The conduit guide apparatus, system, and method for using the conduit guide to fixedly couple a conduit to a support member is described. The conduit guide apparatus includes a partial cylindrical surface, a first neck segment, a second neck segment, a first arcuate shoulder and a second arcuate shoulder. The partial cylindrical surface surrounds a conduit void and a conduit void axis. The first neck segment is adjacent to the first end is characterized by surrounding a first channel along a channel axis that is orthogonal to the conduit void axis.
CONDUIT GUIDE APPARATUS, SYSTEM, AND METHOD

FIELD

[0001] The invention relates to a conduit guide apparatus, system, and method. More particularly, this invention relates to a conduit guide that interfaces with a support member and can receive a conduit that is substantially parallel to the support member.

BACKGROUND

[0002] Throughout a variety of different industries, it is common to have cables or conduits that run along support structures. These cables or conduits can sometimes be part of separate closed systems and are used to conduct electricity, flow hydraulic fluid, house control wires, and provide pressurized air for pneumatic devices. Regardless of the conduit’s intended use, it is necessary to properly secure the cable or conduit in a safe, uniform, and visually appealing manner.

[0003] Commonly, support structures have cables running along them and come equipped with stationary cable guides that are built into the support structure and cannot be moved. These “fixed” cable or conduit guides only allow for a certain
number of cables or a certain diameter of conduit to be routed along a specific route on the support structure. Thus, the fixed guides do not work effectively when there are additional cables or different sized conduits, or the route for the cables and/or conduits are different from the route along the support structure.

[0004] If a structure does not accommodate for the cables or conduit to run along it or the fixed guides provided are not preferable, then other fastening methods are required. A popular method for fastening cables to support structures is to use cable-ties, commonly known as "zip-ties" or "wire-ties." Generally, a cable-tie encompasses both the support structure and the cable, and is then tightened to secure the cable to the support structure.

[0005] The use of cable ties can cause several problems. For example, improper tightening of the cable tie results in the cable shifting laterally or longitudinally along the support structure. This shifting can degrade the cable’s broader system performance and potentially damage the cable and the support structure.

[0006] Additionally, excessively tightening the cable ties may also crush the cable or conduit. Crushing the cable or conduit restricts the internal movement of the cable or flow in the conduit. Additionally, crushing the cable in this manner can also weaken the outer cable or conduit housing, which reduces the lifespan of the cable or conduit and may cause broader system failure.

[0007] Furthermore, securing cables or conduits with cable ties can also be unsightly. Further still, the cable-ties can cause cosmetic damage to both the cable or conduit and the support structure.

**SUMMARY**

[0008] A conduit guide apparatus, system, and method for using the conduit guide to fixedly couple a conduit to a support member is described. The conduit guide apparatus includes a partial cylindrical surface, a first neck segment, a second neck segment, a first arcuate shoulder and a second arcuate shoulder. The partial cylindrical surface surrounds a conduit void and a conduit void axis. Also, the partial cylindrical surface includes a first end and a second end adjacent to the first end.
The first neck segment is adjacent to the first end and surrounds a first channel along a channel axis that is orthogonal to the conduit void axis. The second neck segment is adjacent to the second end and surrounds a second channel along the channel axis that is orthogonal to the conduit void axis. The first arcuate shoulder is adjacent to the first neck segment and includes a first grooved outer wall on both sides of a first recess. The second arcuate shoulder is adjacent to the second neck segment and includes a second grooved outer wall on both sides of a second recess.

[0009] In one illustrative embodiment, the partial cylindrical surface includes a flexible apex segment that enables to the partial cylindrical surface to interface with a plurality of different sized cables or conduits. In another illustrative embodiment, the conduit guide is composed of an elastic compound. In yet another illustrative embodiment, the partial cylindrical surface receives a single conduit. In a further illustrative embodiment, the conduit guide apparatus includes a second partial cylindrical surface adjacent to the first partial cylindrical surface, in which the first partial cylindrical surface receives a first conduit and the second partial cylindrical surface receives a second conduit.

[0010] In a broad illustrative embodiment, the first arcuate shoulder includes a first concave curve that has a first radius and a first angle of approximately 60°-170°, and the second arcuate shoulder includes a second concave curve that has a second radius and a second angle of approximately 60°-170°. In a narrower embodiment, the first concave curve and the second concave curve share a same radius and a same angle of approximately 60°-120°. In an even narrower embodiment, the first concave curve and the second concave curve share the same radius and the same angle of approximately 80°-100°.

[0011] A method for fixedly coupling a conduit to a support member is also described. The method includes the partial cylindrical surface of the conduit guide receiving the conduit. The method then proceeds to position the first arcuate shoulder and the second arcuate shoulder on the support member, in which the conduit is parallel to the support member. The method then proceeds to insert a front end of a cable tie through the first channel and second channel of the neck segments. The front end of the cable tie is then feed through the clasp end of the cable tie. The cable tie interfaces with the first recess of the first arcuate shoulder.
and the second recess of the arcuate shoulder. The cable tie is then tightened so that the conduit guide is fixedly coupled to the conduit and the support member.

**DRAWINGS**

[0012] Figure 1 shows an isometric view of a single conduit guide, a cylindrical support member, a conduit, and a fastener.

[0013] Figure 2 shows an isometric view of the conduit guide in Figure 1 coupled to a thick conduit having a larger diameter than the conduit in Figure 1.

[0014] Figure 3 shows an isometric view of the conduit guide of Figure 1 coupled to an oval support member.

[0015] Figure 4 shows an isometric view of a single conduit guide.

[0016] Figure 5 shows a side view of the single conduit guide.

[0017] Figure 6 shows a front view of the single conduit guide.

[0018] Figure 7 shows a sectional view of the single conduit guide.

[0019] Figure 8 shows a bottom view of the single conduit guide.

[0020] Figure 9A shows an isometric view of a dual conduit guide.

[0021] Figure 9B shows a side view of a dual conduit guide.

[0022] Figure 10 shows a front view of the dual conduit guide.

[0023] Figure 11 shows a sectional view of the dual conduit guide.

[0024] Figure 12 shows a front view of the dual conduit guide and a fastener.

[0025] Figure 13 shows a front view of a dual conduit guide with two different sized cavities and a fastener.

**DESCRIPTION**
Persons of ordinary skill in the art will realize that the following description is illustrative and not in any way limiting. Other embodiments of the claimed subject matter will readily suggest themselves to such skilled persons having the benefit of this disclosure. It shall be appreciated by those of ordinary skill in the art that the apparatus and systems described herein may vary as to configuration and details. Additionally, the methods may vary as to details, order of the actions, or other variations without departing from the illustrative method disclosed herein.

For purposes of this patent the term "conduit" refers to a pipe or tube through which a fluid, wire, or cable passes. By way of example, the fluid may be a polar molecule such as water, a non-polar molecule such as oil or gasoline, or any combination thereof. The conduit may also include one or more wires, in which a single wire refers to a thin flexible thread of an alloy or metal. The conduit may also include a cable which includes a plurality of wires that may be covered with one of a metallic sheath, a plastic material, a rubber or elastomeric material, a glass material, or any combination thereof. Thus, in certain instances the terms "conduit" and "cable" are interchangeable as would readily suggest itself to those of ordinary skill in the art.

The apparatus, systems, and methods presented herein relate to a conduit guide for securing a conduit along a support structure. By way of example and not of limitation, the conduit guide secures conduits of varying diameter to support structures that may vary in both shape and size. Additionally, the conduit guide may be adjusted to allow a conduit or conduits to be substantially parallel to the longitudinal axis of the support structure. Furthermore, the conduit guide braces the conduit or conduits so the conduit or conduits do not move significantly along the lateral axis or vertical axis of the support structure. The conduit guide presented herein may also be referred to as a cable guide or as a universal cable guide.

Referring to Figure 1, there is shown an isometric view of an illustrative conduit guide for a single cable, a cylindrical support member, a conduit, and a fastener. An illustrative conduit guide 10 receives an illustrative single cable 12 in a conduit passage that is defined by the looped portion conduit guide 10. The illustrative conduit guide 10 is substantially symmetrical and includes a conduit passage 22 that receives the cable 12. Typically, the conduit passage 22 has a
diameter that is smaller than the single cable 12 diameter. The cable guide 10 is composed of a flexible material that can receive single cables having larger cable diameters than single cable 12 diameter.

[0030] The conduit guide 10 also includes a first arcuate shoulder 14 and a second arcuate shoulder 16 that can interface with a support structure 18. The illustrative conduit guide 10 also laterally and vertically secures the conduit 12 to the support structure 18. Additionally, the conduit guide 10 allows the cable 12 to move longitudinally.

[0031] Also, the conduit cable guide 10 includes a fastener channel 20. The fastener channel 20 is embedded within the single conduit guide 10 and is disposed below the conduit passage 22 that receives conduit 12. The illustrative fastener channel 20 receives a fastener 24, e.g. a cable tie. The height and width of the fastener channel 20 provide sufficient clearance so that the fastener 24 may be fed though fastener channel 20.

[0032] In operation, the conduit guide 10 is first separated by applying an upward force $F$ to the arcuate shoulders 14 and 16. The conduit guide 10 flexes about the apex 26 and after the upward force $F$ is released, the conduit guide 10 returns to its former shape. Generally, the conduit passage 22 has a smaller diameter than the diameter of the single cable 12, and since the conduit guide 10 is flexible, the conduit guide 10 operates as a biasing element that applies a small force to the single cable 12 so that the conduit guide 10 is slidably coupled to the single cable along the longitudinal axis.

[0033] The conduit guide 10 and the illustrative cable 12 are then placed on the surface of the support member 18. A fastener 24, e.g. a cable tie, is then routed or fed through the fastener channel 20. The fastener 24 secures the cable 12 to the support structure 10. The illustrative fastener 24 is configured to interface with the first recess and the second recess, and it passes through the first fastener channel and the second fastener channel.

[0034] More specifically, the conduit guide 10 and fastener 24 secure cable 12 and minimize movement along the lateral axis and the vertical axis. Although some movement along the longitudinal axis is supported by the cable guide 10, this
movement is typically limited by the cable length, cable materials, and other
engineering and design constraints associated with a properly designed cabling
system. Also, the illustrative cable 12 is secured by the cable guide 10 and avoids
directly contacting the support structure 18.

[0035] Removal of the conduit guide 10 is simply performed by removing or
cutting the fastener 24 to separate the conduit guide 10 from the support structure
18. The conduit guide 10 is separated from the cable 12, by applying the
substantially vertical force F to the arcuate shoulders 14 and 16.

[0036] The conduit guide 10 is composed of a material that is flexible, yet
sufficiently rigid or stiff to expand and contract around various cable or conduit
diameters and interface with differently sized support structures or members.
Additionally, the material has a sufficiently high tensile strength and compressive
strength so the conduit guide 10 may be utilized in high temperature and low
temperature environments.

[0037] Referring to Figure 2, there is shown an isometric view of the conduit
guide 10 in Figure 1 coupled to a thick cable 30 having a larger diameter than the
cable 12 shown in Figure 1. The illustrative conduit guide includes a first neck
segment 32 and a second neck segment 34 that surround a gap 36. Although the
gap 36 is also present in Figure 1, the gap 36 is much more visible in Figure 2
because of the cable diameter of thick cable 30. Also, the illustrative cable 30 is
secured by the cable guide 10 to avoid directly contacting the support structure 18.

[0038] Referring to Figure 3, there is shown an isometric view of the conduit
guide 10 of Figure 1 coupled to an oval support member 40. The flexible conduit
guide 10 conforms to the oval shape of the support structure 40, while holding the
cable 12. Also, the illustrative cable 12 is secured by the cable guide 10 to avoid
directly contacting the support structure 40.

[0039] Referring to Figure 4, there is shown an isometric view of an illustrative
single conduit guide 100 without the cable, support structure and fastener. The
longitudinal axis, lateral axis, and vertical axis are shown in relation to the support
structure as presented above in Figure 1.
The conduit guide 100 includes a partial cylindrical inner surface 102, a first neck segment 104, a second neck segment 106, a first arcuate shoulder 108 and a second arcuate shoulder 110. The partial cylindrical inner surface 102 surrounds a conduit void and a conduit axis that is parallel to the longitudinal axis. Also, the partial cylindrical inner surface 102 is looped so that a first end 102a is adjacent to a second end 102b. The first neck segment 104 is adjacent to the first end 102a. Additionally, the first neck segment 104 surrounds a first fastener channel 111a along a lateral channel axis that is parallel to the lateral axis and orthogonal to the conduit axis.

The second neck segment 106 is adjacent to the second end 102b and surrounds a second fastener channel 111b (not shown) along the lateral channel axis that is orthogonal to the conduit axis. The first arcuate shoulder 108 is adjacent to the first neck segment 104 and includes first grooved outer walls 112a and 112b on both sides of a first recess 114. The second arcuate shoulder 110 is adjacent to the second neck segment 106 and also includes a second grooved outer wall (not shown) on both sides of a second recess (not shown). Alternatively, a single grooved outer wall 112 may be adjacent to the first recess 114, instead of the two grooved outer walls shown.

Referring to Figure 5, there is shown a side view of the single conduit guide. More specifically, the side view shows the first arcuate shoulder 108, which includes a first grooved outer walls 112a and 112b that are on both sides of a first recess 114.

Referring to Figure 6, there is shown a front view of the single conduit guide. The partial cylindrical inner surface 102 surrounds a conduit void 116 that receives the conduit or cable. A conduit axis 118 is parallel to the longitudinal axis.

The conduit guide 100 includes a flexible head segment 120 at the apex of the conduit guide, which enables the conduit guide to interface with a variety of different sized cables or conduits. The materials properties of the conduit guide include plastic and elastic compounds.

In a broad illustrative embodiment, the first arcuate shoulder 108 includes a first concave curve that has a first radius, r, and a first angle, Θ, of approximately 60°-170°, and the second arcuate shoulder 110 includes a second concave curve.
that has a second radius and a second angle of approximately 60°-170°. In a
narrower embodiment, the first concave curve and the second concave curve share
a same radius, \( r \), and a same angle, \( \Theta \), of approximately 60°-120°. In an even
narrower embodiment, the first concave curve and the second concave curve share
the same radius, \( r \), and the same angle, \( \Theta \), of approximately 80°-100°.

[0046] In an alternative embodiment, one arcuate shoulder may have a different
radius or a different angle than the other arcuate shoulder. In another alternative
embodiment, the cable guide may only include one arcuate shoulder that is coupled
to the partial cylindrical inner surface.

[0047] Referring to Figure 7, there is shown a sectional view on line 7 of Figure 5
for the single conduit guide. The first arcuate shoulder 108 includes the grooved
outer wall 112b which is adjacent to the first recess 114. The second arcuate
shoulder 110 includes the grooved outer wall 113b which is adjacent to the second
recess 115.

[0048] Referring to Figure 8, there is shown a bottom view of the single conduit
guide. With respect to the first arcuate shoulder, the recess 114 is shown between
the grooved outer walls 112a and 112b. For the second arcuate shoulder, the
recess 115 is shown between the grooved outer walls 113b and 113b.

[0049] Referring to Figure 9A, there is shown an isometric view of a dual conduit
guide 130. The conduit guide 130 is similar to the conduit guide presented above,
however, conduit guide 130 includes a first partial cylindrical inner surface 132 and a
second partial cylindrical inner surface 134 that are separated by a nipple 136. The
first partial cylindrical inner surface 132 is configured to receive a first conduit or
cable and the second partial cylindrical inner surface 134 is configured to receive a
second conduit or cable.

[0050] Referring to 9B, there is shown a side view of the dual conduit guide.
More specifically, the side view shows a first arcuate shoulder that includes a first
grooved outer wall on both sides of a first recess as described previously.

[0051] Referring to Figure 10, there is shown a front view of the dual conduit
guide that includes a head component 138. The head component 138 is disposed
above the fastener channel 140 (shown on Figure 11). Thus, the head portion 138
of conduit guide 130 includes the first partial cylindrical inner surface 132, the
second partial cylindrical inner surface 134, and the nipple 136 that separates the
first and second partial cylindrical inner surfaces.

[0052] Referring to Figure 11, there is shown a sectional view on line 11 of Figure
9B for the dual conduit guide. The sectional views shows the fastener channel 140
disposed below the head portion 138. Additionally, the head portion 138 includes
the first partial cylindrical inner surface 132, the second partial cylindrical inner
surface 134, and the nipple 136 that separates the first and second partial cylindrical
inner surfaces.

[0053] Referring to Figure 12, there is shown a front view of the dual conduit
guide 130, a fastener 142, and a support member 144. The fastener 142 is
configured to interface with the first recess and the second recess, and passes
through the first channel and the second channel as described above.

[0054] Referring to Figure 13, there is shown a front view of a dual conduit guide
150 with two different sized cavities. More specifically, the dual conduit guide 150
includes a head component having a first partial cylindrical inner surface 152 that is
different from the second partial cylindrical inner surface 154. The first partial
cylindrical inner surface 152 is configured to receive a larger cable or conduit than
the second partial cylindrical inner surface 154. A nipple 156 that separates the first
and second partial cylindrical inner surfaces. The fastener 158 is configured to
interface with the support structure 160 and the first recess and the second recess,
and the fastener passes through the first channel and the second channel, as
described above.

[0055] In another illustrative embodiment, the conduit guide includes a head
portion with three or more partial cylindrical inner surfaces in the head portion of the
cable guide. In another illustrative embodiment the conduit guide includes a plurality
of heads, in which each head includes at least one partial cylindrical surface that is
configured to receive at least one conduit or cable.

[0056] A method for fixedly coupling a conduit to a support member with a conduit
cable is also described. The method includes having the partial cylindrical surface of
the conduit guide receive a conduit or cable. The method then proceeds to position
the first arcuate shoulder and the second arcuate shoulder on the support member or structure. The conduit or cable that is held by the conduit guide runs parallel to the support member. The method then proceeds to insert a fastener through the first fastener channel and second fastener channel that are disposed along the neck segments described above. In the illustrative embodiment, the fastener is a cable tie and the front end of the cable tie passes through the first fastener channel and second fastener channel. The front end of the illustrative cable tie is then feed through the clasp end of the cable tie. The cable tie interfaces with the first recess of the first arcuate shoulder and the second recess of the second arcuate shoulder. The cable tie is then tightened so that the conduit guide is fixedly coupled to the conduit and the support member.

[0057] In certain embodiments of the present invention, the conduit guide is designed to accommodate a single conduit. Other embodiments are designed to accommodate multiple conduits. Additionally, other embodiments are designed to accommodate considerably different sized conduits and support structures.

[0058] The technical advantage of the conduit guide apparatus provides a simplified installation process that does not require a "fixed" cable or conduit guides, and does not require the disassembly of the conduit or the structural support system. Another advantage of the conduit guide apparatus, system, and method presented above is that a cable or conduit guide that can be used across a multitude of industries that can accommodate a range of cable or conduit types and diameters. Additionally, the conduit guide can conform to different size and shaped support structures. Furthermore, the conduit guide uniformly secures the conduit laterally and vertically. Further still, the conduit guide allows the conduit to move longitudinally.

[0059] It is to be understood that the detailed description of illustrative embodiments provided for illustrative purposes. The scope of the claims is not limited to these specific embodiments or examples. Various structural limitations, elements, details, and uses can differ from those just described, or be expanded on or implemented using technologies not yet commercially viable, and yet still be within the inventive concepts of the present disclosure. The invention should therefore not be limited by the above described embodiment, method, and examples, but by all
embodiments and methods within the scope and spirit of the invention as claimed. Thus, the scope of the invention is determined by the following claims and their legal equivalents.

[0060] What is claimed is:
CLAIMS

1. A conduit guide apparatus comprising,
   a partial cylindrical surface that is characterized by surrounding a conduit void and a conduit void axis, wherein the partial cylindrical surface includes a first end and a second end adjacent to the first end;
   a first neck segment adjacent to the first end, wherein the first neck segment is characterized by surrounding a first channel along a channel axis which is orthogonal to the conduit void axis;
   a second neck segment adjacent to the second end, wherein the second neck segment is characterized by surrounding a second channel along the channel axis which is orthogonal to the conduit void axis;
   a first arcuate shoulder adjacent to the first neck segment, the first arcuate shoulder characterized in that a first grooved outer wall on both sides of a first recess; and
   a second arcuate shoulder adjacent to the second neck segment, the second arcuate shoulder characterized in that a second grooved outer wall on both sides of a second recess.

2. The conduit guide apparatus as claimed in claim 1 wherein the partial cylindrical surface includes a flexible apex segment that enables to the partial cylindrical surface to interface with a plurality of different sized conduits or cables.

3. The conduit guide apparatus as claimed in claims 1 or 2, wherein the conduit guide apparatus includes an elastic compound.

4. The conduit guide apparatus as claimed in claims 1, 2 or 3 wherein the partial cylindrical surface characterized by receiving a single conduit.

5. The conduit guide apparatus as claimed in claim 1, 2 or 3 further comprising a second partial cylindrical surface adjacent to the first partial cylindrical surface, wherein the first partial cylindrical surface characterized by receiving a first conduit and the second partial cylindrical surface characterized by receiving a second conduit.
6. The conduit guide apparatus as claimed in any preceding claim wherein the first arcuate shoulder is characterized in that a first concave curve that has a first radius and a first angle of approximately 60°-170° and the second arcuate shoulder is characterized in that a second concave curve that has a second radius and a second angle of approximately 60°-170°.

7. The conduit guide apparatus as claimed in claims 1, 2, 3, 4 or 5 wherein the first concave curve and the second concave curve are characterized by sharing a same radius and a same angle of approximately 60°-120°.

8. The conduit guide apparatus as claimed in claims 1, 2, 3, 4, or 5 wherein the first concave curve and the second concave curve are characterized by sharing a same radius and a same angle of approximately 80°-100°.

9. A conduit guide system comprising,

   a partial cylindrical surface that is characterized by surrounding a conduit void and a conduit void axis, wherein the partial cylindrical surface includes a first end and a second end adjacent to the first end;

   a flexible apex segment of the partial cylindrical surface characterized by enabling the partial cylindrical surface to interface with a plurality of different sized conduits or cables;

   a first neck segment adjacent to the first end, wherein the first neck segment is characterized by surrounding a first channel along a channel axis which is orthogonal to the conduit void axis;

   a second neck segment adjacent to the second end, wherein the second neck segment is characterized by surrounding a second channel along the channel axis that is orthogonal to the conduit void axis;

   a first arcuate shoulder adjacent to the first neck segment, the first arcuate shoulder characterized in that a first grooved outer wall on both sides of a first recess, and a first concave curve that has a first radius and a first angle of approximately 60°-170°;

   a second arcuate shoulder adjacent to the second neck segment, the second arcuate shoulder characterized in that a second grooved outer wall on both sides of
a second recess, and a second concave curve that has a second radius and a second angle of approximately of 60°-170°; and
   a fastener characterized by interfacing with the first recess and the second recess, the fastener characterized by passing through the first channel and the second channel.

10. The conduit guide as claimed in claim 9 characterized by the conduit guide being composed of an elastic compound.

11. The conduit guide as claimed in claim 9 or 10 wherein the partial cylindrical surface is characterized by receiving a single conduit.

12. The conduit guide as claimed in claim 9 or 10 further comprising a second partial cylindrical surface adjacent to the first partial cylindrical surface, wherein the first partial cylindrical surface is characterized by receiving a first conduit and the second partial cylindrical surface receives a second conduit.

13. The conduit guide as claimed in claim 9, 10, 11 or 12 characterized by the first concave curve and the second concave curve share a same radius and a same angle of approximately 60°-120°.

14. The conduit guide as claimed in claim 9, 10, 11 or 12 characterized by the first concave curve and the second concave curve share a same radius and a same angle of approximately 80°-100°.

15. A method for coupling a conduit to a support member with a conduit guide, the method comprising,
   receiving the conduit on a partial cylindrical surface of the conduit guide, wherein the conduit guide includes,
      the partial cylindrical surface characterized by surrounding a conduit void and a conduit void axis that receives the conduit, wherein the partial cylindrical surface is characterized by a first end and a second end adjacent to the first end,
a first neck segment adjacent to the first end, wherein the first neck
segment is characterized by surrounding a first channel along a
channel axis that is orthogonal to the conduit void axis,
a second neck segment adjacent to the second end, wherein the
second neck segment is characterized by surrounding a second
channel along the channel axis that is orthogonal to the conduit
void axis,
a first arcuate shoulder adjacent to the first neck segment, the first
arcuate shoulder characterized by a first grooved outer wall on
both sides of a first recess, and
a second arcuate shoulder adjacent to the second neck segment, the
second arcuate shoulder characterized by a second grooved
outer wall on both sides of a second recess;
positioning the first arcuate shoulder and the second arcuate shoulder on the
support member, wherein the conduit is characterized by being parallel to the
support member;
inserting a front end of a cable tie through the first channel and second
channel of the neck segments; and
feeding the front end of the cable tie through a clasp end of the cable tie,
wherein the cable tie is characterized by interfacing with the first recess of the first
arcuate shoulder and the second recess of the arcuate shoulder; and
tightening the cable tie so that the conduit guide is characterized by being
fixedly coupled to the conduit and the support member.

16. The method as claimed in claim 15 characterized by enabling the partial
cylindrical surface to interface with a plurality of different sized conduits with a
flexible apex segment disposed on the partial cylindrical surface.

17. The method as claimed in claim 15 or 16 characterized by receiving a single
conduit.

18. The method as claimed in claim 15, 16 or 17 characterized by receiving at
least two conduits with a second partial cylindrical surface adjacent to the first partial
cylindrical surface, wherein the first partial cylindrical surface receives a first conduit and the second partial cylindrical surface receives a second conduit.

19. The method as claimed in claim 15, 16, 17 or 18 characterized by positioning the first arcuate shoulder and the second arcuate shoulder on the support member includes,

   the first arcuate shoulder having a first concave curve that has a first radius and a first angle of approximately 60°-170°; and

   the second arcuate shoulder having a second concave curve that has a second radius and a second angle of approximately of 60°-170°.

20. The method as claimed in claim 15, 16, 17 or 18 characterized by positioning of the first arcuate shoulder and the second arcuate shoulder on the support member includes the first concave curve and the second concave curve sharing a same radius and a same angle of approximately 80°-100°.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/047459

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F16L 3/137 (2014.01)
CPC - F16L 3/137 (2014.10)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - F16B 2/02, 2/06, 2/08; F16L 3/08, 3/12, 3/137, 3/233, 33/035 (2014.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC - 24/16R, 16PB; 248/61, 74.1, 74.2, 74.3, 230.8

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase, Google Patents, Google, YouTube.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 5,568,905 A (SMITH II) 29 October 1996 (29.10.1996) entire document</td>
<td>1-3, 9-12, 15-17</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* Special categories of cited documents.
  "A" document defining the general state of the art which is not considered to be of particular relevance
  "E" earlier application or patent but published on or after the international filing date
  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  "O" document referring to an oral disclosure, use, exhibition or other means
  "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
15 October 2014

Date of mailing of the international search report
12 Nov 2014

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Authorized officer:
Blaine R. Copenhaver
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7777

Form PCT/ISA/2 10 (second sheet) (July 2009)
This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **Claims Nos.:** because they relate to subject matter not required to be searched by this Authority, namely:

2. **Claims Nos.:** because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **Claims Nos.: 4-8, 13, 14, 18-20** because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

This International Searching Authority found multiple inventions in this international application, as follows:

1. **As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.**

2. **As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.**

3. **As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:**

4. **No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:**

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.