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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TETSUYA INOUE, MITSUNORI ITO, KUMIKO GORAI, KAZUKI NISHIMURA, and KIYOSHI IKEDA

Appeal 2018-003184
Application 14/707,514
Technology Center 1700

Before GEORGE C. BEST, JEFFREY R. SNAY, and MERRELL C. CASHION, JR., *Administrative Patent Judges*.

SNAY, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 21, 23, 26–28, 31, 32, 34, 36–41, and 43–50. We have jurisdiction under 35 U.S.C. § 6(b).

A hearing was held October 31, 2019, a transcript of which will be made of record when it becomes available.

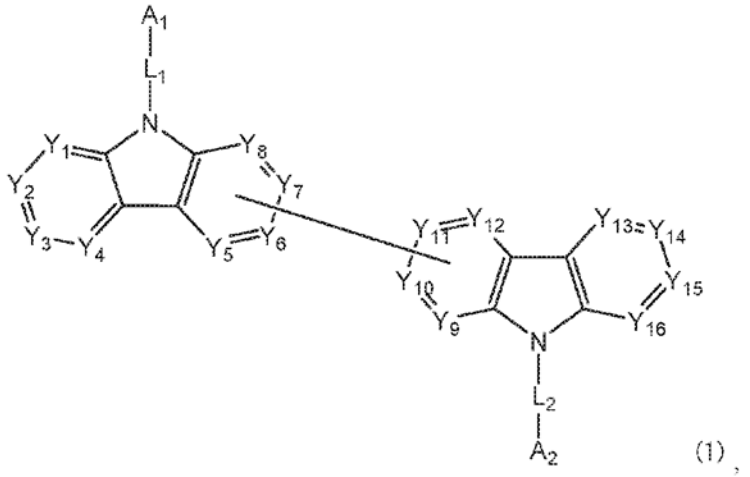
We ***reverse***.

[1] We use the word "Appellant" to refer to "[A]pplicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Idemitsu Kosan Co., Ltd. as the real party in interest. Appeal Br. 1.

BACKGROUND

The subject matter on appeal relates to a biscarbazole derivative for use in an organic electroluminescence device. Spec. ¶ 1. According to Appellant, use of a biscarbazole derivative as described in the Specification and recited in the claims results in an organic-electroluminescence device having high-emission efficiency and long lifetime. *Id.* ¶ 10. Claim 21 is illustrative of the subject matter on appeal and is reproduced from the Claims Appendix of Appellant's Appeal Brief below, with italics added to emphasize a key recitation in dispute:

21. A biscarbazole derivative of formula (1):



(1),

wherein:

each of A_1 and A_2 independently represents an unsubstituted aromatic hydrocarbon group having 6 to 30 ring carbon atoms;

each of Y_1 toY_{16} independently represents C(R) or a nitrogen atom, and each of R groups independently represents a hydrogen atom, a substituent, or a valence bonded to a carbazole skeleton; and

each of L_1 and L_2 independently represents a single bond, an unsubstituted, divalent aromatic hydrocarbon group having 6 to 30 ring carbon atoms

provided that:

> *at least one of A_1 and A_2 represents an unsubstituted fluoranthenyl group*, an unsubstituted triphenylenyl group, an unsubstituted benzophenanthrenyl group, an unsubstituted benzotriphenylenyl group, an unsubstituted dibenzotriphenylenyl group,-an unsubstituted chrysenyl group, an unsubstituted benzochrysenyl group, an unsubstituted picenyl group, an unsubstituted benzo[b]fluoranthenyl group, an unsubstituted binaphthyl group, an unsubstituted dibenzophenanthrenyl group, an unsubstituted naphthotriphenylenyl group, or an unsubstituted benzofluorenyl group; and
>
> at least one pair of R groups on adjacent ring carbon atoms are bonded to each other to form a ring structure together with the ring carbon atoms.

Independent claim 39 recites a biscarbazole derivative which, with regard to the issues raised in this appeal, is essentially the same as that of claim 21. Each remaining claim on appeal depends from claim 21 or 39.

REJECTIONS

I. Claims 21, 23, 26–28, 31, 32, 34, 36–41, and 43–49 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bae,[2] Tominaga,[3] Iwakuma,[4] Kwong,[5] and Nakatsuka.[6]

II. Claim 50 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Bae, Tominaga, Iwakuma, Kwong, Nakatsuka, and Lamansky.[7]

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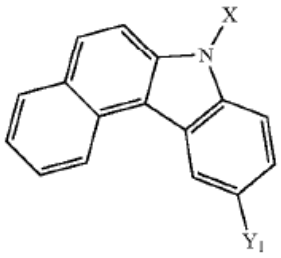
[2] WO 2010/021524 A2, published February 25, 2010. The Examiner relies on US 2011/0210318 A1, published September 1, 2011 ("Bae"), as an English equivalent.
[3] JP 2003133075 A, published May 9, 2003 ("Tominaga"), as translated.
[4] US 2010/0253211 A1, published October 7, 2010 ("Iwakuma").
[5] US 2006/0088728 A1, published April 27, 2006 ("Kwong").
[6] JP 11-149987, published June 2, 1999 ("Nakatsuka"), as translated.
[7] US 2002/0182441 A1, published December 5, 2002 ("Lamansky").

DISCUSSION

A. Rejection of claims 21, 23, 26–28, 31, 32, 34, 36–41, and 43–49

Each of independent claims 21 and 39 requires a biscarbazole derivate having, *inter alia*, a hetero-N substituent selected from a specified group that includes fluoranthenyl.[8]

The Examiner finds that Bae discloses a carbazole derivative represented by the following formula:



in which Y_1 can be a substituted or unsubstituted carbazole and X can be an aryl group having 6–30 carbon atoms. Final Act. 14–15. *See* Bae ¶¶ 16, 18, 62 (formula A-51-N0). The Examiner further finds that Tominaga discloses a carbazole-based compound having a biphenyl substituent at each of the two hetero-N atoms. *Id.* at 15–16. The Examiner acknowledges, however, that neither Bae nor Tominaga teaches substituting a fluoranthenyl compound at one of the hetero-N atoms of the bis-carbazole structure. *Id.* at 19. For that feature, the Examiner finds that "Iwakuma teaches that fluoranthene substituents provide increased stability compared to substituents with lesser numbers of conjugated atoms," and that "Kwong additionally teaches that groups with a higher degree of conjugation have

[8] Although the claims encompass substituents other than fluoranthenyl, the Examiner addresses only the fluoranthenyl substituent. *See* Final Act. 13–20.

increased stability." *Id.* at 19 (citing Iwakuma ¶ 108; Kwong ¶ 62). The Examiner determines it would have been obvious to substitute fluoranthene for Tominaga's phenyl substituent on the carbazole skeleton to provide a compound with improved stability. *Id.* at 20.

Appellant argues, *inter alia*, that neither Iwakuma nor Kwong relates to biscarbazole structures and does not support the Examiner's underlying findings. Appeal Br. 9. We agree.

Kwong discloses arylcarbazoles in which carbazole substituents are separated by a specified aryl core. According to Kwong, a balance of stability and triplet energy is achieved by selection of a suitable degree of conjugation *of the aryl core*. Kwong ¶ 62 ("Where the core of arylcarbazoles have a higher degree of π-conjugation, it is believed to stabilize the reduced (anion radical) state, resulting in more stable electron transport."); ¶ 64 (explaining that increasing π-conjugation of the aryl core of arylcarbazoles also decreases the band gap of the compound and, consequently, lowers the triplet energy level). Iwakuma's teaching of the effects of increased conjugation likewise relates to the aryl core of a compound, specifically, a naphthalene-containing skeleton core having substituent groups at either end. *See* Iwakuma ¶ 98 (identifying the naphthalene-containing skeleton of the disclosed compound); ¶ 108 (explaining that increasing the number of ring atoms *in the skeleton* enhances stability but decreases band gap).

The Examiner does not point to evidence to support a finding that the conjugation effects taught by Kwong or Iwakuma in connection with an aryl core structure would have been viewed by one of ordinary skill as applicable to substituent groups separated by a biscarbazole core, such as those of Bae

or Tominaga. As such, we are persuaded the Examiner's determination that it would have been obvious to one of ordinary skill in the art to replace Tominaga's biphenyl-substituent groups with fluoranthene, for the purpose of balancing stability and triplet energy through increased conjugation of the substituent group is not supported by a preponderance of evidence.

For the foregoing reasons, we do not sustain Rejection I as applied to independent claims 21 and 39. Because the Examiner has not established a prima facie case of obviousness of the independent claims on appeal, we also do not sustain the rejection of claims 23, 26–28, 31, 32, 34, 36–38, 40, 41, and 43–49, which depend from claim 21 or 39.

B. Rejection of claim 50

Rejection II (claim 50) is premised on the same unsubstantiated conclusion drawn from Kwong and Iwakuma as discussed above. Final Act. 25. Accordingly, Rejection II also is not sustained.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
21, 23, 26–28, 31, 32, 34, 36–41, 43–49	103(a)	Bae, Tominaga, Iwakuma, Kwong, Nakatsuka	21, 23, 26–28, 31, 32, 34, 36–41, 43–49	
50	103(a)	Bae, Tominaga, Iwakuma, Kwong, Nakatsuka, Lamansky	50	
Overall Outcome			21, 23, 26–28, 31, 32, 34, 36–41, 43–50	

REVERSED