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(51) INT CL:
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(56) Documents Cited:
GB 2548127 A **GB 2252357 A**
GB 2122248 A **GB 2112054 A**
GB 1207741 A **GB 1075301 A**
GB 0819220 A **CN 206647617 U**
CN 203707689 U **CN 202797793 U**
CN 201733030 U **CN 201733029 U**
JP 2013042601 A

(58) Field of Search:
 INT CL **F16L, H02G**
 Other: **EPODOC, WPI**

(54) Title of the Invention: **Cable clip and kit of parts**
 Abstract Title: **Sprung Cable Restraint/Clip for Securing a Cable to a Surface, and a Kit of Parts Including Cable Trunking**

(57) A clip 100 for securing a cable 300 to a surface, for example a surface 202 of a cable trunking 200, and has a securing element 102 for attaching the clip to the surface, a spring element 104 connected to the securing element and which is movable relative to the securing element between a closed position in which the spring element forms a cable restraint arranged to secure the cable to the surface and an open position in which the spring element is spaced from the surface such that a cable may be placed between the spring element and the surface. In use, the spring element is biased into the closed position, and the securing element may define a hole 108 through which a fastener such as a screw or nail may be passed. The clip spring element may include an arm 114 attached at one end to the securing element and at the other end to a hook 116, and the clip may be made of metal, such as steel.

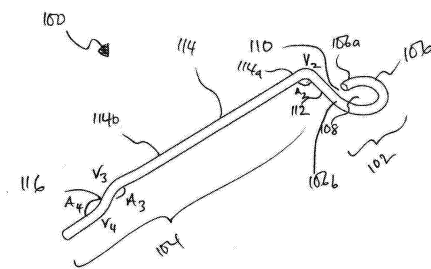


FIG. 1A

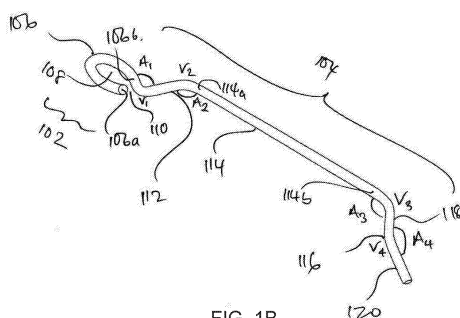


FIG. 1B

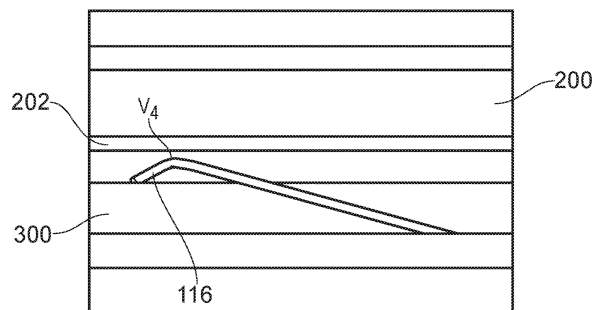


FIG. 3

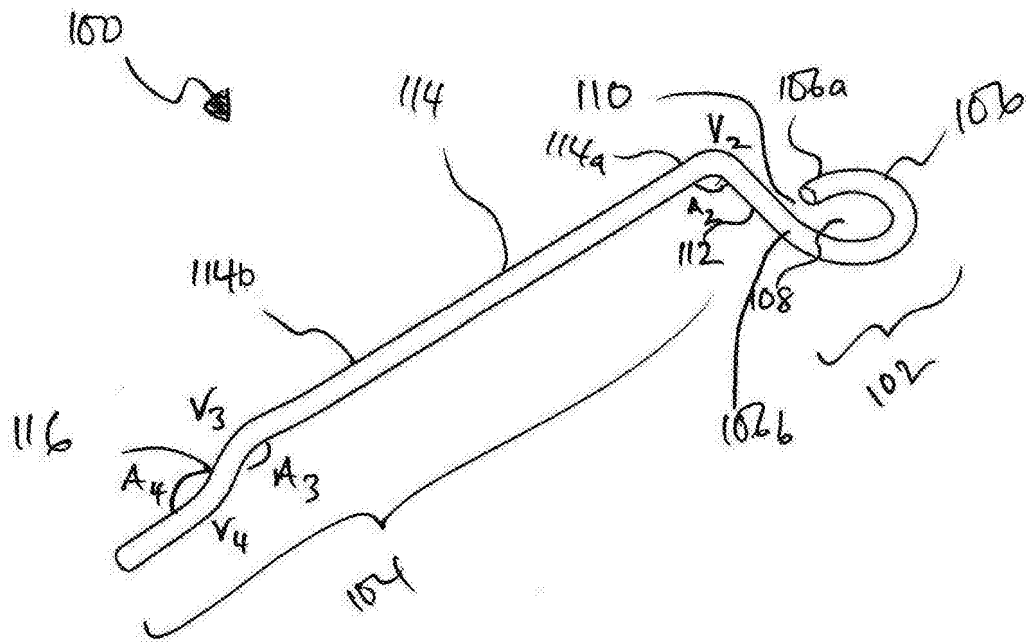


FIG. 1A

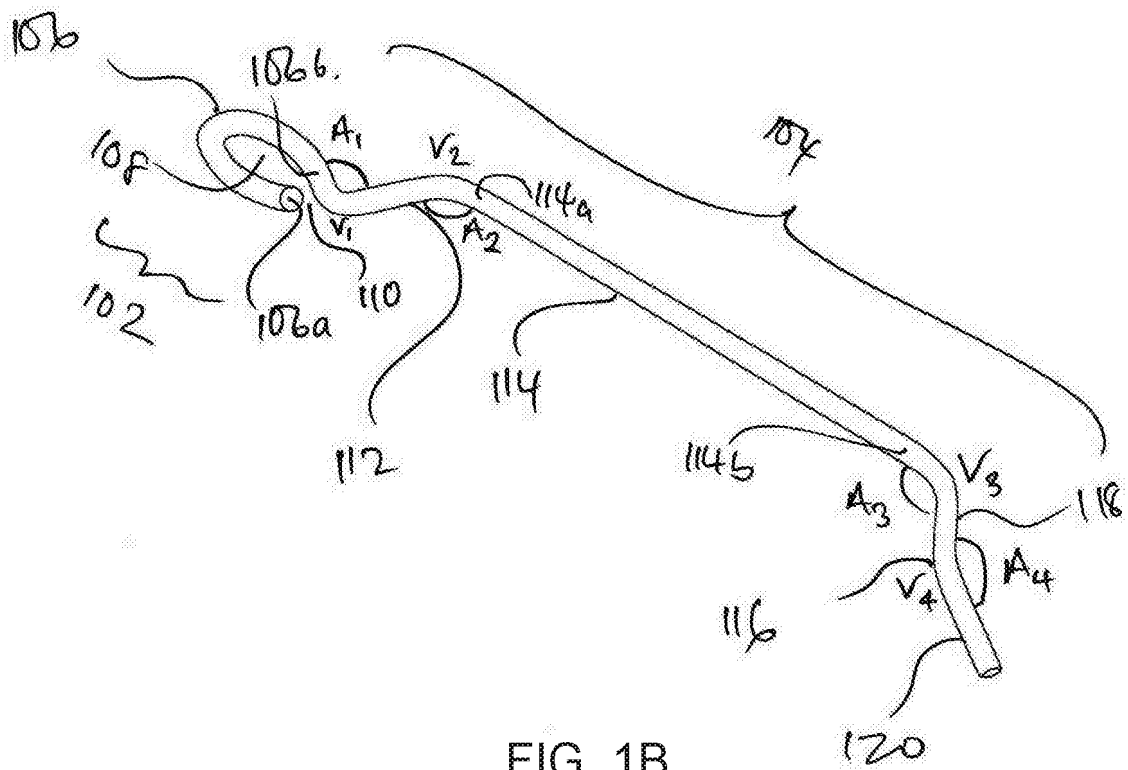


FIG. 1B

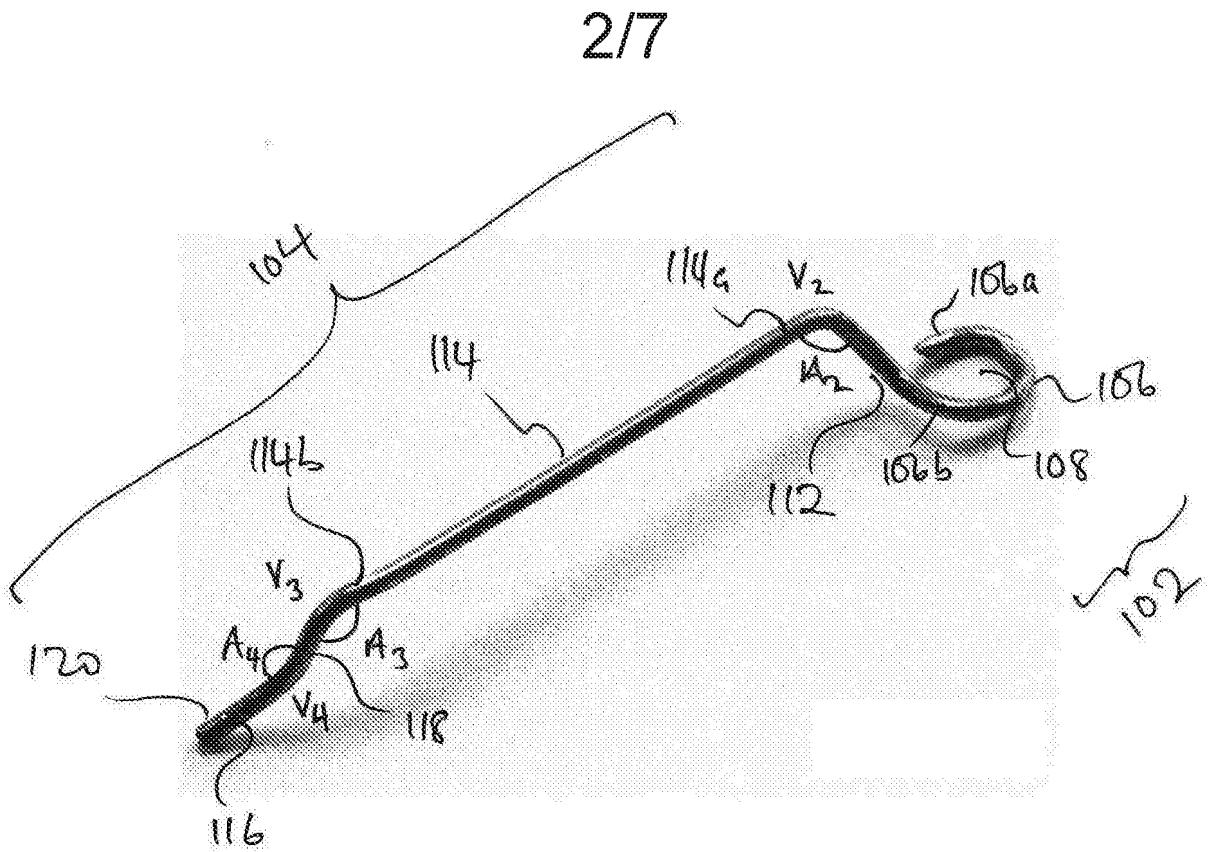


FIG. 2A

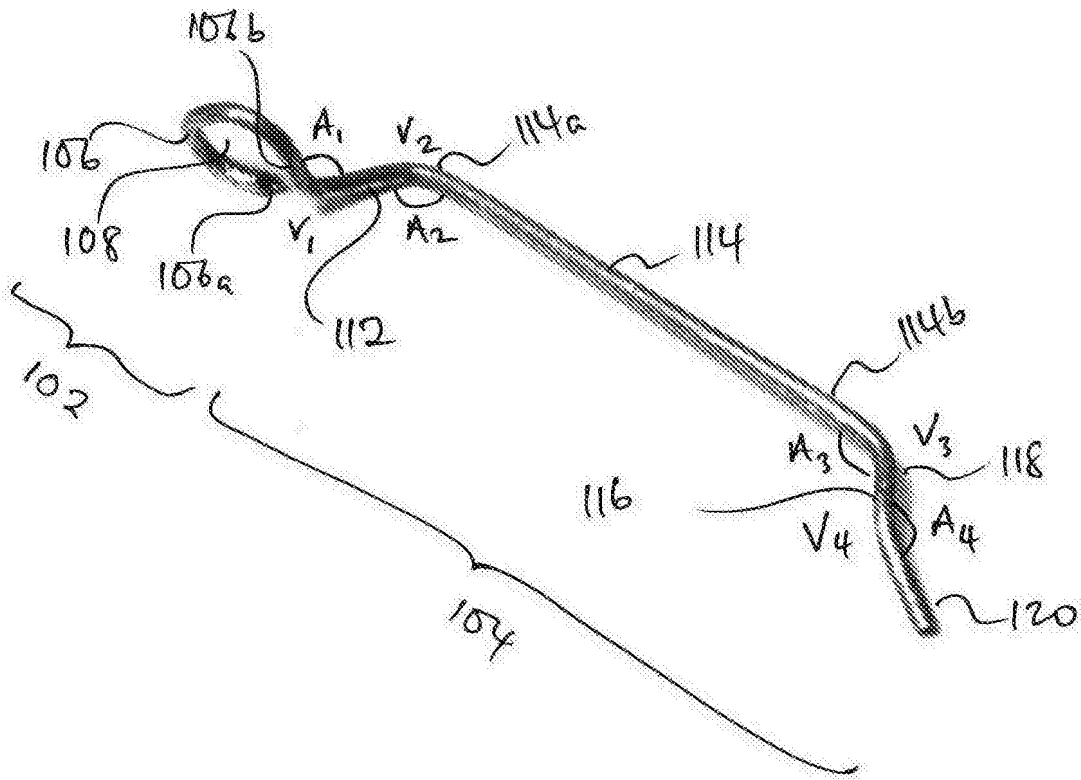


FIG. 2B

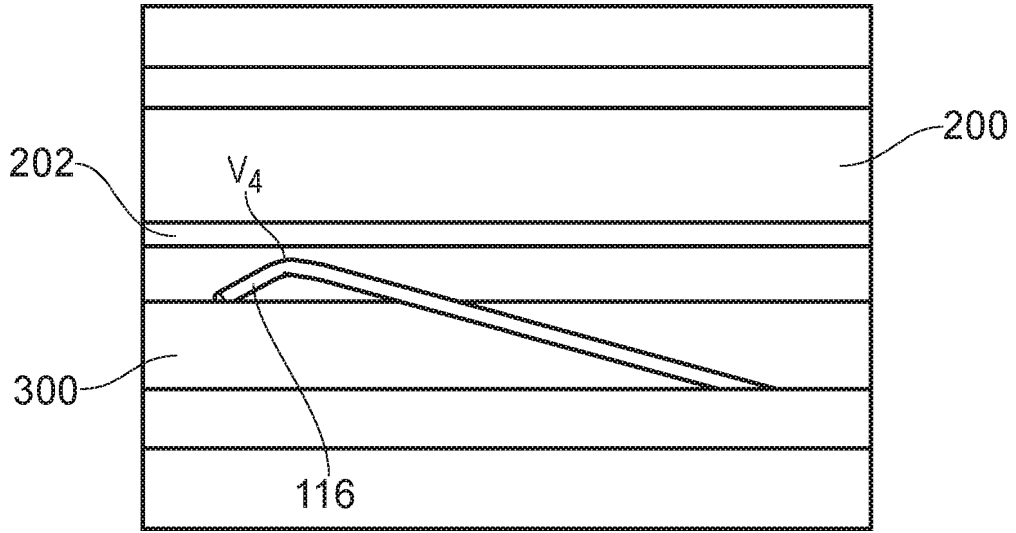


FIG. 3

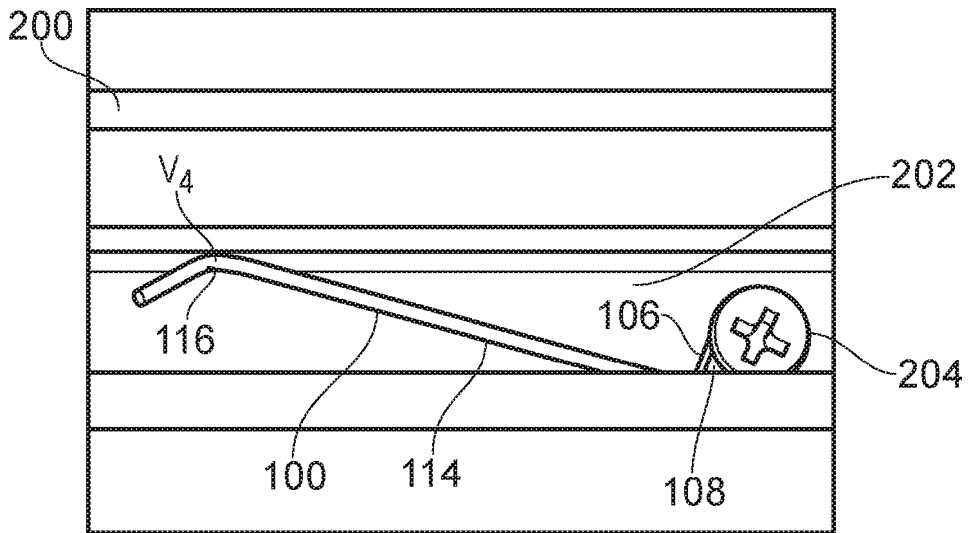


FIG. 4

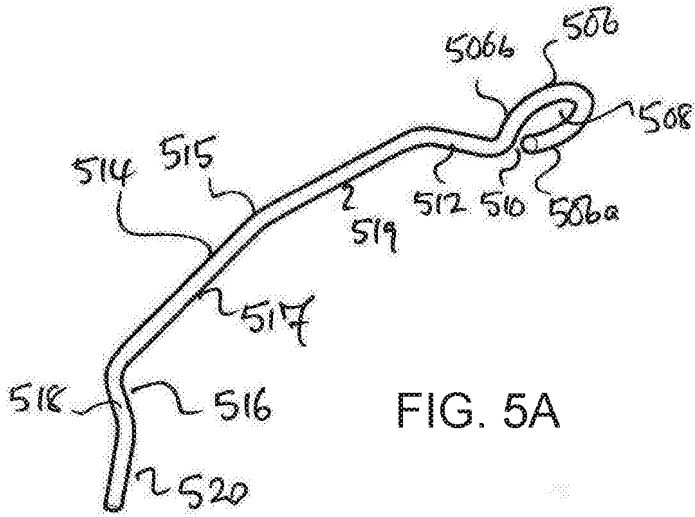


FIG. 5A

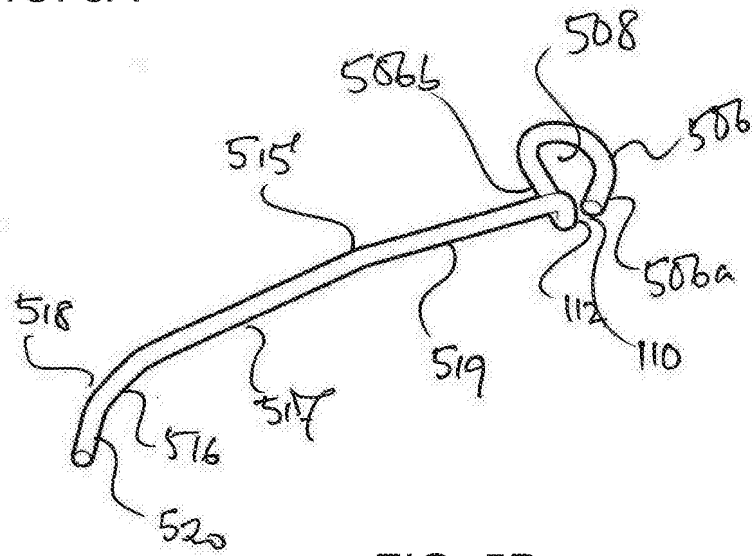


FIG. 5B

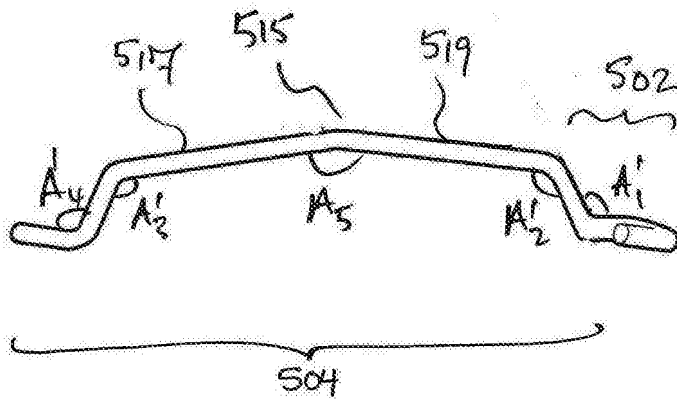


FIG. 5C

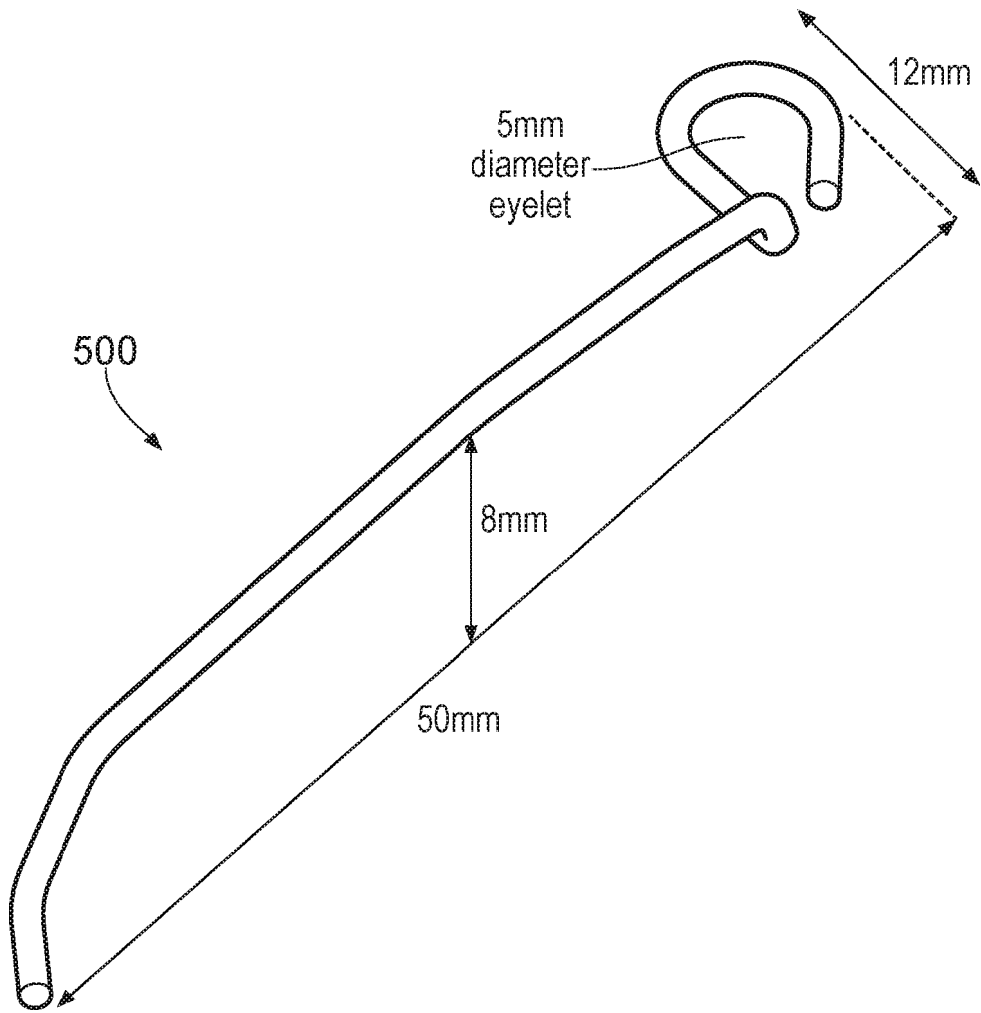
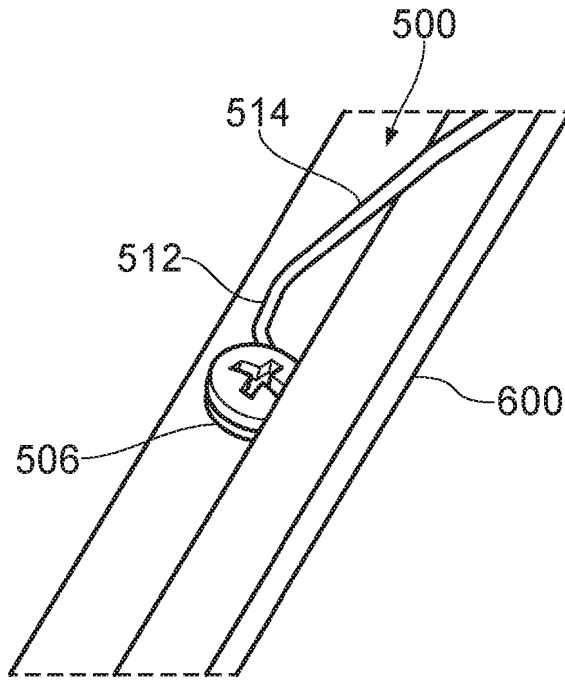


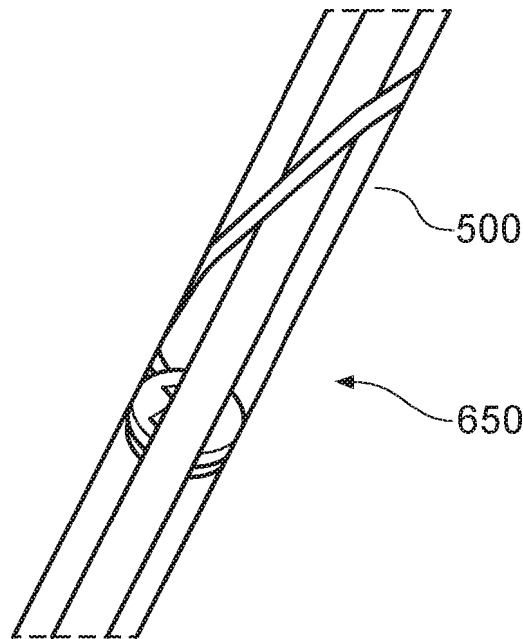
FIG. 6

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In D-Line 20x10mm Micro+ Trunking

FIG. 7A



In traditional 16x10mm Trunking

FIG. 7B

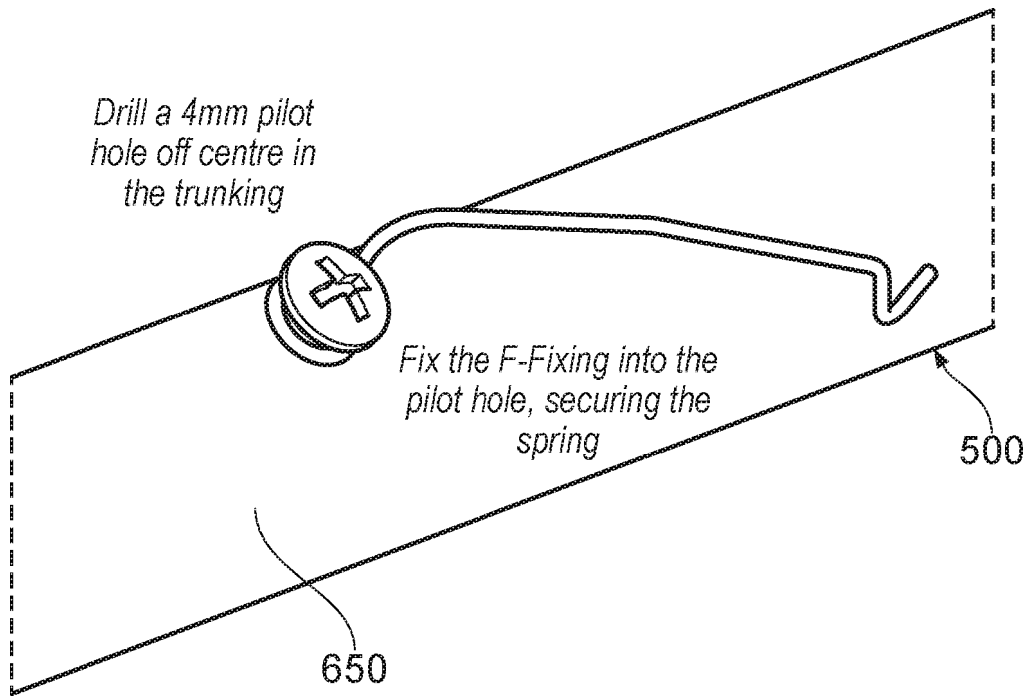


FIG. 8

CABLE CLIP AND KIT OF PARTS

TECHNICAL FIELD OF THE INVENTION

5 The present invention relates to a clip for securing a cable to a surface, and a kit of parts including cable trunking and a cable clip.

BACKGROUND TO THE INVENTION

10 It is known that cables may be secured on ceilings and walls using cable trunking, such as that shown in WO 2005/086304. Such cable trunking is generally made from plastic, or other similar lightweight materials. This has the disadvantage that during a fire, it is liable to melt, causing the cables to drop, causing a potentially fatal hazard. In order to address this for relatively large cable trunking conduits, it is possible to affix a plurality of clips, such as
15 those shown in WO 2016/151286. However, such cable clips are not practical for use in trunking having a small cross-sectional area, since it is difficult to fold the clips around to secure the cable.

SUMMARY OF THE INVENTION

20 Broadly speaking, the present invention addresses the above problem by providing a clip which has a different geometry from those of WO 2016/151286, which may be used in smaller cable trunking, having a width of e.g. 20mm or less.

25 Specifically, the present invention addresses this problem by providing a clip for securing a cable to a surface, the clip including:

a securing element for attaching the clip to said surface; and

a spring element, connected to the securing element, and movable relative to the securing element between:

30 a closed position in which the spring element forms a cable restraint arranged to secure the cable to the surface, and

an open position in which the spring element is spaced from the surface such that a cable may be placed between the spring element and the surface, and

wherein the spring element is biased into the closed position.

35 In some embodiments, the "surface" may be in the form of an internal surface of a cable trunking conduit. It is possible to install clips according to the present invention to cables

which are already in place inside such cable trunking, by using the securing element to attach the clip to the required surface, then lifting the spring element away from the surface (i.e. from the closed position to the open position), placing the cable in the space formed between the cable and the and then allowing it to spring back into place to secure the cable to the surface. The cable-restraining portion is the region between the surface and the spring element through which the cable may pass.

It is useful to define a proximal end of the spring element as the end which is connected to the securing element, and a distal end of the spring element as the end of the spring element which is opposite from the proximal end. A proximal region is a region which is located at or near the proximal end, and a distal region is a region which is at or near the distal end.

In some embodiments, the spring element is shaped so that in use, when the spring element is in the closed position, part of a distal region of the spring element is in contact with the surface. In other embodiments, the spring element may be shaped so that in use, when the spring element is in the closed position, no part of the spring element is in contact with the surface. In such embodiments, it is preferable that the smallest spacing between the spring element and the surface to which the cable is to be affixed is smaller than the diameter (or otherwise widest dimension) of the cable, so that the cable is unable inadvertently to come free of the clip.

It is preferably that the clip includes only a single spring element. In this way, if the cable is used at the end of the cable trunking, the attachment point can be located at the end of the channel without a spring element extending out of the channel.

The securing element and the spring element are preferably integrally formed, and preferably made of metal, preferably having a melting portion of no less than 1000°C. Metals such as steel, and preferably sprung steel melting point are desirable since they are pliable and easily manipulated, but are able to spring back into their original position once a cable has been inserted.

As is clear from the above, the spring element is movable relative to the securing element, and is biased into a closed position. In some embodiments, the spring element may include an arm of material connected (directly or indirectly) at one end to the securing element. In such embodiments, it is preferable that the arm is pivotable relative to the securing means.

In other words, the arm may be bent relative to the securing element to lift it from the closed to the open position, allowing insertion of the cable.

5 The securing element may in the form of a loop of material through which a fastener such as a screw, nail or similar may be passed, in order to attach the clip to the surface. The loop may be a full loop of material, or may be an incomplete loop, having a gap in the case in the perimeter of the loop. In preferred embodiments, the loop is circular or substantially circular loops, and the gap is a circumferential gap. In embodiments in which the loop is incomplete, it is preferable that the gap is sized so that the fastener is unable to pass through, in order to
10 ensure that the clip can be secured to the surface without risk of falling.

The loop forming the securing element is preferably planar or substantially planar, defining a plane. In use, the plane defined by the loop is preferably parallel or substantially parallel to the plane of the surface. The portions of the loop arranged, in use, to contact the surface
15 may be referred to herein as the "surface-engaging portion" of the loop. Similarly, in embodiments in which the securing element is not in the form of a loop, it is still preferable that a plane is still defined (referred to herein as the "securing element plane"), and that a "surface-engaging portion" is identified.

20 In embodiments in which the spring element includes an arm and the securing element defines a plane, it is preferred that a line connecting the proximal and distal ends of the arm is situated in a plane which is (referred to herein as the "arm plane") parallel or substantially parallel to the securing element plane. Specifically, The arm preferably includes a kink, which separates the arm into first portion and a second portion, the first portion and the
25 second portion both being straight or substantially straight and angled at 160° to 170° to each other. In other words, the arm may be in the form of a straight piece of material which is bent. The first portion is preferably the same length as the second portion. In embodiments in which the arm is not straight, the arm plane is the plane which (i) includes both ends of the arm, and (ii) is parallel or substantially parallel to the securing element
30 plane. It should be noted that the arm plane is not the plane which contains both the first and second portions. By providing an arm with a kink, cable bruising can be reduced or prevented. Herein, the term cable bruising refers to damage to the core of the cable which might take place due to pressure on the outer surface of the cable.

35 The arm plane and the securing element plane are preferably spaced from each other, in a direction which is perpendicular to one or both planes by a distance which is close to the diameter of the cable which the clip is configured to hold. In some embodiments, the arm

plane may be spaced from the securing element plane by no more than 20 mm, preferably no more than 15 mm, and most preferably no more than 12 mm.

5 The spring element may include a connecting portion in addition to the arm. Specifically, the connecting portion is located at the proximal end of the arm, and is connected to the securing element. In preferred embodiments, the connecting portion is integrally formed with both the arm and the securing element.

10 The connecting portion is preferably at an angle of 100° to 120° to the end of the securing element to which it is connected, and at an angle of 100° to 120° relative to the arm and/or the arm plane. In this arrangement, when in the closed position, the arm and the connecting portion form the cable restraint. Having the connection portion oriented obliquely relative to the plane of the securing element means that the clip is able to fit in trunking having e.g. a semi-circular cross section, such as shown in WO 2005/086304.

15 In addition to the connecting portion at the proximal end of the arm, the spring element may further include a hook at the distal end. Preferably, the hook portion is formed integrally with the arm. The hook portion may be straight or substantially straight and oriented at an angle of 100° to 120° from the arm. In preferred embodiments, the connector portion, the arm and the hook are arranged in the form of three sides of a rectangle, or three sides of a trapezium. In other words, the connector portion, the arm and the hook are coplanar, or in substantially the same plane. Put alternatively, when viewed in a direction which is parallel to the arm (or the line connecting the ends of the arm), the angular separation of the connecting portion and the hook is preferably no more than 10° . In some embodiments, particularly those in
20 which the arm is not straight, and includes a first portion and second portion, as discussed above, the connector portion, first and second portions, and the hook may all lie within the same plane.

30 In this arrangement, when the clip is secured to the surface using the securing element, the spring element, made up of the arm, the connecting portion and the hook form the cable restraint. In use, the cable passes through the space defined by the cable restraint, and is prevented from falling out by one or more of the arm, the connecting portion and the hook. The spring element may further include a spacer leg at the distal end of the hook, to provide clearance in order to avoid cable bruising.

35 As discussed, in preferred embodiments of the present invention, the clip is used to secure a cable inside cable trunking, and most preferably narrow cable trunking having a width of e.g.

20 mm or less. Such cable trunking defines a channel through which the cables pass, and has a longitudinal axis, referred to herein as a channel or trunking axis. In preferred embodiments of the present invention, therefore, the clip is shaped and sized to fit within a channel having a width of 20 mm or less. When the clip is in place in the channel, it is preferred that the spring element, and more specifically the arm of the spring element is oriented at an angle of 15° to 30° from the channel axis.

A second aspect of the present invention provides a kit of parts for securing a cable to a surface, the kit including:

10 cable trunking defining a channel, the channel having a longitudinal channel axis;

and

a cable clip of the first aspect of the present invention, the cable clip configured to fit inside the channel.

15 It will be appreciated that where compatible, the optional features set out above with reference to the first aspect of the present invention apply equally well to the second aspect of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The invention will now be described with reference to the accompanying drawings, in which:

– Figs. 1A and 1B show an example of a cable clip, in the form of line drawings.

25 – Figs. 2A and 2B are photographs of the cable clip depicted in Figs. 1A and 1B.

– Fig. 3 shows the cable clip inside cable trunking, with a cable in place.

– Fig. 4 shows the cable clip inside cable trunking, with no cable.

30 – Figs. 5A to 5C show a further example of a cable clip, in the form of line drawings.

– Figs. 6 shows the dimensions of the cable clip of Figs. 5A to 5C.

35 – Figs. 7A and 7B shows the cable clip inside two types of cable trunking, with a cable in place.

- Fig. 8 shows the cable clip inside cable trunking, with no cable.

DETAILED DESCRIPTION OF THE DRAWINGS

5 Figs. 1A to 2B show the clip 100 of the present invention in a number of different views, some in the form of line drawings, and others in the form of photographs, to highlight the 3D nature of the clip 100. Broadly speaking, the clip 100 includes securing element 102 and spring element 104.

10 In the embodiment shown, the securing element 102 is in the form of a loop 106, defining a hole 108 through which a fastener such as a screw or a nail may be passed. The loop 106 is not complete, and there is a gap 110 between the end 106a of the loop 106 and the remainder of the clip 100. The gap 110 is small to ensure that in use, the loop 106 is unable to come free of the fastener passing through the hole 108.

15 In the present embodiment, the spring element 104 includes connector portion 112, arm 114, and hook 116, located in the same plane. The connector portion 112 is a small length of metal integrally formed with both the arm 114 and the proximal end 106b of the loop 106. In the embodiment shown in the drawings, the connector portion 112 is joined with the proximal end 106b of the loop 106 at vertex V_1 , and at an angle A_1 , which is approximately 100° to 110° . Furthermore, the connector portion is joined with the end 114a of the arm 114 at vertex V_2 , and at an angle A_2 , which is approximately 100° to 120° .

25 The hook 116 is integrally formed with the arm 114 at the opposite end from the connector portion 112. Specifically, the hook 116 is joined with the end 114b of the arm 114 at vertex V_3 , and at an angle A_3 , which is approximately 100° to 120° . In the embodiment of Figs. 1A to 2B, the hook 116 includes a first part 118 and a second part 120, the first and second parts being integrally formed with each other. The hook 116 specifically consists of a piece of metal which is bent to define the first part 118 and the second part 120. In the
30 embodiment shown, the bend is denoted vertex V_4 , and is at an angle A_4 which is approximately 90° . The second part 120 acts as a spacer leg.

Figs. 3 and 4 show the clip 100 in place inside cable trunking 200. In Fig. 3 the clip 100 is shown with a cable 300 passing along the trunking 200. In Fig. 4, the clip 100 is shown in
35 the trunking 200 without a cable in place, so that the structure of the clip 100 can be more easily seen. The clip 100 is secured to the back wall 202 of the trunking 200 using screw 204, which passes through hole 108 defined by loop 106. It is clear from this drawing that in

use, the arm 114 of the clip 100 rests at an angle of 15° to 30° relative to the longitudinal axis of the trunking 200. The vertex V_4 of the hook 116 is in contact with the wall of the trunking 200, as is the loop 106. Because the spring element 104, consisting of the connecting portion 112, arm 114 and hook 116 is oriented obliquely relative to the longitudinal axis of trunking 200, when viewed in a direction parallel to that longitudinal axis, the arm defines a channel through which a cable 300 may pass, as shown in Fig. 3.

Figs. 5A to 5C show line drawings of another clip 500 of the present invention. Similar reference numerals to those used in Figs. 1 to 4 represent similar components, and the bulk of the description will not be repeated here. Clip 500 of Figs. 5A to 5C differs from clip 100 shown in e.g. Fig. 1A and 1B in that the arm 514 includes a kink 515, which divides the arm into a first portion 517 and a second portion 519, angled at an angle A'_5 of 160° to 170°. The other angles in Figs. 5A to 5C may be as follows: A'_1 is approximately 100° to 110°, A'_2 is approximately 100° to 120°, A'_3 is approximately 100° to 120°, and A'_4 is approximately 90°. Fig. 6 is a photo of the clip 500 of Figs. 5A to 5C showing its dimensions. Figs. 7A shows the clip 500 in place inside cable trunking 600, and Fig. 7B shows the clip 500 in place in cable trunking 650, in both cases with a cable 601, 651 present. Fig. 8 shows clip 500 in place inside cable trunking 650 without a cable.

While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention. All references referred to above are hereby incorporated by reference.

CLAIMS

1. A clip for securing a cable to a surface, the clip including:
 - a securing element for attaching the clip to said surface; and
 - 5 a spring element, connected to the securing element, and movable relative to the securing element between:
 - a closed position in which the spring element forms a cable restraint arranged to secure the cable to the surface, and
 - an open position in which the spring element is spaced from the
 - 10 surface such that a cable may be placed between the spring element and the surface, and
 - wherein the spring element is biased into the closed position.
2. The clip of claim 1, including only a single spring element.
- 15 3. The clip of claim 1 or claim 2, wherein the securing element and the spring element are integrally formed.
4. The clip of claim 3, wherein the clip is made of metal.
- 20 5. The clip of claim 4, wherein the clip is made of steel or brass.
6. The clip of any one of claims 1 to 5, wherein the securing element is planar or substantially planar, and defines a securing element plane.
- 25 7. The clip of any one of claims 1 to 6, wherein the securing element includes a loop of material through which a fastener may be passed.
8. The clip of any one of claims 1 to 7 wherein the spring element includes an arm.
- 30 9. The clip of claim 8 wherein a line connecting the proximal and distal ends of the arm is situated in an arm plane which is parallel or substantially parallel to the securing element plane.
- 35 10. The clip of claim 8 or claim 9, wherein the arm includes a kink which separates the arm into a first portion and a second portion, both the first and second portions being

straight or substantially straight.

11. The clip of claim 10, wherein the first portion is oriented at an angle of 160° to 170° relative to the second portion.

5

12. The clip of claim 10 or claim 11, wherein the first portion is the same length as the second portion.

10

13. The clip of any one of claims 9 to 11, wherein the arm plane and securing element plane are spaced from each other by no more than 12 mm.

14. The clip of any one of claims 8 to 13, wherein the spring element further includes a connecting portion located at the proximal end of the arm, the connecting portion being connected to the securing element.

15

15. The clip of claim 14, wherein the connecting portion is integrally formed with the arm and the securing element.

20

16. The clip of claim 14 or claim 15, wherein the connecting portion is arranged at an angle of 100° to 110° to the end of the securing element to which it is connected.

17. The clip of any one of claims 14 to 16, wherein the connecting portion is arranged at an angle of 100° to 120° to the arm and/or arm plane.

25

18. The clip of any one of claims 14 to 17, wherein the spring element further includes a hook at the distal end of the arm.

19. The clip of claim 18, wherein the hook is integrally formed with the arm.

30

20. The clip of claim 19 wherein the connecting portion, the arm and the hook are coplanar or substantially coplanar.

21. The clip of any one of claims 18 to 20, further including a spacer leg.

35

22. A kit of parts for securing a cable to a surface, the kit including:
cable trunking defining a channel, the channel having a longitudinal channel axis; and

a cable clip according to any one of claims 1 to 21, the cable clip configured to fit inside the channel.



Application No: GB1809853.3

Examiner: Brian A. Woods

Claims searched: 1-22

Date of search: 26 November 2018

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, at least	GB819220 A (GEN ELECTRIC CO LTD) See whole document noting a spring clip secured to trunking by its springy nature.
X	1, at least	GB2548127 A (HELLERMANN TYTON LTD) See whole document noting a cable clip with a clamp element 4 which can be widened to allow the insertion of a cable against a spring force which biases the clip against a cable mounted on a surface. Also note securing nail 18.
X	1, at least	CN202797793 U (DONGFENG VISTEON AUTOMOTIVE TRIM SYSTEMS CO LTD) See whole document noting a plastic clip which is elastic and which can be moved to an open position to allow a cable to be inserted and then released to capture the cable due to the clip elastic force.
X	1, at least	CN201733029 U (FUJIAN JIELIAN ELECTRONICS CO) See whole document noting an elastic secured clip for restraining wiring.
X	1, at least	CN203707689 U (SHANTUI CONSTR MACH CO LTD) See whole document noting an elastic wire clamp 2 with a mounting base 1.
X	1, at least	GB2112054 A (BICC PLC) See whole document noting a resilient spring clip for securing a cable remotely to a surface.
X	1, at least	CN201733030 U (XIANGYU ZHOU) See whole document noting a retaining clip with an elastic hinge, and used for mounting/dismounting wires.
X	1, at least	GB1207741 A (HAYDEN NILOS LTD) See whole document noting a spring wire cable clip able to be moved between an open and a closed position.
X	1, at least	GB1075301 A (FT PRODUCTS LTD) See whole document noting a cable clip with a resilient finger tag 14 Fig 1.
X	1, at least	GB2252357 A (USUI KOKUSAI SANGYO KK) See whole document noting a metal clip with elastic engagement between an open position and a closed



		engaging position in which mounting walls 5a and 5b engage and secure a cable.
X	1, at least	CN206647617 U (YINGFUKANG ZHEJIANG INDUSTRIAL TECH CO LTD) See whole document noting an elastic wire clip for retaining a cable; figs.
X	1, at least	GB2122248 A (FORD MOTOR CO) See whole document noting a resilient cable clip with a hand grip on the bent spring arm to facilitate introduction of the cables.
X	1, at least	JP2013042601 A (NICHIEI INTEC CO LTD) See whole document noting a resilient clip for securing a cable.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

F16L; H02G

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
F16L	0003/04	01/01/2006