

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Wehrli *et al.*

Application number: 14/520,125

Filed: October 21, 2014

For: *Improved High Performance Data Communications Cable*

Attorney Docket No.: 096001-1132 (BEL-001US)

Art Unit: 2847

Examiner: Mayo III, William H.

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MS Amendment
Commissioner for Patents
P.O. Box 1450
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**AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION
ACCOMPANYING A REQUEST FOR CONTINUED EXAMINATION**

Dear Examiner Mayo:

INTRODUCTORY COMMENTS

This Amendment and Response is filed responsive to the final Office Action dated June 8, 2016 and the Examiner Interview conducted August 17, 2016, and accompanies a Request for Continued Examination. In view of the comments set forth below, Applicants respectfully urge reconsideration, withdrawal of the outstanding rejections and allowance of the Claims.

Amendments to the Specification begin on page 2 of this paper, and includes one attachment.

Amendments to the Drawings begin on page 3 of this paper and include 2 replacement sheets.

Amendments to the Claims are reflected in the **Listing of Claims**, which begins on page 4 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENTS TO THE SPECIFICATION

In the Specification, please amend the abstract of the disclosure, as follows. The amendments are shown relative to the application as pending on June 8, 2016:

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~~The present disclosure describes two~~ Two electromagnetic interference (EMI) controlling tape application methodologies for unshielded twisted pair (UTP) cable[[,]] include Fixed Tape Control (FTC) and Oscillating Tape Control (OTC). In FTC, tape application angle and edge placement are controlled to maintain position of the tape edges over a base of nonconductive filler in the cable. In OTC, the tape application angle is continuously varied, resulting in crossing of the tape edges over all of the pairs of conductors with varying periodicity. In both implementations, the filler allows a cylindrical shape.

A clean copy of the amended Abstract is enclosed.

AMENDMENTS TO THE DRAWINGS

Please replace FIGs. 1-3D with the attached replacement drawings. No new matter has been added. The amendments are shown relative to the application as pending on June 8, 2016.

Enclosed: 9 Replacement Sheets
 9 Annotated Sheets

AMENDMENTS TO THE CLAIMS

Upon entry, the following Listing of Claims will replace all prior and previously filed Listings of Claims in this application. The amendments are shown relative to the application as pending on June 8, 2016.

Please amend Claims 1, 6, 7, 9, 13, 14, 15, and 19-20; cancel Claims 16-18; and add new Claim 21 as follows:

Listing of Claims

1. (Currently Amended) A fixed tape control high performance data cable, comprising:
 - a plurality of twisted pairs of insulated conductors;
 - a filler comprising a plurality of arms separating each twisted pair of insulated conductors, each arm having a terminal portion;
 - a multi-layer conductive barrier tape surrounding the filler and plurality of twisted pairs of insulated conductors, the multi-layer conductive barrier tape comprising a continuous conductive material contained between two layers of a dielectric material; and
 - a jacket surrounding the conductive barrier tape;wherein the filler is configured in a helical twist at a first angle; and
wherein the conductive barrier tape is configured in a helical twist at the first angle, and a seam of the conductive barrier tape is positioned above a terminal portion of an arm of the filler.
2. (Original) The fixed tape control high performance data cable of claim 1, wherein a second seam of the conductive barrier tape is positioned above a terminal portion of a second arm of the filler, the second seam overlapping a portion of the conductive barrier tape.
3. (Original) The fixed tape control high performance data cable of claim 1, wherein the seam of the conductive barrier tape is approximately centered above the terminal portion of the arm of the filler.

4. (Original) The fixed tape control high performance data cable of claim 1, wherein the filler has four arms and a cross-shaped cross section.

5. (Original) The fixed tape control high performance data cable of claim 1, wherein each twisted pair of insulated conductors is positioned in the center of a channel formed by two adjacent arms and corresponding terminal portions of the filler.

6. (Currently Amended) The fixed tape control high performance data cable of claim 1, wherein the ~~barrier tape comprises a~~ conductive material of the barrier tape extends to each lateral edge of the ~~contained between~~ two layers of ~~[[a]]~~ the dielectric material.

7. (Currently Amended) An oscillating tape control high performance data cable, comprising:
a plurality of twisted pairs of insulated conductors, each configured in a helical twist at a corresponding plurality of angles;

a filler comprising a plurality of arms separating each twisted pair of insulated conductors, the filler having a helical twist at a first angle distinct from the plurality of angles;

a conductive barrier tape surrounding the plurality of twisted pairs of insulated conductors; and

a jacket surrounding the conductive barrier tape; ~~wherein the plurality of twisted pairs are configured in a helical twist at a first angle;~~ and

wherein the conductive barrier tape is configured in a helical twist at an application angle varying between a second angle and a third angle, distinct from the first angle and distinct from the plurality of angles.

8. (Original) The oscillating tape control high performance data cable of claim 7, wherein the second angle comprises the first angle minus a predetermined value and wherein the third angle comprises the first angle plus the predetermined value.

9. (Currently Amended) The oscillating tape control high performance data cable of claim 7, ~~further comprising a filler comprising a plurality of arms separating each twisted pair of~~

~~insulated conductors; and~~ wherein the application angle varies from the second angle and the third angle along a length of the cable longer than a length of one helical twist of the filler.

10. (Original) The oscillating tape control high performance data cable of claim 7, further comprising a filler comprising a plurality of arms separating each twisted pair of insulated conductors, each arm having a terminal portion; and

wherein a position of a first seam of the conductive barrier tape varies from a first position above a first channel formed by two adjacent arms and corresponding terminal portions of the filler, to a second position over a terminal portion of a first arm of said adjacent arms.

11. (Original) The oscillating tape control high performance data cable of claim 10, wherein the position of the first seam further varies to a third position over a second channel formed by the first arm of said adjacent arms and a third arm and corresponding terminal portions of the filler.

12. (Original) The oscillating tape control high performance data cable of claim 10, wherein the filler has four arms and a cross-shaped cross section.

13. (Currently Amended) The oscillating tape control high performance data cable of claim 10, wherein each twisted pair of insulated conductors is positioned in the center of a channel formed by a first arm and a first portion of a terminal portion of the first arm, and an adjacent second arm and a second portion of a terminal portion of the second arm identical to the first portion ~~two adjacent arms and corresponding terminal portions of the filler~~.

14. (Currently Amended) The oscillating tape control high performance data cable of claim 7, wherein the barrier tape comprises a continuous conductive material contained between two layers of a dielectric material.

15. (Currently Amended) A method of manufacture of a high performance data cable, comprising:

helically twisting each of a plurality of twisted pairs of insulated conductors at a corresponding plurality of angles ~~first angle~~;

positioning a filler comprising a plurality of arms, each arm having a radially-symmetric terminal portion, the filler having a helical twist at a first angle distinct from the plurality of angles;

positioning each pair of the plurality of twisted pairs of insulated conductors within a channel formed by adjacent arms of the filler and corresponding terminal portions;

wrapping the helically twisted plurality of twisted pairs and filler with a conductive barrier tape at an application angle varying between a second angle and a third angle distinct from the plurality of angles; and

jacketing the barrier tape and helically twisted filler and plurality of twisted pairs.

16. (Canceled).

17. (Canceled).

18. (Canceled).

19. (Currently Amended) The method of claim ~~[[18]]~~ 15, wherein the second angle comprises the first angle minus a predetermined value and wherein the third angle comprises the first angle plus the predetermined value.

20. (Currently Amended) The method of claim ~~[[18]]~~ 15, wherein varying the application angle between the second angle and the third angle comprises positioning a feed of the conductive barrier tape tangent to a roller; and moving the roller bidirectionally along a track in a direction at an angle to the length of the cable.

21. (New) The method of claim 15, wherein the barrier tape comprises a continuous conductive material contained between two layers of a dielectric material.

REMARKS

Claims 1-20 were presented for examination. Claims 1-20 were rejected, the specification was objected to because of informalities in the abstract of the disclosure, and the drawings were objected to. In the present amendment, the Abstract has been amended; Figures 1-3D have been amended; Claims 1, 6, 7, 9, 13, 14, 15, and 19-20 have been amended; Claims 16-18 canceled; and Claim 21 added. No new matter has been added. Support for the present amendment may be found throughout the original specification and the Figures as originally filed. Upon entry of the present amendment, Claims 1-15 and 19-21 will be currently pending, of which Claims 1, 7, and 15 are independent. Applicants submit that Claims 1-15 and 19-21 are patentable and in condition for allowance.

The following comments address all stated grounds of rejection. Applicants traverse all pending rejections and urge the Examiner to pass the Claims to allowance in view of the remarks set forth below.

EXAMINER INTERVIEW

Applicants thank the Examiner for taking the time to conduct telephonic Interviews with Applicants' attorney on August 2, 2016 and August 16, 2016 and for providing the Interview Summary. Applicants thank the Examiner for his clarifications of the pending rejections. While Applicants do not necessarily concede the Examiner's positions, in the interests of expediting prosecution, Applicants have amended the Claims herein and submit that, as amended, the Claims are patentable and in condition for allowance.

OBJECTION TO THE SPECIFICATION

The abstract of the disclosure was objected to for informalities. Applicants have amended the abstract to address the Examiner's comments. Accordingly, Applicants respectfully request the Examiner to withdraw the objection to the specification.

OBJECTION TO THE DRAWINGS

In the Office Action, the Examiner objected to Figures 1-3H as lacking proper cross-hatching. Applicants amend Figures 1-3D herein as requested by the Examiner, and respectfully note that Figures 3E-3H are not cross-sectional views and therefore do not require the cross-

hatching suggested by MPEP §608.02. Accordingly, Applicants respectfully request the Examiner to withdraw the objection to the drawings.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

I. Claims 1-6 and 15-17 Rejected under 35 U.S.C. §102

Claims 1-6 and 15-17 were rejected under 35 U.S.C. §102(a)(1) as anticipated by U.S. Publication No. 2012/0222883 to Nordin *et al.* (“Nordin”). Claims 1 and 15 are independent Claims, amended herein. Claims 2-6 depend on and incorporate all of the patentable subject matter of Claim 1. Claims 16-17 are canceled herein, rendering the rejection moot with respect to these Claims. Applicants respectfully traverse this rejection and submit that Nordin fails to disclose each and every element of the claimed invention as amended.

A. Independent Claim 1 Not Anticipated by Nordin

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in as single prior art reference. Independent Claim 1 is directed to a fixed tape control high performance data cable, and recites, in part:

a multi-layer conductive barrier tape surrounding the filler and plurality of twisted pairs of insulated conductors, the multi-layer conductive barrier tape comprising a continuous conductive material contained between two layers of a dielectric material.
(emphasis added)

A similar limitation previously appeared in dependent Claim 6. In rejecting this Claim, the Examiner cited Nordin’s barrier tape, and identified conductive material (34) and dielectric material (35) as shown in FIG. 4, reproduced below:

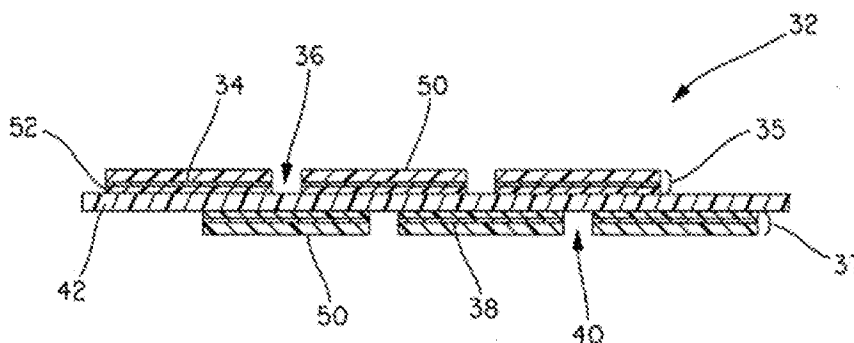


FIG. 4

First, as Nordin explains, the conductive material is not continuous as recited in the Claim as amended, but rather contains gaps (e.g. gaps 36, 40). Nordin even argues that these gaps are necessary to “reduce or eliminate radiation from the barrier layers 35 and 37.” (para. 17) Therefore, Nordin does not teach or suggest a multi-layer conductive barrier tape comprising a continuous conductive material as recited by Claim 1, and in fact teaches away from such a structure.

Second, Nordin’s barrier layers are not a conductive material contained between “two layers of a dielectric material.” As explained at paras. 23-24, each barrier layer includes a substrate of an insulative material such as polyester, polypropylene, polyethylene, or polyimide (50), the conductive segment (34 or 38), and a layer of spray glue (52). Spray glue is not an insulative material such as polyester, polypropylene, polyethylene, or polyimide, and therefore is not the same as the substrate 50. Therefore, Nordin fails to disclose a barrier layer comprising a conductive material contained between two layers of a dielectric material, but rather merely a conductive material with a covering of one layer of a dielectric material opposite an adhesive.

For at least the above discussed reasons, Applicants submit that Claim 1 is patentable as amended and in condition for allowance. Accordingly, Applicants respectfully request the Examiner to withdraw the rejection of Claim 1 under 35 U.S.C. §102.

B. Independent Claim 15 Patentable over Nordin, Lindstrom, and Smith

Independent Claim 15 is directed to a method of manufacture of a high performance data cable. As amended herein, this Claim recites, in part:

helically twisting each of a plurality of twisted pairs of insulated conductors at a corresponding plurality of angles;
positioning a filler comprising a plurality of arms, each arm having a radially-symmetric terminal portion, the filler having a helical twist at a first angle distinct from the plurality of angles;
and
wrapping the helically twisted plurality of twisted pairs and filler with a conductive barrier tape at an application angle varying between a second angle and a third angle distinct from the plurality of angle. (emphasis added)

A similar limitation previously appeared in dependent Claim 18. In rejecting that Claim, the Examiner admits that Nordin does not teach varying an angle of application of a conductive barrier tape, and cited Lindstrom for this feature. As the Examiner notes, Lindstrom

describes twisted pairs of conductors surrounded by a barrier tape, as shown in FIG. 1, reproduced below:

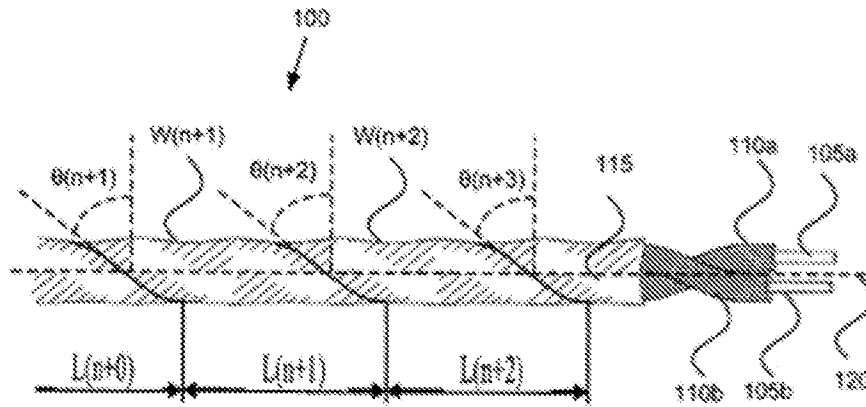


Fig 1

As shown in FIG. 3, reproduced below, and as described at paras. 40-42, the barrier tape lay length or angle (310) is varied up and down around an average lay length equal to the lay length of the twisted pair of conductors (305):

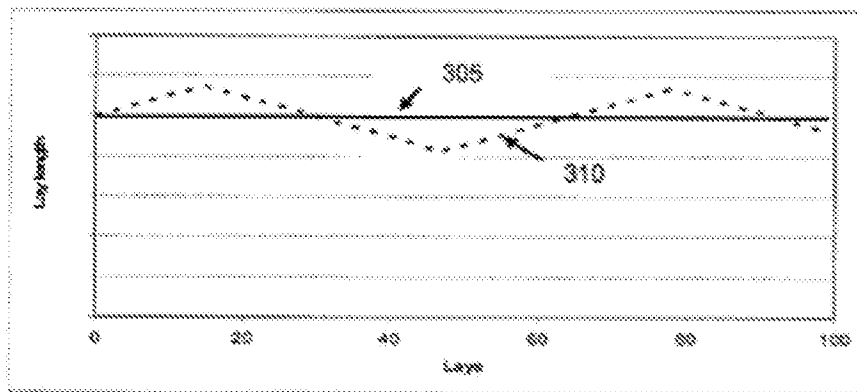
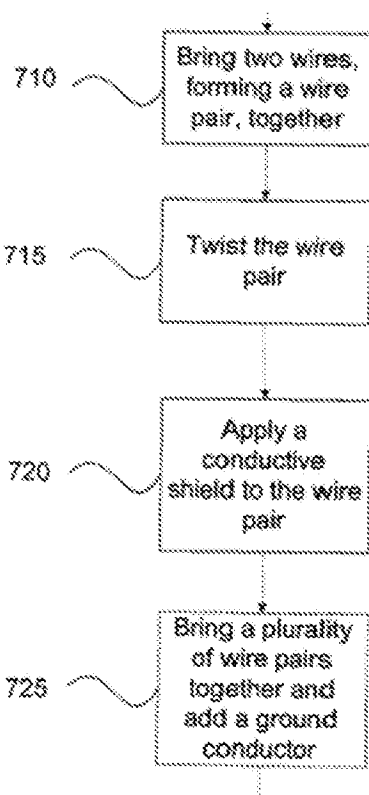


Fig 3

This makes particular sense in Lindstrom as Lindstrom's system applies the barrier tape to each twisted pair of conductors before being brought together, as shown in FIG. 7, reproduced below in part:



Accordingly, in Lindstrom's cable, each barrier tape corresponds to a particular twisted pair and has an application angle varying around the angle of the twist of that pair.

By contrast, Claim 15 as amended recites a filler having a helical twist at an angle distinct from any of the angles of twists of the pairs of insulated conductors, and wrapping the conductors and filler with a barrier tape at an application angle varying between a second and third angle distinct from the angles of twists of the pairs of insulated conductors. Accordingly, Lindstrom does not teach this feature of the Claim as amended.

Furthermore, Lindstrom does not even suggest this feature of the Claim. At para. 16, Lindstrom states that a particular advantage of its design is that the shield is applied in the same operation as the pairs are twisted in a twisting machine. Accordingly, one of skill in the art reading the teachings of Lindstrom would not consider shields applied entirely separate from twisting of the pairs, and at angles unrelated to the twist of the pairs. One modifying Nordin to include Lindstrom's teachings would be led to individually shielded twisted pairs, with each shield lay length varying relative to the lay length of the pair it surrounds, all deployed within a filler and jacket. One would not, however, be led to wrapping a helically twisted plurality of twisted pairs and filler with a conductive barrier tape at an application angle varying between a

second angle and a third angle distinct from the plurality of angles of twists of the pairs, as recited by the Claim as amended. Therefore, Applicants submit that Claim 15 is patentable and in condition for allowance. Accordingly, Applicants respectfully request the Examiner to withdraw the rejection of Claim 15 under 35 U.S.C. §102.

C. Dependent Claims 2-6 Not Anticipated by Nordin

As discussed above, Applicants submit that independent Claim 1 is not anticipated by Nordin. Claims 2-6 depend on and incorporate all of the patentable subject matter of Claim 1. Therefore, Claims 2-6 are also not anticipated by Nordin, and accordingly, Applicants submit that these Claims are patentable and in condition for allowance.

For at least the above-discussed reasons, Applicants submit that Claims 2-6 are patentable and in condition for allowance. Accordingly, Applicants respectfully request the Examiner to withdraw the rejection of Claims 2-6 under 35 U.S.C. §102.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

II. Claims 7-14 and 18-20 Rejected under 35 U.S.C. §103

Claims 7-14 and 18-19 were rejected under 35 U.S.C. §103 as unpatentable over Nordin in view of U.S. Publication No. 2012/00227998 to Lindstrom *et al.* (“Lindstrom”). Claim 20 was rejected under 35 U.S.C. §103 as unpatentable over Nordin and Lindstrom, in further view of G.B. Patent No. 988,789 to Smith Corp. (“Smith”). Claim 18 is canceled herein, rendering the rejection moot with respect to these Claims. Claim 7 is an independent Claim, amended herein. Claims 8-14 depend on and incorporate all of the patentable subject matter of Claim 7. Claims 19 and 20 depend on and incorporate all of the patentable subject matter of Claim 15. Applicants traverse these rejections and respectfully submit that the combination of Nordin and Lindstrom fails to teach or suggest each and every element of the claimed invention.

A. Independent Claim 7 Patentable over Nordin and Lindstrom

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. Claim 7 is directed to an oscillating tape control high performance data cable, and recites, in part:

a plurality of twisted pairs of insulated conductors, each
configured in a helical twist at a corresponding plurality of angles;

a filler comprising a plurality of arms separating each twisted pair of insulated conductors, the filler having a helical twist at a first angle distinct from the plurality of angles;...

wherein the conductive barrier tape is configured in a helical twist at an application angle varying between a second angle and a third angle, distinct from the first angle and distinct from the plurality of angles. (emphasis added)

As discussed above in connection with the rejection of Claim 15, the combination of Nordin and Lindstrom fails to teach or suggest a conductive barrier tape, surrounding a plurality of twisted pairs and a filler, applied at an application angle varying between a second angle and a third angle distinct from a plurality of angles of twist of the pairs. Accordingly, the references also fail to teach or suggest the above features of Claim 7 as amended herein.

For at least the above-discussed reasons, Applicant submits that Claim 7 is patentable and in condition for allowance. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejection of Claim 7 under 35 U.S.C. §103.

B. Dependent Claims 8-14 and 19-20 Patentable over Nordin and Lindstrom

As discussed above in connection with the rejections of independent Claims 7 and 15, Applicants submit that these Claims are patentable and in condition for allowance. Claims 8-14 depend on and incorporate all of the patentable subject matter of Claim 7. Claims 19-20 depend on and incorporate all of the patentable subject matter of Claim 15. Therefore, Claims 8-14 and 19-20 are also patentable and in condition for allowance.

For at least the above-discussed reasons, Applicant submits that Claims 8-14 and 19-20 are patentable and in condition for allowance. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejections of Claims 8-14 and 19-20 under 35 U.S.C. §103.

PATENTABILITY OF NEW CLAIMS

As discussed above in connection with the rejections of independent Claim 15, Applicants submit that this Claim is patentable and in condition for allowance. New Claim 21 depends on and incorporates all of the patentable subject matter of Claim 15 and therefore is patentable for at least the same reasons.

Furthermore, as discussed above in connection with the rejection of Claim 1, the cited art fails to teach or suggest a conductive barrier tape comprising a continuous conductive material contained between two layers of a dielectric material. Claim 21 recites such a feature, and therefore is additionally patentable for at least this reason.

CONCLUSION

In light of the aforementioned amendments and arguments, Applicants contend that each of the Examiner's rejections have been adequately addressed and all of the pending Claims are in condition for allowance. Accordingly, Applicants respectfully request reconsideration, withdrawal of all grounds of rejection, and allowance of all of the pending Claims.

Should the Examiner feel that a telephone conference with Applicants' attorney would expedite prosecution of this application, the Examiner is urged to contact the Applicants' attorney at the telephone number identified below.

Respectfully submitted,

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Date: August 29, 2016

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Abstract

Two electromagnetic interference (EMI) controlling tape application methodologies for unshielded twisted pair (UTP) cable include Fixed Tape Control (FTC) and Oscillating Tape Control (OTC). In FTC, tape application angle and edge placement are controlled to maintain position of the tape edges over a base of nonconductive filler in the cable. In OTC, the tape application angle is continuously varied, resulting in crossing of the tape edges over all of the pairs of conductors with varying periodicity. In both implementations, the filler allows a cylindrical shape.