A Clamp

The present invention is directed to clamps for standing seam roofs. Clamps of this type are known to clamp to an upright of a standing seam roof to secure the clamp to the upright. Such clamps may be used to secure conductors, or the like, to a standing seam roof, for example.

Background

Standing seam roofs are a particular type of roof structure which have become popular due to their ease of manufacture, relatively low cost and good water retention capabilities. A typical standing seam roof structure is illustrated in Figure 1.

The typical standing seam roof structure shown in Figure 1 is formed of a series of plates. Lower surfaces of two adjacent plates are brought together at their adjacent edges to form an upright section. Repeating this arrangement over an entire roof results in the plates forming channels separated by upright sections.

Two such plates 100a, 100b are illustrated in Figure 1. As shown, the lower surfaces of the plates 100a, 100b come together to form an upright 10. The upright 10 extends away from the plane of the roof, but other geometries, wherein the upright forms a bend, preferably of 90°, are also possible.

The upright comprises an elongate standing seam section 12 which terminates at a join 14, by which the plates are joined and the roof is sealed so as to be watertight. Since the join 14 is elevated above the plane of the roof, rain water falling on the roof collects in the channels formed by the plates 100a, 100b and uprights 10, such that the water is drained away below the join.

Typically the join is a crimped portion, as shown in Figure 1, which is formed by folding the edges of the adjacent plates over each other and applying pressure to prevent the join from re-opening. The crimped portion of the upright is larger in cross-section than the standing seam of the upright.

It is known to provide clamps to clamp to uprights of such standing seam roofs. For example, EP 0 594 948 B1 discloses a clamp strap for clamping to a crimped portion of an upright. The strap comprises a pair of opposing arms which grip the crimped section of the upright. A bolt passing through the arms secures the strap to the crimped section by preventing the arms from moving apart. The strength of the connection may be increased by tightening the bolt.

A clamp of this type is illustrated in Figure 2. The clamp is shown in use on the standing seam roof of Figure 1. A clamp 20 is shown clamped to the crimped portion 14 of the upright 10. The clamp 20 comprises first and second arms 22, 24 which surround and grip the crimped portion 14 of the upright 10. The arms 22, 24 are secured together by a bolt 26 which prevents the arms from separating and which may be tightened to strengthen the grip of the arms 22, 24 on the crimped portion 14.

Clamps of the type illustrated in Figure 2 and disclosed in EP 0 594 948 B1, suffer from various problems. Firstly, such clamps can be difficult to install on a roof because their assembly requires a two-handed operation. One hand is required to maintain the clamp in an appropriate position on the crimped portion of an upright whilst the other hand is required to tighten the bolt to secure the clamp in position.

Furthermore, such clamps have a tendency to rotate about the crimped portions, particularly since the bolt may become loose over time. Furthermore, the force required to tighten the bolt to obtain a good grip can damage the components of the clamp or the upright itself.

Finally, such clamps are relatively complex to manufacture because they are formed from multiple components. Furthermore, the components must either be assembled together as a package before being supplied to an installer, or else risk being separated in transit.

Summary of Invention

Accordingly, in a first aspect, the present invention provides a clamp for clamping to an upright of a standing seam roof, the upright having an elongate seam terminating at a crimped portion, the clamp comprising: a clamp body having a cavity for receiving the upright; and fixing means configured to urge the elongate seam of the upright against a retaining wall of the cavity, to secure the clamp to the upright.

This clamp is advantageous in that it has a clamp body which may easily be placed over an upright of a standing seam roof and retained thereon whilst the fixing means is urged against the elongate seam of the upright. The fixing means may be operated with one hand to force the elongate seam of the upright against the cavity wall, to thereby clamp the device to the upright. The fixing means may, for example, be a bolt which may pass through a threaded aperture in the clamp body opposite the retaining wall, such that it may be tightened against the upright using conventional means.

The clamp body may be formed from a single piece. This is advantageous because it is easy to manufacture and assemble. Furthermore, with a fixing means (preferably a bolt), the single piece body may be secured to an upright using one hand.

In one embodiment, the retaining wall of the clamp comprises first and second abutment sections which are offset from each other such that, in use, the first and second abutment section abut the elongate seam and crimped portion of the upright, respectively.

Since the crimped portion of the upright of a conventional standing seam roof has a larger diameter than the elongate seam, it is advantageous to provide the retaining wall with offset abutment sections, rather than a planar surface, such that the wall may, in use, abut the crimped portion and the elongate seam of the upright together.

Preferably, the abutment section for the elongate seam protrudes further towards the opposite side of the clamp body than the abutment section for the crimped portion. More preferably, the retaining wall has a profile which matches the profile of the

upright. For the purposes of positioning the upright in the cavity, the arrangement is optimised when the offset of the first and second abutment sections matches the difference in diameter between the crimped portion and elongate seam of the upright.

In a preferred embodiment, the cavity is a channel formed within the clamp body and the channel follows a crooked path.

Such a channel may be easily machined from a block using convention manufacturing techniques. A single piece clamp body with a channel formed therein is a strong structure which may easily withstand the forces applied between the fixing means and the upright.

The crooked path of the channel is advantageous since it permits the different diameters of the crimped portion and the elongate seam of the upright to be accommodated within the clamp body to allow the upright to be urged against the retaining wall.

In a particularly preferred embodiment, the channel comprises an entrance passage for receiving the upright; and a retaining passage, inclined with respect to the entrance passage, for receiving the crimped portion of the upright to bring the elongate seam of the upright into contact with the retaining wall. Preferably, the retaining passage is inclined away from the opposite wall of the passage to a sufficient degree and for a sufficient distance to enable the elongate seam of the upright to be flush against the retaining wall when the crimped portion is fully received in the retaining passage.

Preferably, the width or diameter of the channel (measured normal to the longitudinal axis of the channel) is equal to or greater than the diameter of the crimped portion of the standing seam, such that the seam may pass through the channel to the end. Optionally, the entrance passage and retaining passage may be of different widths or diameters.

In one embodiment, the retaining wall comprises teeth adapted to resist withdrawal of the upright from the cavity. The teeth may be angled away from the

aperture entrance with respect to the retaining wall, so as to bite on the upright and resist withdrawal of the clamp. Preferably, the teeth are provided on the first abutment section so as to improve the grip of the clamp on the elongate seam of the upright. The teeth also help to prevent the clamp from sliding along or off the standing seam if the fixing means were to become loose. In such a situation, the teeth may grip the crimped portion of the standing seam, to prevent the clamp being removed there from.

In a second aspect, the present invention provides a clamp body for use with any of the clamps described above.

Brief Description of the Drawings

An embodiment of the invention will now be described in detail with reference to the accompanying drawings in which:

Figure 1 is a cross section of a portion of typical standing seam roof;

Figure 2 is a cross section of a known clamping device secured to the crimped portion of the standing seam roof of Figure1;

Figure 3 is a cross section of a clamp according to the present invention;

Figure 4 is a cross section of the clamp of Figure 3 secured to the upright of the standing seam roof of Figure 1; and

Figure 5 is a perspective view of the clamp of Figure 4 in use with two conductor clips.

Detailed Description

A preferred embodiment of a clamp according to the present invention is illustrated in Figure 3. The clamp is suitable for use on an upright of a standing seam roof such as that illustrated in Figure 1.

The illustrated clamp 40 comprises a clamp body 42 having a channel 44 formed therein. The channel 44 is defined by a retaining wall 46 and a second wall 48 opposite the retaining wall 46. The channel has an opening 50 at one end of the clamp body 42.

As illustrated, the channel 44 follows a crooked path. The channel 44 comprises an entrance passage, parallel to the sides of the clamp body 42, and a retaining passage inclined away from the second wall 48 with respect to the entrance passage. The width or diameter of the channel is sufficient to accommodate the crimped portion of the upright of the standing seam roof along the entire length of the channel.

By virtue of the crook in the channel, the retaining wall 46 of the channel comprises first and second abutment portions 52, 54. The first and second abutment portions 52, 54 are offset from each other - the first abutment portion 52 extending further towards the opposite side of the clamp body than the second abutment portion 54.

The first abutment portion comprises a series of teeth 56 which are inclined away from the opening to resist removal of the clamp from the upright.

The clamp body 42 comprises a threaded aperture 58 through which a bolt 60 may be driven to pass through the second wall of the channel 44, contact the elongate seam of the upright and thereby drive the elongate seam against the retaining wall 46. Thus, the clamp 40 may be secured to the upright.

Figure 4 shows the clamp 40 in use, attached to the upright 10 of the standing seam roof of Figure 1. The clamp body 42 is placed over the upright 10 such that the crimped section 14 of the upright 10 is received in the entrance passage of the clamp body 42. As the clamp is lowered onto the upright 10, the crimped section 14 passes

through the entrance passage and into the inclined receiving passage. As the crimped section 14 passes along the inclined receiving passage, the retaining wall 46 is brought toward the upright 10. In particular, the first abutment section 52 is brought toward the elongate seam 12 and the second abutment section 54 is brought toward the crimped section 14, until there is contact between the upright 10 and the retaining wall 46.

Once the clamp body 42 has been positioned on the upright 10, as described above, the bolt 60 is tightened in the threaded aperture 58 until it contacts the elongate seam 12. Further tightening of the bolt drives the seam 12 against the retaining wall 46 such that the clamp 40 is secured to the upright 10. The teeth 56 on the first abutment portion 52 bite against the elongate seam 12 to resist withdrawal of the clamp 40.

Removal of the clamp is achieved by releasing the bolt 60 from the threaded aperture 56. Both assembly and removal of the clamp may be achieved using one hand.

Figure 5 shows the clamp in use with two conductor clips 62, 64. The clips are known in the art, for securing lightning conductor strips, and the like, to a roof. In the illustrated embodiment, a first clip 62 is arranged at an upper face of the clamp, opposite the opening 50, and a second clip 64 is arranged on a side face, opposite the second wall 48 and perpendicular to the first clip 62. In other embodiments, one or more clips may be placed about the clamp in a variety of locations and secured thereto using a variety of techniques which will occur to the skilled person.

It will be appreciated that the invention has been described by way of example only and that alternatives may be provided without departing from the scope of the invention, which is defined in accordance with the appended claims.

CLAIMS

1. A clamp for clamping to an upright of a standing seam roof, the upright having an elongate seam terminating at a crimped portion, the clamp comprising:

a clamp body having a cavity for receiving the upright; and

fixing means configured to urge the elongate seam of the upright against a retaining wall of the cavity, to secure the clamp to the upright.

2. A clamp according to claim 1, wherein the retaining wall comprises first and second abutment sections which are offset from each other such that, in use, the first and second abutment sections abut the elongate seam and crimped portion of the upright, respectively.

3. A clamp according to claim 2, wherein the clamp body comprises a second wall opposite the retaining wall, and wherein the abutment section for the elongate seam protrudes further towards the second wall than the abutment section for the crimped portion.

4. A clamp according to any one of claims 1 to 3, wherein the cavity is a channel formed within the clamp body, the channel following a crooked path.

5. A clamp according to claim 4 wherein the channel comprises:

an entrance passage for receiving the upright; and

a retaining passage, inclined with respect to the entrance passage, for receiving the crimped portion of the upright to bring the elongate seam of the upright into contact with the retaining wall.

6. A clamp according to claim 5, wherein the retaining passage is inclined away from the second wall such that, in use, the elongate seam of the upright may be flush against the retaining wall when the crimped portion is received in the retaining passage.

7. A clamp according to any one of claims 4 to 6, wherein the channel has a width equal to or greater than the diameter of the crimped portion along its entire length.

8. A clamp according to any preceding claim, wherein the retaining wall comprises teeth adapted to resist withdrawal of the upright from the cavity.

9. A clamp according to any preceding claim, wherein the clamp body is formed of a single piece.

10. A clamp according to any preceding claim, wherein the fixing means is a bolt configured to pass through a threaded aperture in the clamp body opposite the retaining wall.

11. A clamp body for use with the clamp of any preceding claim.

12. A clamp substantially as described herein with reference to and as shown in the accompanying drawings.