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EXAMINER
LUCK, SEAN M

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte REN CHIN SHR, TENG CHUN WU,
WEI YUN LIANG, and CHIH WEI KUO

Appeal 2015-004435
Application 13/050,501
Technology Center 2800

Before CATHERINE Q. TIMM, DONNA M. PRAISS, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

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[1] In our Decision below we refer to the Specification filed March 17, 2011 (Spec.), the Final Office Action appealed from mailed January 27, 2014 (Final Act.), the Appeal Brief filed August 25, 2014 (App. Br.), the Examiner's Answer mailed January 8, 2015 (Ans.), and the Reply Brief filed March 9, 2015 (Reply Br.).

STATEMENT OF CASE

Appellants[2] appeal under 35 U.S.C. § 134 from the Examiner's decision to reject claims 1–41 under 35 U.S.C. § 103(a) as follows:

1. Claims 1–5, 7–16, 18–27, 29–37, and 39–41 over Hyde[3] and Ma;[4]
2. Claims 6, 17, 28, and 38 over Hyde, Ma, and Zhou;[5] and
3. Claims 6, 17, 28, and 38 over Hyde, Ma, and Arnett.[6]

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

We AFFIRM.

The claims are directed to a device and method of manufacturing a device for sterilizing an object. Spec. ¶ 1. Claim 1 is illustrative:

> 1. A sterilizing device without plasmon formation, the sterilizing device comprising:
>
> a light guiding member having a surface; and
>
> an ultraviolet (UV) light source emitting a UV light beam so that the UV light beam is guided into the light guiding member based on a total internal reflection, wherein the UV light beam is totally reflected internally in the light guiding member;
>
> wherein when an object contacts or comes close to the surface, an evanescent wave from the UV light beam irradiates on the object.

Claims App'x at App. Br. 13.

Appellants do not separately argue the patentability of independent claims 1, 12, 23, and 34 and dependent claims 2–11, 13–22, 24–33, and 35–41. App. Br. 11–12. In accordance with 37 C.F.R. § 41.37(c)(1)(iv), and

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[2] Appellants identify Industrial Technology Research Institute as the real party in interest. App. Br. 2.
[3] Hyde et al., US 2009/0117001 A1, published May 7, 2009.
[4] Ma et al., US 2004/0252091 A1, published Dec. 16, 2004.
[5] Zhou, US 6,650,822 B1, issued Nov. 18, 2003.
[6] Arnett et al., US 2008/0278460 A1, published Nov. 13, 2008.

based upon the lack of arguments directed to the subsidiary rejections, claims 2–41, will stand or fall together with independent claim 1.

OPINION

Regarding claim 1, the Examiner finds that Hyde teaches a "UV self-sterilizer . . . for the benefit of limiting the undesirable spread of pathogens by indirect contact with everyday objects." Final Act. 5. The Examiner further finds that Hyde teaches a light guiding member having a surface, a UV light source emitting a light beam, the light beam is guided into the light guiding member based on a total internal reflection, and the light beam irradiates an object that contacts or comes close to the surface. *Id.* at 4 (citing Hyde ¶¶ 9, 24–26, 45). The Examiner also finds that Hyde does not teach "wherein the light beam is an evanescent wave" and "may not adequately teach: wherein the UV light beam is totally reflected internally in the light guiding member." *Id.* at 4–5. The Examiner finds that "[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to combine the frustrated total internal reflection and the evanescent wave means of distributing light taught in Ma with [the] UV self-sterilizer taught in Hyde for the benefit [taught by Hyde]." *Id.* at 5 (citing Ma ¶¶ 17, 30–31). According to Ma,

> Total internal reflection permits radiation to be transmitted substantially without loss between opposing surfaces of a transparent material. Total internal reflection is the reflection of electromagnetic radiation from the interface of a transparent material with larger index of refraction n1 (such as glass) with an adjoining medium having a smaller index of refraction n2 (such as air) when the radiation makes an angle smaller than the 'critical angle' (sin=1(n2/n1)) to the normal. When an object such as a human finger is placed in contact with the interface surface, 'evanescent radiation' extending into a

> region occupied by contacting object permits energy to flow across the boundary. This phenomenon is known as frustrated total internal reflection. When transmission across the boundary occurs in this manner, the 'total internal reflection' within no longer total, since some of the transmitted wave passes through the interface surface at the expense of the internally reflected light.

Ma ¶ 17 (citation omitted).

Appellants contend that the Examiner's rejection of claim 1 is in error because (1) the combination of Hyde and Ma does not disclose "wherein when an object contacts or comes close to the surface, an evanescent wave from the UV light beam irradiates on the object[,]" (2) the combination with Ma is based on impermissible hindsight because "[t]he Examiner used Ma to teach the use of evanescent wave" and Ma's touch panel technology "would not use UV light, because it would be harmful to a user[,]" (3) "Hyde utilizes either direct irradiation or plasmon formation for sterilization and avoids forming evanescent wave for the same" because, Appellants assert, "one of ordinary skill in the art would not believe that the evanescent wave can be used to sterilize pathogens around the sterilizer" since it "<u>exhibits exponential decay from the boundary</u> at which the evanescent wave was formed[,]" and (4) "[t]here is no teaching, suggestion, or motivation, let alone even a hint to substitute the contact region 101 [of Hyde] with the touch panel of Ma" because "Hyde teaches a constant UV energy emitted from the contact region 101" and Hyde's FTIR bio sensor is beside the contact region, not on the contact region shown in Figure 4 of Hyde, therefore "Hyde would not have been able to combine an FTIR effect with the contact region because it would cause the contact region 101 with the metal/dielectric surface to be inoperable." App. Br. 6–9.

The Examiner responds that Hyde teaches "the desire to limit exposure to UV radiation as too much can be harmful" and "the fact that UV light can be transmitted via total internal reflection (TIR) device" but lacks specifically describing an embodiment using a TIR surface specification and teaches a preferred plasmon generating metal-dielectric layer. Ans. 3 (citing Hyde ¶¶ 25, 50). The Examiner finds that incorporating the surface taught by Ma "in lieu of the metal-dielectric layer of Hyde would aid in preventing the spread of pathogens since it would provide an additive means of incorporating this device into [an] every day object." *Id.* The Examiner further finds that "surface plasmons exponentially decay away from the surface in a similar fashion to evanescent waves" and that "the incorporation of TIR and FTIR devices in Hyde does indicate towards the combination of a TIR/FTIR device for the whole of the contact region, especially with the relationship between surface plasmons and evanescent waves." *Id.* at 5–6.

In the Reply Brief, Appellants acknowledge that Hyde teaches a device that uses TIR, but assert that "[i]t is clear in Hyde that an evanescent wave from a UV light beam does not irradiate on the object. The TIR device of Hyde is only for coupling UV energy to the contact region 101. The UV light coming out [from] the contact region 101 is constant, or based on a sensor or timer, not because of an evanescent wave and contact from an object." Reply Br. 2. Appellants further assert that there are differences between evanescent waves and surface plasmons, but do not dispute the Examiner's finding that both exponentially decay away from the surface. *Id.* at 4–5. Appellants also illuminate that their argument that the combination

of Hyde and Ma would be harmful to users refers to users' eyes being constantly exposed to UV light by touching the touch screen of Ma. *Id.* at 3.

We are not persuaded by Appellants' arguments and find that the preponderance of the evidence supports the rejection of claim 1 for the reasons provided by the Examiner in the Final Action and the Answer. Final Act. 2–5; Ans. 2–9. We add the following for emphasis.

Hyde explicitly teaches a self-sterilizing article that has a light guiding structure through which UV energy is delivered and the "[l]ight-guiding structures 102 may, for example, include a total internal reflection (TIR) device." Hyde ¶ 25. Hyde further teaches that the light-guiding structure is suitable to transport UV energy from the UV generator. *Id.* at ¶ 24. Ma evidences that it was known that a transparent material such as glass was a suitable material for a TIR structure and that "evanescent radiation" is a "phenomenon" of TIR when an object comes in contact with the interface of the transparent material. Ma ¶ 17. This phenomenon is also described in the Specification, which states "[t]ypically, when there is a total [reflection], an evanescent wave is formed at the boundary." Spec. 8. Therefore, Hyde does disclose a self-sterilizing article having a UV light source, a light guiding member that is suitable for TIR and, as evidenced by Ma, the phenomenon of evanescent radiation, as required by claim 1. Claim 1 does not preclude the use of sensors. Indeed, dependent claim 7 recites "a sensor configured to sense when the object contacts or comes close to the surface." Claims App'x at App. Br. 14. Claim 1 also does not preclude the additive element of a plasmon-supporting metal grating structure for delivering UV energy from the UV light source that is taught by Hyde as another example of a light-guiding structure (Hyde ¶ 25). Furthermore, claim 1 recites "wherein

when an object contacts or comes close to the surface, an evanescent wave from the UV light beam irradiates on the object." The antecedent basis for "surface" is the surface of the light guiding member. Therefore, Appellants' argument that the TIR structure disclosed in Hyde is the light-guiding structure rather than the contact region does not distinguish Hyde over claim 1.

In sum, Appellants have not persuaded us of a reversible error in the Examiner's finding that the phenomenon of an evanescent wave from the UV light beam of Hyde's self-sterilizer would occur in view of Ma's teaching that such a phenomenon would occur with material suitable for TIR.

CONCLUSION

We sustain the Examiner's rejection.

DECISION

The Examiner's decision is affirmed.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED