UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIRIL A. PANDELISEV

Appeal 2007-0927
Application 09/881,104
Technology Center 2800

Decided: May 19, 2008

Before KENNETH W. HAIRSTON, JOHN C. MARTIN, and JEAN R. HOMERE, *Administrative Patent Judges.*

MARTIN*, Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's Final Action rejecting claims 1-8, 10-12, 15, 23-32, 34-41, 43-45, 48, 55-63, 65, 66, and 148-53 under 35 U.S.C. § 112 and/or § 103(a). Claims 9, 13, 14, 16-22, 33, 42, 46, 47, 49-54, 64, 67-147, and 154-77 have been withdrawn from consideration as directed to

nonelected species (Final Action 2, as amended at Answer 2 to indicate that claim 48 has not been withdrawn from consideration). No claims have been canceled.

We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

A. Appellant's invention

Appellant explains that scintillator detectors are used in a wide range of environments for detecting events and rays, particularly gamma rays (Specification 1:5-7). In down-hole detectors, for example, detection of gamma rays is used to determine geologic structures (*id*. at 1:7-8). Gamma camera plates are used in medical applications for imaging and inspecting and anywhere that Computer Aided Tomography (CAT) scans are used (*id*. at 1:8-11).

Appellant's invention is a scintillator apparatus that uses optical fibers to couple photons from a scintillator body to a photoactive device or detector, such as a photodiode (*id*. at 1:14-19). The Specification describes using the scintillator apparatus in various applications, including down-hole detection of radiation in drilled wells or exploration holes (Specification 2:4-7) and medical examination of a patient (*id*. at 18:4-5).

Appellant's Figure 1 is reproduced below.

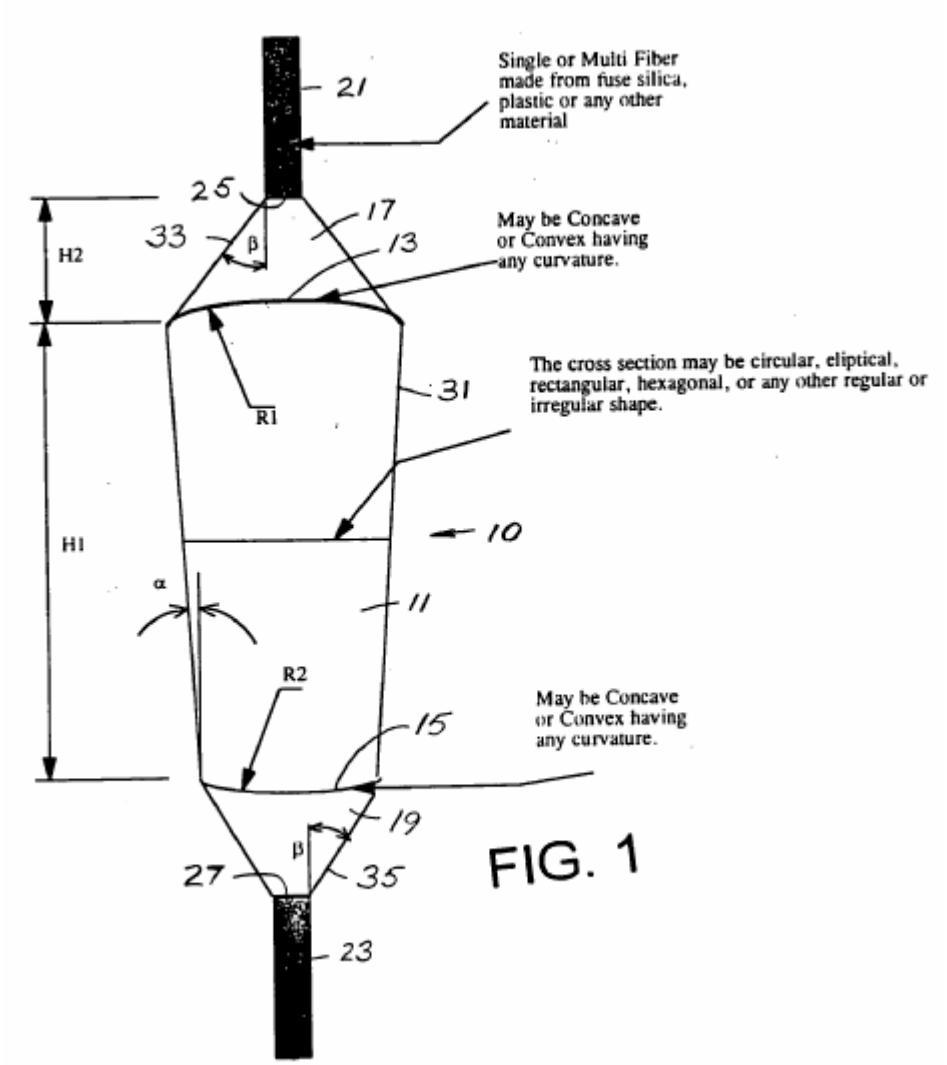

FIG. 1

Figure 1 shows a scintillator having multiple fiber connections (*id*. at 6:8-9).

As shown in this figure, the scintillator detector 10 has a body 11 (*id*. at 8:18-19), which is preferably a doped crystal that produces photons upon being energized by particles, energy, or rays, especially gamma rays (*id*. at 1:23-25). The scintillator body is a generally truncated conical body with a sidewall 31 that has a sidewall

angle α for assisting in directing the photons generated by internal scintillations toward the spheroidal lens-like ends 13 and 15 of body 11 (*id*. at 8:19-22). The concave or convex lens surface ends 13 and 15 cooperate with collimators 17 and 19, which direct photons that are generated in the scintillator 10 to optical fibers 21 and 23, each of which may comprise one or more fibers (*id*. at 8:22 to 9:2).[1] The claim term "optical coupler" appears to refer to either one of the collimators.

Referring to Figure 2 (not reproduced below), the Specification states that "the optical couplers 13 and 15 [sic -- 17 and 19] may be formed with lenses 37 and 39, which reflect and focus the photons from scintillator body 11 to the ends 25 and 27 of the single or multiple optical fibers" (*id*. at 10:8-11).

B. The claims[2]

The independent claims before us are apparatus claim 1 and method claim 34, of which claim 1 reads:

> 1. Fiber optic enhanced scintillator apparatus, comprising a scintillator for producing photons upon being energized by particles, energy or rays, the scintillator further comprising a scintillator body made of scintillator material, surfaces on the body for directing photons toward a photon output for receiving and conducting the photons produced by the scintillator, and a plurality of light-conducting distinct and elongated optical fibers having a proximal and

[1] Numerals 13 and 15 are also used to refer to the collimator surfaces that receive light from the scintillator body. *See* Specification 9:23-24.

[2] With the exception of claim 48, which is reproduced later in this opinion, the claims as reproduced herein are from the Claims Appendix to the Brief.

a distal end, and wherein the proximal end of each fiber is optically coupled to the photon output.

C. The prior art

The references identified in the statements of rejection are:

Meisner et al. (Meisner)	US 4,904,865	Feb. 27, 1990
Attix	US 5,006,714	Apr. 9, 1991
Bourdinaud et al. (Bourdinaud)	US 5,103,099	Apr. 7, 1992
Reed	US 5,313,065	May 17, 1994
Inaba et al. (Inaba)	US 5,331,961	Jul. 26, 1994
Kaufman	US 2002/0087079 A1	Jul. 4, 2002

The Examiner additionally relies on the following patents:

Terada et al. (Terada)	US 5,434,415	Jul. 18, 1995
Conde et al. (Conde)	US 6,453,090 B1	Sep. 17, 2002

D. The rejections

The rejections are as follows:

1. Claims 148-50, 152, and 153 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.[3]

2. Claims 3, 4, 55-63, 148, 151, and 152 stand rejected under 35 U.S.C. § 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which Appellant regards as his invention.

[3] This ground of rejection is incorrectly identified at page 3 of the Final Action as additionally applying to claims 133-47, 154-61, 167, 168, 170-75, and 177, which are among the claims that have been withdrawn from consideration.

3. The following claims are rejected under 35 U.S.C. § 103(a) for obviousness over the following references:

(a) Claims 1-6, 10-12, 34-39, 43-45, 65, 66, 148 and 153 -- Reed in view of Attix;

(b) Claims 7-8, 40-41 and 149-50 -- Reed in view of Attix and Bourdinaud;

(c) Claims 15 and 48 -- Reed in view of Attix, Bourdinaud, and Meisner;

(d) Claims 23 and 24 -- Reed in view of Attix and Inaba;

(e) Claims 25-27 -- Reed in view of Attix, Inaba, and Kaufman; and

(f) Claims 28-32 -- Reed in view of Attix, Inaba, Kaufman, and Bourdinaud.

THE ISSUE

The issue is whether Appellant has shown reversible error by the Examiner in maintaining the rejections.[4]

THE WRITTEN DESCRIPTION SUPPORT REJECTION

Claim 148 reads as follows:

> 148. The apparatus of claim 1, wherein the scintillator is ruggedized for use far below an earth surface, wherein the optical

[4] Appellant has the burden on appeal to the Board to point out the errors in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

> fibers extend from the scintillator below the earth's surface to the detector which is mounted below the earth's surface and at a depth that minimizes the mechanical shock and a the [sic] temperature effects on the photosensor.

Claim 153 is identical except for depending on claim 34.

Because the recited "detector" is connected to the recited "scintillator" by the optical fibers, it is clear that the "detector" corresponds to the recited "photosensor" rather than to the scintillator. Appellant does not contend otherwise.

The Examiner found that the application as filed describes down-hole scintillators but not down-hole detectors (Answer 7, 13). Appellant responded by arguing that "[i]t is clear in the application that the Applicant is referring to down-hole deep oil well ruggedized scintillators for use while drilling. For example, see page 13, lines 13 - 20." Br. 15. This argument is unconvincing because it is directed to the claimed down-hole scintillator, the support for which the Examiner does not question, rather than the claimed down-hole detector (i.e., photosensor), whose support the Examiner does question. Nor do the Specification lines cited by Appellant persuade us of error in the Examiner's position. Those lines read:

> Each of the plurality of independent scintillators is coupled with one or more optical sensors embodied in an oil well logging, logging-while-drilling, or other configuration where the scintillator sensitivity, accuracy and viability are required, and the working conditions are rough and can cause sensor damage and inherent signal degradation in less rugged sensors. The combined scintillators are made to be flexible. Flexible plastic scintillators may be used as crystal encasements 99.

Specification 13:13-20. The description of the scintillators as "coupled with one or more optical sensors embodied in an oil well logging, logging-while-drilling, or

other configuration" does not mean that all of the components of the configuration, including the optical sensors, are located underground. Furthermore, assuming that the explanation that "working conditions are rough and can cause sensor damage and inherent signal degradation in less rugged sensors" suggests that an optical sensor can be ruggedized, it does not further suggest positioning a ruggedized optical sensor underground.

We are therefore affirming the rejection of claims 148 and 153.

The Examiner also found that there is no support for claims 149, 150, and 152. Claim 149 reads:

> The apparatus of claim 5, where the optical coupler possesses special optical properties and can modify the light wavelength emitted from the scintillator to better match the photosensor.

Claim 150 is an exact copy of claim 149 and claim 152 is identical except for being dependent on claim 151.

In response to Appellant's argument that "optical couplers 33 and 35 are described on page 10 and on the next to bottom line of page 9 and are materials that connect optical devices, such as the scintillators to the fibers" (Br. 15), the Examiner correctly held (Answer 13-14) that the cited passages make no mention of wavelength modification.

We are therefore also affirming the § 112, ¶ 1 written description rejection of claims 149, 150, and 152.

THE INDEFINITENESS REJECTION

The Examiner rejected claim 3 under § 112, ¶ 2 due to the indefiniteness of the term "long" in the phrase "wherein the optical fibers are long for reducing dark current" (Answer 4). When a word of degree is used, it is necessary to determine whether the Specification provides some standard for measuring that degree. *Seattle Box Co. v. Industrial Crating & Packing, Inc*., 731 F.2d 818, 826 (Fed. Cir. 1984). Appellant contends (Br. 16) that the meaning of "long" is clear from the recited function of reducing dark current, which is also the function attributed to the use of long optical fibers at page 9, lines 13-17 of the Specification. We agree and conclude that the claim is broad enough to read on using any fiber length that results in at least some reduction in the amount of dark current reduction. The rejection of claim 3 is therefore reversed.

Claim 4 reads:

> 4. The apparatus of claim 1, wherein the scintillator is ruggedized for use far below an earth surface, wherein the optical fibers extend from the scintillator far below the earth's surface to the detector which is mounted above the earth's surface.

Claim 148 recites similar limitations. The Examiner rejected these claims as indefinite because the Specification does not indicate how one is to determine whether a particular construction can be characterized as "ruggedized" or what is meant by "far below" an earth surface. We agree that "far below" is indefinite because neither the Specification nor the claim explains how to distinguish between "below" and "far below." For this reason, we are affirming the rejection of claims 4 and 148. However, we are not persuaded that the term "ruggedized" in these claims adds any further indefiniteness. Assuming for the sake of argument

that "far below" is definite, the phrase "ruggedized for use far below an earth surface" would have been be understood to mean rugged enough to be capable of use "far below an earth surface."[5]

Turning now to claim 55, the Examiner contends (Answer 4-5) that the alternative language "the single or multiple optical fibers" in that claim (and thus in dependent claims 56-63) is indefinite because it lacks a sufficient antecedent basis in parent claim 34, which recites "multiple light-conducting optical fibers" without mentioning a single-fiber alternative. Claims 34 and 55 read as follows (our emphasis):

> 34. Fiber optic enhanced scintillator method, comprising providing a scintillator body made of scintillator material, providing surfaces on the body for directing photons toward a photon output, *providing multiple light-conducting optical fibers* having proximal and distal ends, connecting proximal ends of the optical fibers to the output for receiving photons from the output, and producing photons upon a scintillator being energized by subatomic particles, energy or rays.
>
> 55. The method of claim 34, further comprising providing plural individual scintillator bodies, providing a holder connected to the scintillator bodies, holding the plural scintillator bodies in an array, and *connecting proximal ends of the single or multiple optical fibers to each of the plural individual scintillator bodies*.

Claim 55's alternative language "single or multiple optical fibers" had a clear antecedent basis in originally filed claim 34, which similarly recited "single or multiple light-conducting optical fibers." However, claim 34 was amended to

[5] As explained below in the discussion of the prior art, Reed discloses a
(Continued on next page.)

delete the single-fiber alternative in order to avoid anticipation by Reed. *See* Response filed June 16, 2003, at 9 and 41. In the Answer, the Examiner explained that the absence of a clear antecedent in claim 34 for "the single" optical fiber recited in claim 55 makes it unclear whether the recitation of "the single" optical fiber in claim 55 is intended to mean (a) that each and every fiber of the antecedent plurality of fibers is connected to each and every scintillator, or (b) that a single fiber of the antecedent plurality of fibers is individually connected to only one of a plurality of scintillators such that each single fiber is connected to a single scintillator (Answer 16, 17). This position, which strikes us as a reasonable one, is not addressed in the Brief or in the Reply Brief, which simply states with respect to all of the rejections that "[t]he Applicant reiterates and repeats the arguments made in the Applicant's Appeal Brief dated May 5, 2005" (Reply Br. 1).

We are therefore affirming the rejection of claims 55-63.

Claim 151 ("The apparatus of claim 24, wherein a space between the detectors is filled with an elastomer.") depends on claim 24 (reciting micro lenses), which depends on claim 23 (requiring plural scintillator bodies), which depends on claim 1. None of the claims on which claim 151 depends recites a detector or detectors.

The Examiner explained that "claims 1, 23 and 24, from which claim 151 depends, while providing some antecedent basis for multiple scintillator bodies (perhaps suggesting the possibility of a space between the scintillators), does

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"rugged" scintillator intended for down-hole use.

not provide any antecedent basis for any detector, never mind 'a space between detectors.'" Answer 5. Appellant argues that "[c]laim l is a fiber optic enhanced scintillator apparatus where photons are directed out and then received and conducted. The detectors are associated with the receiving apparatus." Br. 17.

We agree with the Examiner that the lack of a clear antecedent makes the meaning of "detectors" in claim 151 unclear. It is unclear whether "detectors" refers to the plural scintillator bodies required by claim 23, which can be used to detect gamma radiation, or to optical sensors for detecting photons transmitted by the optical fibers. We are therefore affirming the rejection of claim 151 and its dependent claim 152, which does not resolve this ambiguity.

Summarizing, the indefiniteness rejection is reversed with respect to claim 3 and affirmed with respect to claims 4, 55-63, 148, 151, and 152.

OBVIOUSNESS -- REED IN VIEW OF ATTIX

We begin our obviousness analysis by agreeing with Appellant that "[a] person having ordinary skill in the art is an artisan being taught the reference teachings" (Br. 50). *See In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978) ("the PTO usually must evaluate both the scope and content of the prior art and the level of ordinary skill solely on the cold words of the literature").

Reed, which is the primary reference in all of the obviousness rejections, relates in general to the monitoring of nuclear waste and more particularly discloses radiation detectors using scintillating optical fibers (Reed, col. 1, ll. 6-8).

The disclosed radiation detectors are suitable for inclusion in a driven ground penetrator for detecting radiation underground (col. 1, l. 66 to col. 2, l. 3).

The Examiner primarily relies on Reed's first embodiment, which is depicted in Figure 1, reproduced below.

FIG. 1

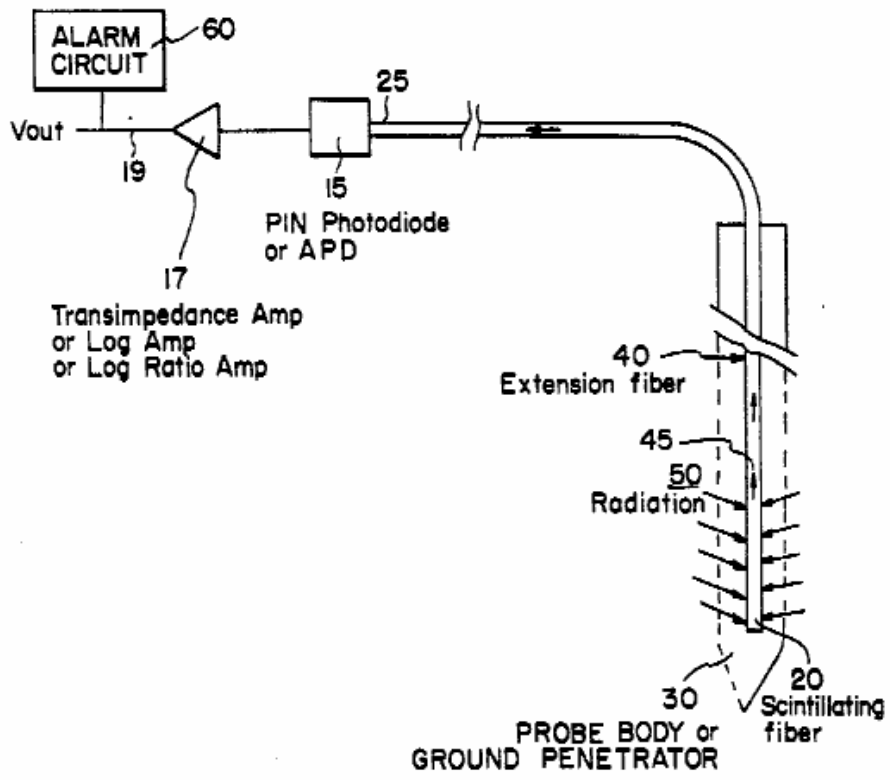

Figure 1 shows a ground-penetrating, fiber optic radiation monitor having a scintillating fiber 20 that is connected to a photodiode 15 by an extension fiber 40. Scintillating fiber 20, which is located entirely within the probe body 30, is joined to extension fiber 40 at a junction 45 inside the probe body by fusion or other

means (col. 1, ll. 50-51; col. 2, ll. 35-41). Dopants in scintillating fiber 20 emit visible light in response to radiation 50 (col. 2, ll. 48-50). Photodiode 15 and other electronics are located above ground (col. 1, l. 50-53). Reed does not indicate that either one of fibers 20 and 40 can be implemented as a plurality of fibers.

Appellant does not dispute the Examiner's finding that Reed satisfies the claim 1 limitations other than having a "plurality of . . . optical fibers" connected to the scintillator body:

> *Reed* discloses a fiber optic enhanced scintillator apparatus (Figs. 1-4) comprising a scintillator body (20), surfaces on the body for directing photons toward a photon output (45) for receiving and conducting the photons produced by the scintillator; and an elongated light conducting optical fiber (40) with a proximal end connected to the photon output (45).

Answer 5.

For a teaching of replacing Reed's single extension fiber 40 with a plurality of optical fibers, the Examiner relies on Attix, which discloses scintillator dosimetry probes for analyzing the spatial distribution of radiation therapy application equipment (Attix, col. 1, ll. 5-7). Figure 1 of Attix is reproduced below:

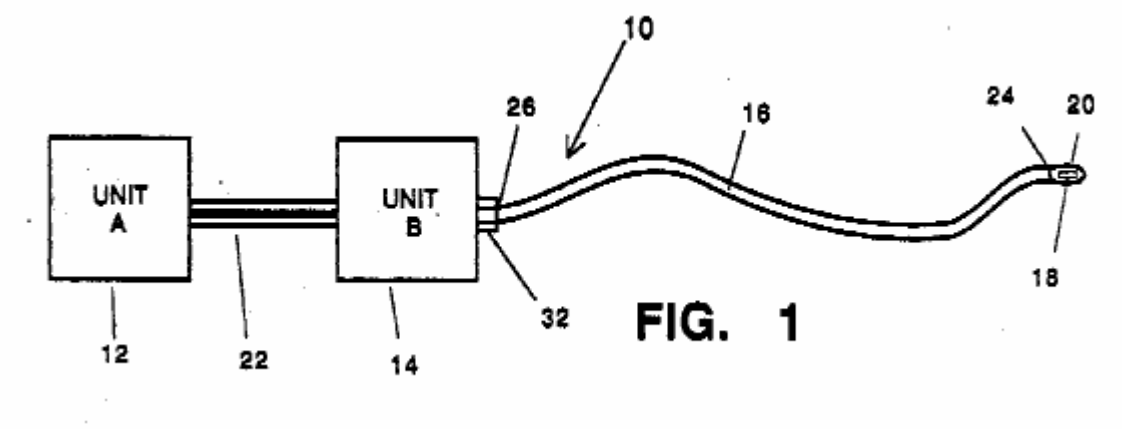

FIG. 1

Figure 1 shows a scintillator dosimetry probe 10 comprising a base unit 12, an optical-to-electrical conversion unit 14, a flexible small-diameter light pipe 16, a scintillator 18, and a scintillator enclosure 20 (col. 3, ll.15-18). Attix explains that "[t]he light pipe **16** is comprised of a single fiber or a bundle of fibers **34** enclosed in an opaque sheath or sheaths **36**, according to usual fiber-optic design practice" (col. 3, ll. 64-67). The Examiner characterizes Attix as "recogniz[ing] the equivalence and interchangeability of a bundle of fibers with a single fiber" (Answer 19) and further explains that

> [a]s is generally known to those skilled in the art, fiber bundles are generally more flexible than the equivalent single fiber arrangement. Additionally, bundles are often more reliable than single fibers because while a defect or break in a single fiber arrangement can result in complete failure, a defect or break in one or only a few fibers in a fiber bundle may results in only a slight or even unnoticeable reduction in performance.

Id. at 20. Appellant does not deny that using a plurality of optical fibers rather than a single optical fiber was known to offer the advantages cited by the Examiner.

The Examiner's position that these known advantages would have provided motivation for replacing Reed's single extension fiber with a plurality of optical fibers comports with the principle that the motivation to combine or modify reference teachings can be based on common knowledge or common sense rather coming from the references themselves. *See KSR Int'l. Co. v. Teleflex, Inc*., 127 S. Ct. 1727, 1741 (2007) ("the [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ"). Thus,

> [r]igid preventative rules that deny factfinders recourse to common sense . . are neither necessary under our case law nor consistent with it.
>
> We note the Court of Appeals has since elaborated a broader conception of the TSM [teaching, suggestion, motivation] test than was applied in the instant matter. *See*, *e.g*., *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (2006) ("Our suggestion test is in actuality quite flexible and not only permits, but *requires,* consideration of common knowledge and common sense"); *Alza Corp. v. Mylan Labs., Inc*., 464 F.3d 1286, 1291 (2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . .").

KSR, 127 S. Ct. at 1742-43. More particularly, *Dystar* held that

> an implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when the "improvement" is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient.

Dystar, 464 F.3d at 1368. *See also Leapfrog Enter., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (holding it "obvious to combine the Bevan device with the SSR to update it using modern electronic components in order to gain the commonly understood benefits of such adaptation, such as decreased size, increased reliability, simplified operation, and reduced cost").

Furthermore, a reference may be understood by the artisan to be suggesting a solution to a problem that the reference does not discuss. As explained in *KSR*:

> The second error of the Court of Appeals lay in its assumption that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem. . . . Common sense teaches . . . that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents
> together like pieces of a puzzle. . . . A person of ordinary skill is also a person of ordinary creativity, not an automaton."

127 S. Ct. at 1742.

Appellant argues that replacing Reed's single optical fiber with plural fibers "will do harm to the Reed device, because Reed expressly teaches a single fiber for conducting light" (Br. 20) and notes that "Reed has an extension fiber 40 and several sections of the scintillating fiber 20 with dichroic mirrors 22 disposed between each individual dichroic mirror" (*id*.), structure that appears in Reed's second embodiment, depicted in Figures 2 and 3.[6] Appellant also cites *In re*

[6] Reed's second embodiment is addressed in detail *infra* in the discussion of the rejection of claim 23 for obviousness over Reed in view of Attix and Inaba.

Gordon, 733 F.2d 900, 902 (Fed. Cir. 1984) for the proposition that a proposed modification of a reference is inappropriate if it would render the reference inoperable for its intended purpose.

These arguments are unconvincing for two reasons. First, as noted by the Examiner (Answer 19:1-2), Reed's Figure 1 embodiment, on which the rejection of claim 1 is based, does not employ dichroic mirrors or separate sections of scintillating fiber 20. Second, Appellant has not explained, and it is not otherwise apparent, why replacing the single extension fiber 40 in Reed's Figure 1 embodiment or second embodiment with a bundle of optical fibers would have been expected to adversely affect operation of either embodiment.

We are therefore affirming the rejection of claim 1 and also of independent claim 34, which recites the limitations of apparatus claim 1 in method form, for obviousness over Reed in view of Attix.

The rejection of dependent claims 2 and 35, which recite a photon detector connected to the distal end of each of the optical fibers, is also affirmed. The recited detector reads on Reed's photodiode 15.

The rejection of claims 3 and 36, which specify that the fibers are long enough to reduce dark current, is affirmed. We agree with the Examiner (Answer 21-22) that Reed's optical fibers when used to connect a down-hole scintillator to an above-ground photon detector will inherently be long enough to cause at least some reduction in dark current.

The rejection of claims 4 and 37, which specify that the scintillator is "ruggedized" for use "far below" an earth surface, is also affirmed.[7] The "ruggedized" limitation is satisfied by Reed's description of his invention as "inherently simple, rugged and reliable" (col. 1, ll. 65-67). The "far below" limitation would appear to be broad enough to read on using the scintillator in a driven ground penetrator in order to reach underground locations that were previously reached by drilling wells (Reed, col. 1, l. 66 to col. 2, l. 3).

Claims 148 and 153, in addition to specifying that the scintillator is "ruggedized" and located "far below" the earth's surface, call for the detector to be "mounted below the earth's surface and at a depth that minimizes the mechanical shock and a the [sic] temperature effects on the photosensor."[8] The Examiner held that

> [a]lthough *Reed* does not specifically disclose that the detector is located below the earth's surface, absent some degree of criticality, such particular location would have been a matter of routine design choice within the skill of a person of ordinary skill in the art depending on the needs of the particular application.

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[7] Of these two claims, the Examiner rejected only claim 4 under § 112, ¶ 2 for indefiniteness, which rejection we have affirmed. Had the Examiner rejected both claims for indefiniteness, we would have summarily reversed the § 103(a) rejection of both claims pursuant to *In re Steele*, 305 F.2d 859, 862-63 (CCPA 1962) (reversing § 103 rejection for being based on considerable speculation as to meaning of terms of claims and assumptions as to their scope).

[8] For the reasons given above, we have affirmed the § 112, ¶ 1 written description rejection of these claims.

Answer 7. Pages 28-30 of the Answer provide more detailed reasoning in support of the rejection, including that

> it is not unexpected that locations below ground (particularly relatively shallow locations) would be less hostile than relatively deeper locations because it is generally well known in the art that the hostility of the environment generally increases (i.e., more extreme temperature and pressure) the deeper the location. The examiner also notes that those skilled in the art appreciate that it is not unexpected that locations slightly below the ground may be less hostile than above ground locations as well since such locations are less susceptible to the effects of weather (i.e., sun, wind, rain, snow, etc) as well damage from traffic, predators and vandals.

Id. at 29-30.

Appellant's response that the recited detector location "is not a mere design choice" (Br. 28) fails to satisfy Appellant's burden to demonstrate error in the Examiner's reasoning. We are therefore affirming the rejection of claims 148 and 153.

Claims 5 and 38 recite an optical coupler between the scintillator body and the optical output, while claims 6 and 39 further specify that the optical coupler comprises an array of micro lenses. The Examiner held that "the use of optical couplings, including micro lenses, are [sic] well known" (Final Action 6), citing Conde and Terada as support (*id*. at 13). At page 23 of the Answer, the Examiner specifically directs Appellant's attention to Conde's column 4, line 65 to column 5, line 4, and column 6, lines 33-42 and to Terada's Figure 14 and column 2, lines 32-39. The cited passage in Terada describes using microlenses to optically couple the ends of fluorescent optical fibers 14a-14c to the respective ends of transmission

optical fibers 15a-15c. Appellant has not even acknowledged the Examiner's reliance on Conde and Terada, let alone demonstrated any error in the Examiner's position. Instead, Appellant states as to each of claims 5, 6, 38, and 39 only that "[n]othing in the references teaches, suggests or motivates one of ordinary skill in the art to combine the references in the manner proposed by the Examiner" (Br. 22). The rejection of those claims is therefore affirmed.

Claims 10, 43, and 65 recite an electronic cooler connected to the detector, while claims 11, 12, 44, 45, and 66 recite magnetic field shielding for shielding the detector or for shielding the detector and the cooler. The Examiner held that such cooling and shielding are well known in the art (Answer 7) without identifying any supporting reference. Although Appellant previously requested withdrawal of all rejections that are based on allegedly well-known practices (*see* February 3, 2004, Response at 42), that request did not include a denial that those practices were well known, as is necessary to shift the burden to the Examiner to provide evidentiary support. *See* Manual of Patent Examining Procedure § 2144.03 (8th ed., rev. 6, Sept. 2007) ("To adequately traverse such a finding, an applicant must specifically point out the supposed errors in the examiner's action, which would include stating why the noticed fact is not considered to be common knowledge or well-known in the art."). Furthermore, the failure of Appellant's Specification to provide any details about the electronic coolers 53 and magnetic shields 55 reflects a belief by Appellant that such details were known in the art. We are therefore affirming the rejection of claims 10-12, 43-45, 65, and 66.

In summary, we are affirming the obviousness rejection based on Reed in view of Attix with respect to all of the claims rejected on that ground, i.e., claims 1-6, 10-12, 34-39, 43-45, 65, 66, 148, and 153.

OBVIOUSNESS -- REED
IN VIEW OF ATTIX AND BOURDINAUD

Claim 7 reads:

> 7. The apparatus of claim 6, further comprising a second optical coupler connected to the scintillator body remote from the first optical coupler, and a second array of micro lenses in the second optical coupler for directing photons from a second part of the scintillator body to a second output, and further comprising second multiple optical fibers connected to the second output.

As noted above in the discussion of claim 1, the recited "scintillator body" reads on Reed's scintillating optical fiber 20, while the recited "plurality of . . . optical fibers" reads on extension fiber 40 when implemented as a plurality of fibers. As evidence of the obviousness of further modifying Reed in a way that satisfies claim 7, the Examiner cites Bourdinaud, which discloses linear radiation detectors that employ a thin plate of scintillating material and plurality of fluorescing optical fibers (col. 2, lines 9-19). A number of embodiments are disclosed, of which the first embodiment is depicted in Figure 1, reproduced below.

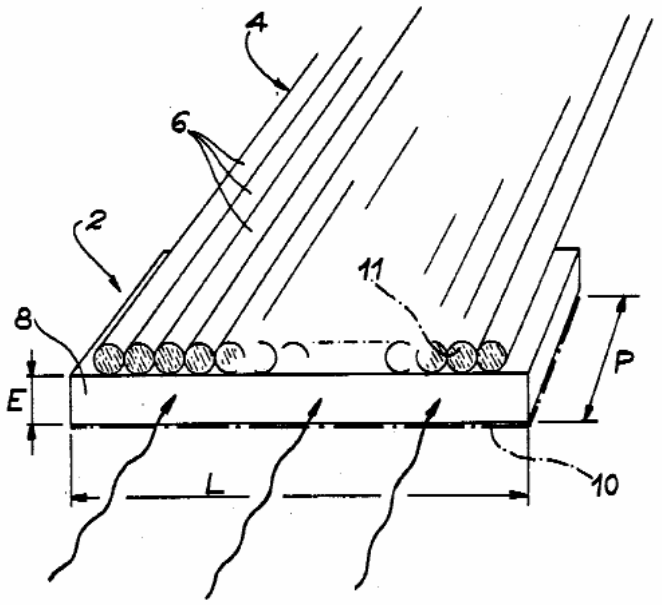

FIG. 1

Figure 1 shows a linear detector that includes a thin plate 2 of scintillating material for emitting visible light in response to radiation (col. 4, ll. 23-26) received through the plate's narrow edge surface 8 (col. 4, ll. 44-45), which is shown as a side surface in Figure 1. Lying side-by-side on the top surface of the plate and attached thereto are a plurality of fluorescent optical fibers 4, which are excited by the visible light emitted by the scintillating material in response to any radiation (col. 4, ll. 27-39). The other ends of the fibers terminate at an image intensifier and a charge transfer device, neither of which is shown in Figure 1 (col. 5, ll. 57-65). Because the detection device is of the linear type, scanning means are necessary to reconstitute an image in two dimensions (col. 6, ll. 13-15).

Bourdinaud's Figure 4 is reproduced blow.

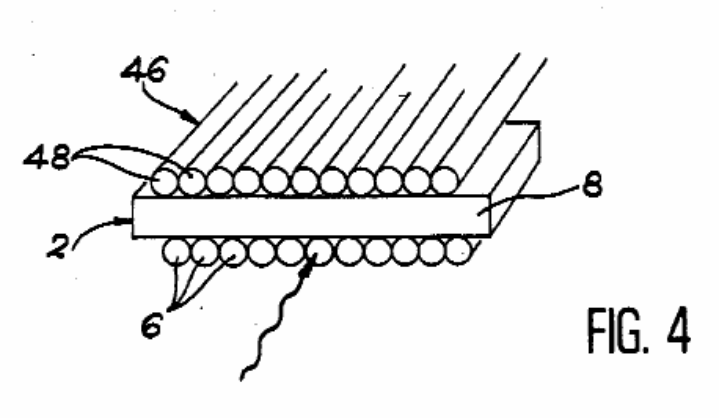

FIG. 4

Figure 4 shows another embodiment of a linear detector. This embodiment has sets of fluorescent optical fibers (6, 46) located on the top and bottom surfaces of the plate. The axes of fibers in set 6 are offset from the axes of the fibers in set 46 in order to improve the spatial resolution of the linear detector (col. 7, ll. 2-6).

According to the Examiner,

> it would have been an obvious design choice within the skill of a person of ordinary skill in the art to modify the apparatus suggested by *Reed* to further include the use of a second optical coupler connected to the scintillator body in view of the known functionally equivalent arrangements suggested by *Bourdinaud*.

Answer 8. Specifically, the Examiner found that Bourdinaud teaches the equivalence of (a) coupling one fiber bundle to one side of a scintillator body and (b) coupling fiber bundles to both sides of a scintillator body (Answer 31-32). In so finding, the Examiner further explained that this teaching of equivalence is not limited to optical fibers of the fluorescent type. *See* Answer 33 ("one skilled in the art would readily understand that the coupling of two bundles to a single body and the use of fluorescing fibers are independent limitations, and not mutually

dependent."). Further, the Examiner "notes that . . . at least one benefit of collecting light from multiple surfaces of a scintillator body is to allow for increased light collection efficiency . . . ." Answer 32.[9]

Appellant responded with the following two arguments:

> [1] Bourdinaud and Reed would have been mutually exclusive because Bourdinaud uses fluorescing cores in fibers to auto-generate wavelengths after a thin scintillator plate receives radiation at its end. Nothing in Bourdinaud would have suggested combination with Reed.
>
> [2] Even if the references were so combined, both of the references lead away from the invention as specifically set forth in the claims. Bourdinaud's fluorescent fibers, excited by light from one side of the scintillator plate, have nothing to do with Reed or Attix or with the present invention.

Br. 31. The first argument is unconvincing because it fails to address the Examiner's obviousness rationale, which treats Bourdinaud's teaching of the equivalence of using one or two fiber bundles as not limited to optical fibers of the fluorescing type. The second argument is unpersuasive because it is not understood.

The rejection of claim 7 is therefore affirmed.

The rejection of claim 8, which depends on claim 7, is affirmed because its merits are not separately argued. Appellant's summary of what the claim recites

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[9] The Examiner's reliance on *In re Harza*, 274 F.2d 669 (CCPA 1960) for the *per se* rule that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced (Answer 31) is not persuasive. *See In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) ("reliance on *per se* rules of obviousness is legally incorrect and must cease").

and assertion that the claimed subject matter would have been unobvious over the references do not constitute a separate argument for patentability. 37 C.F.R. § 41.37(c)(1)(vii) (2007) (last sentence).

The rejection of method claims 40 and 41 is affirmed because they are similar to apparatus claims 7 and 8, respectively.

Claim 149 and identical claim 150 specify that "the optical coupler possesses special optical properties and can modify the light wavelength emitted from the scintillator to better match the photosensor."[10] The Examiner argues that this is well known and a matter of routine design choice (Answer 9). The rejection of these claims is affirmed because their merits are not separately argued. Instead, Appellant simply asserts that "[t]his is not obvious from Reed, Attix, Bourdinaud or any combination thereof. Nothing in the references teaches, suggests or motivates one of ordinary skill in the art to combine the references in the manner proposed by the Examiner." Br. 32.

In summary, the obviousness rejection based on Reed in view of Attix and Bourdinaud is affirmed with respect to all of the claims rejected on that ground, i.e., claims 7, 8, 40, 41, 149, and 150.

OBVIOUSNESS – REED IN VIEW OF
ATTIX, BOURDINAUD, AND MEISNER

[10] We have affirmed the § 112, ¶ 1 rejection of these claims for lacking descriptive support.

Claim 15 differs from claim 7, addressed *supra*, by reciting elastomeric optical couplers:

> 15. The apparatus of claim 1, further comprising a second output and first and second elastomeric optical coupler bodies connected to the scintillator body at different portions thereof for delivering photons from the scintillator body to the outputs, and for cushioning vibrations and impacts encountered by the scintillator.

Claim 48[11] recites similar limitations in method form:

> 48. The method of claim 34, further comprising providing elastomeric optical coupler bodies and photon outputs on the scintillator body at opposite portions thereof, delivering photons from the scintillator body to outputs, and cushioning vibrations and impacts encountered by the scintillator with the elastomeric optical coupler bodies.

Meisner discloses a drill collar that includes two scintillators and two photomultiplier tubes (col. 2, ll. 26-33). Meisner's Figure 2 is reproduced below.

[11] This claim, which does not appear in the Claims Appendix to the Brief, was added by the Amendment filed June 16, 2003, and has not been amended.

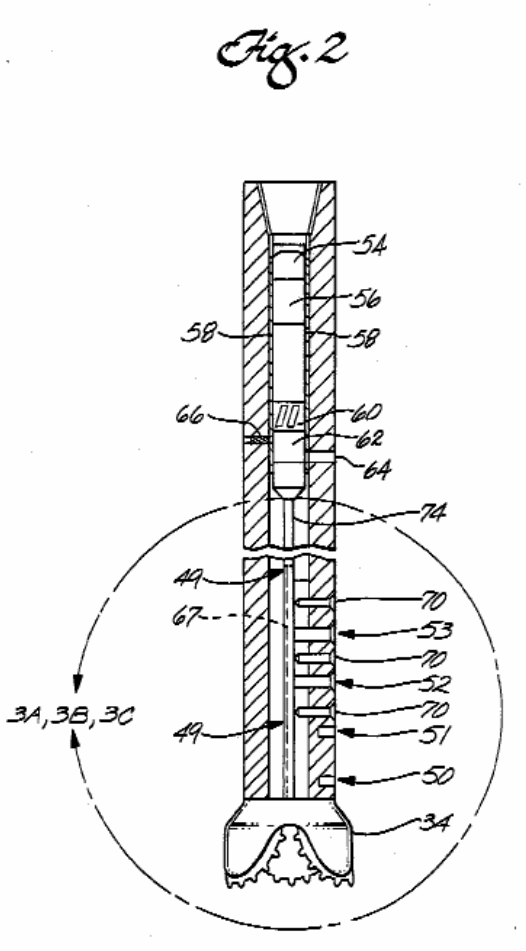

Figure 2 is a longitudinal section of the logging portion of the drill collar at the lower end of the drill string (col. 3, ll. 40-41). The drill collar includes lower scintillator 52 and an upper scintillator 53 (col. 4, ll. 14-15).

Figure 4 is reproduced below.

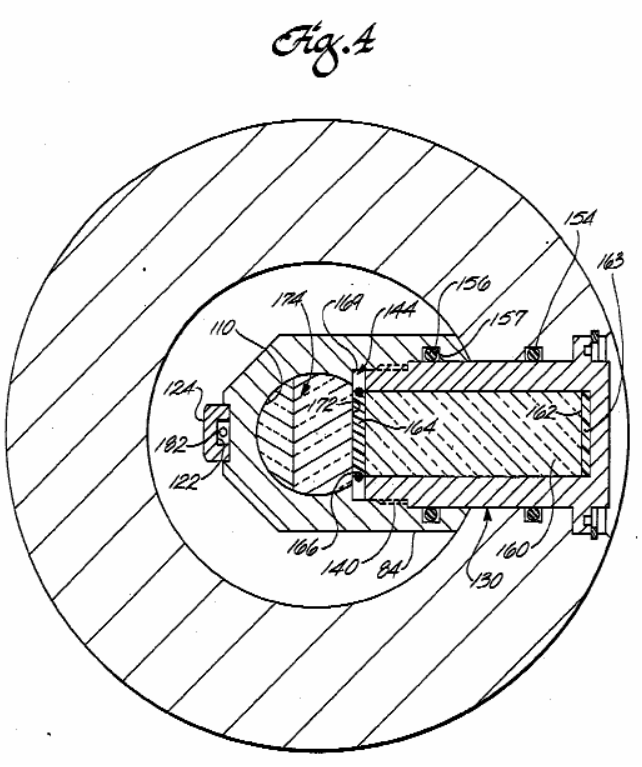

Figure 4 is a cross-sectional view taken through lower scintillator 52. Referring to this figure, the Examiner explained that

> [r]egarding the use of an elastomeric coupling, *Meisner* discloses (Fig. 4) a scintillator apparatus for use in below ground applications including a scintillator body (160) and an elastomeric optical coupler (164), which additionally functions as a shock absorber (col. 6, lines 26-27).

Answer 9. Specifically, elastomeric optical coupler 164 is positioned between the scintillator crystal (unnumbered) and the entrance face of prism 174, which reflects light from the scintillator crystal into a photomultiplier tube 178 (col. 6, ll. 32-37).

Thus, Meisner does not employ optical fibers to couple the scintillator crystals to the photomultiplier tubes.

The Examiner held that it would have been obvious to a person of ordinary skill in the art to further modify the apparatus suggested by Reed, Attix, and Bourdinaud so as to utilize elastomeric couplings in order to reduce the potential for damage caused by shock (Answer 9).

Appellant's argument that the number of references seems to be excessive (Br. 34) is unconvincing with respect to this claim and the other claims as to which this argument was made. *See In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991) ("The criterion . . . is not the number of references, but what they would have meant to a person of ordinary skill in the field of the invention.").

Appellant also argues that

> Meisner has a photomultiplier within the drill head and sends electrical signals to the surface. Meisner suggests placing a photomultiplier tube in the drill head. This is contrary to the Applicant's invention and would thus lead away from the invention, and would thus lead away from combination with the other references.

Br. 36. This argument is unconvincing because we are not persuaded that the artisan would have viewed Meisner's teaching of elastomeric optical couplers to be limited to coupling scintillators directly to photomultipliers.

The rejection of claims 15 and 48 for obviousness over Reed in view of Attix, Bourdinaud, and Meisner is therefore affirmed.

OBVIOUSNESS -- REED
IN VIEW OF ATTIX AND INABA

Claim 23 recites, *inter alia*, an additional scintillator body:

23. The apparatus of claim 1, wherein the scintillator further comprises at least one additional individual scintillator body wherein each additional body is comprised of scintillator material, surfaces for directing photons toward a photon output for receiving and conducting the photons produced by the scintillator, a plurality of light-conducting optical fibers wherein each fiber has a proximal and a distal end and wherein the proximal end of each fiber is optically coupled to the photon output, and a holder for holding the scintillator bodies in an array.

The rejection of this claim is based (Answer 10) on Reed's second embodiment, shown in Figure 2 and Figure 3, of which Figure 3 is reproduced below.

FIG. 3

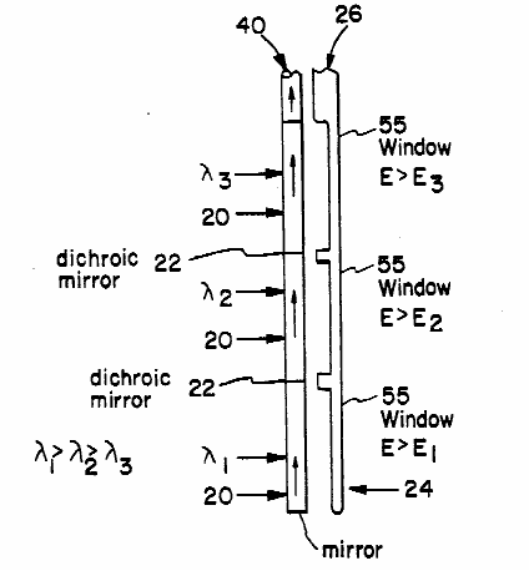

Figure 3 shows a probe for providing quantitative energy discrimination (col. 3, ll. 3-4). Three scintillating fibers 20, separated by dichroic mirrors 22, scintillate at different wavelengths λ_1, λ_2, and λ_3 (col. 3, ll. 4-6, and 14-15).

Selection of the radiation type and energy threshold for each fiber section 20 is accomplished by providing the probe with windows 55 that can be opened and closed such that when opened a selected radiation 50 enters the probe and contacts the corresponding section 20 (coll. 3, ll. 17-23). The light from all of the scintillating fibers 20 is transmitted through the extension fiber 40 to optoelectronics located at the surface, where, as shown in Figure 2, it is spectrally dispersed by a dispersive element 33 and each channel is measured individually by a plurality of detectors 15, amplifiers 17, and indicators 5 (col. 3, ll. 27-33).

The Examiner characterizes the scintillating fibers 20 in this embodiment as plural "scintillator bodies" that are coupled to the photodetectors by a single extension fiber 40 (Answer 10). For a teaching of providing each scintillator body with its own extension fiber (and thereby obviating the need for dichroic mirrors), the Examiner cites Inaba, which discloses a scintillation probe that is described as easily insertable into a fine tube within the body cavity of a living animal (col. 1, ll. 62-64).

Inaba's Figure 1 is reproduced below.

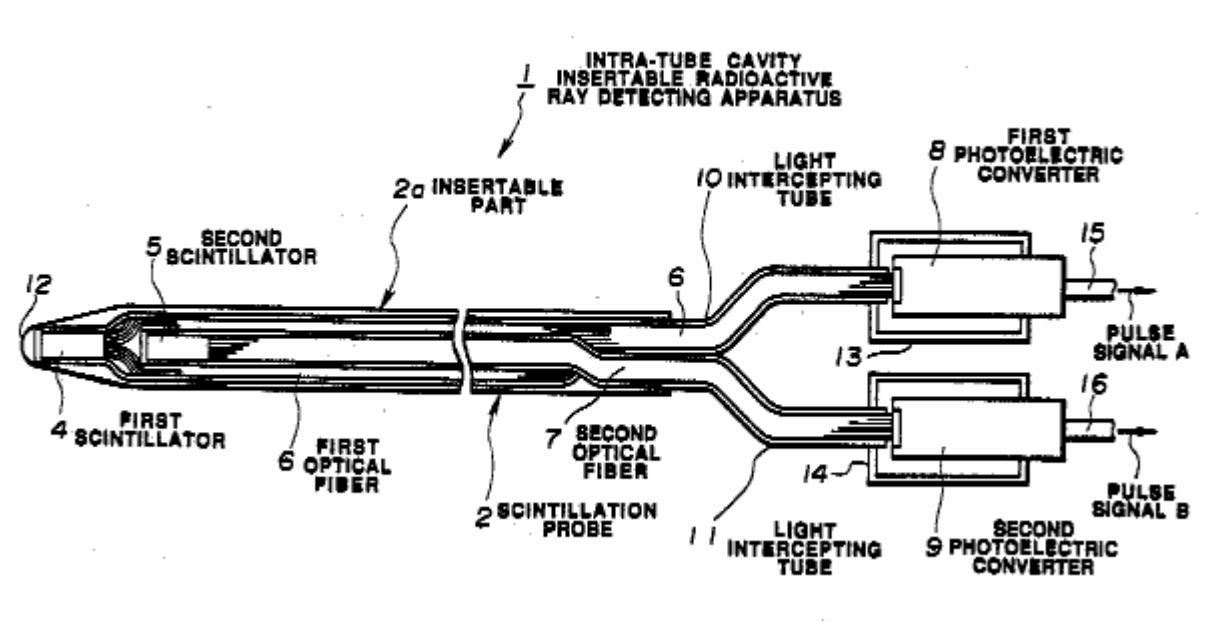

Figure 1 shows a scintillation probe that contains axially displaced first and second scintillators 4 and 5 coupled to photoelectric converters 8 and 9 by respective optical fibers 6 and 7. The Examiner's position is that the artisan would have recognized Inaba's optical coupling arrangement to be functionally equivalent to Reed's (Answer 10) and that it therefore would have been obvious to use separate extension fibers to connect each of Reed's scintillating fibers 20 to the respective photodetectors, with each extension fiber comprising a bundle of fibers. Appellant's argument that "Inaba's thin scintillator for use in a thin tube in an animal body cavity has no relation with Reed or Attix" (Br. 39) takes an unduly narrow view of Inaba's teachings and thus is not responsive to the rejection. The rejection of claim 23 is therefore affirmed.

The rejection of claim 24, which depends on claim 23 and recites micro lenses, is also affirmed. Appellant's argument that the claimed subject matter is

not taught by the prior art fails to address the Examiner's position that micro lenses were well known, in support of which finding he cited Conde and Terada.

OBVIOUSNESS –REED IN VIEW
OF ATTIX, INABA, AND KAUFMAN

Claims 25-27 further define the "holder" that is recited in claim 23 as holding the plural scintillator bodies in an array:

> 25. The apparatus of claim 24, wherein the holder is flexible.
>
> 26. The apparatus of claim 24, wherein the holder is resilient.
>
> 27. The apparatus of claim 24, wherein the holder is elongated and flexible and the plural scintillator bodies are arranged axially in the holder.

For these features the Examiner relies on Kaufman, which relates generally to medical devices and more particularly to a position-sensitive catheter having scintillation detectors (*see* title). The catheter bodies (e.g., 22 in Fig. 1) are described as typically being very flexible and suitable for introduction over a guidewire to a target site within the vasculature (Kaufman, para. 31). The Examiner's position is that "*Reed* teaches that typical prior art installations included introducing detection equipment into test wells" (Answer 11) and "[t]hose skilled in the art appreciate that often these well are not perfectly strait and a flexible probe would have the advantage of being easier to insert or withdraw." *Id*. at 11-12.

Appellant's argument that "Kaufman has a delay line 42 in the catheter head which sends electrical signals to a signal processor outside the catheter, and thus

would have lead away from the present invention even had it been combined with Reed" (Br. 43) is not responsive to the rationale of the rejection.

The rejection is therefore affirmed with respect to claims 25-27.

OBVIOUSNESS -- REED IN VIEW OF ATTIX, INABA, KAUFMAN, AND BOURDINAUD

Claims 28 and 30 read:

> 28. The apparatus of claim 23, further comprising a plurality of optical couplers provided on sides of the scintillator bodies, wherein each optical coupler couples the proximal end of an optical fiber to a scintillator body.
>
> 30. The apparatus of claim 23, wherein the scintillators are angularly related to an axial direction of the holder, and wherein the proximal end of each of the optical fibers is connected to at least one lateral edge of one of the scintillator bodies.

The Examiner relies on Bourdinaud for a teaching of optically coupling fibers to the sides of scintillator bodies, as shown in Figures 2-6 (Answer 12). Regarding the Examiner's reliance on this reference, Appellant (Br. 47-48) repeats the arguments made against the Examiner's reliance on that reference in the rejection of claim 7, which arguments are unconvincing for the reasons given in our discussion of that claim. The rejection of claims 28 and 30 is therefore affirmed.

The rejection of claims 29, 30, and 32 is affirmed because their merits are not separately argued. Instead, Appellant merely explains what these claims recite and asserts the unobviousness of the claimed subject matter over the prior art.

DECISION

The rejection under 35 U.S.C. § 112, ¶ 1, for lack of a written description is affirmed with respect to all of the claims rejected on that ground, i.e., claims 148-50, 152, and 153.

The rejection under § 112, ¶ 2, for indefiniteness is reversed with respect to claim 3 and affirmed with respect to claims 4, 55-63, 148, 151, and 152.

The rejections based on prior art are affirmed with respect to all of the claims rejected on those grounds, i.e., claims 1-8, 10-12, 15, 23-32, 34-41, 43-45, 48, 65, 66, 148-50, and 153.

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. §§ 41.50(f) and 41.52(b).

AFFIRMED

MAT

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