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EP 1048383 A US 4033703 A
US 20070201963 A

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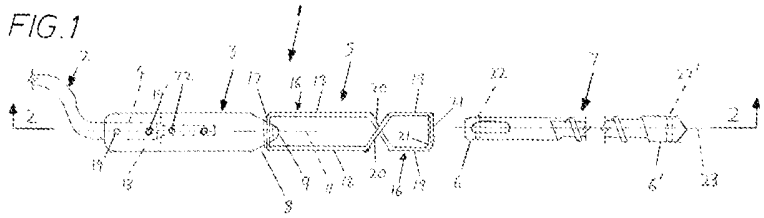
(54) Title of the Invention: **A device for aiding the passage of an elongate member through a bore-hole made by a drill bit**
Abstract Title: **Device to aid the passage of an elongate member through a drilled hole**

(57) The device 1 is provided for aiding the passage of an elongate member such as an electric cable 2 through a bore-hole made by a drill bit 7. The device has a holder 3 for releasably retaining one end 4 of the elongate member. A connector 5 is connected to the holder 3 and this may be a pivotal connection. The connector 5 has a pair of arms 16 to releasably engage the end portion 6 of the drill bit there between. A means for moving the arms 16 enables either engagement or release of the connector from the end portion of the drill bit when pressure is applied simultaneously to a section 18 of both arms.

FIG.1



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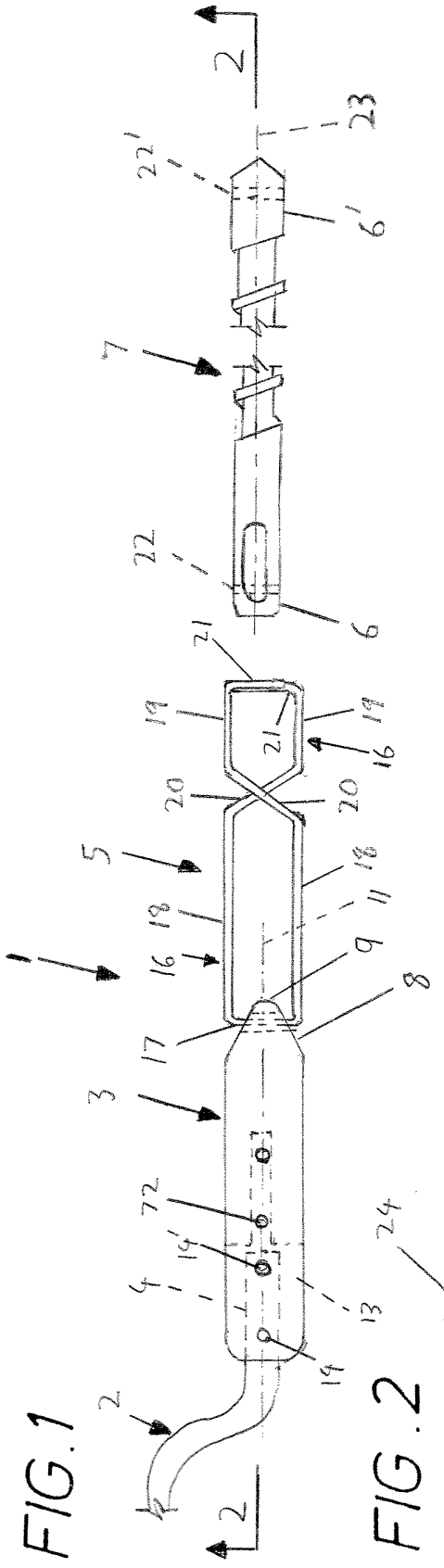
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FIG. 1

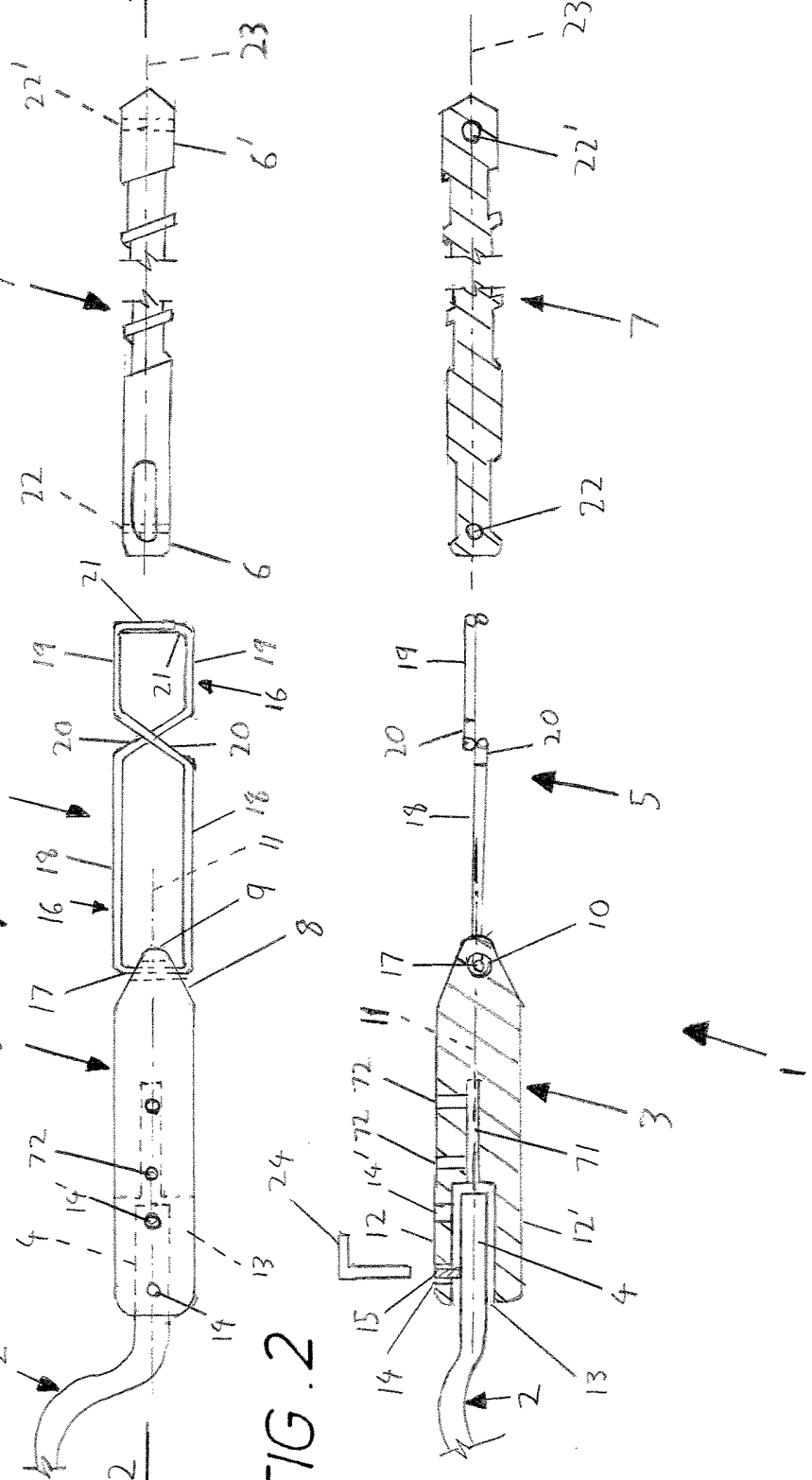
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FIG. 2

FIG. 3

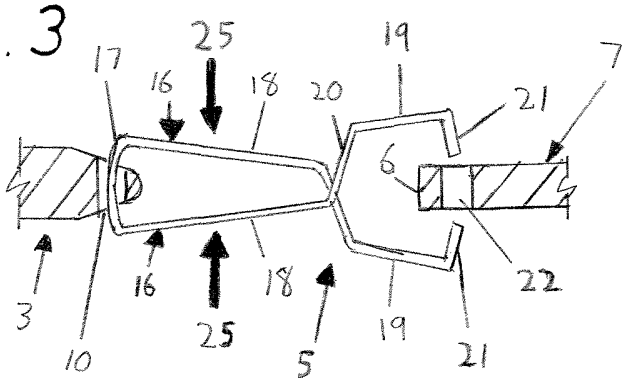


FIG. 4

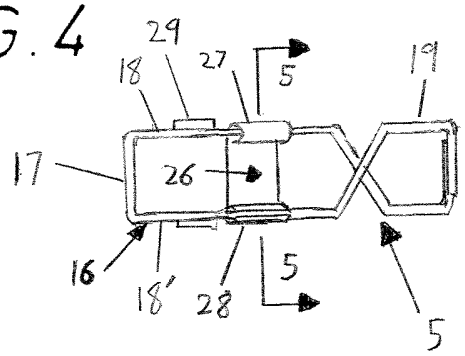


FIG. 5

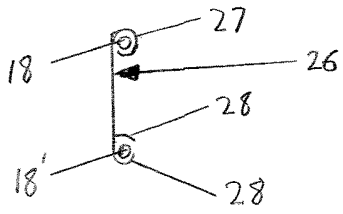


FIG. 6

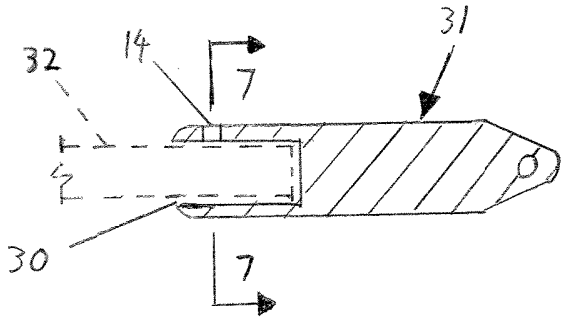


FIG. 7

FIG. 8

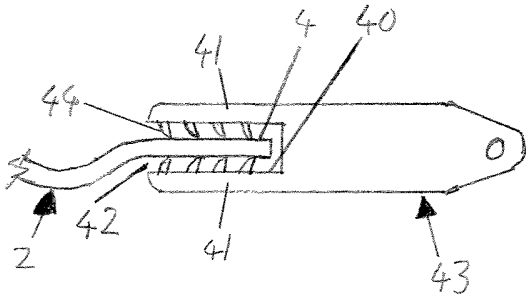


FIG. 9

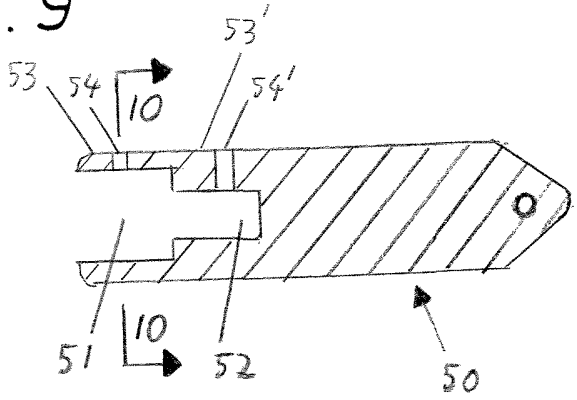


FIG. 10

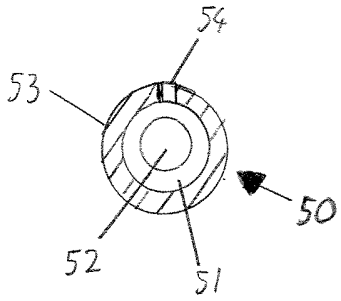


FIG. 11

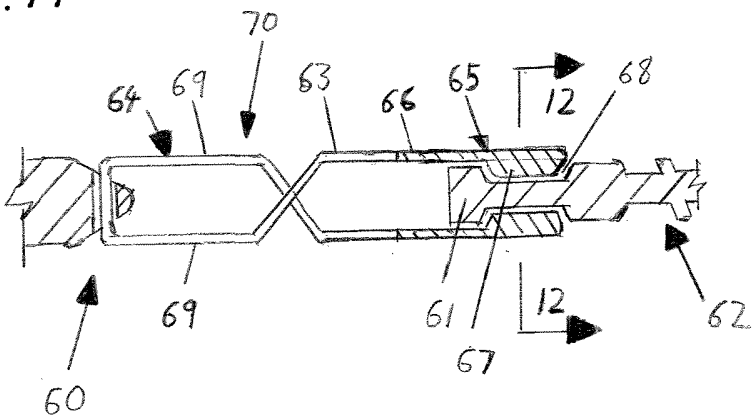


FIG. 12

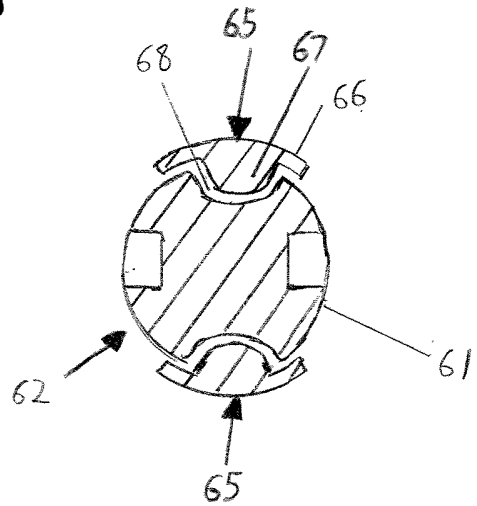
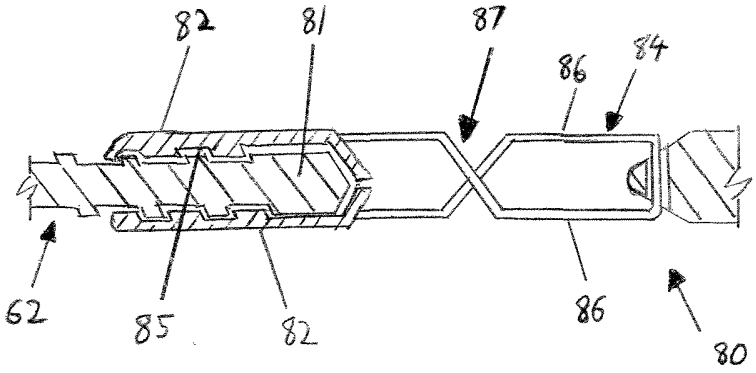


FIG. 13



A DEVICE FOR AIDING THE PASSAGE OF AN ELONGATE MEMBER THROUGH A BORE-HOLE MADE BY A DRILL BIT

The present invention relates to a device for aiding the passage of an elongate member, such as an electric cable or wire or a pipe, through a bore-hole made by a drill bit.

Cables often need to be run through walls of buildings. A hole needs to be first drilled through the wall before the cable can be run through it. Where the wall is a cavity wall the drill forms a pair of aligned holes with each hole on either side of the cavity. After the drill is removed the cable can be fed through the hole on one side of the cavity but it is difficult to feed the cable through the hole on the other side of the cavity.

One solution is to insert a pipe through both holes and then feed the cable through the pipe. However, after inserting the pipe into the hole on one side of the cavity there is still the problem of aligning the pipe with the hole on the other side of the cavity. There is also likely to be debris inside the cavity which would make this more difficult.

US 4033703 discloses a solution to the problem of feeding a cable or wire through a cavity wall. A blade-type drill bit is used to drill the hole through the cavity wall. A wire fishing adapter is then attached to the blade of the drill bit protruding through the wall. The adapter has a gap between a pair of arms for receiving the blade of the drill bit and the blade has a protrusion for engaging a recess in one of the arms. The adapter also has a receptacle for holding an end of a wire. A wire is fixed to the receptacle and the drill bit is pulled through the wall thus pulling the wire through the wall. A problem with this is that the apparatus can only work with blade-type drill bits. Also, the blade needs to be adapted by having a protrusion put on it. Furthermore, the arms need to be prized apart in order to release the blade of the drill bit from the adapter after use.

US 5310294 discloses a drill bit having a wire attachment element that is

either integral to the drill bit or is screwed to the rear of the drill bit. The wire attachment element has a pair of arms at the end distal from the drill bit and one arm is urged towards the other arm so that the end of a wire can be grasped between them. The arrangement for holding the wire appears complex and not robust. The arrangement is also likely to cause the attached wire to snap. If the wire attachment element is integral to the drill bit there is a problem in that the wire attachment element is likely to be damaged by the chuck of the drill. Where the wire attachment element is separate from the drill bit it is screwed to the drill bit after the hole has been drilled through the wall and the drill has been detached from the drill bit. A problem with this is that the drill bit would have to be adapted in order to have a screwed connection with the wire attachment element. Thus, the drill bit would either have a threaded protrusion which may make it difficult for the chuck to effectively hold the drill bit and could be damaged by the chuck, or the drill bit would have a threaded hole which could weaken the drill bit so that the drill bit could be broken by the chuck.

US 5529443 discloses a drill bit with a hole at its rear for receiving an end of a wire. A screw is turned by an Allen key to hold the end of the wire in the hole. A problem with this drill bit is that the hole would weaken the drill bit so that the drill bit could be broken by the chuck.

It is an object of the present invention to provide an apparatus for the installation of an elongate member to alleviate at least one of the above-mentioned problems.

According to the present invention there is provided a device for aiding the passage of an elongate member, such as an electric cable, through a bore-hole made by a drill bit, said device comprising a holder for releasably retaining one end of said elongate member; and a connector connected to said holder for releasably engaging an end portion of said drill bit, said connector comprising a pair of arms to engage said end portion of said drill bit therebetween, and means for moving said arms to enable either engagement or release of said connector from said end portion of said drill bit when pressure is applied

simultaneously to a section of both arms. By the device enabling either engagement or release of the connector from the end portion of the drill bit when pressure is applied simultaneously to a section of both arms, this makes it easy for the device to be engaged to or released from the drill bit. It also does not limit the device to a particular type of drill bit. The device is of simple and robust construction.

The drill bit connector may have a pivotal connection with the elongate member holder. This may be a universal joint.

The means for moving said arms may be actuated by pressure applied simultaneously to the outside of a section of both arms. The arms may be biased to engage said end portion of said drill bit therebetween and said means for moving said arms is adapted to move said arms apart to enable either engagement or release of said connector. Each arm may comprise first and second end sections separated by a cross-over section of said arms, the first end section being connected to said holder and the second end section being arranged to engage the end portion of said drill bit, wherein pressure applied simultaneously to the first end sections of both arms resiliently biases said second end sections to move apart to enable either said engagement or release of said connector. A restraint may be provided between the first end section of each arm to restrain the first end sections from moving towards each other.

The arms may form respective ends of a single wire.

The ends of the arms remote from said holder may be angled towards each other to be engagable in a recess or hole in the end portion of the drill bit.

The holder preferably comprises a recess for retaining said end of said elongate member.

The holder may comprise a plurality of recesses for respectively retaining elongate members having cross-sectional areas of different sizes. The recesses may be in series wherein each successive recess is adapted to retain the end portion of an elongate member having a smaller cross-sectional area than that retainable by the previous recess, said successive recess being

formed in the bottom of said previous recess.

The recess may have barbs for retaining one end of said elongate member.

The ends of the arms remote from said holder may have clamp members adapted to clamp the end portion of said drill bit therebetween.

There may be provided a combination of the device as described above and a drill bit, wherein the drill bit has at least one recess or through-hole for receiving the arms of the connector. The drill bit may have at least one said recess or through-hole in a portion of both ends thereof. The through-hole preferably passes through the drill bit substantially perpendicular to the longitudinal axis of the drill bit and does not substantially weaken the drill bit leaving it robust.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying schematic drawings, in which:

Figure 1 is a view of a device and a drill bit in accordance with an embodiment of the invention;

Figure 2 is a longitudinal sectional view taken along lines 2-2 of Figure 1;

Figure 3 is a view of a connector of the device being actuated so as to enable the device to be connected to the drill bit;

Figure 4 is a view of the connector with a restraint and pads;

Figure 5 is a cross-sectional view taken along lines 5-5 of Figure 4;

Figure 6 is a longitudinal sectional view of a modified holder forming part of the device;

Figure 7 is a sectional view taken along lines 7-7 of Figure 6;

Figure 8 is a view of another modified holder;

Figure 9 is a longitudinal sectional view of yet another modified holder;

Figure 10 is a sectional view taken along lines 10-10 of Figure 9;

Figure 11 is a longitudinal sectional view of a modified connector;

Figure 12 is a sectional view taken along lines 12-12 of Figure 11; and

Figure 13 is a longitudinal sectional view of another modified connector.

Referring to Figures 1 and 2 of the accompanying drawings, a device 1 is provided for aiding the passage of an electric cable 2 or wire through a bore-hole made by a drill bit. The device 1 has a holder 3 for releasably retaining one end 4 of the electric cable 2, and a connector 5 in the form of a wire pivotably connected to the holder 3 for releasably engaging an end portion 6 of a modified SDS drill bit 7.

The holder 3 is bullet shaped with a cone 8 at one end and the cone 8 has a domed top 9. A hole 10 passes through the cone 8 perpendicular to the longitudinal axis 11 of the holder 3 and intersecting the axis 11. The opposite end of the holder 10 has a pair of end walls 12, 12' with a slot 13 or recess in between. One end wall 12 has two holes 14, 14' passing through it and one hole 14 is shown having a set screw 15 although both holes 14, 14' could have a set screw 15. In the centre of the bottom of the slot 13 is a cylindrical recess 71. Holes 72 parallel to holes 14, 14' pass through from the outer surface of the holder 3 to the recess 71 and each hole could have a set screw 15. The holder 3 may be made of metal, plastic or nylon.

The connector 5 has a pair of arms 16 connected by an intermediate wire section 17 which passes through the hole 10 in the holder 3. Each arm 16 comprises first and second end sections 18, 19 separated by a cross-over section 20 of the arms with the first end sections 18 being adjacent the intermediate section 17. The arms 16 are biased to engage the end portion 6 of the drill bit 7 therebetween and the ends 21 of the second end sections 19 of the arms remote from the cross-over section 20 are angled towards each other to be engagable in a through-hole 22 in the end portion 6 of the drill bit 7.

The SDS drill bit 7 has been modified by having a through-hole 22, 22' in a portion of both ends 6, 6' thereof for receiving the angled ends 21 of the arms 16 of the connector 5. The through-holes 22, 22' pass through the drill bit 7 and are perpendicular to the longitudinal axis 23 of the drill bit 7.

Before the device 1 is used, the drill bit 7 is attached to a drill and a bore hole is drilled through a wall. The drill bit 7 is then released from the drill and

left in the wall. The device 1 has an end 4 of an electric cable 2 or wire inserted into the holder slot 13 and the set screw 15 is turned into the inserted cable 2 by an Allen key 24 (see Figure 2) in order to secure the cable 2 to the holder 3. Alternatively, the end of an electric cable or wire of a smaller cross-sectional could be inserted into the cylindrical recess 71 and set screws 15 in the holes 72 be turned by an Allen key 24 to secure the cable to the holder 3.

Pressure is then applied simultaneously to the outside of the first end sections 18 of both arms 16 as illustrated by arrows 25 in Figure 3 by a finger and a thumb of a user. This pressure resiliently biases the second end sections 19 to move apart so that the angled ends 21 can fit over the end portion 6 of the drill bit 7 in the vicinity of the through-hole 22. The pressure is released so that the angled ends 21 enter the through-hole 22 and secure the connector 5 of the device 1 to the drill bit 7. The drill bit 7 can then be pulled through one side of the wall bringing the electric cable 2 through the drilled hole in the wall. The shape of the holder 5 helps it to be pulled easily through the drilled hole. Pressure can then be applied again simultaneously to the outside of the first sections 18 of both arms 16 to release the device 1 from the drill bit 7 and the Allen key 24 used to release the cable 2 from the holder 3.

Instead of attaching the device 1 to one end portion 6 of the drill bit 7, the device 1 may alternatively be connected to the opposite end portion 6' of the drill bit 7 by having the angled ends 21 enter the through-hole 22' at the opposite end portion 6'. This allows the cable 2 to be pulled through from the opposite side of the wall.

Referring to Figures 4 and 5, the connector 5 of the device 1 is shown as having a restraint 26 between the first end section of each arm 16 to restrain the first end sections from moving towards each other and thus accidentally releasing the device 1 from a drill bit 7 to which it is secured. Such an accidental release could occur when the drill bit 7 and an attached device 1 is pulled though a drilled hole in a cavity wall. The restraint 26 comprises a strip which has one end 27 bent around one first end section 18 so that the restraint

26 can rotate about it. The opposite end of the strip has a pair of clips 28 to be clipped to the other first end section 18'. The restraint 26 is to be clipped to the other first end section 18' of the connector 5 after the connector 5 is secured to the drill bit 7 and is to be unclipped from the other first end section 18' after the device 1 has been pulled through the wall. The restraint 26 may be made of plastic.

The connector 5 is also shown as having a pad 29 on the first end section 18 of each arm to make it more comfortable for the finger and thumb of the user to apply pressure to the connector 5 so that the connector 5 can engage, or be released from, the drill bit 7.

In a modification illustrated in Figures 6 and 7, the recess 30 of the holder 31 is cylindrical in shape and is adapted to hold the end of a pipe 32 (shown dotted). The set screw and Allen key are omitted for clarity. The recess 30 may be of a smaller diameter in order to hold, say, the end of an electric cable or wire.

In another modification illustrated in Figure 8, the inside face 40 of the wall 41 on either side of the recess 42 or slot at the end of the holder 43 has barbs 44 for retaining one end 4 of the electric cable 2. The holder 43 may be made of plastic or nylon.

In yet another modification illustrated in Figures 9 and 10, the holder 50 has first and second cylindrical recesses 51, 52 for respectively retaining the ends of elongate members such as electric cables or pipes having cross-sectional areas of different sizes. The second recess 52 is adapted to retain the end portion of an electric cable having a smaller cross-sectional area than that retainable by the first recess 51 and the second recess 52 is formed in the bottom of the first recess 51. The annular wall 53, 53' around the first and second cylindrical recesses 51, 52, respectively, each have a through-hole 54, 54' for holding a set screw (not shown) to be turned by an Allen key in order to retain an end of an elongate member in the relevant recess.

Referring to Figures 11 and 12, the device 60 is modified so that it can be

secured to an end portion 61 of a conventional SDS drill bit 62. The second end section 63 of each arm 64 has a clamp member 65. Each clamp member 65 comprises a channel 66 with a curved cross-section and a protrusion 67 extends from the inside surface of the clamp member 65. The protrusion 67 is shaped to match a corresponding recess 68 in the end portion 61 of the conventional SDS drill bit 62. Thus, when pressure applied simultaneously to the outside of the first end sections 69 of both arms 64 of the connector 70 is released, the clamp members 65 clamp the end portion 61 of the SDS drill bit 62 with the protrusions 67 engaging the respective recesses 68 in the SDS drill bit 62.

In a modification illustrated in Figure 13, the device 80 is modified so that it can be secured to an end portion 81 of a conventional SDS drill bit 62 wherein the end portion 81 has a drill tip. The clamp member 82 of the second end section 83 of each arm 84 has its inside surface 85 moulded to match the end portion 81. Thus, when pressure applied simultaneously to the outside of the first end sections 86 of both arms 84 of the connector 87 is released, the clamp members 82 clamp, and fit around, the end portion 81 of the SDS drill bit 62.

With reference to the devices 60, 80 described above, the restraint 28 illustrated in Figures 4 and 5 could be used to restrain the second end sections 63, 83 from moving apart and thus improve the clamping of the device 60, 80 to the drill bit 62.

Although the above devices have been described as being used with an SDS drill bit they could be used other types of drill bits so long as the drill bits have recesses or through-holes to enable the connector of the device to be secured to the drill bit.

Whilst particular embodiments have been described, it will be understood that various modifications may be made without departing from the scope of the invention. For example, the hole 10 in the holder 3 may be perpendicular to the slot 13.

CLAIMS:

1. A device for aiding the passage of an elongate member, such as an electric cable, through a bore-hole made by a drill bit, said device comprising:

a holder for releasably retaining one end of said elongate member; and

a connector connected to said holder for releasably engaging an end portion of said drill bit, said connector comprising a pair of arms to engage said end portion of said drill bit therebetween, and means for moving said arms to enable either engagement or release of said connector from said end portion of said drill bit when pressure is applied simultaneously to a section of both arms.

2. The device as claimed in claim 1, wherein the drill bit connector has a pivotal connection with the elongate member holder.

3. The device as claimed in claim 1 or 2, wherein said means for moving said arms is actuated by pressure applied simultaneously to the outside of a section of both arms.

4. The device as claimed in claim 1, 2 or 3, wherein said arms are biased to engage said end portion of said drill bit therebetween and said means for moving said arms is adapted to move said arms apart to enable either engagement or release of said connector.

5. The device as claimed in claim 4, wherein each arm comprises first and second end sections separated by a cross-over section of said arms, the first end section being connected to said holder and the second end section being arranged to engage the end portion of said drill bit, wherein pressure applied simultaneously to the first end sections of both arms resiliently biases said second end sections to move apart to enable either said engagement or release of said connector.

6. The device as claimed in claim 5, including a restraint between the first end section of each arm to restrain the first end sections from moving towards each other.

7. The device as claimed in any preceding claim, wherein the ends of the arms remote from said holder are angled towards each other to be engagable in a recess or hole in the end portion of the drill bit.

8. The device as claimed in any preceding claim, wherein the ends of the arms remote from said holder have clamp members adapted to clamp the end portion of said drill bit therebetween.

9. The device as claimed in any preceding claim, wherein the arms form respective ends of a single wire.

10. The device as claimed in any preceding claim, wherein the holder comprises a recess for retaining said end of said elongate member.

11. The device as claimed in claim 10, wherein the recess has barbs for retaining one end of said elongate member.

12. The device as claimed in claim 10 or 11, wherein said holder comprises a plurality of recesses for respectively retaining elongate members having cross-sectional areas of different sizes.

13. The device as claimed in claim 12, wherein the recesses are in series and each successive recess is adapted to retain the end portion of an elongate member having a smaller cross-sectional area than that retainable by the previous recess, said successive recess being formed in the bottom of said previous recess.

14. A combination of the device as claimed in any preceding claim and a drill bit, wherein the drill bit has at least one recess or through-hole for receiving the arms of the connector.

15. The combination as claimed in claim 14, wherein the drill bit has at least one said recess or through-hole in a portion of both ends thereof.

16. The combination as claimed in claim 14 or 15, wherein the through-hole passes through the drill bit substantially perpendicular to the longitudinal axis of the drill bit.

Application No:	GB0915967.4	**Examiner:**	Ian Blackmore
Claims searched:	1-16	**Date of search:**	24 November 2009

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	1-4,10,11,14-16	US4033703 A (SLATER) see figures 1-5
X	1,3-5,9,10,14	EP1048383 A (HANSEN et al) see figures 1-3
X	1,8,10	US2007/201963 A (LAMBERT) see figures 1-7

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

B23B; B25B; H02G

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

EPODOC, WPI, TXTGB1

International Classification:

Subclass	Subgroup	Valid From
B23B	0051/08	01/01/2006
H02G	0001/08	01/01/2006