

Paper No. ____

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMMSCOPE TECHNOLOGIES LLC
Petitioner

v.

BELDEN INC.
Patent Owner

IPR _____
U.S. Patent No. 9,991,030
Issued: June 5, 2018
Filed: May 31, 2017

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 9,991,030
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 41.100 ET SEQ.**

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MANDATORY NOTICES

A. Real Parties-in-Interest

CommScope Technologies LLC, CommScope, Inc. of North Carolina, CommScope, Inc., and CommScope Holding Company, Inc. are the real parties-in-interest.

Based on current law and information available at this time, it is not clear to Petitioner that there are any other real parties-in-interest.

B. Related Matters

The challenged patent, and three additional patents, were asserted against Petitioner in a complaint in *Belden Inc. v. CommScope, Inc. et al.*, Case No. 22-783-RGA (D. Del.) (served June 14, 2022). One of the additional patents, U.S. Patent No. 10,832,833 (the '833 Patent), is related to the challenged patent. Petitioner is filing a separate Petition for *Inter Partes* Review that challenges several claims of that '833 Patent. Petitioner also is filing two other Petitions for *Inter Partes* Review that challenge claims of the other two patents asserted in the lawsuit.

C. Lead and Back-Up Counsel

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D. Service Information

Please address all correspondence and service to all counsel listed above.

Petitioner consents to service by email at the email addresses listed.

PRELIMINARY MATTERS

A. Standing

Petitioner certifies that IPR is available for the '030 Patent; Petitioner is not barred or estopped.

B. Identification of Challenge

Petitioners request invalidation of claims 1-3, 9-14, 16-18.¹

	Claims	Basis for Unpatentability
Ground 1	1-3, 9-14, 16-18	Anticipated by Cook .
Ground 2	11	Obvious in view of Cook , and one or more of Glew and the knowledge of a POSITA.
Ground 3	1-3, 9-14, 16-18	Anticipated by Glew .
Ground 4	1-3, 9-14, 16-18	Obvious in view of Glew and one or more of Cook and/or the knowledge of a POSITA.
Ground 5	1-3, 9-11, 13, 16-18	Anticipated by Roberts .
Ground 6	1-3, 9-11, 13, 16-18	Obvious in view of Roberts and one or more of Jachimowicz-172 and/or the knowledge of a POSITA.
Ground 7	1-3, 9-11, 13, 16-18	Obvious in view of Grounds 5 and/or 6 and one or more of Jachimowicz-036 and/or the knowledge of a POSITA.
Ground 8	11	Obvious in view of any one or more of grounds 5-7 and one or more of Glew and/or the knowledge of a POSITA.
Ground 9	12, 16	Obvious in view of any one or more of grounds 5-7 and one or more of Simons and/or the knowledge of a POSITA.

¹ Petitioner does not concede that any challenged claim meets grounds for patentability that cannot be raised during an IPR, including patentability requirements under Sections 101 and 112.

Ground 10	1-3, 9-14, 16-18	Obviousness in view of Clark-478 and one or more of Roberts, Glew , and/or the knowledge of a POSITA.
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C. Supporting Declaration

Petitioner submits an expert declaration from Kenneth Cornelison (EX-1006).

D. Fees

Petitioner authorizes the Patent Office to charge Deposit Account No. 502880 for the fee set forth in 37 C.F.R. § 42.15(a) and any other required fees.

Introduction

The '030 patent discloses a cable having twisted-pair conductors, a filler separating the conductors, and a multi-layer barrier tape, with dielectric and conductive layers, surrounding the conductor pairs and filler. Each challenged independent claim recites a three-layer tape with a conductive layer positioned between dielectric layers and extending to each lateral edge of the two dielectric layers. The Patent Owner successfully argued during prosecution that the recitation of a “surrounding” (or “wrapping”) barrier tape successfully distinguished over the three-layer tape shield (15) of Roberts, which is positioned *between* conductor pairs (e.g., used as a filler/separator).

This petition identifies multiple references that teach cables with the claimed three-layer barrier tape surrounding conductor pairs and a filler. This includes a different barrier tape (tape 18) disclosed in Roberts that surrounds the conductor pairs and filler and is formed of a plastic-coated metal, but was not discussed during prosecution.

The PTAB should institute review for two main reasons. First, the references, which were either not considered during prosecution or were not considered for their features addressed in this petition, disclose claimed three-layer barrier tapes supposedly missing from the references discussed during prosecution.

Second, the references disclose all the limitations recited in the claims - or at least make them obvious.

Summary of the Challenged Patent

A. Brief Description

The '030 Patent discloses “methods of manufacture and implementations of unshielded twisted pair (UTP) cables with a barrier tape, which may be conductive or partially conductive, with reduced alien crosstalk and return loss . . . via control of application angle of the barrier tape around helically arranged twisted pairs of conductors.” Ex. 1001, 2:22-28. In one implementation – called fixed tape control (FTC) – “the angle of application of the barrier tape is configured to match a helical twist angle of the cable, and the edges of the barrier tape are precisely placed on terminal portions of arms of the filler.” *Id.*, 2:37-41, *see also* 5:38-49. In a second implementation – called oscillating tape control (OTC) – “the angle of application of the barrier tape is continuously varied across a predetermined range.” *Id.*, 2:47-50, 5:50-59. The '030 Patent asserts that FTC- or OTC-applied barrier tape is an improvement over “typical longitudinal or spirally applied tape” (i.e., “application methodologies of barrier tapes used in typical cables”). *Id.*, 5:60-6:2, 9:64-10:16; EX-1006, ¶¶47-48.

The '030 Patent discloses that the barrier tape is a “conductive barrier tape 110” that “has three layers in a dielectric/conductive/dielectric configuration” and

“may comprise a continuously conductive tape, a discontinuously conductive tape, . . . a combination of a foil and dielectric material or any other such materials.”

EX-1001, 6:3-8, 7:32-54, FIGS. 1, 3A; EX-1006, ¶¶49-51.

B. Relevant History of the '030 Patent

The '030 Patent issued from U.S. Application No. 15/610,504 ('504 Application), filed on May 31, 2017. The '030 Patent claims priority from U.S. Application No. 14/520,125, which claims further priority from U.S. Provisional Application No. 61/894,728, filed October 23, 2013.

C. '030 Patent Claims

There are 2 independent claims at issue in this Petition (1, 18). They recite similar limitations but claim 1 is written as a product and claim 18 a method. Each recites a cable (or method of making a cable) having twisted-pair conductors, a filler that separates the conductor pairs, and a three-layer barrier tape that surrounds (or wraps) the conductor pairs and filler, where the tape includes a conductive material between, and extending to the lateral edges of, two layers of dielectric material. Claim 1 further requires that the conductive material be a “continuous conductive material.” The Claims Listing Appendix lists the text of each of the claims and labels each element (A, B, C, etc.).

D. Prosecution History

The '030 Patent is a continuation of U.S. Patent No. 9,697,929, and claims priority to a provisional filed on October 23, 2013. The originally-filed claims were rejected based on double-patenting, and further rejected as obvious based on Clark-478 in view of Roberts (claims 1-3, 9-13, 16-18), and Clark-478 in view of Roberts and US Publication No. 2006/0169467 (“Nordin”) (claims 4-5, 14, 19). EX-1002. The Examiner said it would be obvious to replace Clark-478’s two-layer barrier tape (aluminum/mylar) that surrounded the cable conductors and filler with Roberts’ three-layer tape 15 (having a metal coated on both sides with a dielectric material) that separates conductor pairs from each other to reduce crosstalk between adjacent conductor pairs. *Id.*, 8-9. Patent Owner responded that Roberts’ three-layer tape 15 was “between” the cable conductor pairs for the purposes of reducing crosstalk between the conductors and did not “surround” or “wrap” the conductor pairs as recited in independent claims 1 and 18. *Id.*, 6-9. Based on this distinction, the Examiner allowed the claims.

Summary of the Asserted Prior Art

A. Primary References

1. “Glew”: U.S. Patent Pub. No. 2013/0248240 (EX-1008)

Glew was filed in March, 2013, published in September, 2013, and is prior art.

Glew discloses a cable having twisted-pair conductors, a filler/separator positioned between those conductor pairs to provide a shield between the pairs, various multi-layer barrier tapes (including a three-layer tape with a conductive layer positioned between two dielectric layers) surrounding the conductor pairs and filler, and a jacket surrounding everything (annotations added):

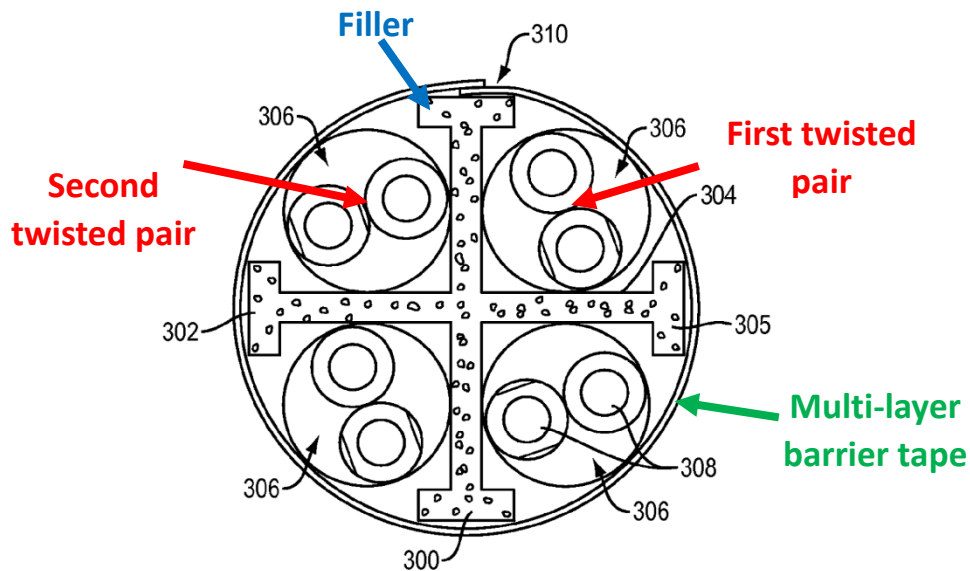
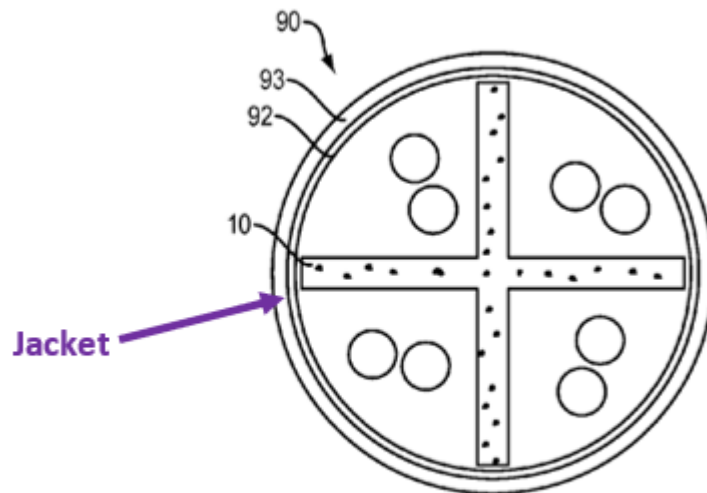
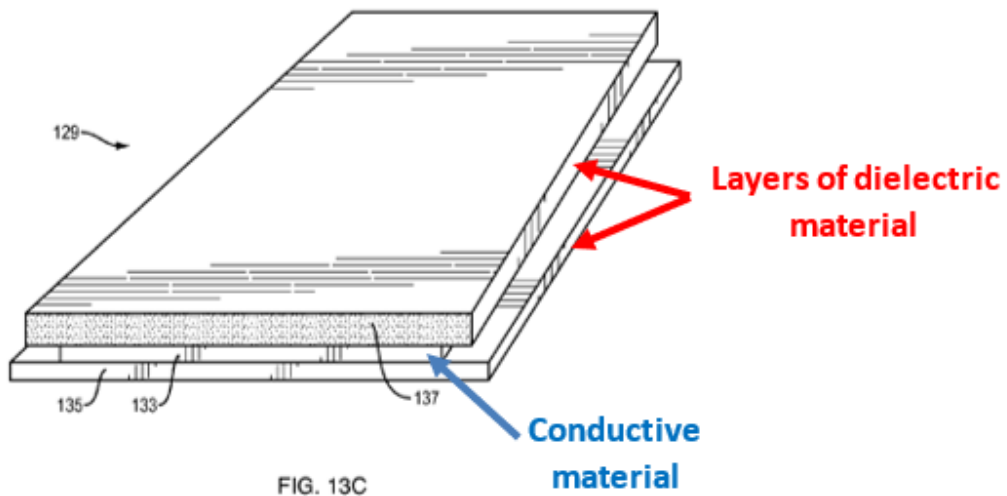


FIG. 10A

Schematic of 3-Layer Barrier Tape



See EX-1008, ¶¶[0154], [0195], [0221-230], FIGS. 6A-6B, 10A, 13C; EX-1006, ¶¶61-62.

2. “Cook”: U.S. Patent No. 9,363,935 (EX-1010)

Cook issued on June 7, 2016, from an application filed March 15, 2013. It is prior art. Cook describes a cable having twisted-pair conductors, a filler/separator positioned between conductor pairs, a three-layer barrier tape (with conductive layer between two layers of dielectric material) surrounding the conductor pairs and filler, and a jacket surrounding everything (annotations added):

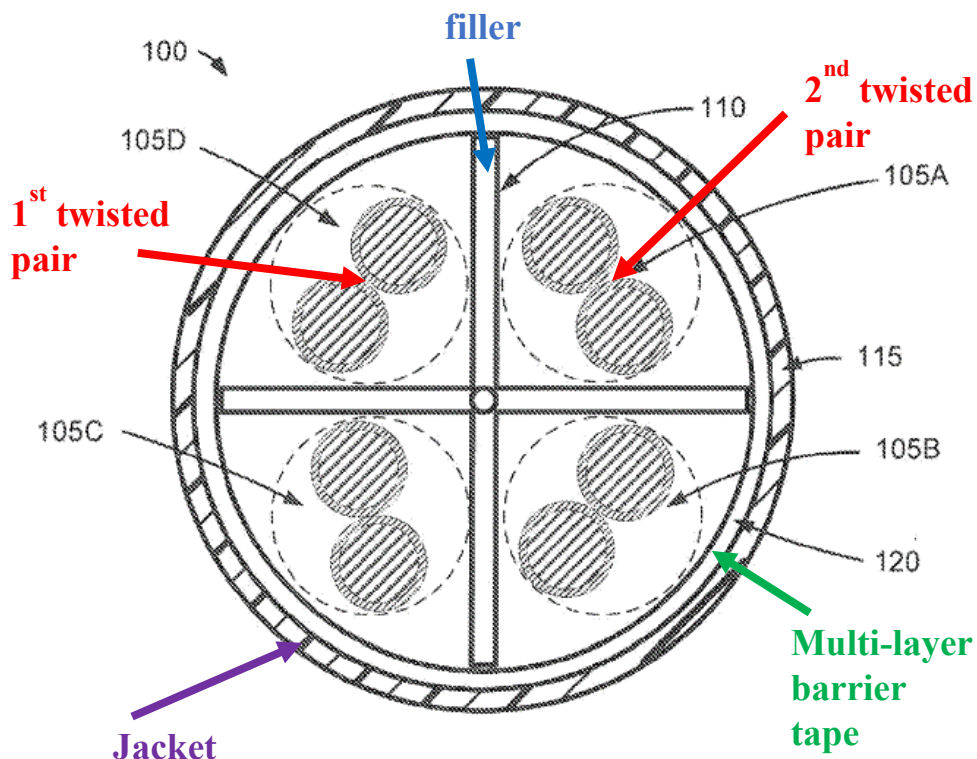


FIG. 1

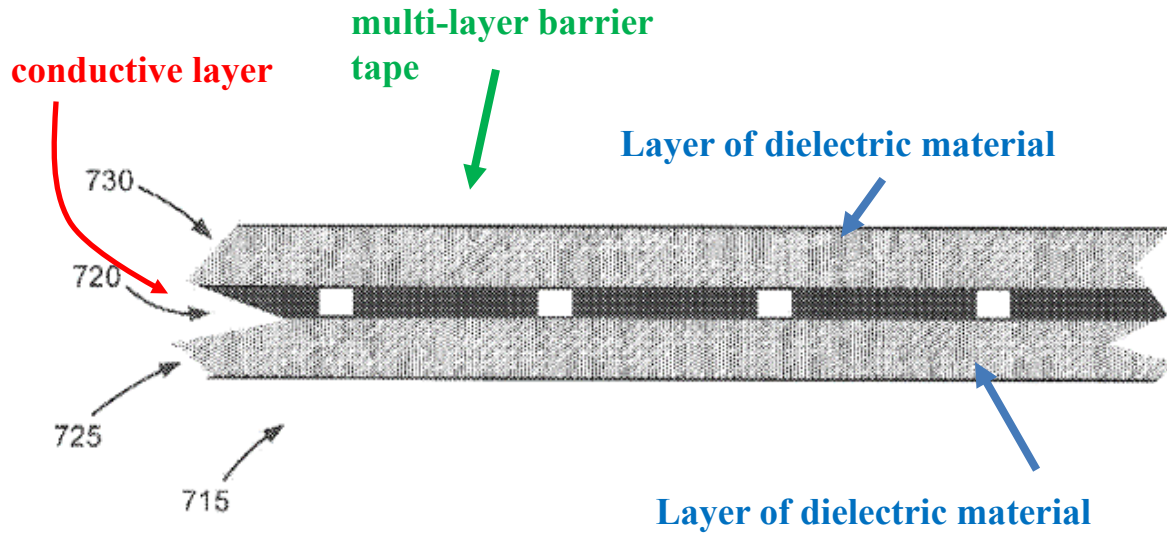


FIG. 7B

See, e.g., EX-1010, 4:32-47, 4:55-59, 5:18-48, 15:3-14, 22:39-41, FIGS 1-2; 7B; EX-1006, ¶63. Cook discloses that the electrically conductive layer can be discontinuous (as shown in FIG. 7B) or “continuous”. *See, e.g.,* EX-1010, 7:10-15 (“[E]lectrically conductive material (e.g., a metallic material, an alloy, etc.), whether continuous or comprising electrically conductive patches or sections can be disposed on a substrate or dielectric material.”)

3. “Roberts”: U.S. Patent No. 3,622,683 (EX-1009)

Roberts issued in November 1971, and is prior art. Roberts discloses a cable with a “plastic-coated metal foil strip or tape” that separates conductor pairs within a cable from each other. EX-1009, Abstract, 3:28-52, FIG. 17; EX-1006, ¶¶64-71. Roberts discloses that the separator tape may have a metal layer with both sides coated with dielectric so that the metal layer is sandwiched between, and extending to the edges of, dielectric layers:

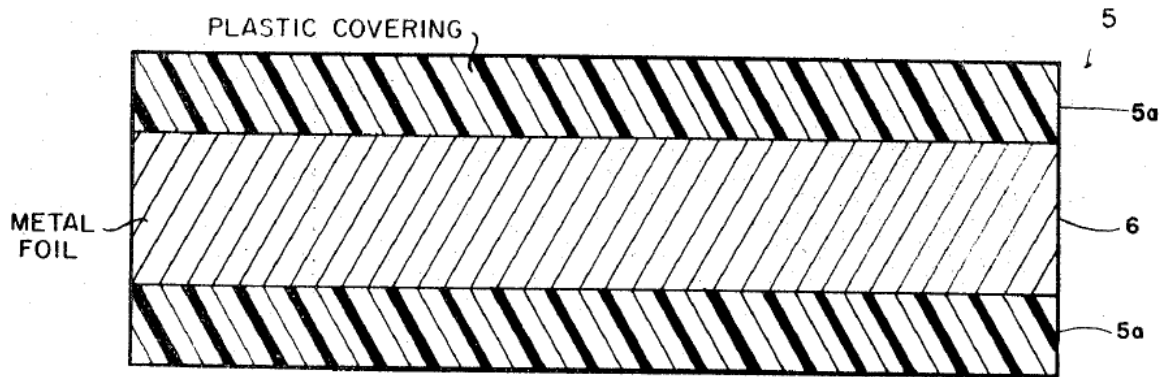


FIG. 5

Id., 4:52-54, FIG. 5.

Roberts also discloses wrapping the conductor pairs and separator with a metal tape shield 18:

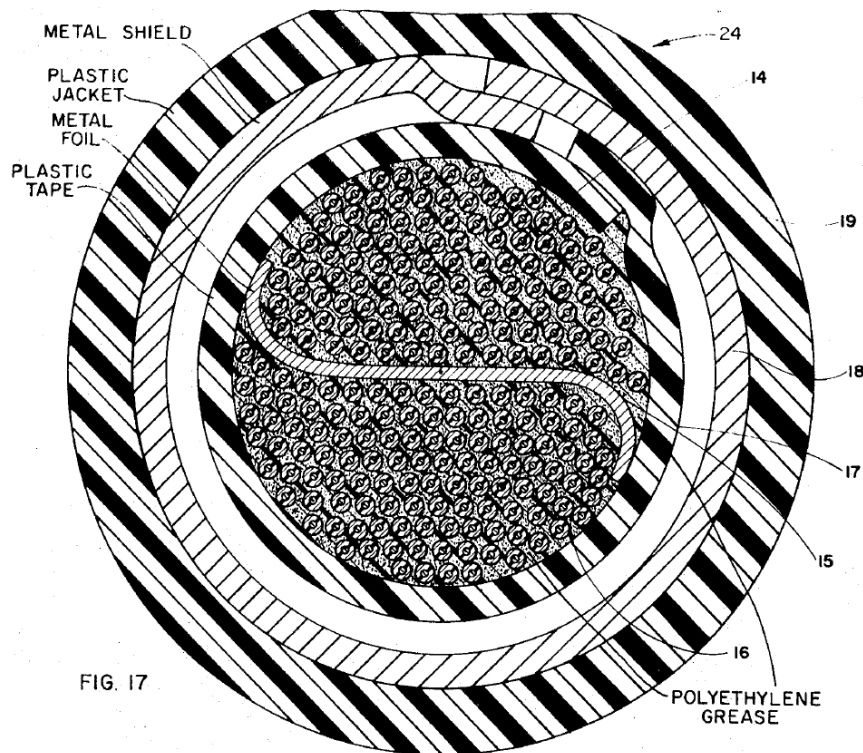


FIG. 17

This metal shield 18 “longitudinally circumscribes and has nested therein,” the conductors and the separator shield 15. *Id.*, 10:42-62, FIG. 17; EX-1006, ¶67.

Metal shield 18 functions as “an electrical, as well as a mechanical shield,” and “can have a plastic, such as polyethylene, firmly adhered to either one or more surfaces thereof.” EX-1009, 4:16-23, 4:64-66.

4. “Clark-478”: U.S. Patent Pub. No. 2006/0168484 (EX-1025)

Clark-478 published in August 2006, and is prior art.

Clark-478 discloses a high performance cable with multiple twisted pair conductors separated by a cross-shaped separator (or filler), a two-layer (aluminum/mylar) barrier tape surrounding the separator and conductors, and an outer jacket (annotations added):

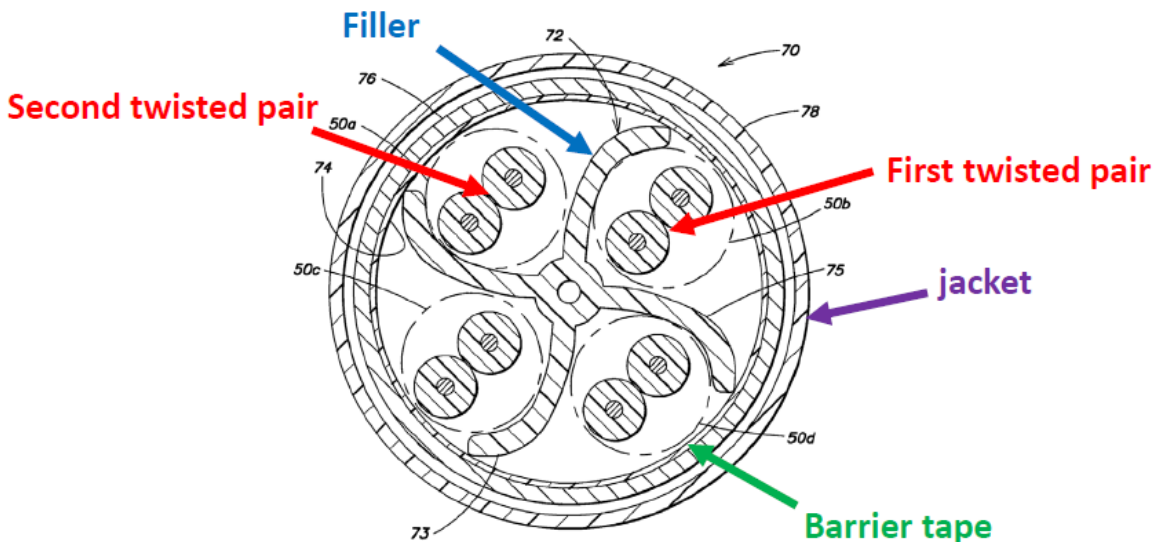


FIG. 2

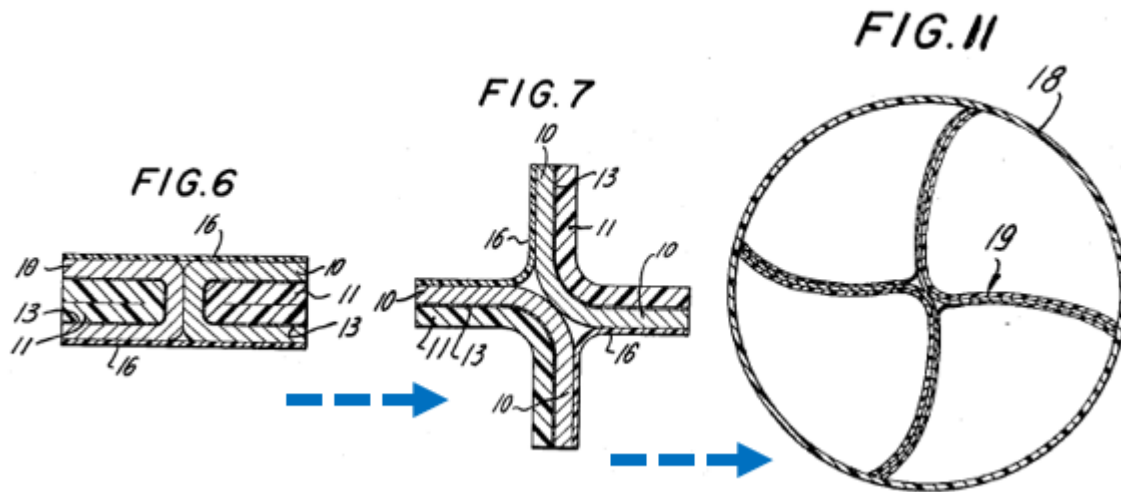
EX-1025, ¶¶ [0034], [0039-041], [0048], FIG. 2. Clark-478 discloses that the separator/filler isolates the conductor pairs, which reduces crosstalk between adjacent pairs. *Id.*; EX-1006, ¶¶ 72-75.

B. Secondary References

1. “Simons”: U.S. Patent No. 3,911,200 (EX-1012)

Simons issued in October 1975, and is prior art.

Simons discloses “an improvement over the shielding means disclosed in [Roberts].” EX-1012, 1:5-12. The “improvement” includes using a multi-layer tape to form a four-arm filler to create four channels within the cable:

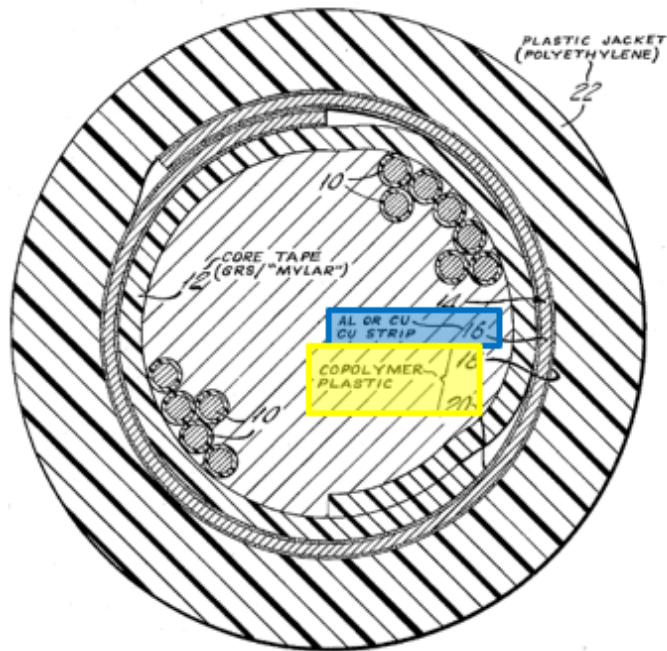


Id., 2:4-9, 2:18-20, 3:1-26, 3:42-46, FIGS. 6, 7, 11; EX-1006, ¶76.

2. “Jachimowicz-036”: U.S. Patent No. 3,233,036 (EX-1013)

Jachimowicz-036 published in 1966 and is prior art.

Jachimowicz-036 teaches a cable with a shielding tape 14 having a metal layer (16) between two layers of a dielectric material (18, 20):



EX-1013, 2:52-66, FIG. 3; EX-1006, ¶77.

3. “Jachimowicz-172”: U.S. Patent No. 3,894,172 (EX-1014)

Jachimowicz-172, which issued in July 1975, is prior art, and discloses a cable that uses multiple twisted pairs of insulated conductors having different lay lengths. EX-1014, 2:31-33, FIG. 2; EX-1006, ¶78.

Claim Construction

Petitioner presently believes the plain meaning is enough to resolve this petition.²

² Petitioner reserves the right to advance specific constructions in district court litigation, as well as in response to any specific constructions advanced by Patent Owner.

Level of Ordinary Skill

A person of ordinary skill in the art (POSITA) would have had a bachelor's degree in electrical engineering and a minimum of 3-4 years of industry experience in connection with designing, manufacturing, and testing of twisted-pair data cables. An individual with a master's degree in electrical engineering would require less industry experience (e.g., 1-2 years). EX-1006, ¶12.

Discretionary Issues

Petitioner's grounds are not the same or substantially the same as any combination previously presented to the Patent Office. Cook, Glew and Roberts each disclose a cable having a three-layer dielectric/metal/dielectric barrier tape surrounding/wrapping the cable conductors and filler that separates conductors. Each proposed reference and combination fills the precise gap at issue during prosecution vis-à-vis the challenged claims. Therefore, there is no need to show an error and discretionary denial is unwarranted.

Discretionary denial also is not warranted because this petition presents compelling evidence of unpatentability. Each ground includes art that expressly discloses the only feature Patent Owner used to distinguish the art during prosecution and all of the features recited in all, or at least most, of the claims. Further, much of the art anticipates the claims.

Also, although the '030 Patent is involved in litigation, the litigation is at a very early stage: no claim construction opinions have been issued, no written discovery has occurred, no depositions have been taken, and no expert reports have been submitted—all of which weigh against a discretionary denial. *Apple Inc. v. Fintiv Inc.*, IPR2020-00019, Paper 11 at 10 (PTAB Mar. 20, 2020) (precedential); *HP Inc. v. Neodron Ltd.*, IPR2020-00459, Paper 17 at 40 (PTAB Sep. 9, 2020). Trial is not set until October 2025, more than two years from now. EX-1005. And if this IPR is instituted, Petitioner intends to seek a stay with stipulation to not raise in district court any of the grounds raised in this Petition, which also weighs against a denial.

ARGUMENT

Ground 1: Cook Anticipates Claims 1-3, 9-14, 16-18

A. Independent Claim 1 (and 18)

- 1. A cable comprising: [1A] (and [18A]) a first twisted pair of insulated conductors; [1B] (and [18A]) a second twisted pair of insulated conductors; [1C] (and [18B]) a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors; and**

Cook discloses a cable (e.g., “cable 100”) having first and second twisted pairs of insulated conductors (105A and 105B) and a “separator 110 (also referred to as a separation filler, a filler, an interior support, or a spline)” (*filler*) that separates the twisted pairs as illustrated in the annotated figure below:

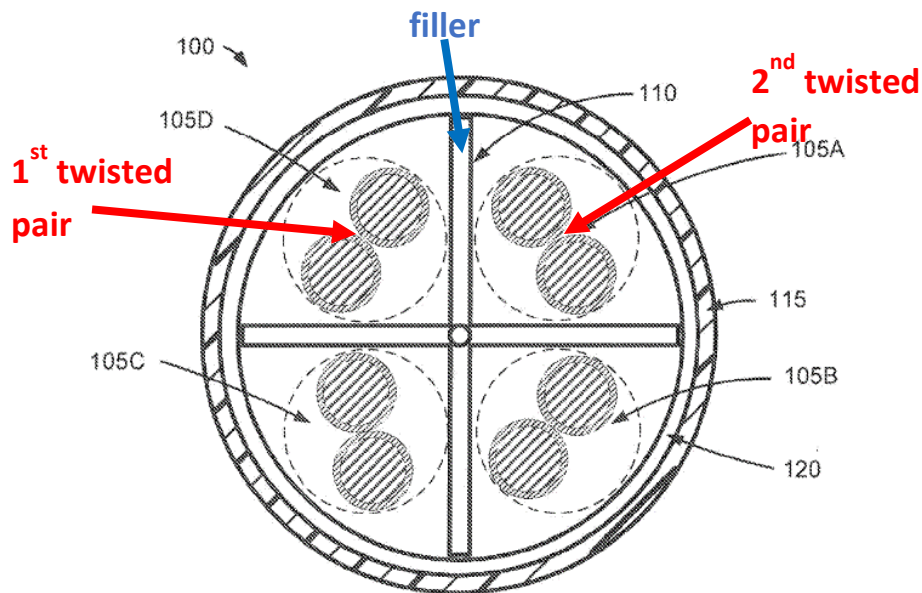


FIG. 1

EX-1010, 4:32-47, 4:55-59, 5:63-6:22, 15:57-63, FIGS 1-2; EX-1006, ¶¶79-80.

2. Element 1D (and [18C-1] and [18C-2])

“...a multi-layer conductive barrier tape comprising a continuous conductive material contained between two layers of a dielectric material, the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material, the barrier tape surrounding the first twisted pair of insulated conductors, the second twisted pair of insulated conductors, and the filler;”

Cook discloses a multi-layer barrier tape (tape shield 120) surrounding the first and second twisted pairs of conductors and the filler as shown in the annotated figure:

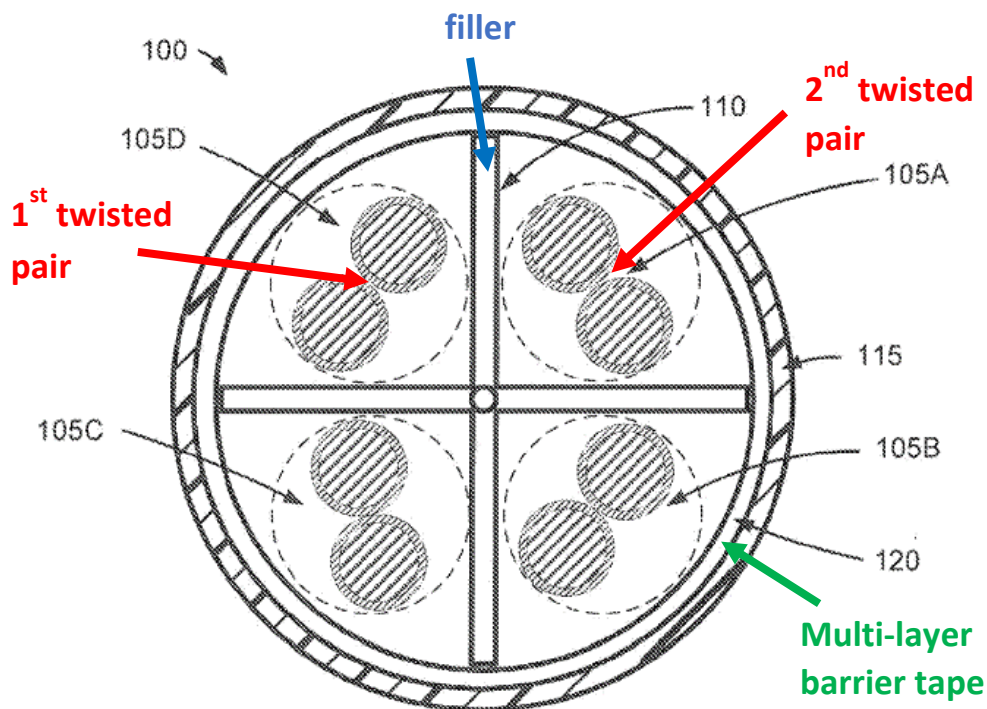
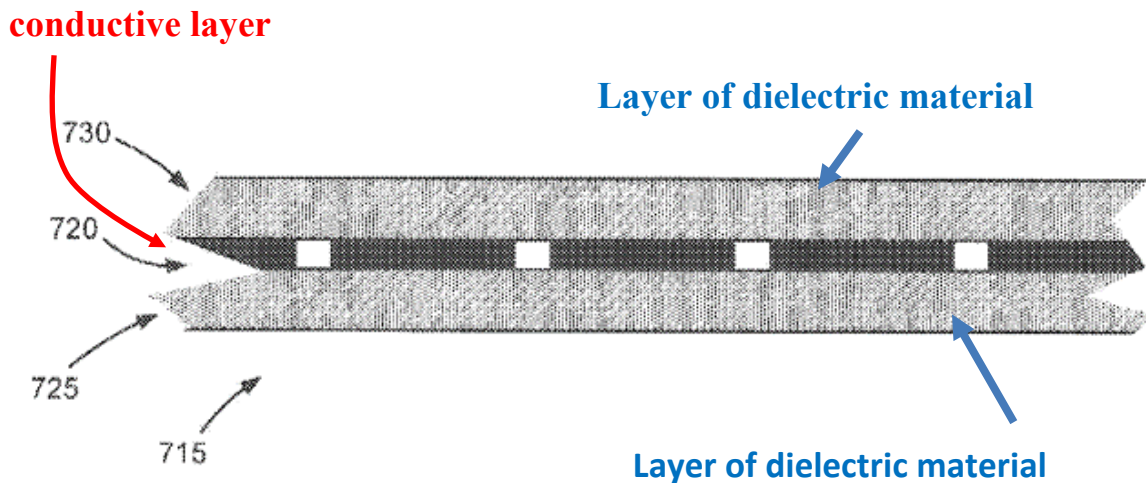


FIG. 1

EX-1010, 5:46-48, 6:35-41, FIGS 1-2; EX-1006, ¶81.

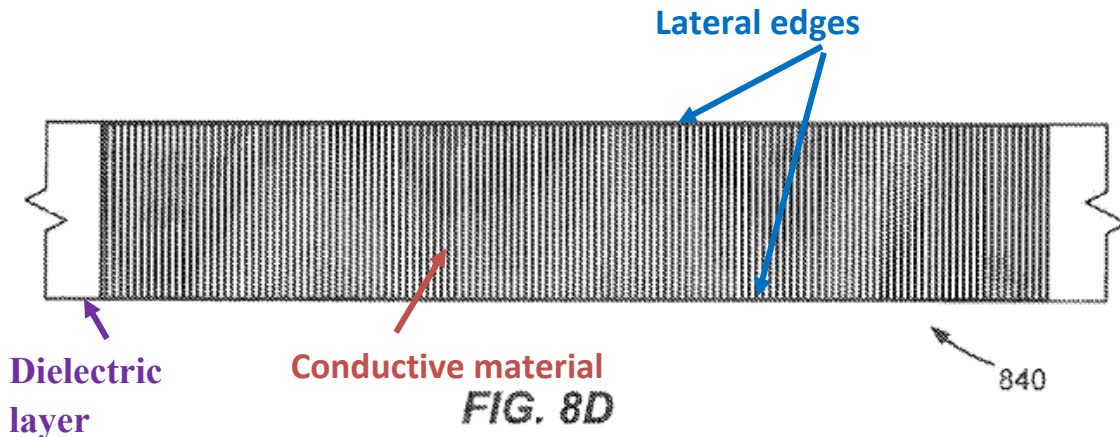
Cook’s “shield 120” may be a “tape” (or “tape shield”) that comprises a “continuous” electrically conductive material (or “an electrically conductive layer”) that is “sandwiched between multiple [(e.g., two)] dielectric layers,” or, as an alternative, comprise “discontinuous” separated patches or sections of electrically conductive material “sandwiched between” dielectric layers.³ See, EX-1010, 6:50-7:20, 11:8-39, 11:64-12:5, 22:30-41, FIGS. 7B, 8A-8D; EX-1006, ¶83. The side view of an exemplary shield where a discontinuous “electrically conductive layer 720 is sandwiched between two dielectric layers 725, 730” is illustrated in FIG. 7B:



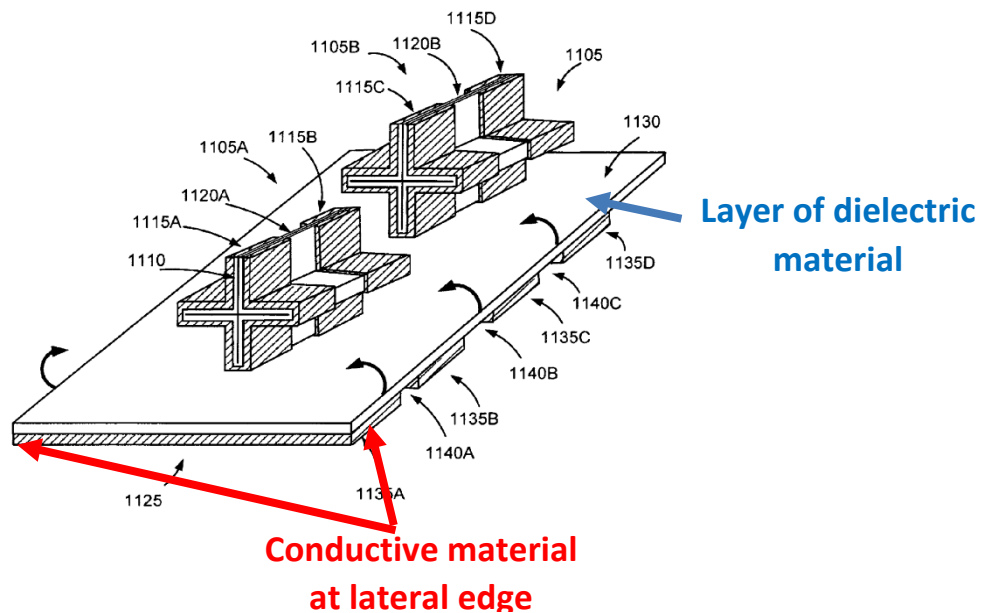
EX-1010, 22:39-41, FIG. 7B (annotated); EX-1006, ¶82.

³ Cook’s disclosed tape shield is similar to the ’030 Patent’s “conductive barrier tape 110” that “comprise[s] a continuously conductive tape, a discontinuously conductive tape . . . [or] a combination of a foil and dielectric material.” EX-1001, 7:32-45.

Cook discloses the conductive material *extending to each lateral edge of the two layers of dielectric material*. EX-1006, ¶¶84-87. This is illustrated in annotated Figure 8D (below) which shows the conductive layer vis-à-vis one of the dielectric layers:



See Ex-1010, 23:58-67, FIG. 8D (annotated). Cook explains that the conductive material is “running along the longitudinal length” of the tape and “span[s] fully across a width” of the shield. See, *id.*, 12:22-23, 23:58-67; EX-1006, ¶84. Further, Figure 11(annotated below), which illustrates an exemplary shield layer 1125 (a two-layer *barrier tape*) that is “folded or wrapped around” the separator (filler) and the twisted pairs of conductors (not shown), has conductive material (i.e., patches) extending to each lateral edge of the dielectric layer.



EX-1010, 25:39-57, FIG. 11. Although this embodiment shows discontinuous patches (as opposed to the alternative “continuous” design), continuous conductive material would similarly extend to the lateral edges such as shown above in FIG 8D. EX-1006, ¶¶84-86.

In the event that the recited “lateral edges” are interpreted to be the right and left dielectric ends of the tape (in lieu of top and bottom edges identified in FIG. 8D above), Cook discloses that the conductive material layer may be either “continuous, [or] discontinuous.” EX-1010, 7:11-14. A POSITA would understand a multi-layer tape having continuous conductive material would extend to each longitudinal end, such as illustrated in the annotated figure below:

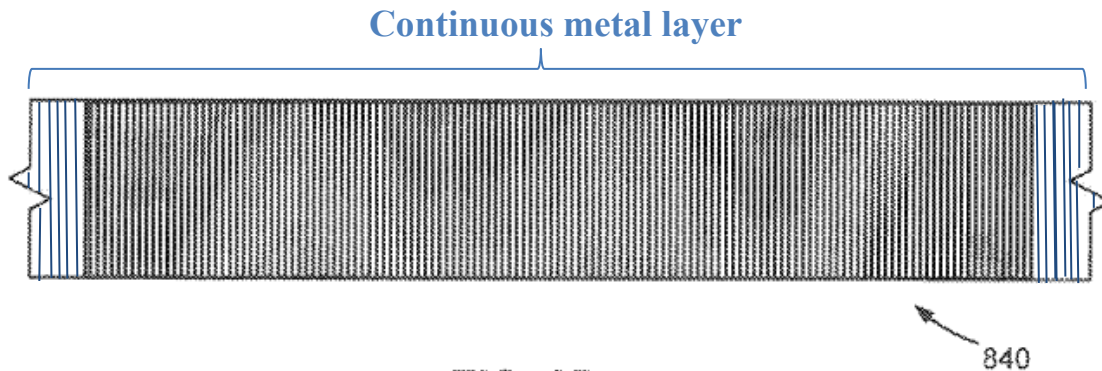


FIG. 8D

Id., FIG. 8D (annotated); EX-1006, ¶¶87-88.

Therefore, Claim 1 is anticipated by Cook. EX-1006, ¶¶81-89.

B. Dependent Claims 2-3, 9-14, 16-17

1. Claim 2

“2. The cable of claim 1, wherein the filler comprises a dielectric material.”

Cook discloses this. Separator 110 (*filler*) includes “a dielectric layer” formed of one of various exemplary listed plastics and polymers or of “dielectric material that does not ordinarily conduct electricity.” EX-1010, 11:8-14; *see*, EX-1006, ¶¶90-91.

2. Claim 3:

“3. The cable of claim 1, wherein the filler has a helical twist at a first angle.”

Cook discloses that the separator (*filler*) and twisted pairs of conductors “may be helically stranded or twisted together” for various beneficial purposes, including tightly coupling the components in order to limit or prohibit movement

of the separator along the length of the cable. EX-1010, 25:26-38; 14:55-58 (“[T]he cable core and the four twisted pairs 105 may be collectively twisted about a longitudinal axis of the cable 100 in a common direction.”). Cook thus discloses this element. EX-1006, ¶¶92-94.

3. Claim 9:

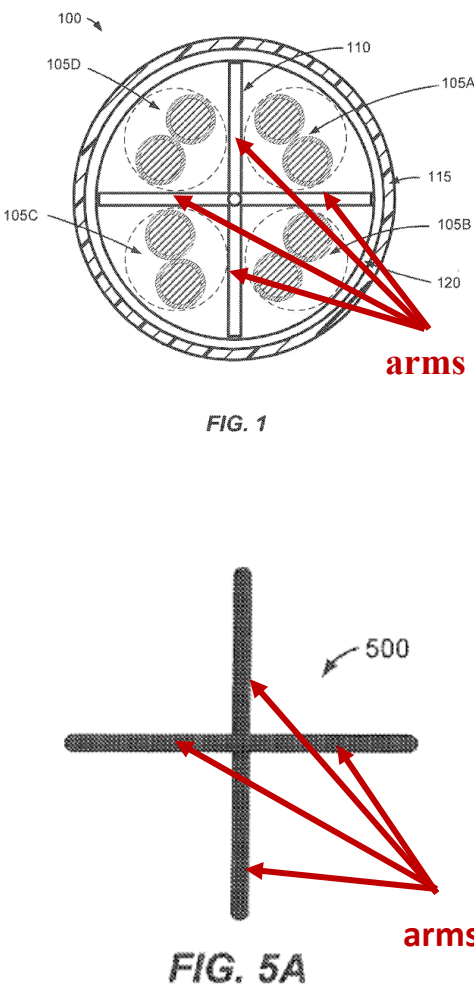
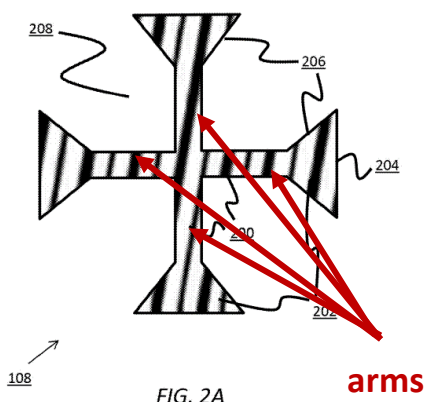
“9. The cable of claim 3, wherein the first twisted pair of insulated conductors and the second twisted pair of insulated conductors have a helical twist around the filler at the first angle.”

As discussed regarding claim 3, Cook discloses that the separator and twisted pairs of conductors “may be helically stranded or twisted together” for various beneficial purposes. EX-1010, 25:26-38; *see also, id.*, 14:55-58. Thus, Cook discloses the twisted pair conductors having a helical twist around the filler at the first angle (i.e. at the angle of the filler’s helical twist). EX-1006, ¶95.

4. Claim 10:

“10. The cable of claim 1, wherein the filler comprises at least one arm.”

As illustrated below (annotated), separator 110 (*filler*) comprises multiple arms:

 FIG. 1 is a cross-sectional view of a cable 100. It features a central core 110 surrounded by a barrier tape 115. The barrier tape is divided into four quadrants by a central cross 120. Each quadrant contains a circular filler element 105A, 105B, 105C, and 105D. Red arrows point from the word "arms" to the four quadrants of the cross 120. FIG. 5A is a schematic diagram of a cross 500. Red arrows point from the word "arms" to the four arms of the cross.	 FIG. 2A is a schematic diagram of a cross 108. It features a central core 208 surrounded by a barrier tape 206. The barrier tape is divided into four quadrants by a central cross 204. Each quadrant contains a circular filler element 202, 204, 206, and 208. Red arrows point from the word "arms" to the four quadrants of the cross 204.
EX-1010, FIGS. 1 & 5A	EX-1001, 6:52-62, FIG. 2A

Thus, Cook discloses this element. EX-1006, ¶¶96-97.

5. Claim 11:

“11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.”

Cook discloses that the tape shield (*barrier tape*) may be “wrapped” or “folded” around the separator and twisted pair conductors. EX-1010, 25:39-57, FIG. 11. When wrapped or folded, the long edges of the tape either meet at a seam

or overlap and create a seam. *See, id.*, 24:60-25:11, 25:39-57, FIGS. 10-11.

Although Cook FIG. 11 doesn't show precisely where the seam will be relative to terminal portions of the filler arms, a POSITA would understand, particularly given that Cook describes the separator and twisted pairs being helically twisted together along the length of the cable (EX-1010, 14:55-58, 25:26-38), that the seam of the barrier tape would be positioned above a terminal portion of an arm of the filler at various points along the longitudinal length of the cable. For example, Glew, which also teaches a multi-layer barrier tape that is "wrapped around" a cable core (that may be helically twisted)⁴, shows a cross-sectional view along a portion of the cable, in which the seam is directly above a terminal portion of the filler arm:

⁴ *See* Ground 3 §§B(2), B(3), *infra*.

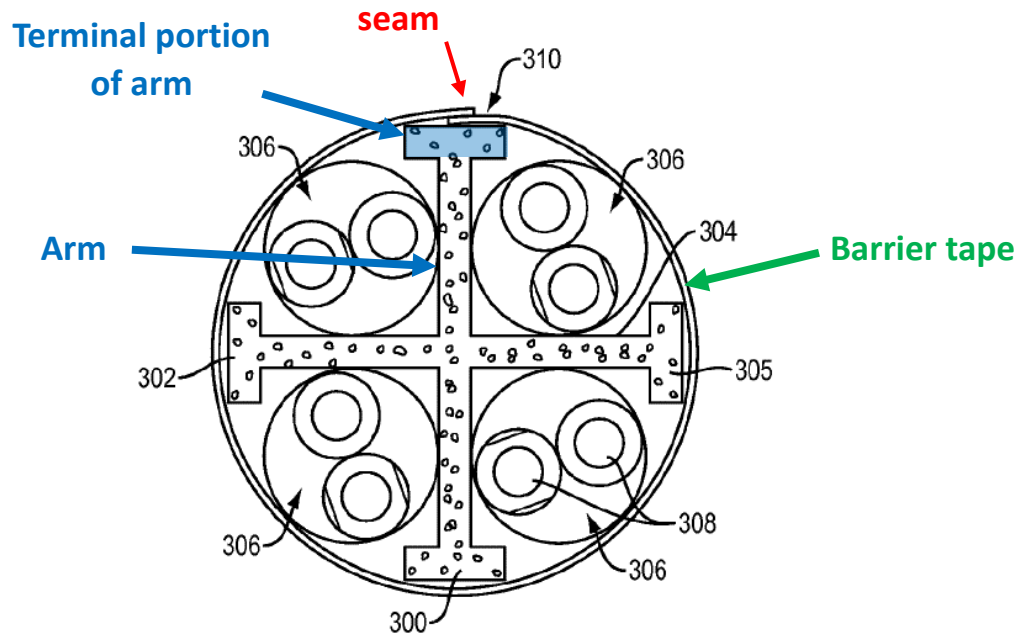


FIG. 10A

EX-1008, ¶[0154], FIG 10A (annotated).

Cook thus discloses this element. EX-1006, ¶¶98-100.⁵

6. Claim 12:

12. The cable of claim 10, wherein the filler comprises four arms in a cross shape.”

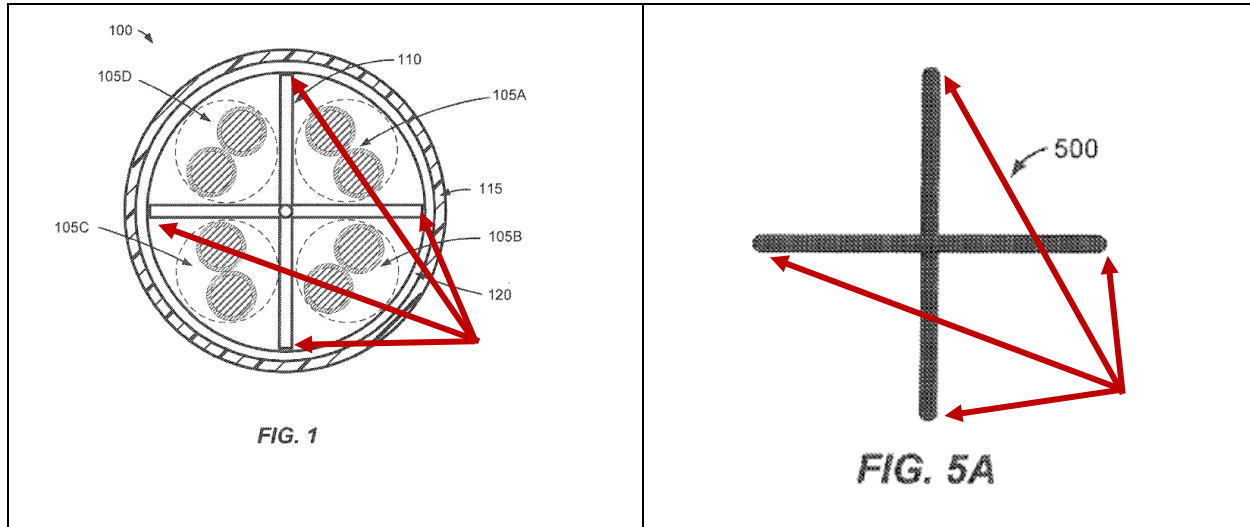
Cook discloses this, stating that separator (*filler*) can be “X-shaped or cross-shaped.” EX-1010, 11:43-44, 11:55-56, 19:50-55, FIGS. 1, 5A; *see also*, EX-1006, ¶¶101-102.

⁵ Petitioner recognizes that, in view of the specification, this limitation may be construed as requiring the seam to be above a terminal portion of an arm for the entire longitudinal length of the filler arm, as is done by the '030 patent's disclosed fixed tape control (FTC) process, instead of at any particular point along the length of filler arm. *See* EX-1001, Abstract, 2:37-46. Under that interpretation, Cook does not expressly show such seam location.

7. Claim 13:

“13. The cable of claim 10, wherein each arm ends in a symmetrical terminal portion.”

As illustrated, e.g., in FIGS. 1 and 5A (annotated), Cook discloses this element:



EX-1010, 4:55-59, 19:50-55, FIGS. 1-2 & 5A; *see also, id.*, 11:48-50 (disclosing “a separator having T-shaped members extending from a central point or center member”); EX-1006, ¶¶103-106.

8. Claim 14:

“14. The cable of claim 10, wherein the terminal portion of each arm is wider than a middle portion of said arm.”

Cook discloses that separator (*filler*) may have a different shape, such as “having T-shaped members extending from a central point or center member.” EX-1010, 11:40-50. This describes a separator, such as shown in FIG. 2E of the ’030 patent:

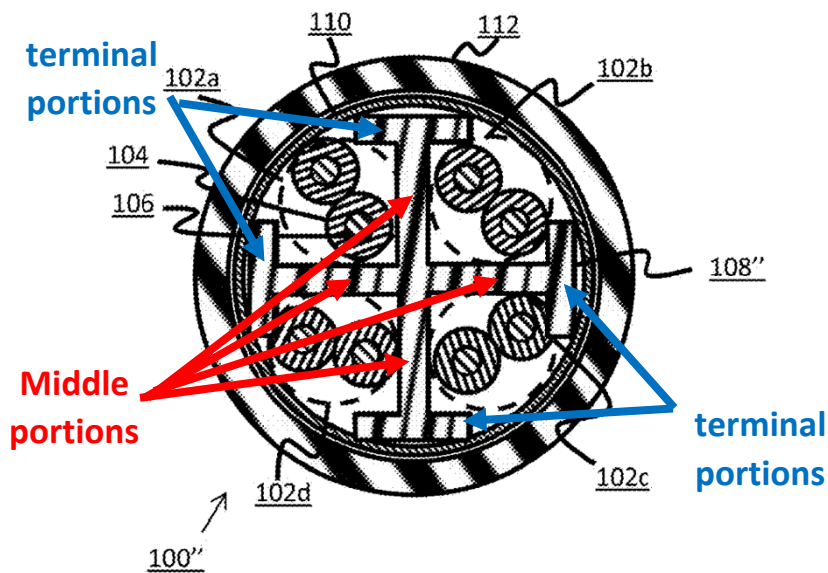


FIG. 2E

See EX-1001, FIG. 2E. In this configuration, each terminal portion of the arm has a lateral extension which makes it (the terminal portion) wider than a middle portion of that arm (and also symmetrical as recited in claim 13 above). EX-1006, ¶¶105-106.

9. Claim 16:

“16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.”

As illustrated, in FIG. 1 (annotated), separator 110 (*filler*) has a pair of arms that form a channel, wherein the first twisted pair of conductors is positioned within the channel:

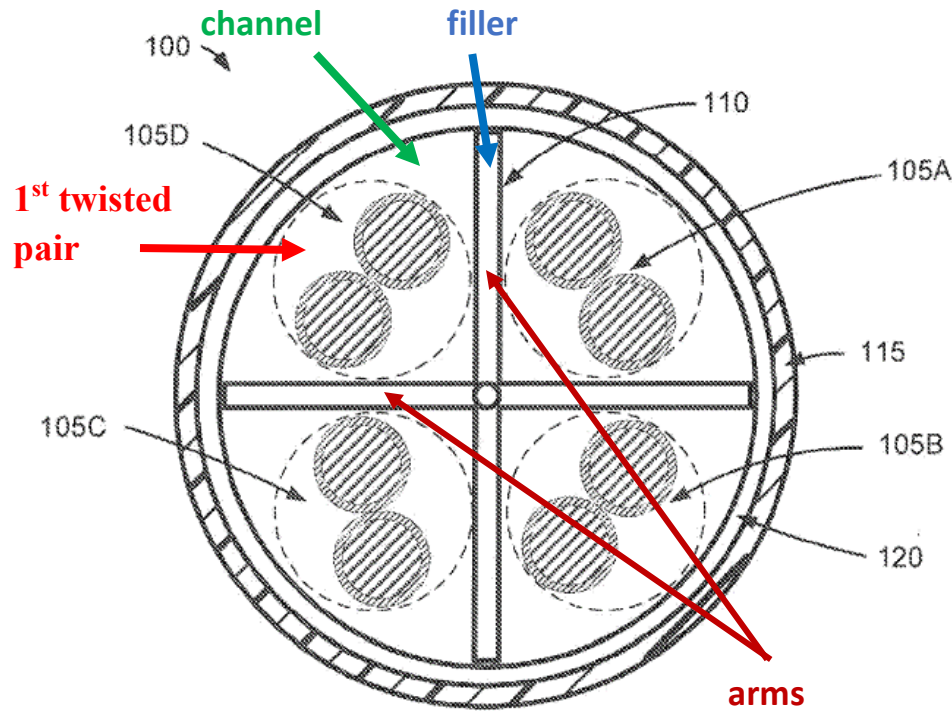


FIG. 1

See, e.g., EX-1010, 4:32-47, 4:55-59, 15:57-63, 19:50-53, FIGS 1-2 & 5A; EX-1006, ¶¶107-108.

10. Claim 17:

“17. The cable of claim 1, further comprising a jacket surrounding the conductive barrier tape.”

Cook discloses a jacket 115 surrounding the shield 120 (*conductive barrier tape*) as illustrated, e.g., in the annotated Figure below:

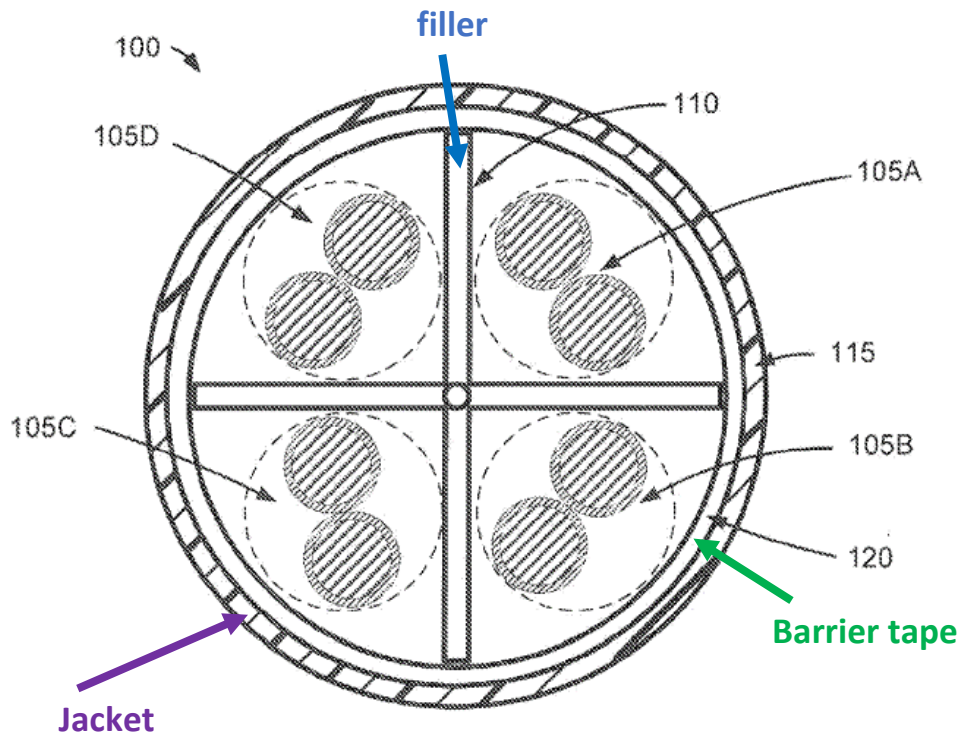


FIG. 1

EX-1010, 5:18-42, 15:57-5, FIGS 1-2; EX-1006, ¶¶109-110.

C. Independent Claim 18

Claim 18 recites essentially the same structural limitations as claim 1, except it does not require the conductive layer to be “continuous” and it is written in the form of a “method.” Cook's disclosure relative to the elements of apparatus claim 1 equally applies to a “method” of manufacturing such cable. Using Cook's cable and teaching described above for claim 1 (which identifies for each limitation in claim 1 the corresponding structural limitation in claim 18 being “provid[ed]” (twisted pair conductors ([18A])) or “position[ed]” (filler ([18B])) or “wrap[ed]” around the conductors and filler (barrier tape ([18C-1, 18C-2])) results in

performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. EX-1006, ¶¶111-120.

Ground 2: Claim 11 is Obvious in view of Cook and Glew and/or the knowledge of a POSITA

A. 11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.

If Cook is deemed not to disclose this element, modifying Cook to include a seam of the barrier tape positioned above a terminal portion of an arm of the filler would have been obvious to a POSITA in view of Glew. EX-1006, ¶¶121-128.

Glew discloses cable designs and manufacturing methods for cables capable of high speed transmission and reducing crosstalk so as to satisfy various industry requirements associated with, for example, Category 5e, Category 6 and Category 6A cables. *See, e.g.*, EX-1008, ¶¶[0006-007], [0122-123]. Glew also discloses helically twisting the filler. *See Infra* Ground 3 §B(2) discussion of Glew anticipating claim 3. Glew discloses using a multi-layered shield 310 that also is “wrapped around” the separator 300 (*filler*) and twisted pairs of conductors so that it encircles them. *Id.*, ¶¶[0154], [0197], FIG. 10A. In “wrap[ping] around” the filler and conductors, the seam of the barrier tape (i.e., shield 310) is positioned above the terminal portion of a filler arm, as shown below:

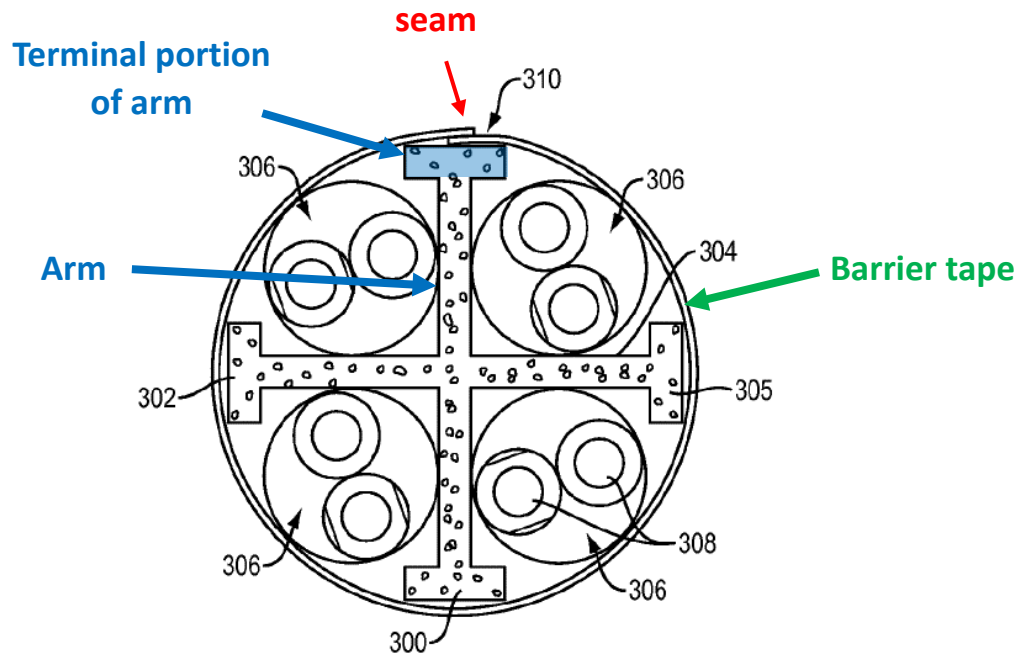


FIG. 10A

Id., FIG. 10A; EX-1006, ¶¶122-124. Glew thus discloses that “wrapping” the filler and conductors results in the barrier tape having the seam positioned above the terminal portion of a filler arm. EX-1006, ¶¶123-125.

Further, a POSITA would have understood that barrier tapes were wrapped around cable cores with controlled machines allowing for the tape (and its seams) to be precisely positioned relative to the wrapped components (e.g., the twisted pair conductors and the filler/separator). EX-1006, ¶126; EX-1004.

As discussed above, Cook discloses to “wrap” the tape around the filler (which may be helically twisted) and conductors, and Glew illustrates that so “wrapping” results in the seam positioned above the terminal portion of a filler arm. A POSITA would be motivated to look to Glew’s wrapping in view of

Cook's disclosure of wrapping the barrier tape around the helically-twisted filler and conductors. And a POSITA would have reasonable expectation that wrapping Cook's filler and conductors to have a cross-section like as shown in Glew would be successful. EX-1006, ¶¶127-128. Thus, this claim would have been obvious to a POSITA.

Ground 3: Glew Anticipates Claims 1-3, 9-14, 16-18

A. Independent claim 1 (and 18)

1. A cable comprising: [1A] (and [18A]); [1B] (and [18A]); [1C] (and [18B]); and

Glew discloses a cable with two twisted pairs of insulated conductors 306, and a separator 300 (*filler*) that separates the two twisted pairs, as shown in this annotated figure:

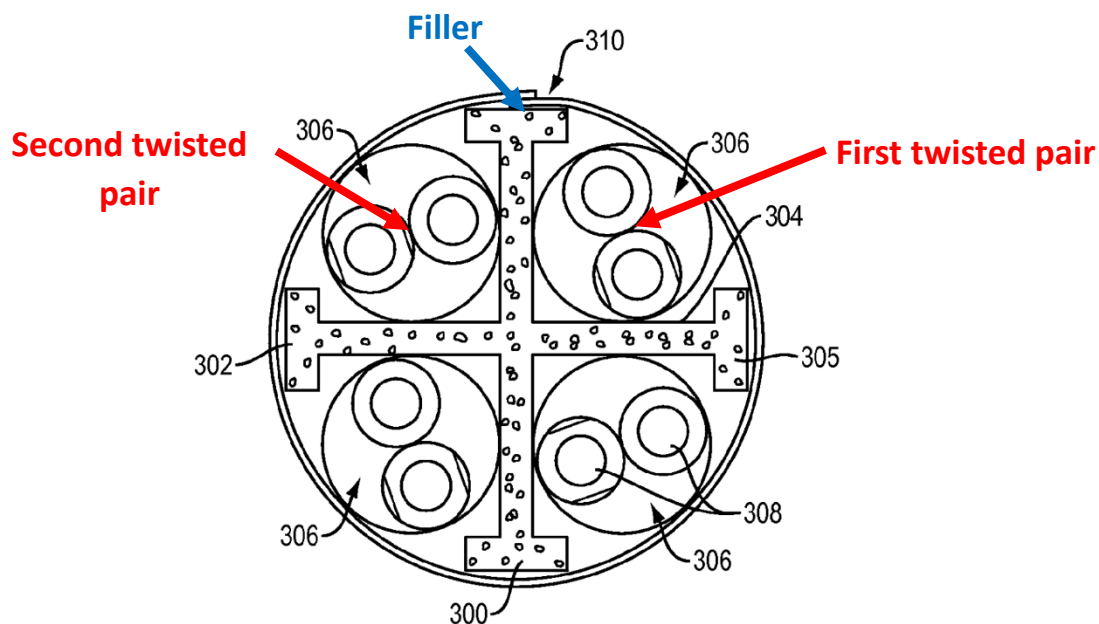


FIG. 10A

See EX-1008, ¶¶[0030], [0143], [0146], [0154-155], FIG. 10A, 10B; EX-1006, ¶¶129-131.

2. Element 1D (and [18C-1] and [18C-2])

Glew discloses shielding material 310 (*barrier tape*) surrounding the first twisted pair of insulated conductors, the second twisted pair of insulated conductors, and the filler, as indicated in the annotated figure below:

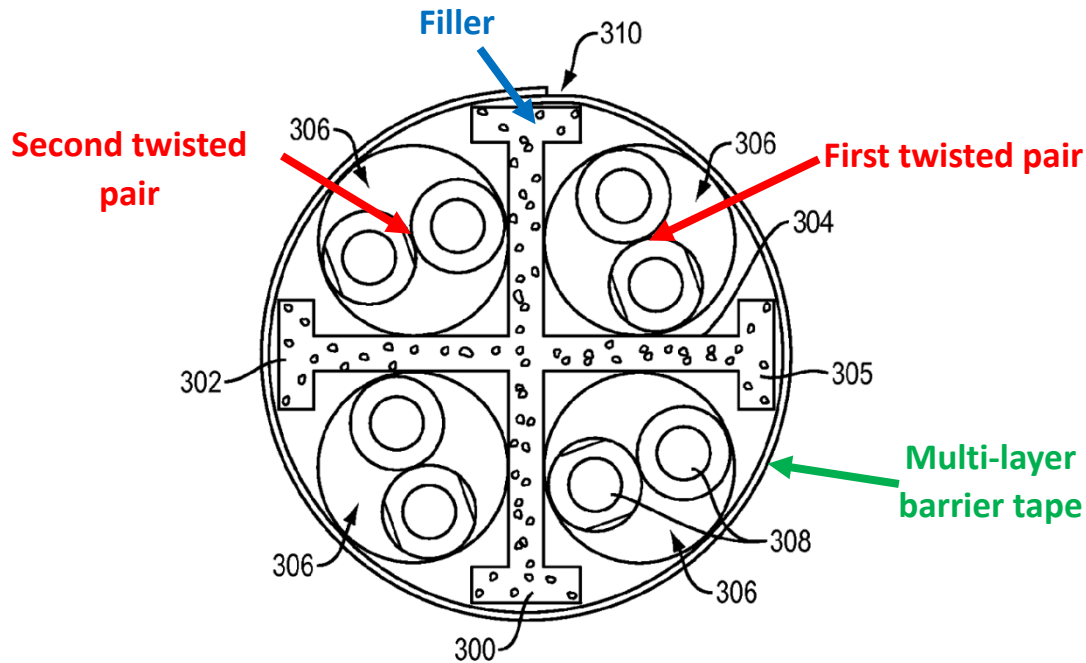
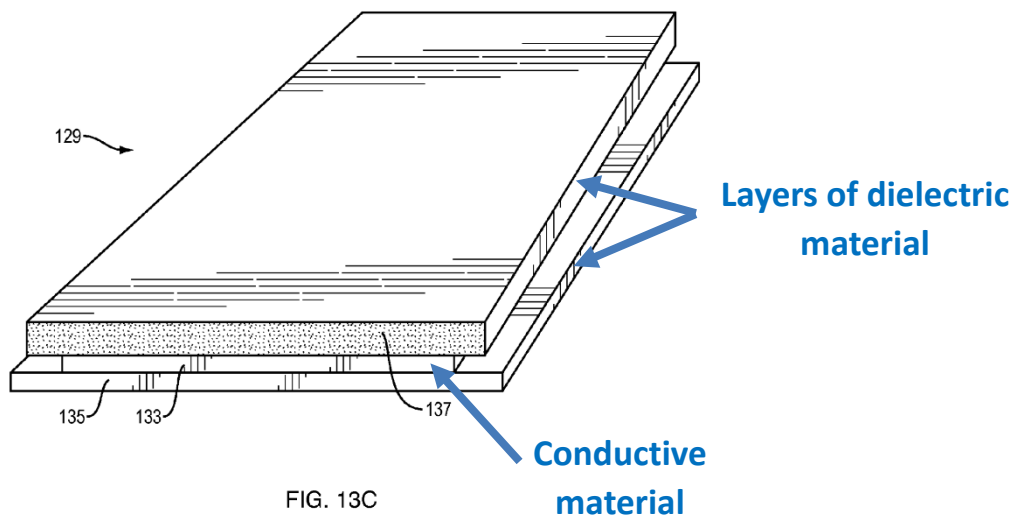


FIG. 10A

See, e.g., EX-1008, ¶¶[0154], [0197], FIG. 10A; EX-1006, ¶¶132-133.

The shielding material 310 is a “multilayer conductive barrier tape” with a “conductive material contained between two layers of a dielectric material.” EX-1006, ¶134. Glew discloses that the shielding material “can be a multi-layer tape

material, as discussed below with respects to FIGS. 13A, 13B, 13C, 13D” EX-1008, ¶¶[0154], [0158]. The multi-layered tape in FIG. 13C has “a thin metallic layer 133 (e.g., an aluminum foil layer) [that] is disposed between an underlying polymeric substrate 135 and a non-woven fabric layer 137.” *Id.*, ¶[0195]. Here is an annotated illustration:



See id., ¶¶[0187-188], [0190], [0193], [0195-196], [0206].

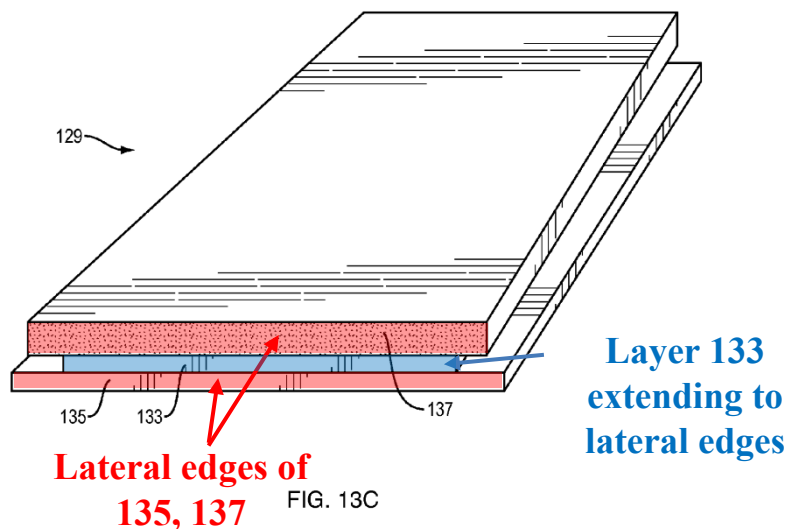
The substrate layer is formed of “polymeric material” such as a dielectric material like FEP, PFA or polyolefins, and may be “electrically insulative, dissipative or conductive.” *Id.*, ¶¶[0187-188]. Similarly, the “non-woven layer 137 can be formed of a polymeric material” and may be “insulative, dissipative or conductive” (or “free of electrically conductive inclusions”). *Id.*, ¶¶[0190], [0193], [0195]. The polymeric material can be the same for the substrate layer and layer 137, or vice-versa. *See id.*, ¶¶[0187], [0195]. Glew thus discloses a “multilayer

conductive barrier tape” with a “conductive material contained between two layers of a dielectric material.” EX-1006, ¶¶134-135.

Glew also discloses that the metallic layer 133 in the three-layer tape of FIG. 13C is “continuous.” The metallic layer 133 in FIG. 13C is partially concealed by layer 137. However, Glew explains that FIG. 13C “illustrates a modified version of the multi-layered tape discussed in connection with FIG. 13B” in that it has the metallic layer between the other two layers as opposed to the metallic layer being the top layer (as shown in FIG. 13B). EX-1008, ¶[0195]. The metallic layer 123 in FIG. 13B is continuous from front to back, and thus a POSITA would understand that the metallic layer 133 in the modified three-layer version in FIG. 13C (which merely moves the location of the metallic layer relative to the other layers) is also continuous. Further, in the other multi-layer tape embodiments shown in FIGS. 13A and 13D, the metallic layers (i.e., 117, 143) are continuous from the front-most (proximal) to the rear-most (distal) ends. EX-1008, FIGS. 13A and 13D. Glew also teaches using tapes that exhibit electrical conductivity along their longitudinal lengths. *See id.*, ¶¶[0031], [0166-174], FIG. 11. Thus, a POSITA would understand Glew to disclose that the metallic layer is continuous from the proximal to the distal ends of the tape. EX-1006, ¶¶135-136.

Regarding the recited conductive layer “extending to each lateral edge of the two layers of the dielectric material”: the ’030 patent does not identify or define

what is meant by “lateral edge.” As shown below, the metallic layer 133 extends to the front edges of dielectric layers 135 and 137, which can be considered “lateral edges” of these two dielectric layers in that they extend laterally (as compared to extending along the longitudinal axis).



EX-1008, ¶[0195], FIG. 13C (annotated). And as explained above, a POSITA would also understand that the metallic layer extends to the back edges at the distal ends of the dielectric layers. EX-1006, ¶136.

A POSITA also would understand Glew to teach that the multi-layer tape of FIG. 13C has the thin metal layer 133 extending to the side edges of the dielectric layers. *Id.*, ¶138. Glew states that FIG. 13C and similar Figures (such as FIG. 13B) is merely a “schematic description” or “schematic illustration.” EX-1008, ¶¶[0077-78], [0190], [0195]. A POSITA would understand that the Figure is intended to identify and illustrate the three different layers of the multi-layer tape,

not to show that these layers must be or are intended to be offset relative to each other when the tape is employed in a cable.

A POSITA would understand that when a three-layer tape, such as shown in FIG. 13C, is manufactured for use in a cable, the three layers would be aligned along the side edges. EX-1006, ¶¶137-138. Tapes typically are manufactured by slitting larger films to size (e.g., slitting a large film to make multiple 1” wide tapes (or different sizes)). To make a tape as is seemingly literally depicted in FIG. 13C (or 13B), which has each layer of a different width, would involve custom-making individual tapes for individual cable sizes instead of making tapes via the customary slitting manufacturing process. *Id.*, ¶138. It would take much more time and be more complex to make all three of the layers in FIG. 13C offset from each other, and Glew does not suggest that such an alternative process would be used or that having different layer widths would be important or advantageous. For at least those reasons, a POSITA would understand that when the three-layer tape in Glew’s FIG. 13C is manufactured for use in a cable, and used in a cable (such as depicted in FIG. 10A), the conductive layer 133 also extends to those side edges of the dielectric layers. *Id.*, ¶¶132-140.

B. Dependent Claims 2-3, 9-14 and 16-17

1. Claim 2

“2. The cable of claim 1, wherein the filler comprises a dielectric material.”

Glew discloses that separator 300 (*filler*) “can be formed of a polymeric material, such as FEP, PFA, MFA, and any of the other polymers discussed above.” EX-1008, ¶0154, FIG. 10A. These include dielectric materials. EX-1006, ¶¶141-142.

2. Claim 3:

“3. The cable of claim 1, wherein the filler has a helical twist at a first angle.”

In connection with discussing separators (fillers) and cables with such separators, Glew identifies (and “incorporates by reference in their entirety”) other exemplary separator embodiments (and cables with such embodiments) from other patents and publications, including US Publication No. 2010/0206609 (“’609 Publication”) which has the same inventor as one of the named inventors in Glew. EX-1008, ¶¶[0144], [0159], [0219]; EX-1026. Glew thus includes the disclosures of all such references, including the ’609 Publication. *See Arbutus Biopharma Corp. v. Modernatx, Inc.*, 65 F.4th 656, 662-663 (Fed. Cir. 2023) (quoting *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000) (“When a reference or material from various documents is incorporated, they are ‘effectively part of the host documents as if [they] were explicitly contained therein.’”)).

Glew also states that the different separator shapes [0144] and embodiments [0159] and “cable in which separators according to the teachings of the invention

can be employed” are disclosed in the ’609 Publication. EX-1008, ¶¶[0144], [0159], [0219]. Such separators and cables for employing Glew’s teaching are thus highlighted to a POSITA.

The ’609 Publication teaches helically twisting the filler (referred to as the separator or the core) in the cable. EX-1026, ¶¶[0064] (“The various shaped sections of the core support-separator may be helixed along the length of the communications cable.”), [0086] (“Finally, the bunched plurality of transmission media and core are optionally twisted to close the cable ...”), [0187] (“The anvil-shaped separator may be cabled with a Mixed configuration. The helically twisted portions (165) in turn define helically twisted conductor receiving grooves within the channels that accommodate the twisted pairs or individual optical fibers.”), [0195] (“The crush resistance of the inventive separator helps preserve the spacing of the twisted pairs, and control twisted pair geometry relative to other cable components. Further, adding a helical twist allows for improving overall electrical performance design capability while preserving the desired geometry.”). Thus, Glew (through its incorporation of the ’609 Publication by reference) discloses the filler has a helical twist at a first angle, as recited. EX-1006, ¶¶143-146; *see also*, *Kenmetal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1384 (anticipatory when element is immediately apparent to one of ordinary skill in the art).

3. Claim 9:

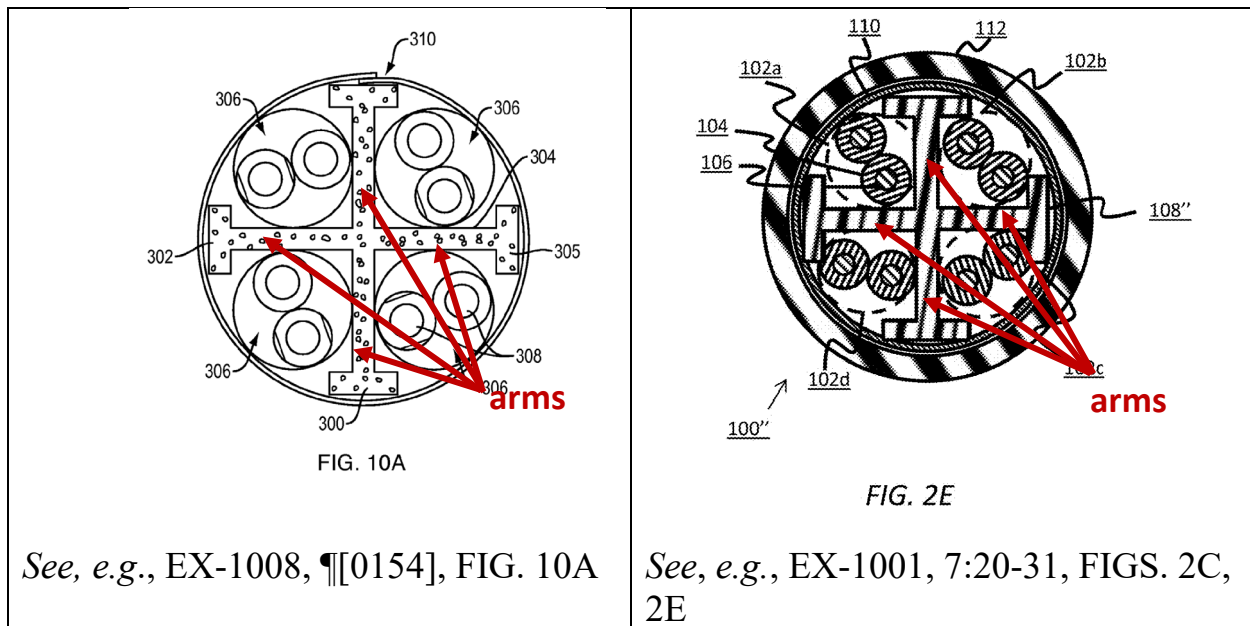
“9. The cable of claim 3, wherein the first twisted pair of insulated conductors and the second twisted pair of insulated conductors have a helical twist around the filler at the first angle.”

As discussed above regarding claim 3, the '609 Publication, which was incorporated in its entirety into Glew (EX-1008, ¶¶[0159], [0219]), describes a cable and a manufacturing process in which twisted pairs and the separator/core (filler) are twisted together, with the twisted pairs being positioned in the “helically twisted receiving grooves” of the separator, which results in the pairs being helically twisted about the filler as recited in claim 9. *See* EX-1026, ¶¶[0064], [0086], [0187], [0195]. Thus, Glew discloses the twisted pair conductors having a helical twist around the filler at the first angle (i.e. at the angle of the filler’s helical twist). EX-1006, ¶¶147-148.

4. Claim 10:

“10. The cable of claim 1, wherein the filler comprises at least one arm.”

Glew discloses the separator 300 (*filler*) having four arms 304, that are virtually the same as the arms on several embodiments in the '030 patent:



Glew thus discloses this element. EX-1006, ¶¶149-150.

5. Claim 11:

“11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.”

As shown in the annotated figure below, Glew discloses that shielding material 310 (*barrier tape*) has a seam that is positioned above flap portion 305 (*terminal portion*) of an arm of the separating member 300 (*filler*):

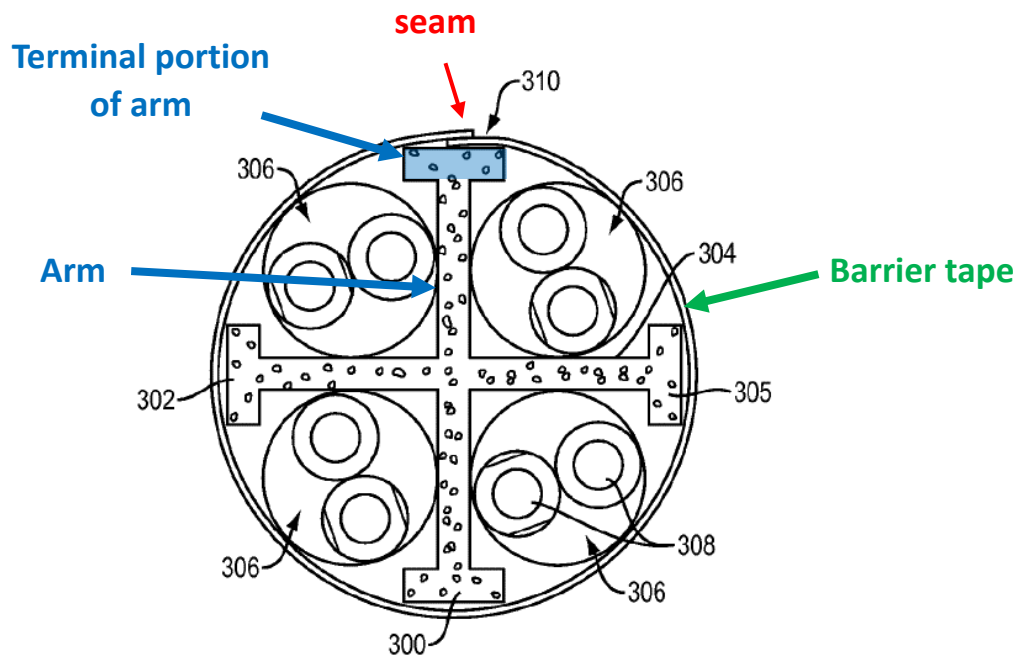


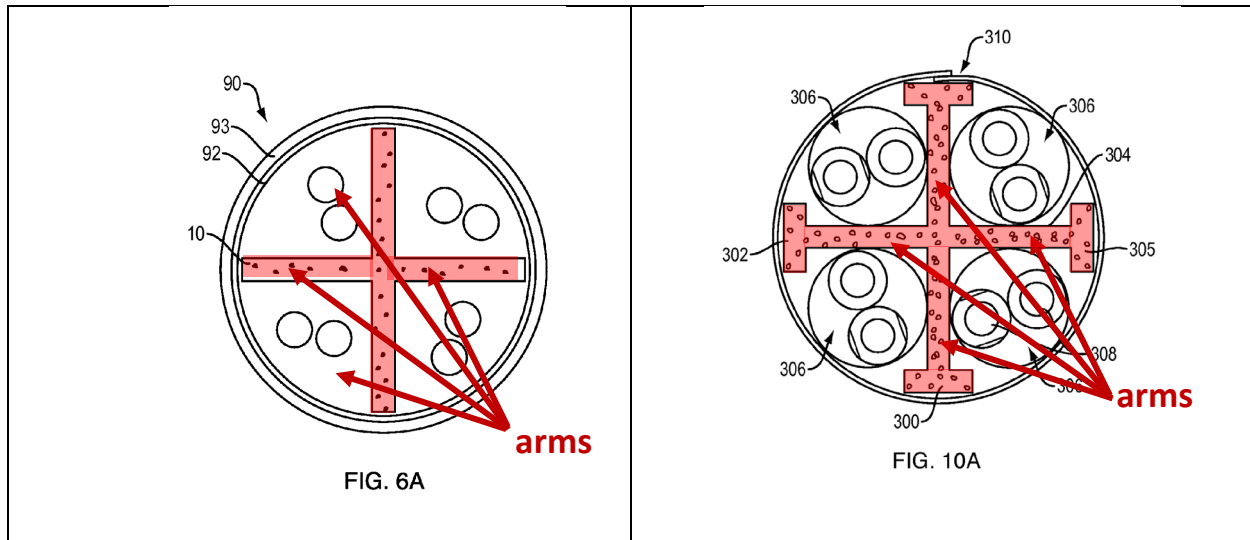
FIG. 10A

EX-1008, ¶[0154], FIG. 10A (annotated); *see also id.* FIG. 10H; EX-1006, ¶¶151-153.

6. Claim 12:

12. The cable of claim 10, wherein the filler comprises four arms in a cross shape.”

As discussed above with respect to claim 10, Glew discloses a separator 300 (*filler*) having four arms 304 in a cross shape:



EX-1008, ¶¶ [0144], [0154], [219], FIGS. 6A & 10A; EX-1006, ¶¶ 154-156.

7. Claim 13:

“13. The cable of claim 10, wherein each arm ends in a symmetrical terminal portion.”

As illustrated FIG. 10A, each of the arms 304 is T-shaped and terminates in a symmetrical flap portion 305 (*terminal portion*):

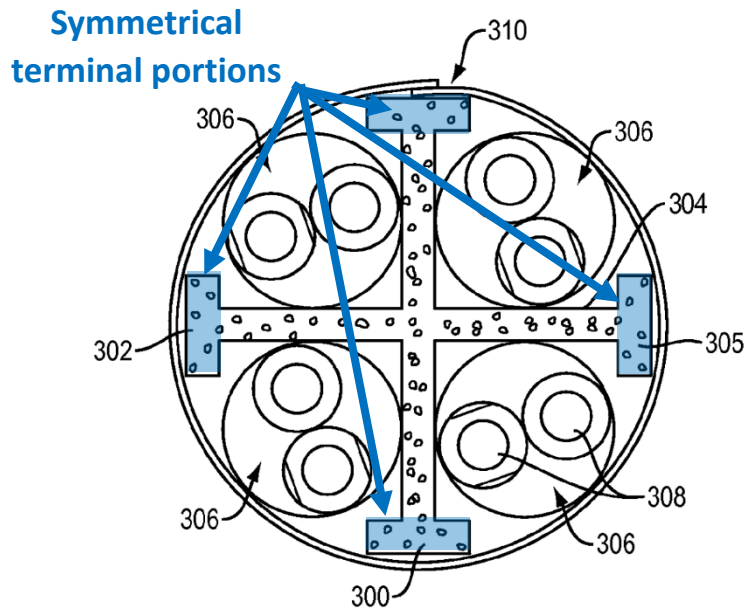


FIG. 10A

EX-1008, ¶ [0154], FIG. 10; EX-1006, ¶¶157-158.

8. Claim 14:

“14. The cable of claim 10, wherein the terminal portion of each arm is wider than a middle portion of said arm.”

As shown in the annotated figure below, the flap portion 305 (*terminal portion*) of each arm 304 is wider than the middle portion of the arm:

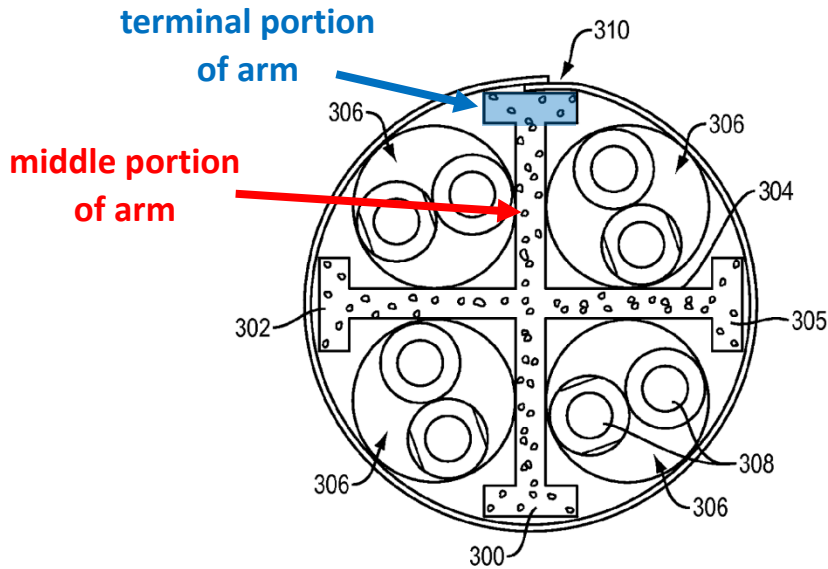


FIG. 10A

EX-1008, ¶[0154], FIG. 10A (annotated); EX-1006, ¶¶159-160.

9. Claim 16:

“16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.”

As shown in the annotated figure below, Glew’s separator 300 (*filler*) has a pair of arms that forms a channel, wherein the first twisted pair of insulated conductors is positioned within the channel:

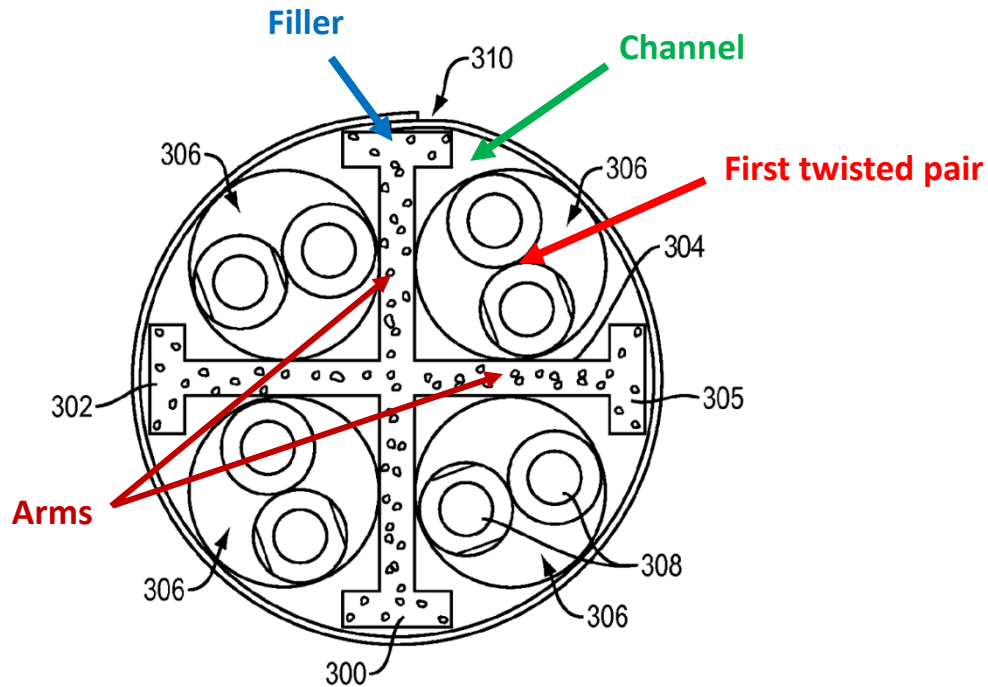


FIG. 10A

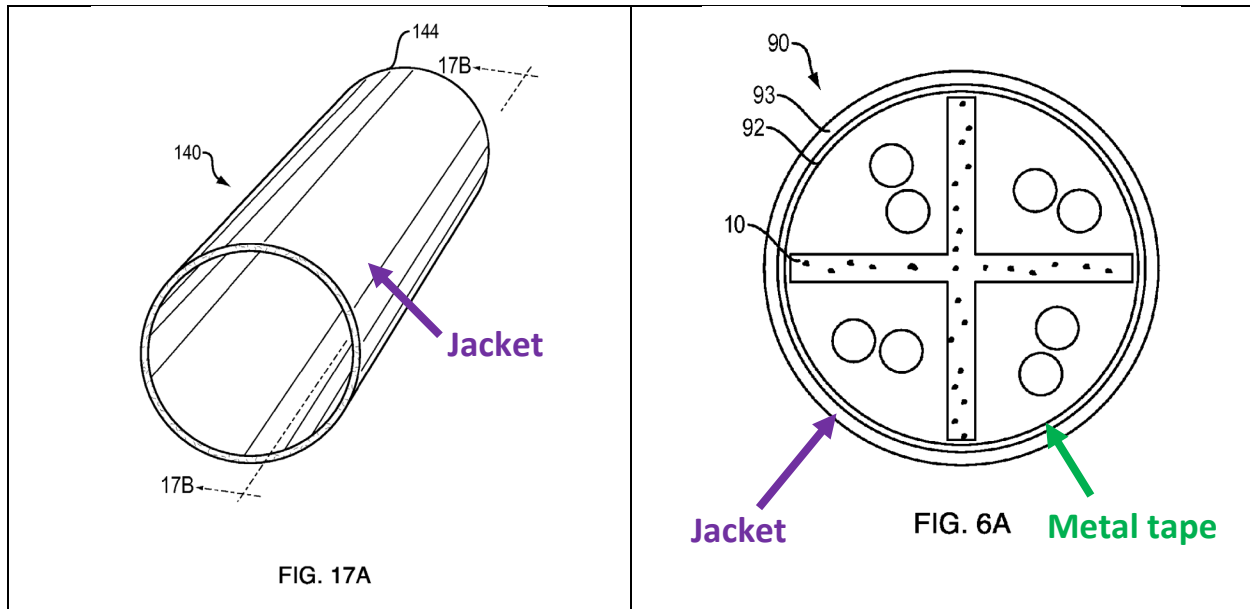
EX-1008, ¶[0154], FIG. 10A (annotated); EX-1006, ¶¶161-162.

10. Claim 17:

“17. The cable of claim 1, further comprising a jacket surrounding the conductive barrier tape.”

Glew describes utilizing an outer jacket that surrounds the barrier tape and twisted pairs. *See, e.g.*, EX-1008, ¶¶[0036-43], [0146], [0221-233], FIG. 17A.

Glew’s jacket, and cable with an outer jacket surrounding a metal barrier tape, are illustrated in the annotated figures below:



See *id.*, ¶¶ [0146-147], [221-230], FIGS 6A, 6B, 17A, 18A, 18B; EX-1006, ¶¶163-164.

C. Independent Claim 18

Claim 18 recites essentially the same limitations as claim 1, except it does not require the conductive layer to be “continuous” and it is written in the form of a “method.” Glew's disclosure relative to the elements of apparatus claim 1 equally applies to a “method” of manufacturing such cable. Using Glew’s cable and teaching described above for claim 1 (which identifies for each limitation in claim 1 the corresponding structural limitation in claim 18 being “provid[ed]” (twisted pair conductors ([18A])) or “position[ed]” (filler ([18B])) or “wrap[ed]” around the conductors and filler (barrier tape ([18C-1, 18C-2])) results in performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. EX-1006, ¶¶165-173.

Ground 4: Claims 1-3, 9-14, 16-18 are Obvious in view of Glew and Cook and/or the knowledge of a POSITA

In the event Glew is deemed to not disclose a barrier tape with a continuous conductive material “extend[ing] to each lateral edge of the two layers of the dielectric material” (as recited in each of independent claims 1 and 18) if the lateral edges are as labelled below, it would have been obvious to a POSITA at the time of the '030 invention to modify Glew's barrier tape to have the conductive material so extend in a finished cable. EX-1006, ¶¶174-178.

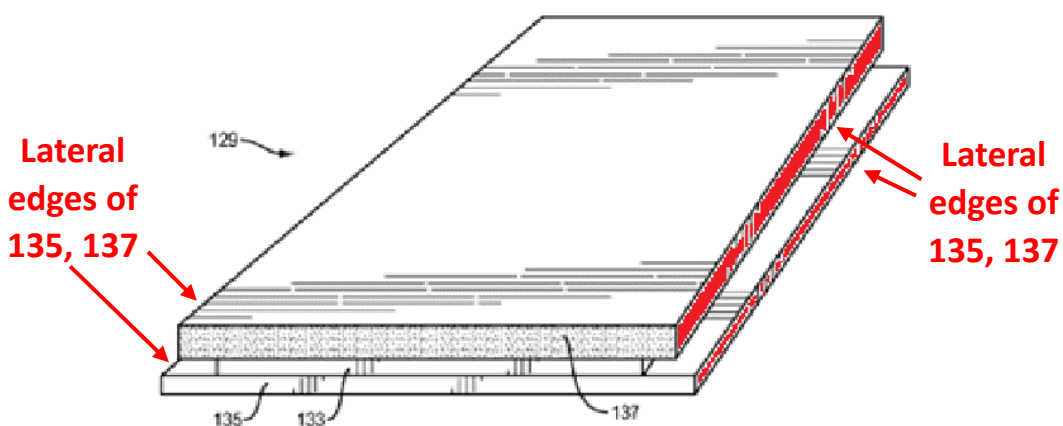


FIG. 13C

First, making such a modification would have been obvious in view of Glew alone. Regarding the conductive material being *continuous*: Glew discloses that the metallic layers in the multi-layered tapes in FIGS. 13A, 13B and 13D are continuous. Moreover, Glew states that FIG. 13C (which shows the recited three-layer tape with the metallic layer sandwiched between two dielectric layers) is a modification of FIG. 13B in that the metallic layer is positioned between the layers

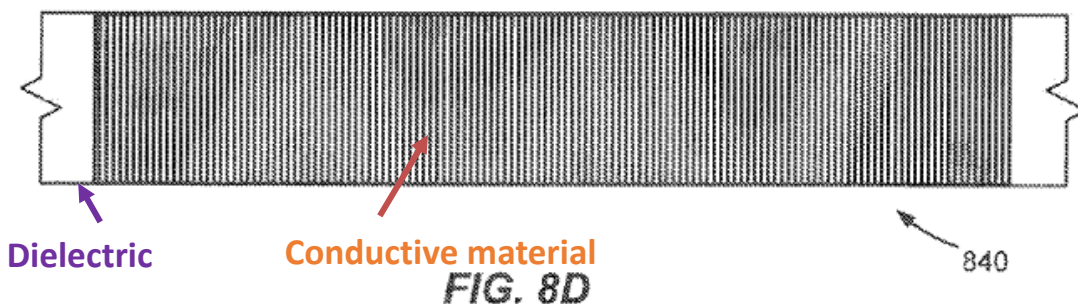
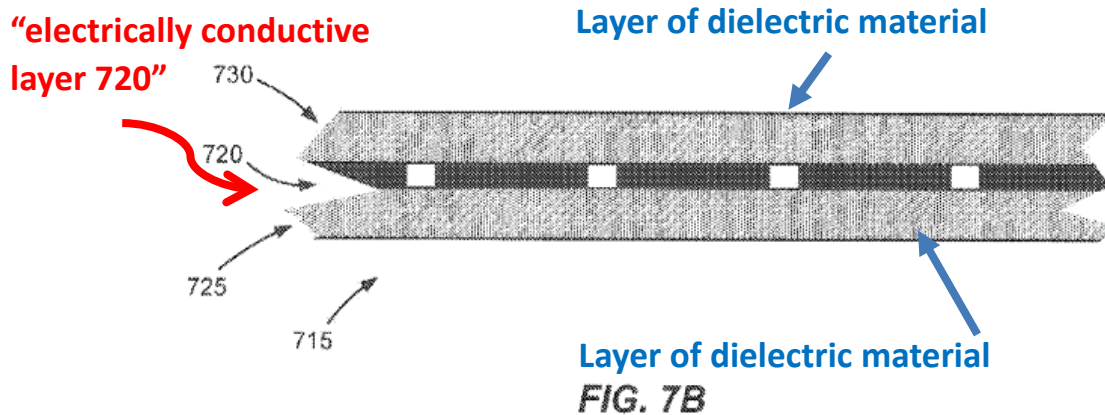
instead of being above both of the dielectric layers (as in FIG. 13B). *See* FIG. 13B (showing metallic layer extending full length of dielectric layers). With regard to the conductive material *extending to the lateral edges*: as explained above in connection with element [1D], at the time of the '030 patent filing date the common method of making multi-layer tapes, such as disclosed in Glew, was to feed large sheets or films of the multi-layer material into a slitter, which then slits the sheet into smaller-sized tapes. This process results in all three layers having side edges flush with each other. *See*, Ground 3 §A(2), *supra*; *see also* EX-1037, FIGS. 3A, 3B, 4B; EX-1038 (“Cook-794”) at FIG. 3; EX-1006, ¶¶175-176. So, for example, a manufacturer that wanted 1” wide tapes would not make 1” wide tapes one at a time; instead it slits several 1” wide tapes from a much wider sheet. EX-1006, ¶¶176-177.

To make a tape as literally depicted in FIG. 13C (or 13B), which has each layers of different widths, would require making each tape individually. That would take much more time and be more complex and costly to make than using the customary slitting process. Glew does not suggest that having non-aligned edges is advantageous or important. EX-1006, ¶177.

Glew ties the benefits of its disclosed shield (providing electromagnetic shielding, and reducing alien crosstalk and insertion loss) to the existence of the three layers, not whether their edges are aligned or unaligned. *See* EX-1008,

¶¶[0007], [0101], [0197], [0217]. Just like the '030 Patent, Glew does not talk about the lateral edges of its shield (*barrier tape*). And Glew's disclosed manufacturing steps to create the multi-layer tape (e.g., using adhesives or bonding agents or thermal bonding or ultrasonic bonding) are applicable to the tape layers whether the edges are aligned or not. *See id.*, ¶¶[0199-200]. A POSITA would find it obvious to make the three layers of the multi-layer tape flush with each other (i.e., have the metal layer extend to the side edges of the dielectric layers in FIG. 13C). Doing so would provide the benefits of Glew's disclosed tape and doing so also would be simpler and cheaper to manufacture. EX-1006, ¶¶177-181. Thus, modifying Glew to have the tape with aligned lateral edges would have been obvious to a POSITA. *Id.*

Second, making the Glew conductive layer continuous and extending to the lateral edges of the dielectric layers would have been obvious in view of Cook. EX-1006, ¶¶181-182. Cook discloses a three-layer barrier tape (having a conductive layer sandwiched between layers of dielectric material) wrapped around the filler and conductors:



See EX-1008, 4:32-47, 4:55-59, 5:46-48, 5:63-6:22, 6:35-41, 15:57-63, FIGS 1-2, 7B, 8D; EX-1006, ¶¶181-182.

As discussed in Ground 1 regarding [1D], Cook specifically discloses that the conductive layer (i.e., the “electrically conductive material (e.g., a metallic material, an alloy, etc.)” can be “continuous” or “discontinuous” (e.g., comprise separated conductive patches or sections) and “span[s] fully across a width” of the shield with its side edges aligned with the side edges of the dielectric layers. EX-1008, 7:1-15, 12:22-23, FIGS. 7C, 8A-8D; Ground 1 §A(2), *supra*. Figure 8D (above) shows the conductive layer extending to each of the sides of the tape. Cook thus demonstrates that it is well-known for multi-layer tapes to have the

metal layer side edges flush/aligned with the dielectric layer edges. EX-1006, ¶¶182-184. This also is shown, for example, in the Smith and Cook-794 references discussed above. EX-1037, FIGS. 2A, 4A-4B; EX-1038, FIG. 2A.

A POSITA would recognize that modifying Glew's three-layer tape to extend to the longer, longitudinally extending edges of the dielectric material (assuming it is not already disclosed) is the combination of familiar elements according to known methods to yield predictable results. The modification is simply a rearrangement of old elements with each performing the same function it had known to perform, yielding no more than one would expect from such an arrangement. EX-1006, ¶¶184-187.

Glew's cable, including its multi-layer tape, provides for shielding of the twisted pairs of conductors from external interference (e.g., reducing alien crosstalk). *See, e.g.*, EX-1008, ¶[0101]. Likewise, Cook's three-layer tape (with aligned lateral edges) is a "shield layer" that shields the twisted pairs of conductors from external interference. *See, e.g.*, EX-1010, 3:52-55, 4:5-13, 5:45-48, 6:35-40. A POSITA would have a reasonable expectation that using the Glew tape modified to have the metal layer extending to the lateral edges of the dielectric layers (as shown in Cook) would be successful. Moreover, as explained above, a POSITA would understand that it would be more cost-effective and simpler to manufacture

such tapes with aligned edges than with the offset edges schematically illustrated in Glew FIG. 13C. EX-1006, ¶186.

It thus would have been obvious to a POSITA to modify Glew, and Glew so modified meets all of the elements of claim 1 (and the remaining claims) as set forth above in Ground 3. *See* EX-1006, ¶¶187-188, Ground 3, *supra*.

Thus, claims 1 and 18 and all the other dependent claims would have been obvious to a POSITA. EX-1006, ¶¶174-188.

Ground 5: Roberts Anticipates Claims 1-3, 9-11, 13, 16-18

A. Independent claim 1 (and 18)

- 1. A cable comprising: [1A] (and [18A]); [1B] (and [18A]); [1C] (and [18B]); and**

Roberts shows a cable with first and second twisted pairs of insulated conductors. *E.g.*, EX-1009, Abstract (“A plurality of insulated electrical conductors (pairs), of an otherwise conventional telephone cable design are divided into at least two portions by plastic-coated metal foil strip or tape . . . By dividing electrical conductor telephone pairs . . . with plastic-coated metal foil, the crosstalk properties are so vastly improved”), 3:21-31 (discussing dividing a disturbing “circuit” from a disturbed “circuit”); EX-1006, ¶¶189-191. Further, Roberts indicates that groups of electrical conductors 14 and 16, such as those shown in Fig. 17, are comprised of groups of twisted pairs of insulated conductors. Roberts explains that the cable manufacturing process uses a die 30a shown at Figure 23

that has “holes (33) through which twisted electrical conductors (14) and (16) pass” and that the apparatus shown in Figure 23 is used to manufacture the cable shown in Figure 17:

FIG. 23 (manufacturing process)

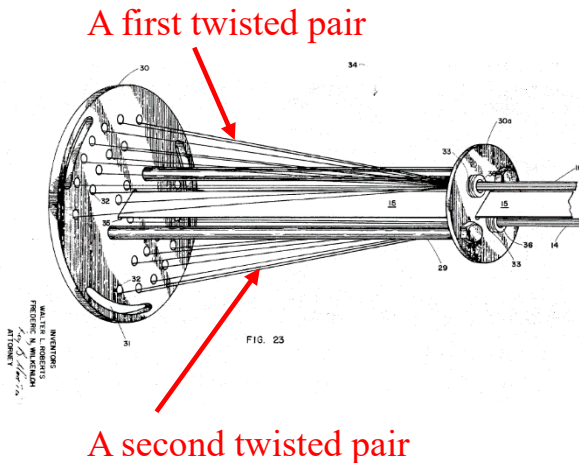
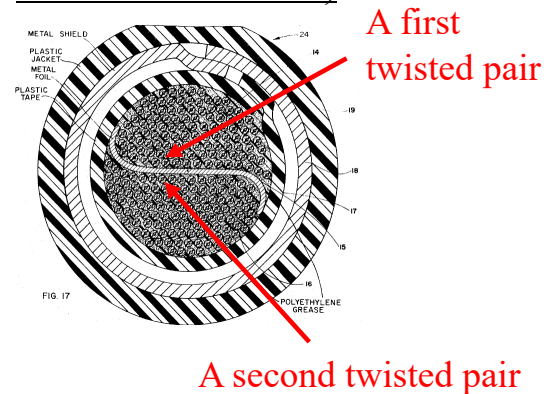


FIG. 17 (assembled cable with multiple twisted pairs of insulated conductors)

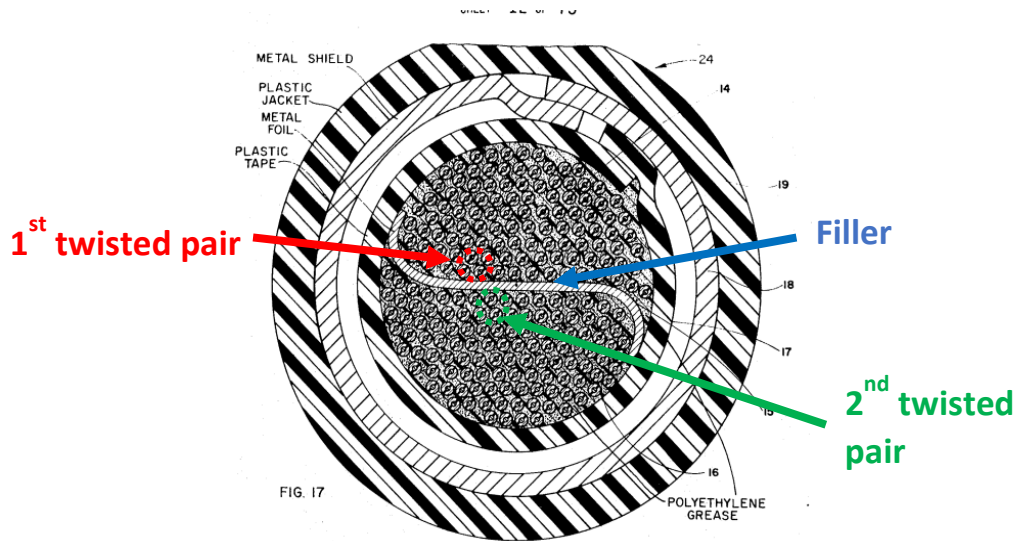


EX-1009, 12:6-8, 12:12-14, Figs. 23, 17. A POSITA would understand that each strand being pulled through the die plate holes 32 to hole 33 in die plate 30a, as depicted and described in Figure 23, is a twisted pair. *Id.*, 12:5-12, Fig. 23; EX-1006, ¶¶192-194; EX-1016, p. 9 (“twisted pair wire supply” provides insulated twisted pairs that are then fed through a die plate into the stranding machine). And Roberts’ other Figures mimic catalog images of twisted pairs of insulated conductors. EX-1006, ¶195. EX-1041, 20 (102.01).

Further, unless specified in a reference that a pair was untwisted, it was assumed that the pair was twisted. EX-1006, ¶¶195-196. Using twisted insulated copper conductor pairs was the conventional and common practice for

communication cables using pairs or quads of insulated conductors, both at the time of Roberts (1968) and the '030 patent priority date. *Id.*, ¶196; *see also, e.g.*, EX-1019, 1:10-15 (“A typical telephone cable is constructed of twisted pairs of metal conductors . . .”); EX-1016, p. 7 (“Most of the cables within the scope of AT&T’s EC&W product line utilize the twisted pair construction.”); EX-1014 at 2:32-33 (“three pairs 10-14 [of insulated conductors] are each twisted with a different lay”). Twisting pairs of conductors was known to help prevent electrical noise and minimize cross talk. EX-1006, ¶193; EX-1016, p. 7. And by the time of the invention, conventional cables included twisted pairs of conductors, with each twisted pair having a specified distance between twists. EX-1006, ¶¶32-33, 196-197. Thus, a POSITA would understand Roberts’ cable to include multiple twisted pairs of insulated conductors. *Id.*, ¶198.

Regarding the claimed filler: As shown in FIG. 17, the twisted pairs of insulated conductors are separated by a “METAL FOIL” 15 (*filler*):

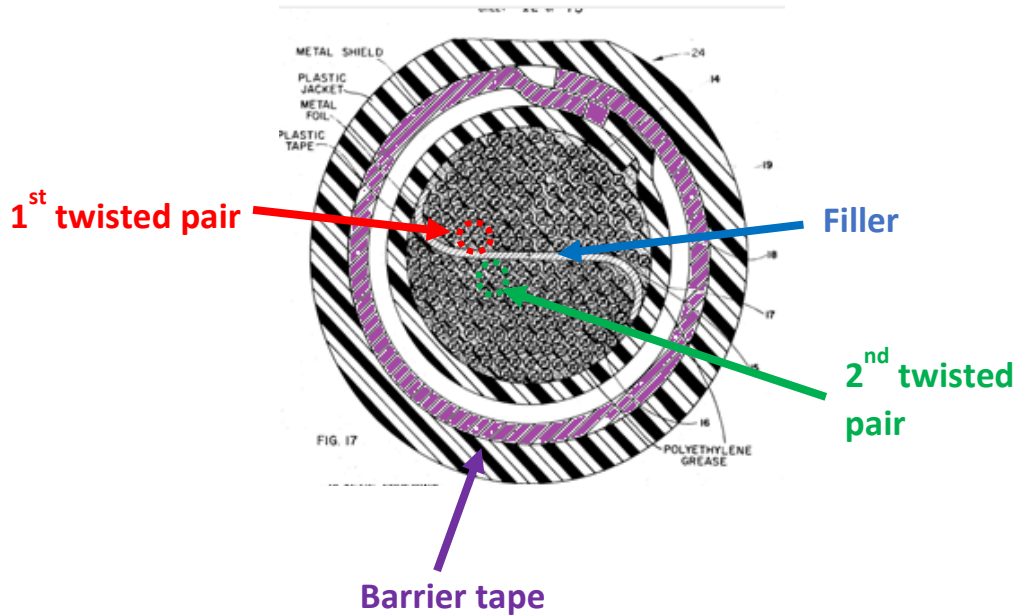


EX-1009, Abstract, 10:48-62, 12:5-8, FIGS. 17 & 23; EX-1006, ¶¶190-191, 200.

Thus, Roberts discloses a cable with the recited elements. EX-1006, ¶¶189-202.

2. Element 1D (and [18C-1] and [18C-2])

Roberts discloses this. EX-1006, ¶¶203-208. Referring to annotated FIG. 17 below, metal shield 18 (*barrier tape*) surrounds the first and second twisted pairs of insulated conductors and the filler:



EX-1008, 4:15-23, 10:42-51, 12:30-36, FIG. 17; EX-1006, ¶¶203-207.

The metal shield 18 is a multi-layer tape with a conductive layer between two dielectric layers. EX-1006, ¶¶203-207. The shield 18 is described as “metal tape” (or “metal armor tape”) that operates “as an electrical, as well as a mechanical, shield” and that “can have a plastic, such as a polyethylene, firmly adhered to either one or more surfaces thereof.” EX-1009, 4:15-23, 12:30-36. This is the same description as the metal foil shield 15 (*filler*) which Roberts says may be “coated on one side,” or “coated on both sides with a plastic”, such as shown in, for example, Roberts FIGS. 5 and the '030 Patent FIG. 3A (provided (with coloring) below):

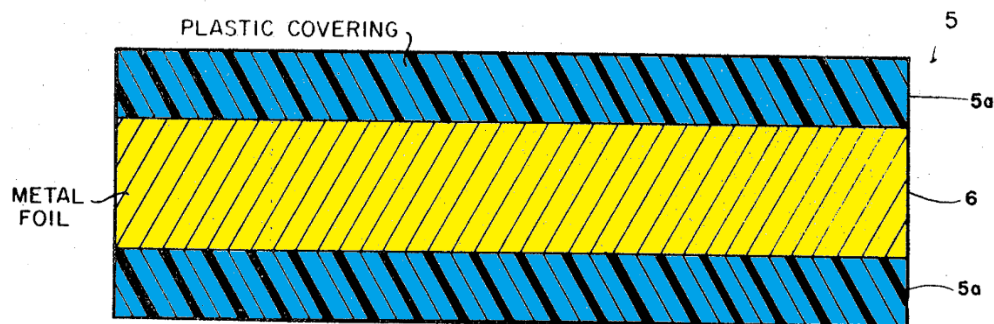


FIG. 5

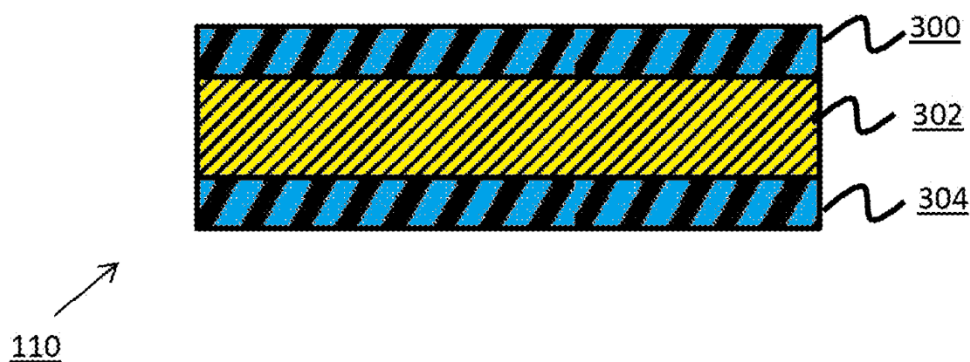
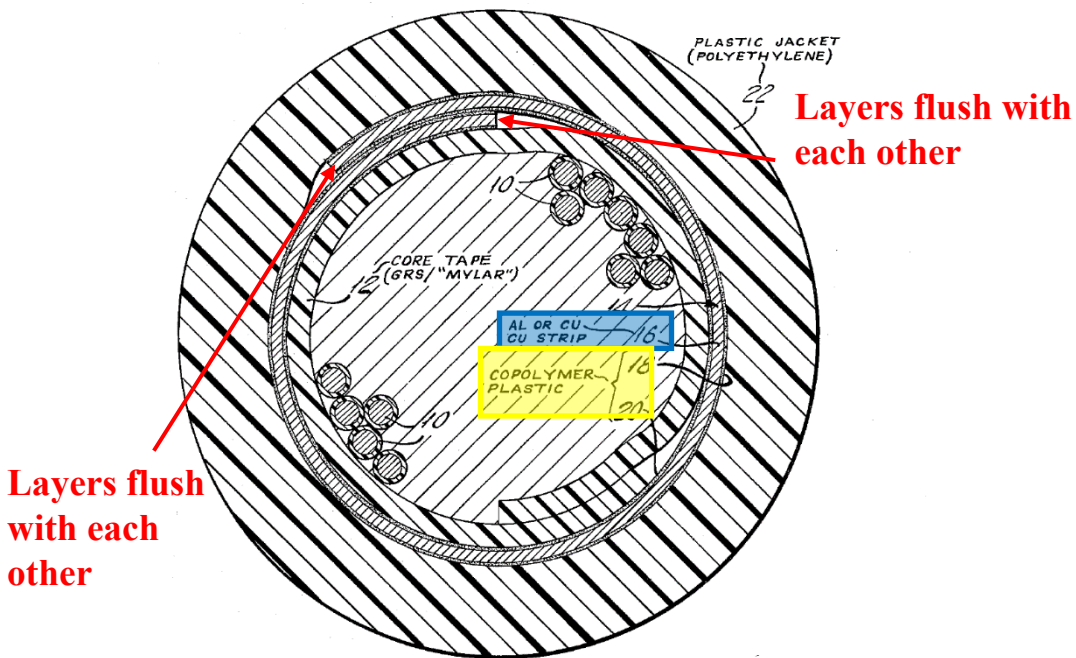


FIG. 3A

EX-1009, 4:48-60, 10:52-62, FIG. 5; EX-1001, 7:32-45, FIG. 3A; EX-1006, ¶¶203-207. In this disclosed three-layer tape, the metal layer is continuous and has lateral edges flush with the edges of the dielectric layers. EX-1006, ¶¶203-207. A POSITA would conclude that the disclosed metal shield 18 (with dielectric on both surfaces) would look the same. *Id.*

Roberts also discloses that the cable is of “conventional telephone cable design” except that the conductors are divided into the separate portions by the filler (i.e., the plastic-coated foil). EX-1009, Abstract. A POSITA would

understand that with conventional designs, the metal armor tape 18 has a continuous metal layer sandwiched between two layers of a dielectric material and extending to the lateral edges of the dielectric material. See, EX-1006, ¶¶44-45, 206. An example of such conventional design is shown in Jachimowicz-036 (illustrated below) which has a tape shield 14 with a metal layer 16 between plastic layers 18, 20 with flush edges, and in other well-known plastic-clad metal tape products such as those sold under the “Zetabon” trademark.



EX-1013, 2:52-66, FIG. (annotated); EX-1006, ¶¶44-45, 206; EX-1031 to EX-1037; EX-1014 at 3:23-27.

Roberts, therefore, discloses a cable with the elements recited in Claim 1. EX-1006, ¶¶203-208.

B. Dependent Claims 2-3, 9-11, 13, 16-17

1. Claim 2

“2. The cable of claim 1, wherein the filler comprises a dielectric material.”

Roberts discloses this, as shield 15 (*filler*) can be coated on one side, both sides, or completely surrounded by a plastic material such as “polyethylene teraphthalate (Mylar) dielectric.” *E.g.*, EX-1009, 3:49-66, 12:48-62, 11:13-16, FIGS. 5, 7, 18, 19, 21; EX-1006, ¶¶209-210.

2. Claim 3:

“3. The cable of claim 1, wherein the filler has a helical twist at a first angle.”

Roberts discloses that the conductors and shield 15 (*filler*) in FIG. 17 are twisted into a “twisted composite” during manufacturing. EX-1009, 12:12-30, FIG. 23. Thus, this element is disclosed. EX-1006, ¶¶211-213.

3. Claim 9:

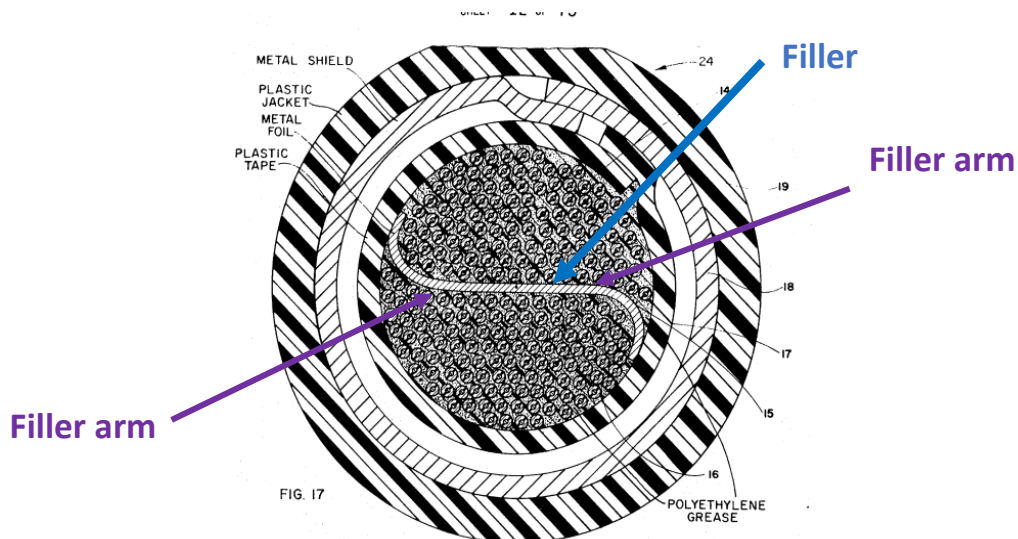
“9. The cable of claim 3, wherein the first twisted pair of insulated conductors and the second twisted pair of insulated conductors have a helical twist around the filler at the first angle.”

Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a “twisted composite” during manufacturing. EX-1009, 12:12-30. Thus, they are helically twisted around the filler at the same angle (i.e., the first angle). EX-1006, ¶¶214-215.

4. Claim 10:

“10. The cable of claim 1, wherein the filler comprises at least one arm.”

Shield 15 (*filler*) has at least one arm:



See EX-1009, FIG. 17 (annotated); EX-1006, ¶¶216-218.

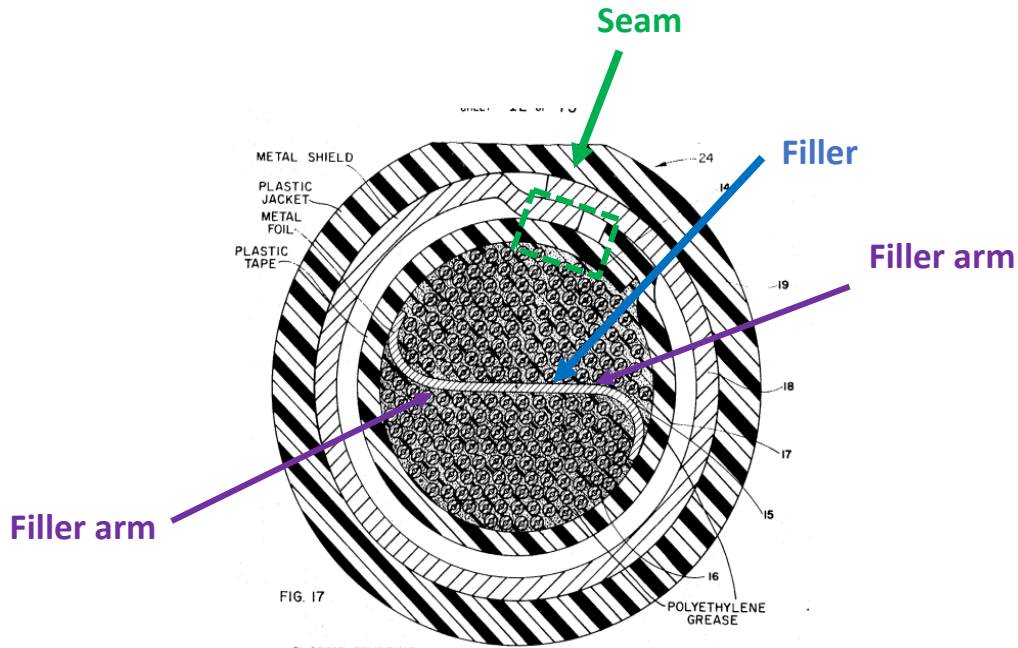
5. Claim 11:

“11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.”

Although the cross-sectional view illustrated in Roberts FIG. 17 does not illustrate the seam of metal shield 18 (*barrier tape*) positioned above a terminal portion of an arm of the shield 15 (*filler*), a POSITA would recognize that Roberts discloses such a feature at other cross-sectional locations along the cable. EX-1006, ¶¶219-221.

Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a “twisted composite” during manufacturing. EX-1009, 12:12-30. This “twisted composite” is “traversed through a taping machine where the metal tape is

applied.” *Id.*, 12:20-33. And Roberts discloses that metal tape “is a tapelike strip that has been longitudinally folded or wrapped around” the twisted pair-filler composite, like a cigarette, with the overlapping edges forming a seam. *Id.*, 4:17-20; EX-1006, ¶220. Figure 17 (below) shows the seam that is formed:



EX-1009, 10:42-48, FIG. 17 (annotated); EX-1006, ¶¶220-221. Given the longitudinal folding, the seam will be relatively straight along the length of the cable. *See* EX-1009, 4:27-33, FIGS. 1-2; EX-1006, ¶¶220-221.

A POSITA would understand the location of the seam relative to the conductor-filler “twisted composite” filler arms would change, and, at some locations along the length of the cable, be positioned above a filler arm. EX-1006, ¶¶219-222. Thus, the twisting conductor-filler composite would, at multiple points along the cable, be oriented such that the metal shield seam would be positioned

over the filler arm. *Id.*; see also, EX-1001, 5:60-64 (explaining longitudinally wrapped tape varies the location of the tape edge relative to the conductors and filler).⁶ Stated another way, a POSITA would recognize that the seam would, at points along the length of the cable, be positioned as shown in FIG. 10A of Glew:

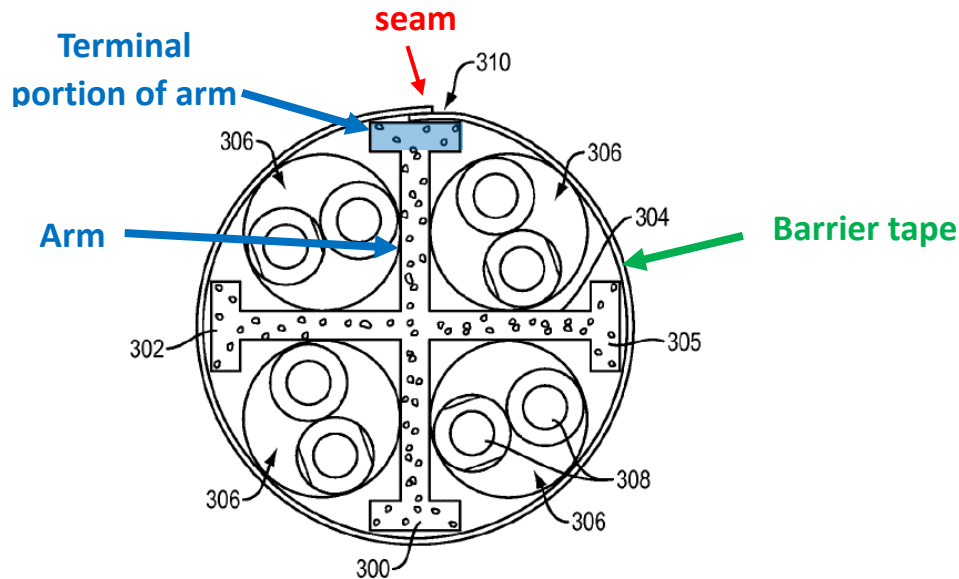


FIG. 10A

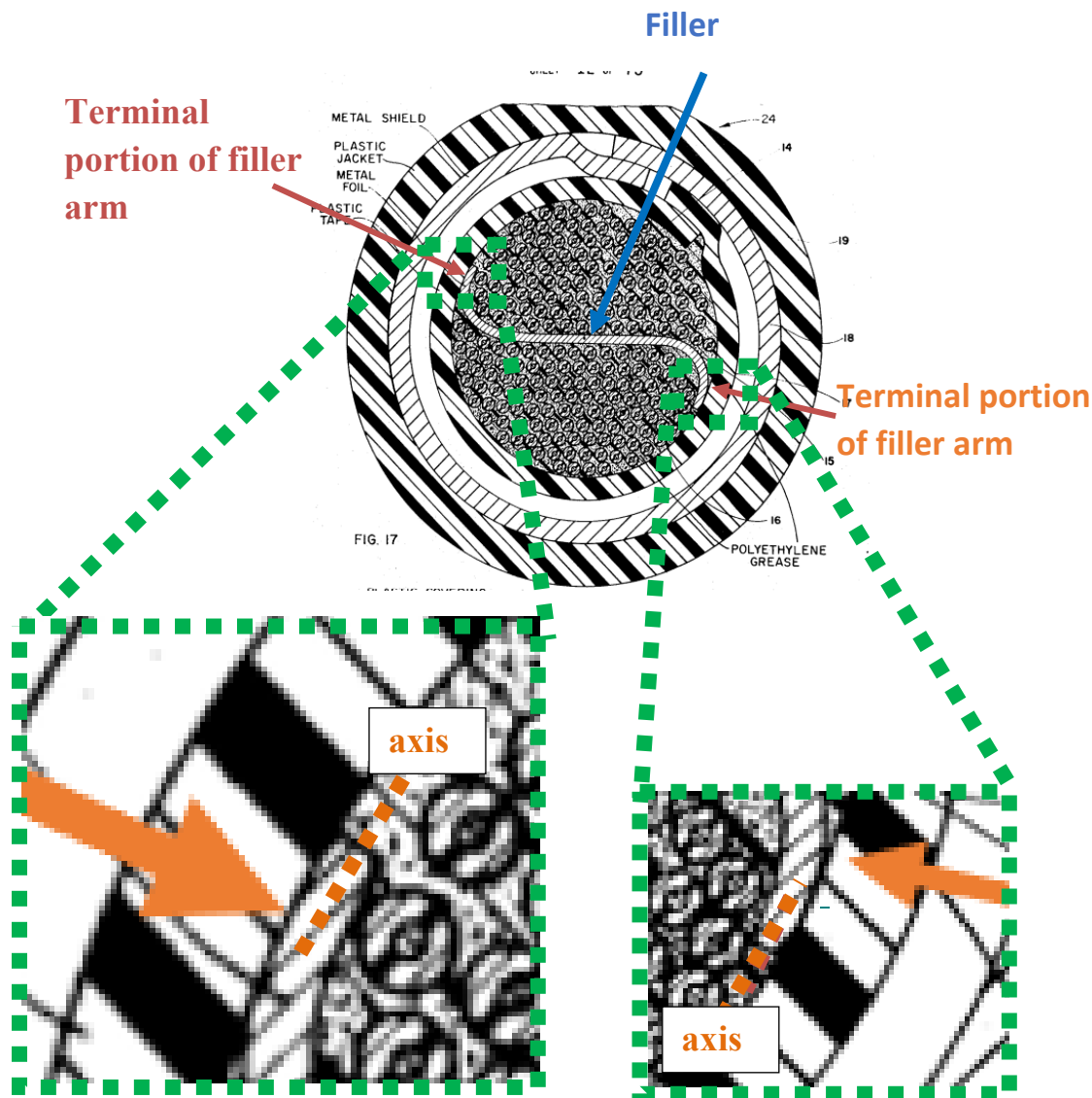
EX-1008, FIG. 10A; EX-1006, ¶¶219-222. Therefore, Roberts discloses this element, and this claim is anticipated. *Id.*

⁶ Petitioner recognizes that, in view of the specification, this limitation may be construed as requiring the seam to be above a terminal portion an arm for the entire longitudinal length of the filler arm, as is done by the '030 patent's disclosed fixed tape control (FTC) process, instead of at any particular point along the length of filler arm. See, EX-1001, Abstract, 2:37-46. Under that interpretation, Roberts does not disclose this element.

6. Claim 11:

“13. The cable of claim 10, wherein each arm ends in a symmetrical terminal portion.”

As illustrated in the annotated figure below, each arm ends in a terminal portion that is symmetrical about the arm's center axis of the terminal that is extending in the same direction as the terminal portion:



See EX-1009, FIG. 17 (annotated); EX-1006, ¶¶223-224. The Examiner understood this claim element the same way, when stating that the similarly-shaped filler (72) arms (75) shown in Clark-478 (EX-1025) ended in symmetrical terminal portions:

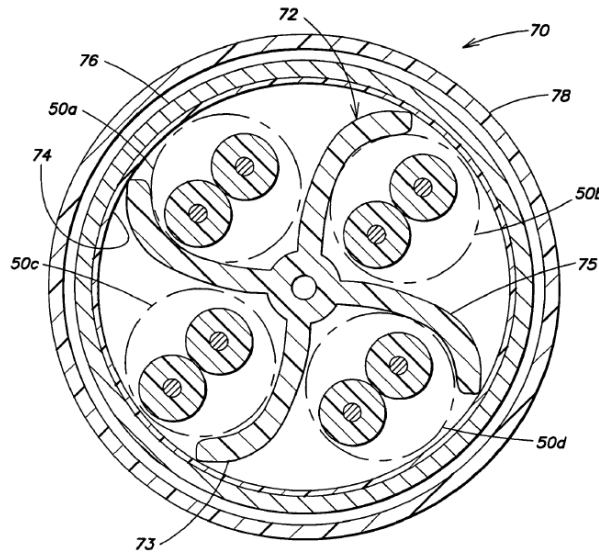


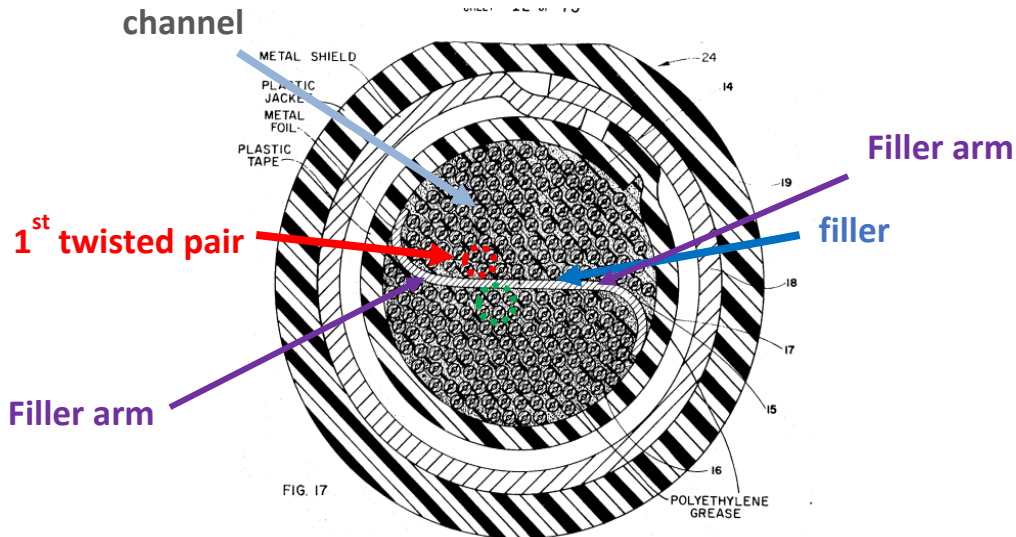
FIG. 2

EX-1025, FIG. 2; -1002, pp. 7-8. Therefore, this claim is anticipated. EX-1006, ¶¶223-224.

7. Claim 16:

“16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.”

As shown below, Roberts’s shield 15 (*filler*) has a pair of arms that form a channel, and the first twisted pair of insulated conductors is positioned within the channel:

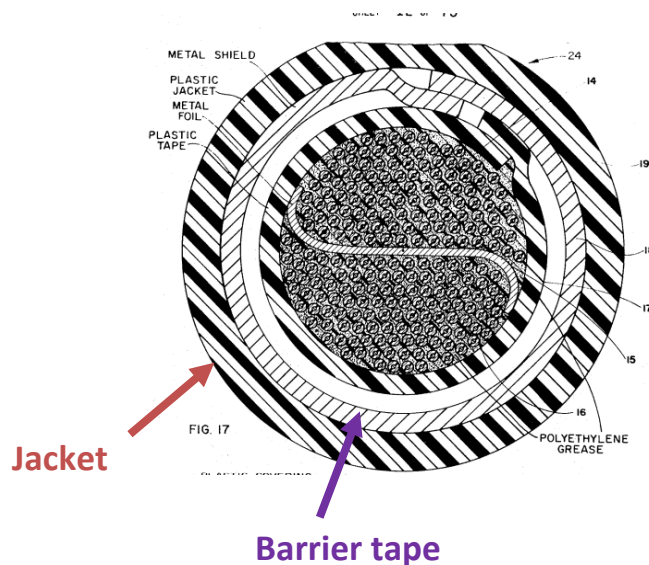


See EX-1009, 10:50-62, FIG. 17 (annotated), Claim 11; EX-1006, ¶¶225-226.

8. Claim 17:

“17. The cable of claim 1, further comprising a jacket surrounding the conductive barrier tape.”

Roberts discloses the cable having a sheath 19 (*jacket*) surrounding the metal shield 18 (*conductive barrier tape*) as illustrated in the annotated Figure below:



See EX-1009, 10:44-46 (“[T]here is an outer cable sheath (19) longitudinally circumscribing a metal armor shield (18). . . .”), FIG. 17 (“PLASTIC JACKET”); EX-1006, ¶¶227-229.

C. Independent Claim 18

Claim 18 recites essentially the same limitations as claim 1, except it does not require the conductive layer to be “continuous” and it is written in the form of a “method.” Roberts’ disclosure relative to the elements of apparatus claim 1 equally applies to a “method” of manufacturing such cable. Using Roberts’ cable and teaching described above for claim 1 (which identifies for each limitation in claim 1 the corresponding structural limitation in claim 18 being “provid[ed]” (twisted pair conductors ([18A])) or “position[ed]” (filler ([18B]) or “wrap[ed]” around the conductors and filler (barrier tape ([18C-1, 18C-2])) results in performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. EX-1006, ¶¶230-239.

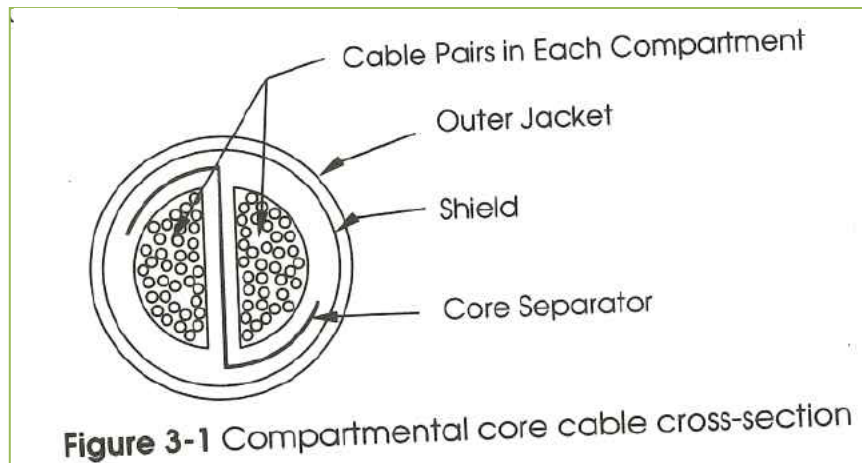
Ground 6: Claims 1-3, 9-11, 13, 16-18 are Obvious in view of Roberts and Jachimowicz-172 and/or the knowledge of a POSITA

If Roberts is found to not disclose first and second twisted pairs of insulated conductors (elements [1A], [1B] and [18A]), the use of twisted pairs of insulated conductors in Roberts’ cable would have been obvious for all the reasons explained in Ground 5, and further in view of Jachimowicz-172.

Roberts discloses a largely “conventional” cable using “pairs” of insulated conductors that are “twisted.” EX-1009, Abstract, 3:5-8, 12:5-8, FIG. 22. As explained by Mr. Cornelison, a POSITA would understand Roberts thus discloses cables having twisted pairs of insulated conductors. EX-1006, ¶¶240-241.

A POSITA also would be motivated, and find it obvious, to use twisted pairs of conductors in Roberts’ cable given their benefits and common usage.

Id. ¶¶241=248. Jachimowicz-172 teaches a data communications cable with multiple twisted pairs of insulated conductors having different twist lengths. EX-1014, 2:32-33; FIGS. 2 & 4. By 2013 and well before, twisting pairs of insulated conductors into multiple sets of “twisted pairs” was the most common and conventional way to provide insulated conductors in data communications cables. EX-1006, ¶242; EX-1008, ¶[0004] (“cables normally have four or more twisted pairs of conductors”); EX-1016, pp. 7-10; EX-1017, pp. 1-24. This is because twisted pairs were known to provide the electrical benefits of lower crosstalk and decreased unbalanced mutual capacitance, along with the mechanical benefits of ensuring the individual wires in a pair stay together and the various pairs do not become intermixed. EX-1006, ¶¶32-33, 242-243; *see also, e.g.* EX-1016, p. 7. And cables such as those disclosed by Roberts typically utilized twisted pairs that were separated into different groups, such as in Roberts’ cable:



EX-1018 at p. 8 (FIG. 3-1); *see* EX-1006, ¶243.

It would have been an obvious and routine modification to configure the insulated conductors in Roberts as twisted pairs. A POSITA would have been motivated to do this to get the known, predictable mechanical and performance benefits of twisted pairs, and to avoid the known drawbacks of using a plurality of non-twisted pair insulated conductors in a data communications cable. A POSITA would have had a reasonable expectation of success in doing this because providing multiple conductors in data communications cables such as that disclosed by Roberts was the common, conventional way to construct such a cable. EX-1006, ¶¶244-248. Further, there was nothing about Roberts' cable that would make using twisted pairs unusually difficult or require anything other than routine skill. EX-1006, ¶246.

Ground 7: Claims 1-3, 9-11, 13, 16-18 are Obvious in view of Roberts Jachimowicz-036 and/or the knowledge of a POSITA

As explained above in Ground 5, Roberts' metal tape shield 18 is a three-layer barrier tape with the continuous conductive material extending to the lateral edges of the dielectric layers on either side of the conductive material.

If it is found that Roberts' metal tape shield 18 does not disclose these claimed features, it would have been obvious to a POSITA to modify Roberts to include such a barrier tape. EX-1006, ¶¶249-250. Roberts discloses that the inventive cable is largely "conventional" and includes a metal armor tape shield 18. EX-1009, 4:15-23, 12:30-36, FIGS. 1, 17. This metal tape 18, which circumscribes the conductors and interior separating shield 15 (as well as other cable components), operates "as an electrical, as well as a mechanical, shield" and "can have a plastic, such as a polyethylene, firmly adhered to either one or more surfaces thereof." *Id.*, 4:15-23, 12:30-36, FIGS. 1, 17. The metal tape 18 also is corrugated. *Id.*, 4:15-17.

Roberts discloses another three-layer tape. Metal shield 15 (*filler*) is a metal tape with a continuous metal material sandwiched between – and extending to the lateral edges of – two layers of a dielectric. The cross-sectional drawing of this three-layer tape is the same as the three-layer tape disclosed in the '030 Patent:

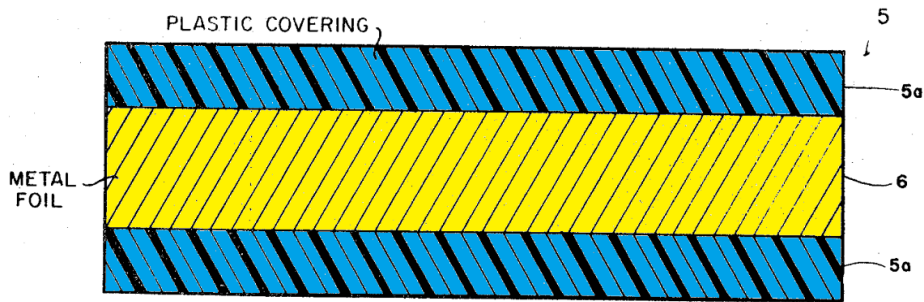
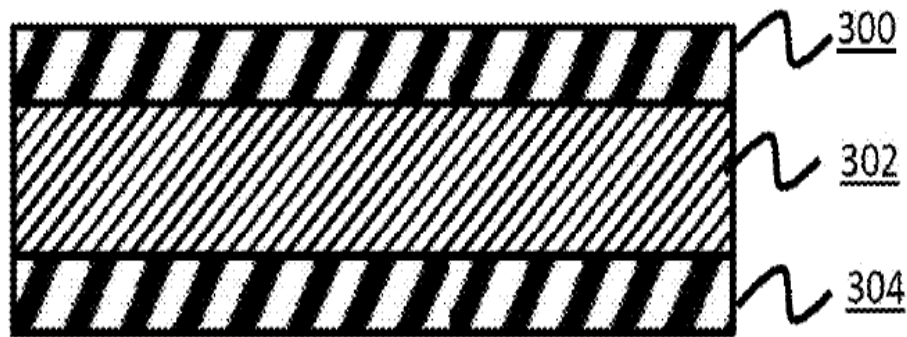


FIG. 5

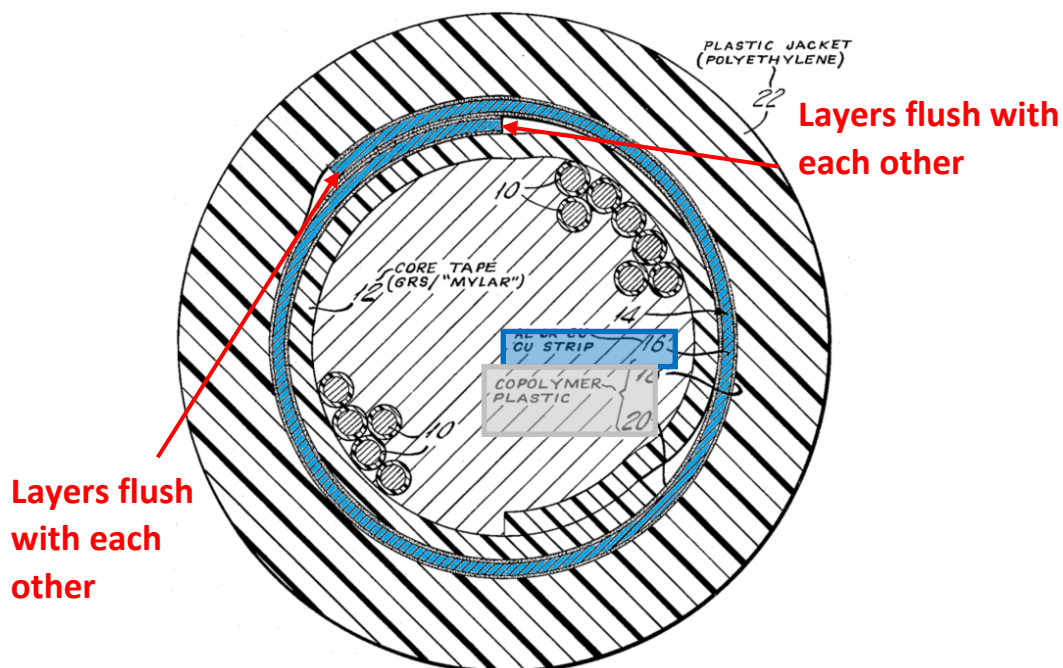


EX-1009, 4:48-60, 10:52-62, FIG. 5; EX-1001, 7:32-45, FIG. 3A. As illustrated, metal layer 6 on the alternative Roberts tape (shown in the cross-section drawing of FIG. 5 above) is continuous and has lateral edges flush with the edges of the dielectric layers 5a. Roberts also discloses that shield 15, like the shield 18, “can be corrugated to increase its mechanical strength.” EX-1009, 4:48-62.

A POSITA would be motivated by Roberts’ own disclosure to utilize, for the metal tape shield 18 (*barrier tape*), a conductive barrier tape that has the cross section of Roberts FIG. 5, which meets the elements of [1D] and [18C-1, 18C-2]. EX-1006, ¶¶249-253. Tape 15 in Roberts is an exemplary embodiment of what tape shield 18 having plastic “adhered to either one or more surfaces thereof” could

be, and certainly one alternative of what a POSITA would consider tape shield 18 (i.e., the barrier tape) to be. EX-1009, 4:20-22.

In addition, it would be obvious to use the three-layer barrier tape in Jachowicz-376 on Roberts' cable. Roberts discloses that the cable is largely "conventional," (EX-1009, Abstract). Another such conventional cable (but without a filler/separator) is illustrated in Jachimowicz-036, which has an outer three-layer barrier tape (14) with a continuous metal layer (layer 16) extending between the lateral edges of the plastic (i.e., dielectric) layers (18, 20):



EX-1013, 1:42-50, 2:52-66, FIG. 3 (annotated).

Likewise, other well-known multi-layer barrier tape shields, such as those sold under the Zetabon trademark, had a continuous metal layer sandwiched

between and extending to the lateral edges of the dielectric layers. EX-1006, ¶¶44-45, 254-256; EX-1031 to EX-1037; EX-1013, 3:23-27

There are only so many ways to shield with a metal tape having plastic on one or more of its surfaces, and one way is with a conventional, well-known three-layer tape discussed above that meets the claim limitations regarding a continuous conductive layer that extends to the lateral edges. A POSITA would have been motivated to use tapes with such designs, particularly in view of Roberts' disclosing use of a metal tape with plastic layers on one or more surfaces thereof. And a POSITA would have a reasonable expectation of success, given Roberts' disclosure of such a three-layer design (for another disclosed tape 15) and given that such tapes, like Roberts' shield 18, can be corrugated and provide an electrical, as well as mechanical, shield. *See* EX-1013, 2:52-72; EX-1009, 4:60-63; EX-1006, ¶¶249-258.

Further, there are limited ways to provide a metal tape shield 18 with plastic "adhered to one or more surfaces thereof." One of those has the continuous metal layer and dielectric layers with the cross section as shown in Roberts FIG. 5 (and also Jachimowicz-172 and '030 Patent FIG. 3A). The tape as recited is just one of a finite number of possible predictable possibilities. Thus, this claim and all the other claims would have been obvious to a POSITA. EX-1006, ¶¶249-258.

Ground 8: Claim 11 is Obvious in view of Any of Grounds 5-7 and Glew and/or the knowledge of a POSITA

A. “11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.”

If Roberts is deemed not to disclose this element, modifying Roberts to include a seam of the barrier tape positioned above a terminal portion of an arm of the filler would have been obvious in view of Glew. EX-1006, ¶¶259-266.

Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a “twisted composite” and subsequently “traversed through a taping machine where the metal tape is applied.” EX-1009, 12:12-30. The tape 18 (*barrier tape*) is “longitudinally folded or wrapped around” the twisted pair-filler composite with the overlapping shield edges forming a seam. *Id.*, 4:17-20, FIG 17; EX-1006, ¶¶259-261. However, the seam in FIG. 17 is not shown directly above the filler arms.

As explained in Grounds 2 and 3, Glew discloses a barrier tape “wrapped” around the conductors and filler with the seam above the terminal portion of a filler arm. This is shown in the cross-sectional drawing in FIG. 10A:

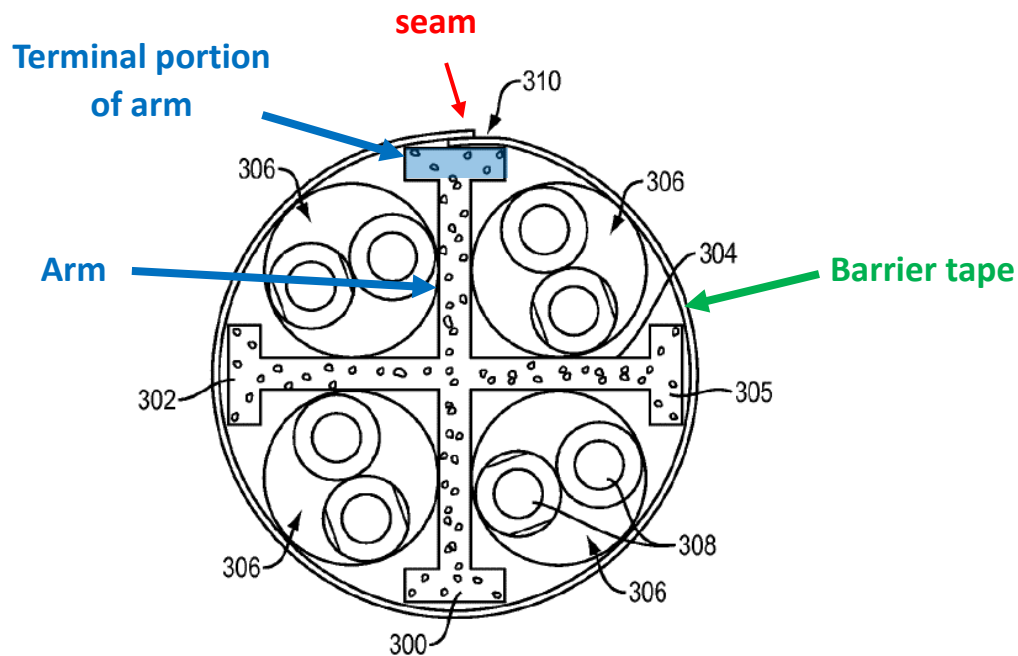


FIG. 10A

EX-1009, ¶[0154], FIG. 10A (annotated); EX-1006, ¶¶259-262.

Further, a POSITA understood that barrier tapes were wrapped around cable cores with controlled machines allowing for the tape (and its seams) to be precisely positioned relative to the wrapped components (e.g., the twisted pair conductors and the filler/separator). EX-1006, ¶264; EX-1004.

As mentioned above, Roberts likewise discloses that the barrier tape is “wrapped around” the separator (filler) and the twisted pairs of conductors so that it surrounds them. EX-1009, 4:17-20, 10:30-33, FIG. 17. A POSITA would be motivated to look to Glew’s wrapping in view of Roberts’ disclosure of wrapping

the barrier tape around the filler and conductors. And a POSITA would have reasonable expectation that wrapping Roberts' filler and conductors to have a cross-section like as shown in Glew would be successful. EX-1006, ¶¶262-265. Like Glew, Roberts discloses an internal filler that is surrounded by a longitudinally-wrapped barrier tape.

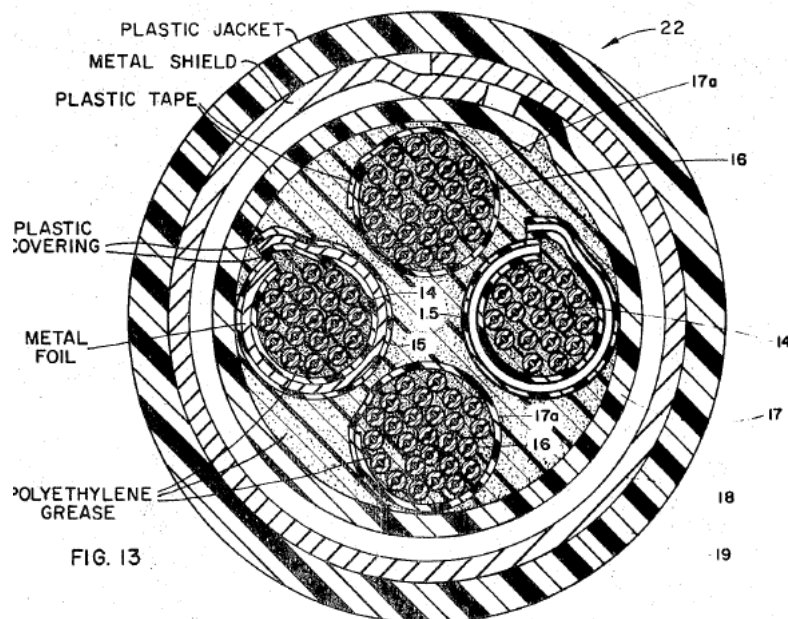
Thus, modifying Roberts to include a seam of the barrier tape positioned above a terminal portion of an arm of the filler would have been obvious to a POSITA, and the so-modified Roberts cable would have all the elements of claim 11. Thus, claim 11 would have been obvious to a POSITA. EX-1006, ¶¶259-266.

Ground 9: Claims 12 and 16 are Obvious in view of Any of Grounds 5-8 and Simons and/or the knowledge of a POSITA

A. Claim 12: “The cable of claim 10, wherein the filler comprises four arms in a cross shape.”

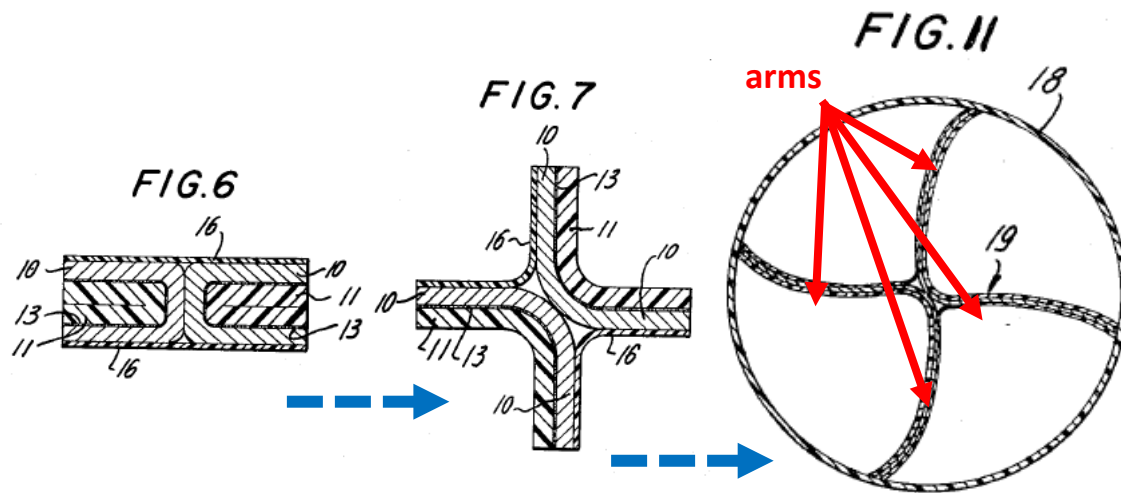
Roberts teaches all the limitations of claim 10 (and claim 1 from which claim 10 depends), as explained above. Roberts does not disclose the further limitation “wherein the filler comprises four arms in a cross shape.”

Roberts discloses separating the conductors into four separate groups (instead of just two groups as shown in FIG. 17), and using multiple plastic-coated metal shields 15 to circumscribe some groups and plastic tapes 17a to circumscribe other groups, as illustrated below:



EX-1009, 7:25-51, FIG. 13. This embodiment, like the FIG. 17 embodiment, thus includes a metal shield 15 (*filler*) separating first and second separate twisted pairs from each other (e.g., twisted pair conductors 14 from twisted pair conductors 16) and a multi-layer conductive barrier tape (metal shield 18) surrounding the filler and conductors and having the three layers as discussed above with respect to element [1D]. *See id.*, 7:25-51, FIG. 13; Ground 5 §A(2), *supra*; EX-1006, ¶267.

Simons (EX-1012) discloses “an improvement over the shielding means disclosed in [Roberts].” EX-1012, 1:5-12. The Simons “improvement” includes a cross-shaped shielding tape 19 (*filler*) with four arms to separate four groups of conductors from each other:



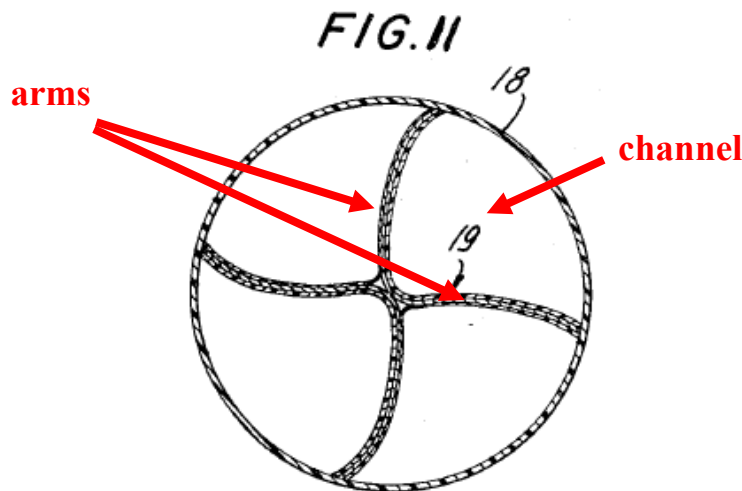
Id., 2:4-9, 2:18-20, 3:1-26, 3:42-46, FIGS. 1, 6, 7, 11. As Simons explains, the shielding tape of FIG. 6 “is fed into the cabler” and “opens as in FIG. 7 to a system having four fins forming four longitudinal parallel shielding compartments.” *Id.*, 3:15-26. FIG. 11 illustrates a cable with “a four-compartment shielding tape 19, for example, as shown in FIGS. 6 and 7.” *Id.*, 3:42-46.

A POSITA would have been motivated to modify Roberts to use Simons’ “improved” four-arm shield-tape as a filler – particularly when separating conductors into four groups (as disclosed by FIG. 13 of Roberts). Simons discloses that such design is an “improvement” of Roberts and provides examples as to why it is an improvement. *Id.*, 1:5-12, 3:33-44, 4:1-9. A POSITA also would have had a reasonable expectation that such improvement would be successful. The shield would work to shield the conductors within the compartments. EX-1006, ¶¶267-269.

Thus, modifying Roberts to include a filler having four arms in a cross shape would have been obvious to a POSITA, and the so-modified Roberts cable would have all the elements of claim 12. Thus, this claim would have been obvious to a POSITA. EX-1006, ¶¶267-272.

B. Claim 16: “The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.”

As discussed above concerning claim 12, it would be obvious to modify Roberts to include the four-armed (or “four-compartment”) filler shielding tape from Simons, as shown below:



EX-1012, 2:4-9, 4:18-21, FIG. 11; EX-1006, ¶¶273-275. As identified in the annotated figure above, the Simons filler has a pair of arms that form a channel (or “compartment”), and Simons explains that these channels are for “longitudinal parallel shielding of insulated wires and wire groups”, including “pairs of

conductors”, in the cable. EX-1012, 3:1-4, 4:1-9. Thus, the modified Roberts (per claim 12) includes this element. EX-1006, ¶¶274-276.

In addition, as explained in connection with claim 12, a POSITA would be motivated to employ Simons’ “improvement” and expect such improvement to be successful. EX-1006, ¶271. Therefore, this claim is obvious. EX-1006, ¶¶273-276.

Ground 10: claims 1-3, 9-14, 16-18 are Obvious in view of Clark-478 and Roberts, Glew and/or the knowledge of a POSITA

A. Independent claim 1 (and 18)

- 1. A cable comprising: [1A] (and [18A]); [1B] (and [18A]); [1C] (and [18B]); and**

Clark-478 discloses a cable 70 with two twisted pairs of insulated conductors (50a, 50b) and a separator 72 (*filler*) separating the pairs:

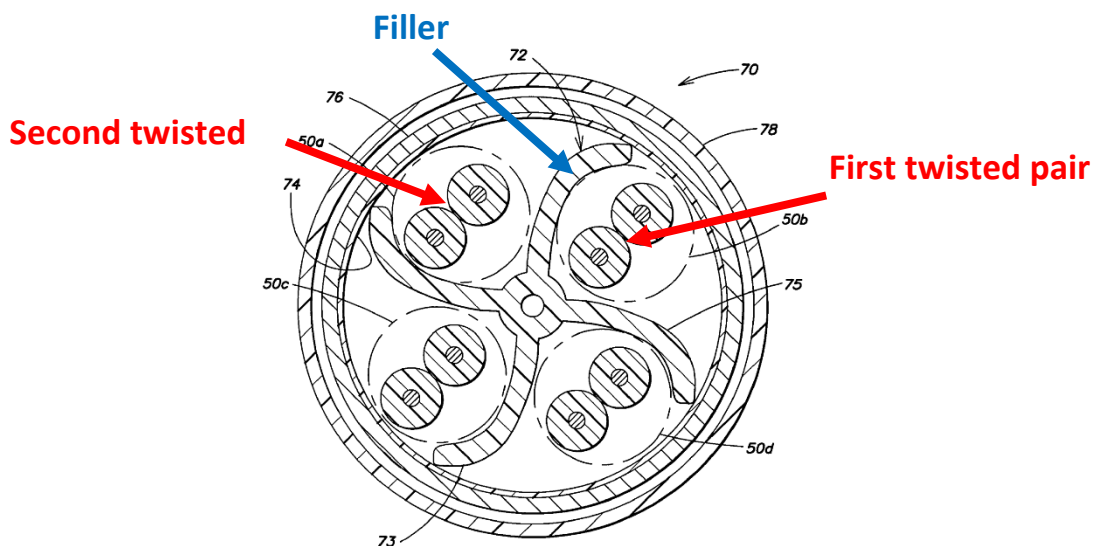


FIG. 2

EX-1025, ¶[0041], FIG. 2 (annotated); EX-1006, ¶¶277-278.

2. Element 1D (and [18C-1] and [18C-2])

As the Examiner found during prosecution, Clark-478 discloses all of this element except the barrier tape having three layers, with a conductive material contained between two layers of a dielectric material. *See* EX-1002, pp. 7-8; EX-1006, ¶¶279-280; EX-1025, ¶¶[0041], [0047], FIG. 2. Instead, Clark-478 discloses a two-layer barrier tape (i.e., aluminum/mylar binder 74) surrounding the filler and twisted pairs:

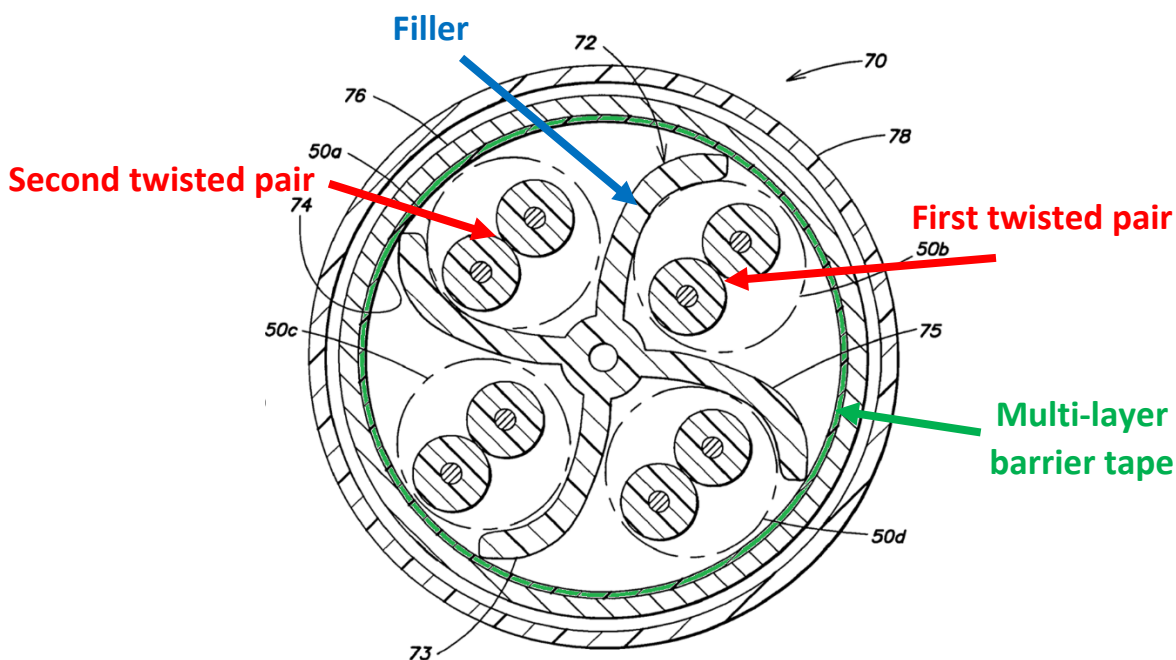


FIG. 2

See Clark-478, ¶[0047], FIG. 2; EX-1006, ¶280.

The Examiner concluded during prosecution that it would be obvious to replace the two-layer barrier tape in Clark-478 with a three-layer tape. It just so

happened that the three-layer tape pointed to by the Examiner (and distinguished by Patent Owner) was the Roberts interior metal foil tape (element 15) that *did not surround* the conductors and the filler. But Roberts does disclose such a surrounding tape (metal tape shield 18), and so does Glew.

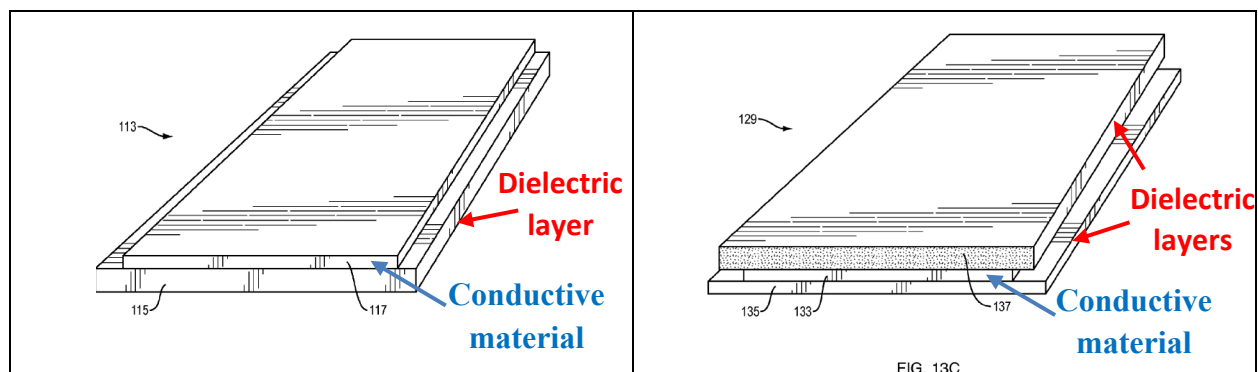
As explained in connection with Grounds 3 and 5, a POSITA would understand that each of Roberts and Glew discloses the claimed three-layer barrier tape having the features recited in elements [1D], [18C-1] and [18C-2]. *See* Ground 3 §A(2), Ground 5 §A(2), *supra*. Specifically, each discloses to a POSITA a barrier tape with a continuous conductive material between two dielectric layers and extending to the lateral edges of those dielectric layers. *See* Ground 3 §A(2), Ground 5 §A(2) *supra*; EX-1006, ¶¶281-283.

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 at 415-16 (2007). Likewise, “when a ‘patent simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *Id.*, 417. That is the situation here. Surrounding Clark-478’s filler and twisted pairs with Roberts’ or Glew’s three-layer tapes is simply the use of different known tape shield to perform the function of shielding what they enclose. EX-1006, ¶¶287-288.

Further, a POSITA would have been motivated to combine these references. Clark-478, Glew and Roberts each discloses a multi-layer barrier tape formed of conductive and dielectric layers that surround twisted pairs in order to reduce crosstalk, and in particular alien crosstalk from other cables. *See* EX-1025, ¶[0048]; EX-1008, ¶[0007],[0030],[0101],[0165],[0194],[0197]; EX-1009, 4:16-23 (armor acts as electrical and mechanical shield); EX-1006, ¶¶289-291. In addition, having the three-layer tape (instead of the two-layer tape in Clark-478) would provide a further benefit of having a dielectric layer between the conductors and the metal layer, which would mitigate the risk of high voltage failures and the risk of current transferring from the conductors to the metal layer of the shield while maintaining internal cross-talk isolation characteristics. POSITAs have been motivated to isolate the conductors from the metal layer of a shield since at least the 1960s, as exemplified by Roberts, which discloses adding mylar and also a grease-like dielectric material to cables to help isolate the conductors from the metal layer in multi-layer shields. *See* EX-1009, 3:37-75, 4:48-5:15; EX-1006, ¶291.

A POSITA at the time of the '030 Patent filing date also would understand that modifying Clark-478 to have a three-layer barrier tape (such as disclosed in Glew and/or Roberts) would yield a predictable result, such as shielding the surrounded conductors. EX-1006, ¶¶290-292. Each of the two-layer barrier tape

in Clark-478 and the three-layer tape in Glew (and three-layer metal shield tape 18 in Roberts) includes a continuous conductive layer that reduces crosstalk from other cables. That shielding function is performed whether there is a dielectric layer on one side or both sides of that conductive layer. Also, Roberts and Glew disclose both two-layer and three-layer barrier tape designs. Roberts says that the metal shield 18 can have a dielectric on one surface **or** more than one surface. EX-1009, 4:15-23. Likewise, Glew discloses that the shielding material 310 (*barrier tape*) can be either two layers (e.g., metal/dielectric; FIG. 13A) or three layers (dielectric/metal/dielectric; FIG. 13C).



EX-1009, ¶¶[0154],[0195-196], FIGS 10A, 13A, 13C.

Therefore, modifying Clark-478 to have the recited barrier tape would have been obvious to a POSITA. EX-1006, ¶¶279-292.

B. Dependent Claims 2-3, 9-14, 16-18

1. Claim 2

“2. The cable of claim 1, wherein the filler comprises a dielectric material.”

Clark-478 discloses the separator 72 (*filler*) can be made of “fluoropolymer materials ... such as fluoro ethylene propylene (FEP).” EX-1025, ¶[0039]. Thus, Clark-478 discloses this element. EX-1006, ¶¶293-294.

2. Claim 3:

“3. The cable of claim 1, wherein the filler has a helical twist at a first angle.”

Clark-478 teaches that the filler has a helical twist at a first angle (i.e., the cable is manufactured with a lay configuration with an angle that results in a cable lay length that is greater than three inches). *See* EX-1025, ¶[0043]. Clark-478 also incorporates by reference in its entirety U.S. Patent No. 6,074,503, which discloses that the separator 101 is “cabled into the cable with the twisted pairs 103”. EX-1025, ¶[0038]; EX-1039, 3:44-50. The illustrations in Clark-478 and the other patent are in pertinent part the same:

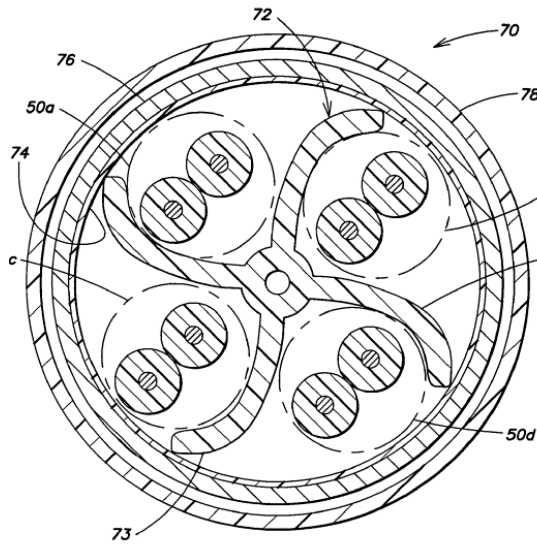


FIG. 2

EX-1025, FIG. 2

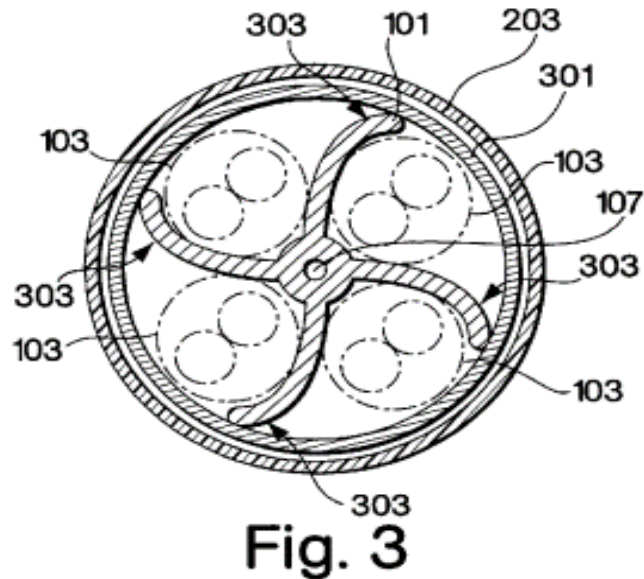


Fig. 3

EX-1039, FIG. 3

Clark-478 thus discloses this element. EX-1006, ¶¶295-297; *see also* EX-1002, pp. 7-8.

3. Claim 9:

“9. The cable of claim 3, wherein the first twisted pair of insulated conductors and the second twisted pair of insulated conductors have a helical twist around the filler at the first angle.”

Clark-478 teaches that the twisted pairs and separator are cabled (i.e., twisted) together to form a multi-pair cable with a desired cable lay length, e.g., “less than about five inches” or “greater than 3 inches”. EX-1025, ¶¶[0017], [0026], [0035]. As found by the examiner during prosecution, Clark-478 discloses this recited feature. *See* EX-1002, pp. 7-8; EX-1006, ¶¶298-299.

4. Claim 10:

“10. The cable of claim 1, wherein the filler comprises at least one arm.”

Clark-478 discloses a separator 72 (filler) with four protrusions 75 (arms):

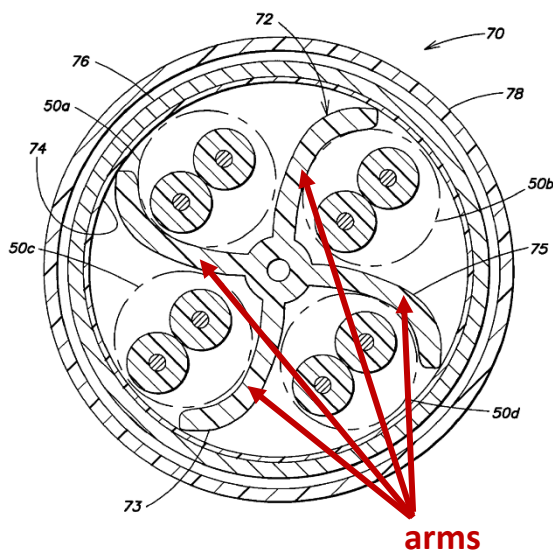


FIG. 2

Clark-478 at FIG. 2 (annotated); EX-1006, ¶¶300-302.

5. Claim 11:

“11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.”

Clark-478 discloses that each of the binder 74 and the shield 76 may be “wrapped around” the conductors and separator. EX-1025, ¶¶[0047-048]. Thus, Clark-478 discloses to a POSITA that each of the binder and shield includes a seam (i.e., where the edges of the tape overlap or abut). EX-1006, ¶303. Clark-478 also discloses that the conductors and filler are twisted as they extend

longitudinally through the cable. *See supra*, discussion of claims 3 and 9; EX-1025, ¶¶[0035], [0043]; EX-1006, ¶304.

As a result, a POSITA would understand that at one or more locations of the cable along its longitudinal length, the seams of each of the wrapped binder 74 and shield 76 would be positioned above a terminal portion of a filler arm. As the '030 Patent itself acknowledges, “typical longitudinal or spirally applied tape” results in the tape seam sometimes crossing the conductors and other times not crossing the conductors (i.e., being positioned above the terminal portion of the filler arm). EX-1001, 5:60-65. Thus, as in *Glew* – where the shielding material 310 (*barrier tape*) is “wrapped around the separator 300” (*filler*) – the barrier tape seam as taught in Clark-478 will on occasion be positioned above the terminal portion of the filler arm:

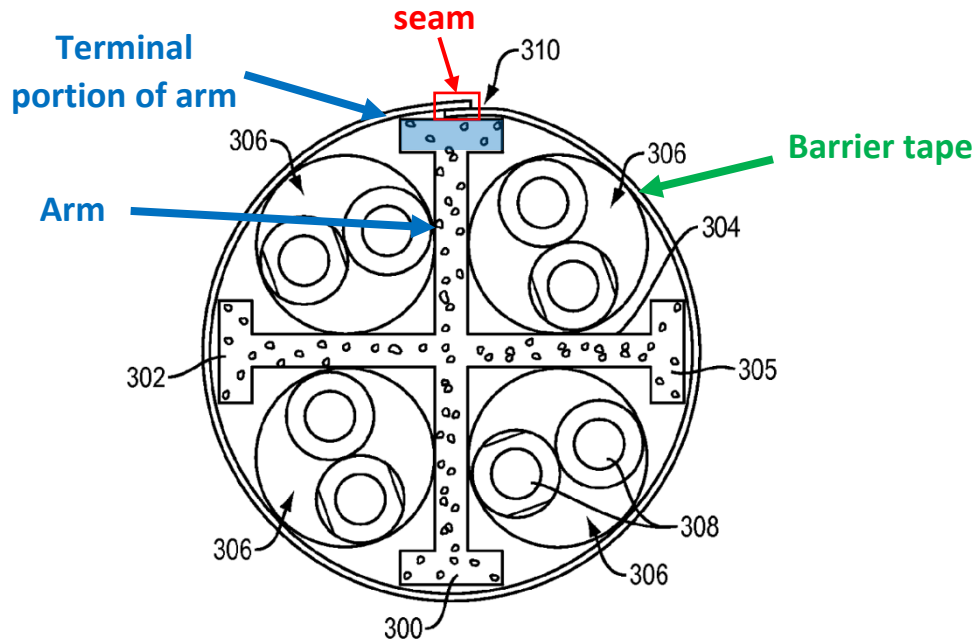


FIG. 10A

EX-1008, ¶[0154], FIGS. 10A, 10H; EX-1006, ¶305.

Also, for the reasons discussed above for Element [1D], it would have been obvious to modify Clark-478 to incorporate the three-layer barrier tape in Glew. Glew, like Clark-478, discloses that the shielding material 310 (*barrier tape*) is “wrapped around” the separator 300 (*filler*), and illustrates the seam positioned above a terminal portion of an arm of the filler (as illustrated above). Further, positioning a tape seam where desired was well known. EX-1006, ¶1006. Thus, the Clark-478-Glew combination discloses the barrier tape seam positioned as recited. EX-1006, ¶¶303-307.

6. Claim 12:

12. The cable of claim 10, wherein the filler comprises four arms in a cross shape.”

Clark-478 describes the cable as having a “cross or ‘+’ shaped separator 72” with four protrusions 75 (*arms*). EX-1025, ¶¶[0041], [0044], FIG. 2; EX-1006, ¶¶308-309.

7. Claim 13:

“13. The cable of claim 10, wherein each arm ends in a symmetrical terminal portion.”

Clark-478 discloses this element. *See* EX-1002, pp. 7-8 (“the arms (75’s) are symmetrical terminal portions (Fig 2)”); EX-1025, FIG. 2; EX-1006, ¶310. Also, Clark-478 discloses that the term separator “is used to describe generally any of various forms ... employed to separate and/or isolate one or more twisted pairs in a cable.” EX-1025, ¶¶[0044-045]. Clark-478 incorporates by reference the separators disclosed in U.S. Pat. 6,074,503, which includes a plus-shaped separator with arm ends having symmetrical terminal portions as shown below:

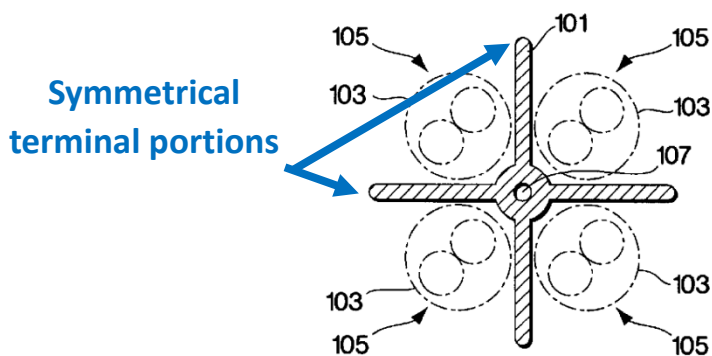


Fig. 1

Id., ¶[0038]; EX-1039, FIG. 1 (annotated); EX-1006, ¶310.

Even if Clark-478's filler arms did not end in symmetrical terminal portions, it would have been obvious to modify Clark-478's filler to have such arms in view of Glew. EX-1006, ¶¶311-313. Glew discloses another version of a cross-shaped separator (used to isolate the pairs) with arms 304 that terminate in a symmetrical T-shaped flap portions 305 (*terminal portions*). See EX-1025, ¶[0154], FIG. 10A, FIG. 10F. It would have been obvious to a POSITA at the time of the invention to combine the disclosed separator in Glew into the Clark-478 cable. Clark-478 teaches that the separator can have a variety of configurations and shapes, and defines "separating" as providing material in order to significantly eliminate pair-to-pair contact. *Id.*, ¶¶[0044-45]. The Glew separator has the same general cross-shaped form as the separator in Clark-478 and separates the twisted pairs from each other to significantly eliminate pair-to-pair contact. *Id.*, FIG. 10A. Also, the Glew separator has added material at the terminal ends of the arms, further reducing or eliminating the potential for twisted pairs contacting each other, which Clark-478 describes as the purpose of the separator. EX-1008, FIG. 10A; EX-1006, ¶¶309-313. Thus, modifying Clark-478 to have the recited arms would have been obvious. See, EX-1006, ¶¶313-314.

8. Claim 14:

“14. The cable of claim 10, wherein the terminal portion of each arm is wider than a middle portion of said arm.”

Clark-478 discloses that the filler arms each make effectively point-to-point contact with binder 74 (which is circumscribed by shield 76):

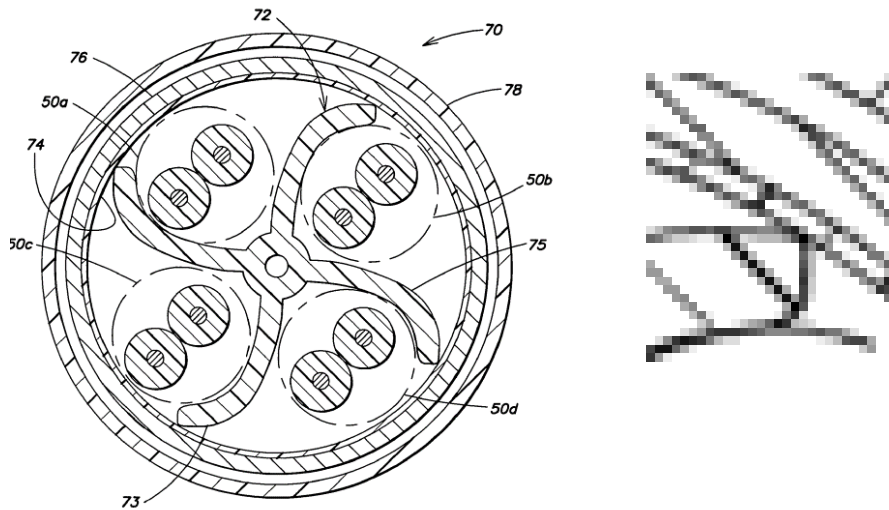


FIG. 2

EX-1025, FIG. 2

As shown below, Glew discloses separators/fillers with arms terminating in wide portions (e.g., T shapes):

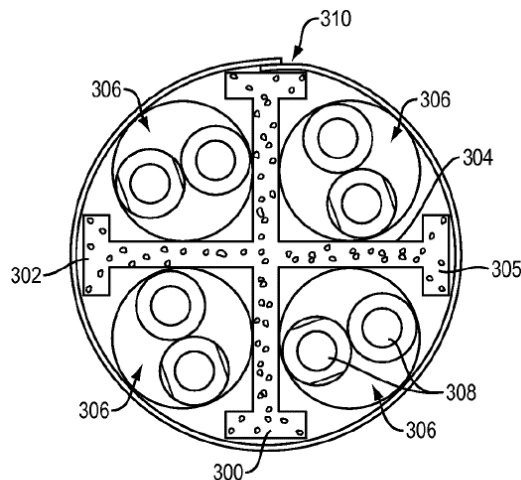


FIG. 10A

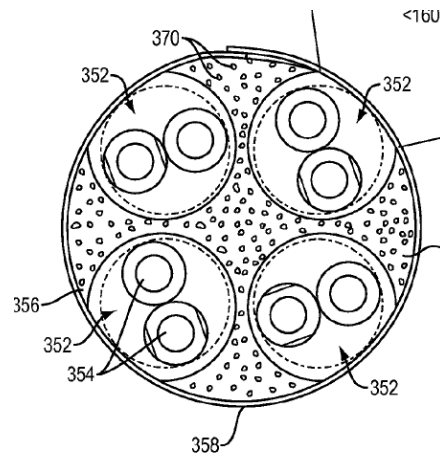


FIG. 10F

EX-1008, FIGS. 10A, 10F. These arms, like Clark-478's filler arms, form channels for the twisted pair conductors. *Id.*, ¶[0155], FIGS. 10A, 10F.

As discussed above with respect to claim 13, it would be obvious to use this Glew separator on Clark-478's cable. *See* Section X(J)(a), *supra*. In addition, a POSITA would recognize one or more additional advantages with the wide-terminal-portion arms of the Glew filler. For example, the arms in Glew better support the tape being wrapped around them such that the cable better maintains a stable cross section, which is preferable. EX-1006, ¶¶315-320; *see generally*, EX-1044 (Blouin) (describing importance of having thicker terminal portions of filler arms). More of the separator terminal arm portions provide support for the subsequently wrapped layers. And the wider-terminal-portion arms are more substantial and better facilitate maintaining the twisted-pair environment and keeping the separation distance between twisted pairs consistent. This is important

because the proximity of the tape to the twisted pair conductors impacts electrical performance, and so having a more uniform spacing between the shield and the conductors is typically preferred. EX-1006, ¶¶315-320.

9. Claim 16:

“16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.”

Clark-478 states that “[s]eparator 72 forms spaces or channels 74a-74d for respective twisted pairs 50a-50d of the cable.” EX-1025, ¶[0041]. This is illustrated below in the annotated figure below:

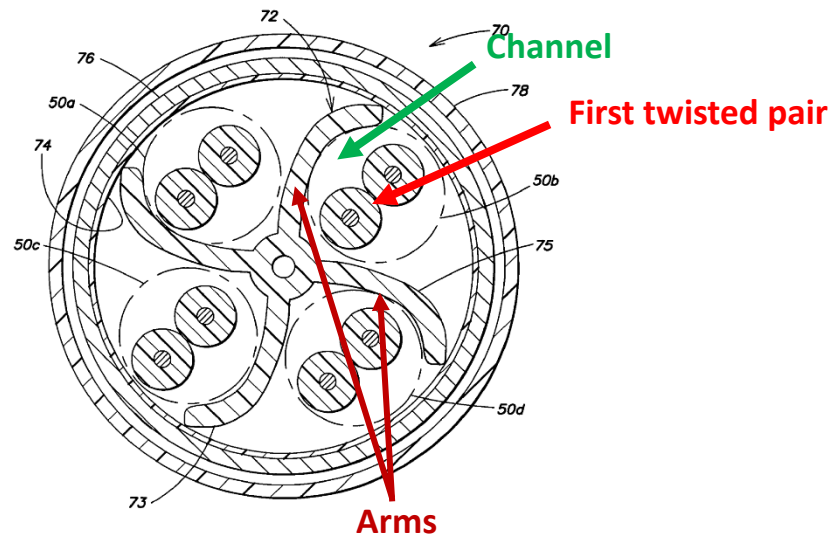


FIG. 2

Id., FIG. 2 (annotated); EX-1006, ¶¶321-323.

10. Claim 17:

“17. The cable of claim 1, further comprising a jacket surrounding the conductive barrier tape.”

Clark-478 discloses an outer jacket 78 surrounding the binder 74 (*conductive barrier tape*) as recited:

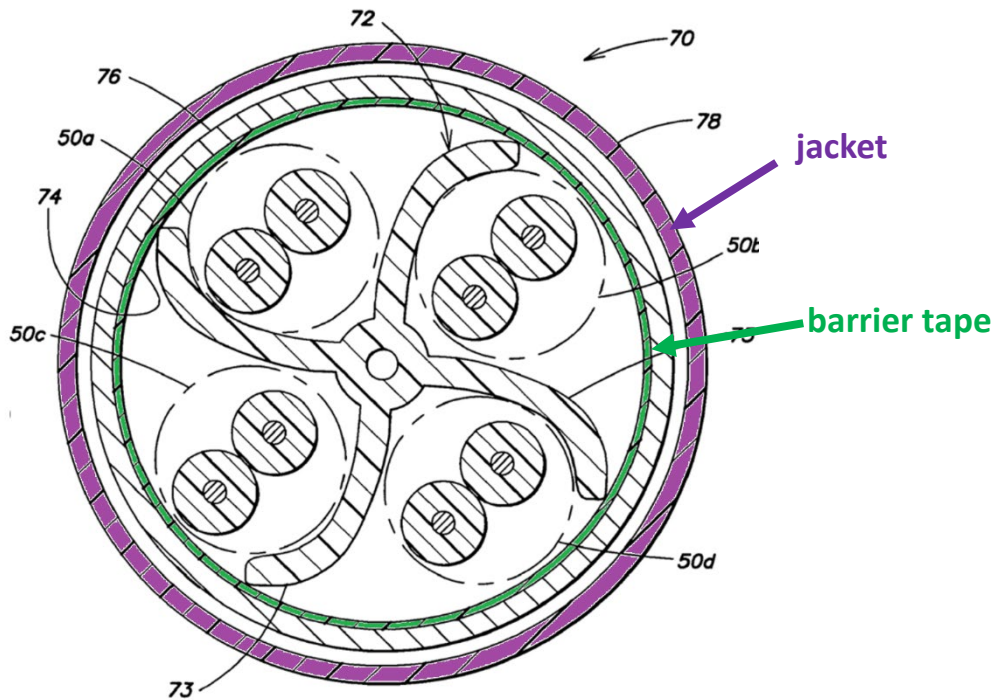


FIG. 2

EX-1025, ¶[0048], FIG 2(annotated); EX-1006, ¶¶324-326.

C. Independent Claim 18

Claim 18 recites essentially the same limitations as claim 1, except it does not require the conductive layer to be “continuous” and it is written in the form of a “method.” The combination of Clark-478’s, Glew’s and Roberts’ disclosure relative to the elements of apparatus claim 1 equally applies to a “method” of manufacturing such cable. Using Clark-478’s cable along with the teachings of

Roberts and Glew described above for claim 1 (which identifies for each limitation in claim 1 the corresponding structural limitation in claim 18 being “provid[ed]” (twisted pair conductors ([18A])) or “position[ed]” (filler ([18B])) or “wrap[ed]” around the conductors and filler (barrier tape ([18C-1, 18C-2])) results in performing the method recited in claim 18 and renders claim 18 obvious for the same reasons discussed above. EX-1006, ¶¶327-337.

Ground 11: Claims 3 and 9 are Obvious in view of any of Grounds 3-7 in view of one or more of Cook and/or the knowledge of a POSITA

Petitioner believes that each of Glew and Roberts discloses the helically twisted filler and conductors around the filler as recited in claims 3 and 9. If not, it would be obvious to a POSITA to modify the Glew and Roberts cables to have the filler and conductors with the recited helical twist. EX-1006, ¶¶338-339. Utilizing a helically twisted cable filler/separator (with the conductors having a helical twist around the filler) was common practice and provided well known advantages, as described, for example, in Cook. *See* EX-1010, 25:25-23; *see also* EX-1026, ¶¶[0064], [0187], [0187], [0195]. And a POSITA would understand that such helical twisting of the filler (and the twisted pairs around the filler) also was common practice. A POSITA would thus be motivated by such advantages and common practice to include such structure in the Roberts and Glew cables (if assumed such structure was lacking.). EX-1006, ¶¶338-339.

CONCLUSION

There is at least a reasonable likelihood claims 1-3, 9-14, and 16-18 are invalid.

Respectfully submitted,

Dated: June 13, 2023

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Claims Listing Appendix

U.S. Patent No. 9,991,030
Challenged Claims

Designation	Claim 1
	1. A cable, comprising:
Element 1A	a first twisted pair of insulated conductors;
Element 1B	a second twisted pair of insulated conductors;
Element 1C	a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors;
Element 1D	a multi-layer conductive barrier tape comprising a continuous conductive material contained between two layers of a dielectric material, the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material, the barrier tape surrounding the first twisted pair of insulated conductors, the second twisted pair of insulated conductors, and the filler.

Designation	Claim 2
	2. The cable of claim 1, wherein the filler comprises a dielectric material.

Designation	Claim 3
	3. The cable of claim 1, wherein the filler has a helical twist at a first angle.

Designation	Claim 9
	9. The cable of claim 3, wherein the first twisted pair of insulated conductors and the second twisted pair of insulated conductors have a helical twist around the filler at the first angle.

Designation	Claim 10
	10. The cable of claim 1, wherein the filler comprises at least one arm.

Designation	Claim 11
	11. The cable of claim 10, wherein a seam of the barrier tape is positioned above a terminal portion of an arm of the filler.

Designation	Claim 12
	12. The cable of claim 10, wherein the filler comprises four arms in a cross shape.

Designation	Claim 13
	13. The cable of claim 10, wherein each arm ends in a symmetrical terminal portion.

Designation	Claim 14
	14. The cable of claim 10, wherein the terminal portion of each arm is wider than a middle portion of said arm.

Designation	Claim 16
	16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.

Designation	Claim 17
	17. The cable of claim 1, further comprising a jacket surrounding the conductive barrier tape.

Designation	Claim 18
	18. A method of manufacture of a cable, comprising:
Element 18A	providing a first twisted pair of insulated conductors and a second twisted pair of insulated conductors;
Element 18B	positioning a filler between the first twisted pair of insulated conductors and the second twisted pair of insulated conductors;
Element 18C-1	wrapping the first twisted pair of insulated conductors, second twisted pair of insulated conductors, and filler with a conductive barrier tape comprising a conductive material contained between two layers of a dielectric material,
Element 18C-2	the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material.

Exhibit List Appendix

Exhibit No.	Exhibit Description
1001	U.S. Patent No. 9,991,030 (the '030 patent)
1002	Office Action dated 06/28/2019
1003	Amendment and Response to Non-Final Office Action dated 10/3/2017
1004	-
1005	Scheduling Order, C.A. No. 22-783-RGA (D. Del.)
1006	Expert Declaration of Kenneth Cornelison
1007	<i>Curriculum Vitae</i> of Kenneth Cornelison
1008	U.S. Patent Publication No. 2013/0248240 (Glew)
1009	U.S. Patent No. 3,622,683 (Roberts)
1010	U.S. Patent No. 9,363,935 (Cook)
1011	U.S. Patent No. 7,335,837 (Pfeiler)
1012	U.S. Patent No. 3,911,200 (Simons)
1013	U.S. Patent No. 3,233,036 (Jachimowicz-036)
1014	U.S. Patent No. 3,894,172 (Jachimowicz-172)
1015	U.S. Patent No. 4,428,787 (Pan)
1016	<i>Electronic Wire & Cable - A User's Guide: Performance and Selection</i> , Section 5: Multiconductor Cables, AT&T (1987)
1017	Whitham D. Reeve, <i>Subscriber Loop Signaling and Transmission Handbook – Digital</i> , IEEE Telecommunications Handbook Series (1995)
1018	Whitham D. Reeve, <i>Subscriber Loop Signaling and Transmission Handbook – Analog</i> , IEEE Telecommunications Handbook Series (1992)
1019	U.S. Patent No. 5,380,591 (Keogh)
1020	U.S. Patent No. 1,727,972 (Ford)
1021	U.S. Patent No. 1,956,730 (Reichelt)
1022	U.S. Patent No. 3,803,340 (Jachimowicz-340)
1023	Canadian Patent Application No. 2,058,046 (Tessier)

1024	U.S. Patent No. 4,262,164 (Nutt)
1025	U.S. Patent Pub. No. 2006/0169478 (Clark-478)
1026	U.S. Patent Publication No. 2010/0206609 ('609 Publication)
1027	U.S. Patent No. 5,670,748 ("Gingue")
1028	G.F. Moore, Electric Cable Handbook, BICC Cables (3rd. Ed. 1997)
1029	The New IEEE Standard Dictionary of Electrical and Electronics Terms (5th ed. 1993)
1030	Neil Sclater and John Markus, Electronics Dictionary, McGraw-Hill (6th Ed. 1997)
1031	Draka – B03: Rodent protection (2009-01-19)
1032	U.S. Patent No. 5,427,643 (Aitken)
1033	U.S. Patent No. 4,213,280 (Sandborn)
1034	U.S. Patent No. 4,439,632 (Aloisio)
1035	U.S. Patent No. 4,327,248 (Campbell)
1036	U.S. Patent No. 5,518,836 (McCullough)
1037	US Patent Publication No. 2011/0147039 (Smith)
1038	US Patent No. 7,532,794 (Cook-794)
1039	US Patent No. 6,074,503 (Clark-503)
1040	U.S. Patent No. 4,755,629 (Beggs)
1041	Alcatel Cable Systems Product Catalog (circa 1988-1990)
1042	U.S. Patent No. 6,378,283 (Barton)
1043	U.S. Patent No. 6,570,095 (Clark)
1044	U.S. Patent No. 6,365,836 (Blouin)
1045	Declaration of Sylvia D. Hall-Ellis, PhD. re. EX-1016, EX-1017, EX-1018 and EX-1028

CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,486 words per Microsoft Word's word count tool, which complies with requirement of 14,000 words allowed under 37 CFR § 42.24(a)(i).

Dated: June 13, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on June 13, 2023 a complete and entire copy of this PETITION FOR INTER PARTES REVIEW OF UNITED STATES PATENT NO. 9,991,030 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42 and all supporting exhibits were provided by Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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