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CLIP ASSEMBLY

(15)

The present invention relates to a clip assembly. The clip assembly may be adapted for use with a clinching machine capable of sequentially severing and wrapping the clips on elements of a workpiece, especially overlapping wire members employed in the manufacture of furniture, bed springs, and the like, to secure the wire members together.

In U.S. Patent No. 3,613,878, there is disclosed a clip assembly in the form of a row of U-shaped sheet metal clips. The clips are maintained in alignment with each other either by means of a strip of a pressure sensitive adhesive tape, or by means of a continuous layer of an adhesive, applied on the arched crown portions of the clips. The clip assembly of the patent is adapted to be used with a hand-held clinching tool provided with a magazine for receiving a clip assembly, and along which the clip assembly is pushed in the direction of the forming jaw of the tool by a slidable member in abutting engagement with the last clip of the

While the clip assembly arrangement disclosed in the patent greatly adds to the speed and efficiency of wrapping clips on wire members employed in the manufacture of furniture, bed springs, and the like, there has arisen a need in the industry for a clip assembly for use in conjunction with clinching machines for automatically and rapidly wrapping clips on wire members in a high-speed, production line operation. The use of such high-speed machines, whether they be of the stationary type, or robot-like in operation, requires a clip assembly that can be used in the form of a coil comprising upwards of a thousand, or more, clips, and which, moreover, can withstand the forces applied to the assembly by the machines. More specifically in this latter connection, the use of an assembly in the form of a coil comprising a large number of clips requires that each clip be successively pull-fed, at high speeds, into the forming jaw of the clinching machine without any clip assembly or coil failure. Due to the low strength of the adhesive bond formed between the adhesive tape, or the adhesive material, and the metal crown of the clips of the assembly disclosed in the aforementioned patent, the assembly of the patent cannot withstand the forces applied to it by the high-speed, pull-feed mechanism of clinching machines used in an automated production line type operation. Other forms of clip assemblies such, for example, as those utilizing elongated strands of a small diameter plastic filament or line which are inserted into open-end recesses or notches provided in the lateral margins or edges on both sides of each clip of the assembly also are

1 unsatisfactory for use in high-speed, automatic clinching
machines employing a pull-feed mechanism due, in the
main, to the inherent weakness of both the small diameter
filament or line used, and the frictional forces relied
5 upon to maintain the clips in aligned relation to one
another.

In accordance with one aspect of the present
invention, there is provided a clip assembly for use with
a clinching tool capable at high speed of sequentially
10 severing and wrapping a clip over adjacent wire members
to secure such members together, the assembly comprising:

a plurality of clips having a bight portion and
depending leg portions providing a substantially U-shaped
end view, the clips being arranged successively in
15 aligned relation to one another and with the axis of each
clip, which axis extends generally perpendicular to the
plane of said U-shaped end view, being disposed
substantially perpendicular to the direction in which the
successively arranged clips extend; and

20 flexible metal interconnecting means fixedly
secured at discrete contact points on the bight portions
of the clips of the clip assembly for maintaining the
clips in aligned relation with one another, said
interconnecting means including portions which span the
25 gaps between the contact points of adjacent clips, thus
to constitute clip spanning portions which are severable
to enable the clips of the assembly to be sequentially
severed and wrapped by a clinching tool over adjacent
wire members.

30 Preferred embodiments of the present invention
provide an improved clip assembly which is uniquely
suited for use in automatic clinching machines of the
type employed in high-speed production line operations.
The integrated, high-strength structural features of the
35 clip assembly enable it to be used in the form of a
relatively tightly wound coil comprising upwards of a

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1 thousand, or more, clips, and to be pull-fed at a high speed into the forming jaw of such a machine without any

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clip assembly or coil failure. The ability to use the assembly in the form of a coil comprising a large number of clips reduces "down times" for coil replacement to a minimum thereby enhancing significantly the efficiency and the economic advantage of the overall automated operation.

In a preferred embodiment the improved clip assembly comprises a plurality of generally U-shaped clips having a bight crown or head portion and depending leg portions integrally joined to the transverse margins of the crown or head portion. It should be mentioned here that the constructions of the individual clips employed in the fabrication of the improved clip assembly of the present invention are structurally essentially the same as the clips comprising the



clip assembly described in U.S. Patent No. 3,613,878,
and it should be understood, therefore, that the
various embodiments of the clip, per se, illustrated
and described therein are incorporated by reference
5 in the present disclosure. The clips comprising the
assembly of this invention, like the clips of the
assembly shown in the aforementioned patent, are in
the form of a row. The clips of the improved
assembly, however, are maintained in aligned relation
10 to one another by resilient interconnecting means
intimately bonded in point contact to each of the
clips comprising the assembly.
The interconnecting means may comprise a pair of small
15 diameter, flexible wires which are positioned in
spaced relation to one another in point, substantially
tangential contact with the outer surface of the
crown or head portion of each of the clips comprising
the assembly, and are intimately bonded, as by a
20 metal-to-metal bond, to the crown or head portion
of each of the clips. The wires thus secured
to the clips provide severable, clip spanning
portions which freely extend between each bonded
contact point along the length of the clip assembly
25 thereby enabling the clips to be sequentially
severed and wrapped by a clinching tool on overlap-
ping wire members of the type used in the manufac-
ture of furniture, for example. The clip spanning
portions of the interconnecting means also serve
30 to impart a flexibility to the clip assembly which
enables the assembly to be rolled into a tight coil
of any desired dimensions without in any way dis-
rupting the structural integrity of the clip assembly.

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As an alternative the flexible wires comprising the interconnecting means of the clip assembly are bonded in point contact with the side edges of the crown or head portion of the clips at a position adjacent to the
5 juncture of the depending legs of the clips with the transverse margins of the crown or head portion thereof. This arrangement, as in the case of the previously described embodiment of the clip assembly, provides freely extending, severable, clip spanning portions of
10 the interconnecting means having sufficient flexibility to enable the assembly to be formed into a tight coil.

The superior structural strength of the clip assembly of preferred embodiments of this invention permits each clip of the assembly to be sequentially
15 drawn or pulled by a high-speed clinching machine into a position where the reciprocal plunger and the forming jaw of the machine can wrap the clips on wire members used in the construction of furniture, bed springs, and the like. Furthermore, the integral, high strength, all metal
20 construction of the clip assembly acts to resist any forces encountered during handling or use which may have an adverse effect on the structural integrity of the assembly and, in addition, enables the assembly to be stored for prolonged periods under substantially any
25 temperature and humidity conditions without deterioration.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to
30 the accompanying drawing in which:-

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FIG. 1 is a view in perspective of the wire members of a pair of coiled springs secured to bordering retaining wires by a clip comprising an embodiment of the clip assembly of the present invention;

FIG. 2 is an enlarged view in perspective of said embodiment of the clip used for the purpose illustrated in Fig. 1;

FIG. 3 is a view in perspective of a portion of an embodiment of the clip assembly of the present invention;

FIG. 4 is an enlarged top plan view of the embodiment of the assembly shown in Fig. 3;

FIG. 5 is a side view in elevation of said embodiment as illustrated in Fig. 4;

FIG. 6 is an enlarged diagrammatic view, partly in section, showing an embodiment of the clip assembly positioned in the magazine of a clinching tool, and a clip of the assembly being severed by the reciprocal plunger of the tool prior to being secured on wire members held in the forming jaw of the tool;

FIG. 7 is an enlarged top plan view of a section of another embodiment of the clip assembly of the present invention;

FIG. 8 is a side view in elevation of the embodiment of the clip assembly shown in Fig. 7; and

FIG. 9 is a schematic view of the clip assembly in coil form.

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As stated hereinabove, the U-shaped clips comprising the clip assembly of this invention may be of several different forms as illustrated and described in U.S. Patent No. 3,613,878. In Fig. 2 of the present drawings, one form of such a clip is shown. The clip, designated generally by reference numeral 10, desirably comprises a one-piece unit having an arcuate or rounded crown or head portion 12 to the transverse margins of which are joined depending leg portions 14 and 16. The leg portion 14, as shown, is triangular in shape and is positioned substantially intermediate the ends of the crown or head portion 10. The leg portion 16 is provided with a centrally located recess 16a which substantially corresponds in shape and dimensions to the leg portion 14. When the clip 10 is wrapped by a clinching tool on overlapping wires, as illustrated in Fig. 1, the legs 14 and 16 are reformed in a manner to position the leg 14 in the recess 16a of the leg portion 16 thereby providing an integrated structure with no exposed sharp or fraying edges.

Referring now to Figs. 3, 4 and 5 of the drawings, the embodiment of the clip assembly there illustrated, and designated generally by reference numeral 20, comprises an indefinite number of clips, such as the clip 10, arranged in aligned side-by-side relation to one another. The clips, when arranged in the form of a straight row as shown in Figs. 3, 4 and 5, have the leg 14 thereof contiguous to the leg 16 of the next clip in line, and the assembly, when fed into a clinching tool,

will be oriented with respect to the forming jaw of the tool to position the leg 14 of the clips, as illustrated in Fig. 3, in the direction of the forming jaw.

5 The clips 10 comprising the clip assembly 20 are maintained in alignment with one another by means of a pair of longitudinally extending, small diameter wires 22-22 which are positioned in spaced apart relation, inwardly of the side margins of 10 the crown or head portion 12 of the clips. The wires employed for this purpose desirably are made of low carbon steel, and can range in diameter from about 0.015 inch (0.38 mm) to about 0.030 inch (0.76 mm), more or less. 15 The wires 22-22, as best shown in Fig. 5, are in substantially tangential, point contact with the outer surface of the crest of the crown or head portion of each of the clips, and are intimately, and preferably, permanently, bonded to the crown or head portion of each clip of the assembly 20 at their 20 point of contact therewith. The bond 24 between the wires 22-22 and the crown or head portion of the clips advantageously is a metal-to-metal bond formed by fusing, as by spot welding, the wires to the crowns or head portions. While spot welding 25 is the preferred means for securing the wires on the clips, soldering or brazing, for example, may also be used to attain an intimate bond therebetween.

30 Again, as best shown in Fig. 5, bonding of the wires 22-22 to the crown or head portion 12 of the clips 10 at their point of contact therewith, provides freely extending, severable, clip spanning portions 26 between each of the longitudinally

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aligned bonds 24 formed on the crown or head portions of the clips. The clip spanning portions 26 enable the clips of the assembly to be sequentially severed by the plunger of a clinching tool, and, equally
5 important, have a length and flexibility such that the assembly can be rolled into a tight coil without disrupting the structural integrity of the assembly.

In Figs. 7 and 8 of the drawings, a modified form of the clip assembly of the present
10 invention is shown. The embodiment there illustrated and designated generally by reference number 30, comprises a plurality of clips 10 arranged in aligned relation in the manner of the clips of the assembly
20. The clips 10 of the assembly 30, like the clips
15 10 of the assembly 20, are maintained in alignment by means of a pair of wires 32-32 similar to the wires 22-22 of the assembly 20. The wires 32-32, however, are intimately bonded to the side edges of the crown or head portion 12 of the clips at points
20 adjacent to the juncture of the transverse margins of the crown or head portions with the depending legs 14 and 16 of the clips. The wires 32-32, as in the case of the wires 22-22 of the assembly 20, advantageously are secured to the edges by metal-
25 to-metal bonds 34. The bonding of the wires to the edges of the crowns or head portions can be carried out in the same manner as described above with relation to the wires 22-22, namely, by spot welding, soldering or brazing. Clip spanning portions 36
30 are provided between the bonds on adjacent clips for enabling the clips to be sequentially severed from the assembly 30, and to impart sufficient flexibility to the assembly to permit it to be

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formed into a coil if desired. A schematic representation of such a coil 40 is illustrated in Fig. 9.

In Fig. 6 of the drawings, a section of the assembly 20 is schematically shown positioned on the magazine 50 of an automatic clinching machine 52. Overlapping wires 54-54 to be wrapped by a clip 10 of the assembly are cradled in the forming jaw 56 of the machine. When the reciprocal plunger 58 of the machine is actuated, the lead clip of the assembly is separated from the assembly by severing the clip spanning portions 26 of the wires 22-22 between the first clip and the next clip in line. The severed clip is then driven into engagement with the forming jaw 56 where it is reformed on the overlapping wires 54-54. The plunger then instantly returns to its original position in readiness for the next clip of the assembly. As stated hereinabove, the construction of the clip assembly of the present invention permits the clips to be sequentially advanced at a high speed in the direction of the forming jaw of the machine by exerting a pulling force on the assembly. The ability of the assembly to maintain its structural integrity while being subjected to such a force enables the assembly to be fed into the clinching machine from a coil comprising an indefinite number of clips thereby enhancing the efficiency and the productivity of the operation.

Referring, again, to Fig. 1 of the drawings, clips 10 from an assembly of this invention are shown in their reformed or wrapped condition on overlapping wires of a coil spring 60 and bordering

retaining wires 62. In a high-speed, automated operation, the clips can be secured on the wires of such a workpiece in a fraction of a second.

5 While for purposes of illustration, preferred embodiments of the present invention have been disclosed, other embodiments thereof may become apparent to those skilled in the art and, accordingly, this invention is to be limited only by the scope of the appended claims.



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1 CLAIMS

1. A clip assembly for use with a clinching tool capable at high speed of sequentially severing and wrapping a clip over adjacent wire members to secure such members together, the assembly comprising:

a plurality of clips having a bight portion and depending leg portions providing a substantially U-shaped end view, the clips being arranged successively in aligned relation to one another and with the axis of each clip, which axis extends generally perpendicular to the plane of said U-shaped end view, being disposed substantially perpendicular to the direction in which the successively arranged clips extend; and

flexible metal interconnecting means fixedly secured at discrete contact points on the bight portions of the clips of the clip assembly for maintaining the clips in aligned relation with one another, said interconnecting means including portions which span the gaps between the contact points of adjacent clips, thus to constitute clip spanning portions which are severable to enable the clips of the assembly to be sequentially severed and wrapped by a clinching tool over adjacent wire members.

2. A clip assembly according to claim 1 wherein the interconnecting means is integrally fused to the bight portions of the clips at said discrete points of contact.

3. A clip assembly according to claim 1 wherein the interconnecting means comprises a pair of flexible wires which are secured at said discrete contact points to the bight portions of the clips by a metal-to-metal bond.

4. A clip assembly according to claim 3 wherein the wires are spaced apart along said axis of each clip and are disposed in substantially tangential contact with the bight portions at said discrete contact points.

5. A clip assembly according to claim 1 or 2, wherein the interconnecting means comprises a pair of wires

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1 secured to respective end faces of bight portions of the clips.

6. A clip assembly for use with a clinching tool capable at high speeds of sequentially severing and 5 wrapping a clip over adjacent wire members to secure such members together, the clip assembly comprising:

a plurality of clips having a bight portion and depending leg portions providing a substantially U-shaped end view, the clips being arranged successively in 10 abutting, or near abutting, aligned relation to one another, and with the axis of each clip which axis extends generally perpendicular to the plane of said end view, being disposed substantially perpendicular to the direction in which the successively arranged clips 15 extend; and

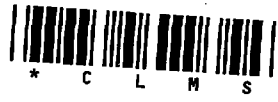
flexible metallic interconnecting means for maintaining the clips in said aligned relation, said metallic interconnecting means being fixedly secured in point contact with each clip of the assembly by a 20 metal-to-metal bond so as to be disposed substantially tangentially to said bight portion, said metallic interconnecting means including portions which span the gaps between the metal-to-metal bonds of adjacent clips thus to constitute clip spanning portions which are 25 severable to enable each clip to be sequentially severed and wrapped by a clinching tool over adjacent wire members.

7. A clip assembly as claimed in any preceding claim wherein the clip spanning portions have a length and 30 flexibility such that the clip assembly can be rolled upon itself into a coil.

8. A clip assembly according to claim 7, wherein the assembly, when formed into such a coil, is oriented to position the leg portions of the clips in a direction 35 facing away from an axis of the coil, and wherein the bight portion of each clip is oriented so as to be positioned in overlying relation to the leg portions of

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the clips comprising the preceding convolution of the
1 coil.

9. A clip assembly as claimed in any preceding claim,
in which the clips are formed of sheet metal.

10. A clip assembly substantially as hereinbefore
5 described with reference to the accompanying drawings.

11. A method for sequentially severing and wrapping a
clip over adjacent wire members using a clip assembly
according to any preceding claim, the method comprising:

forming the assembly into a coil, the clips being
10 oriented on the coil such that the legs of the clips
extend radially outwardly with relation to the axis of
the coil;

mounting the coil formed from the clip assembly
for rotation;

15 applying a pulling force to the end of the clip
assembly forming the coil whereby the assembly is
pull-fed into a clinching tool capable of sequentially
severing and wrapping the clips of the assembly over
adjacent wire members; and

20 sequentially severing and wrapping each clip of
the clip assembly over said adjacent wire members.

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