

PATENT SPECIFICATION

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(72) Inventor: Masao Maeda



(54) U-CLIP ASSEMBLY

(71) We, MEIHO CO., LTD., a Japanese company, of 1-24-2, Musashinodai, Fussa-shi, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a U-clip assembly which includes two or more U-clips each of which is adapted to clinch elongated members, for instance, wires to one another.

It has been a common practice to clip two or more wires together, or to clip wires to other members in assembling various products, as, for example, where coiled springs and border wires are clipped together or to other members for use in a bed, armchair, automotive seat and the like. The U-clips find a wide range of applications for clinching wires or the like together or to other members.

Known embodiments of U-clips and U-clip assemblies are illustrated in Figures 1 to 10 of the accompanying drawings, wherein:

Figure 1 shows a number of U-clips in a clinching condition;

Figure 2 is a perspective view of a first type of known U-clip;

Figure 3 is a transverse cross-sectional view of the U-clip of Figure 2;

Figure 4 is a perspective view of a second type of known U-clip;

Figure 5 shows a side view of a U-clip assembly including the U-clips, illustrated in either Figure 2 or Figure 4;

Figure 7 illustrates in side view a second U-clip assembly known from the prior art;

Figure 8 shows the assembly of Figure 7 with one U-clip attached;

Figure 9 illustrates a further known type of U-clip assembly; and

Figure 10 shows the assembly of Figure 9 in a distorted position.

Referring firstly to Figure 1, there is shown at 1 a coiled spring, at 2 a border wire, to which the coiled spring 1 is clipped, and at 3 U-clips incurring a lowering in clipping efficiency. A clip assembly shown in Figure 9 is of such an arrangement that, unlike the assembly shown in Figure 7, the areas 12 of the crowns 4 of

of a thin sheet metal plate member, and includes a crown 4, i.e. an arched portion, and planar leg units 5, 6 extending from the crown 4 in slightly outwardly angled directions, respectively, with the tip central part of the unit 5 being cut away so as to provide two clip ears 7, 8 while the tip, opposite side-parts of the unit 6 are cut away so as to leave a single clip ear 9 in its central portion. Upon clinching the clip to an elongated member, the single clip ear 9 is so designed as to be squeezed between the two clips ears 7, 8 in their clinching condition.

The U-clip shown in Figures 4 and 5 is a modification of the U-clip made of a thin sheet metal shown in Figures 2 and 3, in that a thin layer 10 made of a soft material such as for instance, vinyl chloride, rubber, paper, felt, imitation leather and the like, which eliminates squeaks and rattles is used as a liner over the inner surface of the U-clip, thereby preventing friction or creaking sound emitted due to the contact of the U-clip with specific wires.

The U-clip shown in Figures 2 and 3 or Figures 4 and 5 can be used for constituting the assembly shown in Figure 6. The illustrated assembly is of such an arrangement that U-clips are arrayed in juxtaposed, contiguous relation to one another, facing in the same direction, with the span of each curved crown portion extending along the longitudinal direction of the array and then the outer surfaces of the crowns 4 of U-clips are bonded to a single retaining member, for instance, a flexible member 11 by means of an adhesive, so as to provide a unitary element.

Referring now to Figures 7 and 8, areas 12 of the crowns 4 of U-clips, which are bonded to a flexible member 11, are relatively small, resulting in lowered bonding strength. Accordingly, when such U-clip assemblies are transported, or when assemblies are inserted into magazines of tools, U-clips tend to be detached from their respective assemblies in the direction of arrow 12a, shown in Figure 8, thereby incurring a lowering in clipping efficiency. A clip assembly shown in Figure 9 is of such an arrangement that, unlike the assembly shown in Figure 7, the areas 12 of the crowns 4 of

the U-clips, which are to be bonded to the flexible member 11, are relatively large. However, the strength of the retaining member to retain the clip assembly in a desired fixed condition is lowered, i.e. small bends 13 of the flexible member 11 are likely to be further bent in the direction of arrow 14, with the result that when such a clip assembly is inserted into a tool magazine, a clip tends to be directed outwardly as shown by arrow 15 in Figure 10, which leads to a lower clinching efficiency.

According to the present invention, there is provided a U-clip assembly comprising a longitudinal array of two or more U-clips and a retaining means to retain each U-clip in a predetermined juxtaposed and contiguous relationship to its respective neighbour or neighbours, wherein each U-clip is made of a plate member and has a curved crown portion spanning the space between respective leg portions, the array being arranged so that each U-clip faces in the same predetermined direction and the span of each curved crown portion extends along the longitudinal directions of the array, and the retaining means is a member made of flexible material and bonded to the crown portion of each U-clip over an outer apex portion thereof, each apex portion being such that it subtends an angle within the range 25° to 100° at the center of curvature of its respective crown portion and in a plane parallel to the longitudinal direction of the array and at right angles to the plate member of the respective U-clip.

Preferably the leg portions of each of said U-clips include planar leg units extending from the crown portion thereof, said leg units being either parallel to each other or slightly outwardly angled with respect to each other, one of the said units being formed with a central portion cut away therefrom so as to provide clip ears whilst the other of the said units is formed with side-portions cut away therefrom so as to provide a single clip ear at its center, whereby in use said single clip ear may engage said clip ears therebetween when said clip is brought into a clinching condition.

Particular embodiments of the present invention will now be described by way of example only with reference to Figure 11 of the accompanying drawings which is a side view of a U-clip assembly.

Clips constituting a U-clip assembly of the embodiment shown in Figure 11 are similar in shape to those shown in Figures 2 and 3 or Figures 4 and 5. A retaining member adapted to retain the clips is made of a material similar to that of the aforementioned flexible member 11. However, the areas of clips bonded to the flexible member 11 fall within specific limits.

Figure 11 shows U-clips in an array with the apices of the crowns positioned upwards. Then in a plane 16 parallel to the longitudinal direction of the array and at right angles to the plate members forming the U-clips, i.e. parallel to the surface of the drawing shown in Figure

11, there is shown by a broken line 17 a circle inscribed to the inner surface of the crown 4, having its center at 18. The center 18 is also the center of curvature of the crown 4. Shown at 19 is an apex of the crown 4, and at 20 by a one-point chain line a first phantom line connecting the center 18 of the circle 17 to the apex 19 of the crown 4. Shown at 21, 22 by one-point chain lines are second and third phantom lines positioned in the same plane as that of the circle 17, and extending through the center 18 of the circle 17. Angles 23, 24 formed by the first line 20 with the second and third lines 21, 22 are substantially equal to each other, ranging from 12.5° to 50° , respectively. In other words, and angle 25 formed by the second line 21 with the third line 22 is so designed as to fall in an angular range 25° to 100° .

The flexible member 11 is bonded only to such a portion of the outer surface of the crown 4, as is defined by moving an arcuate portion 26 defined by the second and third lines 21, 22 in the direction perpendicular to the surface of the drawing of Figure 11.

It has been found that there may be achieved a balanced relationship between a force or strength needed to bond a clip to the flexible member 11, and a force or strength required to retain an assembly in a predetermined shape.

As is apparent from the foregoing description of the U-clip assembly of the embodiment shown in Figure 11, a flexible member is bonded only to such an arcuate portion of the outer surface of a crown of each U-clip as is defined by the second and third phantom lines extending through the center of a circle inscribed to the inner surface of a crown of the clip and forming an angle within the range 25° to 100° , when moved in a direction perpendicular to a plane parallel to the longitudinal direction of the array and at right angles to the plate member of the clip. As a result, the danger is reduced of clips being detached from the retaining member upon transportation or insertion of the clip assembly into a tool magazine. The shape of the assembly can thus be maintained in a fixed condition so that the clip will not be deflected or inclined undesirably, thus resulting in improvements in clinching efficiency.

The U-clips are preferably made of a thin sheet metal. However, as an alternative, as in the case of the U-clip of Figure 4, the inner surface of the U-clips can be lined with a thin layer of a material, such as vinyl chloride, rubber, paper, felt, imitation leather and the like to reduce friction and/or creaking sounds caused between the U-clip and the wires which it clinches together.

WHAT WE CLAIM IS:—

1. A U-clip assembly comprising a longitudinal array of two or more U-clips and a retaining means to retain each U-clip in a predetermined juxtaposed and contiguous relation-

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the U-clips, which are to be bonded to the flexible member 11, are relatively large. However, the strength of the retaining member to retain the clip assembly in a desired fixed condition is lowered, i.e. small bends 13 of the flexible member 11 are likely to be further bent in the direction of arrow 14, with the result that when such a clip assembly is inserted into a tool magazine, a clip tends to be directed outwardly as shown by arrow 15 in Figure 10, which leads to a lower clinching efficiency.

According to the present invention, there is provided a U-clip assembly comprising a longitudinal array of two or more U-clips and a retaining means to retain each U-clip in a predetermined juxtaposed and contiguous relationship to its respective neighbour or neighbours, wherein each U-clip is made of a plate member and has a curved crown portion spanning the space between respective leg portions, the array being arranged so that each U-clip faces in the same predetermined direction and the span of each curved crown portion extends along the longitudinal directions of the array, and the retaining means is a member made of flexible material and bonded to the crown portion of each U-clip over an outer apex portion thereof, each apex portion being such that it subtends an angle within the range 25° to 100° at the center of curvature of its respective crown portion and in a plane parallel to the longitudinal direction of the array and at right angles to the plate member of the respective U-clip.

Preferably the leg portions of each of said U-clips include planar leg units extending from the crown portion thereof, said leg units being either parallel to each other or slightly outwardly angled with respect to each other, one of the said units being formed with a central portion cut away therefrom so as to provide clip ears whilst the other of the said units is formed with side-portions cut away therefrom so as to provide a single clip ear at its center, whereby in use said single clip ear may engage said clip ears therebetween when said clip is brought into a clinching condition.

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11, there is shown by a broken line 17 a circle inscribed to the inner surface of the crown 4, having its center at 18. The center 18 is also the center of curvature of the crown 4. Shown at 19 is an apex of the crown 4, and at 20 by a one-point chain line a first phantom line connecting the center 18 of the circle 17 to the apex 19 of the crown 4. Shown at 21, 22 by one-point chain lines are second and third phantom lines positioned in the same plane as that of the circle 17, and extending through the center 18 of the circle 17. Angles 23, 24 formed by the first line 20 with the second and third lines 21, 22 are substantially equal to each other, ranging from 12.5° to 50° , respectively. In other words, and angle 25 formed by the second line 21 with the third line 22 is so designed as to fall in an angular range 25° to 100° .

The flexible member 11 is bonded only to such a portion of the outer surface of the crown 4, as is defined by moving an arcuate portion 26 defined by the second and third lines 21, 22 in the direction perpendicular to the surface of the drawing of Figure 11.

It has been found that there may be achieved a balanced relationship between a force or strength needed to bond a clip to the flexible member 11, and a force or strength required to retain an assembly in a predetermined shape.

As is apparent from the foregoing description of the U-clip assembly of the embodiment shown in Figure 11, a flexible member is bonded only to such an arcuate portion of the outer surface of a crown of each U-clip as is defined by the second and third phantom lines extending through the center of a circle inscribed to the inner surface of a crown of the clip and forming an angle within the range 25° to 100° , when moved in a direction perpendicular to a plane parallel to the longitudinal direction of the array and at right angles to the plate member of the clip. As a result, the danger is reduced of clips being detached from the retaining member upon transportation or insertion of the clip assembly into a tool magazine. The shape of the assembly can thus be maintained in a fixed condition so that the clip will not be deflected or inclined undesirably, thus resulting in improvements in clinching efficiency.

The U-clips are preferably made of a thin sheet metal. However, as an alternative, as in the case of the U-clip of Figure 4, the inner surface of the U-clips can be lined with a thin layer of a material, such as vinyl chloride, rubber, paper, felt, imitation leather and the like to reduce friction and/or creaking sounds caused between the U-clip and the wires which it clinches together.

WHAT WE CLAIM IS:-

1. A U-clip assembly comprising a longitudinal array of two or more U-clips and a retaining means to retain each U-clip in a predetermined juxtaposed and contiguous relation-



ship to its respective neighbour or neighbours,
wherein each U-clip is made of a plate member
and has a curved crown portion spanning the
space between respective leg portions, the array
5 being arranged so that each U-clip faces in the
same predetermined direction and the span of
each curved crown portion extends along the
longitudinal direction of the array, and
the retaining means is a member made of flexi-
10 ble material and bonded to the crown portion
of eac U-clip over an outer apex portion there-
of, each apex portion being such that it sub-
tends an angles within the range 25° to 100° at
the center of curvature of its respective crown
15 portion and in a plane parallel to the longi-
tudinal direction of the array and at right angles
to the plate member of the respective U-clip.
2. A U-clip assembly according to Claim 1,
wherein the leg portions of each of said U-clips
20 include planar leg units extending from the
crown portion thereof, said leg units being
either parallel to each other or slightly out-
wardly angled with respect to each other, one
of the said units being formed with a central
25 portion cut away therefrom so as to provide
clip ears whilst the other of the said units is
formed with side-portions cut away therefrom
so as to provide a single clip ear at its center,
whereby in use said single clip ear may engage

said clip ears therebetween when said clip is
brought into a clinching condition. 30
3. A U-clip assembly according to Claim 1
or Claim 2, wherein each of said U-clips is made
from sheet metal.
4. A U-clip assembly according to Claim 3, 35
wherein each of said U-clips has a layer of
material lining an inner surface of said sheet
metal, said material being such as to reduce
friction and/or sounds.
5. A U-clip assembly according to Claim 4, 40
wherein said material is selected from vinyl
chloride, rubber, paper, felt and imitation
leather.
6. A U-clip assembly according to any one of
the preceding claims wherein each apex portion 45
is in the form of an arc of a circle so that the
said center of curvature is the center of the
circle.
7. A U-clip assembly substantially as herein
described with respect to Figure 11 of the 50
accompanying drawings.

MEWBURN ELLIS & CO.
Chartered Patent Agents and
European Patent Attorneys 55
70/72, Chancery Lane,
London, WC2A 1AD.
Agents for the Applicants