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. US 9,991,030
Issued: June 5, 2018
Filed: May 31, 2017

EXPERT DECLARATION OF KENNETH CORNELISON

In Support of *Inter Partes* Review of U.S. Patent No. 9,991,030

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I, Kenneth Cornelison, declare as follows.

I. INTRODUCTION

1. I have been retained by Petitioner, CommScope Technologies LLC, ("CommScope" or "Petitioner") to provide expert opinions in connection with a petition for *inter partes* review before the United States Patent and Trademark Office. I understand that this declaration involves my expert opinions and expert knowledge related to U.S. Patent No. 9,991,030 ("the '030 Patent"), titled "High Performance Data Communications Cable," and its field of endeavor.

2. I have been asked to provide my independent technical review, analysis, insights, and opinions regarding the '030 Patent and the references that form the basis for the grounds of unpatentability set forth in the Petition for *Inter Partes* Review of the '030 Patent. The statements made herein are based on my own knowledge and opinions.

II. SUMMARY OF OPINIONS

To summarize the opinions stated herein, it is my opinion that the claims of the '030 patent are invalid based on the following grounds:

	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.
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.

III. QUALIFICATIONS

3. I have 40+ years of experience in the wire and cable industry. My experience includes the design, development and testing of high speed data cables. I obtained my BSEE in 1974 and I started working in the wire and cable industry in 1976. Through the late 1970s through the 2000s, I worked in the design, manufacturing and testing of wires and cables for companies including Anaconda, Alcatel, Belden and General Cable. My roles included being manager of product development and customer engineering, process development manager, and VP of Technology – Data Communications. Since leaving General Cable, I have

consulted in the wire and cable industry, published several papers, given technical training and been actively involved in the International Wire and Cable Symposium (IWCS). The IWCS promotes, initiates, and coordinates the exchanging of technical information on wire, cable and fiber optics within industry and the government, through an annual IWCS Symposium. I have been an instructor (or co-instructor) at the annual Symposiums held in 2013, 2014, 2015, 2016, 2018, 2019, 2022, and am currently expecting to be an instructor at the Symposium planned for 2023. I am a named inventor on more than 15 US patents.

4. I am being compensated for my time at the rate of $175 per hour for time spent on this matter. I have no interest in the outcome of this proceeding, and my compensation is not dependent upon the outcome of this proceeding.

IV. MATERIALS CONSIDERED

5. My technical review, analysis, insights, and opinions are based on my experience and other qualifications discussed above, as well as my study of relevant materials.

6. I have reviewed and am familiar with the ‘030 patent specification, claims, and prosecution history.

7. I have also reviewed and am familiar with each exhibit cited herein. I confirm that to the best of my knowledge the accompanying exhibits are true and accurate copies of what they purport to be, and that an expert in the field would

reasonably rely on them to formulate opinions such as those set forth in this declaration.

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	*Curriculum Vitae* 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	*Electronic Wire & Cable - A User's Guide: Performance and Selection*, Section 5: Multiconductor Cables, AT&T (1987)
1017	Whitham D. Reeve, *Subscriber Loop Signaling and Transmission Handbook – Digital*, IEEE Telecommunications Handbook Series (1995)
1018	Whitham D. Reeve, *Subscriber Loop Signaling and Transmission Handbook – Analog*, 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 Pub")
1027	U.S. Patent No. 5,670,748 ("Gingue")
1028	G.F. Moore, Electric Cable Handbook, BICCCables (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")

8. In this declaration, I provide various annotated figures to aid in explaining my opinions. However, these figures are not intended to necessarily imply literal, precise physical or bodily combination or modification in exactly or

only the way shown or annotated. Instead, I provide those figures only to help illustrate various concepts, and they should not be taken as showing the only disclosure of a particular element, or the only way that a person of ordinary skill in the art would have been motivated to modify or combine references.

V. RELEVANT LEGAL PRINCIPLES

A. Effective Filing Date

9. I understand that claims of a patent have an "effective filing date" and that obviousness is considered based on the prior art as of that date.

10. The utility application for the '030 patent (application No. 15/610,504) was filed on May 31, 2017. It is a continuation of application No. 14/520,125, now U.S. Patent No. 9,697,929, and claims priority to a provisional application filed on October 23, 2013. Therefore, I am told that for the purposes of this proceeding, I have been asked to use October 23, 2013 as the effective filing date for the challenged claims.

B. Person of Ordinary Skill in the Art

11. I have been informed that a person of ordinary skill in the art ("POSITA") is a person who is presumed to have complete knowledge of the relevant prior art and who would think along the lines of conventional wisdom in that art. The person of ordinary skill in the art has ordinary creativity and does not have extraordinary skill, e.g., is not an expert. I have been informed that factors to

consider in determining the level of ordinary skill in the art include the educational level of workers in the field, the types of problems addressed in the art, prior-art solutions to such problems, how quickly innovations are made, and the complexity of the technology.

12. The '030 patent relates to data communication cables. Generally speaking, the '030 patent discloses a cable having twisted-pair conductors, a filler that separates the pairs from each other, a barrier tape that surrounds the filler and twisted-pair conductors, and an outer jacket surrounding everything, such as illustrated below, and techniques to improve crosstalk characteristics.

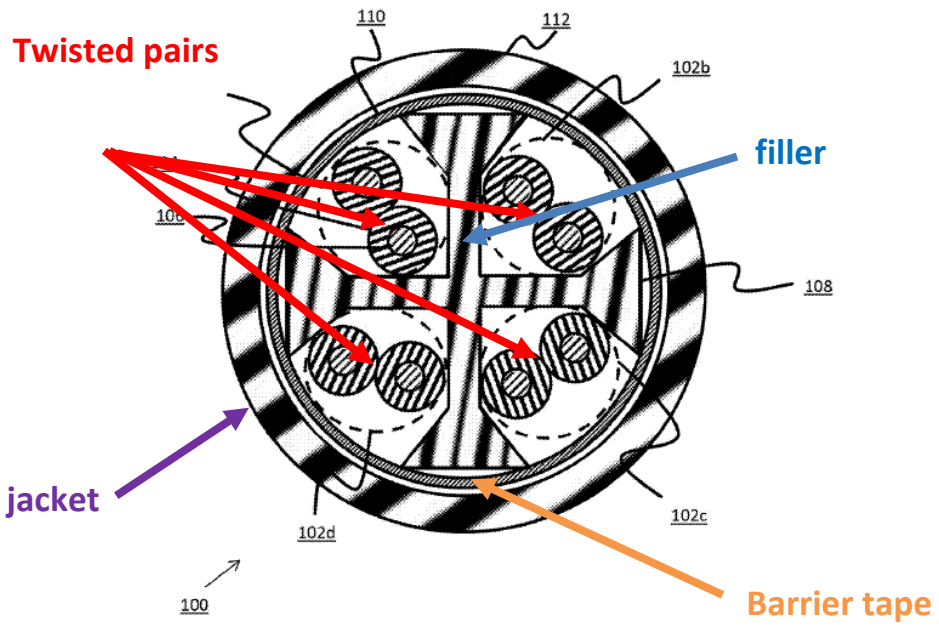


FIG. 1

See Ex. 1001 at Title, Abstract, FIG. 1, 6:20-62, 3:32-63. In view of the factors mentioned above and the discussion of the technical background herein, it is my

opinion that a person of ordinary skill in the art of the '030 patent 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).

13. Throughout my declaration, even if I discuss my analysis in the present tense, I am always making my determinations based on what a POSITA would have known at the time of the invention.

C. Claim Construction Standard

14. I have been instructed by counsel on the law regarding claim construction and patent claims, and understand that a patent may include two types of claims—independent claims and dependent claims. An independent claim stands alone and includes only the features it recites. A dependent claim can depend from an independent claim or another dependent claim. I understand that a dependent claim includes all the features that it recites in addition to all of the features recited in the claim from which it depends.

15. In an *inter partes* review proceeding such as this, I understand the claim of a patent shall be construed using the same claim construction standard that would be used to construe the claim in a civil action. I understand this includes construing the claim in accordance with the ordinary and customary meaning of

such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. For completeness, I understand this standard is different from the prior "broadest reasonable interpretation" standard that was used in certain earlier *inter partes* review proceedings.

16. I understand an appropriate dictionary definition may provide evidence explaining the ordinary and customary meaning as would be understood by a person of ordinary skill in the art.

17. I understand that if there are specific statements in the specification that define the invention with respect to a term, those statements are strong evidence of a definition for the term.

D. Anticipation and Obviousness Law

18. In this declaration I have been instructed by counsel on the law regarding anticipation and obviousness. I understand that a claim is invalid if it is anticipated or obvious.

1. Anticipation

19. I understand that anticipation of a claim requires that every element of a claim is expressly or inherently disclosed in a single prior art reference. I understand that an anticipating reference need not use the exact terms of the claims, but must describe the patented subject matter with sufficient clarity and detail to establish that the claimed subject matter existed in the prior art and that

such existence would be recognized by persons of ordinary skill in the field of the purported invention. I also understand that an anticipating reference must enable one of ordinary skill in the art to reduce the purported invention to practice without undue experimentation. Under what is known as inherency, I understand that if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates. I also understand that I may examine evidence that is outside of the prior art reference in determining whether a feature, while not expressly discussed in the reference, is necessarily present in that reference.

2. Obviousness

20. I understand that a patent claim is also invalid if the claims would have been obvious to a POSITA at the time of the invention. I understand that the obviousness inquiry should not be done in hindsight but rather from the perspective of a POSITA as of the time of the invention.

21. I understand that to obtain a patent, the claims must have been, as of the time of the invention, nonobvious in view of the prior art. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a POSITA at the time of the invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered:

(1) the scope and content of the prior art;

(2) the level of ordinary skill in the art;

(3) the differences between the claimed invention and the prior art; and

(4) any objective indicia of nonobviousness.

22. I understand that a claim is obvious when the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a POSITA at the time of the invention.

23. I understand that certain objective indicia can be important evidence regarding whether a patent is obvious. Such indicia include: industry acceptance; commercial success of products covered by the patent claims; long-felt need for the invention; failed attempts by others to make the invention; copying of the invention by others in the field; unexpected results achieved by the invention as compared to the closest prior art; praise of the invention by the infringer or others in the field; taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at making the invention; and the patentee proceeded contrary to the accepted wisdom of the prior art. I understand that such evidence must have a nexus, or causal relationship to the elements of the claim. I

am unaware of any such objective considerations having a nexus to the claims at issue in this proceeding.

24. I understand that obviousness can be established by combining multiple prior art references to meet each and every claim element, or by modifying a single prior art reference.

25. I understand that a showing of obviousness based on the combination of references can require that, as of the patent's effective filing date, (1) a POSITA would have been motivated to combine prior art references to arrive at the claimed subject matter and (2) there would have been a reasonable expectation of success in achieving the claimed invention from such combination.

26. I also understand that to support a combination of multiple prior art references or a modification of a single reference, there must be a rationale explaining why a skilled artisan would combine or modify the references in the manner claimed and how the proposed combination or modification meets each and every claim element. This rationale may come from a teaching, suggestion, or motivation to combine. However, I understand that a specific teaching, suggestion, or motivation to combine elements in the prior art to achieve the claimed combination is not required for obviousness. Instead, I understand that a combination of known elements may be obvious in light of the interrelated teachings of the prior art, the effects of demands in the market, the background

knowledge possessed by a POSITA, and inferences and creative steps that a POSITA would employ. But I also understand that a proposed combination or modification of references can be susceptible to hindsight bias. When it appears hindsight bias is being used, I understand the modification or combination is not considered obvious.

27. I understand that exemplary rationales that may support a conclusion of obviousness include: combining or modifying prior art elements according to known methods to yield predictable results; simple substitutions of one known element for another to obtain predictable results; using a known technique to improve similar devices in the same way; applying a known technique to a known device ready for improvement to yield predicable results; choosing from a finite number of identified, predicable solutions, with a reasonable expectation of success; known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predicable to one of ordinary skill in the art; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention.

28. I understand that teaching away, e.g., discouragement from making the proposed modification, is strong evidence that the references are not

combinable. I also understand that a disclosure of more than one alternative does not necessarily constitute a teaching away.

29. I understand that the combination does not need to result in the most desirable embodiment, but if the proposed combination does not have a reasonable expectation of success at the time of the invention, a POSITA would not have had an adequate teaching, suggestion, or motivation to combine the references.

30. I understand that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated or physically combined into the structure of the primary reference, but whether the claimed invention is rendered obvious by the teachings of the references as a whole.

VI. TECHNOLOGY OVERVIEW

31. The '030 Patent relates to data communications cables and purports to disclose ways to reduce "problems of cable to cable 'alien' crosstalk (ANEXT) and signal Return Loss (RL) in a cost effective manner." EX-1001 ('030 Patent) at Abstract, 1:25-38, 3:27-37. None of the claims of the '030 patent recite that they are limited to cables operating at particular high speeds. '030 Patent at Claims 1-20.

32. Communications cables are typically constructed of twisted pairs of metal conductors (e.g., wires). *See* EX-1008 (Glew) at ¶¶[0004-0005], EX-1025 (Clark-478) at ¶[0004], EX-1016 (EW&C User Guide) at p. 7 ("Most of the cables

within the scope of AT&T's EC&W product line utilize the twisted pair construction."). Twisted pairs were (and are) commonly referred to as simply "pairs" in the industry. *See, e.g.*, EX-1017 (Reeve) at p. 18 ("Each cable pair consists of two twisted insulated conductors."). Each of the conductors of a twisted pair is typically wrapped in an insulating material, commonly a polymeric material. This was well known at the time the priority application was filed in 2013. *See, e.g.*, EX-1019 (Keogh) at 1:10-12 (filed Dec. 30, 1992; "A typical telephone cable is constructed of twisted pairs of metal conductors for signal transmission. Each conductor is insulated with a polymeric material."). A number of twisted pairs were then assembled into a cable and wrapped in a polymeric sheath or jacket. *Id.* at 1:12-16; *see also* EX-1016 at p. 7 ("Production of small cables of this type involves twisting individual pairs and grouping those twisted pairs to form either a cable or a unit for a larger cable.").

33. Twisted pairs have been a staple of the cable industry for over a century. For example, telephone cable patents from the 1920s discuss using twisted pairs in electrical cables. *See, e.g.*, EX-1020 (Ford) at 2:55-57 (filed April 18, 1924; "A plurality of copper wires insulated with paper, cotton, silk, or other suitable materials, usually twisted together in pairs"); EX-1021 (Reichelt) at 1:43-47 (filed Sept. 11, 1929; "assembling and twisting a plurality of twisted pairs of individual insulated electrical conductors into a single compact group or so called

cable unit"). When compared to untwisted pairs, twisted pairs have improved crosstalk and decreased unbalanced mutual capacitance. EX-1016 at p. 7 ("The two main reasons for twisting pairs of conductors are to minimize or eliminate crosstalk and to decrease unbalanced mutual capacitance."). Certain electrical parameters, such as impedance, are dependent on the spacing of the two conductors. Twisting the two conductors maintains consistent spacing between the two conductors along the length of the pair. The twisting also causes periodic reversals in the electrical field that surrounds the pair. These reversals also result in improved isolation from electrical fields produced by adjacent pairs or outside electrical fields. Twisted pairs also have a mechanical advantage in that the individual wires stay together, and the individual wires of the pair do not become intermixed.

34. An alternative to twisted pairs is twisted quads. Twisted quads require four wires arranged in a square or star and twisted about a central axis. Because twisted quads involve four wires twisted together to act as two pairs, less space is required for a twisted quad than two twisted pairs. However, twisted quads need to be a perfect square or interference between the opposite wires of the twisted quad can result. Twisted quads were primarily used in telephone cabling in Europe, while twisted pairs were favored in the United States. Generally, a POSITA can substitute twisted pairs for cable applications that use twisted quads and vice versa.

Both are simply ways of arranging pairs to reduce crosstalk. Twisted pairs are generally favored over twisted quads for high frequency cable implementations.

35. Crosstalk was a well-known issue associated with communication cables at the time the priority application was filed. *See, e.g.*, EX-1014 (Jachimowicz-172) at 1:8-16. Crosstalk can refer to crosstalk between adjacent pairs or groups of pairs, or crosstalk between adjacent cables. Crosstalk between pairs or groups of pairs was known to occur when a signal is transmitted over a first twisted pair—commonly referred to as a disturbing circuit—and that signal induces currents and electromotive forces in another twisted pair—referred to as the disturbed circuit. EX-1009 (Roberts) at 3:21-28; *see also* EX-1010 (Cook) at 1:57-67; EX-1022 at 1:7-10. This results in the disturbed circuit carrying two signals: (1) the information signal intended for transmission and (2) the unwanted signal induced by the disturbing pair. EX-1022 (Jachimowicz-340) at 1:5-15. The unwanted signal is superimposed over the intended signal reducing the clarity and reliability of the transmission. *Id.* at 1:10-16.

36. Prior to 2013 (and also prior to 1999), there were several known ways to reduce crosstalk between pairs within a cable. For example, the twist lengths of the twisted pairs may be varied to prevent the electrical fields surrounding each pair from being in unison along their length and therefore more strongly influence the other. The twist lengths of the twisted pairs may also be varied to prevent the

twisted pairs from nesting together. EX-1014 at 1:30-34. Nesting results when the circles circumscribing each twisted pair overlap with each other resulting in closer proximity from pair to pair and stronger crosstalk between the pairs. *See, e.g.*, EX-1040 (Beggs) at 6:57-7:3, FIG. 8A. Preventing the twisted pairs from nesting together reduces crosstalk.

37. Another known way to reduce crosstalk was to physically separate a twisted pair or set of twisted pairs from each other such that the voltage induced by the disturbing pair on the disturbed pair is decreased. *See, e.g.,* EX-1023 (Tessier) at 3:17-31. The distance needed between twisted pairs to meet various performance requirements can be determined though mathematical models of the cable. *See id*. at 3:19-23. Though in my experience, experimentation is also often used to verify and finalize desired performance.

38. Various physical separators for reducing crosstalk were known and used in the art prior by the filing of the priority application. Some separators were made purely of plastic or polymers. *See, e.g.*, EX-1011 (Pfeiler) at FIG. 7 (discussed below), EX-1025 at ¶[0044], EX-1023. Others were plastic-coated metallic tapes. *See, e.g.*, EX-1009 (Roberts; discussed below), EX-1025 at ¶[0047] (aluminum/mylar tape); EX-1022, EX-1018, EX-1017. Common plastic coatings included an olefin polymer such as polyethylene, polypropylene, polyethylene terapthalate (Mylar), or other plastic material. *See, e.g.*, EX-1009 at 3:32-37. Still

others included dielectric material with electrically conductive inclusions, or coated with metal, or having a metal strip embedded therein. E.g., EX-1008 at ¶¶[0149-154], FIGS. 8A, 8B, 9, 10A.

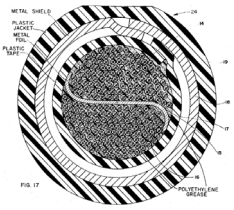
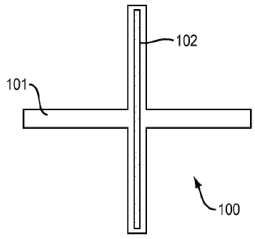
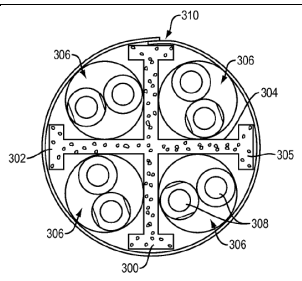
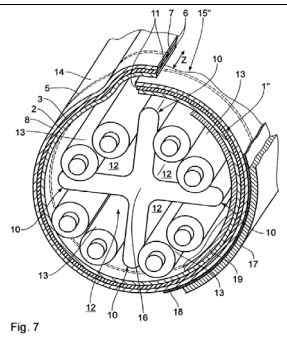
39. The designs of separators have evolved over time based on various considerations. One application involved dividing a cable containing many twisted pairs into two compartments. *E.g.*, EX-1009 at Abstract. Twisted pairs in one compartment were used to transmit signals in one direction, and twisted pairs in the other compartment were used to transmit signals in the opposite direction. *Id.* at 1:8-22. A shield was used to electrically isolate the two compartments in order to reduce near-end crosstalk (crosstalk that occurs when a twisted pair transmitting in one direction causes crosstalk on a nearby twisted pair transmitting in the opposite direction)[1]. Isolating the two compartments was important because of the relative strength of the signals. The signal being transmitted at one end would be relatively stronger than the signal being received at that end because signal strength is diminished as it travels through the cable. Thus, the crosstalk caused by the transmit signal on the receive signal would be more significant due to the differences in signal strength. *See id.* at 1:22-26. Further, the shielding did not need

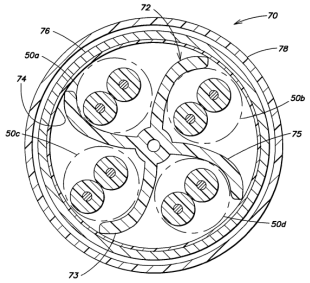
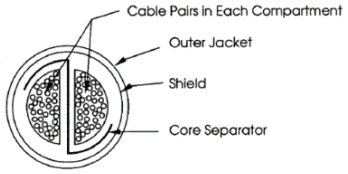
[1] EX-1029 (IEEE Dictionary) at p. 5 ("near-end crosstalk. Crosstalk that is propagated in a disturbed channel in the direction opposite to the direction of propagation of the current in the disturbing channel. *Note*: the terminal of the disturbing channel at which the near-end crosstalk is present is ordinarily near to or coincides with the energized terminal of the disturbing channel.").

to completely surround compartments to prevent near-end crosstalk. The shield could simply be placed between compartments. *See, e.g.*, *id.* at Fig. 17; 11:7-12.

40. Another application involved dividing a cable containing many twisted pairs into four or more compartments. *E.g.*, *id.* at FIGS. 13-16. Those compartments could be defined by several distinct separators (e.g., multi-layer shield tapes 15 and plastic tapes 17 in FIGS. 13-14), or substantially "+" or cross-shaped separators such as in EX-1012 (Simons) (FIG. 11) and EX-1008 (FIGS. 9 & 10A) and EX-1010 (FIGS. 1-2).

41. Below are some examples of separators known in the art prior to the invention date associated with the '030 patent:

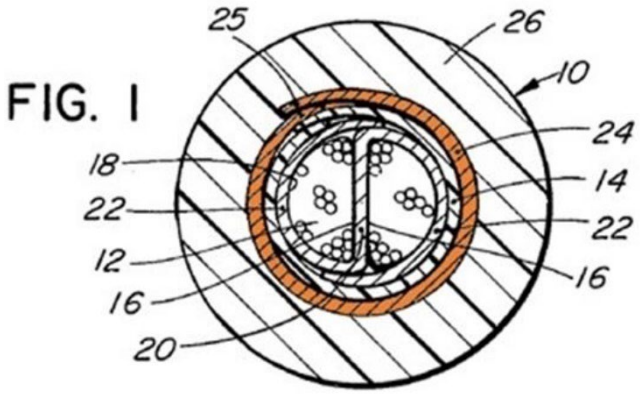
<table>
<tr>
<td>
EX-1009, Fig. 17 – plastic-coated metal tape separator</td>
<td>
EX-1008, Fig. 9 – metal strip encased in dielectric polymer</td>
</tr>
<tr>
<td>
FIG. 10A</td>
<td>
Fig. 7
EX-1011, FIG. 7 – plastic separator</td>
</tr>
</table>

-1008, FIG. 10A – polymer-with-metal-inclusions separator	
 EX-1025, ¶[0047]. FIG. 2 – Aluminum/Mylar separator	 EX-1017, at p. 30 (Fig. 7-7 – core separator); *see also* EX-1016 (Fig. 3-1).

42. A POSITA would understand that a dielectric material is an insulator. *See, e.g.*, EX-1030 at p. 4 (dielectric). Polymers and plastics were generally known to be dielectric materials prior to the filing of the priority application. *See id*. Specifically, olefin polymers such as polyethylene and polypropylene were known to have very low dielectric constants. EX-1027 at 2:10-13. Polyester layers were also known to be good dielectrics with low dielectric constants. An example of a common polyester used in cabling was Mylar.

43. Utilizing barrier tapes for surrounding the conductors within a cable and reducing crosstalk from other cables also was known prior to 2013. Some of those known barrier tapes had two layers: one being dielectric and the other being conductive (e.g., aluminum/Mylar tapes). *See, e.g.*, EX-1025 at ¶[0047] ("the binder 74 may also be conductive, for example, also an aluminum/mylar tape"); EX-1010 at 22:25-33, FIG. 7A.

44. Others had three layers, with an electrically conductive layer "sandwiched between multiple dielectric layers in order to form a shield." E.g., *id.* at 7:1-20. For example, in 1963, a patent issued for a "Corrosion Proof Shielding Tape for Shielding Telephone Cables" concerning a shielding tape having an aluminum strip coated on both major surfaces with a plastic protective film with high electrical resistivity. *See*, EX-1013 (Jachimowicz-036) at 2:52-65, Figure. Similarly, U.S. Patent No. 4,428,787 (EX-1015) discloses wrapping an "aluminum shield 24" that is "coated on both sides with plastic" around the twisted pair conductors and separator within the cable:



EX-1015 at 2:62-3:18, FIG. 1 (annotated); *see also*, EX-1014 at 3:23-27 (describing "shield 34" wrapped around the cable core and including a "strip of foil with a polyolefin coating on both sides").

45. It was common for a barrier tape to be a metal tape with "plastic, such as polyethylene, firmly adhered to either one or more surfaces thereof" (e.g., on

one side of the metal, sandwiching the metal, or fully encasing the metal). E.g., EX-1009 at 4:16-23. These coated metal tapes acted as "electrical, as well as mechanical, shield[s]" surrounding the conductors inside the cable. *Id*. at 4:17-23. One common shield tape was a plastic/metal/plastic three-layer tape sold under the Zetabon™ brand name. *See* EX-1031 at p. 2 ("As standard the tape is 0.155 mm thick. . . . On both sides of the tape it is further coated with a 0.055 mm thick polymer coating. A common trade name for this material is Zetabon™."); *see* also EX-1036 at 17:42-55 ("Materials that are chemically compatible as a housing material include . . . a Zetabon™ brand of a plastic/metal/plastic laminate . . . ."); EX-1032 at 1:39-50 ("When plastic coated tapes, such as Zetabon (trade name of Dow Chemical) are spliced, the original plastic coating is removed from the ends to be spliced . . . ."); EX-1034 at 6:1-8 ("For example, the combination of a metallic strip which is pre-coated with an ethylene acrylic acid copolymer adhesive-like material is marketed by the Dow Chemical Company of Midland, Michigan under designations X0-5554.21 and X0-5554.28 and is referred to as Zetabon® plastic clad metal sheathing for electrical wire and cable."); EX-1033 at 2:56-61, FIG. 5 ("The envelope 32 of FIG. 5 consists of a layer of flexible metal 34, such as aluminum, between two layers 36 and 38 of a plastic film, such as polyetehylene; one example of such envelope 32 including these three layers 34, 36, 38 is found under the trademarks DOW A282 or ZETABON."); EX-1035 at

1:17-28 (“Flexible metal tape suitable for use in tubing and electrical cable shields . . . are well known in the art. Examples of an 8 and 12 mil aluminum tape coated on both sides with approximately 2 mils of a copolymer of ethylene and a monomer having a reactive carboxyl group suitable for use in the present invention are respectively sold under part numbers A282 and XO-5554.07 under the Trademark "Zetabon" by Dow Chemical Company.”).

46. A POSITA would have had familiarity (as I did and still do) with each of these different types of tapes and cables with such tapes, and had such familiarity long prior to 2013.

VII. THE ‘030 PATENT

47. The ‘030 Patent describes a communications cable with a plurality of twisted pairs and a filler 108 within a barrier tape and further surrounded by a jacket. *See* Ex. 1001 at Title, Abstract, FIG. 1, 6:20-62, 3:32-63.

48. 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.” *Id*.at 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*. at 3:37-41, 8:38-46; *see also*, Abstract. 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*.at 2:47-50, 9:7-13. The '030 Patent asserts that FTC- or OTC-applied barrier tape is an improvement over "typical longitudinal or spirally applied tape" (i.e., "compared to various tape application methodologies of barrier tapes used in typical cables"). *Id*.at 5:60-6:2, 9:64-10:16.

49. With respect to the components of the cable, the filler is, but need not be, cross-shaped and separates the twisted pairs from each other. *Id*. at 3:11-13, 3:50-52, 6:11-13, 6:49-58, FIG. 1. The filler includes arms which radiate from a central point to terminal portions that may, but need not be, anvil-shaped or T-shaped and provide a structural stability to the cable. *Id.*

50. Various configurations of the pair separator are disclosed. For example, Figure 1 discloses a filler 108 in a cross shape where the terminal portions of the arms are anvil-shaped, while Figure 2E discloses a filler 108'' in a cross shape where the terminal portions of the arms are T-shaped:

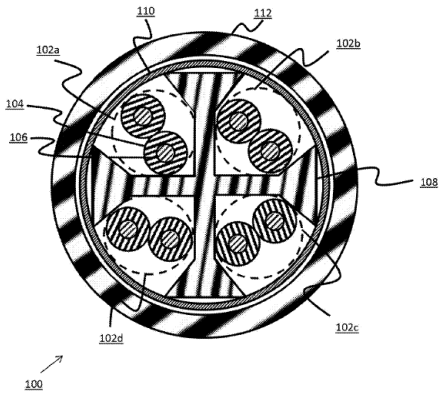


FIG. 1

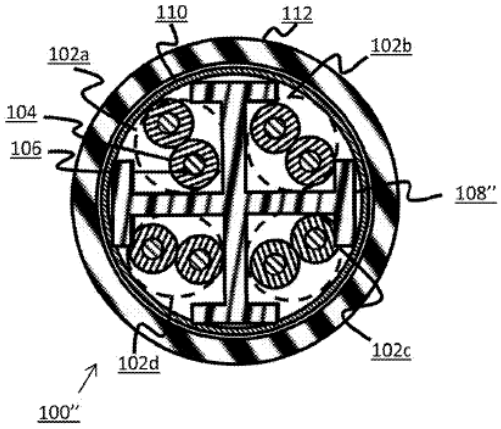


FIG. 2E

Id. at FIGS. 1, 2E.

51. The barrier tape that surrounds the filler and twisted pair conductors is disclosed as a "conductive barrier tape" (with associated numeral 110) that may be "a continuously conductive tape, a discontinuously conductive tape, a foil, a dielectric material, a combination of a foil and dielectric material, or any other such materials." *Id.*at 7:32-37, FIG. 3A. In the embodiment illustrated, the conductive barrier tape has a multi-layer configuration, with a conductive layer (e.g., aluminum foil 102) sandwiched between two layers of dielectric material 300, 304, such as polyester (PET), as illustrated in FIG. 3A:

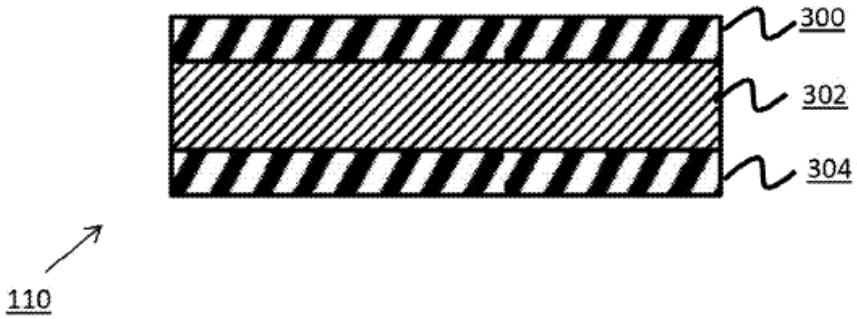


FIG. 3A

Id. at 7:32-45, FIG. 3A. The specification states that "[a]lthough shown edge to edge, in some embodiments, the conductive layer 302 may not extend to the edge of the tape 110. In such embodiments, the dielectric layers 300, 304 may completely encapsulate the conductive layer 302." *Id.* at 7:49-52.

A. The Challenged Claims of the '030 Patent

52. The challenged claims include claims 1-3, 9-14 and 16-18. These claims include two independent claims (1 and 18) and 10 dependent claims (dependent claims 2, 3, 9-14 and 16 claim 1).

B. Prosecution History

53. I have reviewed the prosecution history of the '030 patent. I summarize it briefly here.

54. The utility application ('504 Application) that became the '030 Patent was filed on May 31, 2017. It is a continuation of application No. 14/520,125,

filed on Oct. 21, 2014, and is now U.S. Patent No. 9,697,929. The '030 patent also lists Provisional application No. 61/894,728, filed on Oct. 23, 2013.

55. The '504 Application claims were originally rejected for double patenting in view of the '929 patent and as obvious over Clark-478 in view of Roberts (and for some claims, in further view of other references). EX-1002. The Examiner determined that Clark-478 disclosed all elements of the independent (and some other) claims (including a cable having twisted pair conductors separated by a filler, with a barrier tape surrounding the conductors and filler) except that Clark-478's barrier tape included two layers (aluminum and mylar) and did not "necessarily disclose the barrier tape comprising a conductive material in-between two dielectric layers" as recited in the application claims. *Id.* at Office Action pages 6-8. The Examiner determined that Roberts' internal metal shield tape 15, which has dielectric/conductive/dielectric layers and separates groups of conductors from each other, disclosed such a tape and that it would have been obvious to modify Clark-478 to use such tape as a barrier tape as recited in the claims. *Id*. at Office Action pages 8-9.

56. In response, the Patent Owner submitted a terminal disclaimer and also argued that the Examiner's proposed combination was wrong. In particular, Patent Owner argued that Roberts' internal separator shield tape 15 was "between" the conductors and did not "surround" the conductors, and that the Examiner's

stated motivation for using the Roberts shield tape 15 (to reduce crosstalk between conductors within the cable) would not apply to using such shield to *surround* the Clark-478 conductors. EX-1003 at pages 6-9.

57. It does not appear that much of the prior art that I focus on in this declaration as anticipating or rendering obvious claims of the '030 Patent (e.g., Cook and Glew) were addressed during prosecution. The Clark-478 and Roberts references were discussed by both the Examiner and the Patent Owner during prosecution, but only with respect to potentially modifying Clark-478 to include Roberts' internal tape shield 15 that separated groups of conductors within the cable. In this declaration, I focus on Roberts' barrier metal tape shield 18 surrounding all of the conductors, which Roberts discloses to act as an electrical (and mechanical) shield and "can have a plastic, such as polyethylene, firmly adhered to either one or more surfaces thereof." EX-1009 at 6:16-23.

C. Prior proceedings on the '030 patent

58. I am not aware of any prior legal or administrative proceedings involving the '030 Patent.

VIII. CLAIM CONSTRUCTIONS

59. I understand that claim terms in a patent are to be given their plain and ordinary meaning, as would have been understood by a person having ordinary skill in the art, at the time of the alleged invention, which I am informed is October

23, 2013, considering the language of the claims, the specification, and the prosecution history of record.

60. I have given the claim terms their plain and ordinary meaning, as would have been understood by a person having ordinary skill in the art as of October 23, 2013, in view of the claims themselves, the specification of the '030 patent, and its prosecution history.

IX. OVERVIEW OF THE PRIOR ART

A. Primary References

1. "Glew": U.S. Patent Pub. No. 2013/0248240

61. Glew (EX-1008) published on September 26, 2013.

62. Glew discloses, among other things, a cable having twisted-pair conductors, a dielectric filler member (or separator) that can have dispersed conductive particles and that is positioned between those conductor pairs to provide shielding of radiation between the pairs, multi-layer barrier tape surrounding the conductors and filler, and a jacket surrounding everything:

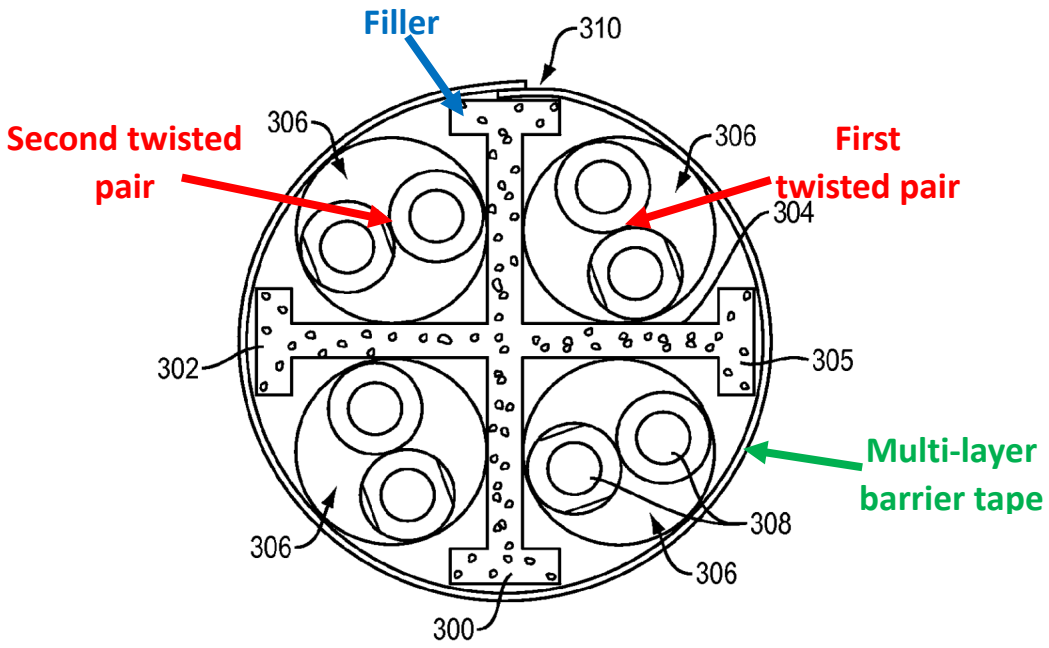


FIG. 10A

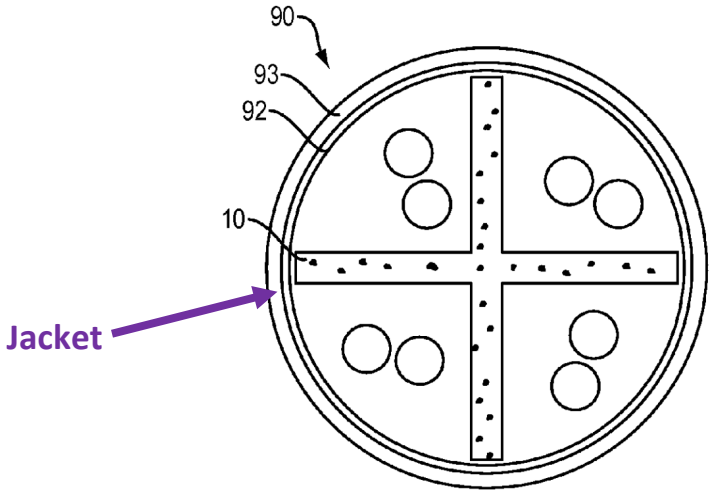


FIG. 6A

See, EX-1008 at ¶¶[0038], [0043], [0146-147], [0154], [0195], [0221-230], FIGS. 6A-6B, 10A, 13C, 17A-B, 18A-B. Glew discloses several barrier tapes, including

a two-layer barrier tape having a conductive layer and plastic substrate layer, as well as a three-layer barrier tape having a conductive layer positioned between two dielectric layers.

Schematic of 2-Layer Barrier Tape

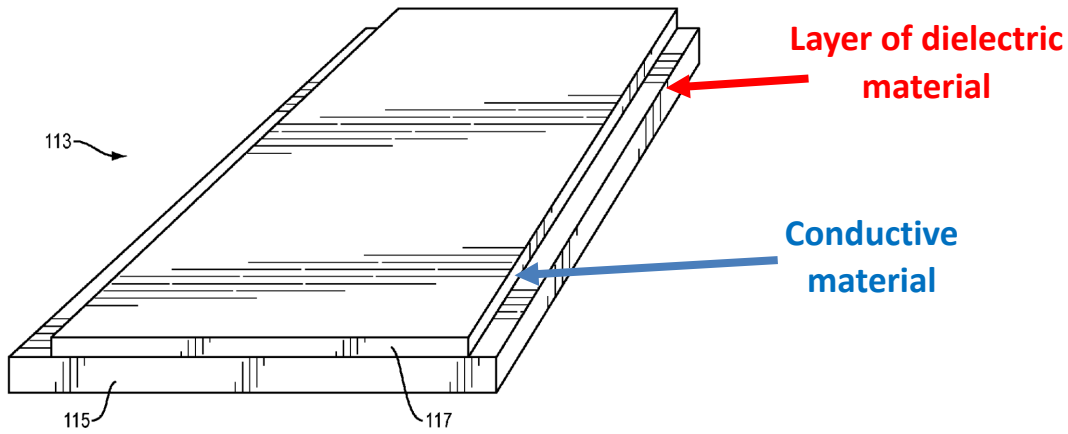


FIG. 13A

Schematic of 3-Layer Barrier Tape

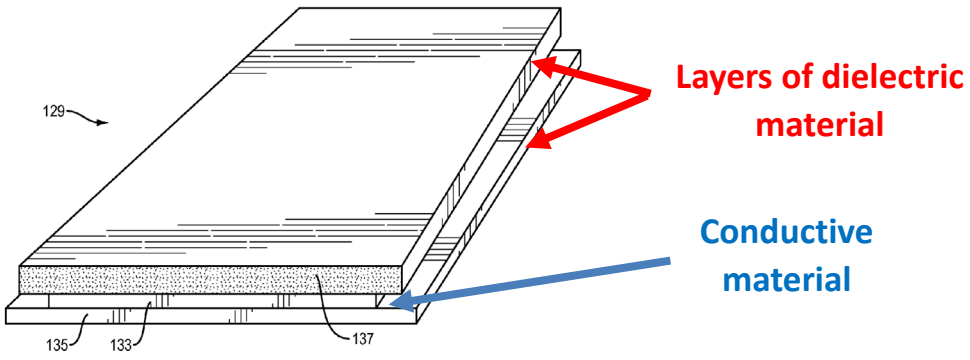


FIG. 13C

*See id.*at ¶¶[0154], [0187-189], [0195], FIGS. 13A, 13C, 17A-B, 18A-B.

2. "Cook": U.S. Patent No. 9,363,935

63. Cook (EX-1010) issued on June 7, 2016 from an application filed on March 15, 2013. Cook describes a cable having twisted-pair conductors, a filler member (or separator) positioned between those conductors, a three-layer barrier tape surrounding the conductors and filler, and a jacket surrounding everything:

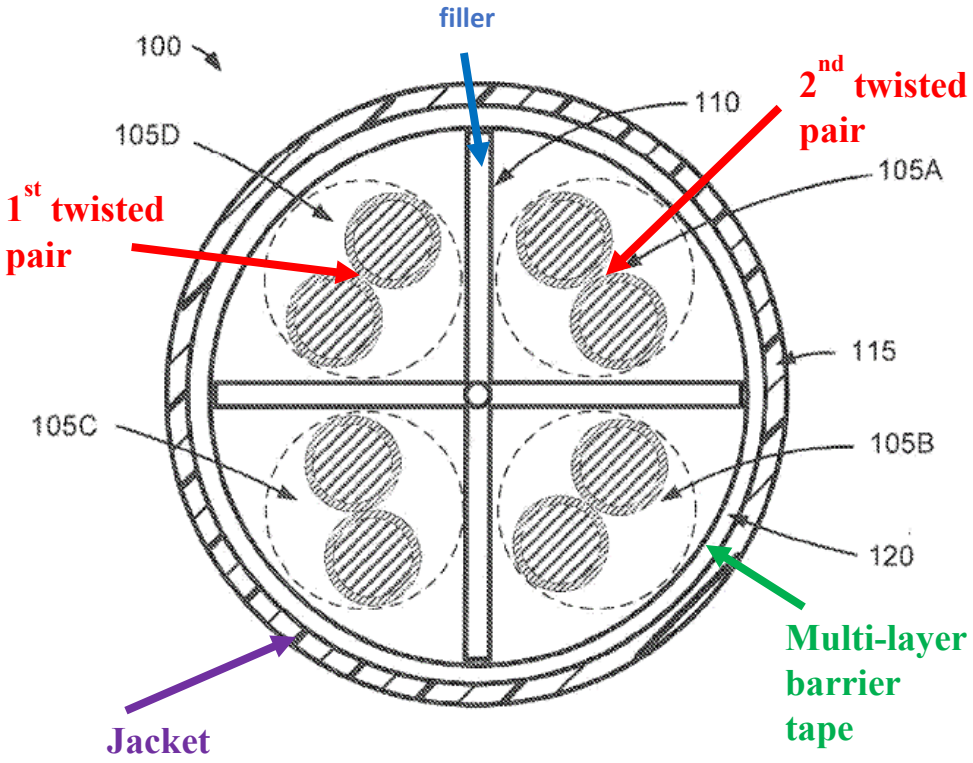


FIG. 1

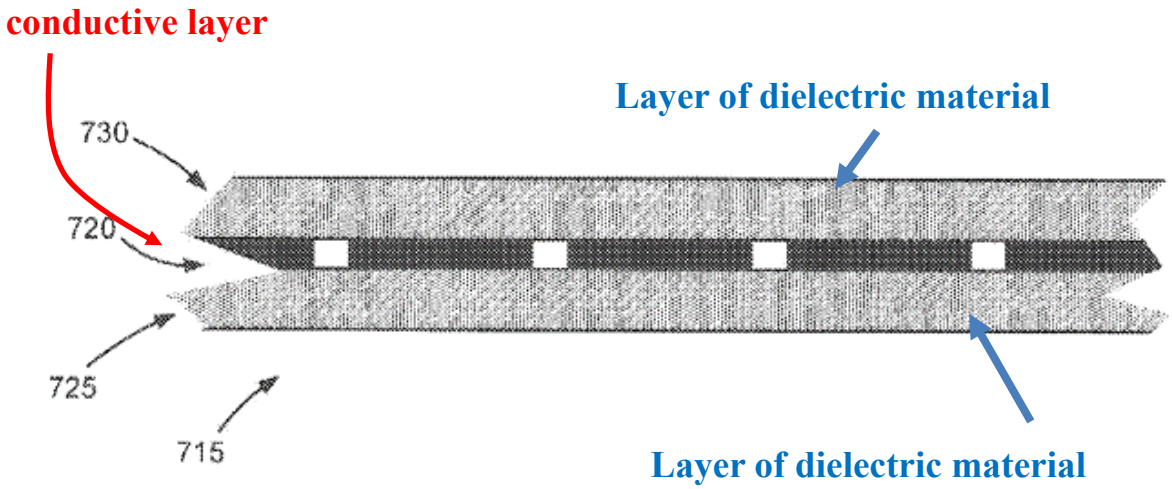


FIG. 7B

See, e.g., EX-1010 at 4:5-10, 4:32-47, 4:55-59, 5:18-48, 5:63-6:22, 6:35-41, 15:3-14, 15:57-16:19, 22:39-41, 25:39-63, FIGS 1-2; 7B, 11. Cook discloses that the conductive layer can be discontinuous (with a series of separated conductive patches) or continuous along the length of the barrier tape. *See e.g.*, *id*. at 7:10-14 ("A wide variety of suitable methods or techniques may be utilized to form a shield, such as shield 120. For example, electrically conductive material (e.g., a metallic material, an alloy, etc.), whether continuous or comprising electrically conductive patches or sections . . . .").

3. "Roberts": U.S. Patent No. 3,622,683

64. Roberts (EX-1009) issued on November 23, 1971. Roberts is cited on the '030 Patent and was considered as a secondary reference in connection with rejections made based on Clark-478 (EX-1025) as a primary reference. *See* EX-1002.

65. Roberts discloses a telephone cable, and a method of making it, that reduces crosstalk between electrical conductor pairs using a separator shield between the electrical conductor pairs. EX-1009 at Abstract; 13:34-36. Roberts teaches dividing a plurality of electrical conductor pairs into at least two portions by a "plastic-coated metal foil strip or tape." *Id*. at Abstract; *see also id.* 3:28-52. Roberts discloses that such separator may have a metal layer with both sides coated with dielectric so that it is sandwiched between dielectric layers, as illustrated in FIG. 5 below:

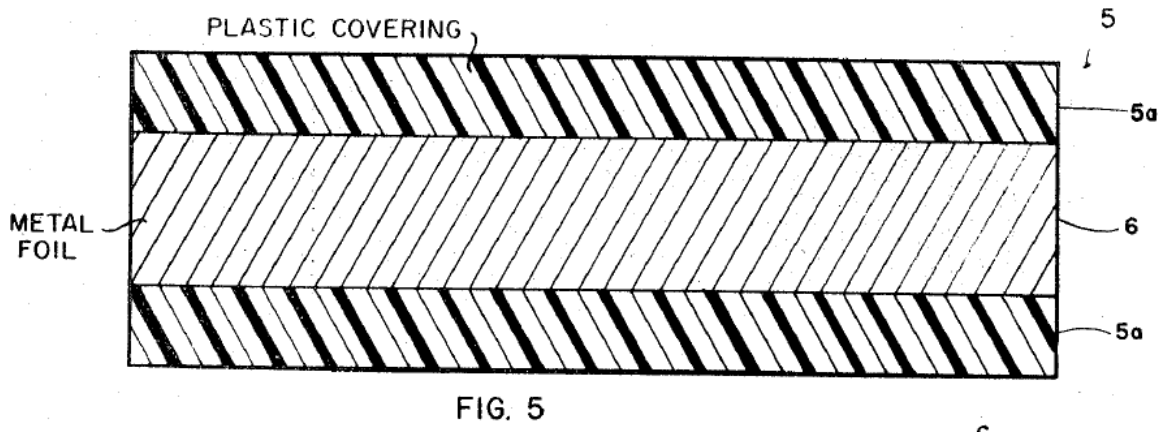
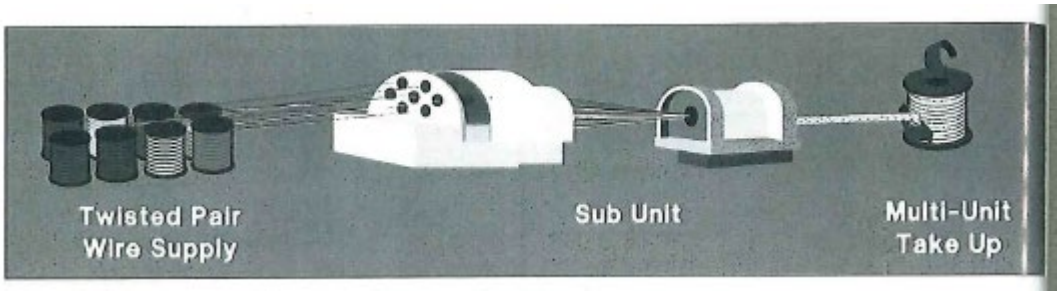


FIG. 5

Id. at 4:52-54, FIG. 5.2. Roberts teaches that his foil strip is preferably coated on both (or all) sides with a plastic coating, so that the plastic coating acts "as a dielectric." *Id*. at 3:37-52; *see also id*. at 3:40-46 ("dielectric protection can take the form of a firmly adhesive plastic coating . . .")

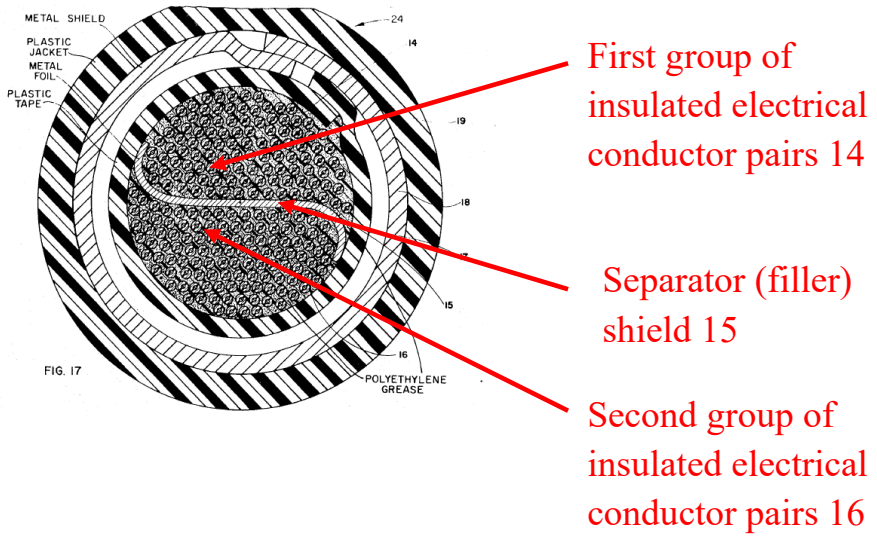
66. Roberts teaches the separator foil strip in various configurations that separate first and second groups of insulated electrical conductors (14) and (16)

from each other. *E.g., id*. at 4:2-16, 10:42-62. A POSITA would understand that such insulated electrical conductors are groups of twisted pairs of wire conductors. *E.g., id*. at 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 . . . dividing electrical conductor telephone ***pairs*** . . with plastic-coated metal foil") (emphasis added); *see also* EX-1017 at p. 11 ("The most commonly used transmission media in present-day digital loop applications is twisted pair metallic (copper) cable."); EX-1018 at p. 3 ("The main and most important part of a conventional two-wire loop is an outside plant cable pair (two twisted conductors), which provides a bidirectional signaling and transmission path."); EX-1016 at pp. 7-10. Twisted pairs were used in such cables at that time as they are today. In fact, it would have been uncommon for a cable of this type to have non-twisted pairs. *See* EX-1016 at p. 7. Typically, cables are manufactured by drawing twisted pairs through die plates into a laying tool that twists or "cables" the twisted pairs together. This is shown in cable manufacturing references. *E.g.*, EX-1016 at pp. 9-10. I have reproduced a figure showing this process below:



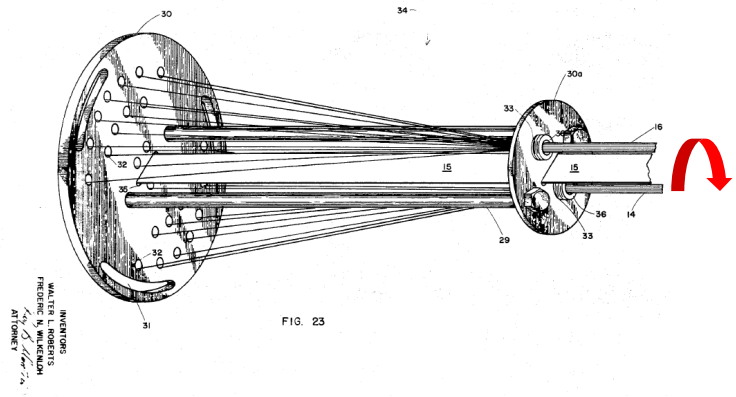
EX-1016 at p. 9. These die plates appear to be implementing a similar cabling process as implemented by Roberts. *Compare* EX-1009 at Fig. 23 *with* EX-1016 at p. 9.

67. In one embodiment, foil strip shield or screen 15 may form an "S" (serpentine) shape separating groups of insulated electrical conductors. EX-1009 at 10:56-62, Fig. 17 (annotations added):



68. This configuration has the advantage of requiring less divider shield material to manufacture, without the loss of any desired electrical properties such as mitigation of near-end crosstalk. *Id*. at 11:7-12.

69. Roberts teaches that the embodiment of Figure 17 is created by forming a "***twisted composite*** formed from elements (14), (15), and (16)"—the conductor pairs 14 and 16, the plastic-coated separator shield 15 twisted together about a common axis of the cable. *Id*. at 12:14-29 (emphasis added). This is accomplished using a manufacturing tool such as shown in Figure 23, that Roberts explains is used to manufacture the embodiment of Figure 17:



Id. at 12:12-14 (annotation added). To assemble the cable, insulated electrical conductors (twisted pairs) are pulled through holes 32 in dieplate 30 to holes 36 in dieplate 30a to form two sets of twisted insulated electrical conductors 14 and 16. *Id*. at 11:75-12:8; Fig. 23. The separator shield 15 is fed through center slot 35 in dieplates 30 and 30a. *Id*. at 12:2-4. The dieplates rotate while twisted pairs of conductors 14 and 16 and shield or screen 15 are fed through, producing the "twisted composite" of elements (14), (15), and (16). *Id*. at 12:14-29.

70. This twisted composite is subsequently wrapped with a metal tape shield 18. *Id*. at 12:30-39 (explaining that the composite is "traversed through a

taping machine where metal tape (18) is applied thereto as shown in FIG. 17"). As Roberts explains, the metal shield 18 "longitudinally circumscribes and has nested therein," the conductors and the separator shield 15. *Id*. at 10:42-62, FIG. 17. This metal tape shield 18 "can have a plastic, such as polyethylene, firmly adhered to either one or more surfaces thereof." *Id*. at 4:20-23.

71. During prosecution, the Examiner and Patent Owner focused on Roberts' 3-layer metal separator shield 15, which in one embodiment has the conductive layer positioned between, and extending edge-to-edge with, dielectric layers. *See id.* at 4:48-62, FIG. 5. The Examiner relied upon this separating shield tape, as illustrated in Roberts FIGS. 1, 4 & 5, to argue that modifying the Clark-478 reference to include a three-layer barrier tape surrounding the filler and twisted pairs was obvious because the Roberts separator shield would "reduce crosstalk between adjacent conductors, which results from barrier tapes only having one dielectric layer laminated to aluminum." EX-1002 at Office Action pages 8-9. The Patent Owner responded that the metal foil tape pointed to by the examiner was positioned "*between*" conductors in order to reduce crosstalk *between* the conductors, whereas claim 1 recites the barrier tape "*surrounding*" all of the conductors of the cable. EX-1003 at pages 6-9. The Patent Owner argued that "for the claimed barrier tape to 'reduce crosstalk between adjacent conductors' despite not being deployed between the conductors, as the Examiner contends is the

motivation to combine Clark-478 and Roberts, the principle of operation of Roberts' shield (and indeed, known physics) would have to be modified." *Id.* at page 8.

4. "Clark-478 ": U.S. Patent Pub. No. 2006/0169478

72. Clark-478 (EX-1025) discloses a high performance cable 70 that includes multiple twisted pair conductors separated by a separator, with a barrier tape surrounding the separator and conductor pairs, and a jacket then encircling the barrier tape, separator and conductor pairs:

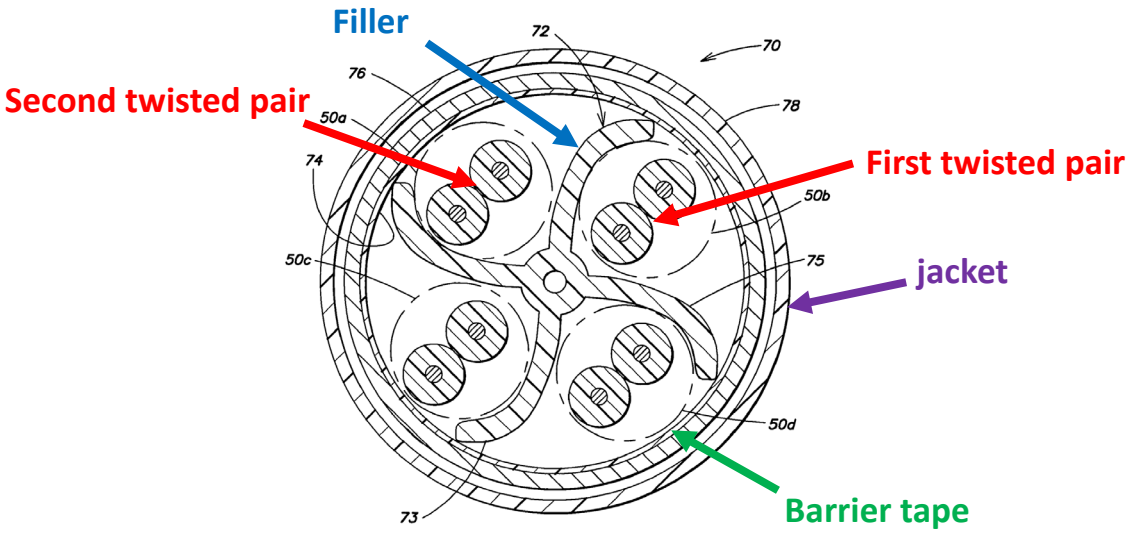


FIG. 2

EX-1025 at ¶¶ [0034], [0039-041], [0048], FIG. 2.

73. Clark-478 discloses that high performance cables are known to "employ some form of separator between the individual twisted pairs in a cable for

isolation to further reduce crosstalk" and can have a variety of shapes, such as an "substantially flat" S- or serpentine shape or "a cross or '+' shap[e]":

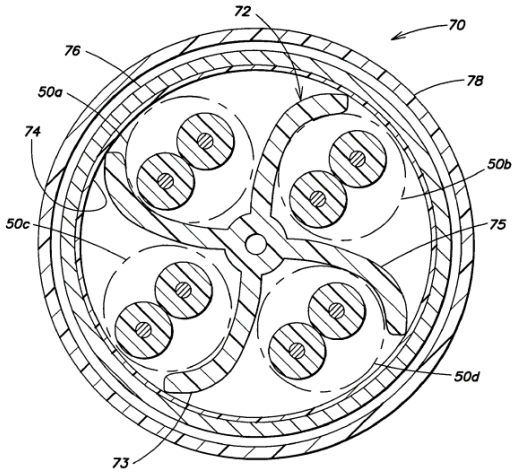


FIG. 2

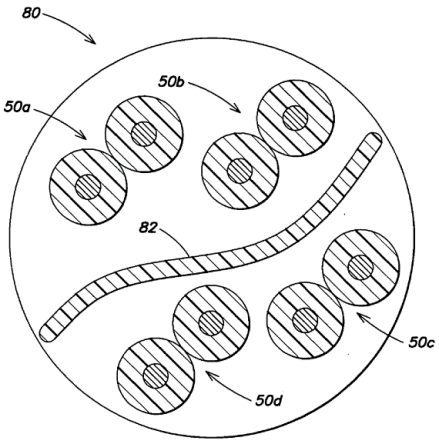


FIG. 3

Id. at ¶¶[0038], [0041], [0044] FIGS. 2 & 3.

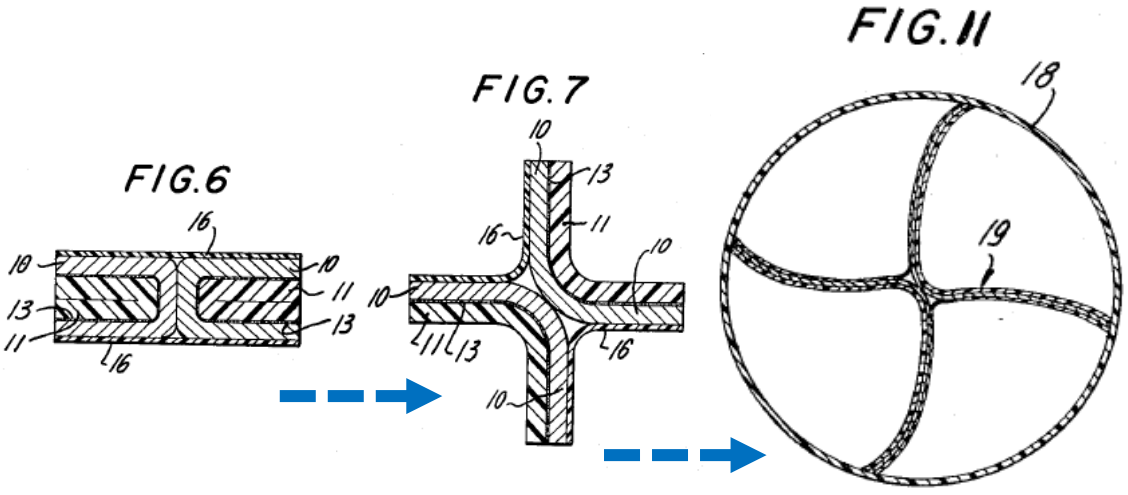
74. Clark-478 also discloses a binder 74 that is a two-layer aluminum/mylar tape, and comprises a continuous aluminum layer on a dielectric layer (mylar) and extending to the edges of the mylar. *Id*. at ¶[0047], FIG. 2; EX-1002 at Office Action pages 7-8.

75. During prosecution, the Examiner found that Clark-478 discloses a cable having most of the elements recited in the then-pending claims, including independent claims 1 and 18, but that Clark-478 did not disclose a three-layer barrier tape surrounding the filler and twisted pair conductors as recited in the claims. EX-1002 at Office Action at pages 6-8.

B. Secondary References

1. "Simons": U.S. Patent No. 3,911,200

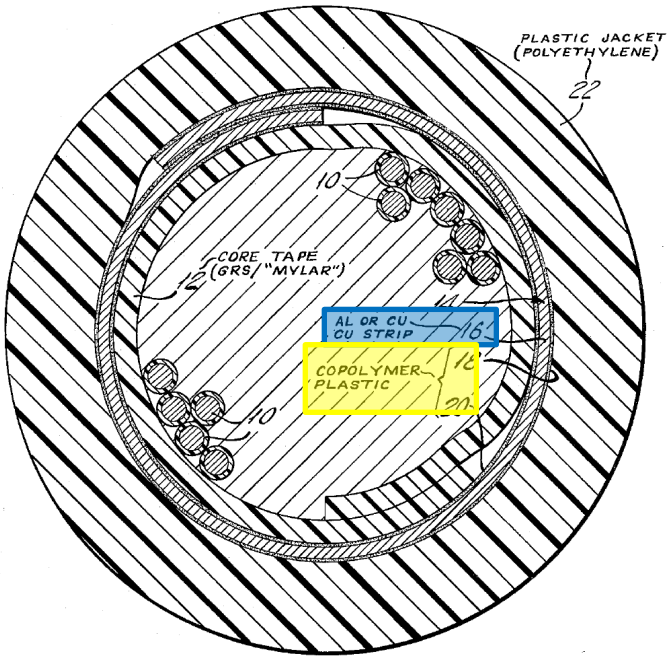
76. Simons (EX-1012) discloses "an improvement over the shielding means disclosed in [Roberts]." Simons at 1:5-12. The Simons "improvement" includes using a multi-layer tape to form a four-arm filler to create four channels within the cable and separate conductor pairs in the cable from each other:



EX-1012 at 2:4-9, 2:18-20, 3:1-26, 3:42-46, FIGS. 1, 6, 7, 11.

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

77. Jachimowicz-036 published in 1966 and teaches a shielding tape for shielding cables. EX-1013 at Title, 1:1-13. The shielding tape ("shield 14") is a metal tape having the continuous metal layer sandwiched between two layers of a dielectric material and extending to the lateral edges of the dielectric material such as illustrated below.



Id. at 2:52-66, FIG. (annotated).

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

78. Jachimowicz-172 issued in July 1975, and discloses a cable that uses multiple twisted pairs of insulated conductors. 1014 at 2:32-33 ("three pairs 10-14 [of insulated conductors] are each twisted with a different lay"); Fig. 2 (showing each twisted pair with a different lay), Fig. 4. Jachimowizc-172 also discloses the cable including an outer shield 34 that "may be a strip of aluminum foil with a polyolefin coating on both sides …." *Id*. at 3:34-27.

X. GROUNDS OF INVALIDITY

A. GROUND 1: Cook Anticipates Claims 1-3, 9-14, 16-18

1. Independent Claim 1

1. A cable comprising:

[1A] a first twisted pair of insulated conductors;

[1B] a second twisted pair of insulated conductors;

[1C] a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors; and

79. Cook discloses a cable comprising these elements. Cook discloses a cable (for example, "cable 100") that has 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 for example in the annotated figure below:

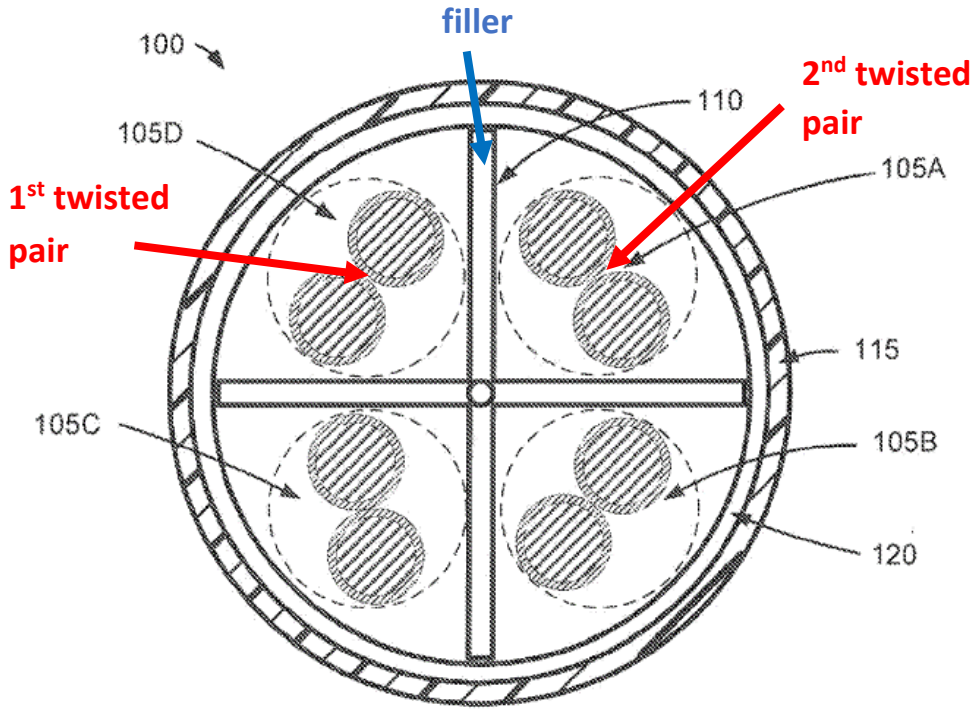


FIG. 1

See EX-1010 at 4:32-47, 4:55-59, 5:63-6:22, 15:57-16:19, FIGS 1-2.

80. Thus, Cook discloses these elements.

[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.

81. Cook discloses this element. Cook discloses a multi-layer barrier tape (tape shield 120) surrounding the first and second twisted pairs of conductors and the filler as illustrated for example:

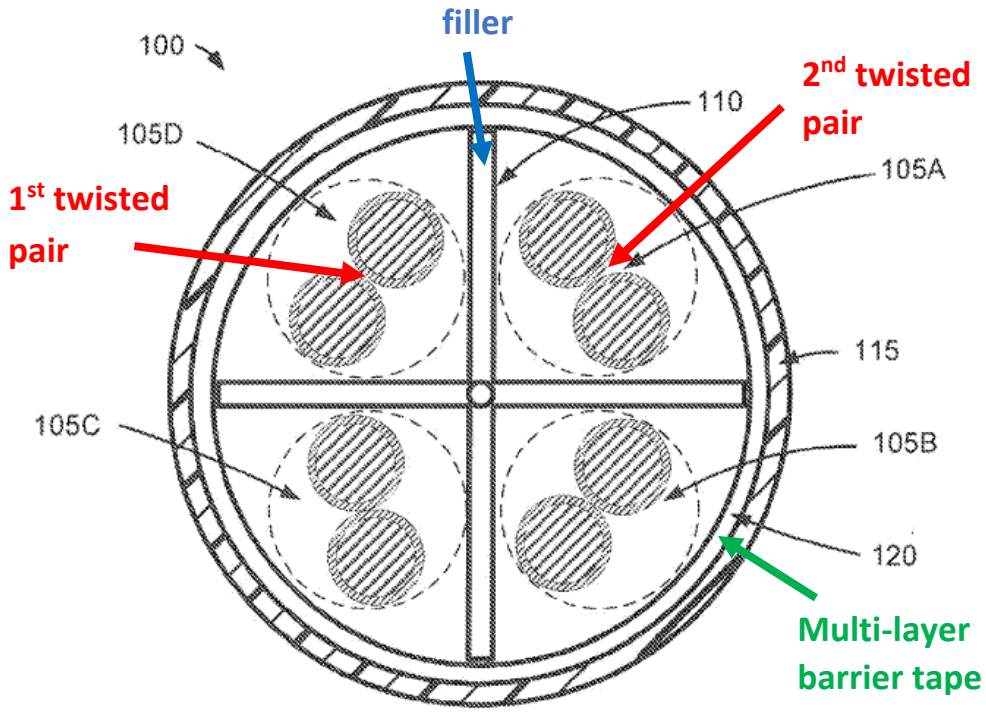


FIG. 1

See id. at 4:32-47, 4:55-59, 5:46-48, 5:63-6:22, 6:35-41, 15:57-16:19, FIGS 1-2.

82. Cook discloses that the "shield 120" may comprise 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.[2] *See id*. at 6:50-7:20, 11:8-39, 11:64-12:5, 22:39-41, FIGS. 7B, 8A-8D. Cook states that the conductive material may be "either continuous, [or] discontinuous" (7:11-15), and that the conductive material "may be grounded at either end when a cable incorporating the shield layer is installed." *Id*. at 23:64-66. 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:

[2] In this way, 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 at 7:32-45.

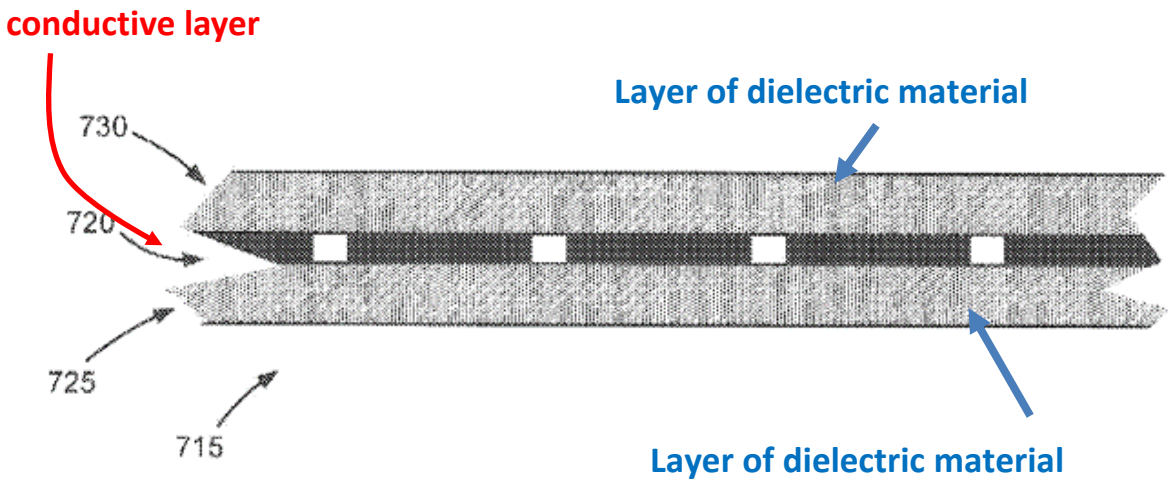


FIG. 7B

Id. at 22:39-41, FIG. 7.

83. Cook also describes its disclosed shields each as "a tape" or "tape shield layer" of the cable. *Id*. at 7:10-20, 11:8-39, 22:30-41, 24:47-50.

84. Cook also discloses that the conductive material extends to each lateral edge of the two layers of the dielectric material, as illustrated in the annotated Figure below vis-à-vis one of the dielectric layers, with the conductive material "running along the longitudinal length" of the tape and extending to each lateral edge:

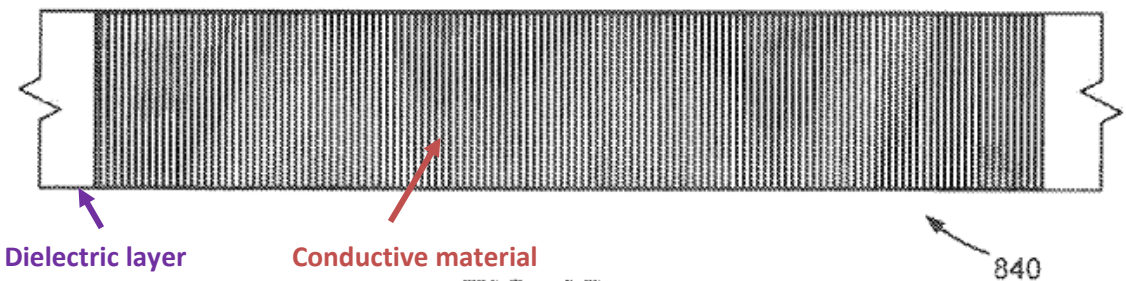
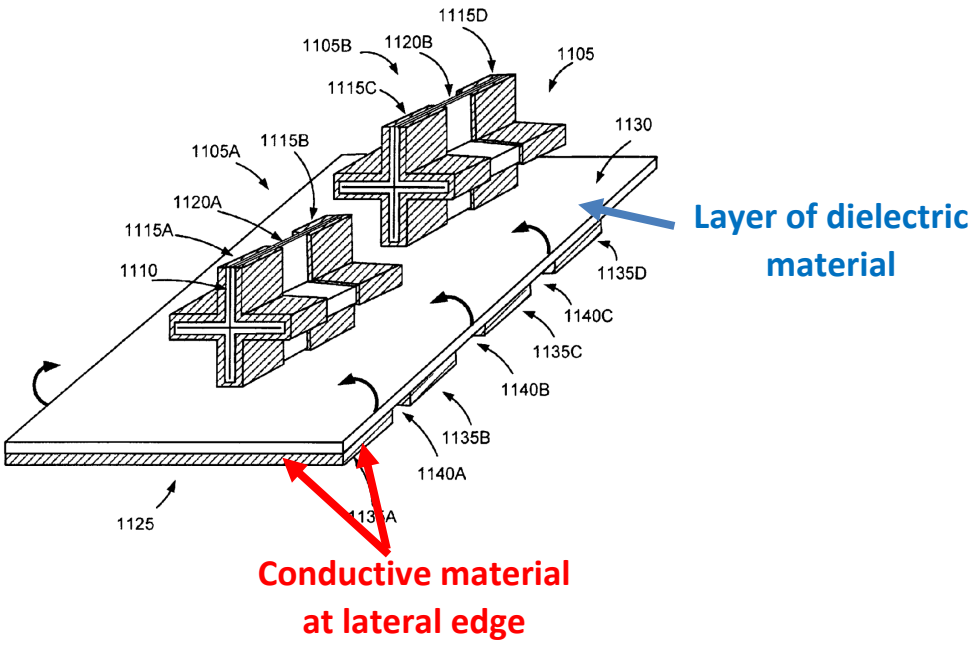


FIG. 8D

See id. at 23:58-67, FIG. 8D. Cook explains, and illustrates, that the conductive metal in the conductive layer "span[s] the full width" of the shield. *See id*. at 12:22-23, 22:62-23:58, FIGS. 8A-8C, FIG. 11.

85. Cook Figure 11(annotated below) shows a shield layer 1125 (a two-layer *barrier tape*) with the conductive material extending to the lateral edges of substrate layer 1130 ("*layer of dielectric material*"), and how the shield layer is "folded or wrapped around" the separator (filler) and the twisted pairs of conductors (not shown). *Id*. at 25:39-57, FIG. 11.



86. This Figure 11 embodiment shows discontinuous patches (as opposed to the alternatively-disclosed design with a continuous conductive layer). However, a POSITA would understand that with a continuous design, the conductive

material would similarly extend to the lateral edges such as shown above in FIG 8D.

87. In the event the recited "lateral edges" are interpreted to be the right and left dielectric ends of the tape along the longitudinal length in the above illustration in FIG. 8D (in lieu of top and bottom edges), Cook discloses that the conductive material layer may be either "continuous, [or] discontinuous". *Id*. at 7:11-14. In addition, Cook discloses that a dielectric end "may be" included "as desired" and that conditional terms such as "may" are "intended to convey that . . . other embodiments do not include" the associated feature/element. *Id*. at 23:60-67, 25:64-26:9. Cook also discloses that the shield tape 120 "may be grounded at either end." *Id.* at 6:53-56, 23:64-67. Therefore, a POSITA would understand Cook to also disclose a multi-layer tape having continuous conductive material extending to each longitudinal end, such as illustrated in the annotated figure below with the metal layer extending from end to end instead of being discontinuous patches:

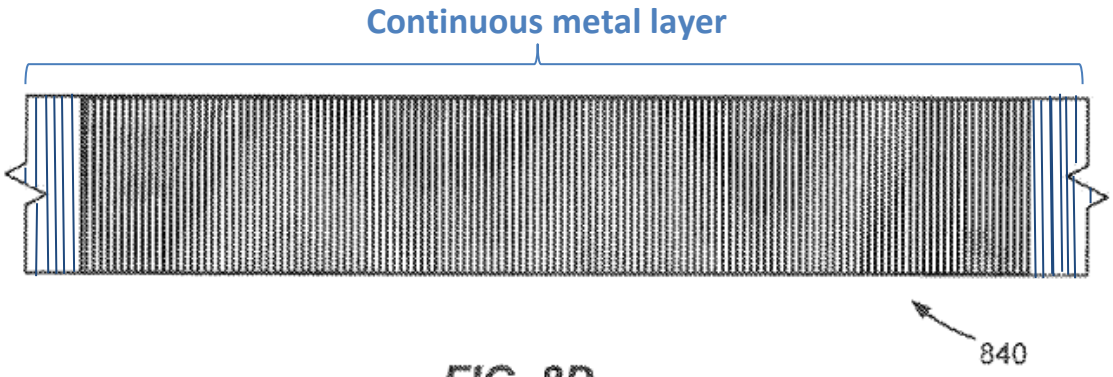


FIG. 8D

88. Cook, therefore, discloses this element.

89. A POSITA, therefore, would understand Cook to disclose a cable with the elements recited in Claim 1, and that claim 1 is anticipated by Cook.

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

90. Cook discloses that 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." *Id*. at 11:8-14.

91. Thus, Cook discloses this element, and this claim is anticipated.

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

92. Cook discloses that the separator (*filler*) "maintain[s] a desired orientation of the twisted pairs . . . along a longitudinal direction of the cable" (Cook at 7:39-43), and that the separator 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. *Id*. at 25:26-38. "For example, the cable core and the four twisted pairs 105 may be collectively twisted about a longitudinal axis of the cable 100 in a common direction." *Id*. at 14:55-58.

93. This discloses to a POSITA that the filler (and also the twisted pairs of conductors) are helically twisted at an angle (*a first angle*) and that Cook discloses the element recited in this claim.

94. Therefore, this claim is anticipated.

4. Dependent claim 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.

95. As discussed with respect to claim 3, Cook discloses that the separator and twisted pairs of conductors "may be helically stranded or twisted together" for various beneficial purposes. *Id*. at 25:26-38; *see also*, *id.* at 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), as recited, and this claim is anticipated.

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

96. Cook discloses separator 110 ("*filler*") comprising multiple arms, similar to the '030 Patent's filler arms (200):

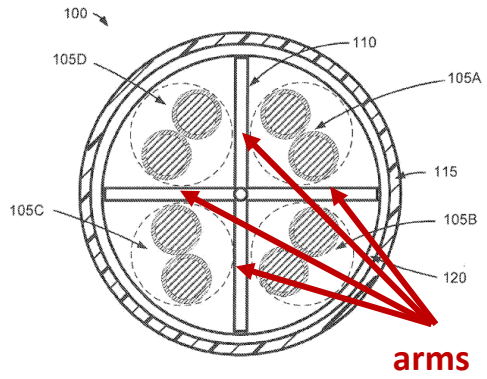


FIG. 1

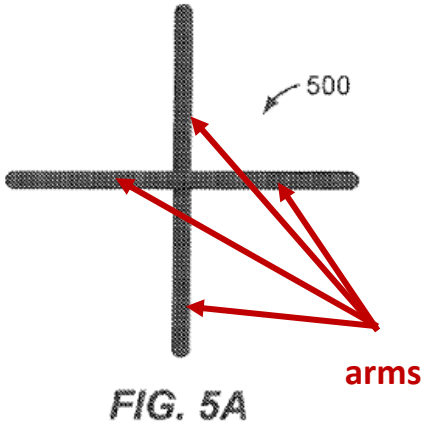


FIG. 5A

Id. at 4:55-59, 19:50-61, FIGS. 1 & 5A

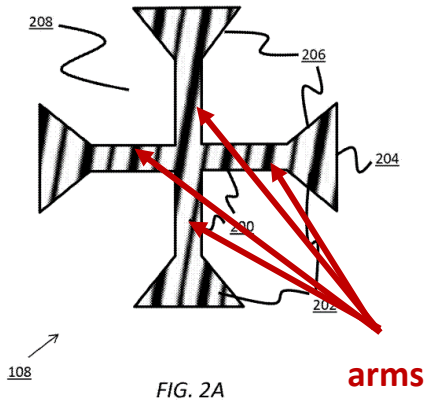


FIG. 2A

EX-1001 at 6:52-62, FIG. 2A

97. Thus, Cook discloses this claim element, and this claim is anticipated by Cook.

6. Dependent claim 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.

98. Cook discloses this element.

99. Cook discloses that tape shield may be "wrapped" or "folded" around the separator and twisted pair conductors, such as illustrated in FIG. 11. *Id*. at

25:39-57, FIG. 11. As illustrated, upon being wrapped or folded, the long edges of the tape would either meet at a seam or overlap and create a seam. *See id*. at 24:60-25:11, 25:39-57, FIGS. 10-11. A POSITA would understand, particularly given that Cook describes the separator and twisted pairs being helically twisted together along the length of the cable (*id*. at 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 longitudinally "wrapped around" the twisted cable core such as described in Cook, shows a cross-sectional view along a portion of the cable, in which the seam is directly above a terminal portion;

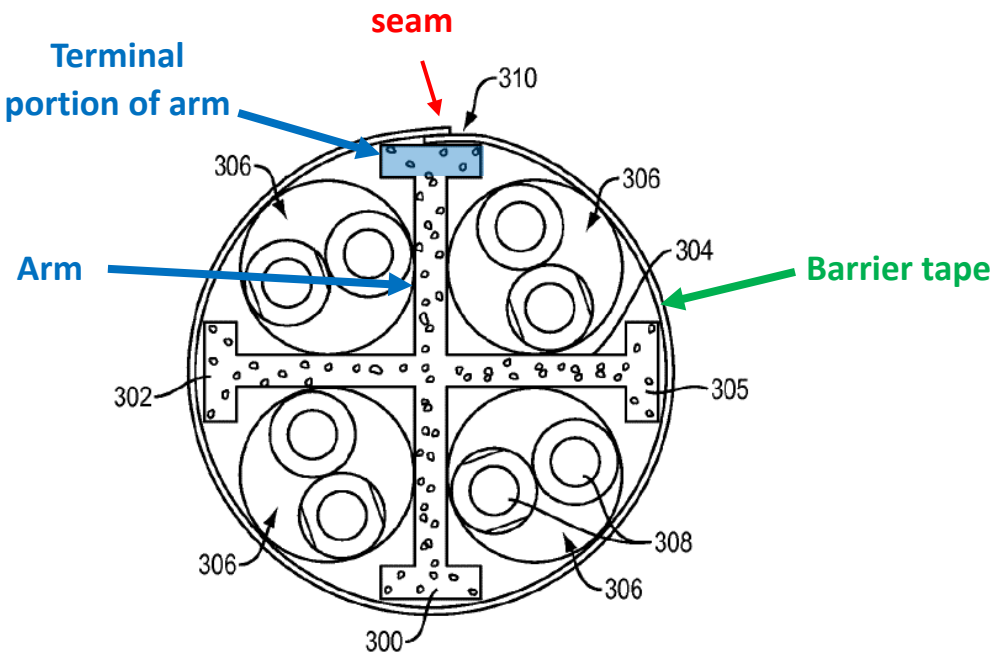


FIG. 10A

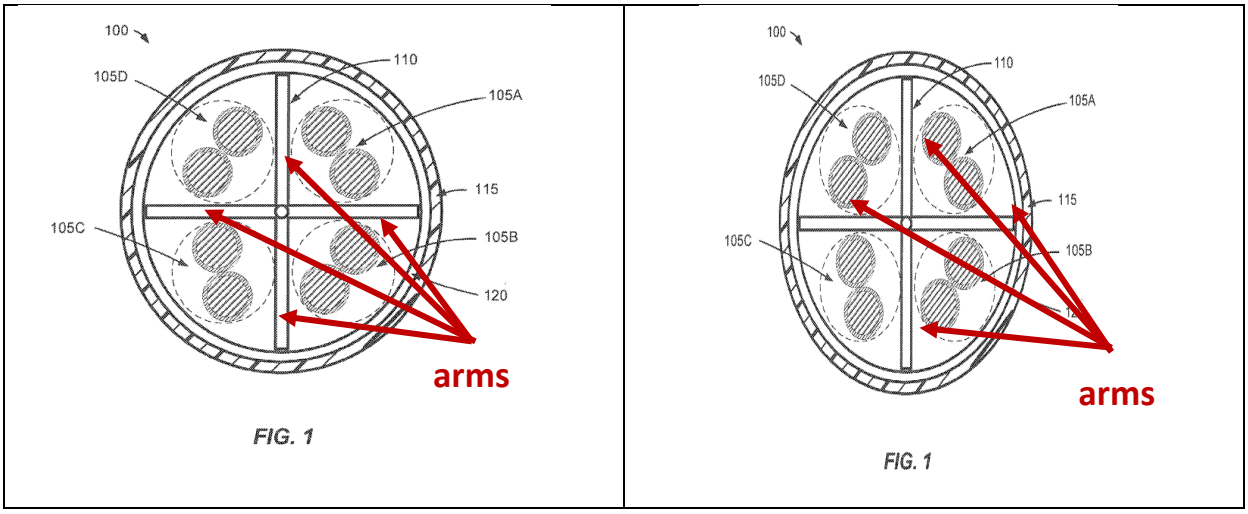
EX-1008 at ¶[0154], FIG 10A.

100. Therefore, Cook discloses this element, and this claim is anticipated.[3]

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

101. Cook teaches that the separator ("*filler*") can have multiple configurations, including being "cross-shaped." EX-1010 at 11:44, 11: 55-56.

Cook includes figures that disclose fillers having four arms in a cross shape:



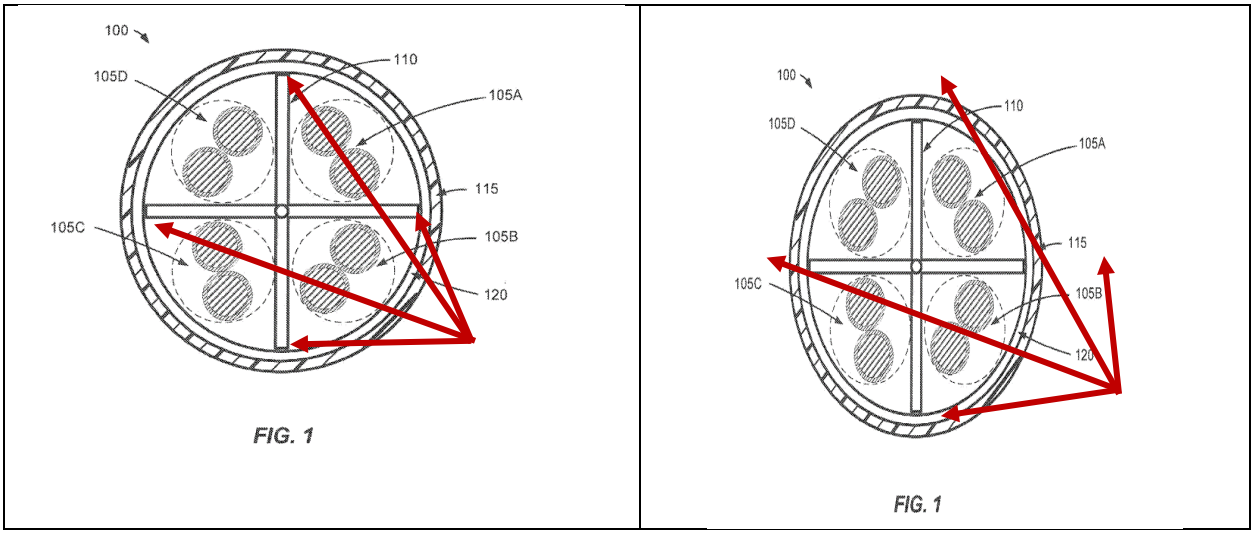
See, e.g., id. at 4:55-59, 19:50-55, FIGS. 1 & 5A.

102. Therefore, Cook discloses this element and this claim is anticipated.

[3] In my view, and in view of the specification, a POSITA could understand "a seam of the barrier tape is positioned above a terminal portion of an arm of the filler" to require that, like in the '030 Patent's disclosed fixed tape control (FTC) process, the seam be positioned above a terminal portion of an arm of the filler along the entire longitudinal length of the cable instead of at any particular point along the length of cable arm. *See* EX-1001 at Abstract, 2:37-46. If such an interpretation is applied then Cook does not, in my view, disclose this claim element.

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

103. As illustrated in FIGS. 1 and 5A, for example, Cook discloses this element:



Id. at 4:55-59, 19:50-55, FIGS. 1 & 5A.

104. Therefore, Cook discloses this element, and this claim is anticipated.

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

105. Cook discloses that the separator ("*filler*") may, instead of looking like a "+" sign, "hav[e] T-shaped members extending from a central point or center member." *Id*. at 11:40-50. This describes a separator, such as shown in FIG. 2E of the '030 patent, in which all the arms have a T-shaped end portion:

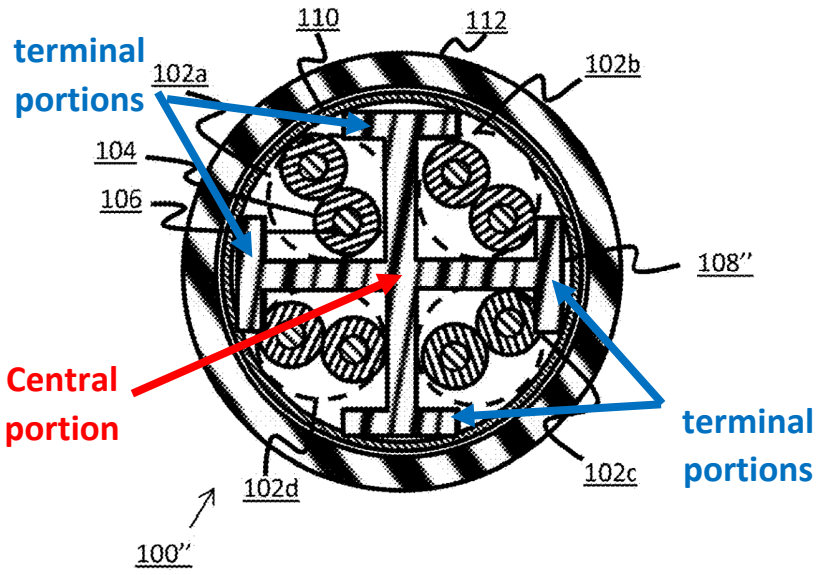


FIG. 2E

See EX-1001 at FIG. 2E. In this disclosed structure (which illustrates what Cook describes), each terminal portion of the arm has a lateral extension which makes it (the terminal portion) wider than a middle portion of that arm.

106. Cook thus discloses this element and anticipates this claim.

10. Dependent 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.

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

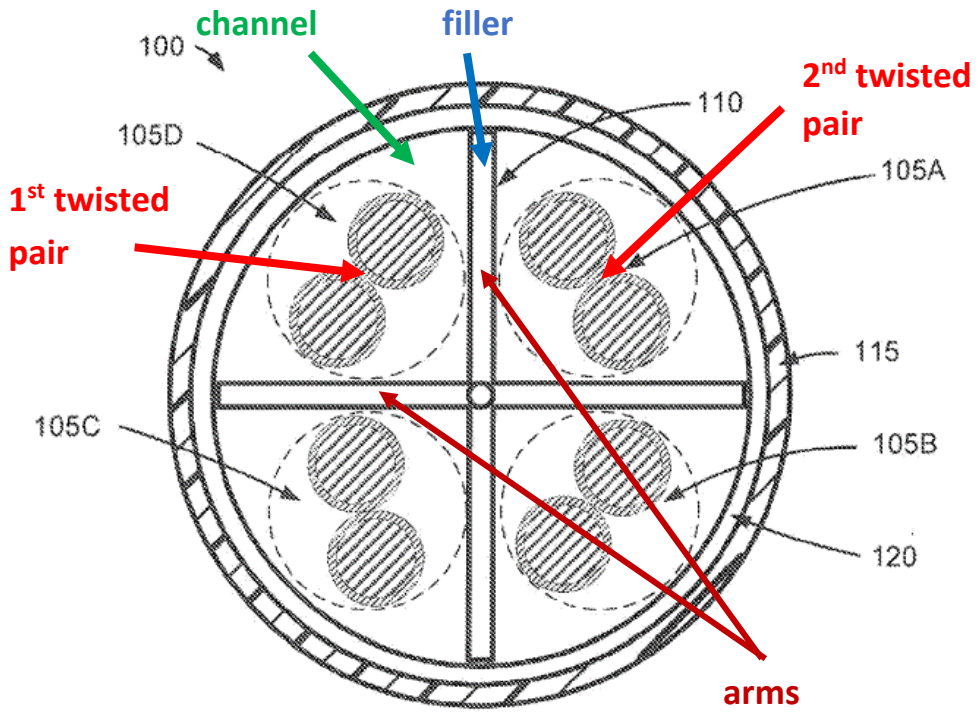


FIG. 1

See, e.g., EX-1010 at 4:32-47, 4:55-59, 15:57-16:19, 19:50-53, FIGS 1-2 & 5A.

108. Therefore, Cook discloses this element, and this claim is anticipated.

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

109. Cook discloses a cable further having a jacket (e.g., "jacket 115") surrounding the conductive barrier tape (i.e., shield 120) as illustrated for example in the annotated Figure below:

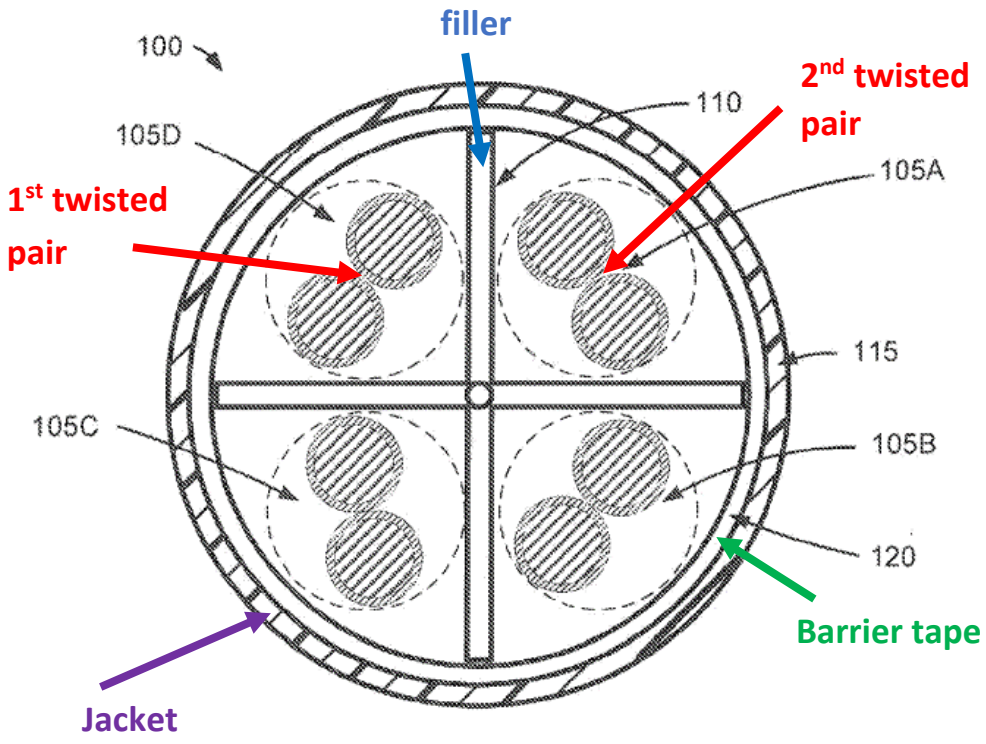


FIG. 1

Id. at 4:32-47, 4:55-59, 5:18-42, 15:57-16:19, FIGS 1-2.

110. Therefore, Cook discloses this element, and this claim is anticipated.

12. Independent claim 18

111. Claim 18 is a method claim that recites essentially the same structural limitations as claim 1, except that it does not require the conductive layer of the three-layer barrier tape to be "continuous". *Compare* EX-1001, claim 1, *with* claim 18.

112. The structural limitations recited by this method claim (i.e., the first and second twisted pairs of insulated conductors (element [18A]), the filler separating (or between) the twisted pairs (element [18B]), and the three-layer

barrier tape wrapped around (or surrounding) the filler and twisted pairs and having a conductive material between two layers of a dielectric material and extending to each lateral edge of the two layers of the dielectric material (elements [18C-1] and [18C-2]) are disclosed by Cook as explained above with respect to corresponding elements [1A] and [1B] (first and second twisted pairs), [1C] (filler separating the twisted pirs), and [1D] (three-layer barrier tape surrounding the filler and conductors, with conductive layer between dielectric layers and extending to lateral edges of the dielectric layers). *See* Section X(A)(a) above.

113. Using Cook's cable and teaching as described for claim 1 above results in performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. See, my discussion above in Sections X(A)(a) concerning Cook's disclosure of separating the twisted pairs of insulated conductors with a filler and wrapping (or having wrapped) the twisted pairs of insulated conductors and filler with the recited barrier tape in connection with claim elements [1A-D]. As I explain in more detail below, the method steps of "providing" the twisted pairs of insulated conductors, "positioning" the filler between them, and "wrapping" the conductors and fillers with the recited barrier tape are disclosed by the Cook cable's having had the twisted pairs of conductors provided and the filler being positioned between them (see below discussion regarding elements [18A] and [18B]), and the barrier tape having the recited

characteristics and being wrapped around them all (see below discussion regarding elements [18C] and [18D]). Thus, this claim is anticipated.

18. A method of manufacture of a cable, comprising:

[18A] providing a first twisted pair of insulated conductors and a second twisted pair of insulated conductors;

[18B] positioning a filler between the first twisted pair of insulated conductors and the second twisted pair of insulated conductors; and

114. These are method steps that essentially mimic the cable apparatus elements [1A-C]. Cook discloses these elements as illustrated in the annotated figure below:

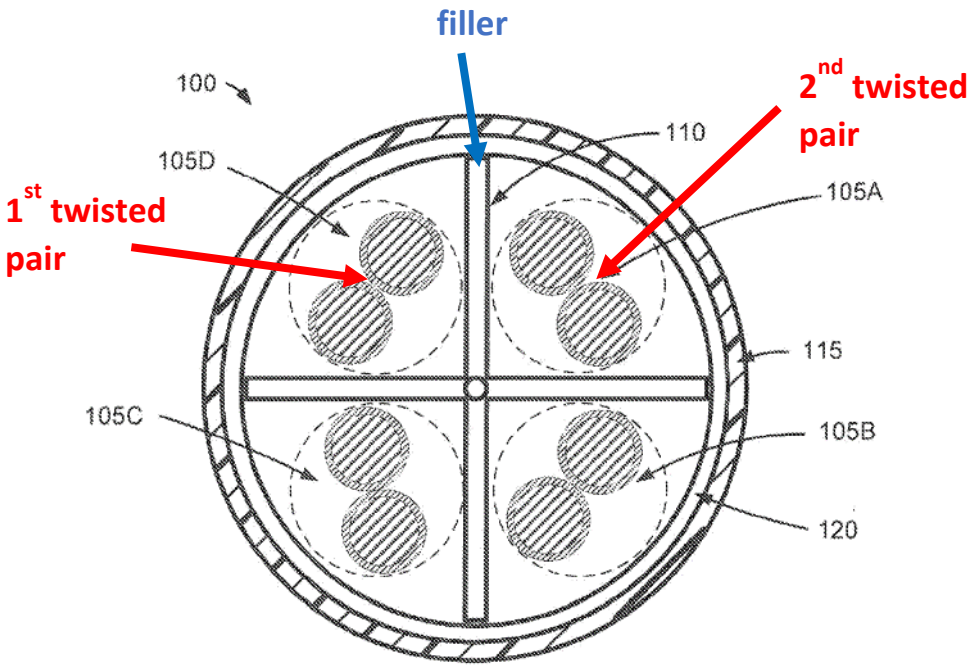


FIG. 1

See, e.g., EX-1010 at 4:32-47, 4:55-60, 5:63-6:22, 7:37-49, 15:57-16:19, FIGS 1-2; Section X(A)(a)([1A-1C]) above.

115. Cook thus discloses these method steps.

[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,

[18C-2] the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material.

116. These are method steps that essentially mimic the cable apparatus element [1D]. As explained in that section, Cook discloses these elements.

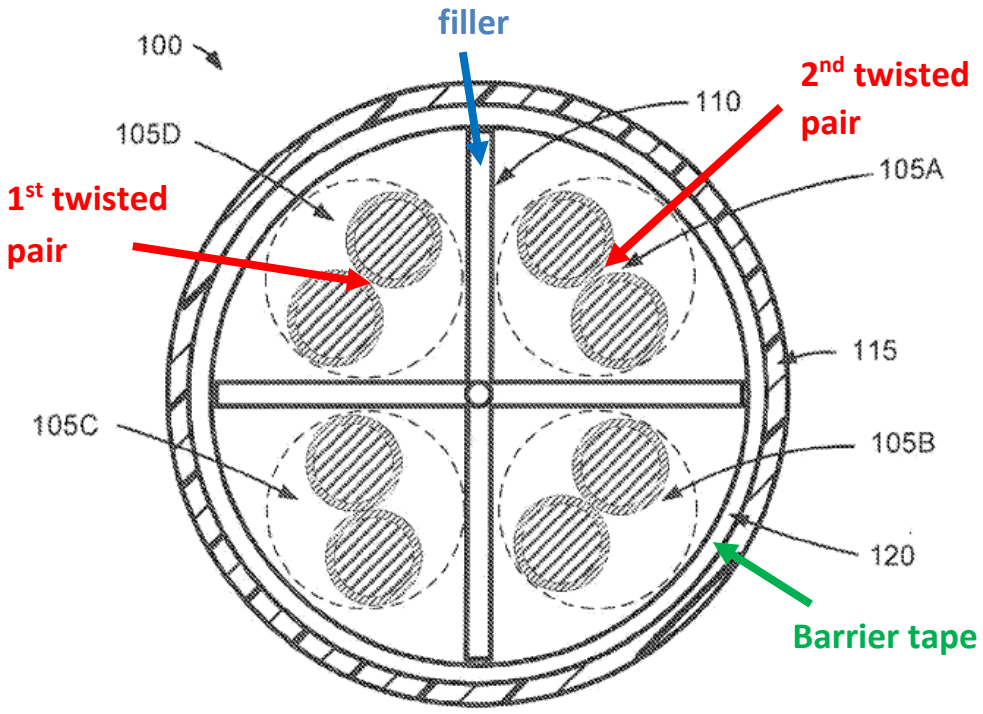


FIG. 1

See my comments above regarding Cook and element [1D]; *see also* EX-1010 at 4:32-47, 4:55-59, 5:46-48, 5:63-6:22, 6:35-41, 15:57-16:19, FIGS 1-2.

117. Cook explains that the shield (*barrier tape*) is "folded or wrapped around" the separator (filler) and the twisted pairs of conductors so that it surrounds them. *Id*. at 25:39-57, FIGS. 1 & 11.

118. Cook also describes a three-layer shield (*barrier tape*) that may be formed as a tape in which "electrically conductive layer 720 is sandwiched between two dielectric layers 725, 730" as illustrated in FIG. 7B:

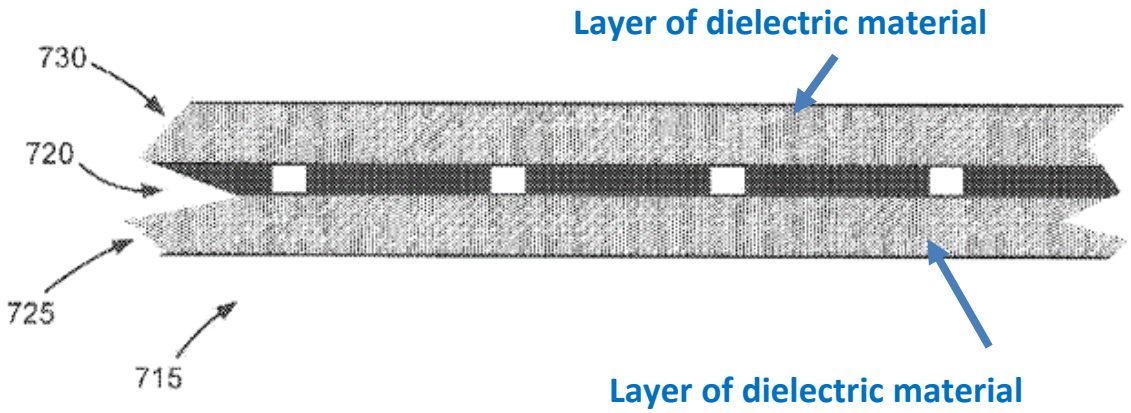


FIG. 7B

Id. at 11:8-28, 22:39-41, FIG. 7B.

119. Cook also discloses that the conductive material may be "continuous" (*see id.* at 7:11-15), which means extending along the entire longitudinal length, and that the conductive metal material may "span fully across a width" of the separator. *Id*. at 12:22-23. Thus, Cook discloses that the conductive layer is

continuous and extends to each lateral edge of the two layers of dielectric material. See also my comments in connection with element [1D] above.

120. Cook discloses each of the recited steps, and so anticipates this claim.

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

1. Dependent 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.

121. In my opinion, Cook discloses this element to a POSITA. See discussion above regarding claim 11 in Section X(A)(a)(11). However, I have been asked to assume that Cook does not disclose this claim language.

122. Cook discloses that the shield (*barrier tape*) is "folded or wrapped around" the separator (filler) and the twisted pairs of conductors so that it surrounds them. *See* EX-1010 at 25:39-57, FIGS. 1 & 11.

123. 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 at ¶¶[0006-007], [0122-123].

124. In one embodiment, Glew discloses using a multi-layered shield 110 that is "wrapped around" the separator 300 (*filler*) and twisted pairs of conductors so that it encircles them. *Id*. at ¶¶[0154], [0197], FIG. 10A. In "wrap[ping]

around" the filler and conductors, the seam of the filler is positioned, in the cross-section illustrated in FIG. 10A, above the terminal portion of a filler arm:

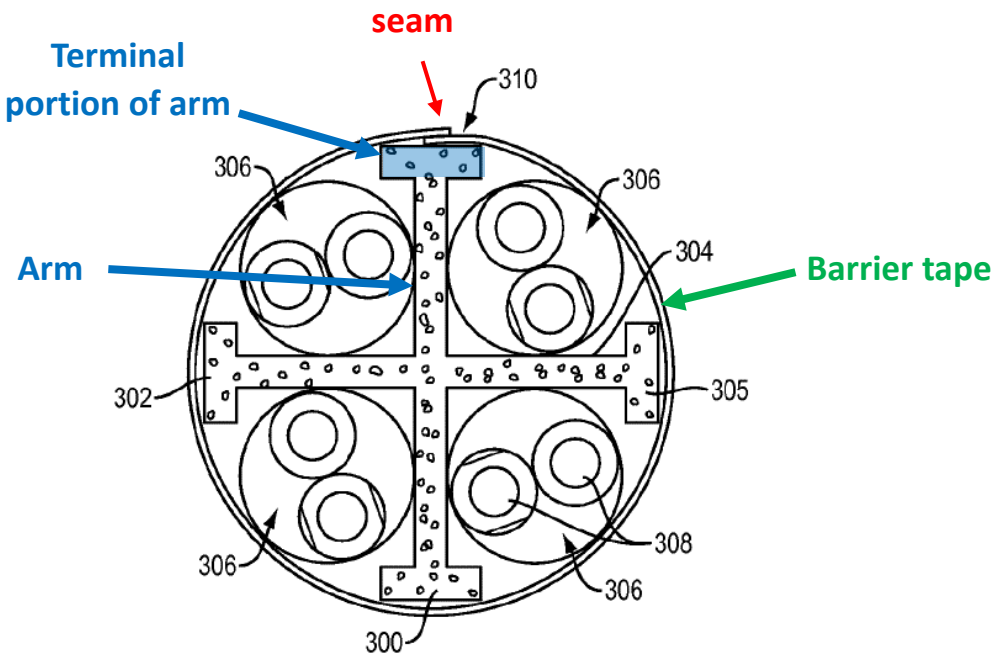


FIG. 10A

125. Cook likewise discloses that the barrier tape is "folded or wrapped around" the separator (filler) and the twisted pairs of conductors so that it surrounds them. *See, e.g.*, EX-1010 at 25:39-57, FIGS. 1 & 11. Glew discloses that "wrapping" the filler and conductors results in the barrier tape having – at least at one location along the length of the cable – the seam positioned above the terminal portion of a filler arm. EX-1008 at ¶[0165].

126. Further, a POSITA at the time of the alleged invention of the '030 Patent would know that a barrier tape (and its seam) may be precisely positioned relative to the cable components (such as a "+" filler separating twisted pairs of

insulated conductors) so that the seam would be, for example, positioned above the terminal portion of the filler arm. I know that from first-hand knowledge in the industry prior to 2013, and also from art such as Barton (EX-1042). Barton discloses use of a multi-finned filler (mechanical alignment components 180) to position the twisted pairs in a substantially square array (EX-1042 at 2:62-67, 10:23-25, FIG. 4) and use of a binder applicator 150 to apply a binder, such as a helical sheath having desirable properties (e.g., materials capable of acting as a Faraday cage), pursuant to selected control settings. EX-1042 at 6:50-7:19. A binder tape containing conductive components helically applied around a cable core would behave as a Faraday cage.

127. A POSITA would be motivated to look to Glew's wrapping in view of Cook's disclosure of wrapping the barrier tape around the filler and conductors, as well as known wrapping techniques. 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.

128. Thus, modifying Cook to wrap the barrier tape (metal tape shield 18) around the filler and conductors to have a seam positioned above a terminal portion of a filler arm like shown in Glew would have been obvious to a POSITA.

C. GROUND 3: Glew Anticipates Claims 1-3, 9-14, 16-18

1. Independent Claim 1

1. A cable comprising:

[1A] a first twisted pair of insulated conductors;

[1B] a second twisted pair of insulated conductors;

[1C] a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors; and

129. In my opinion, Glew discloses these elements.

130. As illustrated below, for example, Glew discloses a cable with two twisted pairs of insulated conductors 306, and a separator 300 (filler) that separates the two twisted pairs:

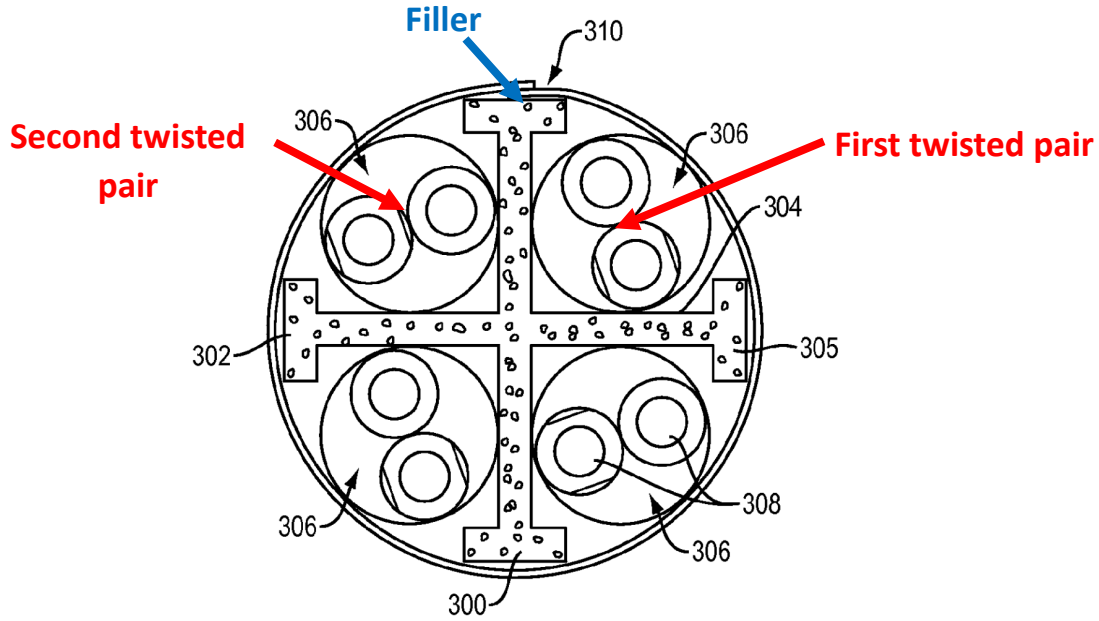


FIG. 10A

See EX-1008 at ¶¶[0030], [0143], [0146], [0154-155], [0165], FIGS. 5, 6A, 10A, 10B.

131. Thus, Glew discloses these elements.

[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.

132. Glew discloses this element.

133. As illustrated below, for example, Glew discloses shielding material 310 surrounding the first twisted pair of insulated conductors, the second twisted pair of insulated conductors, and the filler:

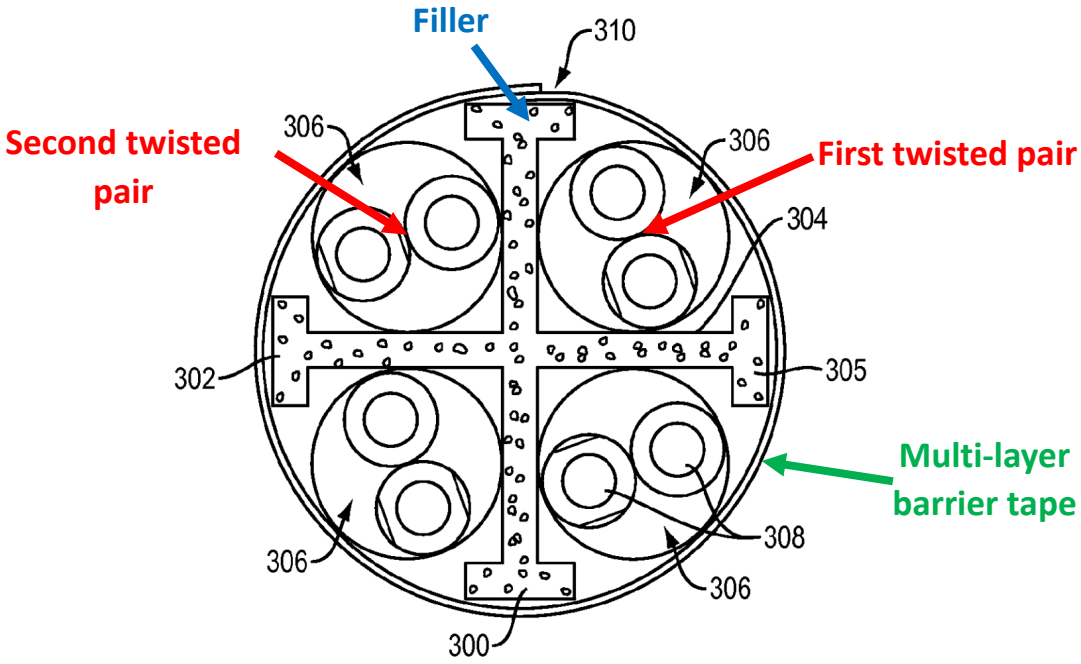


FIG. 10A

See, e.g., EX-1008 at ¶¶[0146], [0154], [0197], FIGS. 6A, 10A.

134. The shielding material 310 is a "multilayer conductive barrier tape" with a "conductive material contained between two layers of a dielectric material." Glew discloses that the shielding material "can be a multi-layer tape material, as discussed below with respects to FIGS. 13A, 13B, 13C, 13D …." *Id*. at ¶¶[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*. at ¶[0195]. An annotated illustration is provided below:

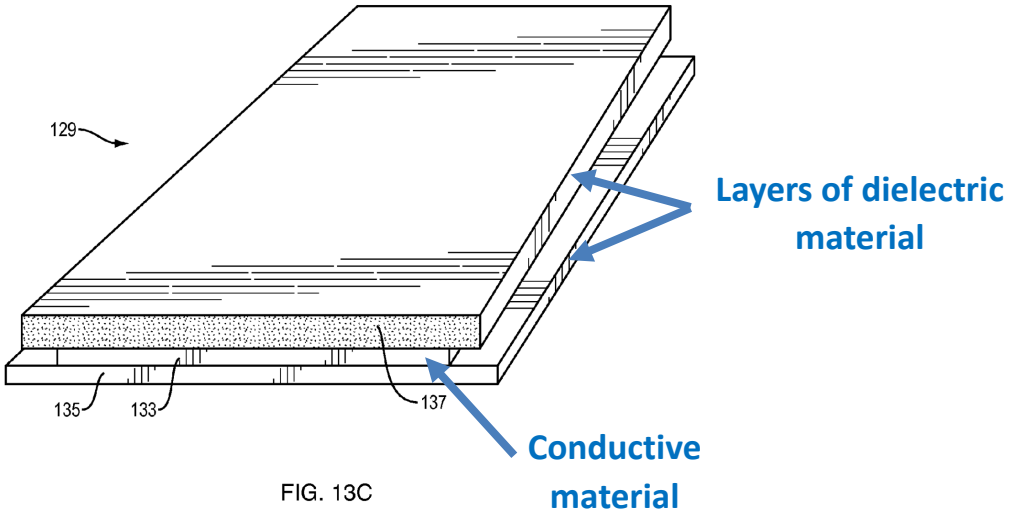


FIG. 13C

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

135. Glew teaches that 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*. at ¶¶[0187-188]. Similarly, Glew teaches that 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*. at t ¶¶[0190], [0193], [0195]. The polymeric material can be the same for the substrate layer and layer 137. *Id*. at ¶[0195]. And the substrate layer can be a non-woven fabric like the non-woven fabric layer. *Id*. at ¶[0187]. Given this disclosure, a POSITA would understand that Glew discloses a "multilayer conductive barrier tape" with a "conductive material contained between two layers of a dielectric material" as recited in the claim.

136. Glew also discloses that the metallic layer 133 in the three-layer tape of FIG. 13C is "continuous" and "extending to each lateral edge of the two dielectric layers of dielectric material." The metallic layer 133 in FIG 13C is partially concealed by layer 137. However, in all of the other multi-layer tape embodiments shown in FIGS. 13A, 13B and 13D, the metallic layers (i.e., 117, 123, 143) are continuous from the front-most (proximal) to the rear-most (distal) ends. *Id*. at FIGS. 13A, 13B and 13D. Also, Glew teaches using tapes having a "continuous" conductive layer from the proximal end of the cable to the distal end, and that exhibit electrical conductivity along their longitudinal lengths. *See id.* at ¶¶[0031], [0041], [0166-174], FIG. 11. The '030 patent does not identify or define what is meant by lateral edge in this claim. 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).

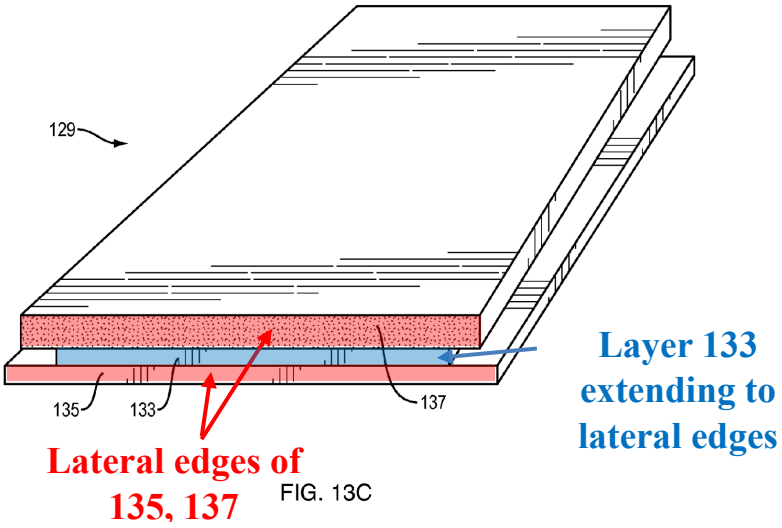


FIG. 13C

Id. at ¶[0195], FIG. 13C. A POSITA would also understand that the metallic layer extends to the back edges of the dielectric layers as I discuss above. See *Id*. at ¶[0041], [0160], [0187], [0190], [0198], FIGS. 13A, 13B, 13D.

137. In my opinion, a POSITA would not view FIG. 13C of Glew as disclosing only a tape that has three layers with varying widths. Glew states that FIG. 13C and similar Figures (such as FIG. 13B) is merely a "schematic description" or "schematic illustration." *Id*. at ¶¶[0077-78], [0190], [0195]. As such, it 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.

138. As discussed in more detail below, a POSITA would understand that when a three-layer tape, such as shown in FIG. 13C, is manufactured for use in a cable that the three layers would be aligned along the side edges. In the cable

industry, as I know from first-hand experience, tapes are typically manufactured by first making wider sheets or films of multi-layer tape, and then feeding those sheets through a slitting machine that slits the wider sheet into several many narrower strips along the length of the sheet to make tapes of various widths to correspond to different diameter cables (e.g., 1" wide tape, 0.75" wide tapes). An example manufacturing tapes (aluminum mylar tapes) with the films being slit can be viewed at https://www.youtube.com/watch?v=8246xDWPe3k. This slitting process also is described, for example, in US Patent Publication No. 2011/0147039 ("Smith") which shows slitting three-layer tapes where the conductive layer is discontinuous. EX-1037, FIGS. 3A, 3B, 4B and EX-1038 ("Cook-794") at FIG. 3A. So, for example, a manufacturer does not usually make a single 1" wide tape at a time; instead it slits several 1" wide tapes from a much wider sheet. And as illustrated in Smith and Cook-794, the slitted film results in tapes having the metal layer extending to each longitudinally extending edge of the dielectric material. To make a tape as literally depicted in FIG. 13C (or 13B), which has each layer of a different width, would involve making each tape individually instead of via the customary slitting manufacturing process. It would take much more time and be more complex to make the layers offset from each other, and there is no description in Glew that such an alternative process would be used or that having different layer widths is important or advantageous. For at least those reasons, it is

my opinion that a POSITA would understand that when the three-layer tape in Glew's FIG. 13C is manufactured for use in a cable and then used in a cable (such as depicted in FIG. 10A), the conductive layer 133 also extends to those side edges of the dielectric layers, and a POSITA would understand Glew to disclose such a tape having the conductive layer 133 extending to the side edges of the dielectric layers.

139. Glew, therefore, discloses this element.

140. Therefore, a POSITA would understand that Glew discloses a cable with the elements recited in claim 1, and that claim 1 is anticipated by Glew.

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

141. Glew discloses the 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 at ¶0154, FIG. 10A. A POSITA would understand that Glew thus discloses that the filler comprises a dielectric material.

142. Thus, Glew discloses this element, and this claim is anticipated.

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

143. Glew discloses this element.

144. In connection with the discussion of separators (fillers) and cables that include 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 at ¶¶ [0144], [0159], [0219]; EX-1026. Glew also states that the different separator shapes and embodiment 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]. Those separators and cables for employing Glew's teachings are therefore highlighted to a POSITA.

145. The '609 Publication explicitly teaches helically twisting the filler (referred to as the separator or the core) in the cable. EX-1026 at ¶¶[0064] ("The various shaped sections of the core support-separator may be helixed along the length of the communications cable."), [0086] ("Next, the method bunches the aligned plurality of transmission media and core using a second die which forces each of the plurality of the transmission media into contact with the surface features of the core which maintain a spatial relationship between each of plurality of transmission media. 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."). Having the filler helically twisted is, thus, is immediately apparent to a POSITA based on Glew's own disclosure.

146. Thus, Glew discloses the filler has a helical twist at a first angle, as recited. And this claim is anticipated by Glew.

4. Dependent Claim 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.

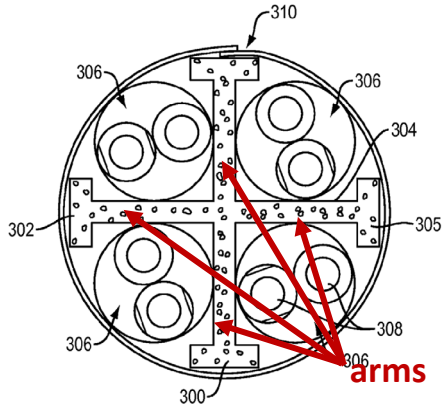
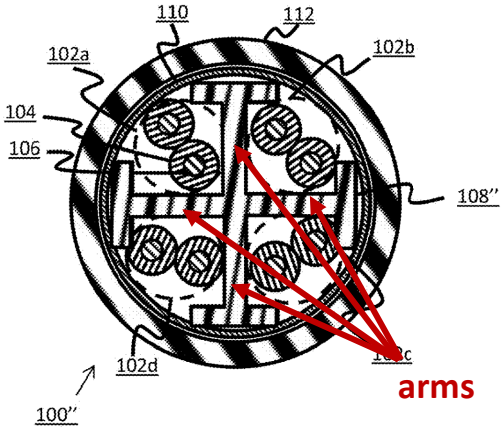
147. As discussed with respect to claim 3, the '206 Publication, which was incorporated in its entirety into Glew (EX-1008 at ¶¶[0144], [0159], [0219]), describes a cable and a manufacturing process in which twisted pairs and the separator/core (filler) are twisted together, with the twisted pairs being 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 at ¶¶[0064] ("The various shaped sections of the core support-separator may be helixed along the length of the communications cable."), [0086] ("Next, the method bunches the aligned plurality of transmission media and core using a

second die which forces each of the plurality of the transmission media into contact with the surface features of the core which maintain a spatial relationship between each of plurality of transmission media. 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.").

148. Thus, as discussed in connection with claim 3, Glew discloses that 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 recited. And this claim is anticipated by Glew.

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

149. 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:

 FIG. 10A	 FIG. 2E
See, e.g., EX-1008 at ¶[0154], FIG. 10A	*See, e.g.,* EX-1001at 7:20-31, FIGS. 2C, 2E

150. Glew thus discloses this element, and this claim is anticipated.

6. Dependent Claim 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.

151. Glew discloses this element.

152. As seen below in annotated FIG. 10A, Glew discloses that shielding material 310 (*barrier tape*) has a seam that is positioned above a terminal portion of an arm of the separating member 300 (*filler*):

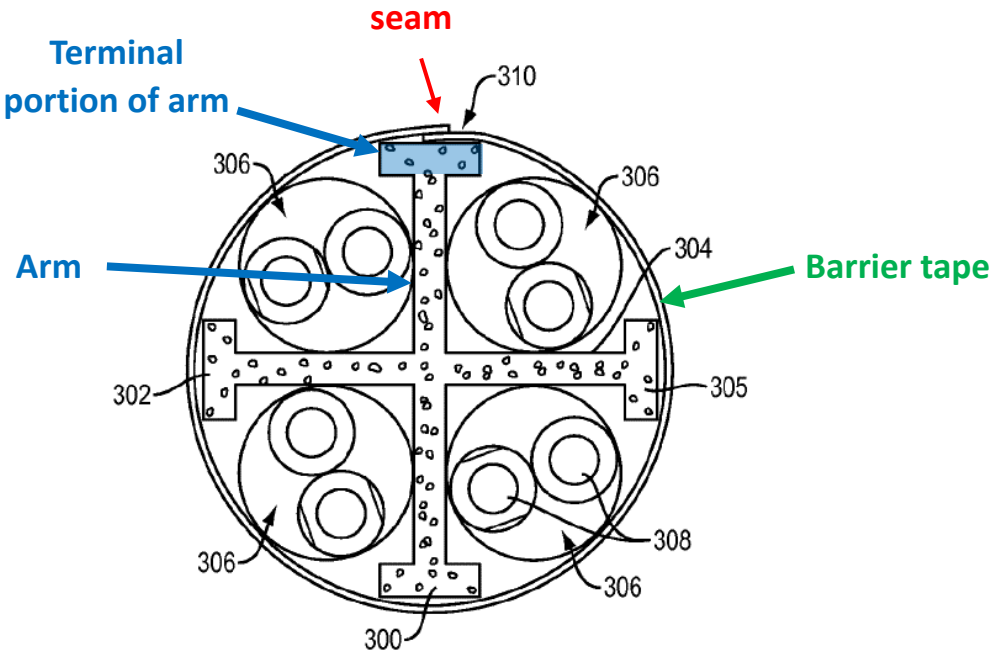


FIG. 10A

EX-1008 at ¶[0154], FIGS. 10A; *see also id*. at FIG. 10H.

153. Therefore, Glew discloses this element, and this claim is anticipated.

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

154. Glew teaches this element.

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

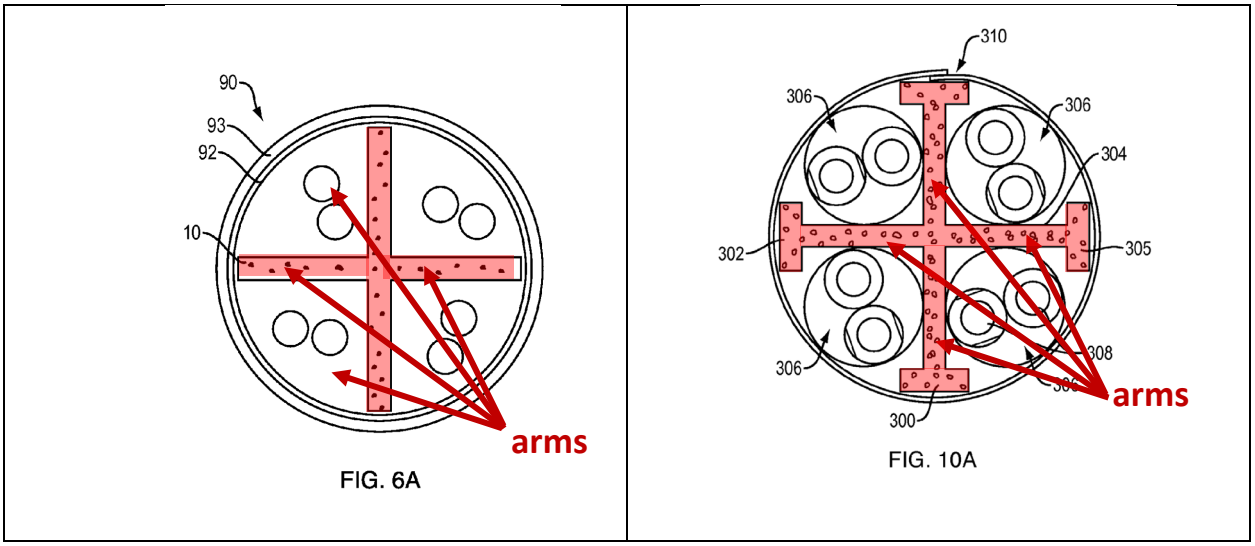


FIG. 6A

FIG. 10A

EX-1008 at ¶¶ [0144], [0154], [219], FIGS. 6A & 10A.

156. Therefore, Glew discloses this element, and this claim is anticipated.

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

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

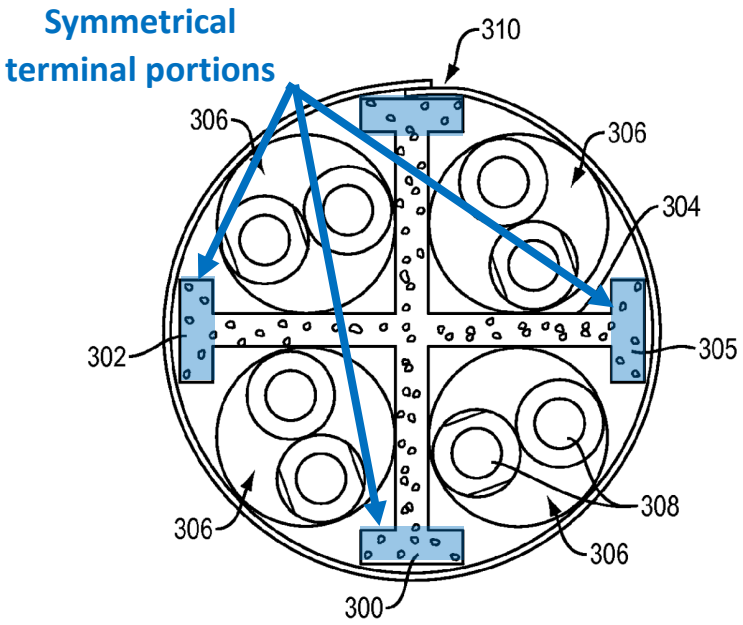


FIG. 10A

Id. at ¶[0154], FIG. 10A.

158. Therefore, Glew discloses this element, and this claim is anticipated.

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

159. As indicated in the annotated FIG. 10A below, the flap portion 305 (*terminal portion*) of each arm 304 is wider than the middle portion of the arm:

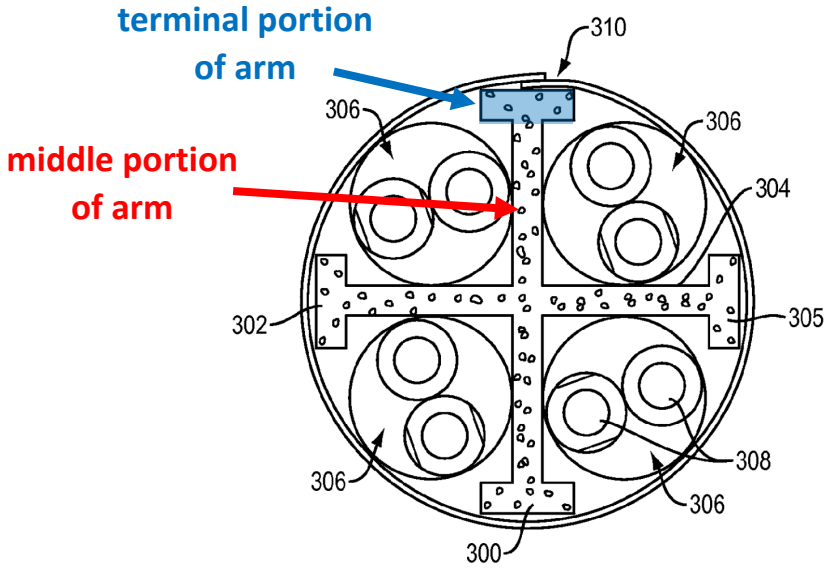


FIG. 10A

*Id.*at ¶[0154], FIG. 10A.

160. Glew thus discloses this element and anticipates this claim.

10. Dependent 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.

161. As illustrated in FIG. 10A, 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:

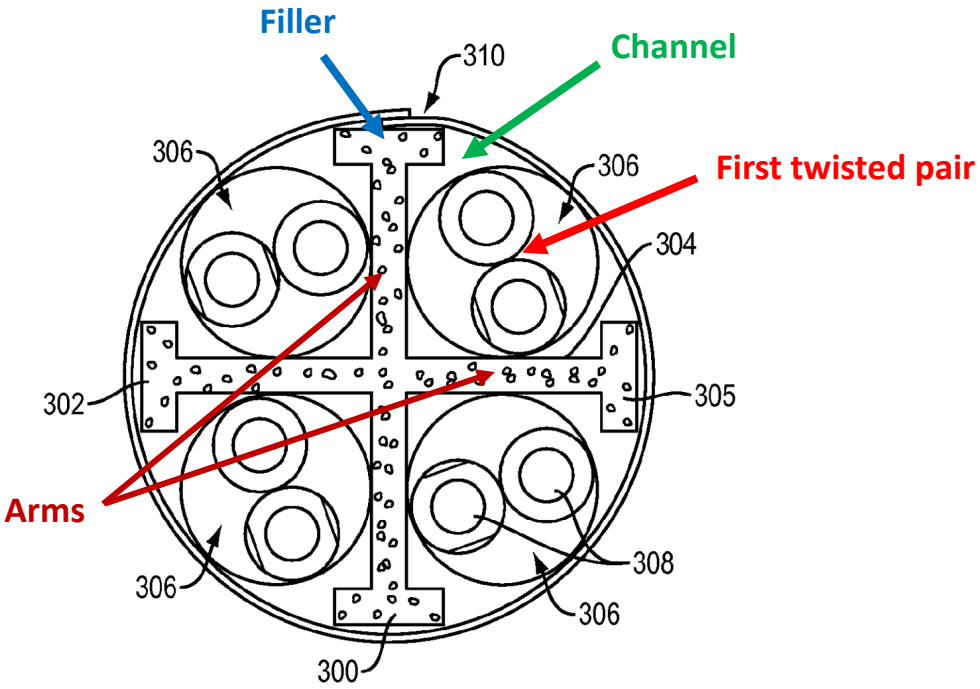


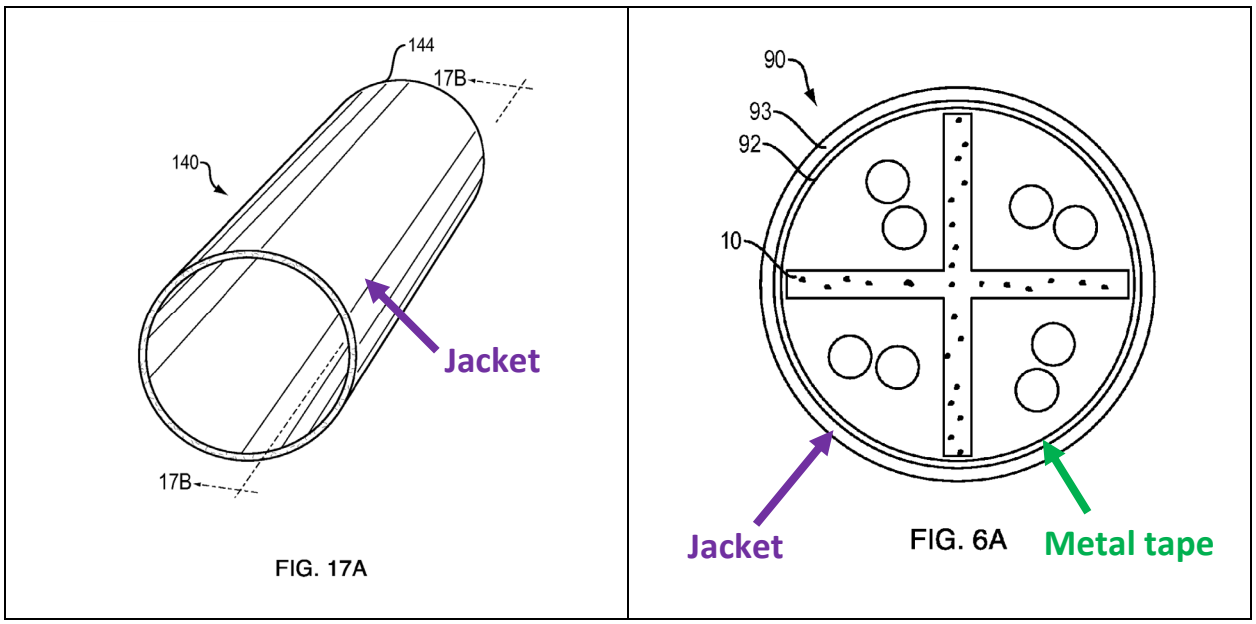
FIG. 10A

Id. at ¶[0154], FIG. 10A.

162. Therefore, this element is disclosed, and this claim is anticipated.

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

163. Glew discloses this element. Glew describes an outer jacket that surrounds the barrier tape/layer and twisted pairs. *See, e.g.*, *id*. at ¶¶[0036-43], [0146], [0221-233], FIG. 17A. As shown below, Glew illustrates an exemplary jacket, and a cable with an outer jacket surrounding a metal barrier tape:



Id. at ¶¶ [0146-147], [221-230], FIGS 6A, 6B, 17A, 18A, 18B.

164. Therefore, Glew discloses this element, and this claim is anticipated.

12. Independent claim 18

165. Claim 18 is a method claim that recites essentially the same structural limitations as claim 1, except that it does not require the conductive layer of the three-layer barrier tape to be "continuous". Compare EX-1001, claim 1 *with* claim 18.

166. The structural limitations recited by this method claim (i.e., the first and second twisted pairs of insulated conductors (element [18A]), the filler separating (or between) the twisted pairs (element [18B]), and the three-layer barrier tape wrapped around (or surrounding) the filler and twisted pairs and having a conductive material between two layers of a dielectric material and extending to each lateral edge of the two layers of the dielectric material (elements

[18C-1] and [18C-2]) are disclosed by Glew as explained above with respect to corresponding elements [1A] and [1B] (first and second twisted pairs), [1C] (filler separating the twisted pirs), and [1D] (three-layer barrier tape surrounding the filler and conductors, with conductive layer between dielectric layers and extending to lateral edges of the dielectric layers). *See*, Section X(C)(a) above.

167. Using Glew's cable and teaching as described for claim 1 above results in performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. See, my discussion above in Sections X(C)(a) concerning Glew's disclosure of separating the twisted pairs of insulated conductors with a filler and wrapping (or having wrapped) the twisted pairs of insulated conductors and filler with the recited barrier tape in connection with claim elements [1A-D]. As I explain in more detail below, the method steps of "providing" the twisted pairs of insulated conductors, "positioning" the filler between them, and "wrapping" the conductors and fillers with the recited barrier tape are disclosed by the Glew cable's having had the twisted pairs of conductors provided and the filler being positioned between them (see below discussion regarding elements [18A] and [18B]), and the barrier tape having the recited characteristics and being wrapped around them all (see below discussion regarding elements [18C] and [18D]). Thus, this claim is anticipated.

18. A method of manufacture of a cable, comprising:

[18A] providing a first twisted pair of insulated conductors and a second twisted pair of insulated conductors;

[18B] positioning a filler between the first twisted pair of insulated conductors and the second twisted pair of insulated conductors; and

168. These are method steps that essentially mimic the cable apparatus elements [1A-C]. Glew discloses these elements, as illustrated in the annotated figure below:

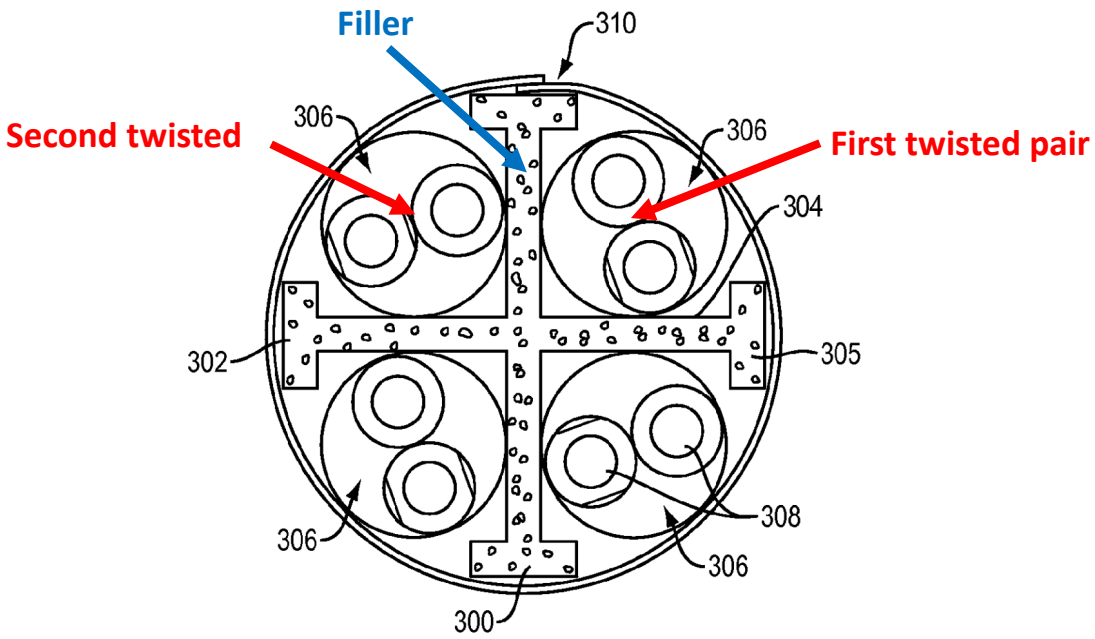


FIG. 10A

EX-1008 at ¶¶[0030], [0143], [0146], [0154-155], [0165], FIGS. 5, 6A, 10A, 10B; Section X(C)(a) above regarding elements 1[A-C].

169. Glew thus discloses these method steps.

[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,

[18C-2] the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material.

170. These are method steps that essentially mimic the cable apparatus element [1D]. As explained in connection with [1D] and illustrated below, Glew discloses a shielding material 310 (*barrier tape*) *wrapping the first twisted pair of insulated conductors, second twisted pair of insulated conductors, and the filler*:

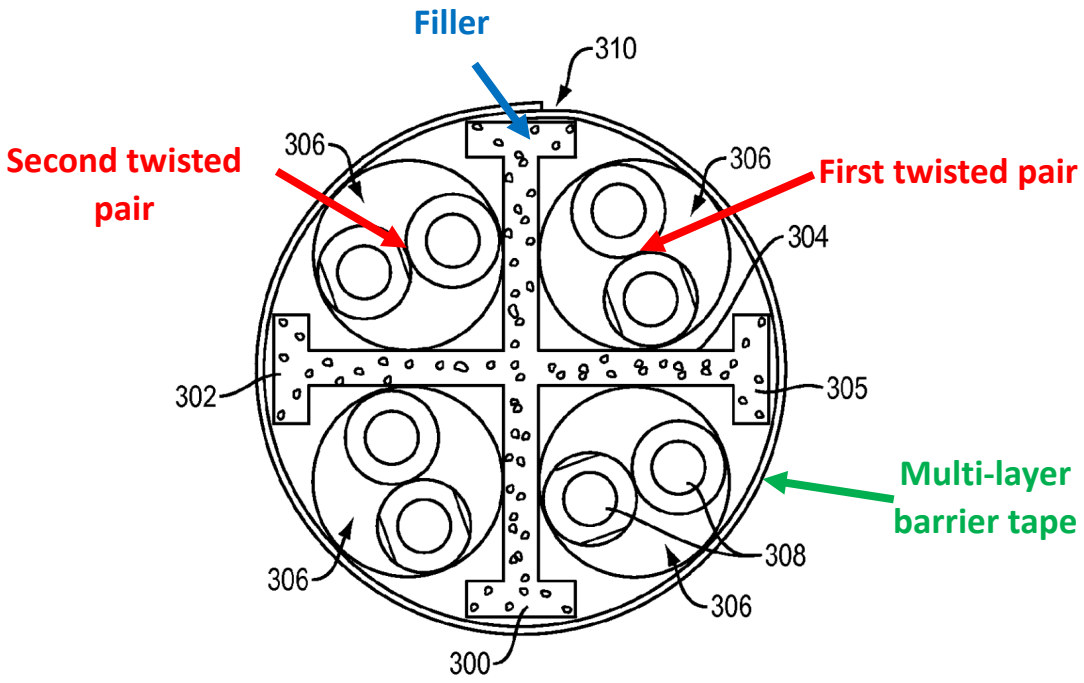


FIG. 10A

*See id.*at ¶¶[0146], [0154], [0197], FIGS. 6A, 10A FIG 10A.

171. The shielding material 310 is a "*conductive barrier tape*" with a "*conductive material contained between two layers of a dielectric material*." As

explained above regarding [1D], the shielding material "can be a multi-layer tape material" (¶¶[0154], [0158]) and have "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.* at ¶[0195]. As explained in connection with element [1D], the substrate 135 and non-woven fabric layer 137 each may be dielectric material (and the substrate can be a non-woven fabric like the layer 137), and an annotated illustration of the three-layer dielectric/conductive/dielectric tape of FIG. 13C is provided below:

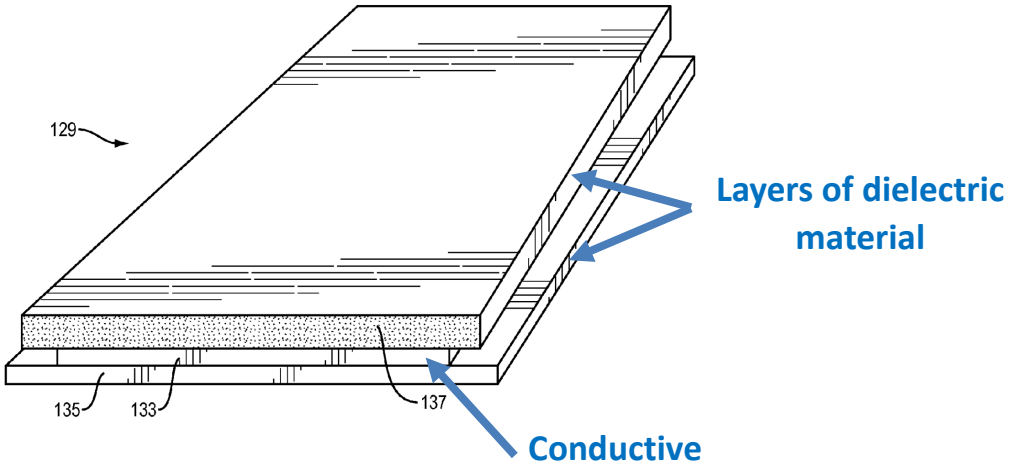


FIG. 13C

See id. at ¶¶[0187-188], [0190], [0193], [0195-196], [0206], FIG. 13C; *see also* section X(C)(a) above regarding element [1D].

172. As I also explained above in connection with element [1D], Glew discloses that the metallic layer 133 is "continuous" and "extending to each lateral

edge of the two dielectric layers of dielectric material." See section X(C)(a) above regarding element [1D].

173. Glew discloses each of the recited steps, and so anticipates this claim.

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

174. I have been asked to assume that the "lateral edges" of the Glew FIG. 13C barrier tape are the longitudinally-extending (and longer) side edges as illustrated below and further that Glew does not disclose the metal layer "extending to each lateral edge of the two layers of the dielectric material".

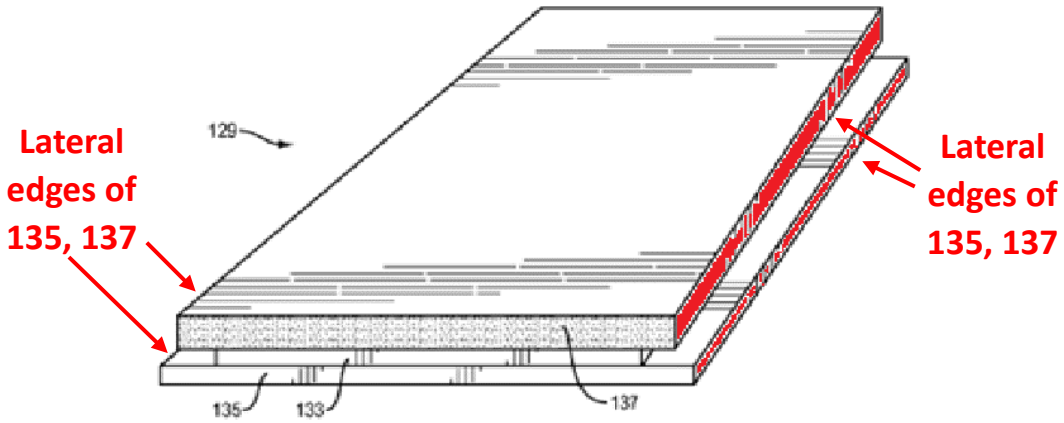


FIG. 13C

175. With that assumption, I also have been asked to provide my opinion as to whether it would have been obvious to a POSITA to modify Glew's metal layer 137 to so extend. In my opinion, it would have been obvious.

176. It would have been obvious based on Glew alone, particularly in view of the POSITA's knowledge of typical tape manufacturing process. As explained

above in connection with element [1D], a common method of making multi-layer tapes, such as disclosed in Glew, results in large sheets or films of the multi-layer material being fed into a splitter, which then slits the sheet into smaller size tapes. Following this process results in the three layers having their side edges flush with each other. *See*, section X(C)(a) above regarding element [1D]. An example of manufacturing tapes (aluminum mylar tapes) with the films being slit can be viewed at https://www.youtube.com/watch?v=8246xDWPe3k. This slitting process also is described, for example, Smith, which shows slitting three-layer tapes where the conductive layer is discontinuous. EX-1037 at FIGS. 3A, 3B, 4B; see also EX-1038 (Cook-794) at FIG. 3A. So, for example, a manufacturer does not make a single 1" wide tape at a time; instead it slits several 1" wide tapes from a much wider sheet. And as illustrated in Smith and Cook-794, the slitted film results in tapes having the metal layer extending to each longitudinally extending edge of the dielectric material. To make a tape as literally depicted in FIG. 13C (or 13B), which has each layer of a different width, would involve making each tape individually instead of via the customary slitting manufacturing process. It would take much more time and be more complex and costly to make the layers offset from each other, and there is no description in Glew that such an alternative process would be used or that having different layer widths is important or advantageous.

177. Glew does not suggest that having non-aligned edges is advantageous or important. Glew points to the existence of the three layers (not whether their edges are aligned or unaligned) in a shield that surrounds the twisted pair conductors as providing the benefits listed by Glew, such as providing an electromagnetic shield and reducing alien crosstalk and reducing insertion loss. *See* EX-1008 at ¶¶[0007], [0101], [0197], [0217]. 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*. at ¶¶[0199-200].

178. 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 generally simpler and cheaper to manufacture.

179. If the Glew FIG. 13C tape is modified as suggested above (so that the metal layer was continuous along the length and also extended to the sides edges of the other two layers), in view of my opinion that all of the other elements recited in Claim 1 (and its dependent claims 2-3, 9-14, and 16-17) are disclosed by Glew (see my discussion as to those claim elements in Sections X(C)(a) above), it is my opinion that those claims would be obvious in view of Glew.

180. A POSITA also would find modifying Glew's metal layer to extend to the longer, longitudinally extending side edges of the dielectric layers to be obvious in view of Glew and Cook.

181. Cook, as I discuss above in section X(A)(a), discloses a cable comprising multiple twisted pairs of insulated conductors separated by a filler, with a three-layer barrier tape (having a conductive layer sandwiched between layers of dielectric material) wrapped around the filler and conductors, and an outer jacket. This is illustrated below:

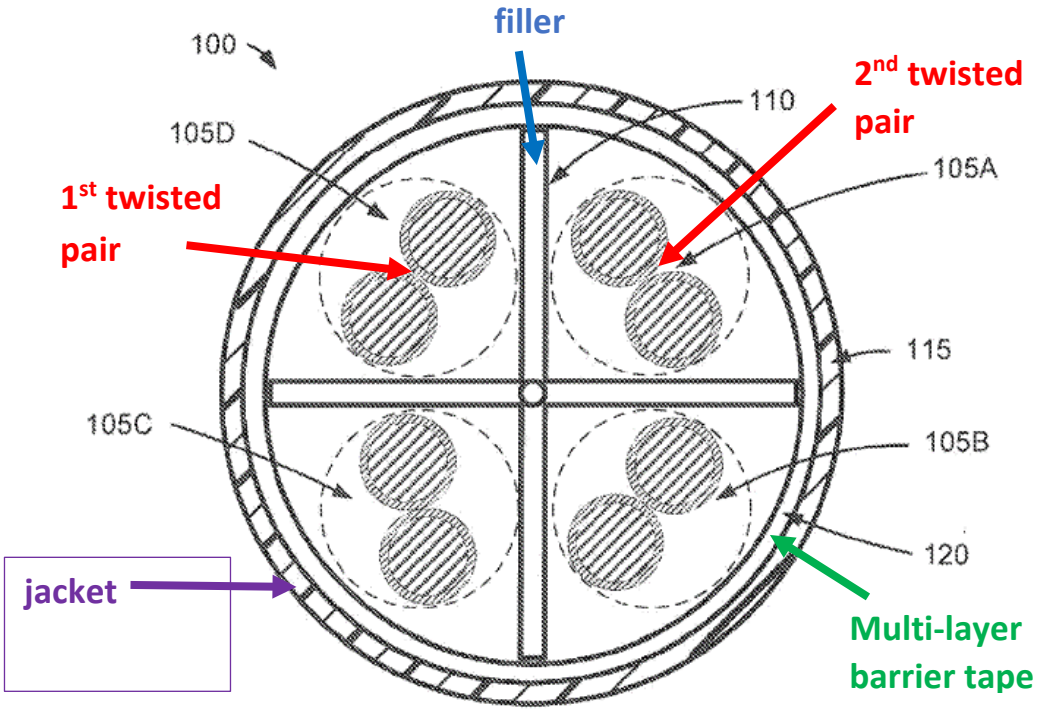


FIG. 1

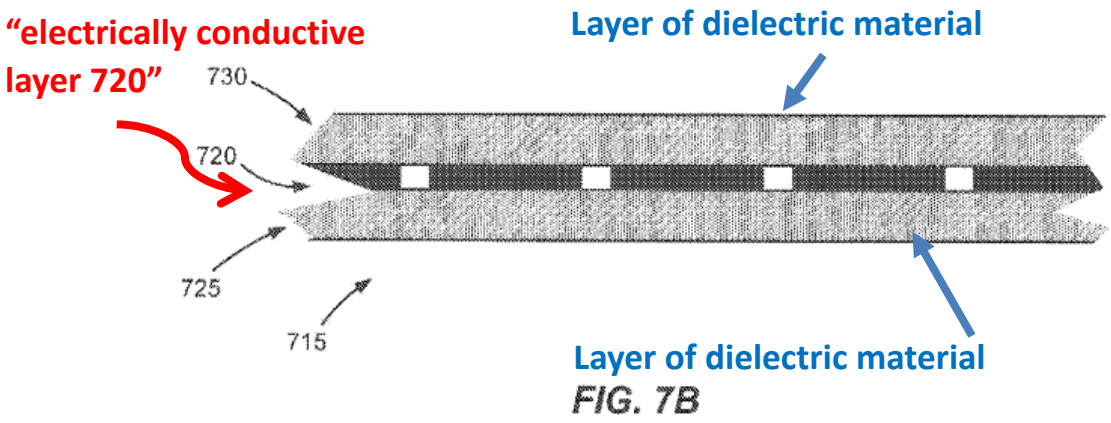


FIG. 7B

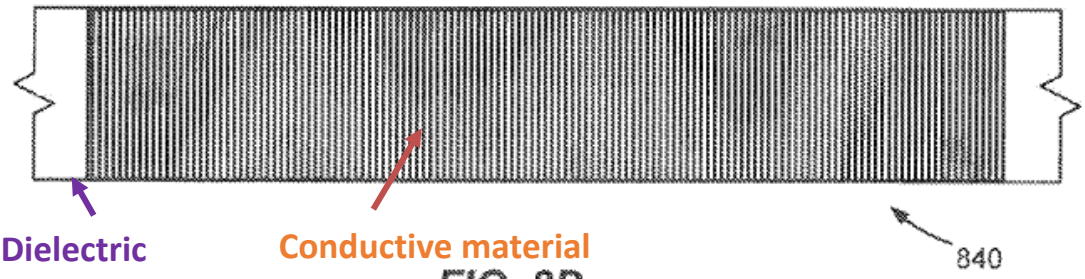


FIG. 8D

See EX-1010 at 4:32-47, 4:55-59, 5:46-48, 5:63-6:22, 6:35-41, 15:57-16:19, FIGS 1-2, 7B, 8D.

182. Cook specifically discloses that the conductive layer (i.e., the "electrically conductive material (e.g., a metallic material, an alloy, etc.)" can either be "continuous" or "discontinuous" (e.g., comprise separated conductive patches or sections). *Id*. at 7:1-15. Figures 8A-8D illustrate "example configurations for electrically conductive material that may be utilized to form a . . . shield layer in accordance with various embodiments of the disclosure." *Id*. at 2:58-61. In each Cook embodiment, the conductive layer "span[s] fully across a width" of the shield with its side edges aligned with the side edges of the dielectric

layers. *Id*. at 12:22-23, FIGS. 7C, 8A-8D. Figure 8D (above) shows the conductive layer extending to each of the sides of the tape.

183. 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. This also is shown, for example, in the Smith and Cook-794 references discussed above. EX-1037 at FIGS. 2A, 4A-4B; EX-1038 at FIG. 2A.

184. I have been informed that the Supreme Court has stated that "the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results" and that "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."

185. In my opinion, 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. It is also my opinion that making such a 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.

186. 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 at ¶[0101]. Likewise, Cook's three-layer tape is a "shield layer" that shields the twisted pairs of conductors from external interference. *See, e.g.*, EX-1010 at 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 (e.g., in connection with element [1D] – see Section X(C)(a), paragraph 138), 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. *See also* paragraph 175, above.

187. Thus, it is my opinion that, assuming Glew does not disclose the three-layer barrier tape having the metal layer extending to each lateral edge of the dielectric layers, it would have been obvious to modify Glew, in a manner shown in Cook, to have such a metal layer between the dielectric layers.

188. With all of the other elements recited in Claim 1 (and its dependent claims 2-3, 9-14, and 16-17) already being disclosed by Glew (see my discussion as to those claim elements in Section X(C)(a)-(b) above), it is my opinion that

those claims also would be obvious to a POSITA at the time of the invention in view of the modified Glew three-layer tape as taught by Cook.

E. GROUND 5: Roberts Anticipates Claims 1-3, 9-11, 13, 16-18

1. Independent Claim 1

1. A cable comprising:

[1A] a first twisted pair of insulated conductors;

[1B] a second twisted pair of insulated conductors;

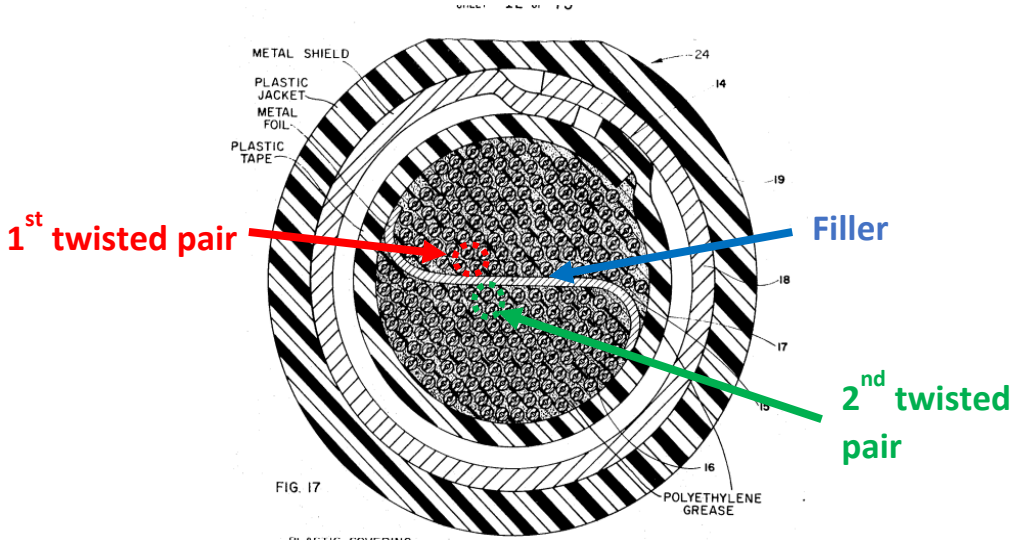
[1C] a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors; and

189. In my opinion, Roberts discloses a cable comprising these elements.

190. Roberts discloses a cable. *See* EX-1009 at Title, Abstract, Abstract, 1:5-40, 2:72-75, 3:16-22, 3:32-59, FIGS. 1 & 17.

191. Roberts discloses first and second twisted pairs of insulated conductors separated by a filler. Roberts states that "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" and explains how measurements "between pairs" demonstrate that dividing the "pairs" as disclosed is an improvement over the prior art. Roberts at Abstract. Roberts also discloses a manufacturing die having holes through which "twisted electrical conductors (14) and (16) pass." *Id*. at12:5-8, FIG. 22. This discloses to a POSITA that electrical conductors (14) and (16) are twisted pairs of insulated conductors, and these

twisted pairs of conductors are (with reference to FIG. 17 below) on opposite sides of the "METAL FOIL" (15):



See, e.g., id. at Abstract, 10:48-62, 12:5-8, FIGS. 17 & 23

192. Roberts discloses "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" and explains how measurements "between pairs" demonstrate that dividing the "pairs" as disclosed is an improvement over the prior art. *Id*. at 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"). A POSITA would plainly understand that the pairs were used in Roberts' cable. Roberts discusses reducing crosstalk

between a disturbing "circuit" and a disturbed "circuit." *Id*. at 3:21-28. Roberts' solution is to place a shield between the disturbing circuit and the disturbed circuit that attenuates the wave energy produced by the disturbing circuit. *Id*. at 3:28-31. Other prior art references, including EX-1022 ("Jachimowicz-340"), use the "disturbing" and "disturbed" language and recognize that each circuit requires a pair. *See* EX-1022 at 1:7-10 (defining crosstalk as "the induction of current in the ***'disturbed' pair*** by currents flowing in the ***'disturbing' pair***." (emphasis added). Jachimowicz-340 is particularly informative as it discusses the solutions taught by Roberts including an S or Z shaped screen. *See id*. at 1:42-48.

193. 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 plate 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)

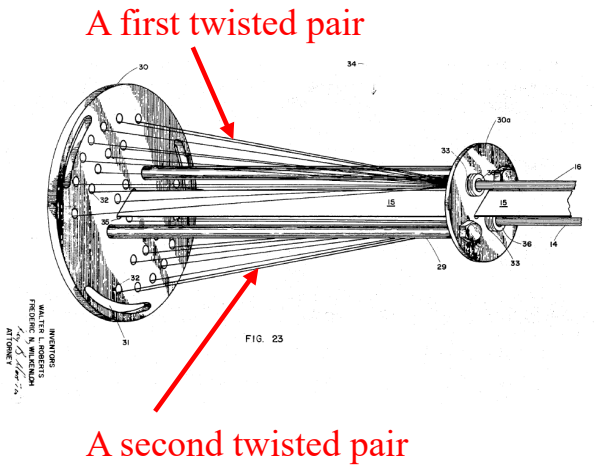
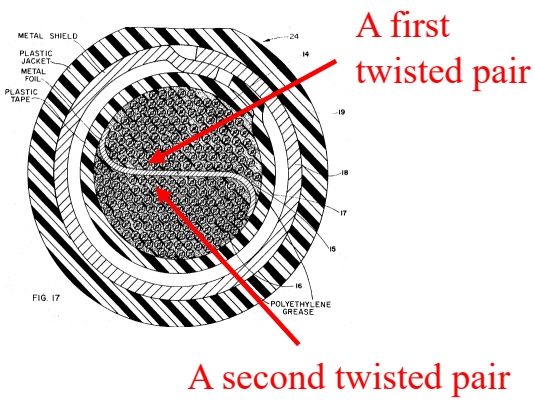


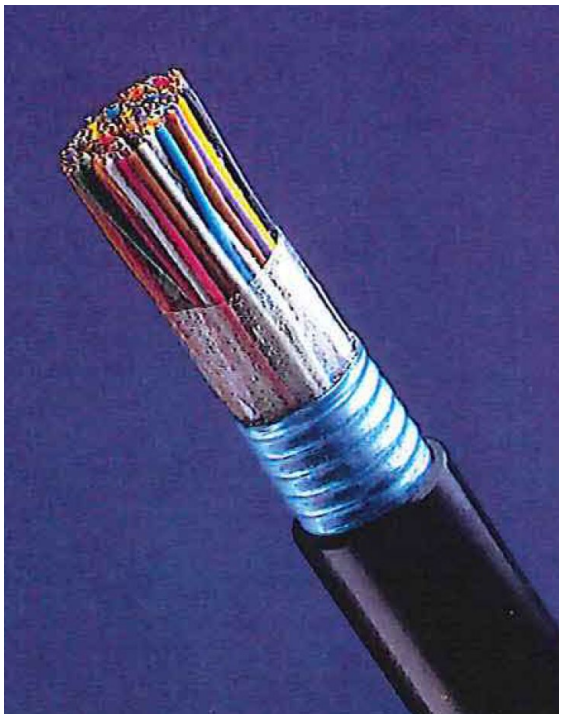
FIG. 17 (assembled cable)



EX-1009 at 12:6-8, 12:12-14, Figs. 23, 17.

194. A POSITA would understand that each strand being pulled through the dieplate holes 32 to hole 33 in dieplate 30a, as depicted and described in Figure 23, is a twisted pair. *Id*. at 12:5-12, Fig. 23; EX-1016 at p. 9 ("twisted pair wire supply" provides insulated twisted pairs that are then fed through a dieplate into the stranding machine).

195. In addition, the Roberts FIGS. 1-4 illustrations of the conductors 14/16 is consistent with cables and twisted pair conductors as shown in prior art literature, such as the catalog pages below (which lack the Roberts' internal separator shield 15):



Cable Construction

CONDUCTORS: Solid bare annealed copper. Sizes 19, 22, 24 and 26 AWG (.9, .64, .5 and .4mm).

INSULATION: Individual copper conductors are insulated with a dual extruded cellular inner layer and a color coded solid outer layer of high density polyethylene or polypropylene.

TWISTED PAIRS: Insulated conductors twisted to form pairs with varying lays to minimize crosstalk and meet capacitance unbalance limitations.

EX-1041 at p. 20 (102.01).[4]

196. The use of twisted pairs in data communications cables was conventional and common practice both at the time of the Roberts patent (1968) and the '030 patent priority date (2013). *E.g.*, EX-1043 at 1:23-2:52; EX-1019 at 1:10-15 ("A typical telephone cable is constructed of twisted pairs of metal

[4] This Alcatel Cable Systems product catalog was publicly available and distributed by Alcatel during my employment with Alcatel Cable Systems, which was in the 1988-1992 time period.

conductors . . ."); EX-1016 at p. 7 ("Most of the cables within the scope of AT&T's EC&W product line utilize the twisted pair construction."); Jachimowicz-172 at 2:32-33 ("three pairs 10-14 [of insulated conductors] are each twisted with a different lay"); EX-1028 at p. 23 ("Twisted Pair Data Cables"), 25 ("Cables with twisted pairs are used where balanced signal transmission is required, together with low crosstalk"), 32-33 (Fig. 55.1 (cross-section of telecommunication twisted pair cable)); EX-1017 at p. 11 ("The most commonly used transmission media in present-day digital loop applications is twisted pair metallic (copper) cable"); EX-1041 at p. 20. In fact, unless it was specified expressly that a pair was *un*twisted, a POSITA would have assumed that it was twisted. This is because, as I explained above, twisting pairs of conductors was common and known to help prevent electrical noise and minimize cross talk. *See, e.g.*, Paragraphs 32-33; EX-1016 at p. 7 ("The two main reasons for twisting pairs of conductors are to minimize or eliminate crosstalk and to decrease unbalanced mutual capacitance.").

197. By the time of invention associated with the '030 Patent, "In a conventional cable, each twisted pair of conductors has a specified distance between twists along the longitudinal direction" of the cable. EX-1008 at ¶[0005].

198. A POSITA would therefore understand that Roberts is disclosing a cable with a multitude of twisted pairs of conductors.

199. The cross-sectional view of FIG. 17 does not specifically identify which conductor is twistedly paired with another conductor of the pair. However, a POSITA would recognize that each conductor in a twisted pair of conductors would be adjacent to each other. I have circled above (in red and green; see paragraph 189) adjacent conductors to indicate twisted pair conductors.

200. As Roberts explains, the separator "shield" 15 in FIG. 17 (*filler*) separates the twisted pairs of conductors and can be "a metal foil coated on both sides with a plastic, or a metal foil completely surrounded by a plastic." EX-1009 at 10:50-62, FIG. 17. This plastic/metal/plastic filler is illustrated below:

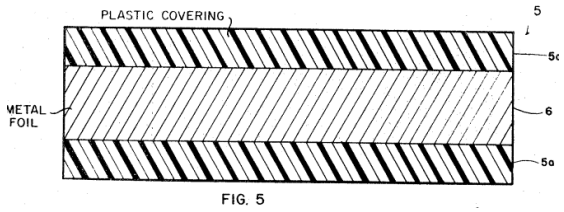


FIG. 5

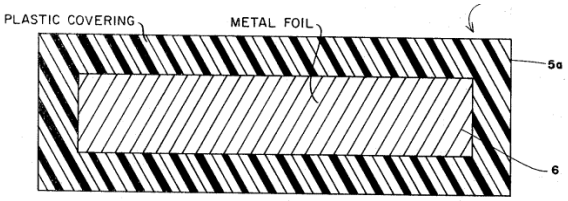


FIG. 8

INVENTORS

Id. at 7:32-41, 7:71-8:4, 10:50-62, 11:7-16, FIGS. 1, 8, 18, 21. In one embodiment, the metal layer is aluminum foil and the plastic material is Mylar, a non-conductive dielectric. E.g., *id*. at 3:50-66. Roberts explains that the dielectric coatings on the foil "keep unwanted currents … from reaching the metallic shield (aluminum foil)," and thus the separator shield 15 "non-conductively" shields the twisted pairs from each other. *Id*. at 3:37-45.

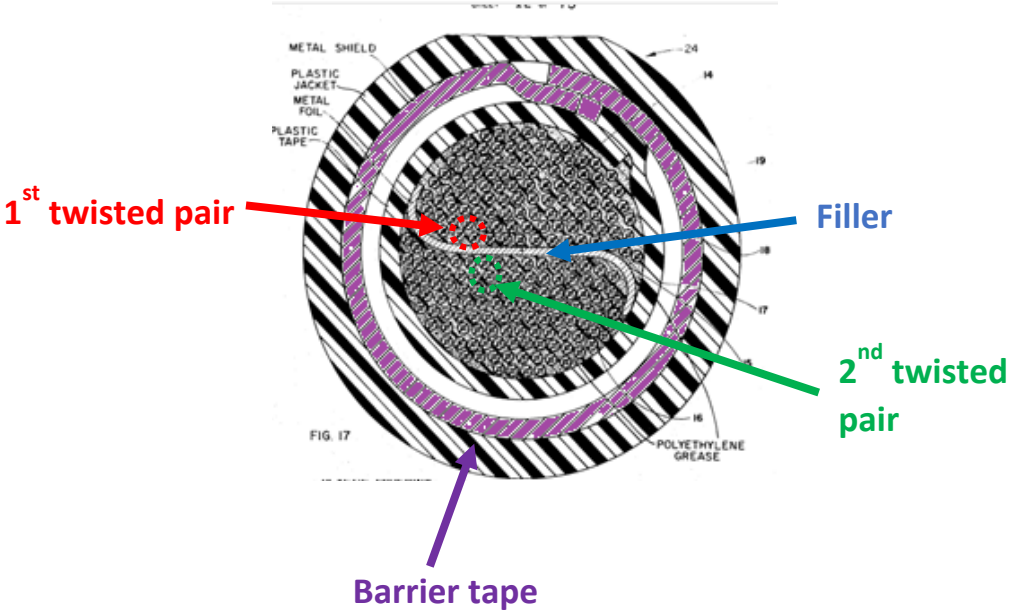
201. For the reasons expressed above, a POSITA would understand that Roberts discloses the twisted pairs of insulated conductors and filler separating them as recited in this element.

202. Thus, Roberts discloses these elements.

[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.

203. Roberts discloses this element.

204. Referring to FIG. 17 below, Roberts discloses metal shield 18 (*barrier tape*) surrounding the first twisted pair of insulated conductors, the second twisted pair of insulated conductors, and the filler:



Id. at 4:15-23, 10:42-51, 12:30-36, FIG. 17. The metal shield 18 (*barrier tape*) – which is just inside the plastic jacket – "longitudinally circumscribes and has nested therein," the conductors and the shield 15 (*filler*). *Id*. at 10:42-62, FIG. 17. Roberts also describes that during manufacture, the conductors-filler composite is "traversed through a taping machine where metal tape (18) is applied thereto …." *Id*. at 12:30-33, FIG. 17,

205. Roberts discloses that the metal shield 18 is a multi-layer tape with a conductive layer between two dielectric layers. Roberts describes the metal shield 18 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." *Id*. at 4:15-23, 12:30-36. Thus, as with the metal foil shield (15) that may be "coated on one side," or "coated on both sides with a plastic", Roberts discloses a metal shield 18 being a metal tape with the metal and plastic layers having the same layers such as in, for example, Roberts FIGS. 5 and the '030 Patent FIG. 3A, which are provided (with coloring) below:

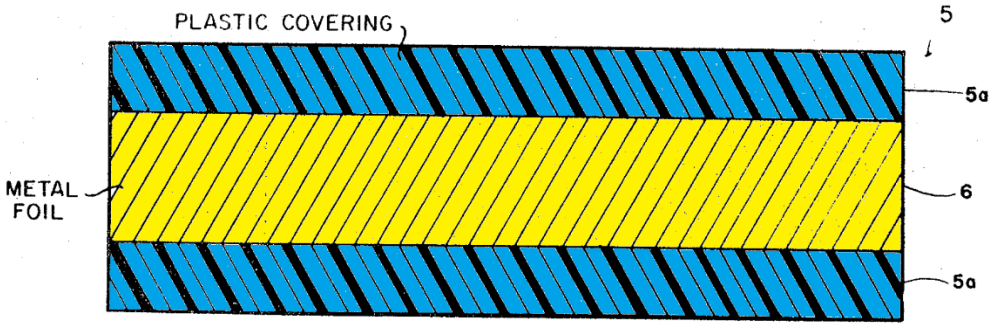


FIG. 5

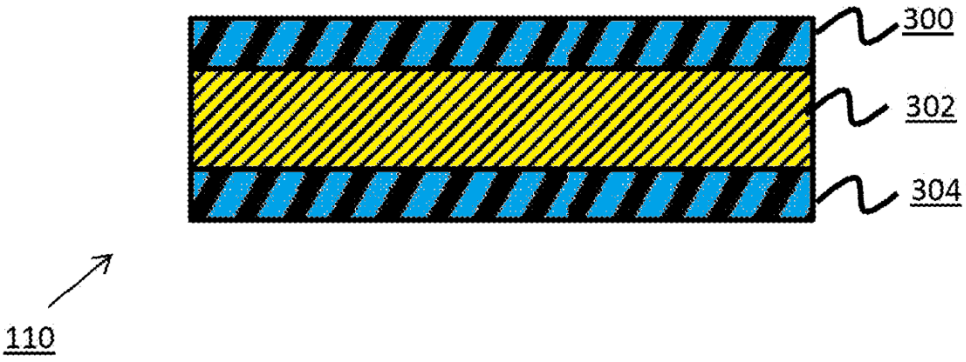
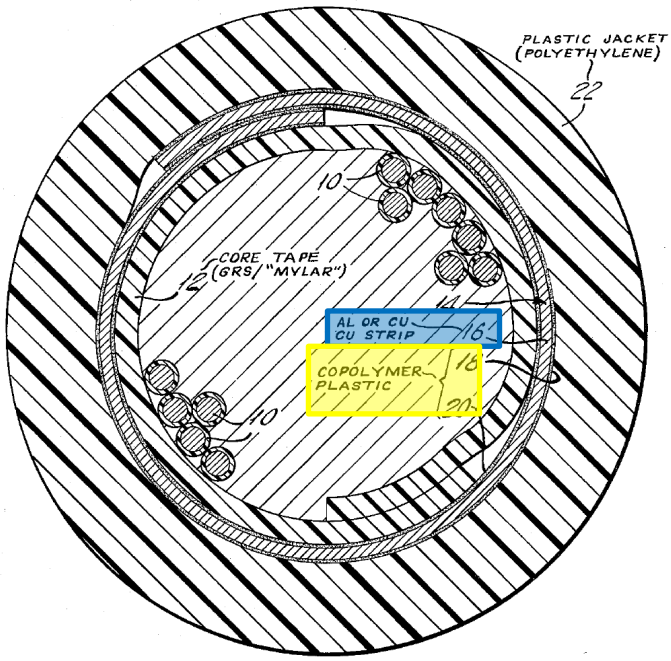


FIG. 3A

Id. at 4:48-60, 10:52-62, FIG. 5; EX-1001 at 7:32-45, FIG. 3A. As illustrated, the metal layer is continuous and has lateral edges flush with the edges of the dielectric layers.

206. 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 at Abstract. A POSITA at the time of the invention in Roberts would understand that the conventional design includes the metal armor tape 18 having the continuous metal layer sandwiched between

two layers of a dielectric material and extending to the lateral edges of the dielectric material, such as illustrated below with respect to "shield 14" and in plastic-clad metal tape products, such as those sold under the "Zetabon" trademark.



See EX-1013 at 2:52-66, Figure; EX-1014 at 3:23-27 (describing "shield 34" wrapped around the cable core and including a "strip of foil with a polyolefin coating on both sides"); *see also* Paragraphs 44-45 above (and references cited therein).

207. A POSITA would understand that Roberts, therefore, discloses this element.

208. Thus, this claim is anticipated by Roberts.

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

209. Roberts discloses shield 15 ("filler") can be coated on one side, both sides, or completely surrounded by a plastic material such as "polyethylene terapthalate (Mylar) dielectric." EX-1009 at 3:49-66, 12:48-62, 11:13-16, FIGS. 5, 7, 18, 19, 21.

210. Thus, Roberts discloses that the filler comprises a dielectric material as recited, and this claim is anticipated.

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

211. Roberts discloses this element.

212. Roberts discloses, with respect to the embodiment of FIG. 17, that the conductors and shield 15 (*filler*) in FIG. 17 are twisted into a "twisted composite" during manufacturing. EX-1009 at 12:12-30, FIG. 23. A POSITA would understand that the twisting is "helical" twisting (as common in the wire and cable industry) and that shield 15 (*filler*) thus has a helical twist at a first angle, as recited.

213. Therefore, this claim is anticipated by Roberts.

4. Dependent Claim 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.

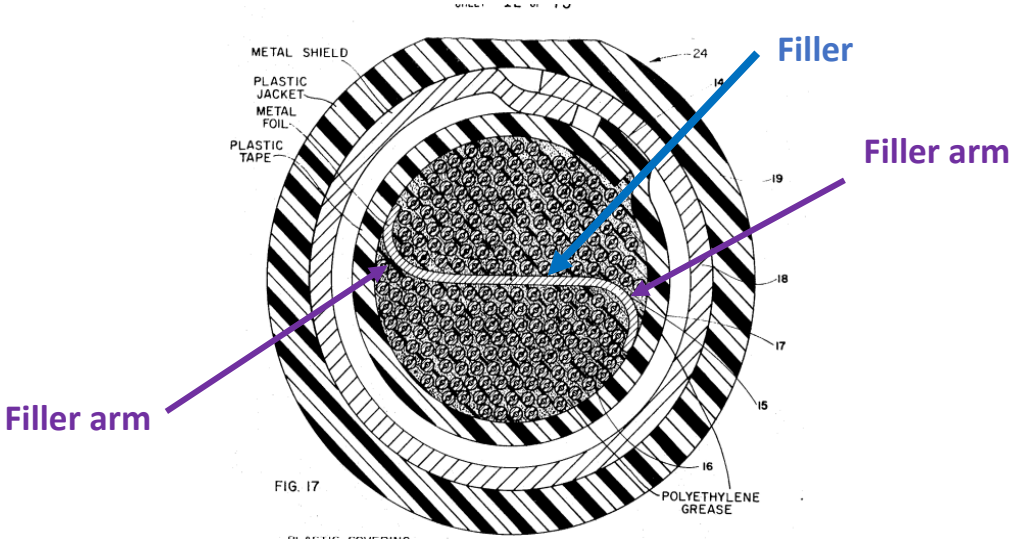
214. Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a "twisted composite" during manufacturing. EX-1009 at 12:12-30. A POSITA would understand that the conductors therefore have a helical twist around the filler at a first angle.

215. This element is disclosed by Roberts, and this claim is anticipated.

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

216. Roberts' filler (shield 15) has at least one arm.

217. The '030 Patent explains that its disclosed filler has "arms 200 radiating from a central point and having a terminal portion 202". EX-1001 at 6:54-56. Roberts's filler also has at least one arm as illustrated in the annotated drawing below:



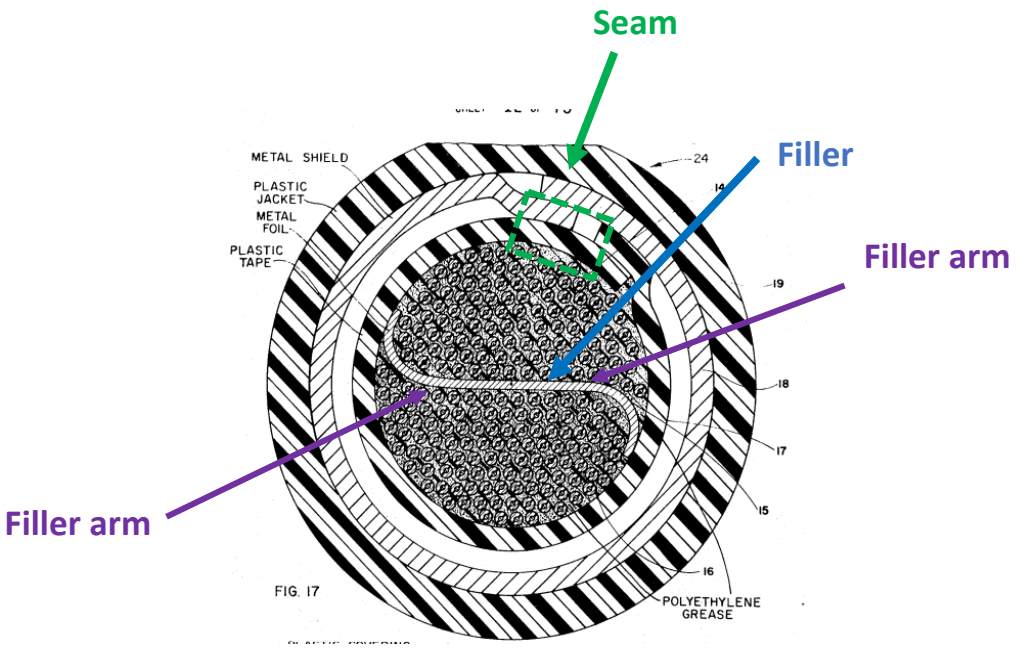
EX-1009 at FIG. 17.

218. Roberts thus discloses this element, and this claim is anticipated.

6. Dependent Claim 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.

219. 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. Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a "twisted composite" during manufacturing. EX-1009 at 12:12-30. This "twisted composite" is "traversed through a taping machine where the metal tape is applied." *Id*. at12:20-33. And Roberts discloses that metal shield 18 "is a tapelike strip that has been longitudinally folded or wrapped around" the twisted pair-filler composite. *Id*. at 4:17-20.

220. FIG. 17 illustrates that the overlapping edges of the folded metal shield 18 (*barrier tape*) form a seam:



See, e.g., id. at 10:42-48, FIG. 17.

221. Because the conductor-filler composite is twisted along the longitudinal length of the cable and the metal shield 18 (*barrier tape*) is longitudinally folded, a POSITA would understand the location of the seam relative to the filler arms would vary along the length of the cable, and that the seam would, at some locations along the length of the cable, be positioned above a filler arm. A POSITA would understand that "longitudinally folded" means that the metal shield is wrapped like a cigarette, with the seam being relatively straight along the length of the cable. *See id*.at 4:27-33, FIGS. 1-2. Thus, the twisting conductor-filler composite would, at multiple points along the cable, be oriented

such that the metal shield 18 seam would be positioned over the terminal portions of the filler arm. Thus, a POSITA would understand that at some point along the longitudinal length, the seam of the longitudinally wrapped metal shield (*barrier tape*) would be positioned above a terminal portion of an arm of the filler such as shown, for example, in FIG10A of Glew:

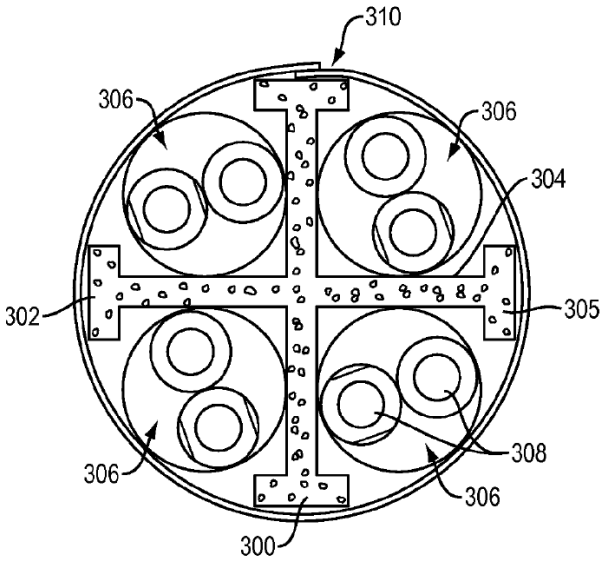


FIG. 10A

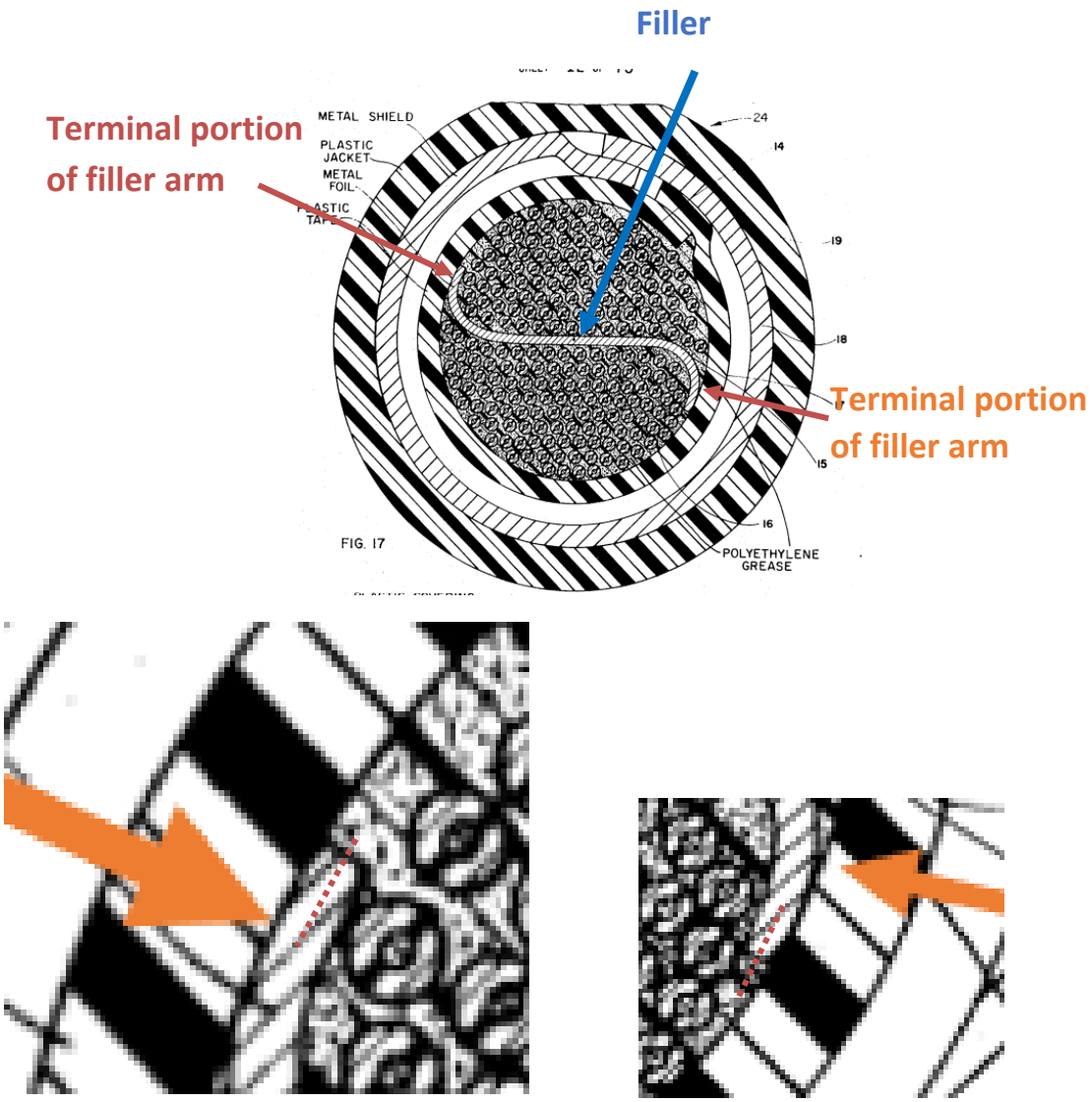
EX-1008 at FIG. 10A.

222. Roberts thus discloses this element, and this claim is anticipated.[5]

[5] In my view, and in view of the specification, a POSITA could understand "a seam of the barrier tape is positioned above a terminal portion of an arm of the filler" to require that, like in the '030 Patent's disclosed fixed tape control (FTC) process, the seam be positioned above a terminal portion of an arm of the filler along the entire longitudinal length of the cable instead of at any particular point along the length of filler arm. *See*, EX-1001 at Abstract, 2:37-46. If such an interpretation is applied then Roberts does not, in my view, disclose this claim element.

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

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



EX-1009 at FIG. 17, claim 11 (reciting "terminal portions circumferentially extending around portions of the outer periphery of [the] core and having

respective spaced-apart free ends “). It appears that the Examiner understood this claim element the same way during the original patent prosecution, when stating that the filler (72) arms (75) shown in Clark-478 (EX-1025) ended in symmetrical terminal portions:

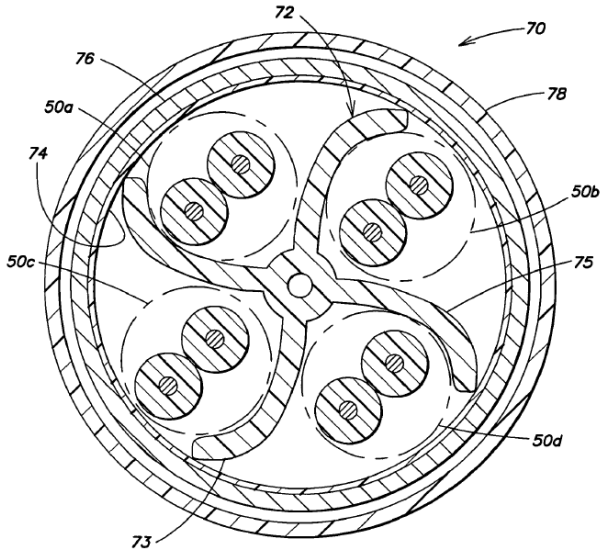


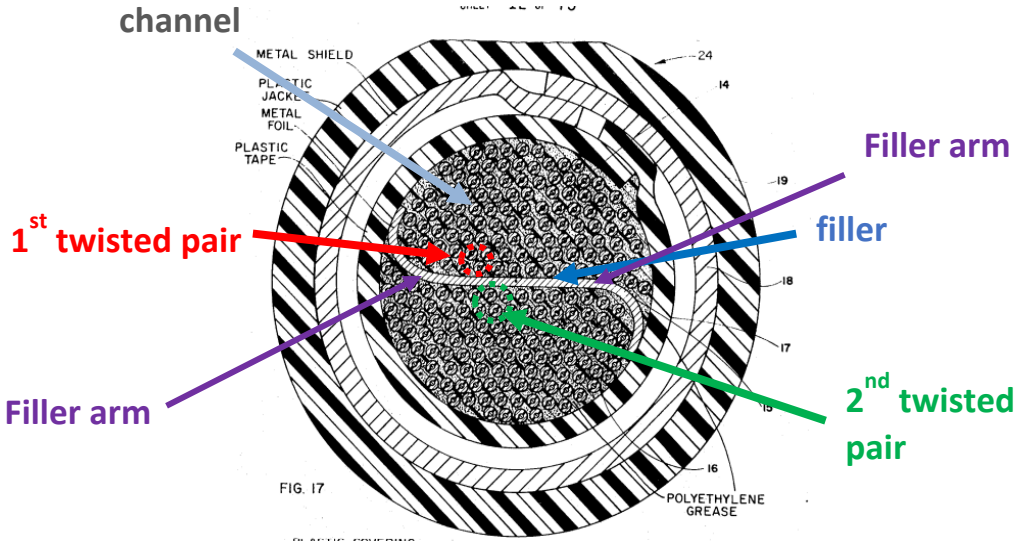
FIG. 2

EX-1025 at FIG. 2; EX-1002 at Office Action page 7.

224. Therefore, Roberts discloses this element, and this claim is anticipated.

8. Dependent 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.

225. As illustrated, for example, in FIG. 17 (annotated 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:



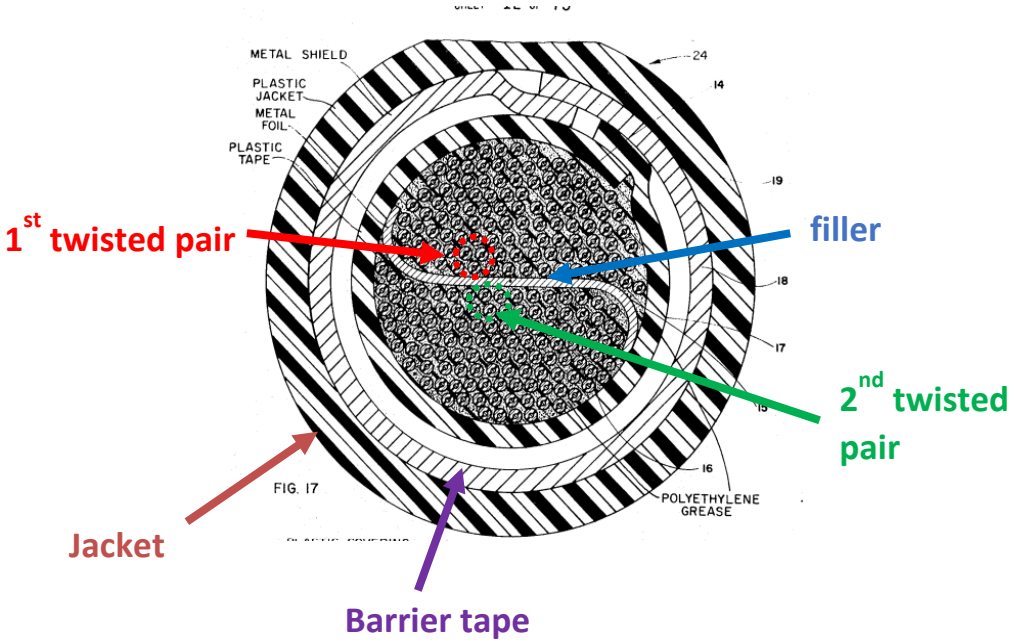
EX-1009 at10:50-62, FIG. 17, Claim 11.

226. Therefore, this element is disclosed, and this claim is anticipated.

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

227. Roberts discloses this element.

228. Roberts discloses the cable also having an outer cable sheath 19 (*jacket*) surrounding the metal shield 18 (*conductive barrier tape*) as illustrated in the annotated drawing below:



EX-1009 at 7:25-35, 7:65-8:7, 10:42-62, 12:30-36, FIGS. 13, 14 & 17. As Roberts explains, "there is an outer cable sheath (19) longitudinally circumscribing" the barrier tape, filler, and conductors. *Id*. at 10:42-62, FIG. 17.

229. Therefore, Roberts discloses this element, and this claim is anticipated.

10. Independent claim 18

230. Claim 18 is a method claim that recites essentially the same structural limitations as claim 1, except that it does not require the conductive layer of the three-layer barrier tape to be "continuous". Compare EX-1001, claim 1 *with* claim 18.

231. The structural limitations recited by this method claim (i.e., the first and second twisted pairs of insulated conductors (element [18A]), the filler separating (or between) the twisted pairs (element [18B]), and the three-layer

barrier tape wrapped around (or surrounding) the filler and twisted pairs and having a conductive material between two layers of a dielectric material and extending to each lateral edge of the two layers of the dielectric material (elements [18C-1] and [18C-2]) are disclosed by Roberts as explained above with respect to corresponding elements [1A] and [1B] (first and second twisted pairs), [1C] (filler separating the twisted pirs), and [1D] (three-layer barrier tape surrounding the filler and conductors, with conductive layer between dielectric layers and extending to lateral edges of the dielectric layers). *See*, Section X(E)(a) above.

232. Using Roberts' cable and teaching as described for claim 1 above results in performing the method recited in claim 18 and renders claim 18 anticipated for the same reasons discussed above. See, my discussion above in Sections X(E)(a) concerning Roberts' disclosure of separating the twisted pairs of insulated conductors with a filler and wrapping (or having wrapped) the twisted pairs of insulated conductors and filler with the recited barrier tape in connection with claim elements [1A-D]. As I explain in more detail below, the method steps of "providing" the twisted pairs of insulated conductors, "positioning" the filler between them, and "wrapping" the conductors and fillers with the recited barrier tape are disclosed by the Roberts' cable's having had the twisted pairs of conductors provided and the filler being positioned between them (see below discussion regarding elements [18A] and [18B]), and the barrier tape having the

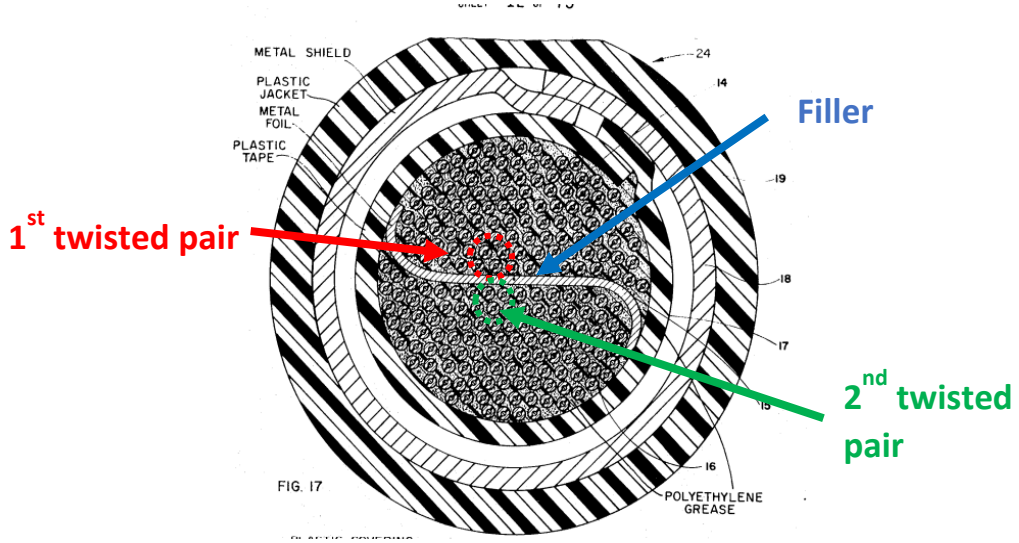
recited characteristics and being wrapped around them all (see below discussion regarding elements [18C] and [18D]). Thus, this claim is anticipated.

18. A method of manufacture of a cable, comprising:

[18A] providing a first twisted pair of insulated conductors and a second twisted pair of insulated conductors;

[18B] positioning a filler between the first twisted pair of insulated conductors and the second twisted pair of insulated conductors; and

233. These are method steps that essentially mimic the apparatus elements [1A-C]. Roberts discloses these elements, as illustrated in the annotated figure below:



EX-1009 at Abstract, 2:72-75, 3:69-32, 10:48-62, 12:5-8, FIGS. 17 & 23. As explained in more detail with [1A-C], Roberts discloses that the conductors (14) and (16) are twisted pairs of conductors, and the metal foil shield 15 (*filler*) is between – and separates – the twisted pairs of conductors. *See*, Section X(E)(a) above (regarding elements [1A-C]); EX-1009 at Abstract, 10:48-56, 12:13-38.

234. The cross-sectional view of FIG. 17 does not specifically identify which conductor is twistedly paired with another conductor to form the pair. However, a POSITA would recognize that each conductor in a twisted pair of conductors would be adjacent to each other. I have circled (in red and green) adjacent conductors to indicate twisted pair conductors.

235. Thus, Roberts discloses these elements.

> **[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,**
>
> **[18C-2] the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material.**

236. These are method steps that essentially mimic the cable apparatus element [1D]. As explained in connection with [1D] these steps are disclosed in Roberts. *See* Section X(E)(a) (regarding element [1D]).

237. Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a twisted composite during manufacturing. Roberts at 12:12-30. The twisted pair-filler composite is "traversed through a taping machine" where a metal shield 18 (*barrier tape*) is applied. Ex-1009 at 12:20-33. Roberts refers to the metal shield 18 as a "metal tape" or "metal armor tape." *Id*. at 4:15-23, 12:30-36. And the metal shield "is a tapelike strip that has been longitudinally folded or wrapped around" the twisted pair-filler composite. *Id*. at 4:17-20. Thus, the step of

wrapping the conductors and fillers with the metal shield 18 (*barrier tape*) is disclosed.

238. Roberts further discloses that this metal shield 18 (*barrier tape*) 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*. at 4:15-23, 12:30-36. Roberts also discloses the cable is of "conventional telephone cable design" but for dividing the conductors into separate groups by the filler (i.e., the plastic-coated foil). Roberts, Abstract. As described in more detail with respect to element [1D], Roberts thus discloses a metal shield 18 that is conductive metal tape (which is conductive having a conductive layer of metal) with conductive material contained between two layers of a dielectric material and with a cross-section (and with the metal extending to each lateral edge of the two layers of dielectric material) *See* Section X(E)(a)(element [1D]); s*ee also* EX-1013 at 2:52-66, Figure; paragraph 203 (and references cited therein).

239. Roberts thus discloses each of the recited steps, and so anticipates this claim.

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

240. I explained above that Roberts teaches the use of twisted pairs of insulated conductors. *See* Sections IX(A)(3) and (X)(E)(a)(elements [1A], [1B]).

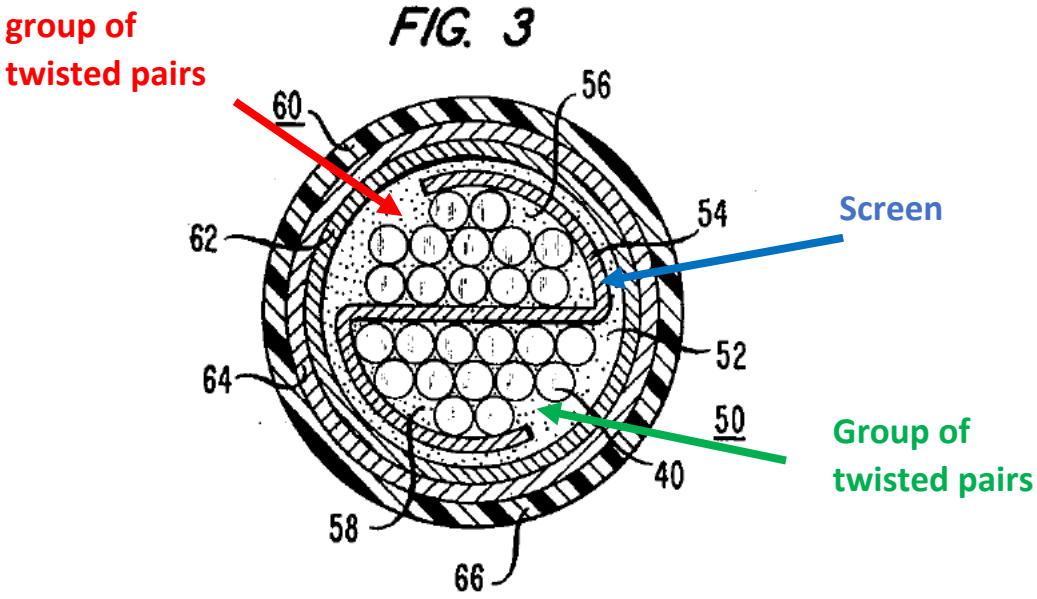
However, I have been asked to assume that Roberts is deemed to not disclose "twisted pairs of insulated conductors." Even with that assumption, it is my opinion that it would have been obvious to a POSITA at the time of the invention to replace Roberts' conductors (14) and (16) with twisted pairs of insulated conductors.

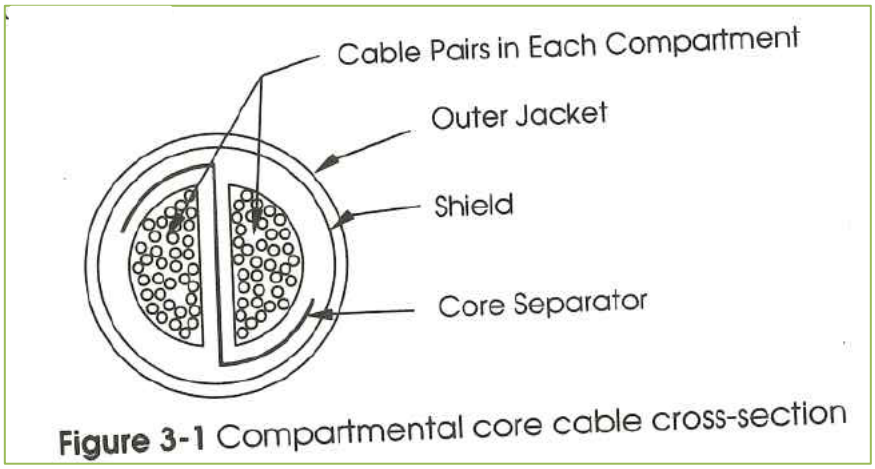
241. First, Roberts specifically refers to its insulated conductors as being "pairs" and "twisted." EX-1009 at Abstract, 13:5-8, FIG. 22. Roberts also refers to this aspect of the cable design (using pairs of insulated conductors) as "conventional." *Id*. at Abstract. As I explained above (see paragraphs 32-33 above, Section X(E)(a) regarding elements [1A] and [1C] and Section IX(A)(3)), twisted pair insulated conductors were – and have been – conventional since long before the invention date associated with the '030 Patent. It would have been obvious for a POSITA to use conventional twisted pair insulated conductors as conductors (14) and (16) in the Roberts cable.

242. Further, Jachimowicz-172 teaches a data communications cable that uses multiple twisted pairs of insulated conductors. EX-1014 at 2:32-33 ("three pairs 10-14 [of insulated conductors] are each twisted with a different lay"); Fig. 2 (showing each twisted pair with a different lay), Fig. 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. *See* EX-1016 at p. 7 ("Most of the cables within the scope of AT&T's EC&W product line utilize the twisted pair construction."), 50 (showing "pair twisting" as the first step in making cable core units); Pfeiler at 1:15-28 (teaching that "customary data transmission cables use several of the above twisted pairs, for example four"); Glew at ¶[0004] (explaining that "cables normally have four or more twisted pairs of conductors"). It was known to used twisted pairs of conductors instead of straight conductors because twisting the pairs of conductors helped to minimize or eliminate crosstalk and to decrease unbalanced mutual capacitance. E.g., EX-1016 at p. 7; EX-1048 at 102.01. Additionally, twisting pairs provides a mechanical advantage. The individual conductors of the pairs stay grouped together and maintain their shape when the cable is laid out.

243. Further, by the time of the invention (indeed, by the 1960s), telecommunication cables such as disclosed by Roberts typically utilized twisted pairs of insulated conductors that were separated into at least two groups by a screen, such as illustrated below:





EX-1024 at 4:18-35 (annotated); EX-1018 at p. 4 (FIG. 3-1); EX-1017 at p. 30 (FIG. 7-7).

244. Roberts also discloses that – with the exception of the plastic-coated metal shield (15) (*filler*) separating the pair groups – the cable design is otherwise "conventional." EX-1009 at Abstract.

245. To the extent Roberts is found to not expressly teach that the plurality of insulated conductors in the cables it teaches are provided as twisted pairs, it

would have been an obvious and routine modification to configure the insulated conductors in Roberts as twisted pairs.

246. A POSITA would have been motivated to do this to get the known, predictable mechanical and electrical 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. For example, twisted pairs have the mechanical advantage of keeping the two conductors grouped together during the cabling process. Twisted pairs also have the electrical advantage of minimizing or eliminating crosstalk and decreasing unbalanced mutual capacitance. E.g., EX-1016 at p. 7; EX-1041 at p. 20. 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. For example, patents were filed in the 1920s on telephone cables using twisted pairs. *See, e.g.*, EX-1020 at 2:55-57 (filed April 18, 1924; "A plurality of copper wires insulated with paper, cotton, silk, or other suitable materials, usually twisted together in pairs"); EX-1021 at 1:43-47 (filed Sept. 11, 1929; "assembling and twisting a plurality of twisted pairs of individual insulated electrical conductors into a single compact group or so called cable unit"). It would have been simple to feed twisted pairs through Roberts' die plates. For example, AT&T produced a user's guide showing twisted pairs being

fed into die plates in a similar manner as Roberts. *Compare* EX-1016, *with* EX-1009 at Fig. 23. There is nothing about Roberts' specific cable that would make using twisted pairs unusually difficult or require anything other than routine skill.

247. A POSITA also would have a reasonable expectation of success. The use of twisted-pair conductors was common, and worked.

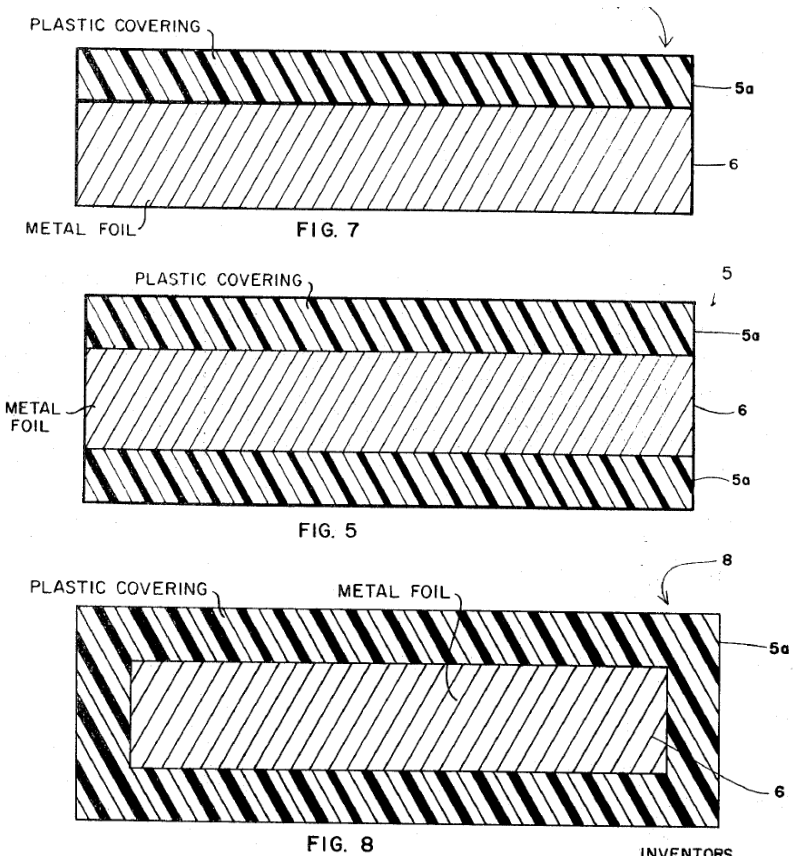
248. For the reasons expressed above in Ground 5, Roberts modified to have twisted pairs of insulated conductors on each side of metal foil shield 15 would also include all of the other recited elements of claims 1-3, 9-11, 13 and 16-18, and would render these claims invalid as obvious to a POSITA also.

G. GROUND 7: Claims 1-3, 9-11, 13, 16-18 are Obvious in view of Grounds 5 and/or 6 and one or more of Jachimowicz-036 and/or the knowledge of a POSITA

249. I explained above that Roberts' disclosure of metal tape shield 18 including "plastic . . . firmly adhered to either one or more surfaces thereof" (EX-1009 at 4:20-23) teaches the tape shield 18 having a metal conductive layer between two layers of a dielectric as recited in the independent claims. See Sections X(E)(a) (element [1D]) and X(E)(b) (elements [18C-1], [18C-2. However, I have been asked I have been asked to assume that Roberts' metal tape shield 18 does not disclose the recited multi-layer barrier tape (elements [1D], [18C-1, 18C-2]). Even with that assumption, it is my opinion that it would have

been obvious to a POSITA at the time of the invention to replace Roberts' metal tape shield 18 with one as recited in view of Jachimowizc-036.

250. First, I believe that I should not have to make that assumption. Roberts' metal tape shield 18 is disclosed to "have a plastic such as polyethylene, firmly adhered to either one or more surfaces thereof." EX-1009 at 4:20-23. Illustrations of a metal tape having plastic adhered to one surface, two surfaces, or all surfaces are shown in Roberts' FIGS. 5, 7 and 8:



Id. at FIGS. 5, 7, 8. Thus, Roberts discloses a multi-layer barrier tape having a continuous conductive material (metal) contained between two layers of a

dielectric material and extending to each lateral edge of the two layers of the dielectric material.

251. But even with that assumption, Roberts discloses that the inventive cable is largely "conventional" and includes a metal armor tape shield 18. *Id*. at 4:15-23, 12:30-36, FIGS. 1, 17. This metal tape 18 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*. at 4:15-23, 12:30-36, FIGS. 1, 17. The metal tape 18 also is corrugated. *Id*. at 4:15-17.

252. Roberts also discloses that its interior metal shield 15 (*filler*) is a metal tape where the continuous metal may coated with just one layer, or may be sandwiched between – and extending to the lateral edges of – two layers of a dielectric just as shown for the 030 Patent's disclosed conductive barrier tape (see below):

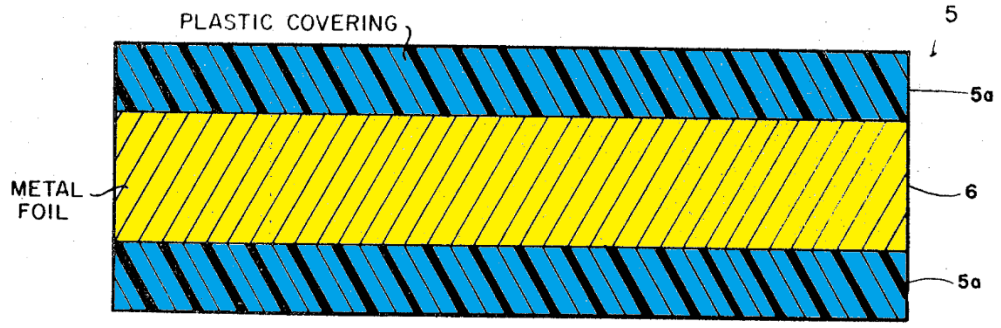


FIG. 5

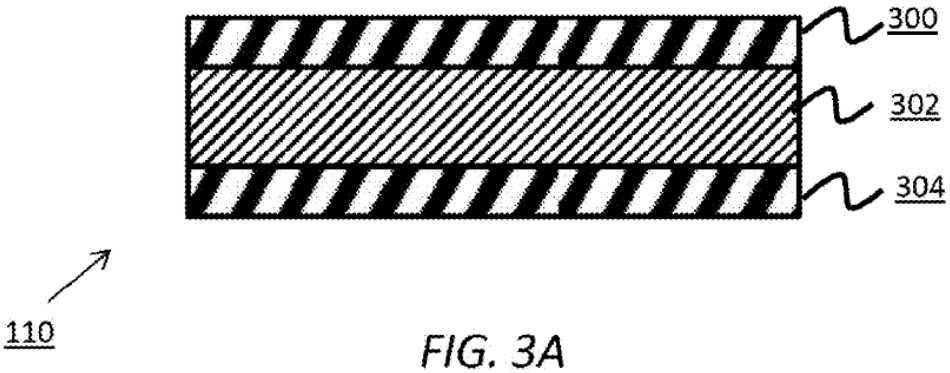


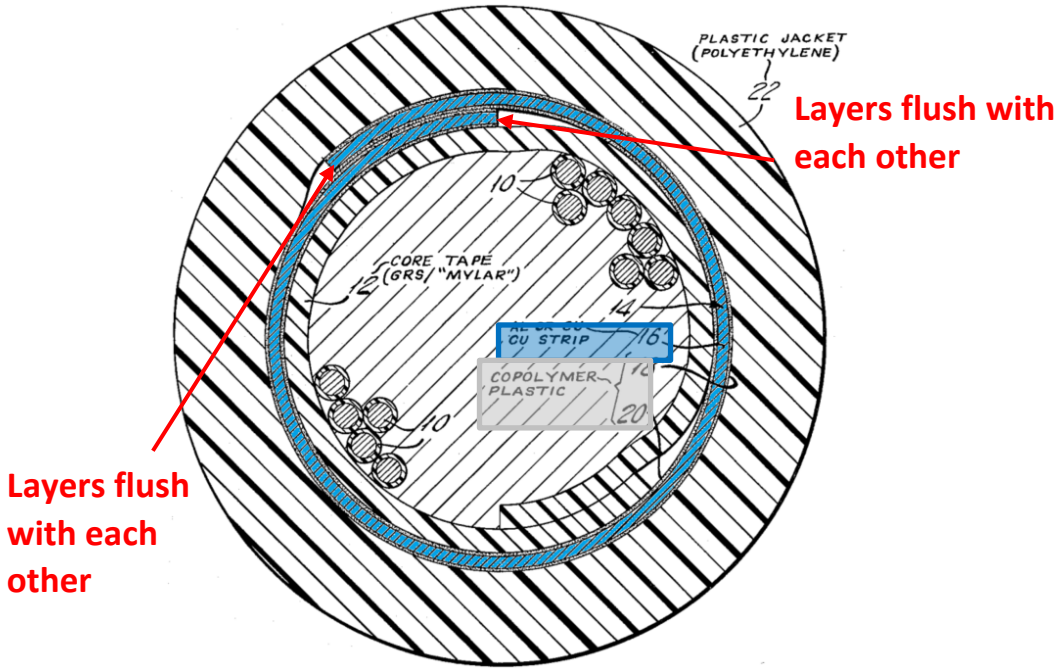
FIG. 3A

Id. at 4:48-60, 10:52-62, FIG. 5; EX-1001q at 7:32-45, FIG. 3A. As illustrated, the metal layer is continuous and has lateral edges flush with the edges of the dielectric layers. Roberts also discloses that the metal layer of this plastic-metal-plastic three-layer shield 15 can also be corrugated. *Id*. at 4:48-62.

253. Roberts thus discloses that each of the metal tape shield 18 (barrier tape) and the interior metal shield 15 (filler) may be made of continuous metal that is between – and extends to the lateral edges of – two layers of a dielectric material. A POSITA, thus, would be motivated by Roberts' own disclosure to utilize a conductive barrier tape that had the cross section of Roberts FIG. 5 as the

metal tape shield 18, which meet the elements of [1D] and [18C-1, 18C-2]. Such tape would meet Roberts' express disclosure of metal tape shield 18 having plastic "adhered to either one or more surfaces thereof."

254. In addition, a POSITA would know that metal tape shields such as disclosed by Roberts typically had the continuous conductive material (metal tape) coated on each side with a dielectric material and extending to the lateral edges of each layer of dielectric material. One such shield is illustrated in Jachimowizc-376, having the continuous metal layer extending between the lateral edges of the dielectric material (see below). The exposed ends of the three-layer shield show the conductive layer 16 (blue) extending to the lateral edges of layers 18, 20 (grey).



EX-1013 at 1:42-50, 2:52-66, Figure (annotated).

255. Likewise, other well-known multi-layer shields, such as those sold under the Zetabon trademark, have a continuous metal layer sandwiched between and extending to the lateral edges of the dielectric layers. See, EX-1014 at 3:23-27 (describing "shield 34" wrapped around the cable core and including a "strip of foil with a polyolefin coating on both sides"); see also paragraphs 44-45 above (and references cited therein). A POSITA would have first-hand knowledge of the plastic/metal/plastic Zetabon tape.

256. Three-layer conductive barrier tapes having the three-layer design recited in the claim were common and well-known. 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 and given that such tapes, like Roberts' shield 18, can be corrugated and provide an electrical, as well as mechanical, shield. *See* EX-1013 at 2:52-72.

257. For the reasons expressed above in Ground 5, Roberts modified to have metal shield 18 be the recited three-layer shield (such as disclosed in Jachimowicz-036) surrounding the conductors would also include all of the other recited elements of claims 1-3, 9-11, 13 and 16-18, and would render these claims invalid as obvious to a POSITA also.

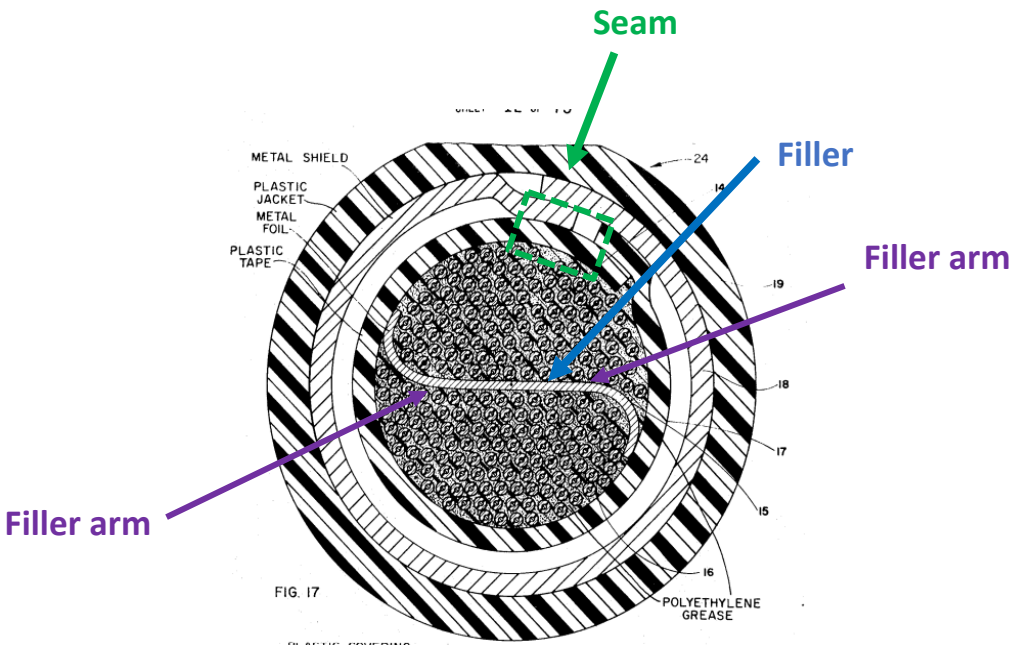
258. Further, as I explained above in connection with Ground 6, if one assumed that Roberts did not disclose "twisted pairs of insulated conductors" then it would have been obvious to a POSITA to modify Roberts to include twisted pairs of insulated conductors. See my discussion above in Ground 6. Making a modification to Roberts – if one assumed Roberts did not expressly disclose both the twisted pairs of insulated conductors and/or the multi-layer barrier tape recited in the claims – to include either or both the twisted pairs of insulated conductors (as recited in the claims) and the multi-layer barrier tape (as recited in the claims) would have been obvious to a POSITA for the reasons I already provided. Utilizing twisted pair conductors and three-layer dielectric/conductive/dielectric barrier tapes were well known and common to POSITAs, POSITAs would have been motivated to utilize such well known cable components, and they provided advantages well-understood by POSITAS as already explained above. And Roberts modified to have metal shield 18 be the recited multi-layer shield surrounding the conductors and also to have twisted pairs of insulated conductors would include all of the other recited elements of claims 1-3, 9-11, 13 and 16-18, and would render these claims invalid as obvious to a POSITA also even if both modifications supposedly had to be made to Roberts.

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

1. 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.

259. In my opinion, Roberts discloses this element. *See* Section X(E)(a)(claim 11) above. But I have been asked to assume that Roberts does not disclose a seam of the barrier tape positioned above a terminal portion of an arm of the filler because of the cross-section illustration:



See EX-1009 at 10:42-48, FIG. 17. Even with this assumption, it would be obvious based on the combination of Roberts and Glew and/or the knowledge of a POSITA.

260. Roberts discloses that the conductors and shield 15 (*filler*) are twisted into a "twisted composite" during manufacturing. *Id*. at 12:12-30. This "twisted composite" is "traversed through a taping machine where the metal tape is applied." *Id*. at 12:20-33. And Roberts discloses that metal shield 18 "is a tapelike strip that has been longitudinally folded or wrapped around" the twisted pair-filler composite with the tape edges forming a seam. *Id*. at 4:17-20, FIG. 17.

261. 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 at ¶¶[0006-007], [0122-123].

262. In one embodiment, Glew discloses using a multi-layered shield 110 that is "wrapped around" the separator 300 (*filler*) and twisted pairs of conductors so that it encircles them. *Id*. at ¶¶[0154], [0197], FIG. 10A. In "wrap[ping] around" the filler and conductors, the seam of the filler is positioned, in the cross-section illustrated in FIG. 10A, above the terminal portion of a filler arm:

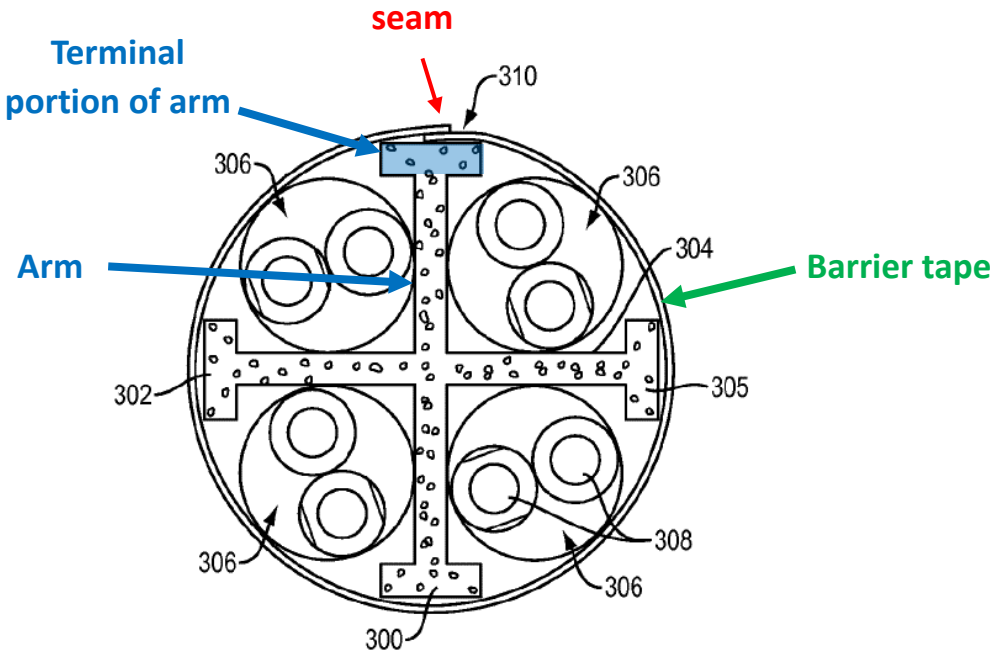


FIG. 10A

263. 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 as illustrated in Roberts FIG. 17. *See, e.g.*, EX-1009 at 4:17-20, 10:30-33, FIG. 17. Glew discloses that "wrapping" the filler and conductors results in the barrier tape having – at least at one location along the length of the cable – the seam positioned above the terminal portion of a filler arm.

264. Further, a POSITA at the time of the alleged invention of the '030 Patent would know that a barrier tape (and its seam) may be precisely positioned relative to the cable components (such as a "+" filler separating twisted pairs of insulated conductors) so that the seam would be, for example, positioned above the terminal portion of the filler arm. I know that from first-hand knowledge in the

industry prior to 2013, and also from art such as Barton (EX-1004 No. 6,378,283). Barton discloses use of a multi-finned filler (mechanical alignment components 180) to position the twisted pairs in a substantially square array (2:62-67, 10:23-25, FIG. 4) and use of a binder applicator 150 to apply a binder, such as a helical sheath having desirable properties (e.g., materials capable of acting as a Faraday cage), pursuant to selected control settings. EX-1004 at 6:50-7:19).

265. 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, as well as known wrapping techniques. 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.

266. Thus, modifying Roberts (or Roberts as modified per Grounds 6 and/or 7) to wrap the barrier tape (metal tape shield 18) around the filler and conductors to have a seam positioned above a terminal portion of a filler arm like shown in Glew would have been obvious to a POSITA.

I. GROUND 9: Claims 12 and 16 are Obvious in view of Any of Grounds 5-7 in view of Simons and/or the knowledge of a POSITA

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

267. Although the Roberts FIG. 17 shield 15 (filler) separates the conductors into only two groups and does not include four arms, Roberts also

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

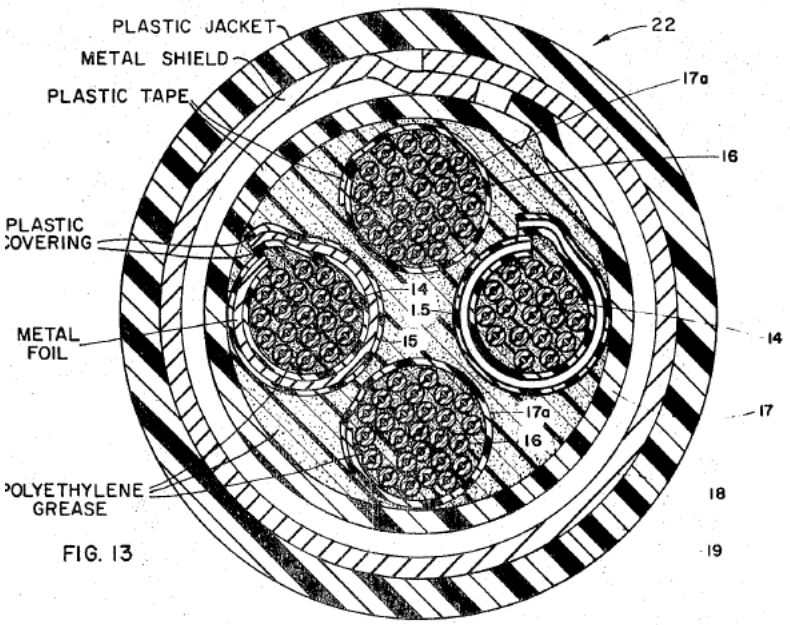
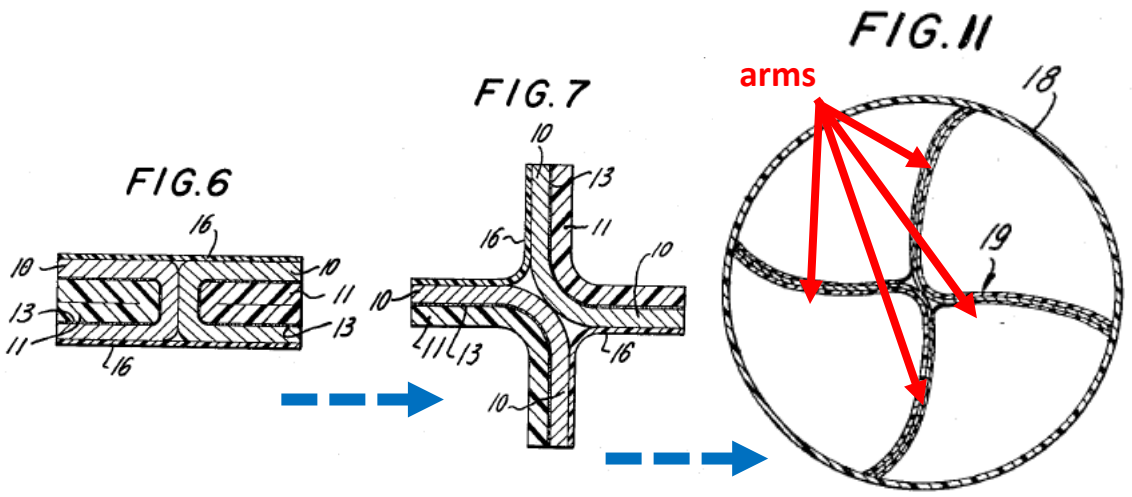


FIG. 13

EX-1009 at 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*. at 7:25-51, FIG. 13, Section X(E)(a)(element [1D]).

268. Simons discloses "an improvement over the shielding means disclosed in [Roberts]." EX-1012 at 1:5-12. The Simons "improvement" includes a cross-

shaped shielding tape 19 (filler) with four arms to separate the four groups of conductors from each other:

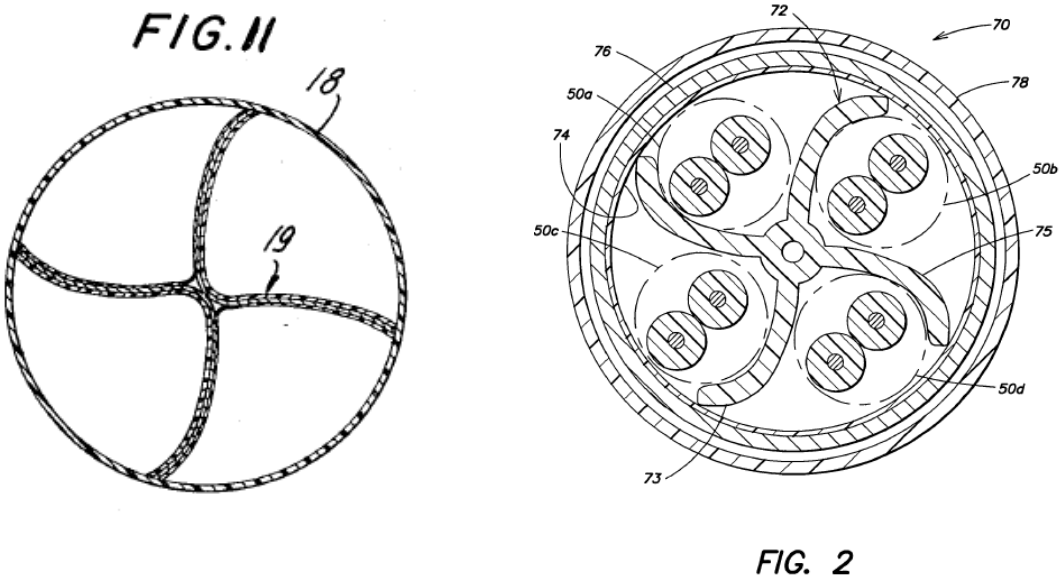


Id. at 2:4-9, 2:18-20, 3:1-26, 3:42-46, FIGS. 1, 6, 7, 11. As Simons explains, the shielding tape of FIG. 6 "is fed into the cabler" and "opens as in FIG. 7 to a system having four fins forming four longitudinal parallel shielding compartments." *Id*. at 3:15-26. FIG. 11 illustrates a cable with "a four-compartment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

269. As illustrated in Figures 6, 7 and 11, the shielding tape also has plastic/dielectric film 11, 16 on each surface facing the compartment so that such film is between the conductive metal layer 10 and the compartment and the tape thus non-conductively shields conductors within a compartment from conductors in other compartments. *See also*, i*d*. at 1:45-48 (referring to the shielding tape as

being an "encapsulated film/foil laminated longitudinal multiconductor cable electrostatic shielding tapes of this invention").

270. The Simons filler has four arms and forms a cross shape. Below is a comparison of Simons FIG. 11 and a published patent application (identifying William T. Clark – one of the inventors of the '030 Patent – as an inventor) describing a "separator 72" as "cross or '+' shaped."



Id. at FIG. 2; EX-1025 at ¶[0041], FIG. 2.

271. A POSITA at the time of the invention would be motivated to modify Roberts (or Roberts as modified per Grounds 6 and/or 7) to use Simons' "improved" four-arm shield-tape as a filler – particularly when separating conductors into four groups (as disclosed by Roberts). Simons discloses that such design is an "improvement" of Roberts and provides examples as to why it is an improvement. EX-1012 at 1:5-12, 3:33-44, 4:1-9. A POSITA also would have

had a reasonable expectation that such an improvement would be successful. The shield would work to shield the conductors within the compartments.

272. Thus, modifying Roberts (or Roberts as modified per Grounds 6 and/or 7) to include a filler having four arms in a cross shape would have been obvious to a POSITA at the time of the '030 Patent invention. And the so-modified Roberts cable would have all of the elements of this claim. So, this claim would have been obvious to a POSITA.

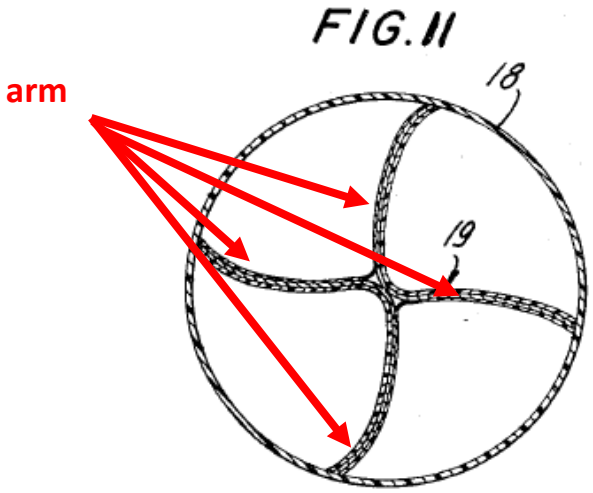
2. Dependent Claim 16. The cable of claim 10, wherein a pair of arms of the filler forms a channel; and wherein the first twisted pair of insulated conductors is positioned within the channel.

273. In my opinion, Roberts discloses this element. See my analysis above concerning Roberts and claim 16.

274. I have been asked to assume Roberts does not disclose a filler having a pair of arms forming channel, wherein the first twisted pair of insulated conductors is positioned within the channel. With that assumption, I have been asked whether modifying Roberts to include a filler having a pair of arms forming a channel, wherein the first twisted pair of insulated conductors is positioned within the channel, would have been obvious to a POSITA at the time of the invention. In my opinion, the answer is yes in view of Simons.

275. As discussed above in connection with claim 12, it would be obvious to a POSITA to modify Roberts (or Roberts as modified per Grounds 6 and/or 7) to

include the four-armed (or "four-compartment") filler shielding tape rom Simons (shown below), which Simons calls an "improvement over" the Roberts filler tape:



EX-1012 at 2:4-9, 4:18-21, FIG. 11. Each pair of arms forms 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. *Id*. at 3:1-4, 4:1-9. Thus, the modified Roberts (per claim 12) includes this element. And, as explained above, a POSITA have been motivated to utilized Simons' four-armed filler in view of Simons' assertion that it was "an improvement" over Roberts (Simons at 1:5-12) and provided four shielded compartments. A POSITA also would have had a reasonable expectation that such an improvement would be successful. The shield would work to shield the conductors within the compartments.

276. Thus, modifying Roberts (or the Roberts as modified per Grounds 6 and/or 7) to include a filler having four arms in a cross shape would have been

obvious to a POSITA at the time of the '030 Patent invention. And the so-modified Roberts' cable would have all of the elements of this claim. So, this claim would have been obvious to a POSITA.

J. GROUND 10: Claims 1-3, 9-14, 16-18 are Obvious in view of Clark-478 (U.S. Publication No. 2006/0169478) and one or more of Roberts, Glew and/or the knowledge of a POSITA

1. Independent Claim 1

1. A cable comprising:

[1A] a first twisted pair of insulated conductors;

[1B] a second twisted pair of insulated conductors;

[1C] a filler separating the first twisted pair of insulated conductors from the second twisted pair of insulated conductors; and

277. In my opinion, Clark-478 discloses a cable comprising these elements.

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

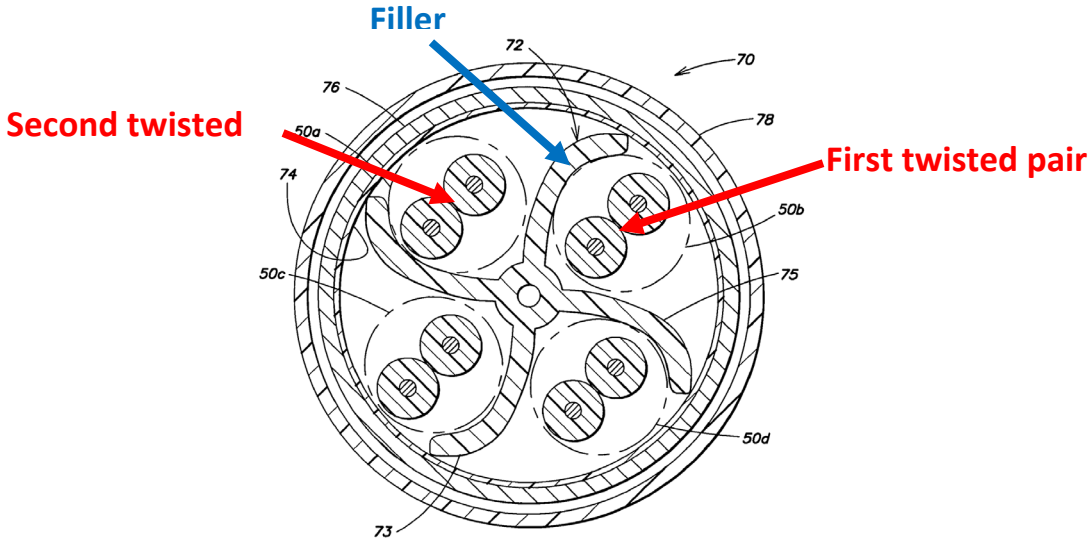


FIG. 2

EX-1025 at ¶[0041], FIG. 2. Thus, Clark-478 discloses these elements.

[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.

279. Clark-478 discloses most of this element. Clark-478 does not disclose the recited three-layer barrier tape.

280. Clark-478 discloses a multi-layer binder 74 (*barrier tape*) surrounding the filler and twisted pairs:

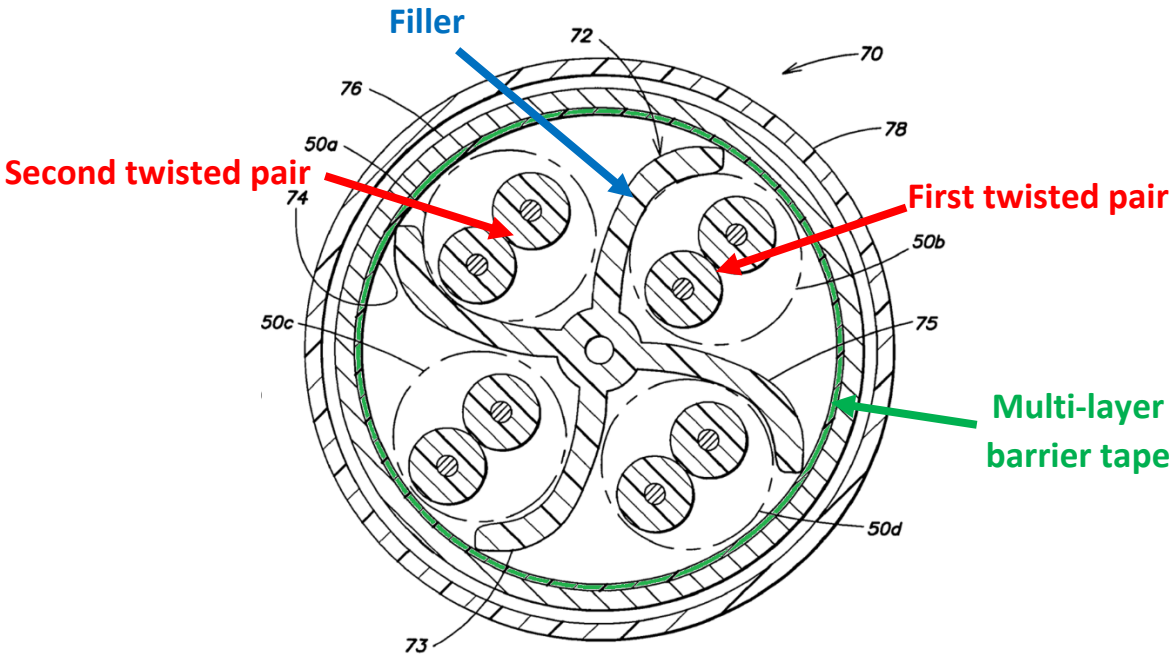
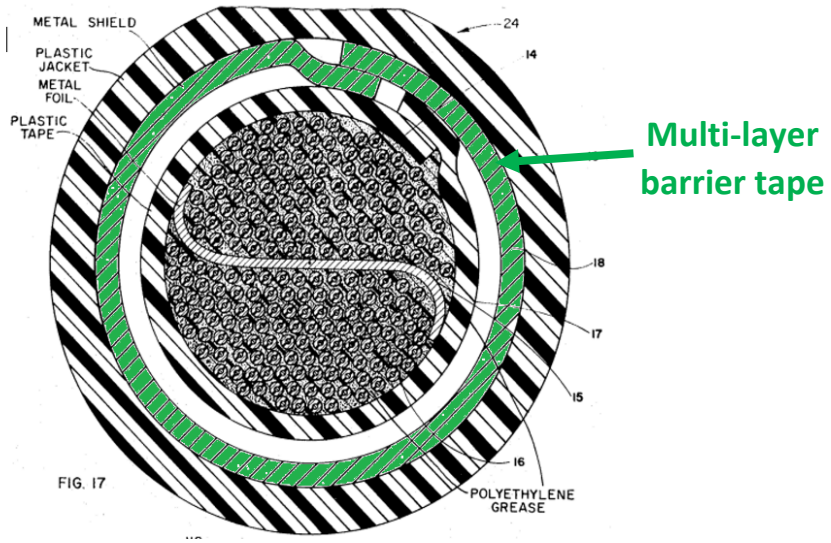


FIG. 2

See EX-1025 at ¶[0047], FIG. 2. Also, I point out that during original prosecution, the Examiner found that binder 74 (*barrier tape*) is a two-layer tape having a continuous conductive layer (e.g., aluminum) on a layer of dielectric material (e.g., mylar) with the conductive layer extending to lateral edges of the dielectric layer. *Id*. at ¶[0047], FIG. 2; EX-1002 at Office Action pages 7-8). I agree that a POSITA would understand Clark-478's disclosure of an aluminum mylar tape to disclose such a tape having continuous conductive layer on a layer of dielectric material and extending to the lateral edges of the dielectric layer.

281. As I explained in connection with Ground 5, Roberts discloses the recited three-layer barrier tape. The Roberts cable has a surrounding metal tape shield 18 (see annotated figure below), that "can have a plastic, such as

polyethylene, firmly adhered to either one or more surfaces thereof." EX-1009 at 4:15-23, 12:30-36, FIG. 17.[6]



As discussed above, a POSITA would understand that Roberts's shield 18 is a three-layer shield, with a *continuous* conductive material *between two layers of a dielectric material* and *extending to each lateral edge of the two dielectric layers of the dielectric material. See* Ground 5 (Section X(E)) (element [1D]).

282. Likewise, as discussed further in connection with Ground 3, Glew discloses a cable with a surrounding shielding material 310 (*barrier tape*), and states that the shielding material can be a multi-layer tape material as shown in

[6] During prosecution, the examiner rejected claim 1 based on the combination of Clark-478 and Roberts, arguing that it would be obvious to use the three-layer metal foil tape design shown in FIG. 5 (for metal tape 15) in place of Clark-478's two-layer barrier tape design. Patent Owner overcame the rejection by arguing that the specific three-layer tape pointed to by the Examiner in Roberts was used to separate groups twisted pairs from each other, and not to surround twisted pairs as recited in the claims. However, neither the Examiner nor Patent Owner addressed Roberts's metal tape shield 18 that surrounded all of the twisted pairs.

FIG. 13C which 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."

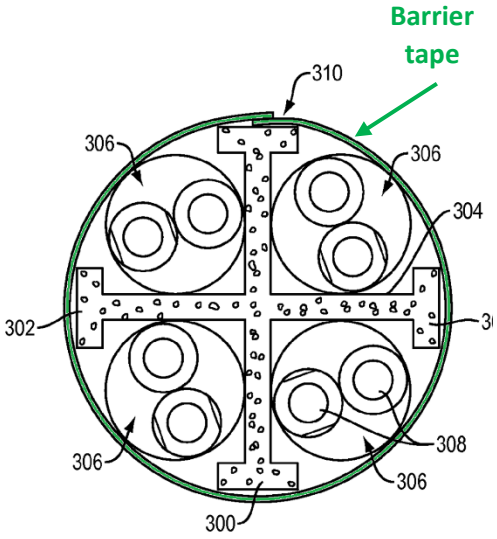


FIG. 10A

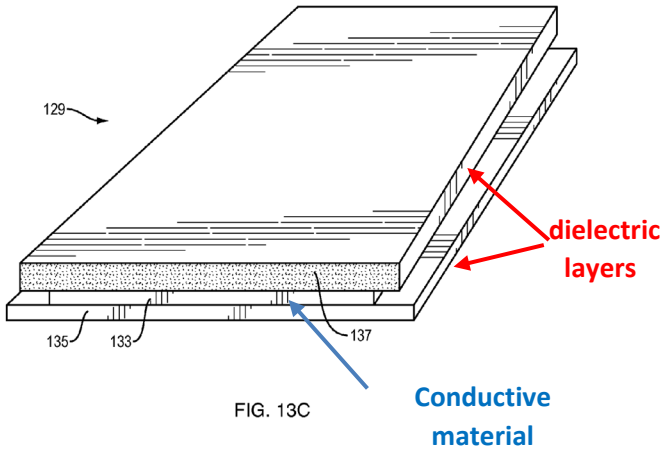


FIG. 13C

EX-1008 at ¶[0195], FIG. 13C.

283. As Glew explains, each of the substrate layer and non-woven layer 137 can be "insulative, dissipative, or conductive" or "free of electrically conductive inclusions." *Id.* at ¶¶[0187], [0188], [0190], [0193]. They may be formed of the same dielectric polymeric materials such as FEP, PFA or polyolefins, and the substrate layer can be a non-woven fabric like the non-woven fabric layer. *Id.* at ¶¶[0187], [0190], [0195]. Further, as explained above in connection with Glew, a POSITA would understand that the metallic layer 133 in FIG. 13C of Glew is *continuous* and "*extending to each lateral edge of the two*

dielectric layers of the dielectric material." See, Ground 3 (Section X(C)) (element [1D].

284. 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. In particular, the Examiner pointed to the Roberts three-layer tape used as interior separator/filler (tape 15) with the cross section illustrated in Roberts FIG. 5. EX-1002 at Office Action pages 8-9.

285. Patent Owner responded that the tape pointed to by the Examiner did not "surround" the cable conductors and filler as recited in the claim; but instead was positioned "between" the conductors. EX-1003 at pages 6-9. Patent Owner argued that the dissimilarity was a distinguishing characteristic, pointing out that Roberts' tape 15 was positioned between conductors to reduce crosstalk between the conductors and that it would defy known physics to use that tape to surround the conductors if one was motivated to reduce crosstalk between them. EX-1003 at page 9.

286. Neither the Examiner nor the Patent Owner discussed Roberts' disclosure of metal tape 18 that surrounds the conductors and the filler/separator 15, and which Roberts discloses as being metal tape that "can have a plastic, such as polyethylene, firmly adhered to either one or more surfaces thereof." EX-1009 at, 4:16-23.

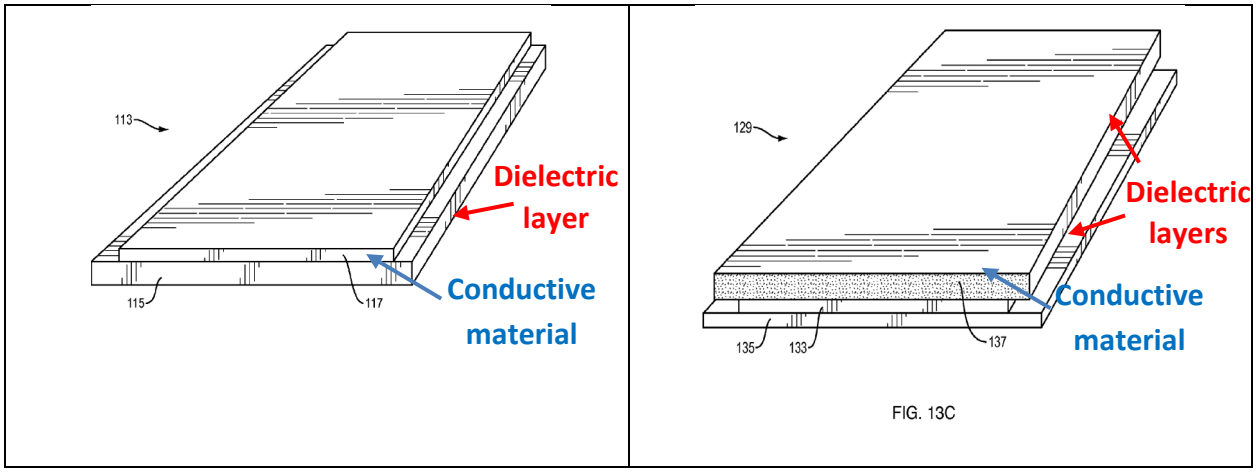
287. I have been informed that the Supreme Court has stated that "the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results" and that "when a 'patent simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious."

288. That is the situation in the case of Roberts, Clark-478 and Glew. A POSITA at the time of the invention would understand that surrounding Clark-478's filler and twisted pairs with Roberts'/Glew's three-layer tapes is simply the use of different known tape shield than Clark-478's to perform the function of shielding what they enclose.

289. Also, a POSITA would have been motivated to combine these references. Clark-478, Glew and Roberts each disclose 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 at ¶[0048]; EX-1008 at ¶¶[0007],[0030],[0101],[0165],[0194],[0197]; EX-1009 at 4:16-23 (armor acts as electrical and mechanical shield)

290. A POSITA at the time of the invention 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. 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) include 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. 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 at 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-1008 at ¶¶[0154],[0195-196], FIGS 10A, 13A, 13C.

291. A POSITA at the time of the invention also would have been motivated to modify Clark-478 to have a three-layer barrier tape (such as disclosed in Glew and/or Roberts). Each type of tape assists in shielding the surrounded conductors from external crosstalk. In addition, having the three-layer tape 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 greaselike dielectric material to cables to help isolate the conductors from the metal layer in multi-layer shields. *See* EX-1009 at 3:37-75, 4:48-5:15.

292. Thus, modifying Clark-478 to have the recited three-layer tape (as disclosed in Roberts) would have been obvious to a POSITA. And the so-modified Clark-478 cable would have all of the elements of this claim. So, this claim would have been obvious to a POSITA

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

293. Clark-478 discloses the separator 72 (*filler*) can be made of "fluoropolymer materials … such as fluoro ethylene propylene (FEP)." EX-1025 at ¶[0039].

294. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

295. 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 at ¶[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")). *Id*. at ¶[0038]; EX-1039 at 3:44-50. The illustrations in Clark-478 and the other patent are in pertinent part the same:

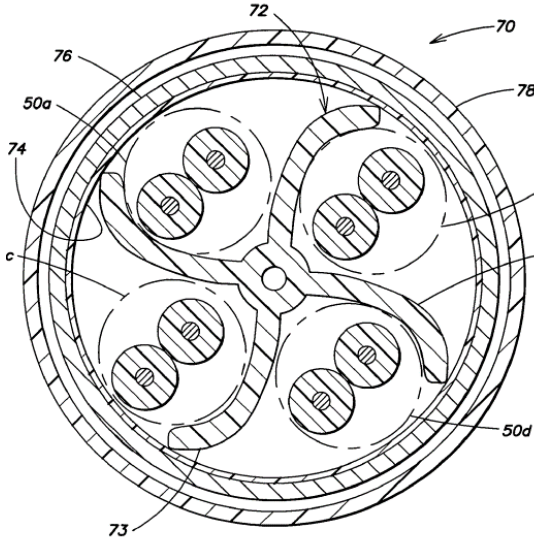


FIG. 2

EX-1025, FIG. 2

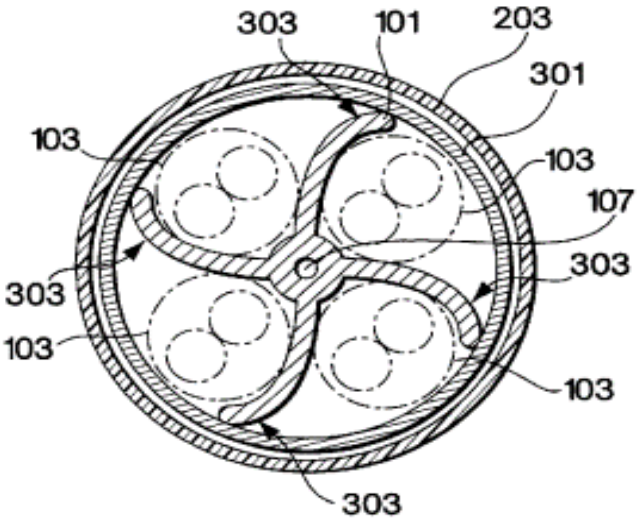


Fig. 3

EX-1039, FIG. 3

296. During prosecution the Examiner found that Clark-478 discloses this recited feature. EX-1002 at Office Action page 7. I agree that it is disclosed.

297. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

4. **Dependent Claim 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.**

298. Clark-478 teaches that the twisted pairs and separator are cabled (i.e., helically 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 at ¶¶[0017], [0026], [0035]. I agree with the finding by the Examiner during prosecution that Clark-478 discloses this recited feature. *See* EX-1002 at Office Action page 7. Glew also discloses this feature as discussed above. *See* Ground 3 (claim 9).

299. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

300. As shown below, Clark-478 discloses a separator 72 (filler) with four protrusions 75 (arms).

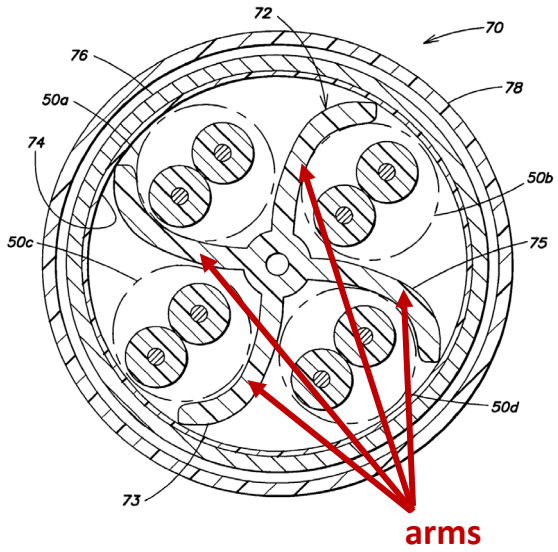


FIG. 2

EX-1025 at FIG. 2.

301. Clark-478 thus discloses this element.

302. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA

6. Dependent Claim 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.

303. Clark-478 discloses that each of the binder 74 and the shield 76 may be "wrapped around" the conductors and separator. EX-1025 at ¶¶[0047-048].

Thus, Clark-478 discloses to a POSITA that teach of the binder and shield includes a seam where the edges of the tape overlap or abut.

304. Clark-478 also discloses that the conductors and filler are twisted as they extend longitudinally through the cable. *Id*. at ¶[0043] (cable is manufactured with a cable lay length greater than three inches); *see also id*. at ¶¶[0017], [0026], [0035]; Section X(J)(a)(claim 3) above.

305. 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 at 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:

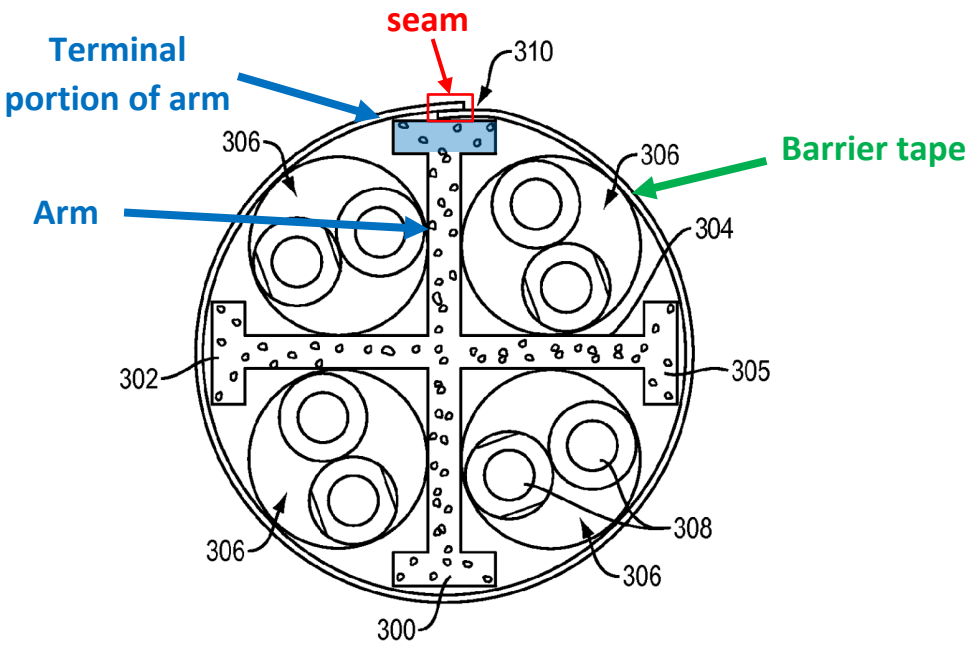


FIG. 10A

See EX-1008 at ¶[0154], FIGS. 10A, 10H.

306. 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 Glew illustrates the seam positioned above a terminal portion of an arm of the filler (as illustrated above). Further, a POSITA at the time of the alleged invention of the '030 Patent would know that a barrier tape (and its seam) may be precisely positioned relative to the cable components (such as a "+" filler separating twisted pairs of insulated conductors) so that the seam would be, for example, positioned above the terminal

portion of the filler arm. I know that from first-hand knowledge in the industry prior to 2013, and also from art such as Barton (EX-1042). Barton discloses use of a multi-finned filler (mechanical alignment components 180) to position the twisted pairs in a substantially square array (EX-1042 at 2:62-67, 10:23-25, FIG. 4) and use of a binder applicator 150 to apply a binder, such as a helical sheath having desirable properties (e.g., materials capable of acting as a Faraday cage), pursuant to selected control settings. EX-1042 at 6:50-7:19. A binder tape containing conductive components helically applied around a cable core would behave as a Faraday cage

307. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

308. Clark-478 describes the cable as having a "cross or '+' shaped separator 72" having four arms in a cross shape. EX-1025 at ¶¶[0041], [0044], FIG. 2.

309. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

310. I agree with the Examiner that Clark-478 discloses this feature. EX-1002 at Office Action page 7 ("the arms (75's) are symmetrical terminal portions (Fig 2))." 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 at ¶¶[0044-045]. Clark-478 specifically 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. *Id*. at ¶[0038]; EX-1039 at FIG. 1. As illustrated below, each arm ends in a terminal portion that is symmetrical:

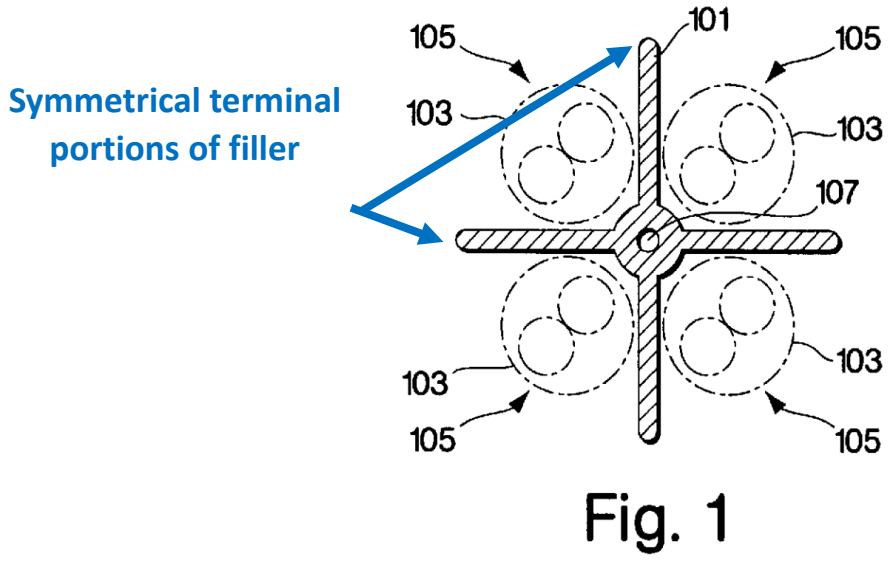


Fig. 1

EX-1039 at FIG. 1 (annotated)

311. 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 portion*). *See* EX-1008 at ¶[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. EX-1025 at ¶¶[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. EX-1008 at FIGS. 10A, 10F. 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. *Id*. at FIGS. 10A, 10F.

312. Further, a POSITA would recognize additional advantages with the filler having the more T-shaped arms as compared to that illustrated in Clark-478. The arms better support the tape being wrapped around them such that the cable better maintains a stable cross section. 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. Other examples of fillers having arms with symmetrical and wider terminal portions, and the benefits of such configurations, are disclosed, e.g., in EX-1044 (Blouin).

313. In my opinion, modifying Clark-478's specifically disclosed filler arms to have T-shaped symmetrical terminal portions such as disclosed by Glew would have been obvious to a POSITA.

314. Thus, the modified (per discussion of claim 1 and also the above (if Clark-478 is deemed not to disclose arms ending in symmetrical terminal portions)) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

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

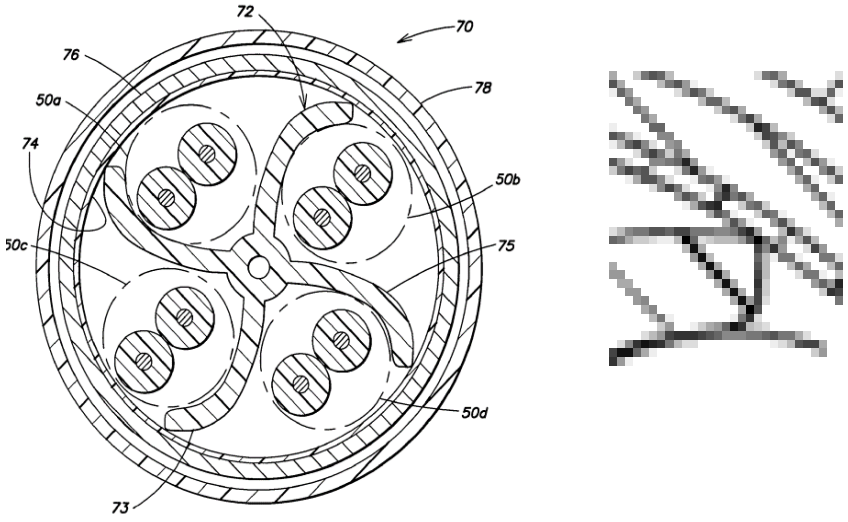


FIG. 2

EX-1025 at FIG. 2.

316. Glew, however, discloses separators/fillers that have arms terminating in wide portions (e.g., T shapes):

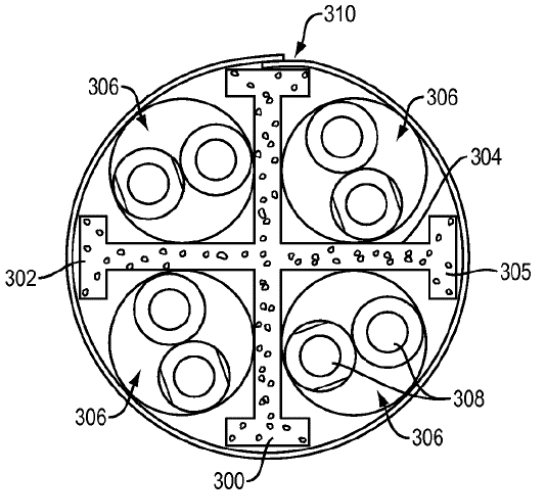


FIG. 10A

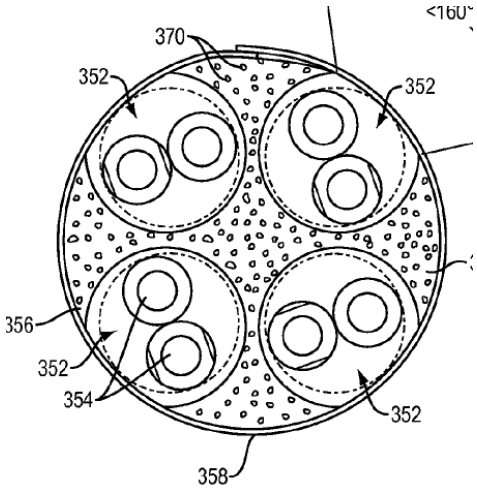


FIG. 10F

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

317. As discussed above with respect to claim 13, it would be obvious to use the Glew separator with wider terminal portions on the Clark-478 Cable. *See*, Section X(J)(a) (claim 13) above.

318. In addition, a POSITA would recognize one or more additional advantages with the wide-terminal-portion arms of the Glew filler as compared to that illustrated in Clark-478. The arms better support the tape being wrapped around them such that the cable better maintains a stable cross section. 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.

319. In my opinion, modifying Clark-478's specifically disclosed filler arms to have arms with wider terminal portions such as disclosed by Glew would have been obvious to a POSITA.

320. Thus, the modified Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

10. Dependent 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.

321. Clark-478 explains that "[s]eparator 72 forms spaces or channels 74a-74d for respective twisted pairs 50a-50d of the cable." EX-1025 at ¶[0041]. As shown below, the channels are formed by arms of the separator 72 (*filler*):

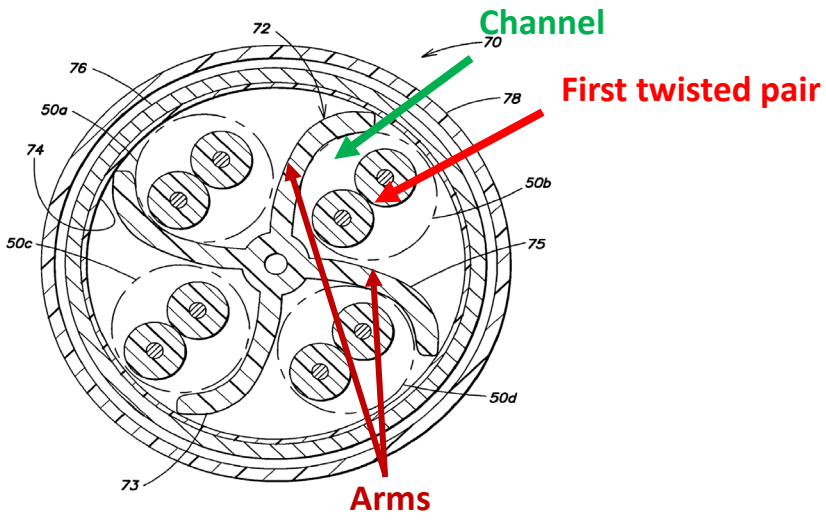


FIG. 2

Id. at FIG. 2.

322. Therefore, this element is disclosed.

323. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

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

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

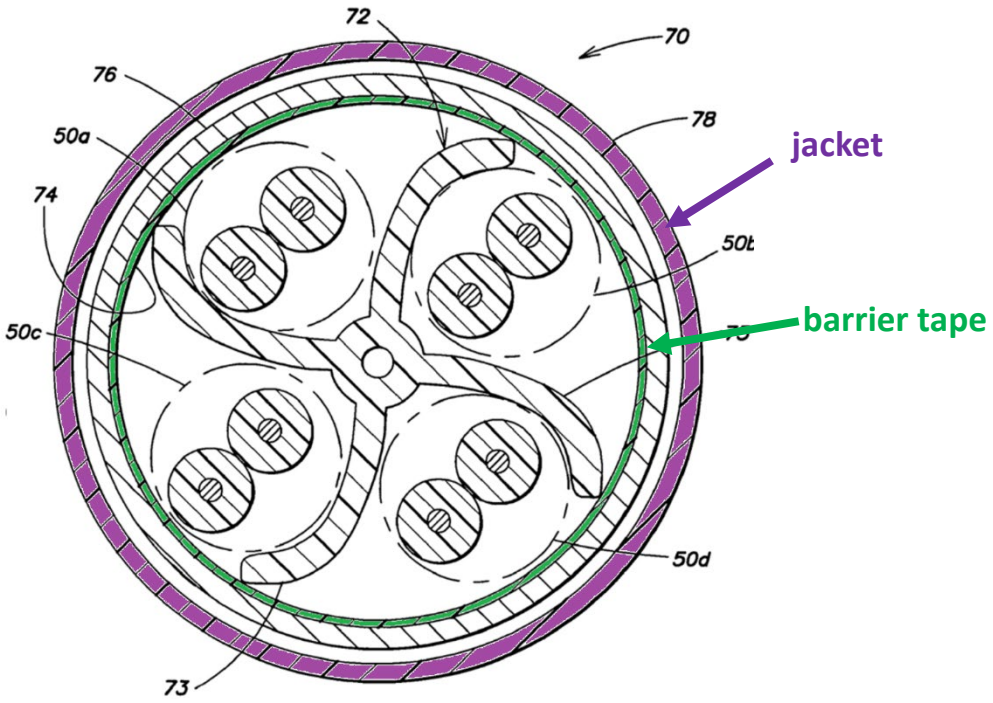


FIG. 2

EX-1025 at ¶[0048], FIG 2.

325. Therefore, this element is disclosed.

326. Thus, the modified (per discussion of claim 1) Clark-478 cable would have this element and this claim, too, would have been obvious to a POSITA.

2. Independent claim 18

327. Claim 18 is a method claim that recites essentially the same structural limitations as claim 1, except that it does not require the conductive layer of the three-layer barrier tape to be "continuous". *Compar*e EX-1001, claim 1 *with* claim 18.

328. The structural limitations recited by this method claim (i.e., the first and second twisted pairs of insulated conductors (element [18A]), the filler separating (or between) the twisted pairs (element [18B]), and the three-layer barrier tape wrapped around (or surrounding) the filler and twisted pairs and having a conductive material between two layers of a dielectric material and extending to each lateral edge of the two layers of the dielectric material (elements [18C-1] and [18C-2]) are disclosed by the Clark-478/Roberts combination as explained above with respect to corresponding elements [1A] and [1B] (first and second twisted pairs), [1C] (filler separating the twisted pirs), and [1D] (three-layer barrier tape surrounding the filler and conductors, with conductive layer between dielectric layers and extending to lateral edges of the dielectric layers). *See*, Section X(J)(a) above.

329. Using the Clark-478/Roberts cable and teaching as described for claim 1 above results in performing the method recited in claim 18 and renders claim 18 obvious for the same reasons discussed above. See, my discussion above

in Sections X(J)(a) concerning Clark-478's disclosure of separating the twisted pairs of insulated conductors with a filler and Roberts' wrapping (or having wrapped) the twisted pairs of insulated conductors and filler with the recited barrier tape in connection with claim elements [1A-D]. As I explain in more detail below, the method steps of "providing" the twisted pairs of insulated conductors, "positioning" the filler between them, and "wrapping" the conductors and fillers with the recited barrier tape are disclosed by the Clark-478/Roberts modified cable having had the twisted pairs of conductors provided and the filler being positioned between them (see below discussion regarding elements [18A] and [18B]), and the barrier tape having the recited characteristics and being wrapped around them all (see below discussion regarding elements [18C] and [18D]). Thus, this claim is obvious to a POSITA.

18. A method of manufacture of a cable, comprising:

[18A] providing a first twisted pair of insulated conductors and a second twisted pair of insulated conductors;

[18B] positioning a filler between the first twisted pair of insulated conductors and the second twisted pair of insulated conductors; and

330. These are method steps that essentially mimic the apparatus elements [1A-C]. Clark-478 discloses these elements, as illustrated in the annotated figure below:

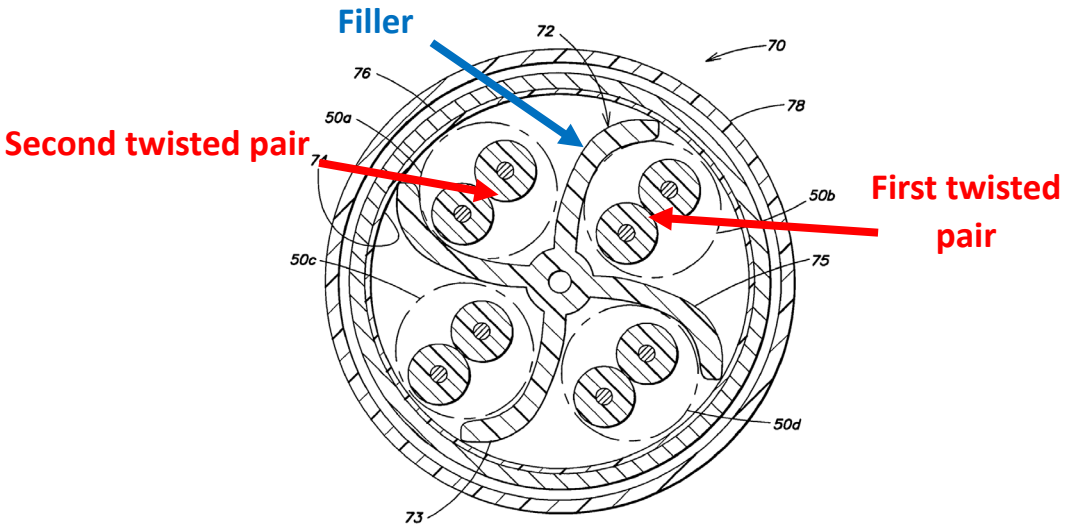


FIG. 2

EX-1025, ¶¶[0041], [0045], FIG 2.

331. Clark-478 thus discloses these recited steps.

[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,

[18C-2] the conductive material of the barrier tape extending to each lateral edge of the two layers of the dielectric material.

332. These are method steps that essentially mimic the cable apparatus element [1D]. As explained in connection with [1D] these steps are disclosed in Clark-478, with the exception of the three-layer barrier tape having the conductive material contained between two layers of a dielectric material as recited. *See* Section X(J)(a) (element [1D]).

333. Clark-478 has a multi-layer binder 74 (*barrier tape*) *wrapping the first twisted pair of insulated conductors, second twisted pair of insulated conductors, and the filler*:

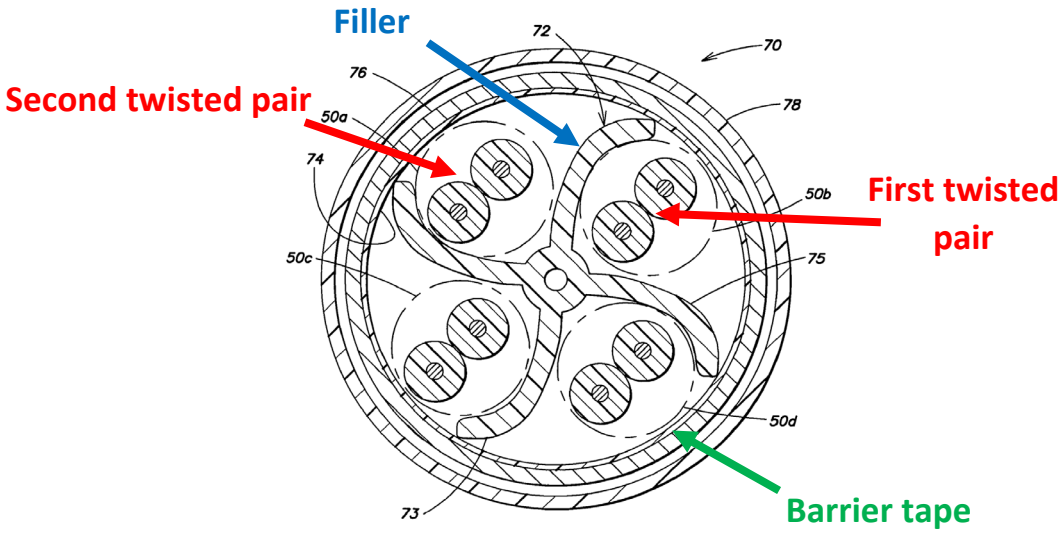


FIG. 2

See EX-1025 at ¶[0047], FIG 2.

334. Roberts's metal tape shield 18 likewise is wrapped around the conductors and filler. EX-1009 at 4:16-23, 11:43-50, 12:26-33, FIGS. 1, 17. And so is Glew's shielding tape (e.g., tape 310 in FIG. 10A). *See* EX-1008 at ¶¶[0154], [0197] (shielding tape "encircle[s] conductors in a cable"), FIG. 10A.

335. As explained above in the discussion of element [1D] (Section X(J)(a)), it would be obvious to replace the 2-layer binder 74 in Clark-478 (i.e., a conductive layer on a dielectric layer) with (or modify such two-layer barrier to be) the 3-layer barrier tape (continuous conductive layer between two dielectric layers

and extending to the lateral edges of the dielectric layers) disclosed in FIG. 13C of Glew or with the metal shield 18 in Roberts. *See* Section [1D], *supra*.

336. Also, as discussed above, Roberts's metal shield 18 and Glew's binder 74 (barrier tape) each includes continuous conductive material extending to each lateral edge as recited. *See* Sections discussing Roberts [1D], and Glew [1D].

337. Thus, Clark-478, so modified, has the recited barrier tape wrapped around the conductors and fillers as recited, and this claim is obvious to a POSITA.

K. 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

338. I explained above in connection with Grounds 3 and 5 that each of Glew and Roberts discloses the cable filler with helical twist at a first angle and twisted-pair conductors having a helical twist around the filler at the first angle as recited in claims 3 and 9. However, I have been asked to assume that neither reference discloses such recited claim elements. Even with that assumption, it is my opinion that it would have been obvious to a POSITA at the time of the invention to utilize a filler having a helical twist at a first angle (and twisted-pair conductors around the filler at the first angle) in the Glew and Roberts cables.

339. Utilizing a helically twisted cable filler/separator (with the conductors having a helical twist around the filler) has been common practice for a long time and provided well known advantages, including those described, for example, in

Cook. See, EX-1010, 25:25-23; *see also* EX-1026 Pub, ¶¶[0064], [0187], [0187], [0195]. Twisting cable components such as the twisted-pair conductors and any separator between them (as well as other components of a cable core) – which a POSITA would understand to be helically twisting – has been a textbook manufacturing step since long before the filing date of the provisional application to which the '030 Patent claims priority. E.g., EX-1016 at p. 9; *see also* EX-1009 (Roberts) at 12:12-38, FIG. 23. Twisting conductors into twisted pairs also was commonplace – and advantageous – as I already explained. See, e.g., Paragraphs 32-33 and Ground 6 above. A POSITA would understand that twisting the twisted pairs imparted a helical twist to the pairs. So, too, does twisting the filler and pairs together. Modifying Roberts and/or Glew – even assuming any modification was necessary – to impart the helical twist at a first angle as recited in claims 3 and 9 would have been a combination of familiar elements according to known methods to yield predictable results (or a simple substitutions of one known element for another to obtain predictable results).

XI. CONCLUSION

340. In signing this declaration, I understand that the declaration will be filed as evidence in the contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

341. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on: 6/11/23

By: Kenneth Cornelison
Kenneth Cornelison

XII. 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.