent or distance defined between identical points defined upon each pair of adjacent threads **828**,**828** as denoted by means of the linear pitch dimension L**3**. More particularly, as the linear pitch dimension L**3** is decreased, whereby an increased number of threads **828** per axial inch is effectively achieved, the pull-out resistance characteristics or properties of the threaded screw fastener **810** are correspondingly increased, however, torque insertion is also increased. It is noted still further that while the angle B**2** is within the range of 0°-6°, it is not desirable to dispose the rearward planar flank surface **830** of the thread **828** at any substantially larger angle because then the rearward planar flank surface **830** will not be able to effectively or substantially define surface-to-surface contact with the entrapped overlapped edge portions of the roofing panels.

[0065] It is lastly to be noted that while the unique and novel teachings of the present invention can be applied to various conventionally sized threaded screw fasteners, the following chart illustrates the various exemplary flank surface angles B**1**,B**2**, as well as the various radial and axial linear dimensions L**1**,L**2**,L**3**,L**4**, that have been developed in connection with a Number 10 threaded screw fastener which is to be used in connection with 24 gauge roofing panels. It will of course be appreciated that the various angles and linear dimensions may therefore vary depending upon the size of the particular threaded screw fastener.

[0066] Example—A Number 10 Sized Threaded Screw Fastener

Angle of Forward Flank Surface	B1	0–60°
Angle of Rearward Flank Surface	B2	0–6°
Axial Length of Thread Crest Portions	L1	0.005 inches
Radial or Width Extent of Fasteners Threads	L2	0.010–0.085 inches
Axial Length or Pitch Dimension Defined Between Identical Locations Of Adjacent Threads	L3	0.035–0.090 inches
Axial Spacing Defined Between Root Portions of Adjacent Threads	L4	0.035–0.090 inches

[0067] Thus, it may be seen that in accordance with the principles and teachings of the present invention, there has been provided a new and improved threaded screw fastener which is provided with a head portion that has integrally incorporated therein unique and novel combination or dual drive means whereby the single threaded screw fastener can be rotatably driven by means of alternative rotary drive socket implements or tools, such as, for example, hexagonally configured or Phillips head configured drive means, or a combination drive tool. In this manner, the threaded screw fastener, having such combination head structure, can be drivingly inserted or installed within substrates regardless of the particular drive socket implement or tool being utilized by field installation or job site personnel. Furthermore, there is provided a new and improved drive socket implement or tool which has integrally incorporated therein both hexagonally configured drive structure, Phillips head drive structure, and domed contour structure for not only structurally accommodating both the hexagonally configured structure and the Phillips head structure integrally incorporated upon the head portion of the threaded screw fastener, but in addition, for accommodating the low profile domed structure of the head portion of the threaded screw fastener. Still further, the threaded screw fastener also comprises thread structure wherein each thread of the threaded screw fastener comprises unique and novel rearward and forward flank surfaces which effectively serve to simultaneously enhance the pull-out resistance characteristics or properties of the threaded screw fastener while reducing the installation or insertion torque characteristics or properties of the threaded screw fastener. Lastly, the threaded screw fastener has unique structure that permits the same to be used in connection with the seaming together of overlapped edge portions of adjacent roofing panels.

[0068] Obviously, many variations and modifications of the present invention are possible in light of the above teachings. For example, it is to be noted that not all of the unique and novel head drive and thread features, as have been disclosed as being characteristic of the present invention, are necessarily included within a single threaded fastener, or within a single socket implement or tool. In addition, while the drive structure incorporated within the head portion of the threaded screw fastener, as well as the corresponding structure incorporated within the drive socket implement or tool, has been primarily disclosed as comprising the hexagonal and Phillips head drive structure, it is noted that other drive combinations are possible. For example, in lieu of the Phillips head drive structure, other drive structure, selected from the group comprising Torx drive means, six-lobe drive means, internal hex drive means, and square drive means, may likewise be employed in accordance with the principles and teachings of the present invention. It is therefore to be understood that within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be protected by Letters Patent of the United States of America, is:

1. A threaded screw fastener, adapted to be used in connection with the securing together of overlapped edge portions of roofing panels having predetermined thickness dimensions, so as to securely fasten said threaded screw fastener at its threadedly secured position within the overlapped edge portions of the roofing panels, comprising:

a shank portion defined around a longitudinal axis;

a head portion formed upon one end of said shank portion;

a tip portion formed upon an opposite end of said shank portion; and

a plurality of threads disposed upon said shank portion of said threaded screw fastener;

wherein each one of said plurality of threads disposed upon said shank portion of said threaded screw fastener comprises a rearward flank surface portion and a forward flank surface portion, and wherein adjacent threads are separated from each other a predetermined amount so as to define a space therebetween, as defined between the root portion of said forward flank surface portion of a particular one of said plurality of threads and the root portion of said rearward flank surface portion of an adjacent successive one of said plurality of threads, for securely accommodating the overlapped edge portions of the roofing panels, fabricated from predetermined gauge material having predetermined thickness dimensions, within said space defined between said adjacent threads.

2. The threaded screw fastener as set forth in claim 1, wherein:

said space, defined between said root portions of said forward flank surface portion and said rearward flank surface portion of adjacent threads which are separated from each other by means of said predetermined amount, has a dimension of at least 0.035 inches so as to securely accommodate the overlapped edge portions of roofing panels.

3. The threaded screw fastener as set forth in claim 1, wherein:

said space, defined between said root portions of said forward flank surface portion and said rearward flank surface portion of adjacent threads which are separated from each other by means of said predetermined amount, has a dimension which is within the range of 0.035-0.090 inches so as to securely accommodate the overlapped edge portions of roofing panels which are fabricated from 22-26 gauge material.

4. The threaded screw fastener as set forth in claim 1, wherein:

said forward flank portion of each one of said plurality of threads is disposed at a first predetermined angle with respect to a radius of said shank portion of said threaded screw fastener; and

said rearward flank portion of each one of said plurality of threads is disposed at a second predetermined angle with respect to said radius of said shank portion of said threaded screw fastener.

5. The threaded screw fastener as set forth in claim 4, wherein:

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is substantially less than said first predetermined angle at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener.

6. The threaded screw fastener as set forth in claim 5, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-60°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-6°.

7. The threaded screw fastener as set forth in claim 4, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-60°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-6°.

8. The threaded screw fastener as set forth in claim 4, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is 0°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is 0°,

whereby said forward flank portion of each one of said plurality of threads is disposed substantially parallel to said rearward flank portion of each one of said plurality of threads.

9. The threaded screw fastener as set forth in claim 1, wherein:

the radial extent of each one of said plurality of threads, as defined between the root portion of the thread and the crest portion of the thread, is within the range of 0.010-0.085 inches.

10. In combination, a plurality of threaded screw fasteners, adapted to be used in connection with the securing together of overlapped edge portions of roofing panels having predetermined thickness dimensions, comprising:

a pair of overlapped edge portions of adjacent roofing panels; and

a plurality of threaded screw fasteners disposed within said overlapped edge portions of said adjacent roofing panels so as to fixedly secure said overlapped edge portions of said adjacent roofing panels together in a seamed manner;

each one of said plurality of threaded screw fasteners comprising a shank portion defined around a longitudinal axis; a head portion formed upon one end of said shank portion; a tip portion formed upon an opposite end of said shank portion; and a plurality of threads disposed upon said shank portion of said threaded screw fastener; wherein each one of said plurality of threads disposed upon said shank portion of said threaded screw fastener comprises a rearward flank surface portion and a forward flank surface portion, and wherein adjacent threads are separated from each other a predetermined amount so as to define a space therebetween, as defined between the root portion of said forward flank surface portion of a particular one of said plurality of threads and the root portion of said rearward flank surface portion of an adjacent successive one of said plurality of threads, for securely accommodating said overlapped edge portions of said roofing panels, fabricated from predetermined gauge material having predetermined thickness dimensions, within said space defined between said adjacent threads.

11. The combination as set forth in claim 10, wherein:

said space, defined between said root portions of said forward flank surface portion and said rearward flank surface portion of adjacent threads which are separated from each other by means of said predetermined amount, has a dimension of at least 0.035 inches so as to securely accommodate said overlapped edge portions of said roofing panels.

12. The combination as set forth in claim 10, wherein:

said space, defined between said root portions of said forward flank surface portion and said rearward flank surface portion of adjacent threads which are separated from each other by means of said predetermined amount, has a dimension which is within the range of 0.035-0.090 inches so as to securely accommodate said overlapped edge portions of said roofing panels which are fabricated from 22-26 gauge material.

13. The combination as set forth in claim 10, wherein:

said forward flank portion of each one of said plurality of threads is disposed at a first predetermined angle with respect to a radius of said shank portion of said threaded screw fastener; and

said rearward flank portion of each one of said plurality of threads is disposed at a second predetermined angle with respect to said radius of said shank portion of said threaded screw fastener.

14. The combination as set forth in claim 13, wherein:

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is substantially less than said first predetermined angle at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener.

15. The combination as set forth in claim 14, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-60°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-6°.

16. The combination as set forth in claim 13, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-60°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is within the range of 0°-6°.

17. The combination as set forth in claim 13, wherein:

said first predetermined angle, at which said forward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is 0°; and

said second predetermined angle, at which said rearward flank portion of each one of said plurality of threads is oriented with respect to said radius of said shank portion of said threaded screw fastener, is 0°,

whereby said forward flank portion of each one of said plurality of threads is disposed substantially parallel to said rearward flank portion of each one of said plurality of threads.

18. The combination as set forth in claim 10, wherein:

the radial extent of each one of said plurality of threads, as defined between the root portion of the thread and the crest portion of the thread, is within the range of 0.010-0.085 inches.

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