Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte TOMOYUKI YOKOKAWA and HIDEYUKI IWATA

Appeal No. 2003-2153
Application No. 09/632,160

ON BRIEF

Before STAAB, McQUADE, and NASE, Administrative Patent Judges.
NASE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 to 8, which are all of the claims pending in this application.

We REVERSE.

BACKGROUND

The appellants' invention relates to a low cost optical fiber cable in which an optical fiber core having an outer covering is suppressed from movement inside the outer covering in the lengthwise direction thereof and which does not cause deterioration of the transmission characteristics even when the cable is bent, and to a method of producing the same (specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellants' brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Hager et al. (Hager)	5,016,973	May 21, 1991
Keller et al. (Keller)	6,253,012	June 26, 2001

Claims 1 to 8 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hager in view of Keller.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejection, we make reference to the answer (Paper No. 12, mailed February 12, 2003) for the examiner's complete reasoning in support of the rejection, and to the brief (Paper No. 11, filed November 26, 2002) and reply brief (Paper No. 13, filed April 3, 2003) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. Upon evaluation of all the evidence before us, it is our conclusion that the evidence adduced by the examiner is insufficient to establish a prima facie case of obviousness with respect to the claims under appeal. Accordingly, we will not sustain the examiner's rejection of claims 1 to 8 under 35 U.S.C. § 103. Our reasoning for this determination follows.

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A prima facie case of obviousness is established by presenting evidence that would have led one of ordinary skill in the art to combine the relevant teachings of the references to arrive at the claimed invention. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988) and In re Lintner, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972). However, the mere fact that the prior art could be modified in the manner suggested by the examiner does not make such a modification obvious unless the prior art suggested the desirability of the modification. See In re Gordon, 773 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Teachings of the applied prior art

Hager

Hager's invention relates to fiber optic cables and the structure for reinforcing the tensile and compressive strength characteristics of the optical fibers contained within the fiber optic cables. Specifically, his invention is directed toward an improved structure for use in low fiber-count cable construction. Figures 1-2 depict an optical fiber cable constructed in accordance with Hager's invention. The optical fiber cable consisting of at least one optical fiber 10 sheathed by a yarn 20 composed of synthetic staple fibers wrapped around a glass core. The yarn enclosed fiber optic cable is then covered with a reinforcing jacket 30 preferably composed of polyethylene. The reinforcing yarn is made by spinning any number synthetic staple fibers around the glass core in a process known by the trademark DREF®. The resulting cable structure is a flexible reinforced cable which, when heated, will become rigid and have high tensile and compressive strength characteristics. Upon heating, the DREF® yarn 20 wrapping melts into the outer polyethylene jacket 30 thereby forming an integral reinforcing jacket. This dielectric cable is then capable of easy installation and upon being installed is protected from rodent damage due to the existence of glass fibers in the reinforcing jacketing.

Keller

Keller's invention relates to an indoor/outdoor optical fiber cable that meets various competing industry standards such as peak flame, peak smoke, average smoke, compression and cold temperature bend tests. Keller teaches (column 3, lines 12-35) that:

> In its broadest sense, the present invention provides a cable having an optical fiber, a buffer tube having the optical fiber arranged therein, and a thermoset material for frictionally-connecting the optical fiber to the buffer tube.
>
> A thermoset material is capable of becoming permanently solid when heated or cured and is also known in the art as a crosslinked polymeric material. (Compare: A thermoplastic An material that is capable of softening or fusing when heated and of hardening again when cooled.) In the present invention, the thermoset material may be a flame-retardant product of Dow Corning named SYLJRD Silguard 184 silicone elastomer, base and curing agent, or a Liquid Rubber--Rubber Molded Compound (PMC-121/40, Parts A and B), which is not flame-retardant, but may be applied about every 0.5-30 meters. The thermoset material will not melt or appreciably soften and will maintain basic elastomeric flexibility in a temperature range from -40 to +85 degree Celsius. The thermoset material allows for fiber helix movement as the cable expands and contracts in the temperature range from -40 to +70 degrees Celsius, and is cyclically placed for frictionally-connecting the optical fiber to the buffer tube at intervals of about every ½ meter, as well as at intervals of about every 10 meters or longer to 30 meters.

Figure 1 is a diagram of a cross-section of a first embodiment of an optical fiber cable having one or more optical fibers 12, a buffer tube 14 having the one or more optical fibers 12 arranged therein, and a thermoset material generally indicated as 16 (by hatching) for cyclically connecting the optical fiber to the buffer tube 14. The cable 10 is an indoor/outdoor flame retardant cable that also has a fiberglass yarn matrix 18 having one or more layers of fiberglass yarns 19, 20 being arranged about the buffer tube 14; and a jacket 22 being arranged about the fiberglass yarn matrix 18. As shown, the indoor/outdoor flame-retardant cable 10 also has ripcords 24, 26 for pulling to access and service the optical fiber inside the cable.

Figure 2 is a diagram of a second embodiment of a cable having one or more optical fibers 102 arranged in a buffer tube 104, and having cyclically-placed thermoset material such as a low viscosity elastomer generally indicated as 106, 108 to hold the one or more optical fibers 102 in the buffer tube 104 at intervals of about every ½ meter. The cyclically-placed thermoset material 106, 108 prevents water ingress in the buffer tube 104, especially when used in combination with water swellable powder, and allows for fiber helix movement as the cable expands and contracts in the temperature range from -40 to +70 degrees Celsius.

Figure 3 is a diagram of a third embodiment of a cable having one or more optical fibers 202 arranged in a buffer tube 204, and having cyclically-placed thermoset material such as a low viscosity elastomer generally indicated as 206, 208 to hold the one or more optical fibers 202 in the buffer tube 204 at intervals of about every 10 meters.

Figure 4 is a diagram of a fourth embodiment of a cable having one or more optical fibers 302 arranged in a buffer tube 304, and having cyclically-placed thermoset material such as a low viscosity elastomer generally indicated as 306, 308 to hold the one or more optical fibers 302 in the buffer tube 304. The cyclically-placed low viscosity elastomer 306, 308 is a thin wavy section of material, which thickens at a mid section to contact the buffer tube wall generating a fiber friction lock when cured or crosslinked. Adjacent cyclically-placed low viscosity elastomers 306, 308 form an area or segment that contains trace amounts of water swellable powder 320 and does not have to be filled for water ingress prevention. The exterior surface of the cable jacket and/or the buffer tube 304 has markings 310, 312 to indicate the cycled placement position of the thermoset material in the event the cable has to be serviced and a technician needs to know the location of the cycled placement.

Figure 5 is a diagram of a fifth embodiment of Keller's invention. In this embodiment the cable is a loose tube plenum indoor-outdoor cable having multiple buffer tubes 402, 404, 406, 408, 410, 412 arranged around a central strength member 414 having an overcoat 415. Each buffer tube 402, 404, 406, 408, 410, 412 has optical fibers 402a, 404a, 406a, 408a, 410a, 412a arranged therein. Each buffer tube 402, 404, 406, 408, 410, 412 also has cycled fiber locks, one of which is respectively shown in hatching as 402b, 404b, 406b, 408b, 410b, 412b. Each buffer tube 402, 404, 406, 408, 410, 412 also has water swellable powder (not shown) therein for absorbing water and other moisture. A water swellable binder 420 is wrapped around the buffer tubes 402, 404, 406, 408, 410, 412. Water swellable yarns 416, 418 are arranged inside the water swellable binder 420. A water swellable aramid yarn 422 is wrapped around the water swellable binder 420. A jacket 424 is arranged about the water swellable aramid yarn 422.

Figure 6 is a diagram of a process for providing cycled fiber locks on an optical fiber. The cycled fiber lock process has a part A, a part B, a gear pump 510, and a drop meter unit 520 for dropping a mixture of the part A and the part B onto optical fibers 502 to form cycled fiber locks 504, 506, 508. The cycled fiber lock process also includes steps using an extrusion crosshead 530 and a water trough 540.

The indoor/outdoor flame-retardant cables in Figures 1-5 may include water swellable powder particles generally indicated as 320 (as a series of dots) in Figure 4 sprinkled on the one or more optical fibers arranged inside the buffer tube. During manufacture of the cable, trace amounts of water swellable powder are electrostatically sprinkled on the one or more optical fibers before being arranged inside the dry-loose buffer tube. The water swellable powder completely eliminates the need for using messy and sloppy gel. The use of trace amounts of water swellable powder significantly reduces the adverse effects of microbending under certain cold temperature conditions. The water swellable powder also eliminates the need for a gel that might otherwise adversely react with any flame retardant polyvinyl chloride (FRPVC) in the buffer tube. The use of water swellable powder is the "dry" aspect of the dry-loose tube of the new dry indoor/outdoor flame-retardant cable.

The rejection under appeal

In the rejection before us in this appeal (answer, pp. 3-4), the examiner (1) ascertained that Hager taught the subject matter of claims 1 to 8 except that Hager fails to disclose applying adhesive onto at least one optical fiber core intermittently in the lengthwise direction thereof, binding the fiber core to the buffer; and (2) concluded that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the intermittent adhesive to the optical fiber cable as taught by Keller et al with the reinforced cable disclosed by Hager et al."

The appellants argue through both briefs that the applied prior art does not suggest the claimed subject matter. We agree.

In our view, the teachings of Keller provide no teaching or suggestion for a person of ordinary skill in the art at the time the invention was made to have applied adhesive onto Hager's optical fiber core intermittently in the lengthwise direction thereof so as to intermittently bind Hager's optical fiber core 10 to the yarn 20. While Keller does teach the alternate use of either cycled (i.e.,intermittent) thermoset material such as a low viscosity elastomer or cycled fiber locks to bind an optical fiber to a buffer tube, Keller does not teach or suggest an optical fiber cable having buffer members composed of a long fiber longitudinally disposed or stranded around an optical fiber core wherein the buffer members and the optical fiber core are adhered together intermittently in the lengthwise direction, and an outer covering surrounding the buffer members.

Since the applied prior art is not suggestive of the claimed subject matter for the reasons set forth above, the decision of the examiner to reject claims 1 to 8 under 35 U.S.C. § 103 is reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1 to 8 under 35 U.S.C. § 103 is reversed.

REVERSED

LAWRENCE J. STAAB
Administrative Patent Judge

JOHN P. McQUADE
Administrative Patent Judge

JEFFREY V. NASE
Administrative Patent Judge

BOARD OF PATENT APPEALS AND INTERFERENCES

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