NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

HOME DEPOT U.S.A., INC.,
Appellant

v.

LYNK LABS, INC.,
Appellee

2023-2151

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2022-00023.

Decided: March 14, 2025

JENNIFER LIBRACH NALL, DLA Piper US LLP, Austin, TX, argued for appellant. Also represented by BRIAN K. ERICKSON; BENJAMIN SHAFER MUELLER, Chicago, IL; STANLEY JOSEPH PANIKOWSKI, III, San Diego, CA; NICHOLAS G. PAPASTAVROS, Boston, MA.

STEPHEN TERRY SCHREINER, Carmichael Ip, Tysons, VA, argued for appellee. Also represented by JAMES CARMICHAEL, STEPHEN MCBRIDE, MINGHUI YANG.

Before DYK, PROST, and HUGHES, *Circuit Judges*.

DYK, *Circuit Judge*.

Home Depot U.S.A., Inc. ("Home Depot") petitioned the Patent Trial and Appeal Board ("Board") for inter partes review ("IPR") of claims 1, 2, and 4 of U.S. Patent No. 10,517,149 (the "'149 patent"). The Board instituted IPR as to all challenged claims. In a final written decision, the Board found Home Depot had shown claims 1 and 4 were unpatentable but had failed to show claim 2 was unpatentable. Home Depot appeals the Board's decision as to claim 2. We *reverse*.

BACKGROUND

Lynk Labs, Inc. ("Lynk") owns the '149 patent, which is titled "AC Light Emitting Diode and AC LED Drive Methods and Apparatus." The '149 patent states it "is directed to an LED light emitting device and LED light system capable of operating during both the positive and negative phase of an AC power supply." '149 patent, col. 12 ll. 36–38. Specifically, the '149 patent discloses a driver that is configured to receive an AC voltage from a "mains power source" (for example, the voltage emitted from a standard wall outlet in the United States) and to provide a voltage and current to an LED circuit. *See* '149 patent, claim 1.

Claim 2, which depends from claim 1, is the only claim at issue in this appeal. Together, claims 1 and 2 recite:

> 1. A lighting system comprising:
>
> > at least one LED circuit having a plurality of LEDs, wherein the plurality of LEDs includes same or different colored LEDs;
> >
> > a driver, wherein the driver includes at least one transistor and at least one capacitor; and

> a package, wherein the package is a heat sinking reflective material;
>
> the driver and the at least one LED circuit all mounted on the package; and
>
> the driver is configured to receive an AC voltage from a mains power source and provide a voltage and current to the at least one LED circuit.
>
> 2. The lighting system of claim 1, wherein the driver is configured to receive at least two different AC forward voltages.

’149 patent, claims 1–2.

In October 2021, Home Depot filed an IPR petition, challenging claims 1, 2, and 4 of the ’149 patent as obvious over U.S. Patent No. 5,457,450 (“Deese”) in view of other references.[1] The Board instituted IPR and ultimately concluded that Home Depot had met its burden to prove unpatentability as to claims 1 and 4 but had failed to meet its burden as to claim 2. J.A. 53. Lynk does not challenge the Board’s determinations as to claims 1 or 4. The dispute on appeal is only as to claim 2 and whether the Board erred in finding that the Deese prior art reference does not disclose “wherein the driver is configured to receive at least two different AC forward voltages.”

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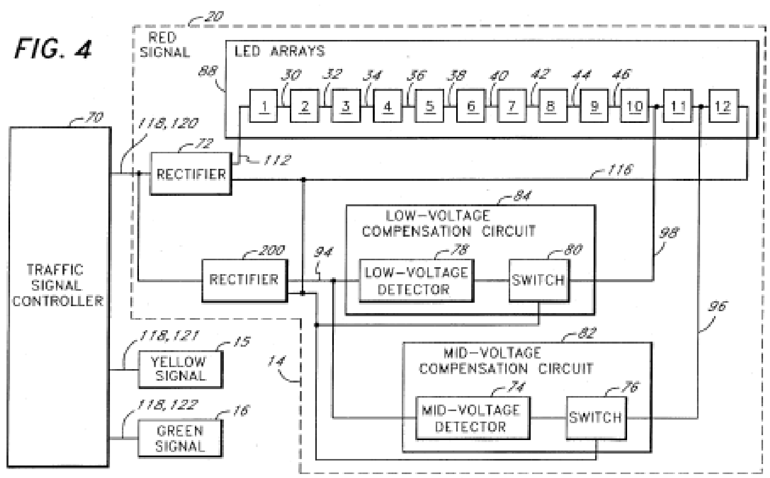
[1] Home Depot argued claims 1 and 2 were unpatentable as obvious over a combination of Deese, U.S. Patent No. 6,019,493 (“Kuo”), and U.S. Patent No. 5,785,418 (“Hochstein”). Home Depot argued claim 4 was unpatentable over Deese, Kuo, Hochstein, and U.S. Patent No. 5,014,052 (“Obeck”).

Deese discloses an LED traffic signal light with numerous LED arrays connected in series. The total number of LED arrays in Deese's circuit is greater than necessary to provide the appropriate amount of light to control traffic in normal conditions. The excess LED arrays "provide for ample light output during periods of reduced line voltage such as is encountered during brown-out conditions." J.A. 1268, col. 5 ll. 31–35.

Figure 4 is illustrative:

FIG. 4



J.A. 1254. Deese discloses that its "driver"[2] receives, at power line 118, voltages in three different ranges:

> [T]he LED circuit 20 operates in one of three different modes, depending on the voltage differential provided across the line voltage power signal 118

2 The Board found Deese describes a "driver" that "includes at least one transistor and at least one capacitor" and "is configured to receive an AC voltage from a mains power source and provide a voltage and current to the at least one LED circuit," as required by claim 1; Lynk does not challenge this finding on appeal.

> and the line voltage return signal 120. This voltage has a normal value of 120 volts AC. However, for various reasons, this voltage can drop well below this normal value. Embodiments of the present invention preferably divide the possible values for input power into three different voltage ranges, a low voltage range, an intermediate voltage range and a full voltage range.

J.A. 1269, col. 8 ll. 18–36. When the input voltage is intermediate or low, Deese describes electrically disconnecting a subset of the LED arrays from the traffic light circuit. By removing a subset of LED arrays based on the level of voltage received, Deese effectively reduces the minimum voltage required to turn on the LED configuration and maintain the light output of the traffic signal light at a suitable intensity utilizing the remaining LED arrays. *See* J.A. 1270, col. 9 ll. 30–35.

Deese's three modes of operation each correspond to one of the three input voltage ranges: (1) in the full voltage mode LED arrays 1–12, i.e., all arrays in LED configuration 88, are illuminated; (2) in the intermediate voltage mode only LED arrays 1–11 are illuminated; and (3) in the low voltage mode only LED arrays 1–10 are illuminated. J.A. 1269–70, col. 8 l. 37–col. 9 l. 20. The Board found that Deese thus teaches "turn[ing] off power to LED arrays 12 and/or 11[,] . . . thereby affect[ing] the voltage drop across the individual LEDs and the current provided to the individual LEDs." J.A. 32. Such functionality ensures that, even in times of reduced line voltage such as a brownout, the received voltage is at least the minimum sufficient to allow current to flow through the connected LEDs arrays, thereby illuminating them.

Important to this appeal is the meaning of the term "forward voltages" as used in claim 2 of the '149 patent. Home Depot argued that the Board should construe the term "forward voltage" as "the minimum voltage difference required between the anode and cathode of the LEDs to allow current to flow through the LEDs," i.e., the minimum voltage required to turn on the LEDs. J.A. 129. Lynk argued no construction was required because "[one of ordinary skill in the art] would readily understand the plain and ordinary meaning of the claim language, which is that the driver is configured to 'receive an AC voltage from a mains power source.'" J.A. 286. The Board adopted Home Depot's construction. The Board explained that the '149 patent specification treated "forward voltage" and "AC mains voltage" as distinct terms that cannot be equated and that Lynk's construction erroneously conflated the two terms.

The Board then determined that Home Depot had not established that Deese discloses a driver "configured to receive at least two different AC forward voltages" as construed. The Board explained that "[w]hatever the value of the AC mains voltage received at lines 118/120 in Deese, that voltage is still AC mains voltage" and that "[w]hile the forward voltage in the array may vary if the value of AC mains voltage varies, neither [Home Depot] nor [its expert] explain how the forward voltage of the LED array is *received* by the driver." J.A. 50. The Board thus concluded Home Depot had not established that claim 2 was unpatentable.

DISCUSSION

Obviousness is a mixed question of fact and law. *Apple Inc. v. Gesture Tech. Partners, LLC*, 127 F.4th 364, 368 (Fed. Cir. 2025). We review the Board's legal conclusion of obviousness de novo and its factual findings for substantial evidence. *Id.* We interpret claim terms by looking to their ordinary meaning in light of the specification and prosecution history. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315–17 (Fed. Cir. 2005) (en banc).

I

As an initial matter, it is necessary to understand the scope of the Board's construction. First, under the Board's construction of "forward voltage," the forward voltage is a property of the LED circuit—i.e., it is the "minimum voltage difference required between the anode and cathode of the LEDs to allow current to flow through the LEDs" of that particular circuit. J.A. 18. For the claimed driver to be configured to receive "at least two AC forward voltages," the driver must thus be configured to receive at least two distinct "minimum voltages," each of which is associated with a respective LED circuit.

Second, contrary to Lynk's assertions, nothing in the claim limits the driver to being configured to receive only the exact, "single value" forward voltage. Claim 2, by nature of its dependence from claim 1, is a "comprising" claim and so is presumptively open-ended. *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1371 (Fed. Cir. 2005). Here, the open-ended "comprising" language means that the claimed driver may also receive other voltages in addition to the exact forward voltage. This makes sense in practice because, in order to power an LED circuit, a driver may receive voltage beyond the exact minimum voltage that allows current to flow through the LEDs. In other words, if a driver receives voltage in excess of the forward voltage, the driver has still received the forward voltage—it has simply received excess voltage as well.

II

The undisputed facts show that Deese discloses "the driver is configured to receive at least two different AC forward voltages," as required by claim 2. The Board's conclusion to the contrary is unsupported by substantial evidence.

Deese discloses three different LED circuit configurations, each with a different forward voltage—that is, three minimum voltages to power three different configurations. Deese describes three modes of operation: (1) a full voltage mode with LED arrays 1–12; (2) an intermediate voltage mode with LED arrays 1–11; and (3) a low voltage mode with LED arrays 1–10. J.A. 1269–70, col. 8 l. 37–col. 9 l. 20. Deese's operating mode is determined by the voltage that its "driver" receives (for example, the voltage input at power line 118). Deese's driver is configured to receive three different voltage ranges corresponding to the three operating modes. J.A. 1269, col. 8 ll. 18–36. In one embodiment, Deese describes that if the input voltage is greater than 107 V, the system operates in the full voltage mode, and its "LED circuit" comprises LED arrays 1–12. The forward voltage of that configuration is the "minimum voltage difference required between the anode and cathode of the LEDs to allow current to flow through [LED arrays 1–12]." If Deese's driver receives a voltage between 96 V and 107 V (for example, during a power grid brown out), the system operates in the intermediate voltage mode, and electrically disconnects LED array 12 from the circuit. The forward voltage of that configuration is the "minimum voltage difference required between the anode and cathode of the LEDs to allow current to flow through [LED arrays 1–11]." Likewise, the forward voltage of Deese's low voltage configuration is the minimum voltage to allow current to flow through LED arrays 1–10.

Removing LED arrays 11 and/or 12 lowers the minimum voltage required to turn on the circuit. As Lynk's expert explained, a skilled artisan "would understand that more LED arrays require more forward voltage," J.A. 2079 (74:9–14)—in other words, the minimum voltage required to allow current to flow through twelve series-connected LED arrays is higher than the minimum voltage required to allow current to flow through only eleven of the same series-connected LED arrays. The Board accordingly acknowledged that, in Deese, "the forward voltage in the array may vary if the value of AC mains voltage [(for example, the voltage at power line 118)] varies." *See* J.A. 50. By removing one or more of the series-connected LED arrays based on the input voltage received, Deese changes the forward voltage of the circuit to correlate to the reduced input voltage. This functionality ensures that there is enough voltage to allow current to flow through the LED configuration, thereby keeping the connected LED arrays illuminated in their respective operating modes. Deese thus describes three different LED circuit configurations with three different forward voltages.

It is also undisputed that Deese teaches a driver configured to receive three different voltage ranges corresponding to the three different LED circuit configurations. Lynk admits that "Deese teaches an LED circuit having a 'driver' that receives an AC voltage input from [an AC mains voltage source]." Appellee's Br. 14. The Board found, and Lynk does not dispute, that Deese's "driver" receives three different voltages from a mains power source via power line 118 and provides power to Deese's twelve LED arrays. As Lynk further acknowledges, Deese describes comparing the voltage input at the driver (i.e., the voltage at line 118) to two threshold values (i.e., an intermediate voltage threshold and a low voltage threshold) and "if the input voltage is less than either threshold, then . . . remov[ing] [LEDs] from the LED array." Appellee's Br. 29. Deese thus describes a driver configured to receive at least a first voltage when the power grid is operating in the full voltage mode; a second, intermediate voltage when the power grid is operating in the intermediate voltage mode; and a third low voltage when the power grid is operating in the low voltage mode. *See, e.g.*, J.A. 1269, col. 7 ll. 24–33. Each of these voltages is within the range sufficient to illuminate the LED arrays of the associated operating mode. Accordingly, Deese's driver is configured to receive at least three different forward voltages, though the driver may also receive voltages in excess of the minimum voltage required to turn on the LEDs. Since claim 2 is an open-ended "comprising" claim, the fact that the driver may receive other voltages is irrelevant.

Based on the undisputed facts, we conclude that Deese teaches that its driver is "configured to receive at least two different AC forward voltages." Accordingly, Deese discloses the claim limitation at issue. The Board's conclusion to the contrary is not supported by substantial evidence.

CONCLUSION

Because the undisputed facts show claim 2 is unpatentable under the proper claim construction, we *reverse* the Board's decision as to claim 2.

REVERSED