Title
Screw fastener having an improved head

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Abstract:

A screw fastener including:

an elongate shank (11);

a head (5) located at one end of the shank, and a drill point (7) located at an opposing end of the shank;

wherein the head has a maximum head diameter that is less than the minimum head diameter of a head of a conventional screw fastener of the same gauge or shank diameter; and

wherein the head includes a drive recess having a size and depth greater than the drive recess that would be used in the head of a conventional screw head of this head diameter.
SCREW FASTENER HAVING AN IMPROVED HEAD

FIELD OF THE INVENTION

The present invention is generally directed to building products, and in particular to a screw fastener. The present invention will be described with respect to the fastening of skirting boards and architraves within a building having a timber or steel frame. It is however to be appreciated that the invention is not restricted to this application, and that other applications are also envisaged.

BACKGROUND OF THE INVENTION

Skirting boards and architraves are normally fastened to the wall of a building having a timber frame using nails. Apart from the convenience of using nails, they have the benefit of being easily driven into the skirting board or architrave such that they can then be stopped and painted over. This therefore allows for a smooth finish with no exposed nail head or visible evidence of where the nail head may be. Conventional screw fasteners can also be used for this application but have a significant disadvantage restricting their use in practice. Screw fasteners have larger heads than nails as the head of the screw fastener is required to support a drive recess of a sufficient size to allow the screw fastener to be driven with minimal wobble. It is therefore generally necessary to counter bore the timber to provide clearance for the head so that it can finish below the timber surface thus allowing it to be stopped over if a smooth final finish is to be achieved. It is therefore more convenient for trade persons to use nails for this application as counter boring is then unnecessary.

The use of nails is however not ideal for steel frame houses. Firstly, due to the varying thicknesses of steel that may be used in making the steel house frame it is difficult for nails to consistently provide a secure fixing. In addition, nails require a specialised nail gun to drive the nails which are not usually owned by a tradesman or owner builder. Also nails are difficult to extract if later required to do so. Screw fasteners are therefore preferred as they can be more easily removed if modifications are required or damaged plasterboard, skirting boards or architraves need to be replaced. Screw fasteners can also be driven using conventional screwdriver tools. The screw fastener must be driven through the skirting board or architrave and a plasterboard layer into the underlying steel frame to provide the correct fixing.
A commonly used screw fastener for this purpose has wings located near the drill tip, with a screw thread being located above the wings. When this screw fastener initially contacts the timber, the wings act to counter bore a clearance hole in the timber. The wings should snap off when they come into contact with the steel to allow the screw thread to engage the steel. The strength of the threaded engagement between the screw thread and the steel should ideally be strong enough to support the build up of the drive torque as the head of the screw fastener contacts and is driven into the timber such that the head is then in a flush position within or below the timber surface. Such screw fasteners require skilled operators if they are to be used successfully. In inexperienced hands, it is possible for the wings to not snap off soon enough when the screw fastener contacts the steel so that the wings also comes into contact with and slightly counterbores the steel. This thins the steel in that area so that the increase in drive torque when the head comes into contact with the timber surface results in the screw thread stripping out the bore. Because the bore is stripped out, the screw fastener cannot then continue to be driven into the timber and it is therefore no longer possible to drive the head below the timber surface leading to an exposed head. In this situation, the fixing is considered to have failed as there is no adequate engagement between the screw fastener and the steel frame and the head remains exposed. The screw fastener must therefore be removed in this situation. The removal is however not straightforward as it is not possible to reverse out the screw fastener as the bore has already been stripped. Therefore, the only way to remove the screw fastener is to use pliers to pull it out.

**SUMMARY OF THE PRESENT INVENTION**

It is an object of the present invention to provide a screw fastener that overcomes one or more of the above noted problems associated with prior art screw fasteners.

With this in mind, there is provided a screw fastener including:
an elongate shank; a head located at one end of the shank, and a drill point located at an opposing end of the shank; wherein the head has a maximum head diameter that is less than the minimum head diameter of a conventional screw fastener of the same gauge or shank diameter; and wherein the head includes a
drive recess having a size and depth greater than the drive recess that would be used in the head of a conventional screw head of this diameter.

The head may preferably have a height greater than a height of the head of said conventional screw fastener of the same gauge or shank diameter.

The head may preferably have a height greater than the height of the head of a conventional screw head of this head diameter.

According to a preferred embodiment, the head includes a frustoconical portion extending outwardly from the shank, and a generally cylindrical portion extending from the frustoconical portion. The head will therefore have a circular cross-section. It is however also envisaged that the head cross-section may be non-circular, for example, triangular, square, hexagonal or octagonal. The drive recess provided within the head, may preferably be a Robertson square drive. The use of other drive types is also envisaged.

The elongate shank preferably includes a first shank portion adjacent the head, and a second shank portion extending from the first shank portion, the drill point being located on the second shank portion, a first screw thread extending along at least a part of the first shank portion. A second screw thread may also extend along at least a part of the first shank portion, the second screw thread extending in a reverse direction to the first screw thread.

Alternatively, the elongate shank preferably includes a first shank portion adjacent the head, and a second shank portion extending from the first shank portion, the drill point being located on the second shank portion, a first screw thread extending along at least a portion of the second shank portion to the drill point. A second screw thread may also extend along at least a portion of the first shank portion, the second screw thread extending in a reverse direction to the first screw thread.

The second shank portion may have a shank diameter equal to a shank diameter of the first shank portion. Alternatively, the second shank portion may have a shank diameter that is less than that of a shank diameter of the first shank portion.

The drill point can be of different types depending on the material that the screw point is used in. For example, the drill point may be for drilling metal, a Type 17 drill point for drilling timber, or a multi purpose type such as a #2SDS drill.
point or multi purpose drill point for drilling either steel or timber or other materials.


The amount of torque required to drive the head into the material of the skirting board or architrave, for example medium density fibreboard (MDF), timber or other materials such as plastic, may be reduced by having a head with a maximum diameter less than the head of a conventional fastener of the same gauge or shank diameter. This helps to reduce the drive torque required to drive the head fully into the skirting board or architrave. A screw fastener having a smaller than conventional head diameter will also be more easy to drive under the surface of the skirting board or architrave such that the head can be stopped and painted over. This makes such a screw fastener suitable as a replacement for nails when used in timber framed houses, and can also be used in steel framed houses.

The reduction of the head diameter would normally require a smaller and shallower drive recess for the head. This would then result in increased wobble of the screw fastener as it is being driven as the drive recess is insufficient in width and depth to properly drive a screw of this gauge or shank diameter. The smaller and shallower drive recess normally required for a screw with this head diameter has the added problem of being subject to cam out, or spinning of the drive tip within the recess making it impossible to drive the screw fastener. This occurs because the torque required to drive this screw fastener with a gauge or shank diameter larger than the drive recess and tip combination was designed for is too great. This is addressed according to the present invention by the head accommodating a drive recess having a size and depth greater than the drive recess of a head of a conventional screw fastener of the same head diameter. The head preferably has a height (being the length of the head in a direction parallel to the elongate axis of the shank) that is greater than the maximum head height of a conventional fastener of the same head diameter. The increased
height of the head allows for a relatively larger and consequently deeper drive recess to be located in the head, the height of the head allowing for the drive recess of a larger size and depth than that normally provided for a head of that reduced diameter. The larger, longer drive recess will penetrate more deeply into the head than a drive recess that would normally be found in a conventional screw fastener with the same maximum head diameter. The result of having a reduced head diameter and a deeper, stronger drive recess is that the problems of wobble and cam out of the recess when the screw fastener is being driven are greatly reduced thereby making it easier to use the screw fastener in its applications.

The shank of the screw fastener may have a first shank portion adjacent the head, and a second shank portion extending from the first shank portion, with the drill point being located on the second shank portion. Depending on the application of the screw fastener, in particular whether it is to be used in a timber or steel framed house, a first screw thread may extend along at least a part of the first or second shank portions. It is also envisaged that the first screw thread may extend the entire length of the elongate shank. A second thread may also extend along at least part of the first shank portion and may have a thread direction opposite to the first thread portion. This “reverse” thread acts to ream a hole through the material being drilled. Such reaming is advantageous when the material being drilled is for example kilned dried hardwood which can split if excessive expansion of the timber is created when driving the head of the screw fastener into and below the surface of the hardwood.

The first shank portion may have the same shank diameter as the second shank portion. Such a configuration is particularly suitable when a relatively high drive torque is required to drive the screw fastener through the skirting board or architrave and into the timber or steel frame. This may for example be the situation when the thickness of the steel frame through which the screw fastener must drill is high, for example greater than 1.50mm. Alternatively, the second shank portion may have a shank diameter that is less than that of the shank diameter of the first shank portion. The drill point may then be smaller in diameter than the shank diameter of the first shank portion, and it will form a bore that is smaller in size than the shank diameter of the first shank portion, and therefore a
crest diameter of the screw thread supported by the first shank portion. Furthermore, the screw thread may be located on the first shank portion such that the drill point is located remotely from the screw thread, being at the end of the second shank portion. The screw fastener according to this preferred embodiment will therefore initially drill into the steel frame as the second shank portion passes through the skirting board or architrave and plasterboard layers into the steel. The second shank portion may be of a length sufficient to allow the drill point to complete the drilling operation through the skirting board or architrave and plasterboard layers and into the steel frame before the screw thread contacts the timber layer. This helps to prevent the timber running up the threaded shank and coming away from the plasterboard. The screw thread can then pass through the skirting board or architrave and plasterboard layers to form a threaded bore within the steel frame. Because the size of the hole initially drilled within the steel frame by the drill point is significantly less than the crest diameter of the screw thread, this has the effect of producing a greater amount of thread engagement between the screw fastener and the steel frame when compared with prior art screw fasteners. The result of this improved screw thread engagement is that the possibility of stripping of the bore is reduced or eliminated. Such an embodiment is particularly applicable for use in buildings where the steel frame has a thickness of for example around 1.50mm or less.

The present invention may therefore provide a screw fastener that can be more easily be driven due to reduced wobble and reduced cam out as well as facilitating the driving of the head below the surface of the timber.

BRIEF DESCRIPTION OF THE INVENTION

It will be convenient to further describe the invention with respect to the accompanying drawings which illustrates preferred embodiments of the screw fastener according to the present invention. Other embodiments of the invention are possible, and consequently, the particularity of the accompanying drawings are not to be understood as superseding the generality of the preceding description of the invention; In the drawings:
Figure 1 is a schematic side view of a first embodiment of a screw fastener according to the present invention;

Figure 2 is a schematic side and end view of the head of the screw fastener of Figure 1;

Figure 3 is a schematic view of a second embodiment of a screw fastener according to the present invention;

Figure 4 is a schematic view of a third embodiment of a screw fastener according to the present invention; and

Figure 5 is a schematic view of a fourth embodiment of a screw fastener according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring initially to Figures 1 and 2, the screw fastener 1 according to the present invention has an elongate shank 3. At one end of the elongate shank 3 is provided the head 5 of the screw fastener 1. The opposing end of the elongate shank 3 is provided with a drill point 7.

The elongate shank 3 is divided into a first shank portion 9 and a second shank portion 11. According to the illustrated embodiment in Figure 1, the first shank portion 9 has a shank diameter 10, which is greater than the shank diameter 12 of the second shank portion 11. As the drill point 7 is supported at the end of the second shank portion 11, the outer diameter 8 of the drill point 7 is substantially the same as the second shank portion diameter 12. The drill point 7 therefore has an outer diameter 8 which is less than the shank diameter 10 of the first shank portion 9.

The embodiment shown in Figure 1 has the first shank portion 9 substantially identical in length to the second shank portion 11. It is however to be appreciated that the relative lengths of the first and second shank portions 9,11 can vary depending on the application and size of the screw fastener 1.

A screw thread 13 extends along at least part of the length of the first shank portion 9. The screw thread 13 has a maximum crest diameter 15 which, being greater than the shank diameter 10 of the first shank portion 9 will subsequently be greater than the outer diameter 8 of the drill point 7. The crest diameter 15 of the screw thread 13 is generally similar in diameter along the first
shank portion 9, a lead in thread 14 to the screw thread 13 tapering to a minimum at the junction 21 between the first and second shank portions 9,11. It is also envisaged that under certain applications, the screw thread 13 can extend along the entire length of the first shank portion 9.

Referring now to Figure 2 which shows in more detail the head 5 of the screw fastener. The head 5 includes a frustoconical portion 17 extending outwardly from the first shank portion 9. A cylindrical portion 19 of the head 5 extends from the frustoconical portion 17. A drive recess 6 is supported by and extends into the head 5. It is however also possible for the head to have a non-circular cross-section, for example triangular, square, hexagonal or octagonal.

The head 5 has an outer diameter 21 which is smaller in size than the head of a conventional screw fastener of the same gauge or shank diameter. While this would normally require that a smaller drive recess be used because of the smaller head diameter, the cylindrical portion 19 of the head 5 provides added height 22 to the head such that the drive recess 6 may more deeply penetrate the head 5. Also a larger sized and deeper drive recess 6 may be used because of the increased height 22 compared with a conventional head of this diameter. Therefore the drive recess can be larger and deeper than would normally be possible for a drive recess in a head having the diameter according to the present invention. The drive recess can be a Robertson square drive at best shown in Figure 2, although other types of drive, for example a Torx® drive, could be used.

The reduced drill point diameter 8 when compared with the shank diameter 10 of the first shank portion 9, produces a relatively small bore within the steel which, when threaded by the screw thread 13, results in an increased thread engagement of the screw thread 13 with the bore. This helps to reduce the possibility of the bore being stripped by the screw thread 13 when there is an increase in the drive torque applied to the screw fastener 1 as the head of the screw fastener contacts, the surface of the skirting board or architrave, which may be made from material such as timber or medium density fibreboard (MDF), or plastic.

The extended portion of blank shank between the drill point and start of the thread, allows the screw fastener to complete a drilling operation through an outer timber skirting board or architrave, an underlying plasterboard layer and into the
steel frame before the screw thread 13 engages the surface of the outer skirting board or architrave. This reduces the possibility of the skirting board or architrave running up the screw thread and away from the plasterboard.

The reduced diameter of the head 5 reduces the maximum required drive torque for driving the head into the timber surface thereby also reducing the drive torque applied to the screw thread 13 and steel frame engagement. Furthermore, the size and depth of the drive recess 6 is such that in the wobble of the screw fastener and the cam out of the recess in the screw head are minimized as it is being driven.

The screw fastener of Figure 3 differs from the embodiment shown in Figure 1 and 2 in the provision of a reverse thread 25 extending along part of the first shank portion 9. That reverse thread 25 has a thread direction that extends in an opposite direction to the thread direction of the main thread 13. The embodiment shown in Figure 1 and 2 can be used to attach skirting boards or architrave formed from for example, MDF. However, where the skirting board or architrave is made from material such as kiln dried hard wood, then it maybe preferable that a larger hole be reamed through the skirting board/architrave by the screw fastener to prevent splitting or cracking of the hard wood when the head engages the skirting board or architrave. This is achieved according to the embodiment shown in Figure 3 by the reverse thread 25 which acts to ream a larger hole through the skirting board or architrave as the screw fastener is being driven there through.

The embodiment shown in Figures 1 to 3 can be used on steel framed houses where the thickness of the steel that the screw fastener needs to drill through is relatively thin, for example, around 1.50mm or less. When the steel thickness is higher, for example, around 2.00mm, then the torque required to drive the screw fastener through the steel can be too high for the head to accommodate leading to shattering of the head. In these applications, it is preferable that the diameter of the second shank portion 11 be the same as the diameter of the first shank portion 9 as shown in the embodiment shown in Figure 4. The use of a relatively larger drill point 7 will reduce the threading torque required to drive the screw fastener thereby reducing the torque applied to the head.
In the embodiment shown in Figure 4, it is also envisaged that a reverse thread be located on the first shank portion 9 as in the embodiment shown in Figure 3. This would then facilitate the use of the screw fastener in attaching, for example, kiln dried hard wood skirting boards and architraves within a steel framed house as previously discussed.

Figure 5 shows an embodiment of the screw fastener of the present invention which is applicable for fastening a skirting board or architrave in a timber framed house. In this embodiment, there is provided a timber drill point 27, for example a Type 17 drill point, with the screw thread extending from that drill point 27 along at least part of the elongate shank towards the head 5. The portion of the elongate shank 3 adjacent the head 5 may be blank and not support any threads. It is however, also envisaged that this portion of the shank support a reverse thread to facilitate use of this screw fastener with skirting boards, architraves made of kiln dried hard wood as previously discussed. It is also envisaged that, in place of the type 17 timber drill point, a number 2 drill point or a multi purpose drill point be used. This may act to reduce the possibility of hard wood skirting boards/architraves being split, particularly when used in mitres around doors and windows.

The screw fastener according to the present invention therefore facilitates the securing of skirting boards and architraves made of timber or other materials within a timber or steel frame building.

Modifications and variations as would be deemed obvious to the person skilled in the art are included within the ambit of the present invention as claimed in the appended claims.
CLAIMS:
1. A screw fastener including:
   - an elongate shank;
   - a head located at one end of the shank, and a drill point located at an opposing end of the shank;
   wherein the head has a maximum head diameter that is less than the minimum head diameter of a head of a conventional screw fastener of the same gauge or shank diameter; and
   wherein the head includes a drive recess having a size and depth greater than the drive recess that would be used in the head of a conventional screw head of this head diameter.

2. A screw fastener according to claim 1, wherein the head has a height greater than a height of a head of a conventional screw fastener of the same gauge or shank diameter.

3. A screw fastener according to claim 1, wherein the head height is greater than a height of a conventional screw head of this head diameter.

4. A screw fastener according to claim 2 or 3, wherein the head includes a frustoconical proportion extending outwardly from the shank, and a generally cylindrical portion extending from the frustoconical portion.

5. A screw fastener according to anyone of the preceding claims, wherein the drive recess provided with in the head is a Robertson square drive.

6. A screw fastener according to any one of the preceding claims, wherein the shank includes a first shank portion adjacent the head, and a second shank portion extending from the first shank portion, the drill point being located on the second shank portion, a first screw thread extending along at least a part of the first shank portion.
7. A screw fastener according to claim 6, wherein a second screw thread extends along at least a part of the first shank portion, the second screw thread extending in a reverse direction to the first screw thread.

8. A screw fastener according to any one of claims 1 to 5, wherein the shank includes a first shank portion adjacent the head, and a second shank portion extending from the first shank portion, the drill point being located on the second shank portion, a first screw thread extending along at least a portion of the second shank portion to the drill point.

9. A screw fastener according to claim 8, wherein a second screw thread extends along at least a part of the first shank portion, the second screw thread extending in a reverse direction to the first screw thread.

10. A screw fastener according to any one of claims 5 to 9, wherein the second shank portion has a shank diameter that is equal to a shank diameter of the first shank portion.

11. A screw fastener according to any one of claims 5 to 9, wherein the second shank portion has a shank diameter that is less than that of a shank diameter of the first shank portion.

12. A screw fastener according to any one of the preceding claims wherein a drill point is for drilling metal.

13. A screw fastener according to any one of claims 1 to 11 wherein the drill point is for drilling timber.

14. A screw fastener according to any one of claims 1 to 11 wherein the drill point is a multi purpose drill point for drilling metal, timber and other materials.