(1) Invention title: ARMORED CABLE WITH INTEGRAL SUPPORT

(2) Abstract: A system for providing cable support may be provided. The system may comprise a conductor core, a filler that may provide integral core support, and armor. The conductor core may comprise at least one conductor. The filler may be applied around at least a portion of the conductor core. The armor may be applied around at least a portion of the filler. The applied armor may be configured to cause the filler to apply a strong enough force on an exterior of the conductor core configured to keep the conductor core from slipping down an interior of the filler due to a gravitational force. In addition, the applied armor may be configured to cause the filler to apply a strong enough force on an interior of the armor configured to keep a combination of the conductor core and the filler from slipping down the interior of the armor due to the gravitational force.
Published: with international search report
TITLE

ARMORED CABLE WITH INTEGRAL SUPPORT

RELATED APPLICATION


BACKGROUND

[002] Cable risers are used to supply power, for example, to multi-story building such as apartments or condominiums. For example, conductors may be placed in a vertical raceway and run to individual apartments. In some situations, due to gravitational forces, conductors within the vertical raceways may slip down the armor. For example, to stop this cable slippage, offsets may be used. Thus, the conventional strategy is to create horizontal offsets in the vertical raceway runs to stop slippage. This often causes problems because conventional systems create significant costs and time requirements for installing cable risers. In view of the foregoing, there is a need for methods and systems for providing vertical cable and raceways more optimally. Furthermore, there is a need for providing cable raceways with integral (i.e. built-in) support.

SUMMARY

[003] A system for providing cable support may be provided. The system may comprise a conductor core, a filler that may provide integral core support, and armor. The conductor core may comprise at least one conductor. The filler may be applied around at least a portion of the conductor core. The armor may be applied around at least a portion of the filler. The filler may apply a strong enough force on an exterior of the conductor core configured to keep the conductor core from
slipping down an interior of the filler due to a gravitational force. In addition, the filler may apply a strong enough force on an interior of the armor configured to keep a combination of the conductor core and the filler from slipping down the interior of the armor due to the gravitational force.

[004] It is to be understood that both the foregoing general description and the following detailed description are examples and explanatory only, and should not be considered to restrict the invention's scope, as described and claimed. Further, features and/or variations may be provided in addition to those set forth herein. For example, embodiments of the invention may be directed to various combinations and sub-combinations described in the detailed description.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[005] The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate various embodiments of the present invention. In the drawings:

[006] FIG. 1 is a diagram of an armored cable system with integral support;

[007] FIG. 2 is a diagram of an armored cable system with integral support and tape separator;

[008] FIG. 3 is a diagram of an armored cable system using different fillers and rubber cord configurations;

[009] FIG. 4 is a diagram of an armored cable system using different fillers and rubber cord configurations;

[010] FIG. 5 is a diagram of an armored cable system using different fillers and rubber cord configurations; and

[011] FIG. 6 is a diagram of an armored cable system with grounded armor.

**DETAILED DESCRIPTION**

[012] The following detailed description refers to the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the following description to refer to the same or similar elements. While embodiments of the invention may be described, modifications, adaptations, and other implementations are possible. For example, substitutions, additions, or modifications may be made to the elements illustrated in the drawings, and the
methods described herein may be modified by substituting, reordering, or adding stages to the disclosed methods. Accordingly, the following detailed description does not limit the invention.

[013] Consistent with embodiments of the invention, an armored cable with integral support may be provided. Embodiments of the invention may eliminate conventional cable offsets in vertical raceway cable installations by providing integral support between conductors and the armor. Consequently, the integral support may keep the conductors within the armor in a vertical raceway installation from slipping down due to gravitational forces. Accordingly, embodiments of the invention may reduce cable installation time and cost.

[014] FIG. 1 shows a diagram of an armored cable system 100 with integral support. FIG. 1 shows a cross-section of system 100, which may have a longitudinal length. As shown in FIG. 1, system 100 may include a conductor core 105, a filler 110, and an armor 115. Conductor core 105, though not so limited, may comprise a first conductor 120, a second conductor 125, a third conductor 130, a fourth conductor 135, and a ground wire 140. Fourth conductor 135 may be configured to be used as a neutral (e.g. may have an insulation color designating it as a neutral or may be of a different size than the other conductors in conductor core 105).

[015] While as shown in FIG.1, conductor core 105 includes four conductors and a neutral, embodiments of the invention are not so limited. For example, conductor core 105 may include any number of conductors (e.g. insulated, non-insulated, or otherwise) and may include any number of ground wires or may not include a ground wire. Any one or more of the conductors in conductor core 105 may be configured to be a neutral wire, or none of the conductors in conductor core 105 may be configured to be a neutral wire. Any one or more of the conductors or ground wire(s) in conductor core 105 may have an insulation color indicating that any one or more of the conductors or ground wire(s) in conductor core 105 is intended as a neutral(s). Furthermore, the conductors or ground wire(s) in conductor core 105 may all be the same size or they may vary individually or in any sub-combination by size. In addition, the conductors or ground wire(s) in conductor core 105 may all be made of the same material (e.g. copper, aluminum, etc.) or they may vary individually or in any sub-combination by material. Also, the conductors or ground wire(s) in conductor core 105 may all be stranded or solid or they may vary
individually or in any sub-combination by being stranded or solid. Notwithstanding, conductor core 105 may comprise any conductor construction.

[016] Filler 110 may comprise, but is not limited to, polyethylene, polyvinyl chloride (PVC), or nylon. A foaming agent, a material comprising micro-spheres, or other similar substances may be added to filler 110 before filler 110 is extruded onto conductor core 105. The foaming agent may be configured to create voids in filler 110. When filler 110 is compressed in a first direction (e.g. toward the center of system 100,) the voids (or micro-spheres) in filler 110 may tend to create an opposing force in filler 110 opposite the first direction. For example, after being extruded onto conductor core 105, filler 110 may have a "squeezing" force applied to its exterior by armor 115. With this squeezing force applied to filler 110, the voids (or micro-spheres) in filler 110 may be configured to cause filler 110 to: i) apply a strong enough force on the exterior of conductor core 105 to keep conductor core 105 from slipping down filler 110's interior due to gravitational forces on conductor core 105; and ii) apply a strong enough force on armor 115's interior to keep the combination of conductor core 105 and filler 110 from slipping down armor 115's interior due to the gravitational forces on conductor core 105 and filler 110. As stated above, micro-spheres added to the filler 110 may cause an effect similar to the voids created by the foaming agent. The micro-spheres may tend to be more evenly distributed in filler 110 than the voids.

[017] Filler 110 may comprise, but is not limited to, a flexible PVC compound (e.g. SW1005) with 0.1% to 5% HC-OI foaming agent by weight. The foaming agent may be supplied by Bayer Corporation of 100 Bayer Road, Pittsburgh, Pa 15205-9741. Furthermore, as stated above, micro-spheres maybe combined with the flexible PVC compound instead of the foaming agent for example. The micro-spheres may comprise Expancel micro-spheres 930 MB 120 supplied by Expancel- AKZO NOBEL of 2240 Northmont Parkway, Duluth, GA 30096. The formulation using micro-spheres may comprise 0.5% 930 MB 120 to 99.5% SW1005 by weight. The range of Expancel micro-spheres used may vary, for example, between 0.1% and 5% by weight.

[018] Notwithstanding, filler 110 may comprise or be augmented with any substance that (when filler 110 is squeezed) is, for example, capable of: i) applying a strong enough force on the exterior of conductor core 105 to keep conductor core
105 from sliding down filler 110's interior due to gravitational forces on conductor core 105; and ii) applying a strong enough force on the interior of armor 115 to keep the combination of conductor core 105 and filler 110 from slipping down armor 115's interior due to gravitational forces on conductor core 105 and filler 110.

[019] Armor 115 may comprise any substance (e.g. metallic, non-metallic, electrically conductive, electrically semi-conductive, etc.) or construction capable of creating the aforementioned "squeezing" force applied to filler 110's exterior. For example, armor 115 may comprise a continuous strip having a width and being applied helically around filler 110. The continuous strip, for example, may be snugly or tightly wrapped around filler 110. The continuous strip (e.g. metallic or non-metallic) may have a concave side facing filler 110. Concavities in the concave side may tend to be filled by portions of filler 110 when armor 115 squeezes filler 110. This concavity filling may aid filler 110 in applying the aforementioned force strong enough on the interior of the armor 115 to keep the combination of conductor core 105 and filler 110 from slipping down armor 115's interior due to gravitational forces on conductor core 105 and filler 110. Armor 115 may be, but is not limited to, welded corrugations or other assembly construction such as interlocked strip or braided stranding for example.

[020] Consistent with embodiments of the invention, armored cable system 100 may be used in cable risers used to supply power, for example, to multi-story building such as apartments or condominiums. For example, armored cable system 100 may be placed in a substantially vertical raceway and run to individual apartments. Due to gravitational forces, conventional conductors within the vertical raceways may slide down the armor. However, consistent with embodiments of the invention, gravitational forces may not cause conductor core 105 to slip down armor 115 because armored cable system 100 may include integral support. This may be true even when armored cable system 100 (and thus conductor core 105) is in a substantial vertical altitude or position. This integral support may be created by filler 110 being "squeezed" by armor 115. With this squeezing force applied to filler 110, voids or micro-spheres in filler 110 may be configured to cause filler 110 to: i) apply a strong enough force on the exterior of conductor core 105 to keep conductor core 105 from slipping down filler 110's interior due to gravitational forces on conductor core 105; and ii) apply a strong enough force on armor 115's interior to
keep the combination of conductor core 105 and filler 110 from slipping down armor 115's interior due to gravitational forces on conductor core 105 and filler 110.

[021] FIG. 2 shows a diagram of a cable system 200 with integral support and tape separator. As shown in FIG. 2, system 200 may include the same elements of system 100 as described above; however, system 200 may include the addition of a tape separator 205. Tape separator 205 may be non-metallic. Notwithstanding tape separator 205, system 200 may be constructed and may function in ways similar to system 100. FIGs. 3 through 5 show other embodiments using different fillers and rubber cord configurations.

[022] FIG. 6 shows a diagram of an armored cable system 600 with grounded armor consistent with embodiments of the invention. System 600 may be used, for example, in applications where electrical codes may require a cable's armor to be well grounded such as in a medical or critical care environment. As shown in FIG. 6, system 600 may include a conductor core 605, a filler 610, an armor 615, and a ground wire 630. FIG. 6 shows a cross-section of system 600, which may have a longitudinal length. For example, ground wire 630 may be placed between filler 610 and armor 615 where ground wire 630 and armor 615 come into electrical contact at a point 635, for example, as described in more detail below.

[023] Conductor core 605, though not so limited, may comprise a first conductor 620 and a second conductor 625. First conductor 620 and second conductor 625 may respectively include insulation layer 621 and insulation layer 626. Notwithstanding, conductor core 605 may include more or less conductors compared to the example shown in FIG. 6. In addition, system 600 may include more or less ground wires compared to the example shown in FIG. 6. Conductor core 605 may be of similar construction as conductor code 105 as described above. However, conductor core 605 may or may not include a ground wire or neutral wire. Similarly, conductor 620 and conductor 625 may be of the same construction as conductor 120 and conductor 125 respectively as described above and ground wire 630 maybe of the same construction as ground wire 140 as described above.

Moreover, filler 610 and armor 615 may be of similar construction to filler 110 and armor 115 respectively as described above.

[024] Armor 615 may comprise any substance (e.g. metallic, non-metallic, electrically conductive, electrically semi-conductive, etc.) or construction capable of...
creating a "squeezing" force applied to filler 610's exterior. For example, armor 615 may comprise a continuous strip having a width and being applied helically around filler 610. The continuous strip, for example, may be snugly or tightly wrapped around filler 610. The continuous strip may have a concave side facing filler 610. Concavities in the concave side facing filler 610 may tend to be filled by portions of filler 610 when armor 615 squeezes filler 610. As described in more detail below, when the aforementioned squeezing force is applied to filler 610 by armor 615, voids (or micro-spheres) in filler 610 may cause filler 610 to apply a strong enough force to ground wire 630 to create an electrical connection between ground wire 630 and armor 615 at point 635, for example.

[025] As described above with respect to FIG. 6, filler 610 may comprise, but is not limited to, polyethylene, polyvinyl chloride (PVC), or nylon. A foaming agent or a material comprising micro-spheres may be added to filler 610 before filler 610 is extruded onto conductor core 605. (Examples of the types and amounts of foaming agent and micro-spheres are described above with respect to filler 110.) The foaming agent may be configured to create voids in filler 610. Notwithstanding, filler 610 may comprise or be augmented with any substance that may be capable of causing filler 610 to apply a strong enough force to ground wire 630 to create an electrical connection between ground wire 630 and armor 615.

[026] Consistent with embodiments of the invention, when filler 610 is compressed (e.g. squeezed by armor 615 or otherwise compressed within armor 615) in a first direction (e.g. toward the center of system 600,) the voids (or micro-spheres) in filler 610 may tend to create an opposing force in filler 610 opposite the first direction. For example, after being extruded onto conductor core 605, filler 610 may have a squeezing force applied to its exterior by armor 615. With this squeezing force applied to filler 610 (e.g. toward the center of system 600,) the voids (or micro-spheres) in filler 610 may tend to create an opposing force in filler 610 opposite the first direction. Consequently, this opposing force may cause filler 610 to apply a strong enough force to ground wire 630 to create an electrical connection between ground wire 630 and armor 615. In other words, armor 615 may press against ground wire 630 on one side of ground wire 630 and filler 610 may press against ground wire 630 on a side opposing armor 615. Accordingly, ground wire 630 may snugly contact armor 615 at at least point 635. Moreover, ground wire
630 may snuggly contact armor 615 at any number of points along system 600’s longitudinal length and is not limited to contacting armor 615 at only point 635. In addition, ground wire 630 may contact armor 615 continuously along system 600’s longitudinal length. When ground wire 630 and armor 615 are both electrically conductive (e.g. both being bare and metallic,) the aforementioned contact between ground wire 630 and armor 615 may create an electrical connection between ground wire 630 and armor 615.

[027] Consistent with embodiments of the invention, filler 110 or filler 610 maybe applied to conductor core 105 or conductor core 605 respectively in any manner and there application is not limited to extrusion. Furthermore, forces caused by filler 110 or filler 610 are not limited to being created by applying armor 115 or armor 615 to squeeze filler 110 or filler 610 respectively. These forces created in filler 110 or filler 610 may be created in any way. In addition, filler 110 and filler 610 may respectively electrically insulate conductor core 105 and conductor core 605 from armor 115 and armor 615. Furthermore, the construction of system 100 or system 600 is not limited to any sequence and the elements that make up system 100 or system 600 can be applied in any sequence.

[028] While certain embodiments of the invention have been described, other embodiments may exist. Further, the disclosed methods’ stages may be modified in any manner, including by reordering stages and/or inserting or deleting stages, without departing from the invention.

[029] While the specification includes examples, the invention's scope is indicated by the following claims. Furthermore, while the specification has been described in language specific to structural features and/or methodological acts, the claims are not limited to the features or acts described above. Rather, the specific features and acts described above are disclosed as example for embodiments of the invention.
WHAT IS CLAIMED IS:

1. A system for providing cable support, the system comprising:
   a conductor core comprising at least one conductor;
   a filler applied around at least a portion of the conductor core; and
   an armor applied around at least a portion of the filler, the filler configured
to:
      apply a strong enough force on an exterior of the conductor core
      configured to keep the conductor core from slipping down an interior of the
      filler due to a gravitational force on the conductor core when the conductor
      core is in a substantial vertical altitude, and
      apply a strong enough force on an interior of the armor configured to
      keep a combination of the conductor core and the filler from slipping down
      the interior of the armor due to the gravitational force on the conductor core
      and a gravitational force on the filler.

2. The system of claim 1, wherein the armor comprises a continuous
   strip applied helically around the filler.

3. The system of claim 1, wherein the armor comprises a concave side
   facing the filler.

4. The system of claim 1, wherein the armor comprises a concave side
   facing the filler wherein portions of the filler fill concavities created by the concave
   side.

5. The system of claim 1, wherein the armor is configured to squeeze
   the filler, wherein the armor squeezing the filler causes the strong enough force on
   the exterior of the conductor core configured to keep the conductor core from
   slipping down the interior of the filler and the strong enough force on the interior of
   the armor configured to keep the combination of the conductor core and the filler
   from slipping down the interior of the armor.
6. The system of claim 1, wherein the filler comprises one of the following: polyethylene, polyvinyl chloride (PVC), and nylon.

7. The system of claim 1, wherein the filler comprises voids.

8. The system of claim 1, wherein the filler comprises voids created by a foaming agent having been added to the filler prior to the filler being extruded onto the conductor core.

9. The system of claim 1, wherein the filler comprises voids created by a foaming agent having been added to the filler prior to the filler being extruded onto the conductor core, the amount of foaming agent being between 0.1% to 5% of the total weight of the filler inclusively.

10. The system of claim 1, wherein the filler comprises micro-spheres.

11. The system of claim 1, wherein the filler comprises micro-spheres having been added to the filler prior to the filler being extruded onto the conductor core.

12. The system of claim 1, wherein the filler comprises micro-spheres having been added to the filler prior to the filler being extruded onto the conductor core, the amount of micro-spheres being between 0.1% to 5% of the total weight of the filler inclusively.

13. A cable comprising:
   a conductor core comprising at least one conductor;
   a filler applied around at least a portion of the conductor core wherein the filler comprises voids created by a foaming agent having been added to the filler prior to the filler being extruded onto the conductor core; and
   an armor applied around at least a portion of the filler, the applied armor configured to squeeze the voids to cause the filler to:
cause a first force on an exterior of the conductor core, the first force configured to keep the conductor core from slipping down an interior of the filler due to a gravitational force on the conductor core, and
cause a second force on an interior of the armor, the second force configured to keep a combination of the conductor core and the filler from slipping down the interior of the armor due to the gravitational force on the conductor core and a gravitational force on the filler.

14. The cable of claim 13, wherein the amount of foaming agent is between 0.1% to 5% of the total weight of the filler inclusively.

15. The cable of claim 13, wherein the armor comprises a continuous strip applied helically around the filler.

16. The cable of claim 13, wherein the armor comprises a concave side facing the filler.

17. A cable comprising:
a conductor core comprising at least one conductor;
a filler applied around at least a portion of the conductor core wherein the filler comprises micro-spheres having been added to the filler prior to the filler being extruded onto the conductor core; and
an armor applied around at least a portion of the filler, the applied armor configured to squeeze the micro-spheres to cause the filler to:
causes a first force on an exterior of the conductor core, the first force configured to keep the conductor core from slipping down an interior of the filler due to a gravitational force on the conductor core, and
cause a second force on an interior of the armor, the second force configured to keep a combination of the conductor core and the filler from slipping down the interior of the armor due to the gravitational force on the conductor core and a gravitational force on the filler.
18. The cable of claim 17, wherein the amount of micro-spheres is between 0.1% to 5% of the total weight of the filler inclusively.

19. The cable of claim 17, wherein the armor comprises a continuous strip applied helically around the filler.

20. The cable of claim 17, wherein the armor comprises a concave side facing the filler.

21. A cable comprising:
   an electrically conductive ground wire applied to an exterior of a filler; and
   an electrically conductive armor applied around the filler and the electrically conductive ground wire, the filler configured to apply a strong enough force to the ground wire to create an electrical connection between the electrically conductive ground wire and the applied electrically conductive armor.

22. The cable of claim 21, wherein the applied armor is configured to squeeze the filler to cause the filler to apply the strong enough force to the ground wire to create the electrical connection between the ground wire and the applied armor.

23. The cable of claim 21, wherein the armor comprises a continuous strip applied helically around the filler.

24. The cable of claim 23, wherein the armor comprises a concave side facing the filler.

25. The cable of claim 23, wherein the armor comprises a concave side facing the filler wherein portions of the filler fills concavities created by the concave side.

26. The cable of claim 21, wherein the filler comprises one of the following: polyethylene, polyvinyl chloride (PVC), and nylon.
27. The cable of claim 21, wherein the filler comprises voids.

28. The cable of claim 21, wherein the filler comprises voids created by a foaming agent having been added to the filler prior to the filler being extruded onto the conductor core.

29. The cable of claim 21, wherein the filler comprises voids created by a foaming agent, the amount of foaming agent being between 0.1% to 5% of the total weight of the filler inclusively.

30. The cable of claim 21, wherein the filler comprises micro-spheres.

31. The cable of claim 21, wherein the filler comprises micro-spheres having been added to the filler prior to the filler being extruded onto the conductor core.

32. The cable of claim 21, wherein the filler comprises micro-spheres, the amount of micro-spheres being between 0.1% to 5% of the total weight of the filler inclusively.

33. The cable of claim 21, further comprising a conductor core.

34. The cable of claim 21, further comprising a conductor core comprising at least one conductor.

35. The cable of claim 21, further comprising a conductor core, the filler being applied around at least a portion of the conductor core.

36. The cable of claim 35, wherein the applied armor is further configured to cause the filler to:

   apply a strong enough force on an exterior of the conductor core configured to keep the conductor core from slipping down an interior of the filler due to a
gravitational force on the conductor core when the conductor core is in a substantial vertical altitude; and

apply a strong enough force on an interior of the armor configured to keep a combination of the conductor core and the filler from slipping down the interior of the armor due to the gravitational force on the conductor core and a gravitational force on the filler.
**INTERNATIONAL SEARCH REPORT**

**INTERNATIONAL CLASSIFICATION OF SUBJECT MATTER**

INV. H01B7/18 H01B9/02

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)

HOIB

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

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

EPO-Internal, WPI Data

**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>
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<tr>
<td>X</td>
<td>US 4 956 523 A (PAWLUK ROBERT R [CA]) 11 September 1990 (1990-09-11) column 2, line 58 - column 3, line 39; figure 1</td>
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<td>X</td>
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</tr>
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</table>

X Further documents are listed in the continuation of Box C. X See patent family annex.

* 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 document 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 document
  * '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

'Y' 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.

'S' document member of the same patent family

Date of the actual completion of the international search

2 September 2008

Date of mailing of the international search report

10/09/2008

Name and mailing address of the ISA/Telephone:
European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Colombo, Alessandro
**INTERNATIONAL SEARCH REPORT**

**DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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| A        | US 4 081 602 A (PANIRI ZVI ET AL)  
28 March 1978 (1978-03-28)  
column 2, line 11 - line 65; figure 1 | 13,17 |

Form PCT/ISA/10 (continuation of second sheet) (April 2005)
**INTERNATIONAL SEARCH REPORT**

**Box No. II** Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

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.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

- see additional sheet

1. D As all required additional search fees were timely paid by the applicant, this International search report covers allsearchable claims.

2. X As all searchable claims could be searched without effort justifying an 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.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-20
   directed to an armoured cable with a filler configured to prevent slippage among conductors and the armour.

2. claims: 21-36
   directed to an armoured cable with a filler configured to ensure electrical connection between a ground wire and a screen.
<table>
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<th>Publication date</th>
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