

" Grille Joint Fastening System"

The present invention relates to a grille joint fastening system and a method of fastening grille joints.

A grille comprises a plurality of vertical and horizontal bars formed into a lattice structure. Joints occur at the points at which the horizontal and the vertical bars cross. The joints are secured by various means to provide a rigid grille. The resultant grilles can be used in the construction of windows, doors, fences, cages and the like.

Currently, the grille joints are secured by means of adhesives, riveting or welding. A typical configuration of a grille is shown in Figure 1.

One method of securing a grille joint is to position a horizontal bar through a hole in a vertical bar, drill a second hole through both bars and either rivet or bolt the two bars together through the second hole.

Another known method of securing grille joints is to place a horizontal bar through an aperture in a first rigid vertical element of a U-shaped cross section as shown in Fig. 2. The first vertical bar element and the horizontal bar are secured together by a rivet or bolt passing through registering holes in the members. The horizontal bar is

then passed through an aperture in a second rigid vertical bar element also of U-shaped construction so that the two channels defined by the two U-shaped cross-sections of the vertical bar elements face each other. The first bar element is pressed into the channel of the second bar element and is locked in position by two longitudinally extending ridges on the first bar element which lockingly engage two longitudinally extending lips on the second bar element.

The above described methods require laborious precision marking and drilling to ensure that the registering holes in the first vertical element and the horizontal bar are aligned.

The present invention aims to provide a grille joint fastening system which obviates the above disadvantages and allows the grille assembly to be constructed quickly and easily without tools.

Accordingly, one aspect of the present invention provides a method of fastening a grille joint comprising the steps of locating a clip at a predetermined position along a first bar, said clip being prevented from moving along said first bar from said predetermined position by restraining means and attaching a second bar at a predetermined position substantially perpendicular to said first bar such that said clip is at least partly enclosed by said second bar.

In another aspect the present invention provides a method of fastening a grille joint comprising the steps

of locating a clip at a predetermined position along a first bar, preventing said clip from moving along said first bar from said predetermined position by restraining means, and securing a second bar to said first bar by attaching said second bar to said first bar at said predetermined position so that said second bar is substantially perpendicular to said first bar and at least partly encloses said first bar.

In order that the invention be more readily understood, an embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which :

Fig. 1 illustrates a perspective view of a grille assembly;

Fig. 2 illustrates a conventional grille joint fastening system;

Fig. 3 is a top view of a vertical bar used in a grille;

Fig. 4 is a perspective view of a grille joint fastening clip and bar for use in one embodiment of the present invention;

Fig. 5 is a perspective view of a grille joint fastening system embodying the present invention;

Fig. 6 is a perspective view of a plurality of horizontal and vertical bars for use with a system embodying the present invention; and.

Fig. 7 is a perspective view of an alternative embodiment of the clip and bar of Fig. 4.

Fig. 1 shows a plurality of vertical and horizontal bars formed into a lattice structure or grille. The joints at which the vertical bars 2 cross the horizontal bars 1 are secured to provide an overall rigid structure. Each joint comprises a vertical bar 2, a horizontal bar 1 and a clip 3 (see Fig. 4).

Each vertical bar 2 consists of two bar elements, a first elongate element 4 and a second elongate element 5. The first elongate element 4 is an extruded length of aluminium formed with a U-shaped cross section comprising a back wall 6 and two side walls 7,8 as shown in Fig. 3. The U-shape defines a channel 9 between the two opposite side walls 7,8. The two outwardly facing surfaces of walls 7,8 of element 4 are each provided with a protruding ridge 10 which extends along the length of the element 4 parallel to its longitudinal axis.

The second element 5 comprises a resilient extruded length of aluminium again formed with a U-shaped cross-section comprising a back wall 11 and two side walls 12,13 as shown in Figure 3. The longitudinal edge of each of the two side walls 12,13 of the second element 5 is provided with a protruding lip 14. The lips 14 project inwardly towards one another, thus decreasing the width of the mouth of a channel 15 defined between the two side walls 12,13 of the second element 5.

The elements 4,5 are dimensioned such that when they are placed opposite one another with the two channels 9,15 facing each other, the first element 4 can be pressed

into the channel 15 of the second element 5. Each ridge 6 of the first element 4 is provided with a ramp surface 16 which allows the lips 14 of the second element 5 to pass more easily over the ridges 10. As the lips 14 pass over the ramp surfaces 16 of the ridges 10, the side walls 12,13 of the second element 5 are forced apart. Because of the resilient nature of the second element 5, the side walls 12,13 return to their original position when the lips 14 have completely passed over the ridges 10. When the lips 14 are in this position, the two elements 4,5 are locked together and are prevented from separating by the locking action of the lips 14 and the ridges 10. In this locked position, the two elements 4,5 form a vertical bar 2 and define a longitudinally extending tube 17 bounded by the backwall 11 of the second element 5 and the back wall 6 and the two side walls 7,8 of the first element 4.

The vertical bar 2, consisting of the two elements 4,5, has at least one pair of aligned apertures 18,19 formed in the back walls 6,11 of the elements 4,5. The common axis of the aligned apertures 18,19 is substantially perpendicular to the longitudinal axes of the elements 4,5. Each aperture 18,19 is dimensioned to receive a horizontal bar such as the horizontal bar 1.

Referring to Fig. 4, the horizontal bar 1 is a rigid elongate member with, for example, a hexagonal cross-section. The bar 1 is formed with a grooved portion 20 defined by two grooves 21,22 located on opposed sides of the bar 1. The grooves 21,22 are cut in the bar 1 at right angles to the longitudinal axis of the bar 1.

The clip 3 is constructed as a single plastics element and consists of two legs 23,24 connected by a base portion 25. The legs 23,24 and the base 25 define between them a predetermined shape which corresponds to the cross-section of the bar 1 at the grooved portion 20. The clip legs 23,24 are of substantially the same width as the grooves 21,22 in the bar 1.

The free ends of the legs 23,24 are formed as retaining portions 26 having confronting sloped surfaces 27 which converge to define at the bottom of the predetermined shape a throat which is slightly narrower than the grooved portion 20 of the bar 1.

Referring to Fig. 5, the size of the clip 3 is such that when mounted on the horizontal bar 1, the clip can be received within the channel 9 of the first element 4. The two outer surfaces of the clip legs 23,24 are of substantially the same width as the channel 9.

The grille joint can be assembled as follows :

The clip 3 is mounted on the bar 1 by locating the sloped surfaces 27 of the retaining portions 26 adjacent the grooved portion 20 of the bar 1. The clip 3 is pushed onto the bar 1 and the clip legs 23,24 are forced apart by the action of the sloped surfaces 27 on the grooves 21,22. The throat eventually clears the grooves 21,22 and the legs 23,24 return to their normal unstressed position.

Thus the clip 3, which is mounted in the grooves 21,22 on the bar 1, is prevented from moving along the bar

1 by the end walls of the grooves 21,22. The clip 3 is prevented from being forced off the bar 1 by the retaining portions 26 which contact a corresponding surface of the bar 1.

One end of the horizontal bar 1, with the clip 3 thereon, is passed through the aperture 18 in the first element 4. The clip 3 is located in the channel 9 of the first element 4. The opposite end of the horizontal bar 1 is passed through the corresponding aperture 19 in the second element 5 so that the channels 9,15 of both elements 4,5 are facing each other with the clip 3 between them. The second element 5 is slid along the horizontal bar 1 until the lips 14 of the second element 5 come into contact with the ridges 10 of the first element 4. Then, the two elements 4,5 are forced together into the locked position as previously described, thus enclosing the clips 3.

The above-mentioned steps can be repeated using horizontal bars 1 having a plurality of grooved portions 20 and vertical bars 2 provided with a plurality of pairs of aligned apertures 18,19 as shown in Fig. 6.

It should be appreciated that the cross-section of the grooved bar and the shape of the corresponding aperture in the vertical members can be of any configuration. For example, they might be circular, square or octagonal. The shape of the clip 3 is not critical as long as it performs its function of preventing the horizontal bar 1 from moving longitudinally with respect to the vertical bar 2. Thus, the clip 3 might have the internal profile which co-

operates with the horizontal bar as shown in Fig. 4, but could have a circular external shape which would allow a circular bar 1' and circular clip 3' (see Fig. 7) to rotate in a corresponding pair of aligned circular apertures as opposed to the clip and bar arrangement shown in Fig. 4.

The two grooves shown in Fig. 4 can be replaced with just one groove as shown in the bar 1 of Fig. 6.

A fastening system comprising the clip 3 and bar 1 shown in Fig. 4 and the vertical elements 4', 5' shown in Figure 8 is also envisaged.



CLAIMS :-

1. A grille joint comprising a first bar, a second bar, a clip and restraining means, wherein said clip is attached to said first bar at a predetermined position, said clip is prevented from moving along said first bar by said restraining means and said second bar is perpendicular to said first bar and substantially encloses said clip so that said second bar is secured to said first bar at said predetermined position.
2. A grille joint according to Claim 1, wherein said second bar comprises two bar elements which are secured together to form said second bar.
3. A grille joint according to Claim 2, wherein said two bar elements are formed with co-operating locking means which lock together so as to form the second bar.
4. A grille joint according to Claim 2 or 3, wherein said two bar elements comprise elongate U-shaped cross sections each defining a longitudinal channel between the confronting side walls of each bar element.
5. A grille joint according to Claim 4, wherein at least one pair of aligned apertures is formed in the back walls of the U-shaped cross sections through which the first bar passes.



- 10 -

6. A grille joint according to Claim 5, wherein the clip is received within the channel of one of the two bar elements and the first bar passes through the pair of aligned apertures.

7. A grille joint according to any one of Claims 3 to 6, wherein said locking means comprises at least one longitudinally extending lip on one bar element and at least one co-operating longitudinally extending ridge on the other bar element.

8. A grille joint according to any one of Claims 5 to 7, wherein the profile of the pair of aligned apertures is the same as the cross-section of the first bar.

9. A grille joint according to any preceding claim, wherein the first bar is formed with a hexagonal cross-section.

10. A grille joint according to any preceding claim, wherein the restraining means is formed on said first bar.

11. A grille joint according to any preceding claim, wherein the clip comprises two legs extending from a base portion.

12. A grille joint according to Claim 11, wherein the legs and the base portion define between them a predetermined shape which corresponds to the cross-section of the first bar at the predetermined position.

13. A grille joint according to Claims 11 or 12, wherein the clip legs have free ends which are formed as retaining portions.



- 11 -

14. A grill joint according to any one of Claims 11 to 13, wherein the restraining means comprises at least one groove formed at said predetermined position on said first bar.

15. A grille joint according to Claim 14, wherein said restraining means comprises two grooves formed on opposed sides of said first bar at said predetermined positions.

16. A grille joint according to Claim 14 or 15, wherein the clip legs are of substantially the same width as the at least one groove in the first bar.

17. A grille joint according to any one of Claims 10 to 16, wherein the first bar is formed with a plurality of restraining means at respective predetermined positions along the length of said first bar.

18. A grille comprising at least one grille joint according to any preceding claim.

19. A method of fastening a grille joint comprising the steps of locating a clip at a predetermined position along a first bar, preventing said clip from moving along said first bar from said predetermined position by restraining means, and securing a second bar to said first bar by attaching said second bar to said first bar at said predetermined position so that said second bar is substantially perpendicular to said first bar and at least partly encloses said first bar.

20. A method according to Claim 19, comprising forming said second bar by combining two bar elements.



21. A method according to Claim 20, comprising forming said two bar elements into the second bar by locking together locking means provided on said two bar elements.

22. A method according to Claim 20 or 21, comprising forming the second bar using two bar elements having elongate U-shaped cross sections each defining a longitudinal channel between the confronting side walls of the respective bar element, and engaging the channel of one of said bar elements in the channel of the other of said bar elements.

23. A method according to Claim 22, comprising passing the first bar through a pair of aligned apertures formed in the back walls of the U-shaped cross sections with the clip located at the predetermined position on the first bar between the two bar elements and the channels of the U-shaped cross-sections facing one another.

24. A method according to Claim 23, comprising receiving the clip within the channel of one of the two bar elements and receiving the channel of the other bar element in the channel of said first bar element.

25. A method according to any one of Claims 21 to 24, comprising locking the two bar elements together by placing at least one longitudinally extending lip on the one bar element against an at least one cooperating longitudinally extending ridge on the other bar element and forcing the two elements together until they are in a locked position.



26. A method, according to any one of Claims 19 to 25 comprising clipping the clip onto the first bar so that the clip is held in position by a retaining portion which secures the clip to the bar.

27. A grille joint substantially as hereinbefore described with reference to the accompanying drawings.

28. A grille substantially as hereinbefore described with reference to the accompanying drawings.

29. A method of fastening a grille joint substantially as hereinbefore described with reference to the accompanying drawings.