

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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THERMALTAKE TECHNOLOGY CO., LTD. and  
THERMALTAKE INC. (a.k.a. THERMALTAKE USA)

Petitioners,

v.

LIAN LI INDUSTRIAL CO., LTD., and CHEN, CHIEN-HAO,

Patent Owners.

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IPR2024-01230  
U.S. Patent No. 10,690,336

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**SUPPLEMENTAL REPLY DECLARATION OF DR. ANDREW WOLFE  
IN SUPPORT OF PETITIONERS' OPPOSITION TO PATENT OWNER'S  
REVISED CONTINGENT MOTION TO AMEND**

I, Andrew Wolfe, declare as follows:

1. I have been retained by Pillsbury, Winthrop, Shaw, Pittman, LLP, counsel for Petitioners Thermaltake Tech. Co., Ltd. and Thermaltake Inc. (collectively, “Thermaltake”), to analyze and offer my expert opinions in support of Thermaltake’s Petition for *Inter Partes* Review of Claims 1-5 of U.S. Patent No. 10,690,336 (“the ’336 Patent”) and regarding Patent Owner’s proposed amended claims. I am being compensated for my work on this matter at my standard hourly billing rate. My compensation does not depend in any way on my opinion or the outcome of this matter.

## **1. Introduction**

### **1.1. Education, Experience, and Qualifications**

2. I am the founder and sole employee of Wolfe Consulting. Through Wolfe Consulting, I provide technical and business analytics to businesses on processor technology, computer systems, consumer electronics, software, design tools, data security, cryptography, and intellectual property issues. A summary of my Education, Experience, and Qualifications has been provided in Ex[1004] ¶¶2-12 and Ex[1005].

## **2. Summary of Opinions on the ’336 Patent**

3. My opinions with respect to the validity of claims 1-5 of the ’336 Patent are provided in Ex[1004]. Additional opinions are provided in Ex[1031]. I

stand by those opinions in light of the PTAB claim constructions in this matter and the PTAB's Preliminary Guidance (Paper 25) on Patent Owner's original Contingent Motion to Amend and incorporate them by reference into this declaration.

4. I have reviewed Patent Owner's Preliminary Response and Patent Owner's Response as well as the exhibits thereto. I have also reviewed Patent Owner's Contingent Motion to Amend and Patent Owner's Revised Contingent Motion to Amend of October 3, 2025 and the exhibits thereto. I have also reviewed the Board's Institution Decision and Preliminary Guidance on Patent Owner's Motion To Amend. I have also reviewed Dr. Tuckerman's deposition transcripts in this matter. In this declaration I have been asked to respond to certain issues discussed in those documents and also, where it may be helpful to the Board, to provide further clarification of the opinions in Ex[1004] and Ex[1031].

5. I have also been asked to opine on the validity of newly amended claims 6 and 7 presented by Patent Owner for the first time in Patent Owner's Revised Contingent MTA. Since Patent Owner does not appear to have distinguished the numbering of these claims from the prior proposed claims 6-7, I will refer to them as new claims 6 and 7.

6. In summary, each of claims 1-5 is obvious under one or more of Grounds 1-7 as described in Ex[1004]. New claims 6 and 7 are also obvious under one or more of Grounds 1a-2a as presented herein.

### **3. Claim Construction**

7. It is my understanding that the parties generally agree that all of the claim terms can be applied using their plain and ordinary meanings for purposes of this IPR. It is my understanding that the Board also has preliminarily applied the plain and ordinary meaning for each claim term. Feb. 19 Decision at pp. 15-18. The Board has also clarified that, “the plain meaning of claim 1 defines three sides of the claimed body, a top of the body (with an illumination area on two sides of the fan), one side of the body with a power socket and a first connector, and another side of the body with a second connector.” *Id* at 17.

8. This claim construction is consistent with the claim scope I applied in my analysis in Ex[1004] and Ex[1031]. It is also consistent with the claim scope I apply in this declaration. Under these claim constructions existing claims 1-5 are obvious and proposed new claims 6 and 7 are also obvious.

9. Despite Patent Owner’s purported agreement with these constructions, Dr. Tuckerman repeatedly applies inconsistent interpretations of the claim language in this and other related proceedings. He also imports various limitations into the claims based on the specification. Since the description of various

elements in the '336 specification is so sparse, this generally involved importing his interpretation of drawings of preferred embodiments into the claims. *See, e.g.*, Ex[2006] ¶¶29-32. This is improper and inconsistent with the plain and ordinary meaning. To the extent that he is suggesting that the figures define the scope of these limitations, he is incorrect.

### 3.1. Side

10. The first such claim term is “side.” In the first place, Dr. Tuckerman did not explain his understanding of the plain and ordinary meaning of “side” in the claims in his earlier testimony other than by referencing the illustration of a preferred embodiment in the figures. *See, e.g.*, Ex[2006] ¶¶31-32. In his deposition, Dr. Tuckerman opined that there is no plain meaning of the term “side” in isolation. Tuckerman Depo 177:2-4.

11. Additionally, Dr. Tuckerman does not believe the term “side” means the same thing each time it is used in claim 1. Tuckerman 55:2-16. Ex.[2052] ¶29-30, Tuckerman Deposition 177:5-14. His interpretation cannot be explained by the context of the claim. In his most recent declaration, Dr. Tuckerman expresses the opinion that in one place in claim 1 referring to a side of the body, side refers to a lateral face of an object such as a die. Ex.[2052] ¶30. I disagree. Neither the '336 specification nor the claims are in the context of a die, and a POSITA would have no reason to adopt such a definition. Dr. Tuckerman admits that the '336 patent is

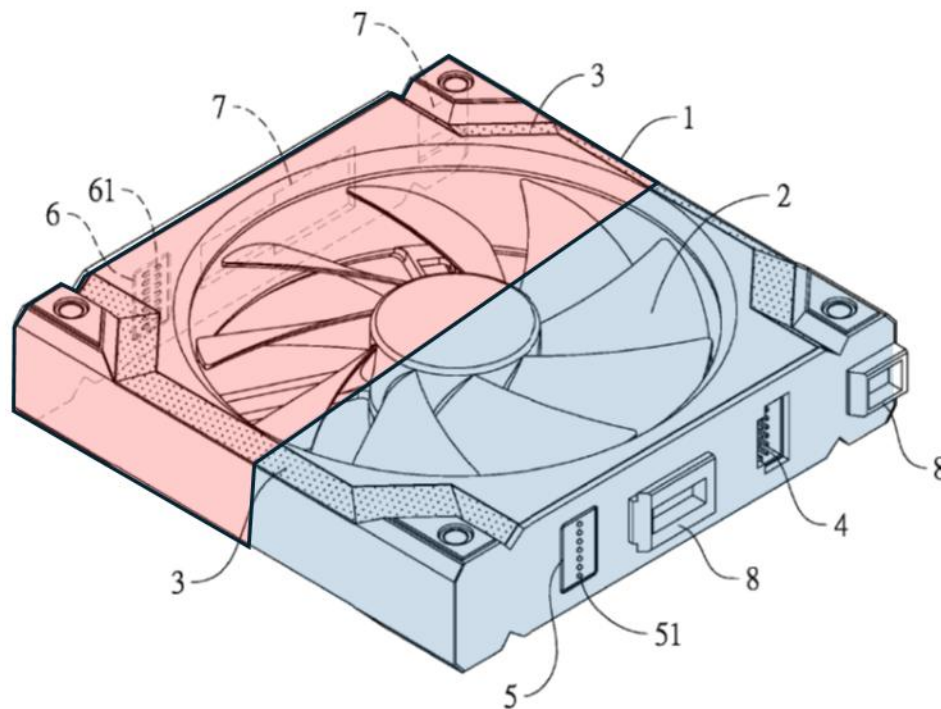
not addressing *die*. Tuckerman Depo 187:4-9. In another place in the claim referring to two sides of the fan, Dr. Tuckerman concludes that the appropriate definition is “an area next to something” as in the side of a pool. *Id.* Neither the ’336 specification nor the claims are in the context of a pool, and a POSITA would have no reason to adopt such a definition. Dr. Tuckerman admits that the ’336 patent is not discussing pools. Tuckerman Depo 186:21-187:3.

12. Claim 1 references two sides of the fan and also references both one and another side of the body. Dr. Tuckerman attempts to distinguish prior art by interpreting the plain meaning of these terms very narrowly, but these narrow interpretations are not plain and ordinary meaning and are not consistent with the intrinsic record.

13. The appropriate plain meaning of “side” in this context is consistent throughout the claim and is not limited in the manner Dr. Tuckerman suggests. For example, Merriam-Webster’s Collegiate Dictionary, Eleventh Edition provides more than a dozen definitions for side, including “a place, space, or direction with respect to a center or to a line of division (as of an aisle, river, or street).” Merriam-Webster’s Collegiate Dictionary, Eleventh Edition at 1157. This interpretation, which is plain and ordinary meaning, is completely consistent with the ’336 specification and claims. For example, the annotated copy of ’336 Figure 1 that I provide below shows a power socket and a first connector on one side of

the body (in blue), and a second connector on another side of the body (in red).

The left side (in red) is a place, space, or direction with respect to a center or to a line of division as is the right side (in blue).



14. There is no reason to exempt the simple plain meaning I have provided from the scope of the '336 claims. Dr. Tuckerman's incorporation of a narrow understanding of the term "side" as used in the claims is not clearly conveyed to a POSITA through the '336 figures or elsewhere in the specification. A simple, plain meaning of "side" such as "a place, space, or direction with respect to a center or to a line of division" is consistent with the specification and provides for the same meaning of the word "side" each time it is used in the claims.

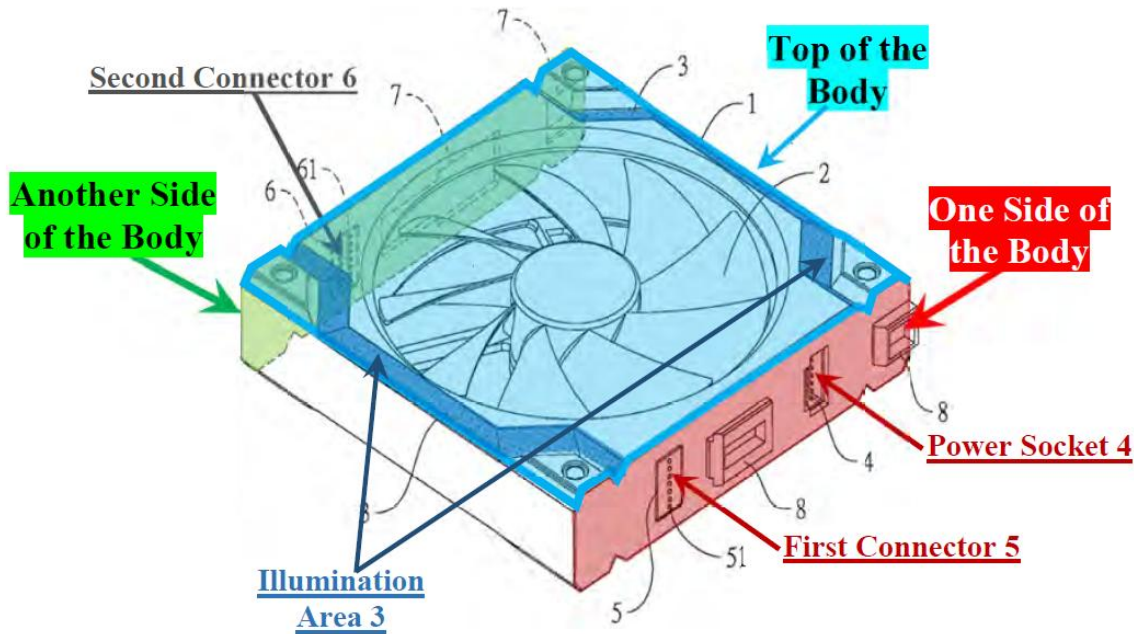
### 3.2. Illumination Area

15. Dr. Tuckerman has opined that “the plain language of claim 1, ... makes clear that an “illumination area” is not simply an area where light happens to be visible to the user – it is the area of the body that actually generates light, i.e., illuminates.” Ex[2006] ¶51. He further opines that it is insufficient with respect to the claims to show that light from LEDs is visible from a top view. *Id.*

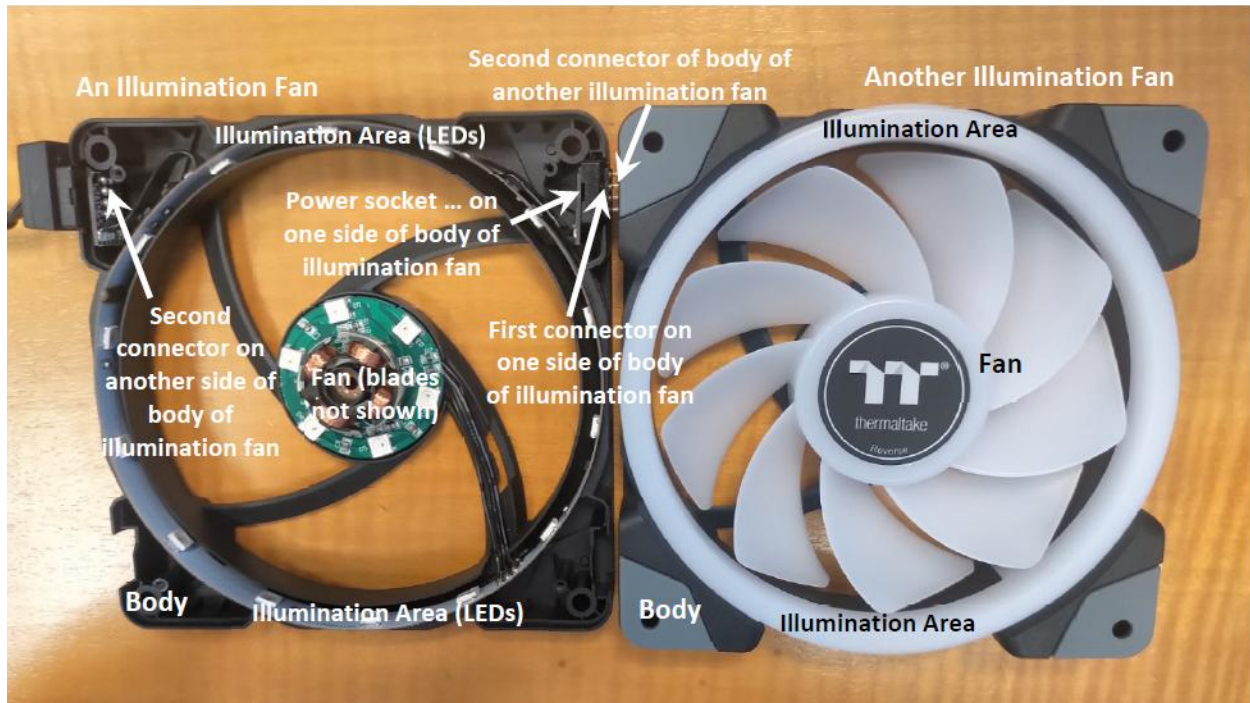
16. This is not the plain meaning of illumination area. The plain meaning of illumination area is an area that is illuminated. While claim 1 does indicate that the illumination area is electrically connected with the claimed connectors, it does not limit the illumination area to the light generating structures nor does it prevent the actual light from being generated separately from the top surface of the fan body. In fact, the word “generate” does not appear in the specification. The specification says that “illumination area 3 can be illuminated.” ’336 at 3:6; 3:15-16.

17. In his prior testimony as recalled at his deposition, Dr. Tuckerman testified that the words “illumination area” are not technical in nature and simply mean a region at the top of the body is lit up. Tuckerman 62:19-63:8; 63:16-64:5. When asked his understanding of the term “illumination area” at deposition, Dr. Tuckerman indicated it meant “visibly illuminated.” Tuckerman 47:14-22.

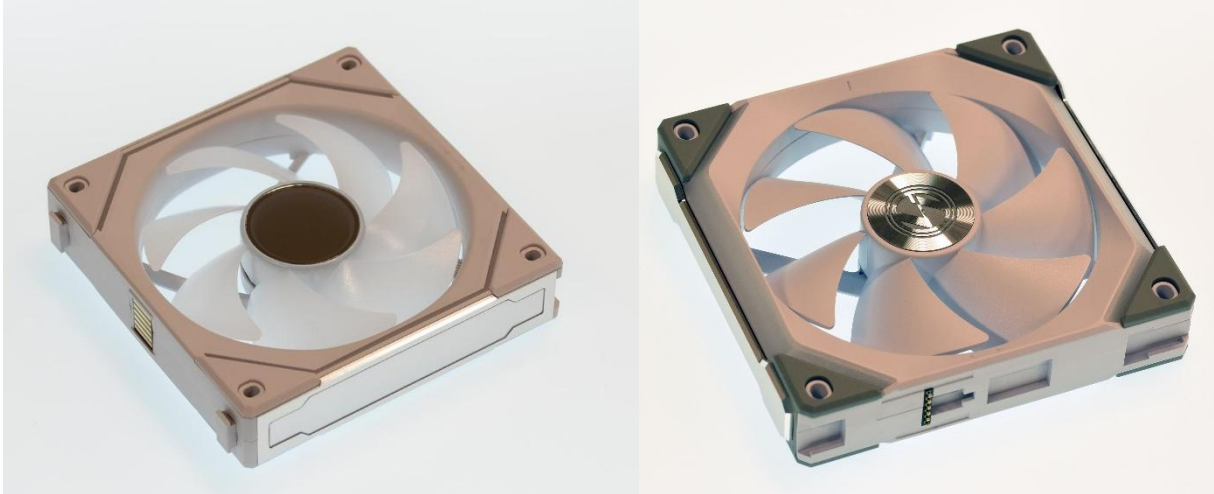
18. Contrary to Dr. Tuckerman's definition in Ex[2006], the area he has marked as Illumination Area 3 on Ex[2006] p. 20 is not disclosed to generate light. A POSITA would understand this to most likely be a diffuser that is illuminated by an internal LED source.



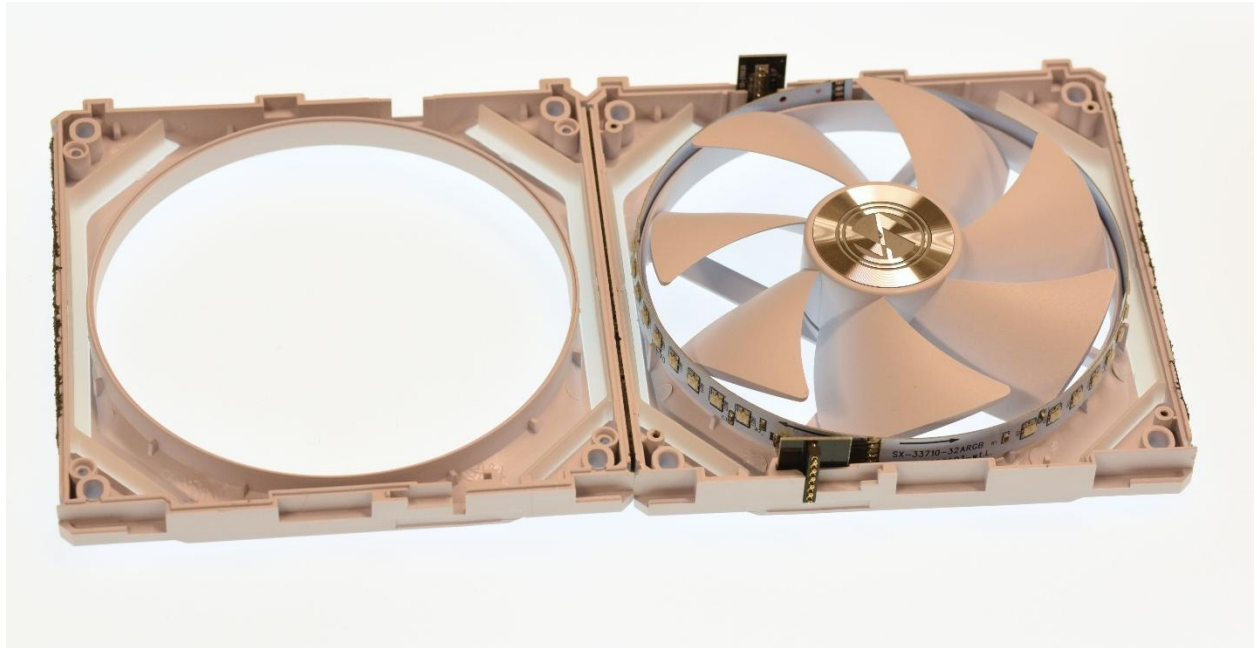
19. Moreover, it is my understanding that diffusers are being accused of practicing this patent in District Court. Ex[1018] at A-5, A-6. The LEDs in the illustrated accused product are interior to the fan body housing and covered by a diffuser, yet both are being accused of being the illumination area. The LEDs point inward and not towards the top of the fan body, in the same way that I applied the prior art in Ex[1004]. The emitted light is visible through diffusion and reflection at the top of the device.



20. Additionally, the Lian Li products that I examined that appear to be reflective of the preferred embodiment also have laterally facing LEDs near the center of the housing and use diffusion and reflection to make the light visible at the top surface.



Lian Li UNI FAN SL



Lian Li UNI FAN SL





Lian Li UNI Fan SL120 V2 RGB Black

21. In fact, Dr. Tuckerman cannot determine, for sure, how the illumination areas in Figure 1 are oriented. Tuckerman 88:8-90:18.

22. Dr. Tuckerman agrees that components interior to the outermost surface of the side edge of the fan can still be considered to be on the side of the fan body. Tuckerman 74:9-78:11, 86:12-25; 87:20-88:7. By the same reasoning, there is no reason that components interior to the outermost surface of the top of the fan can still be considered to be on the top of the fan body.

23. In light of the claim language and the additional evidence, it is clear that the plain meaning of illumination area should not be restricted to the light

generating elements but can include light transmission and reflection elements and that only a portion of the illumination area structure need be at the top of the fan body to provide visible illumination to a viewer at the top. However, to the extent that Dr. Tuckerman's interpretation of the illumination area is found to be appropriate, there is no disclosure of such an illumination area on at least two sides of the fan at top of the body that generates light in the '336 specification.

### **3.3. Illumination Elements**

24. Additionally, Dr. Tuckerman has opined that the function of the illumination elements in the '336 patent is aesthetic (Ex[2002] at ¶24, ¶25, ¶40; Ex[2006] at ¶25, ¶26). If this is the case, it is my understanding that aesthetic claim elements are not sufficient to distinguish prior art. See, e.g., MPEP at 2144.04 I - AESTHETIC DESIGN CHANGES, "matters relating to ornamentation only which have no mechanical function cannot be relied upon to patentably distinguish the claimed invention from the prior art." Nonetheless, these illumination elements are obvious in light of the prior art described in Ex[1004].

### **3.4. Connector comprising a flat surface**

25. New proposed claim 7 includes the limitations "a first connector comprising a first flat surface" and "a second connector comprising a second flat surface." Dr. Tuckerman does not clearly state the plain meaning of these limitations, but based on his testimony, he appears to believe that the claimed flat

surface need not be on the actual conducting element of the connector but can be on any surface of the connector housing. *See e.g.* Ex[2052] pp. 29-30 illustrating opinions regarding new proposed claim elements 7(A)(v) and 7(A)(vi). Since Dr. Tuckerman does not attribute any claimed functionality to the “comprising a first flat surface/ comprising a second flat surface” language and, in fact, contends that it can be any surface of the connector, it does not appear to be more than an aesthetic limitation. Once again, it is my understanding that aesthetic claim elements are not sufficient to distinguish prior art. *See, e.g.,* MPEP at 2144.04 I - AESTHETIC DESIGN CHANGES, “matters relating to ornamentation only which have no mechanical function cannot be relied upon to patentably distinguish the claimed invention from the prior art.” As such, new claim 7 appears to have the same scope as new claim 6.

#### **4. Responsive Opinions Related to Obviousness**

##### **4.1. Dr. Tuckerman does not apply the proper standards**

26. Dr. Tuckerman opines that an embodiment with a cable providing power to a connector that sits between two fans is “possible.” Ex[2052] ¶25. I was also asked questions about this at my deposition. The point of these opinions is not fully clear, but they appear to be addressing the lack of written description for certain proposed claims.

27. If this is the case, Dr. Tuckerman's opinions appear to be irrelevant and apply the wrong standard. Whether or not something is possible is not the standard for written description. It has no impact on whether the claim has been sufficiently disclosed in the specification.

28. Moreover, Dr. Tuckerman's opinions on this issue are not based on the '336 specification. Ex[2032] is not part of the '336 specification. In fact, it is not clear where it is from. Ex[2042] is also not part of the '336 specification. In fact, it is at odds with the '336 specification. Dr. Tuckerman testified that he did not know the origin of these exhibits. Tuckerman Depo 162:2-164:13. He admits that they do not appear in the '336 patent. Tuckerman Depo 164:14-116.

29. Dr. Tuckerman points out a small opening visible in Figure 3 of the '336 specification. Ex[2052] ¶24. While this small opening is visible, it does not correspond to a conduit suitable for a power cable as Dr. Tuckerman suggests. In the disclosed '336 embodiments, such an opening only exists when Figure 3 is comprised of fan bodies as illustrated in Figure 2. In these embodiments, the visible opening does not extend to power connector 4. Moreover, the opening that is present is blocked by engaging block 8. The hypothetical embodiment illustrated in Ex[2052] ¶24-25 is not disclosed in the '336 specification at all.

30. Dr. Tuckerman also relied on my testimony that under my interpretation of the claim scope as applied to the prior art and with certain

assumptions proposed by opposing counsel, the hypothetical embodiment in Ex[2032] and Ex[2042] would be within the scope of claim 1. I note that there are many assumptions in my answer including that I am correct about the invalidity of claim 1. In any case, this is still not relevant to the question of whether such an embodiment is disclosed in the '336 specification and whether there is any written description corresponding to Ex[2032] and Ex[2042].

31. Additionally, when explaining the alleged written description support for new proposed claims 6 and 7, Dr. Tuckerman relies on my testimony that certain features are not excluded by the specification. See e.g. Ex[2052] pp. 26-28. Note that in my testimony, I explained that I understood “exclude” to mean “does it have an explicit statement saying that it’s impossible.” Once again, this is not the proper standard for written description. An applicant must show that the inventor was in possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. See e.g. MPEP 2163.02. Simply failing to exclude features does not provide sufficient written description.

#### **4.2. The core concepts of the claims were well known**

32. Power sockets for computer cooling fans were known prior to 2018. Dr. Tuckerman admits that this is the case. Tuckerman 38:11-14. Power socket

means a socket that could receive power or deliver power or be connected to power. They were well known as of 2018. Tuckerman 48:23-49:11. Dr. Tuckerman testified that a connector, broadly speaking, just connects two things together. Tuckerman 66:8-20.

33. Fans with light-emitting features were known prior to 2018. Dr. Tuckerman admits that this is the case. Tuckerman 40:18-22. These would have included a fan body with a fan in the center of the body.

34. Daisy chaining of fan power connectors was known prior to 2018. *See, e.g.,* Ex[1012] Figs. 3-6. This would cause the chain of fans to rotate when power is applied to the first fan in the chain.

35. Daisy chaining of RGB LED modules was known prior to 2018. *See, e.g.,* Ex[1012] Fig. 5. This would cause the chain of LEDs to illuminate when power is applied to the first LED in the chain and the appropriate color messages are sent down the chain.

36. Mating connectors on opposite sides of fan bodies were known prior to 2018. *See, e.g.,* Ex[1007] Fig. 6. Connectors were well known. Tuckerman rough 46:3-21.

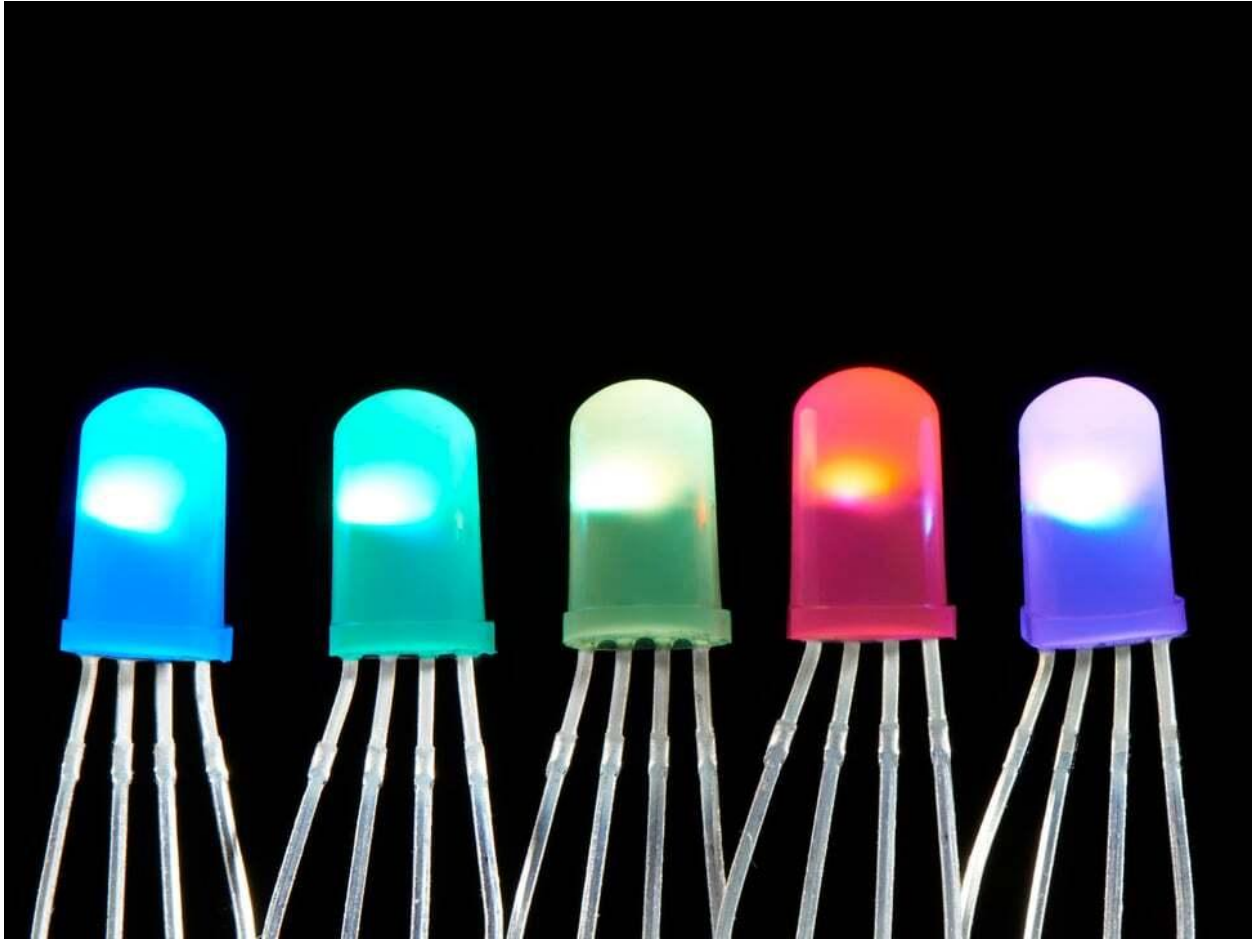
37. Coupling grooves and inserts to couple two fan bodies together were prior to 2018. *See, e.g.,* Ex[1009] Figs. 2, 6; Ex[1011] Fig. 4A.

38. The asserted claims are merely ordinary combinations of ordinary elements arranged in an ordinary manner.

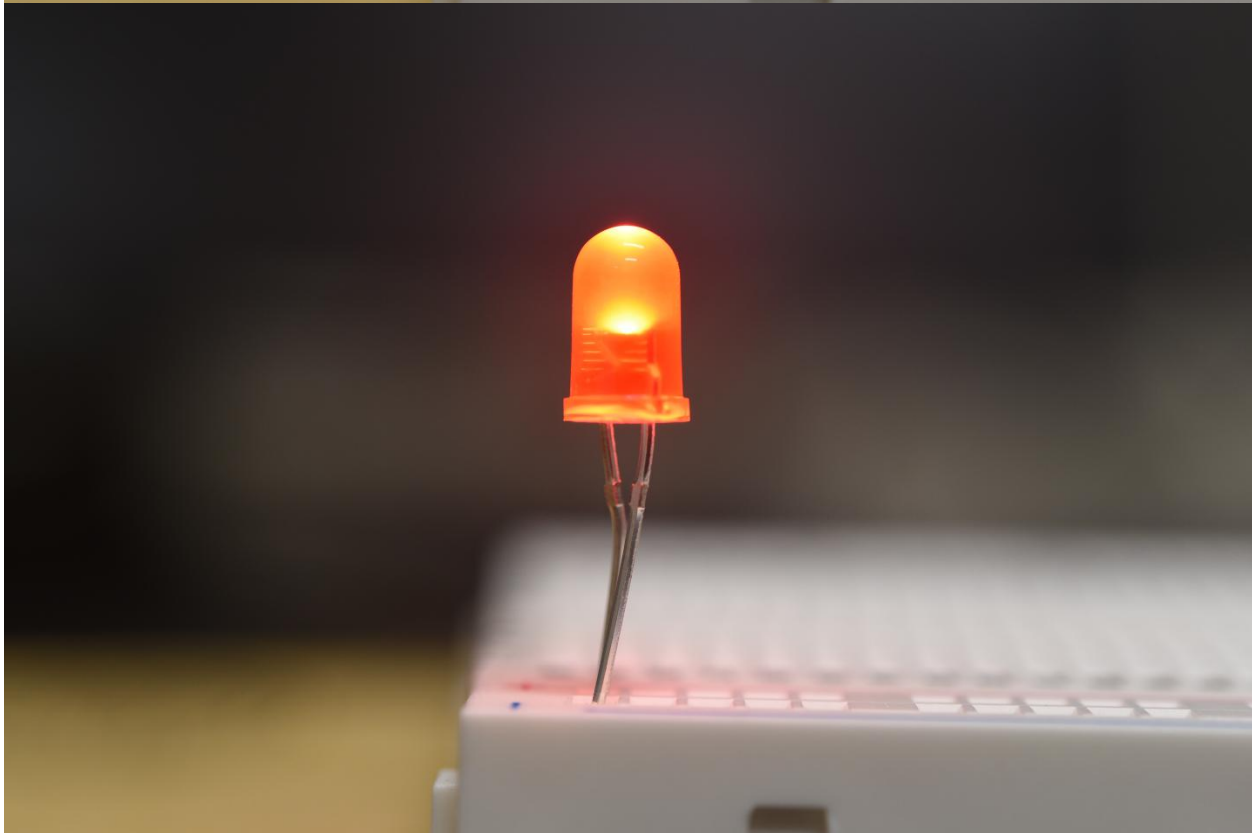
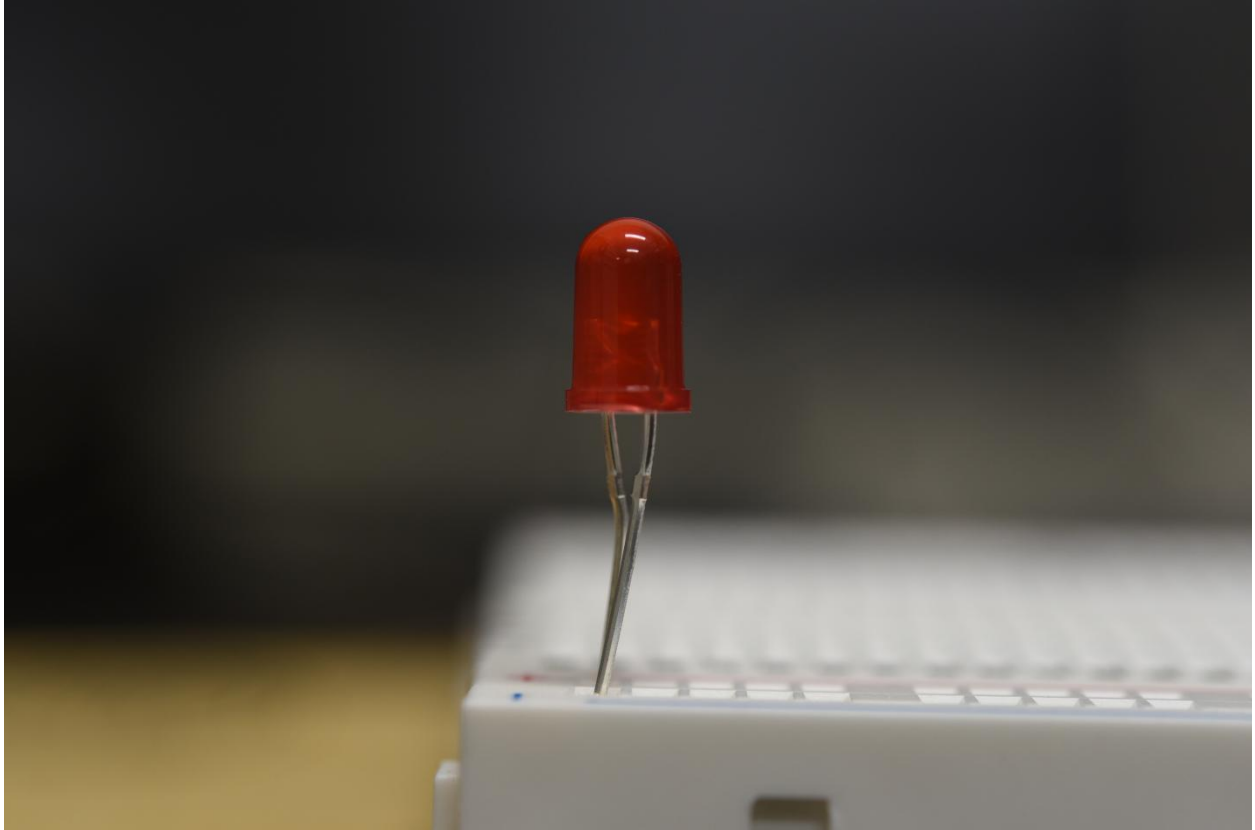
**4.3. Dr. Tuckerman’s criticisms of prior art obviousness are unfounded.**

**4.3.1. “an illumination area on at least two sides of the fan at top of the body”**

39. Patent Owner has recently submitted exhibits EX[2039]-EX[2041] and EX[2043]-EX[2050] which purport to show that a common LED cannot provide illumination at a 90° viewing angle. As I testified at deposition, any such conclusion would be a misunderstanding of these exhibits. In fact, as I stated in my prior declarations, illumination from common LEDs are generally visible at a 90° viewing angle. For example, the photograph below shows the WS2812B RGB LED discussed in Ex[1012] at a 90° viewing angle. The illumination is clearly visible.



40. The photographs below show a common red LED that I described in my prior declaration and that corresponds to exhibits EX[2039]-EX[2041] and EX[2043]-EX[2050]. When the LED is illuminated, the illumination is clearly visible at a 90° viewing angle. While these photographs are contemporaneous, they reflect the knowledge and understanding of a POSITA at the time of the '336 priority date.



41. Dr. Tuckerman testified that only a small percentage of the total light output might be visible at a 90° viewing angle. Tuckerman Depo 204:19-206:16. However, nothing in the claims indicates that any specific portion of the light output must be visible nor has anyone involved in this case suggested that such a limitation exists. Moreover, an actual viewer would never be at a 90° viewing angle from all of the LEDs illustrated in any of the prior art references.

**4.3.1. “a first connector structurally distinct and separable from the power socket”**

42. In my prior declarations, I have provided opinions as to why it is obvious as a mere design choice to either combine the electrical connectors that convey power and data signals between fans into a single socket housing or to split the connector pins into two housings. With respect to small connectors like the ones used in computer fans, these are interchangeable design choices and either would be obvious once the required connections are enumerated.

43. This opinion is supported by numerous printed references that were known in the art prior to the priority date of the '336 patent.

44. One example is the SATA connectors (as disclosed in the SATA 1.0 standard) that have been used in personal computers since 2003. The SATA 1.0a specification was published in January 2003. I have been in possession of my copy since well before the priority date of the '336 patent. Among other things, it

discloses the connectors used for power and data on SATA hard drives. A SATA hard drive is a motorized component in a PC that requires both power and data connections. The specification supports more than one drive sharing cables. It is about the same size and shape as a PC fan and is a component in the same device that also requires power and data connections. A POSITA would be familiar with this technology and motivated to adopt aspects of these connectors into an illumination fan.

45. Figure 5 in the SATA 1.0 specification shows examples of the connectors used for power and signals (i.e. data). (SATA 1.0 p. 38) Two examples are provided. The connector pins can be in a single housing (as in example g) or in two housings (as in examples c & d). Both approaches work and they are interchangeable. A POSITA would understand that either part of the connector can be in either a single housing or two housings.

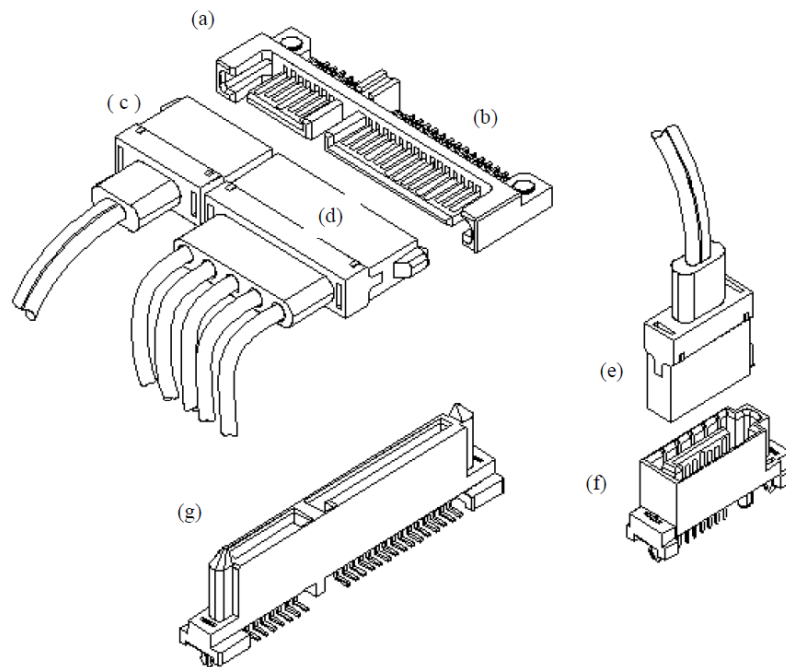


**Figure 5 – Serial ATA connector examples**

Illustrated above: (a) device signal plug segment or connector; (b) device power plug segment or connector; (c) signal cable receptacle connector, to be mated with (a); (d) power cable receptacle connector, to be mated with (b); (e) signal cable receptacle connector, to be mated with (f), the host signal plug connector; (g) host receptacle connector mating directly with device plug connector (a) & (b).

46. Furthermore, Figure 10 in the SATA 1.0 specification shows that it was well known to have two distinct connectors supporting two distinct cables in the same housing.

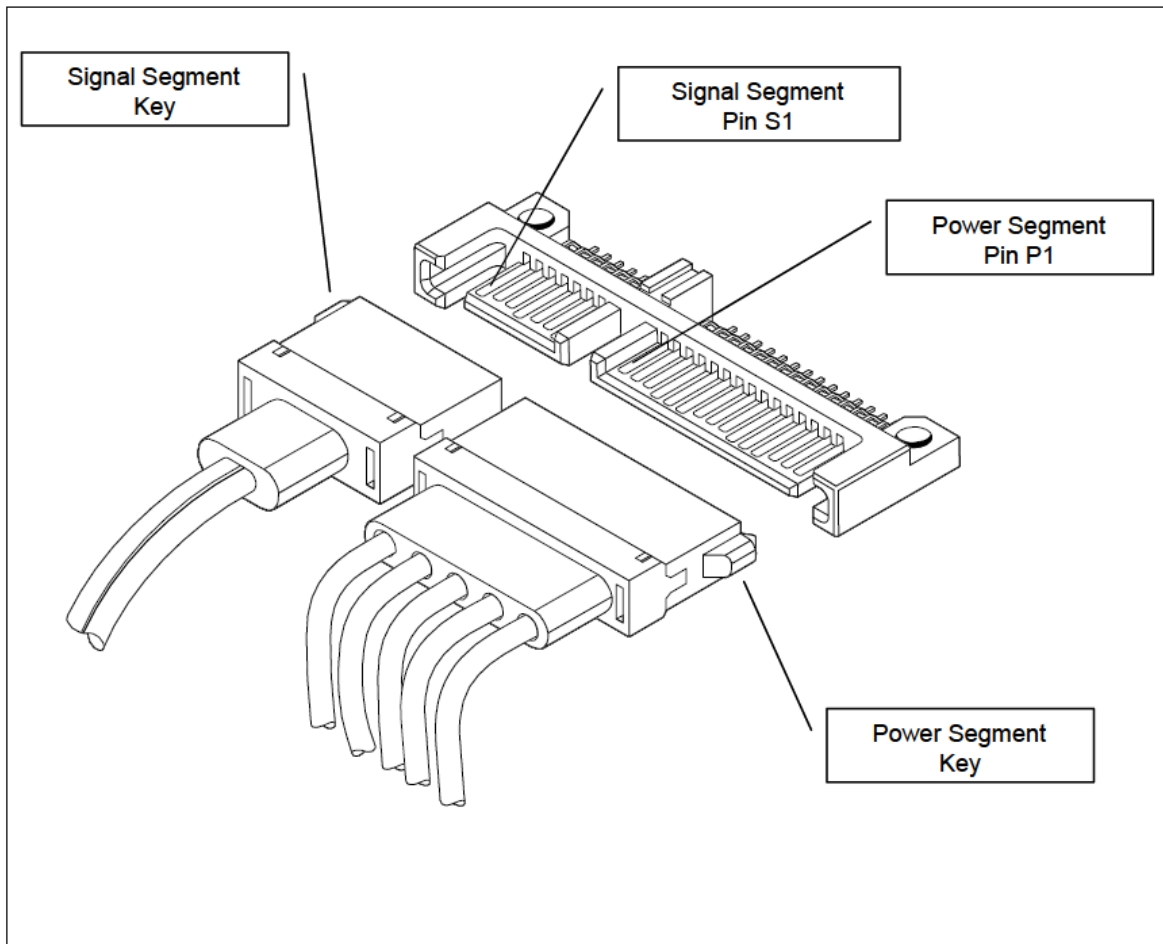


**Figure 10 Connector Pin and Feature Locations**

47. In addition to combining or separating power and signal connectors, the SATA specification teaches that one can have either one or two power connectors on the same side of the device. Figure 68 shows adjacent power and signal connections that can be in the same housing as illustrated in Figure 10. Figure 73 illustrates the alternative of adding a separate legacy power connector in a separate housing, connected to the first power connector and on the same side of the device. Figure 71 illustrates having a separate power connector housing and

signal housing. The SATA 1.0 specification clearly teaches that these are simple design choices.

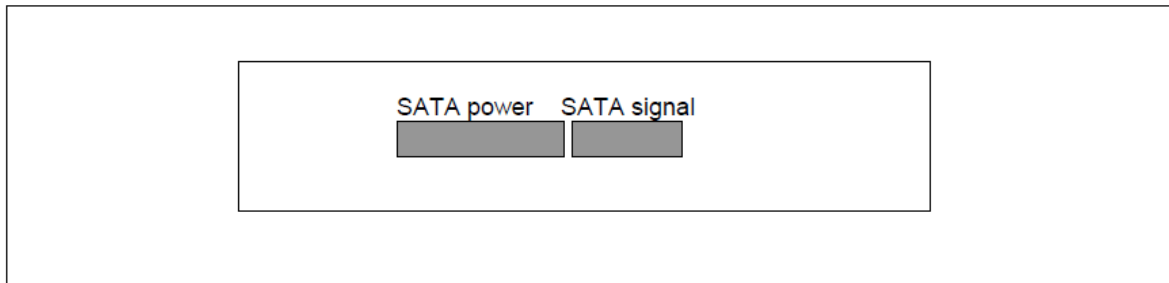


**Figure 68 - Device connector configuration 35A1**

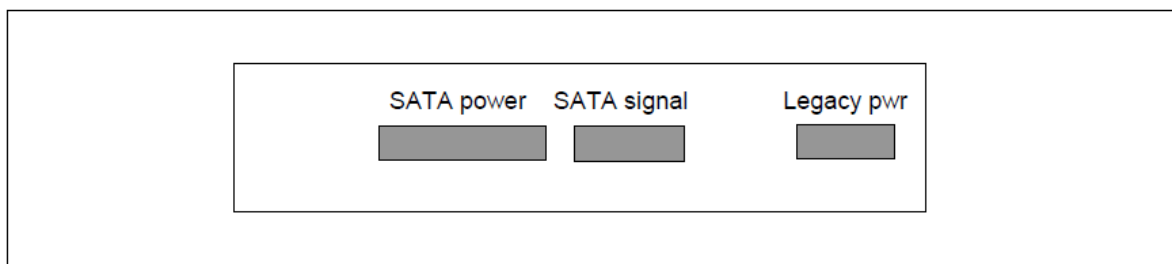


**Figure 73 - Device connector configuration 35B5**

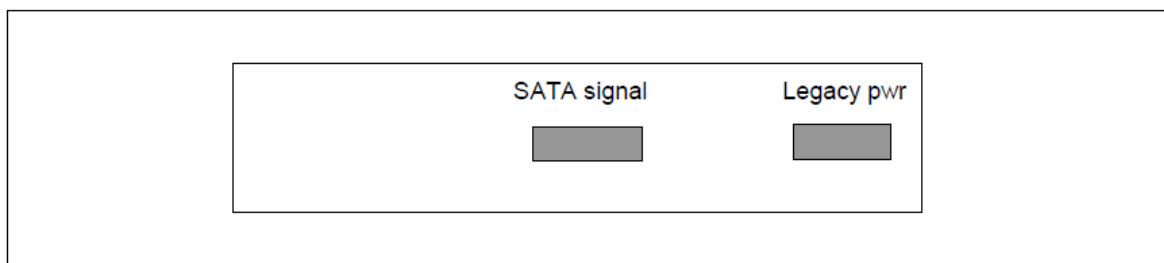
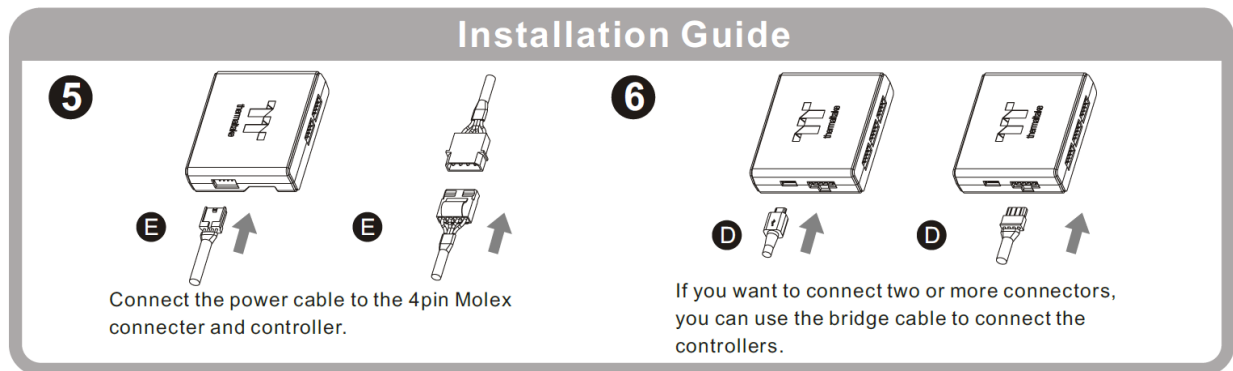


**Figure 71 - Device connector configuration 35B3**

48. The manual for a Thermaltake computer fan product from 2017 illustrates an illumination fan controller that has a power connector on one side coupled to another power connector on the other side. The second power

connector is on the same side as a data connector. A POSITA would be motivated to use the same connector configuration for power and data on an illumination fan as is used on the companion illumination fan controller and would find it obvious to do so.



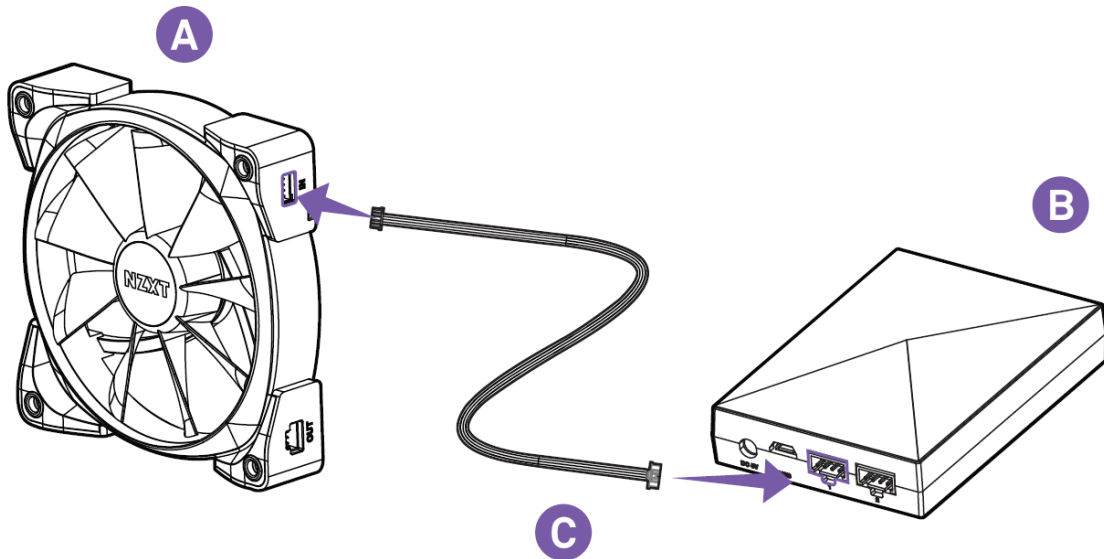
Thermaltake rgb fan manual 2017

49. A published review of the NZXT AER RGB120 illumination fan from 2017 found at <https://www.dvtests.com/nzxt-aer-rgb120-and-rgb140-test-and-review/> and corroborated by the NZXT AER RGB120 manual shows that illumination fans with two connectors on the same side of the fan were well known at the time. I have annotated the photograph below to show the two connectors.



NZXT AER RGB120 review

**3** Connect the controller cable to the HUE<sup>+</sup> and to the Aer RGB's IN port.



NZXT AER RGB120 manual

50. A POSITA would have been aware of all of these documents as well as corresponding products that demonstrate the obviousness of using either one or two connectors on the side of an illumination fan.

**4.3.2. “a connector comprising a flat surface”**

51. New amended claim 7 includes limitations “a first connector comprising a first flat surface disposed on the first side of the body” in element A(v) and “a second connector comprising a second flat surface disposed on the second side of the body” in element A(vi). I explain below why I believe that as written in the claims, these limitations lack written description. However, Dr. Tuckerman has opined that this limitation does not require the claimed flat surface

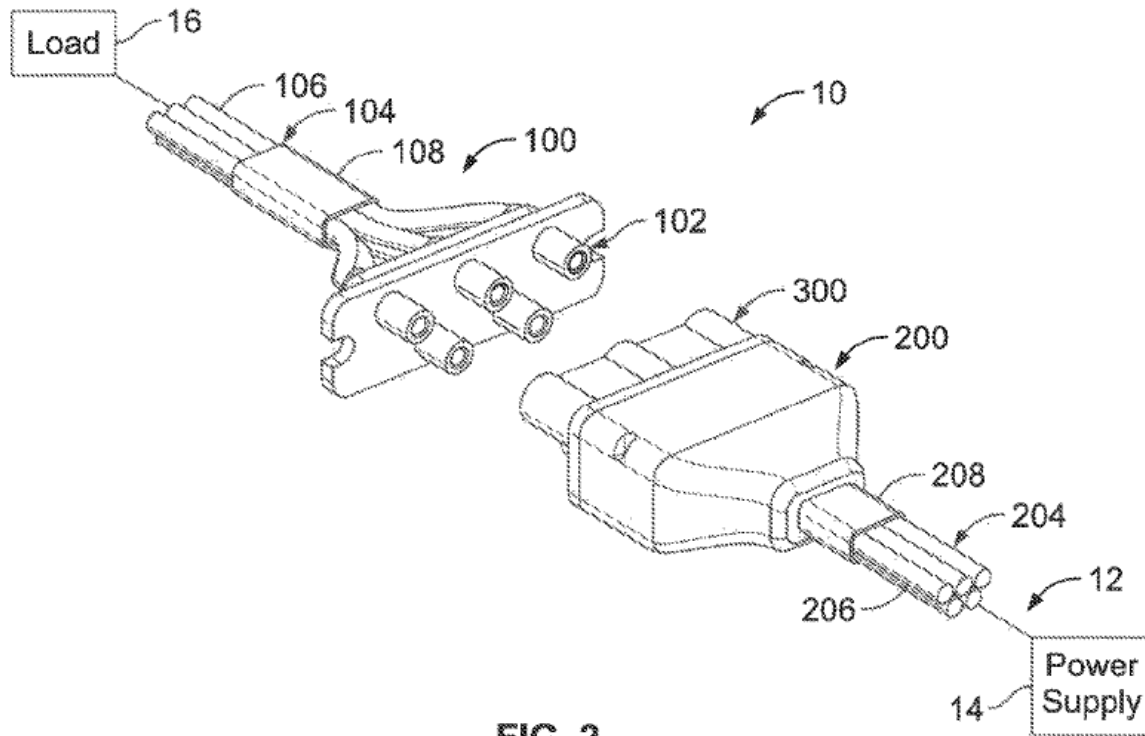
to be planar with no features extending outward from it or recessed from it. Tuckerman Depo 191:13-20. He also opines that a connector with electrical contacts that protrude from or are recessed from the surface may still be covered by new Claim 7. Tuckerman Depo 194:4-8. Under such an interpretation, the use of connectors comprising a flat surface would have been so commonplace as to have been both disclosed by and obvious to use in light of the prior art. A POSITA would have been motivated to use such connectors in the prior art relied upon in this matter since almost all ordinary connectors meet this requirement.

52. Dr. Tuckerman admits that electrical connectors with a flat surface were known in the prior art. Tuckerman Deposition 203:10-19.

53. I have identified several examples of such connectors that would have been well known to a POSITA at the time of the '336 priority date. As a first example, each of the connectors illustrated in section 4.3.1 is comprised of at least one flat surface.

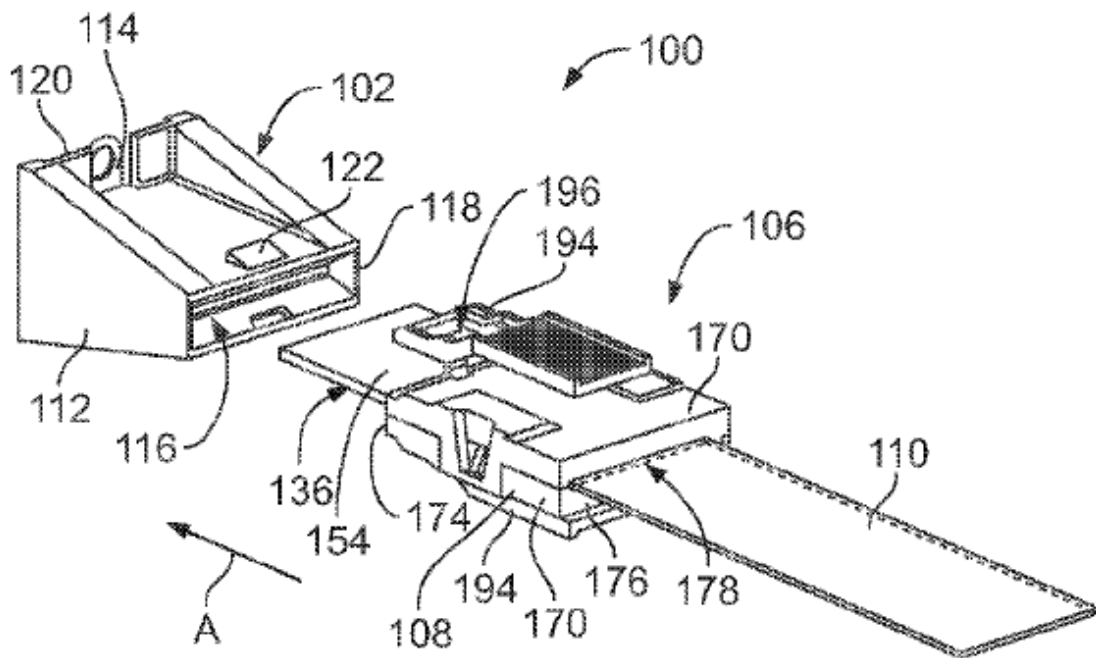
54. A simple search for connector patents from popular connector manufacturers provides many more suitable examples. U.S. Patent Application 20190260150A1 illustrates numerous such connectors including the connector on the left in Figure 2 which clearly included a flat surface. This connector is intended to be disposed on the side of a housing (as illustrated by the fastening detent 120 on each side) and includes several contacts protruding from the flat

surface. 20190260150A1 Figures 3 and 4 and [0028]. It is intended to receive power from a mating connector.

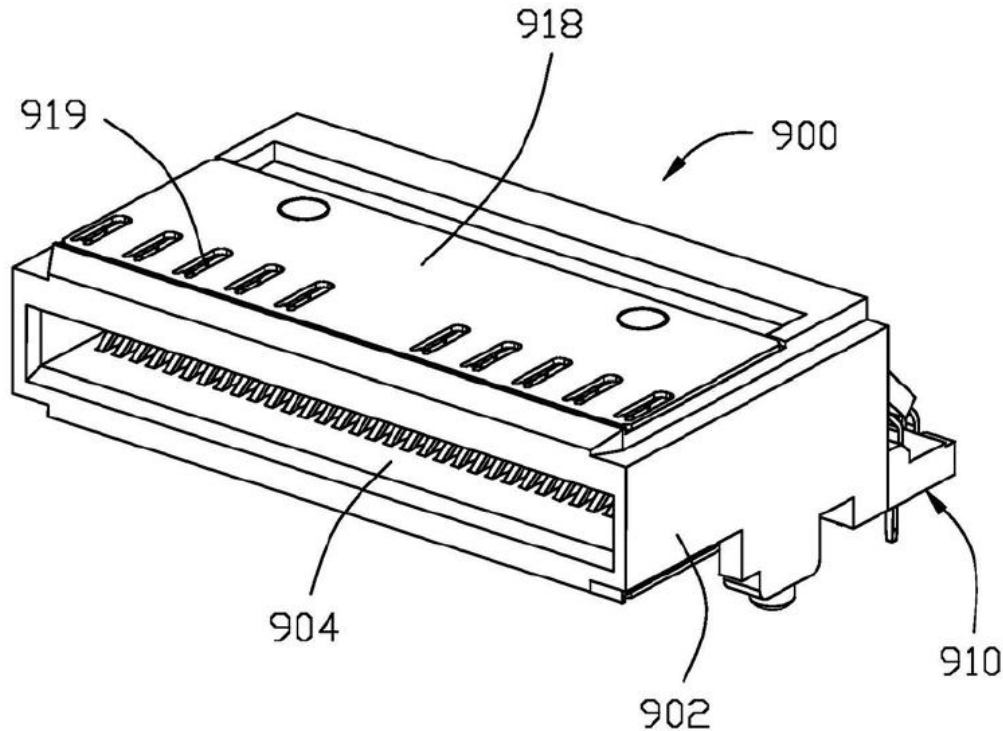


U.S. Patent Application 20190260150A1

55. A similar disclosure of a connector that meets Dr. Tuckerman's definition is taught by U.S. Patent 8,840,415. This patent related to power connector systems and thus a POSITA would be motivated to look to it for a power connector. U.S. Patent 8,840,415 1:5-6. Figure 3 illustrates a power connector 102 including a housing 112 and any number of power terminals inside the housing. U.S. Patent 8,840,415 3:5-28. This connector comprises a number of flat surfaces on the bottom, sides, and front.



56. A similar disclosure of a connector that meets Dr. Tuckerman's definition is illustrated in Chinese Patent CN107871987B. This patent also clearly illustrates a connector with a flat outer surface.



57. Under Dr. Tuckerman's claim interpretation, this additional limitation in claim 7 would be satisfied by simply choosing ordinary connectors or by combining the references with the art discussed in this section.

#### 4.4. The New Amended Claims 6 and 7

58. It is my understanding that Patent Owner has proposed new amended claims 6 and 7. These claims were presented by Patent Owner as below:

6. A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein
  - (A) the first illumination fan comprises:
    - (i) a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;

- (ii) a center fan located in a center of the body;
  - (iii) an illumination area located at the top of the body and disposed on at least two sides of the center fan;
  - (iv) a power socket comprising an opening disposed on the first side of the body;
  - (v) a first connector disposed on the first side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first connector comprises a first electrical terminal configured to electrically connect with a second electrical terminal of the second illumination fan; and
  - (vi) a second connector disposed on the second side of the body;
- (B) the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power via the power socket's electrical connection with the second connector, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and
- (C) when the first connector of the body of the first illumination fan is connected with a second connector of a body of the second illumination fan,

a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.

7. A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein:

(A) the first illumination fan comprises:

(i) a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;

(ii) a center fan located in a center of the body;

(iii) an illumination area located at the top of the body and disposed on at least two sides of the center fan;

(iv) a power socket comprising an opening disposed on the first side of the body;

(v) a first connector comprising a first flat surface disposed on the first side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first flat surface comprises a first electrical terminal that is round and configured to electrically connect with a second electrical terminal of the second illumination fan; and

(vi) a second connector comprising a second flat surface disposed on the second side of the body;

(B) the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power via the power socket's electrical connection with the second connector, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and

(C) when the first connector of the body of the first illumination fan is connected with a second connector of a body of the second illumination fan, a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.

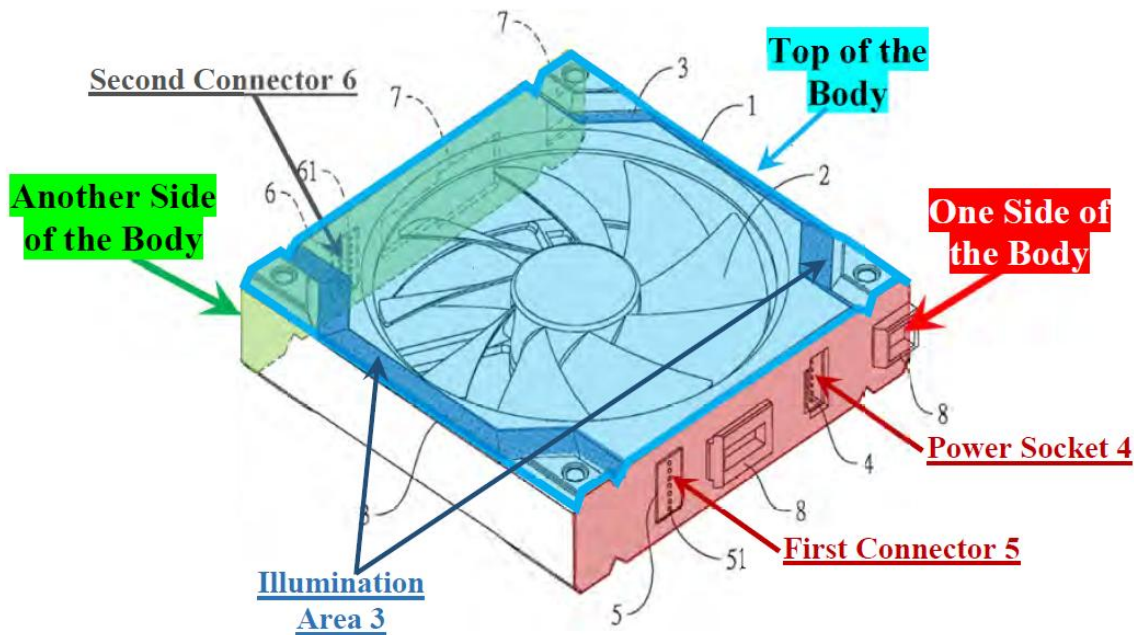
59. The only substantive difference between claims 6 and 7 is that claim 7 includes the additional limitation “a first connector **comprising a first flat surface**” in element A(v) and the additional limitation “a second connector **comprising a second flat surface**” in element A(vi).

#### **4.4.1. Claims 6 and 7 lack written description support**

60. Dr. Tuckerman has opined that “the plain language of claim 1, ... makes clear that an ‘illumination area’ is not simply an area where light happens to be visible to the user – it is the area of the body that actually generates light, i.e., illuminates.” Ex[2006] ¶51. He further opines that it is insufficient with respect to the claims to show that light from LEDs is visible from a top view. *Id.*

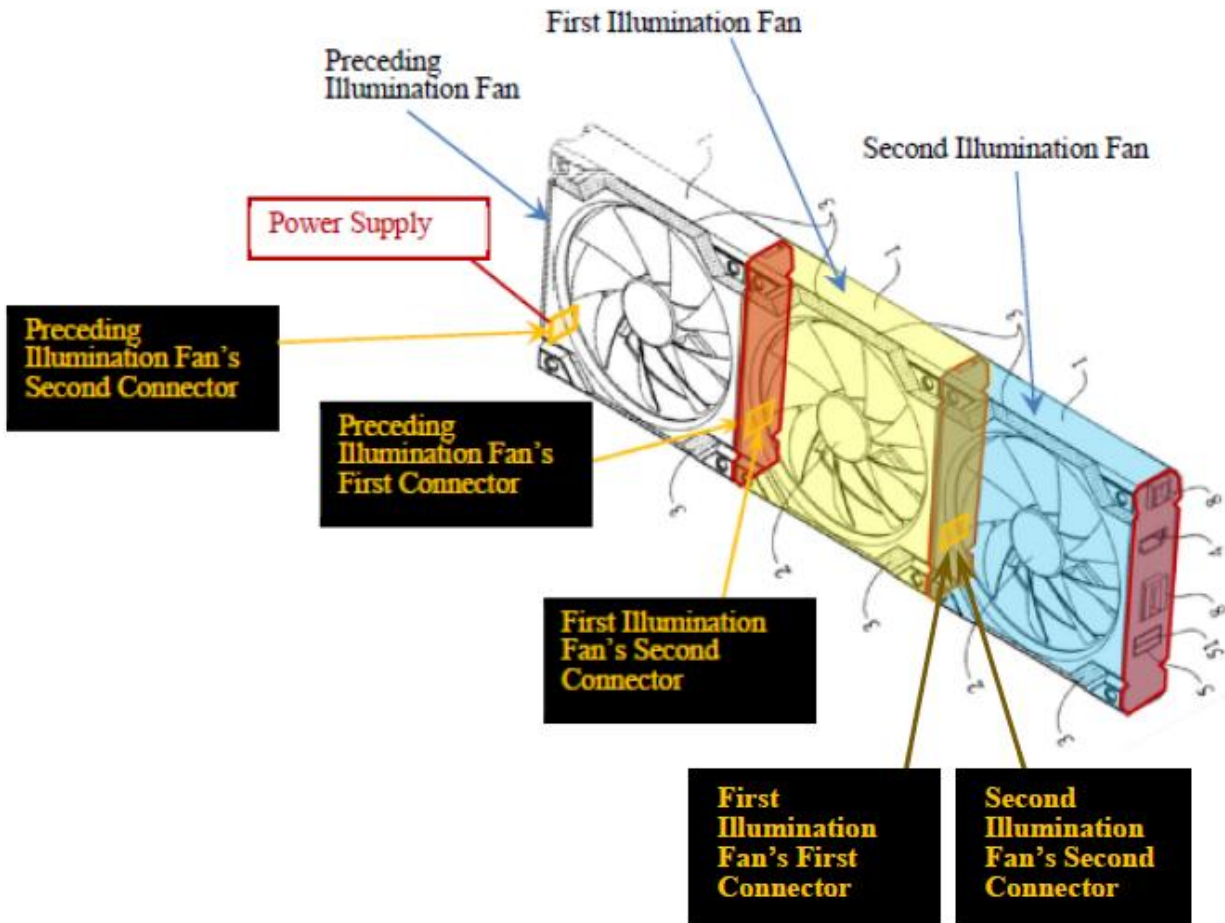
61. Contrary to Dr. Tuckerman’s definition in Ex[2006], the area he has marked as Illumination Area 3 on Ex[2006] p. 20 is not disclosed to generate light. A POSITA would understand this to most likely be a diffuser that is illuminated by

an internal LED source.



62. New claims 6 and 7 require “an illumination area located at the top of the body and disposed on at least two sides of the center fan.” Under Dr. Tuckerman’s opinion that the claimed illumination area must generate light, there is no embodiment described in the ’336 patent in which the light generating elements are located at the top of the body. In fact, the illustrated diffusers are not even at the top of the body as he has applied that term.

63. New claims 6 and 7 claim a combination of two fans, each of which includes a power socket, a first connector, and a second connector which are electrically connected. These claims cover an embodiment whereby external power is provided directly to the second connector rather than directly to the power socket. *See e.g.* Ex[2052] ¶¶39-41, p. 27; Ex[2037]



Ex[2037]

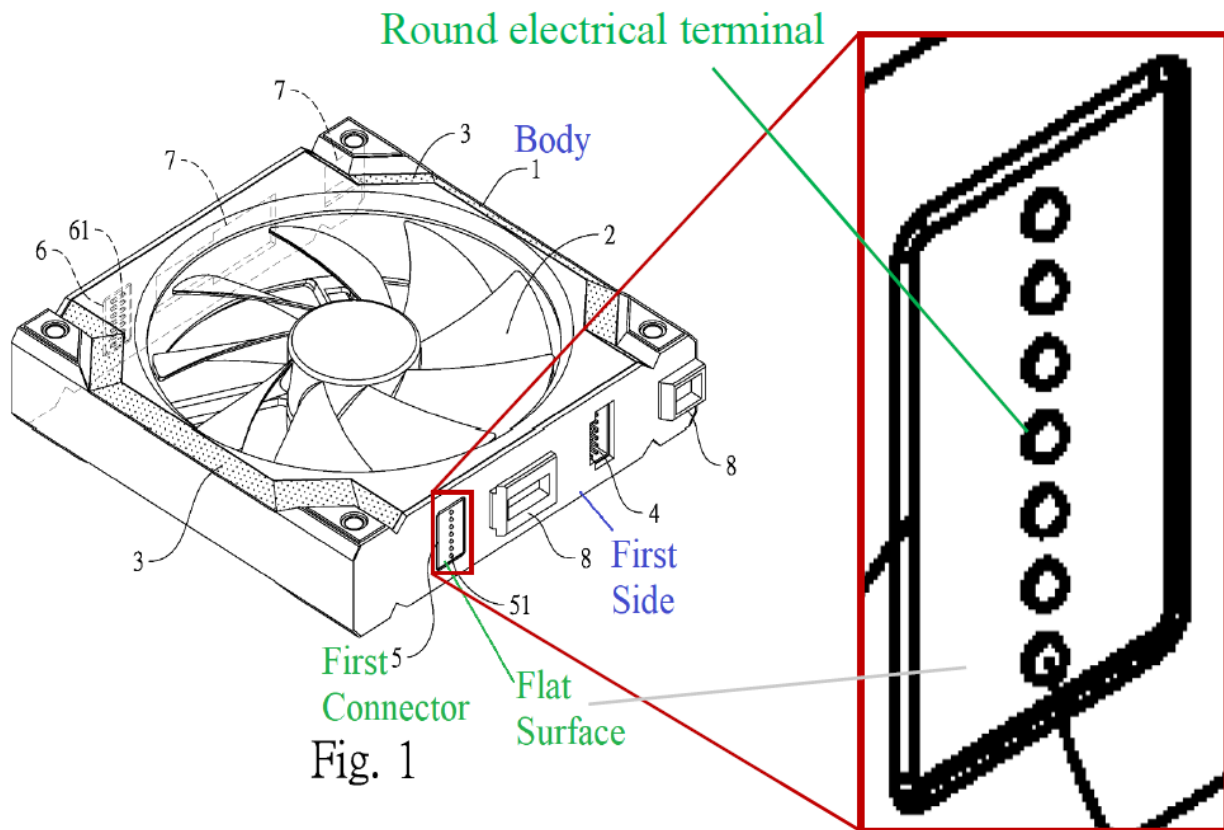
64. There is no written description of such an embodiment in the '336 patent. There is never any disclosure of providing power directly from the power supply to the second connector. As such, no written description is provided for the full scope of claims 1-5 nor for new claims 6 and 7. Dr. Tuckerman essentially admits as much. Ex[2052] p. 27-28. He contends that “such direct power connection on the second connector of the preceding illumination fan does not need to be expressly disclosed or taught by the '336 patent so long as this power

connection is permitted and is not excluded thereunder.” I do not agree that this meets the written description requirement.

65. New claim 7 also includes the limitations “a first connector comprising a first flat surface disposed on the first side of the body” in element A(v) and “a second connector comprising a second flat surface disposed on the second side of the body” in element A(vi). I do not believe that the ’336 patent includes a sufficient written description of these claim limitations.

66. First, I note that the word “flat” does not appear in the specification.

67. With respect to the first of these limitations, Dr. Tuckerman only identifies support for this limitation at Ex[2052] p. 29. In part, he relies on Ex[2017], which to my understanding is not part of the ’336 specification and is not incorporated by reference. Other than that, he relies on an annotated drawing based on ’336 Figure 1.



Dr. Tuckerman's drawing

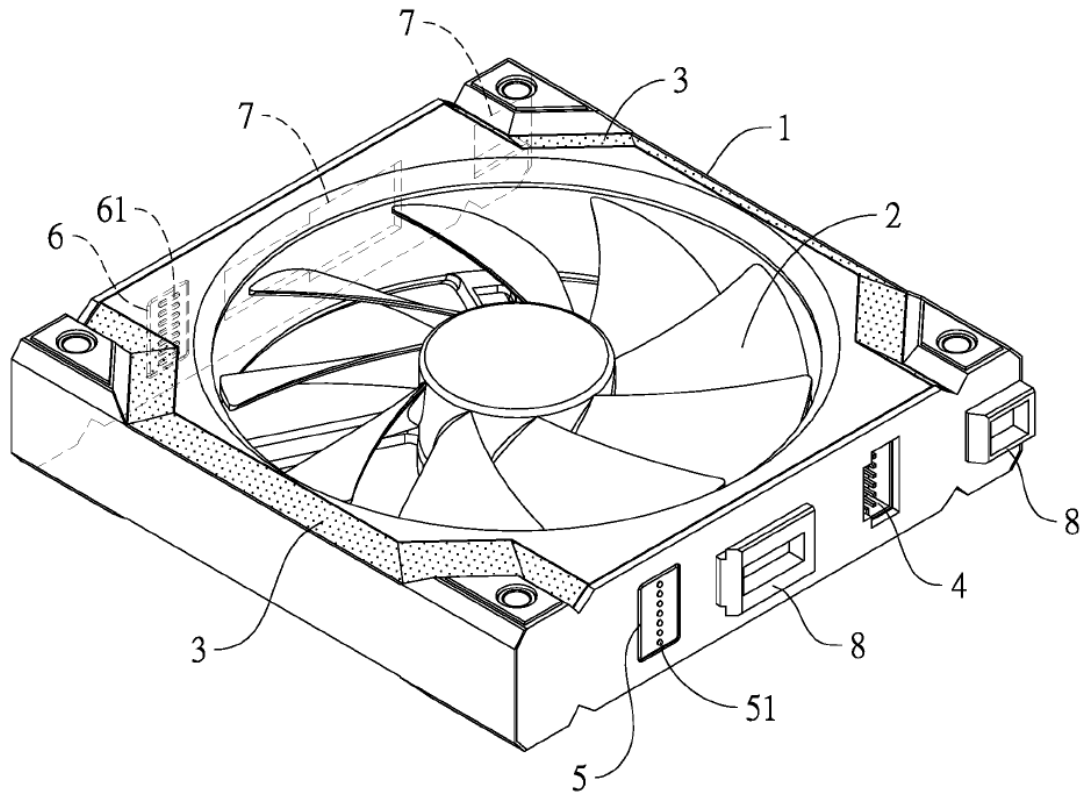
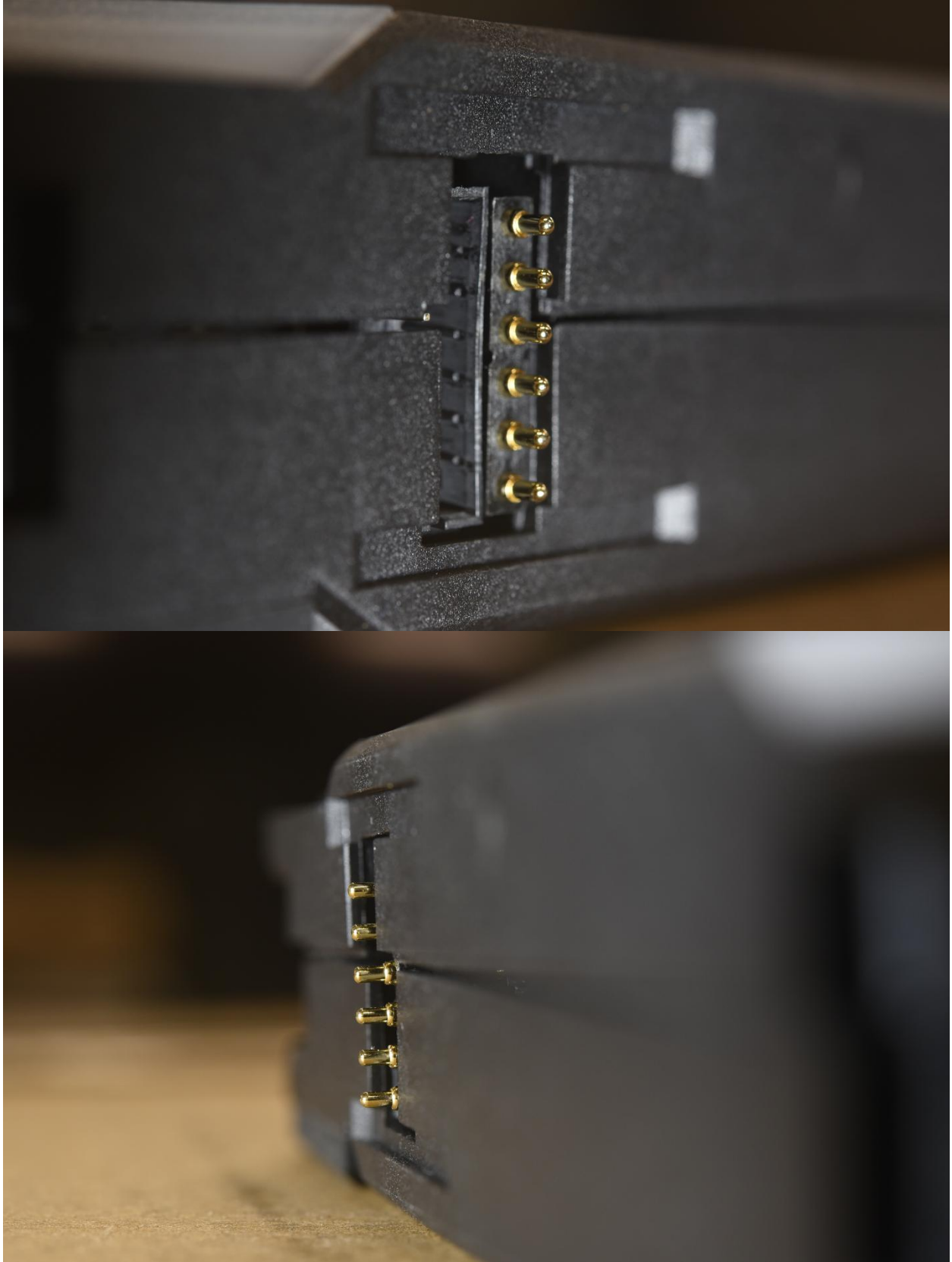


Fig. 1

Original Figure 1

68. Dr. Tuckerman's belief that a flat surface on connector 5 is clearly illustrated is wishful thinking. Moreover, connector 5 is not disposed on the first side of the body under his interpretation of side. Dr. Tuckerman opines that in the claims referring to a side of the body, side refers to a lateral face of an object such as a die. Ex.[2052] ¶30. Connector 5 is disposed in an opening in the lateral face of the body, not on the lateral face of the body.

69. A POSITA would recognize the portion of connector 5 that Dr. Tuckerman has identified as an opening and not as a flat surface. Additionally, it is clearly inset from the surface of the fan body in the drawing. A POSITA would recognize connector 5 as the same type of connector that Dr. Tuckerman identified in the Lian Li products in Ex[2006] p. 105. This connector does not have flat connection pins; they are hemispherical. It also does not have a flat surface disposed on the side of the body as Dr. Tuckerman has defined that term. The connector is disposed in an opening and is attached to an interior surface. A POSITA would understand connector 5 to be this same configuration or at least would not find a flat surface disposed on the lateral surface of the body to be clearly disclosed.



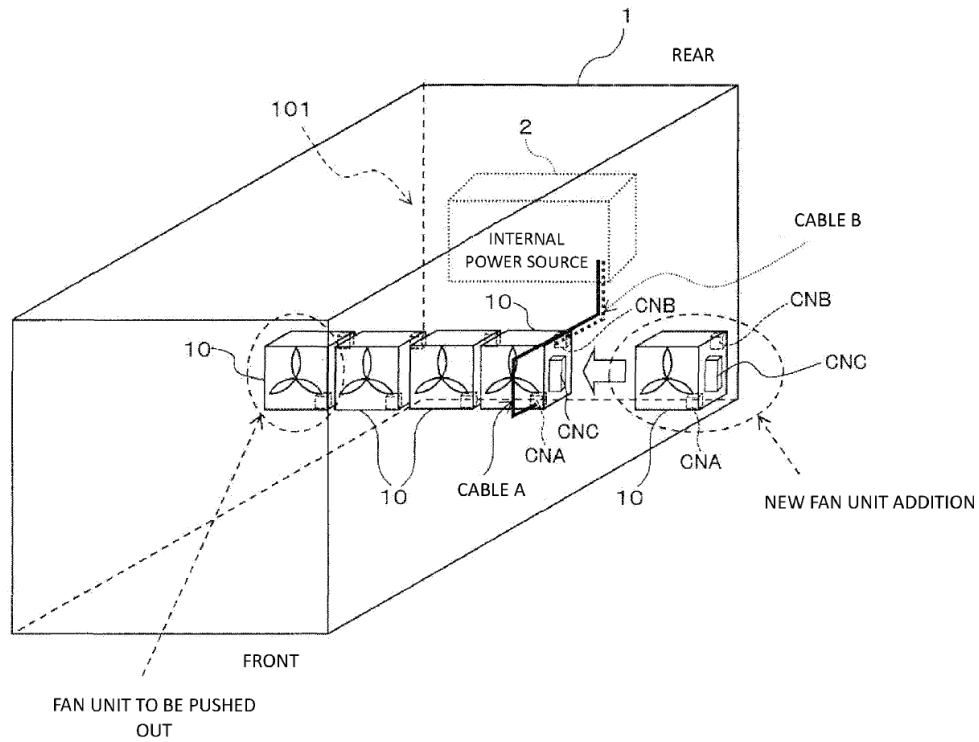
70. Dr. Tuckerman admits that there is no discussion in the text of the specification regarding the shape of the connectors. Tuckerman Depo 191:4-11. Dr. Tuckerman admitted that he could not tell from the photographs he provided of Lian Li products in Ex[2006] p. 105 whether they practiced this claim limitation regarding a flat connector. Tuckerman Depo 194:18-196:17. But he stated that he did not see anything that looked flat. If Dr. Tuckerman, an expert, cannot identify a flat surface from his own photograph, a POSITA could never clearly determine that the drawings in the '336 patent disclose a flat connector surface.

71. The other apparent distinction in these new claims is that first connector is structurally distinct and separable from the power socket. I explained in Ex[1004] why this would be obvious, and it is my understanding that in the Initial Determination the Board agreed. It is a simple design choice whether to combine the power connections and signals into a single connector or to split them between two connectors as I explain above. It is also well documented in prior art references that it would be obvious to combine with the art discussed below. To the extent that this new language is simply splitting multiple connections into 2 housings, this would have been a simple and obvious design choice.

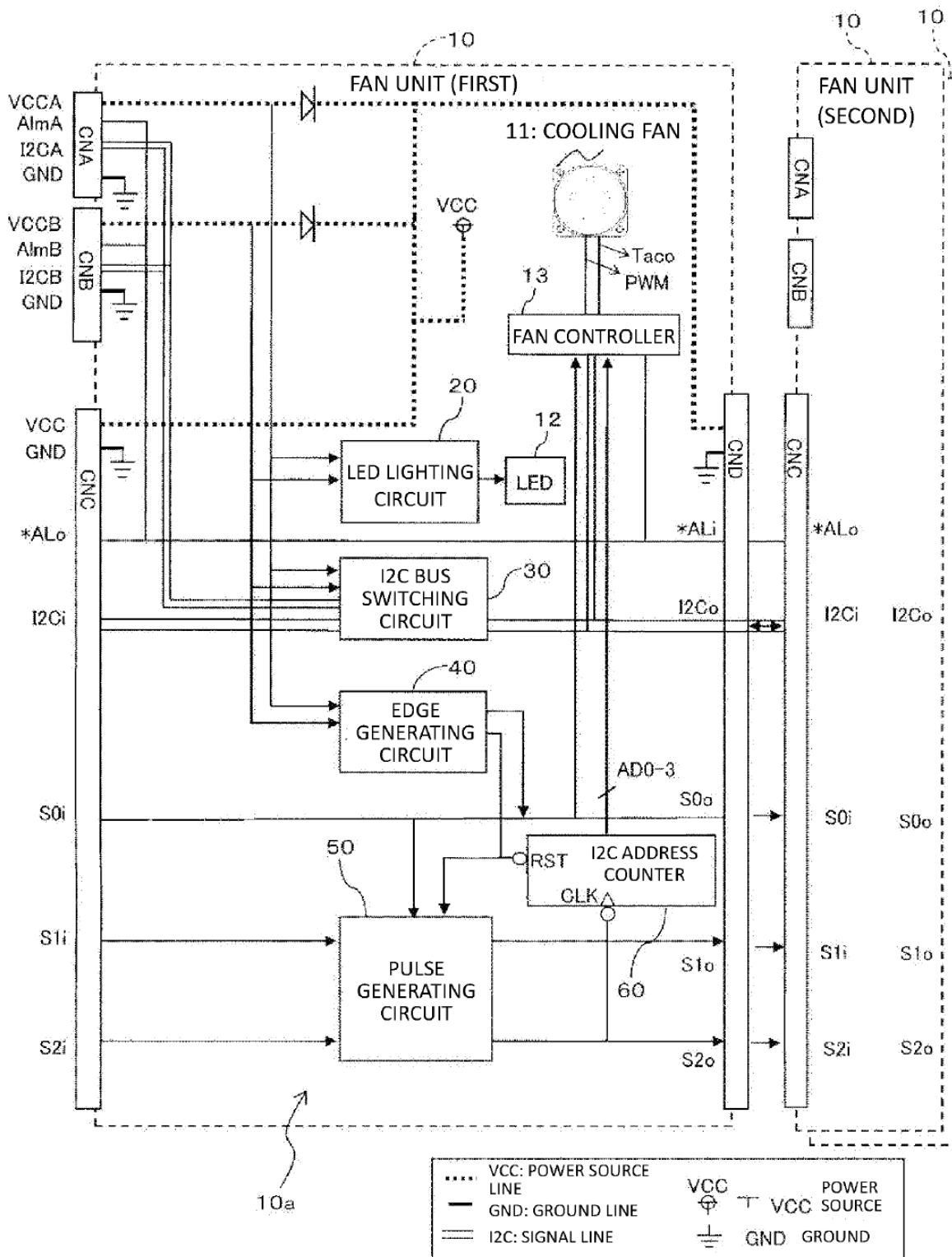
**4.7.1 Ground 1a - JP2018041147A (“Tsuji”) in view of US10082286 (“Huang”) renders new claims 6-7 obvious.**

**4.4.1.1. 6pre: *A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein:***

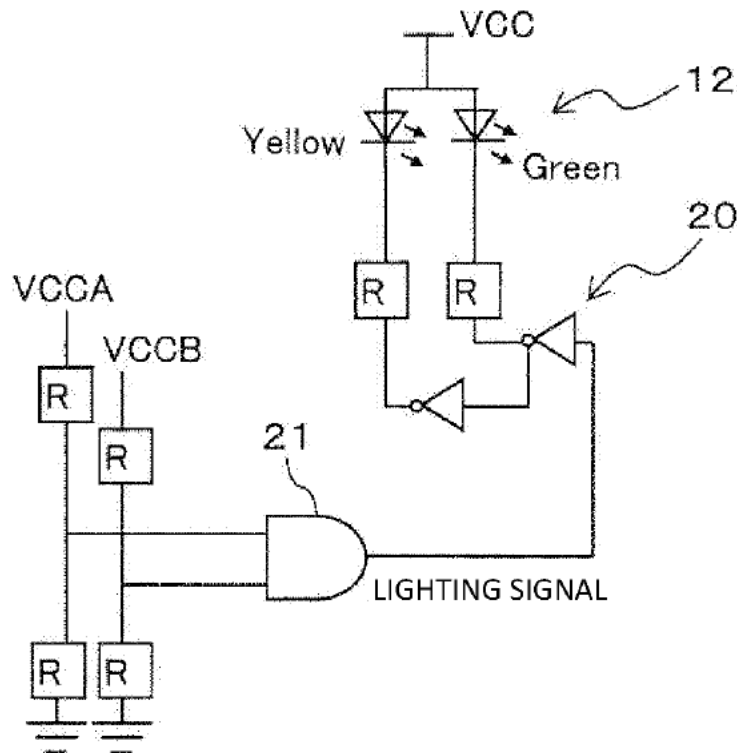
72. To the extent that the preamble is limiting, Tsuji discloses first illumination fan for a computer connected with a second illumination fan for a computer. Tsuji claim 1 discloses “a plurality of fan units that cools the serially-connected electronic apparatus.” In presenting the problem to be solved, Tsuji discloses “In cooling fans conventionally used in large-scale backbone servers, an ability to perform hot maintenance and swapping while maintaining a system operational state (energized state) is desirable. Accordingly, a fan unit that includes a cooling fan is often arranged on the front side or the rear side of a chassis that forms a server casing.” Ex[1007] at [0002]. Tsuji explains that “FIG. 5 is a schematic perspective view of a connection structure of a server and fan units to which a technology according to the present embodiment is applied.” Ex[1007] at [0012]. A POSITA would understand the disclosed server to be a computer. Tsuji also discloses illumination within the disclosed fan. “FIG. 14 is a block diagram showing a configuration of each fan unit according to the present embodiment. FIG. 15 is a block diagram showing a detailed configuration of a Light Emitting Diode (LED) lightning [sic, lighting] circuit shown in FIG. 14.” Ex[1007] at [0012]. Each exemplary fan unit includes a fan 11 and illumination 12.



Ex[1007] at Figure 5



Ex[1007] at Figure 14



Ex[1007] at Figure 15

73. Huang discloses a similar illumination fan in a computer. While Huang does not disclose two fans connected, the teachings of Huang would be incorporated into the multiple fans of Tsuji.

“A cooling fan having a light-emitting effect comprises a frame body, a light-emitting assembly and a fan blade assembly, wherein the frame body has a base and an upper cover” Ex[1008] at Abstract.

“FIG. 1 is a stereoscopic schematic drawing of a first embodiment of the present invention.” Ex[1008] at 3:33-34.

“A fan used in a computer is mainly used to discharge the thermal energy released by the operation of a host computer to the outside. The conventional host computer is often placed in a corner because of

its monotony. In order to increase the visibility of the host computer, there are many transparent or light-emitting cases available in the market that can render the host computer different light changes, a variety of cooling fans, heat-conducting water drains and the like which can emit different light changes are provided in the host computer so as to enhance the visibility of the host computer through different light changes.” Ex[1008] at 1:12-22.

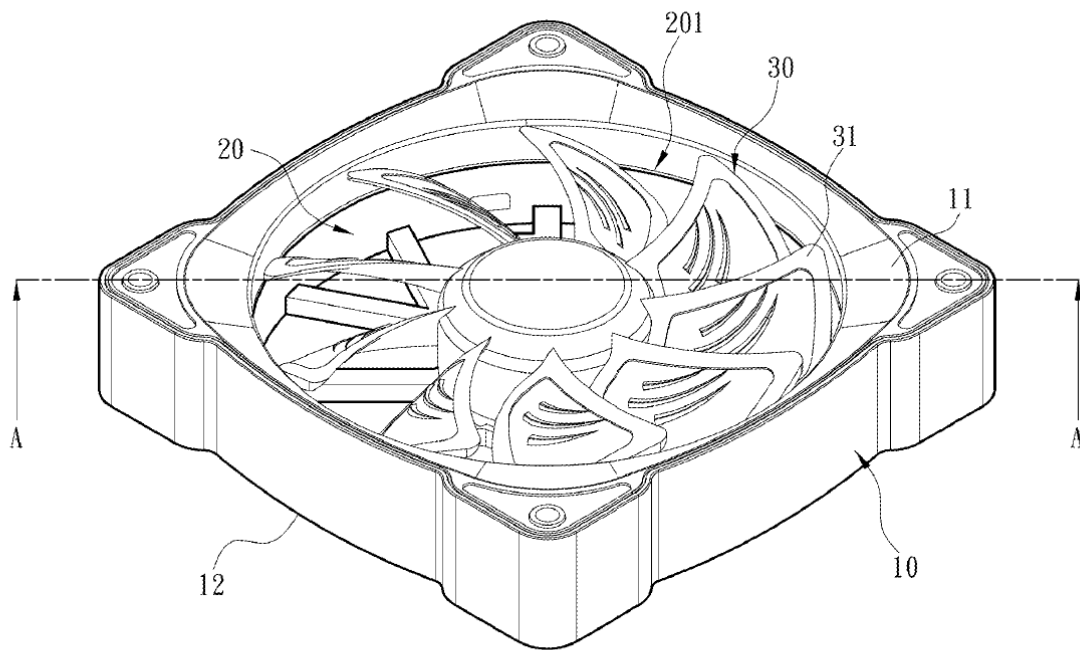


Fig. 1

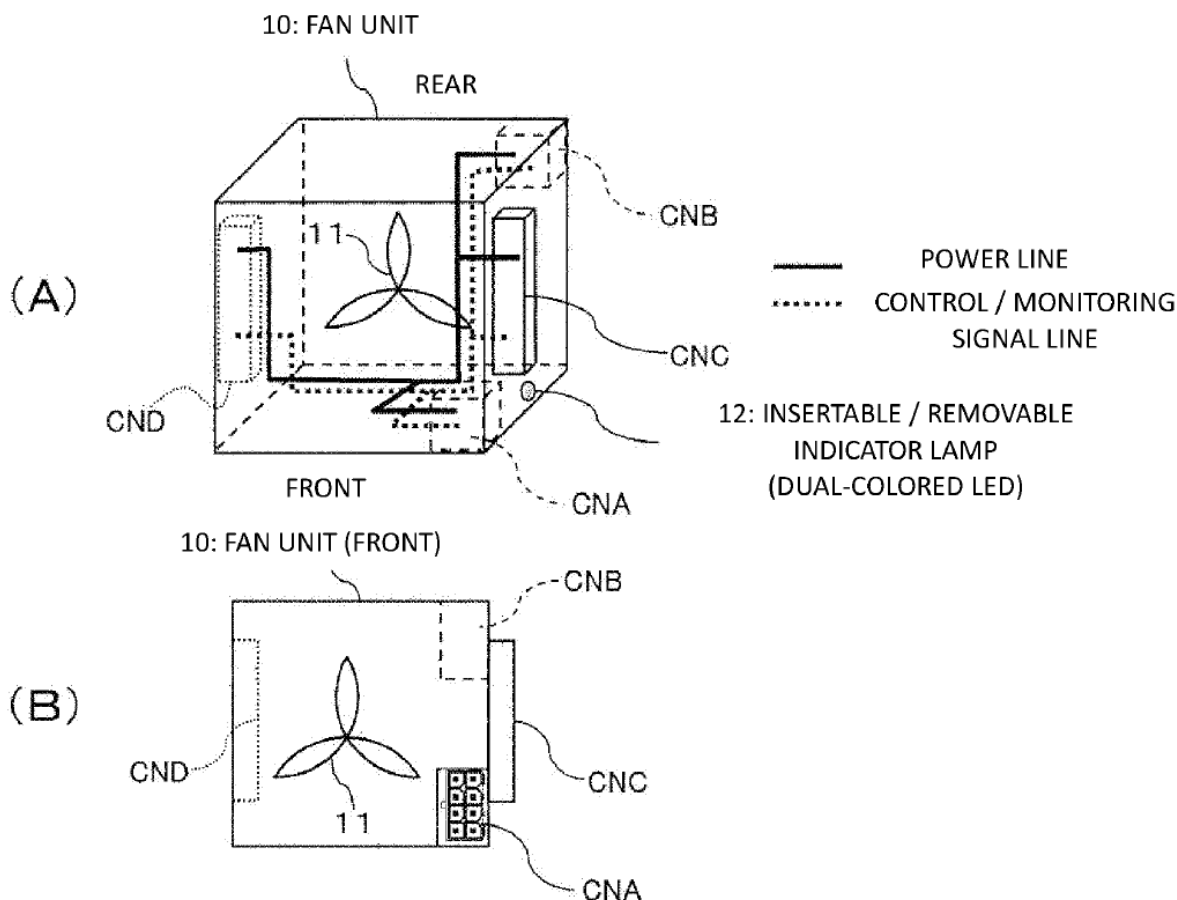
Ex[1008] at Figure 1

**4.4.1.2. 6(A): the first illumination fan comprises:**

74. The first illumination fan comprises the elements discussed below:

**4.4.1.3. 6(A)(i) a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;**

75. Tsuji discloses a body (e.g., Fan Unit 10) body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side, which includes a fan (e.g. Fan 11) that is substantially in the center of the body. *See, e.g., Ex[1007] at Figures 1-8.* These two sides are present even under Dr. Tuckerman's interpretation of the claims.



Ex[1007] at Figure 7

76. Huang also discloses a body (e.g. Frame Body 10) body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side, which includes a fan (e.g., Fan Assembly 30) that is substantially in the center of the body. “FIG. 2 is stereoscopic exploded schematic drawing of the first embodiment of the present invention.” Ex[1008] at 3:35-36. *See also e.g.*, Ex[1008] at Figures 1, 2, and 7.

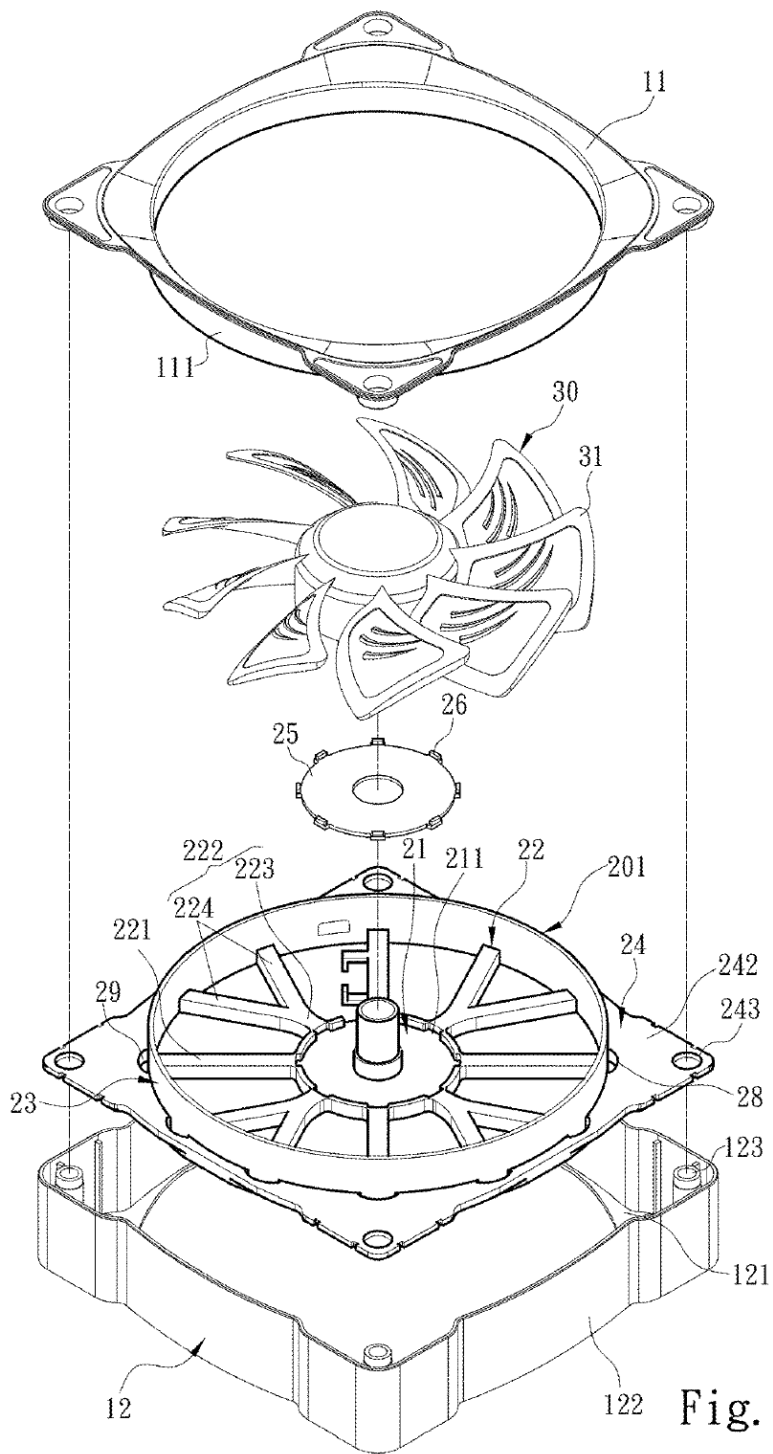


Fig. 2

Ex[1008] at Figure 2

**4.4.1.4. 6(A)(ii): a center fan located in a center of the body**

77. Tsuji discloses a body (e.g., Fan Unit 10) body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side, which includes a fan (e.g., Fan 11) that is substantially in the center of the body. *See* 4.4.1.3 Huang also discloses center fan (Fan Assembly 30) located in a center of the body.

**4.4.1.5. 6(A)(iii): an illumination area located at the top of the body and disposed on at least two sides of the center fan body;**

78. Tsuji discloses an indicator lamp 12 located at the top of the body and disposed on at least a side of the center fan body. Ex[1007] at [0135]-[0136]. *See also e.g.*, Ex[1007] at Figure 7. To the extent that Tsuji does not disclose that the illumination area is on at least two sides of the fan, it would be obvious to a POSITA to place an additional indicator lamp on a second side. Tsuji already teaches that it may be beneficial to have the indicator lamp visible from an additional location. Ex[1007] at [0135]-[0136]. *See also e.g.*, Ex[1007] at Figures 8-12.

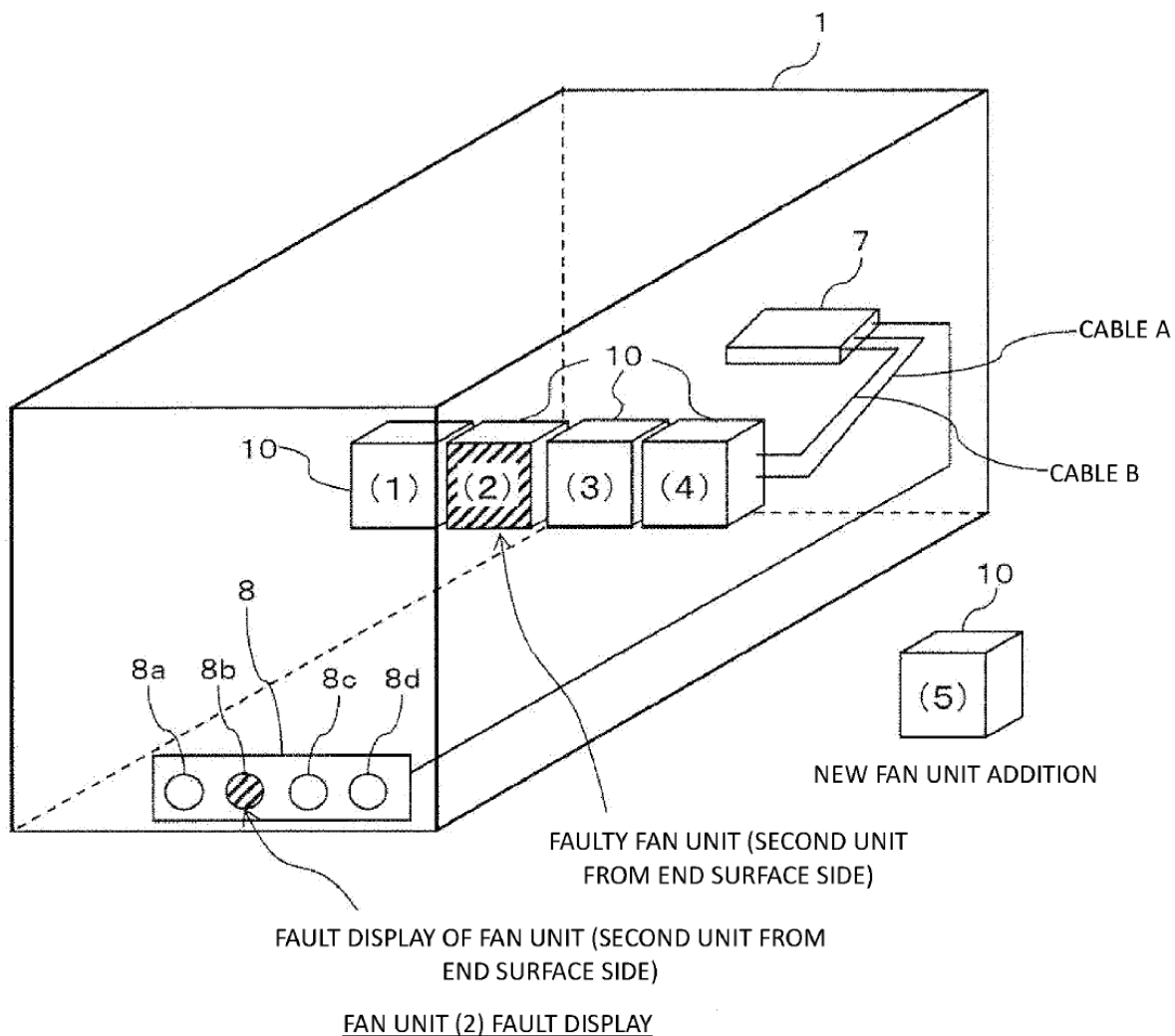
“Accordingly, a link between the installation position of each fan unit 10 inside the casing of server 1 and the I2C slave address thereof can be established without performing any special operation, and the management unit 7 can correctly recognize each fan unit 10 and appropriately perform the rotation speed control or abnormality condition monitoring of each fan unit 10. For example, correspondence between the faulty fan unit 10 and fault LEDs 8a to

8d that should be lit on a fan fault external display panel 8 can be correctly established, as explained later by referring to FIGS. 8 to 11. In such a manner, according to server 1 of the present embodiment, problems and issues of the related technology explained above by referring to FIGS. 1 to 4 can be resolved.” Ex[1007] at [0033]

“Furthermore, as shown in FIG. 7A, an insertable / removable indicator lamp 12 is provided on the right side surface when viewed from the front surface of each fan unit 10. Because the right side surface is exposed to the outside when fan unit 10 is arranged on the right-most side of the plurality of fan units 10 (when fan unit 10 is added), the maintenance person can check a lighting state of the insertable / removable indicator lamp 12.” Ex[1007] at [0040]

“As shown in FIGS. 8 to 11, a fan fault external display panel 8 is provided on a lower part of the front surface of server 1 according to the present embodiment. The fan fault external display panel 8 includes four LEDs (dual-colored LEDs) 8a, 8b, 8c, and 8d. The management unit 7 controls the lighting color of the LEDs 8a to 8d in accordance with the state of the four fan units 10 mounted inside server 1.” Ex[1007] at [0055]; *see also* Ex[1007] at [0056]-[0060], [0064]-[0066].

“As explained above while referring to FIGS. 8 to 11, the fan fault external display panel 8 is arranged on a lower part of the front surface of server 1, and includes the LEDs 8a to 8d that correspond to the four fan units 10. The LEDs 8a to 8d are controlled by the monitoring unit 7 so as to light in a color based on the state of the four fan units 10 installed inside server 1.” Ex[1007] at [0079].



Ex[1007] at Figure 9

79. In light of this teaching, a POSITA would find it obvious to include additional indicator lights on at least two sides of the fan assembly so that they can be visible from multiple perspectives as taught. It would be within the ordinary skill of a POSITA to modify the circuit in Figure 15 to drive two or more bicolor LEDs without any experimentation. Alternatively, it would be within the ordinary

skill of a POSITA to replicate the circuit in Figure 15 to drive two or more bicolor LEDs without any experimentation. As the fan modules can be observed from the top, it would also be obvious to place these indicator LEDs on the top of each of the two sides for improved visibility. There would be no technical adaptation required.

80. Additionally, a POSITA would have found it obvious to modify Tsuji to incorporate the teachings regarding light emitting and diffusing elements from Huang. Moreover, a POSITA could make this modification using the teachings in the references with no additional experimentation and with an extremely high and predictable expectation of success. In the first place, a POSITA would have been motivated to make this combination. Both patents are directed towards the structure and operation of computer cooling fans that include a mounting frame, rotating fan blades, and lights intended to be visible to a user. Thus, these two patents are in the same field of art. *See, e.g.*, Ex[1007] at [Abstract] [Problem] [Solution] and Ex[1008] at 1:6-9. Additionally, design incentive and market forces would encourage a POSITA to incorporate the teachings regarding light emitting and diffusing elements from Huang into Tsuji. Huang provides a larger illumination area that is more uniform. Ex[1008] at 1:57-2:7, Figure 2. This provides more visibility and can be seen from further away than the simpler LEDs in the Tsuji embodiments. Similarly, the light element that improved the fan in

Huang would be obvious to use in the very similar fan in Tsuji in the same way. The illumination element from Huang to be combined with the Tsuji fan design is completely analogous to the modular sensor in the KSR precedent. “It is common sense that familiar items may have obvious uses beyond their primary purposes, and a person of ordinary skill often will be able to fit the teachings of multiple patents together like pieces of a puzzle.” A top-viewable, diffused light as taught in Huang is a familiar item to a POSITA and can be incorporated into the Tsuji fan in the same manner as it is incorporated into the Huang fan. A POSITA would have a good reason (larger, more uniform illumination) to pursue this known option and it would almost certainly lead to anticipated success. Additionally, the positioning of the light on the top of the fan, visible from two sides, is one of a finite number of identified, predictable solutions to placing the light.

81. Huang teaches that the light element forms an illumination area at the top of the fan on at least two sides. In fact, the entire upper cover 11 is illuminated in some embodiments and the entire base 12 is illuminated in some embodiments.

“The cooling fan comprises a frame body, a light-emitting assembly and a fan blade assembly. The frame body includes a base and an upper cover which is made from a light-permeable material and forms an installation space together with the base. The light-emitting assembly is mounted on the base and includes a circuit board, a plurality of light-emitting elements which are electrically connected with the circuit board and emit a light respectively, and a light guide plate. The light guide plate includes a plurality of light guide strips which correspond to each of the plurality of light-emitting elements

respectively to form a guide path that guides the light, and a light diffusion portion which is connected with the plurality of light guide strips. The light diffusion portion includes a first diffusion portion in a position corresponding to each of the plurality of light guide strips, such that the light passes through the guide path to form a diffused light via the first diffusion portion, and the upper cover is in a uniform light-emitting state. The fan blade assembly is arranged in the installation space, and includes a driving unit which is electrically connected with the circuit board and a fan blade which is driven by the driving unit to rotate in the installation space.

In an embodiment, the light diffusion portion includes a first diffusion portion in a position corresponding to each of the plurality of light guide strips, such that the light passes through the guide path and then forms a diffused light using the first diffusion portions, and therefore the upper cover is in a uniform light-emitting state.” Ex[1008] at 1:52-2:14.

“In an embodiment, the plurality of light guide strips further include a plurality of first light guide strips and a plurality of second light guide strips, wherein each of the plurality of first light guide strips extends to the light diffusion portion from each of the plurality of light-emitting elements; each of the plurality of second light guide strips further comprises a first section which extends from the plurality of light-emitting elements and two second sections which extend to the light diffusion portion from the first section respectively.

In an embodiment, the diffused light further comprises a first diffused light and a second diffused light, wherein the first diffused light is formed by passing through the plurality of first light guide strips and then through the first diffusion portions; the second diffused light is formed by passing through the first sections of the plurality of second light guide strips to form two branched lights and then enabling the two branched lights to pass through the second sections and then through the first diffusion portion.” Ex[1008] at 2:29-47.

“In an embodiment, the base is further made from a light-permeable material, such that the entire frame body is in a uniform light-emitting state using the diffused light.

In an embodiment, the base further comprises a bottom plate in which the first connection portion is arranged, and a plurality of outer side plates which are annularly arranged on the bottom plate.” Ex[1008] at 2:52-58.

“In an embodiment, the diffused light further includes a first diffused light, a second diffused light and a third diffused light, wherein the first diffused light is formed by passing through the first light guide strips and then through the first diffusion portion; the second diffused light is formed by passing through the first sections of the second light guide strips to form two branched lights and then enabling the two branched lights to pass through the second sections and then through the first diffusion portion; the third diffused light is formed by enabling the first diffused light and the second diffused light to pass through the second diffusion portion.” Ex[1008] at 3:1-12.

“According to the present invention, the light emitted from the plurality of light-emitting elements is uniformly diffused through the convex lens portion on the light diffusion portion and the semi-concave lens surface of the gap portion, such that the entire upper cover or the entire frame body can present a uniform light-emitting state to increase the visibility when the cooling fan is used.” Ex[1008] at 3:23-29.

“In the present embodiment, the upper cover 11 and the base 12 may further be made from a light-permeable material, such that the entire frame body 10 is in a light-permeable state, or the upper cover 11 may be made from a light-permeable material while the base 12 is made from a light-tight material, such that the upper cover 11 is in a light-permeable state. When the base 12 is made from the light-tight material, a reflection layer is respectively formed on one side of the bottom plate 121 and the plurality of outer side plates 122 of the base 12 inside the accommodating space 14, so as to increase the reflectivity of the bottom plate 121 and the plurality of outer side plates 122. The reflection layers can be formed by embossing, coating or deposition.” Ex[1008] at 4:14-28.

“Therefore, when the light 27 respectively passes through the first light guide strips 221 and the second sections 224 to form the two branched lights 272, the two branched lights 272 will then enter into

the light diffusion portion 23 and then pass through the first diffusion portions 281 to form the first diffused light 271 and the second diffused light 273 respectively, and further the entire light diffusion plate 24 forms a uniform light-emitting effect. Furthermore, since the partition wall 111 is connected to one end surface of the light diffusion portion 23, a part of the first diffused light 271 and the second diffused light 273 will be guided into the upper cover 11 via the light diffusion portion 23, such that the upper cover 11 produces a uniform light-emitting effect.” Ex[1008] at 7:9-22.

“Accordingly, in the present embodiment, when the light 277 passes through the first light guide strips 221 and the second sections 224 respectively to form the two branched lights 272, and the two branched lights 272 will then enter into the light diffusion portion 23 and next passes through the first diffusion portions 281 to form the first diffused light 271 and the second diffused light 273 respectively, the first diffused light 271 and the second diffused light 273 will pass through the gap portion 29 and form a third diffused light 274 via the second diffusion portion 282, such that the third diffused light 274 is uniformly distributed in the light diffusion plate 24, and further the entire light diffusion plate 24 forms a uniform light-emitting effect.

Therefore, when the base 12 is made from a light-permeable material, the bottom plate 121 and the plurality of outer side plates 122 of the base 12 present a uniform light-emitting effect through the first diffused light 271, the second diffused light 273 and the third diffused light 274 which are formed by the light diffusion portion 23, the first diffusion portion 281 and the second diffusion portion 282, and further any face of the entire frame body 10 presents a uniform reflective effect.” Ex[1008] at 7:35-56.

*See also* Ex[1008] at Figures, 1, 2, and 3.

82. When Tsuji is modified to include the teachings related to the lighting element of Huang (e.g. the lights, light guides, diffusors, reflectors, and/or light-permeable materials combined as disclosed in Huang) it will also comprise a fully-illuminated upper cover and a fully-illuminated base.

**4.4.1.6. 6(A) (iv): a power socket comprising an opening disposed on the first side of the body; and**

83. Tsuji discloses a power socket and a first connector on one side of the body, and a second connector on another side of the body. For example, Tsuji discloses “two adjacent fan units among the plurality of the fan units transmit the pulse signal from one side to the other side, and are connected via an inter-fan unit connector that supplies power from one end to the other end.” Ex[1007] at claim 5. It would be obvious for such a power socket to comprise an opening disposed on the first side of the body. *See* Ex[1031] ¶¶85-87.

84. Tsuji also discloses the power connector in claim 6. “The electronic device as claimed in Claim 5, wherein each fan unit among the plurality of the fan units includes a power connector to which two or more power cables that can supply power to its own fan unit are connected when its own fan unit is arranged on one end side of the plurality of the fan units.” Ex[1007] at claim 6.

85. The power sockets are shown as connectors CNA and CNB in Figures 5-7 and Figure 14. Each includes power (VCCA or VCCB) and ground (GND). A POSITA would understand these to be power sockets since they receive a male end part plug from cables A and B. Ex[1007] at [0039] Additionally, a first connector CNC is provided on one side of the body and a second connector CND is provided on another side of the body. These can be seen in Figures 5-7 and Figure 14 as well.

“Moreover, each fan unit 10 includes power connectors CNA and CNB to which two or more power cables capable of supplying power to its own fan unit are connected when its own fan unit is arranged on one end side of the plurality of fan units 10 (refer to FIGS. 5 to 7).” Ex[1007] at [0031].

“Each of fan unit 10 that form such a connection structure includes connectors CNA, CNB, CNC, CND for supplying power and transmitting a control signal / monitoring signal to the adjacent fan unit 10, as shown in FIGS. 5, 6, 7A, and 7B. Furthermore, in the following explanation, the control signal / monitoring signal may be referred to as a control / monitoring signal.” Ex[1007] at [0037].

“Moreover, two connectors CNA and CNB (both female) that enable power supply and live connection of the control signal / monitoring signal are provided on one end of each fan unit 10 (right side when viewed from the front surface). The connector CNA on one side is arranged on a lower part of the front surface of each fan unit 10 such that an end part plug (male) of a cable A is inserted from the front surface side so as to be live-connected. The connector CNB on the other side is arranged on an upper part of the rear surface of each fan unit 10 such that an end part plug (male) of a cable B is inserted from the rear surface side so as to be live-connected. The two cables A and B are connected to the connectors CNA and CNB, respectively, when fan unit 10 is arranged on a right-most side (one side) of the plurality of fan units 10 (when adding fan unit 10). The cables A and B each supply power from a power supplying unit (internal power source) 2 of server 1 and transmits the control signal / monitoring signal and the like received from the management unit 7 (refer to FIGS. 8 to 13).” Ex[1007] at [0039].

“The power is supplied to the serially-connected plurality of fan units 10 from the power supplying unit 2 via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above in a sequence. Moreover, the management unit 7 (I2C master; refer to FIGS. 8 to 13) and the fan controllers 13 of the plurality of fan units 10 (I2C slaves; refer to FIGS. 12 and 13) are connected in a daisy chain form by a serial interface such as I2C. Accordingly, the control signal (pulse signal) from the management unit 7 or the adjacent fan unit 10 is transmitted to the serially-connected plurality of fan units 10

via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above. Therefore, fan unit 10 can be hot-swapped without having to stop the system (server 1).” Ex[1007] at [0041].

“At the start of the operation, four serially-connected fan units 10 are installed in server 1 and the connectors CNA and CNB of the fan unit on the right-most side are connected to the cables A and B, respectively.” Ex[1007] at [0042].

“In other words, the maintenance person confirms that the connectors CNA and CNB of fan unit 10 arranged on the right-most side is connected to the cables A and B, and is in a state in which the cable can be inserted / removed.” Ex[1007] at [0043].

“Upon visually confirming the insertable / removable indicator lamp 12 and confirming that it is the state in which the cable can be inserted / removed, the maintenance person engages the connector CNC (male) of fan unit 10 on the right-most side with the connector CND of the new fan unit 10 (refer to Arrow (1) shown in FIG. 6). Accordingly, the new unit 10 is connected to fan unit 10 on the right-most side as a fifth fan unit 10.” Ex[1007] at [0044].

“The power source unit 2 is an internal power source mounted inside server 1, and as explained above, supplies power to the plurality of fan units 10 via the cable A, the cable B, and the connectors CNA to CND. Moreover, in addition to supplying power to electronic apparatus such as the CPU 3, the MEM 4, and the HDD 5, the power source unit 2 supplies power to other various not-shown electronic apparatus and the like via the electric voltage regulator 6.” Ex[1007] at [0069].

“In the present embodiment, the power line and the control / monitoring signal line of the four fan units 10 inside server 1 are joined in a daisy chain form via the cables A and B, and the connectors CNA, CNB, CNC, and CND. Particularly, as shown in FIG. 13, monitoring unit 7, which is the I2C master, and the fan controller 13, which is the I2C slave in each fan unit 10, are connected by the control / monitoring signal lines SCL and SDL that form the I2C serial interface. SCL is an abbreviation of Serial Clock Line, and

SDL is an abbreviation of Serial Date [sic, Data] Line.” Ex[1007] at [0076].

“As shown in FIG. 14, each fan unit 10 includes the connectors (power source connectors) CNA and CNB for the cables A and B, and the inter-fan connectors CNC and CND explained above.” Ex[1007] at [0084].

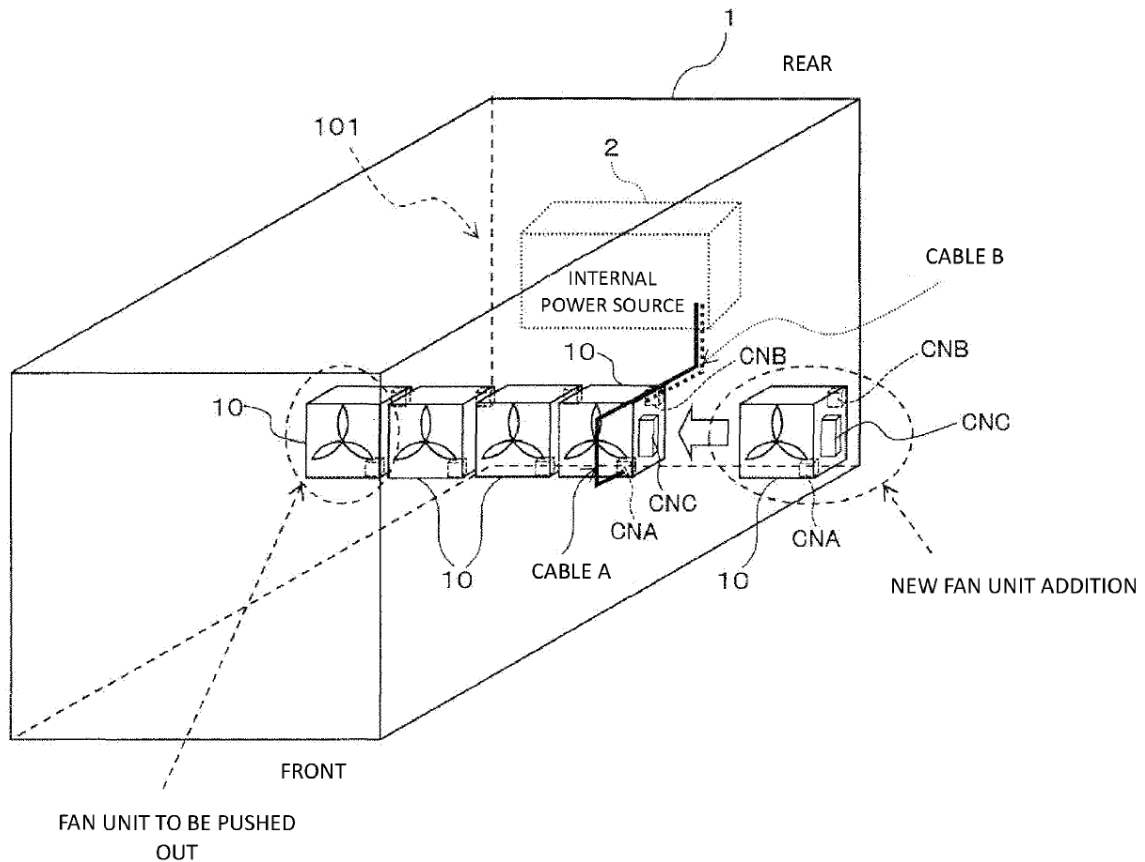
“In FIG. 14, the connectors CNA and CNB are connected to the cables A and B that are connected to a main body unit of server 1, respectively, as explained above. However, the cables A and B can only be connected to the connectors CNA and CNB of the first fan unit 10. The connectors CNC and CND connect the adjacent fan units 10 as explained above.

The connector CNA of the first fan unit 10 is connected to the main body unit of server 1 via the cable A, and is connected to a power source and a signal (a power supply VCCA, an I2C control / monitoring signal line (SCL, SDL) I2CA, an alarm signal Alma, a ground GND) of a first system A. Similarly, the connector CNB of the first fan unit 10 is connected to the main body unit of server 1 via the cable B, and is connected to a power source and a signal (a power supply VCCB, an I2C control / monitoring signal line I2CB, an alarm signal AlmB, the ground GND) of a second system B.

Moreover, in FIG. 14, VCC indicates the power source, and GND indicates ground. Moreover, a character "o" assigned to signals \*ALo, I2Co, S0o, S1o, S2o indicates this signal is output from the respective fan unit 10. Similarly, a character "i" assigned to signals \*ALi, I2Ci, S0i, S1i, S2i indicates this signal is input to the respective fan unit 10.” Ex[1007] at [0091]-[0093].

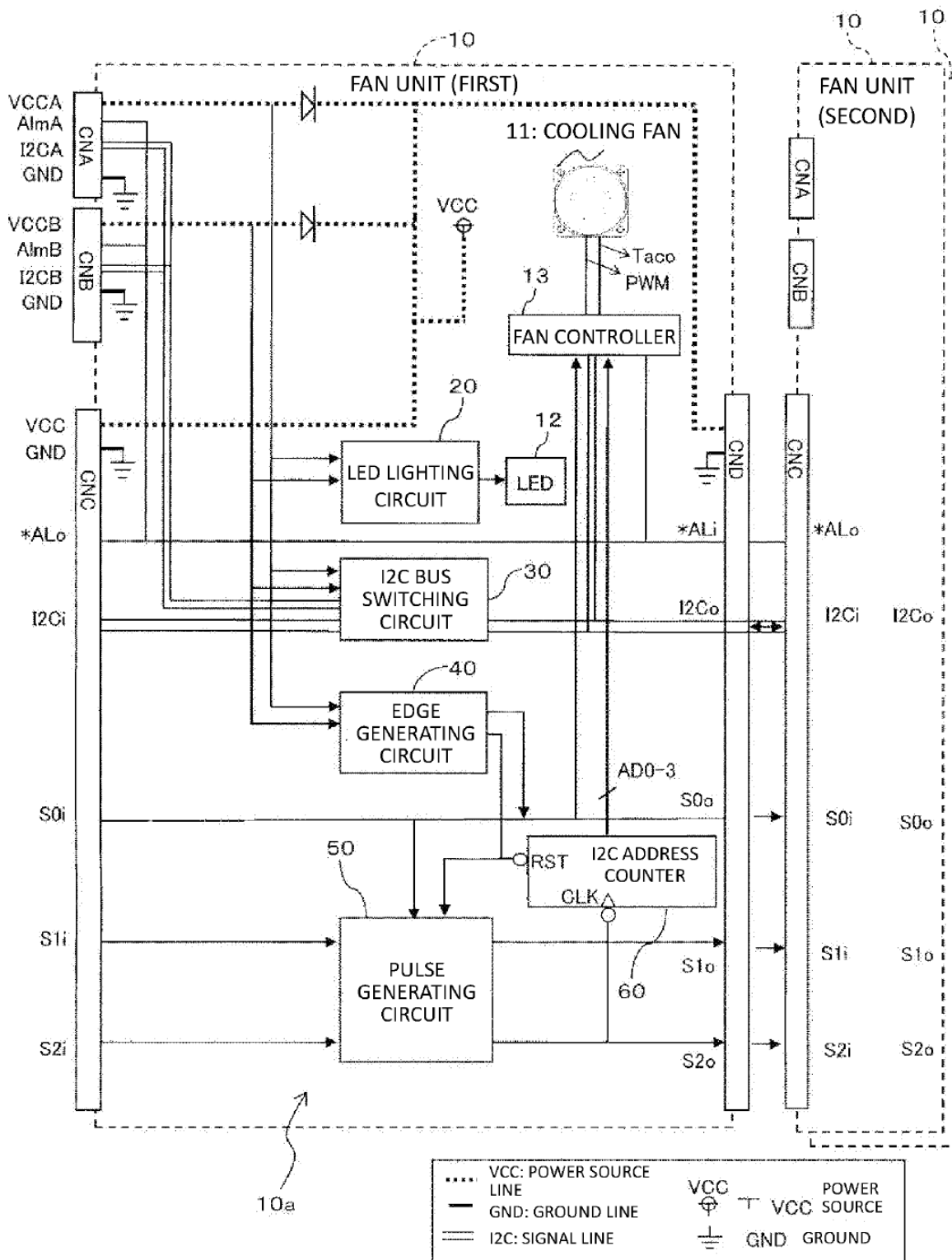
“Particularly, in the edge generating circuit 40 shown in FIG. 17, a pulse signal with a delay time (time width, pulse width) DL1 is generated on the internal signal S0x in accordance with the edge notified from the first fan unit 10 (refer to t3 in FIG. 19). Accordingly, the I2C address counter 60 and the D-FF 52 of the pulse generating circuit 50 are reset. The S0i terminal of the connector CNC and the S0o terminal of the connector CND are electrically serially-connected,

and the D-FF 52 and the I2C address counter 60 inside all fan units 10 are reset.” Ex[1007] at [0115].



Ex[1007] at Figure 5





Ex[1007] at Figure 14

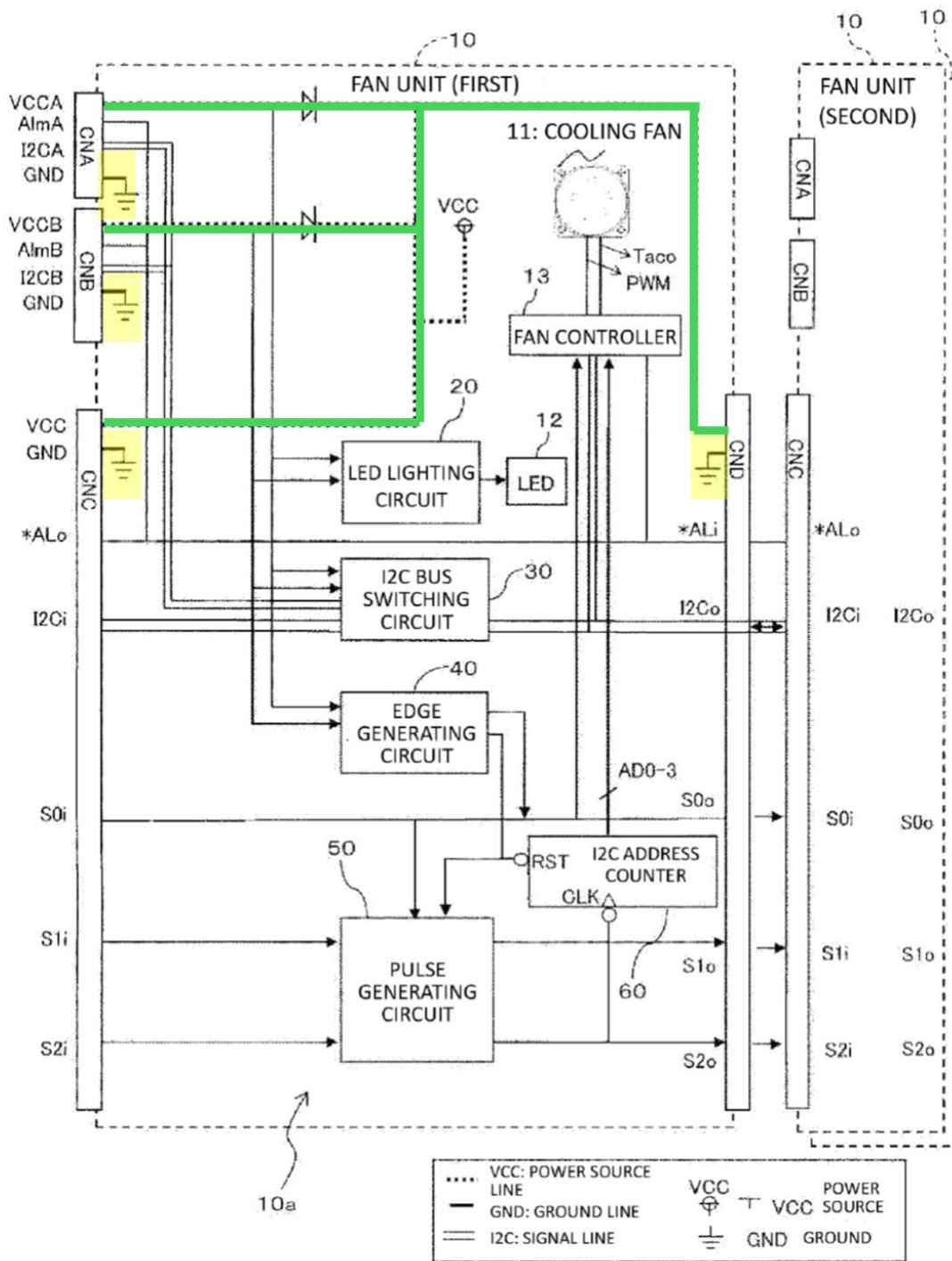
86. To the extent that the Board determines that the connection pins for the signals and power must be split between two connector housings on the same side of the fan body, it would be obvious to a POSITA in light of the references discussed in section 4.3.1 above for the reasons discussed in that section. A POSITA would also be motivated to combine Tsuji and Huang with the teaching of one or more of those references in order to use two connector housings for the connector pins disclosed for CNC.

**4.4.1.7. 6(A) (v): a first connector disposed on the first side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first connector comprises a first electrical terminal configured to electrically connect with a second electrical terminal of the second illumination fan and**

87. Tsuji discloses first connector CNC that is structurally distinct from a power socket CNA. To the extent that CNA is not determined to be on a first side of the body, it would be obvious to place it there since connector CNC is on that side of the body and has the same power connections. It would also be obvious to split connector CNC into two connectors, one of which was a power socket as a simple design choice. This would be obvious to a POSITA in light of the references discussed in section 4.3.1 above for the reasons discussed in that section. A POSITA would also be motivated to combine Tsuji and Huang with the teaching of one or more of those references in order to use two connector housings

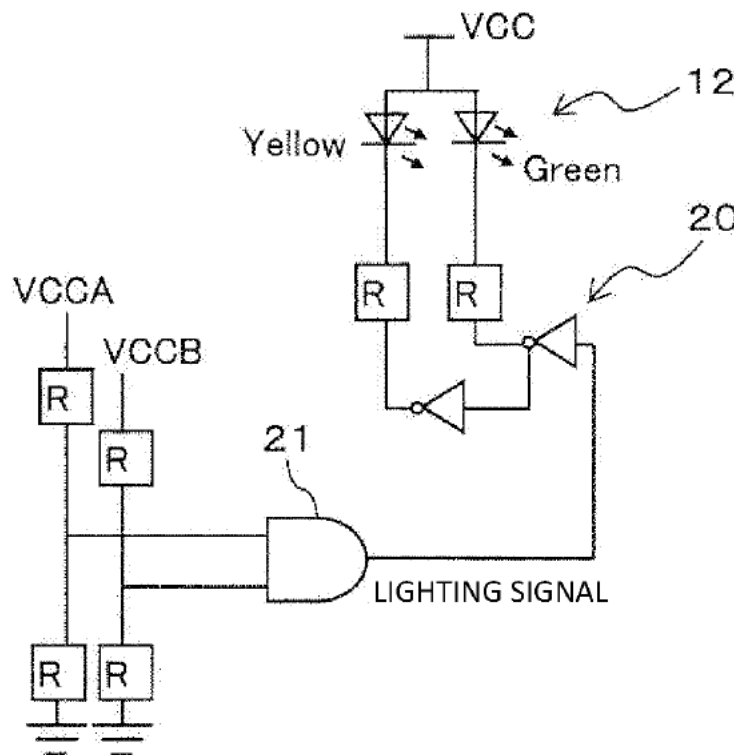
for the connector pins disclosed for CNC. If CNC is split into two connector housings, then the claim can be met without relying on CNA or CNB.

88. Tsuji teaches that the power socket is electrically connected with the first connector, the second connector, the fan and the illumination area. One place to see this teaching is in Tsuji Figure 14. An annotated version of Figure 14 appears below. The yellow highlighted portions of the drawing indicate that the ground signal from power sockets CNA and CNB is electrically connected with first connector CNC and second connector CND. The green highlighted portions of the drawing indicate that the VCC signal from power sockets CNA and CNB is electrically connected with first connector CNC and second connector CND.



Ex[1007] Figure 14 (annotated)

89. These power and ground signals are also connected to the illumination area through LED lighting circuit 20 and LED 12. This is illustrated both in Figure 14 and Figure 15. VCC connects directly to the LEDs and Ground connects through LED lighting circuit 20.



Ex[1007] at Figure 15

90. The power sockets supply power to the fan units. Power is supplied through the fan controller 13 to the cooling fan 11. The controller responds to speed control commands from the I2C signals that are also connected from the

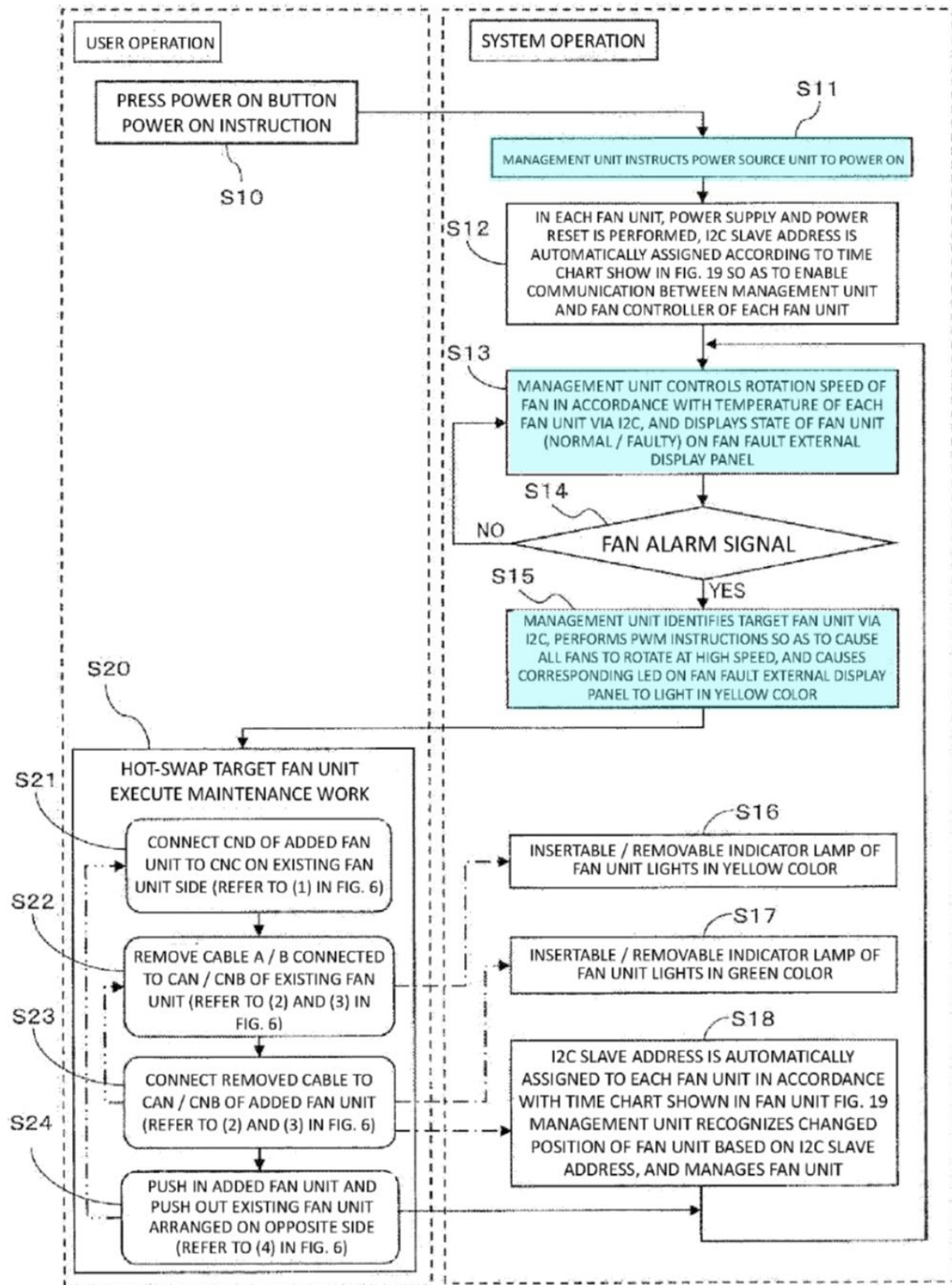
power controller to the fan controller. This can be seen in Figure 14. This functionality is also described in Figure 20. Fan 11 is directly connected to a PWM signal. A POSITA would understand that at least one of the PWM signals would directly correspond to VCC or ground in the normal implementation and it would at least be obvious to implement it in this manner.

“Each fan unit 10 includes a cooling fan 11 that is driven rotationally by a motor (not-shown), and a controlling unit (not-shown). The controlling unit controls each fan unit 10, and includes a fan controller 13, circuits 20, 30, 40, and 50, and a counter 60 (refer to FIG. 14) explained later. The fan controller 13 monitors and controls the operation of the cooling fan 11. Particularly, the controlling unit performs a function of assigning to its own fan unit (fan controller 13) an address that identifies its own fan unit among the plurality of fan units 10 (for example, I2C slave address) by corresponding thereof with the connection position of its own fan unit among the plurality of fan units 10.” Ex[1007] at [0027].

“Moreover, each fan unit 10 includes power connectors CNA and CNB to which two or more power cables capable of supplying power to its own fan unit are connected when its own fan unit is arranged on one end side of the plurality of fan units 10 (refer to FIGS. 5 to 7).” Ex[1007] at [0031].

“On the other hand, when the alarm signal is detected (YES route at Step SI4), the management unit 7 identifies the target fan unit (faulty fan unit) 10 and reads the temperature of the target fan unit 10 via the I2C interface. Moreover, the management unit 7 controls the PWM signal transmitted from each fan controller 13 to the cooling fan 11 so as to forcefully cause the cooling fans 11 of all fan units 10 to rotate at 100% high speed. Furthermore, the management unit 7 causes the LED among the LEDs 8a to 8d corresponding to the target fan unit 10 on the fan fault external display panel 8 to be lit in the yellow color (Step SI5).

Furthermore, in the present embodiment, each fan controller 13 is configured to switch the rotation state of the cooling fan 11 between a 100% high speed rotation and a normal rotation. When a fault in the cooling fan 11 is detected, or when a cable is connected to connector CNA or the connector CNB, that is, when it is recognized that it is time for hot-swapping of fan unit 10, the management unit 7 can forcefully switch the rotation state of the cooling fan 11 to the high speed rotation.” Ex[1007] at [0131]-[0132].



Ex[1007] at Figure 20 (annotated)

91. These signals are passed from one fan unit to the next fan unit when the first connector of the body is connected with a second connector of a body of another illumination fan.

“Each of fan unit 10 that form such a connection structure includes connectors CNA, CNB, CNC, CND for supplying power and transmitting a control signal / monitoring signal to the adjacent fan unit 10, as shown in FIGS. 5, 6, 7A, and 7B. Furthermore, in the following explanation, the control signal / monitoring signal may be referred to as a control / monitoring signal.” Ex[1007] at [0037].

“The power is supplied to the serially-connected plurality of fan units 10 from the power supplying unit 2 via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above in a sequence. Moreover, the management unit 7 (I2C master; refer to FIGS. 8 to 13) and the fan controllers 13 of the plurality of fan units 10 (I2C slaves; refer to FIGS. 12 and 13) are connected in a daisy chain form by a serial interface such as I2C. Accordingly, the control signal (pulse signal) from the management unit 7 or the adjacent fan unit 10 is transmitted to the serially-connected plurality of fan units 10 via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above. Therefore, fan unit 10 can be hot-swapped without having to stop the system (server 1).” Ex[1007] at [0041].

“In the present embodiment, the power line and the control / monitoring signal line of the four fan units 10 inside server 1 are joined in a daisy chain form via the cables A and B, and the connectors CNA, CNB, CNC, and CND. Particularly, as shown in FIG. 13, monitoring unit 7, which is the I2C master, and the fan controller 13, which is the I2C slave in each fan unit 10, are connected by the control / monitoring signal lines SCL and SDL that form the I2C serial interface. SCL is an abbreviation of Serial Clock Line, and SDL is an abbreviation of Serial Data [sic, Data] Line.” Ex[1007] at [0076].

“The four fan units 10 are serially connected, and cool down the electronic apparatus including the CPU 3, the MEM 4, and the HDD

5. Each fan unit 10 includes a cooling fan 11 that is driven rotationally by a not-shown motor. Moreover, the four fan units 10 are configured so as to be hot-swappable by performing the sliding operation of a part of fan units 10 as explained above while referring to FIGS. 5 to 11.” Ex[1007] at [0080].

“As shown in FIG. 14, each fan unit 10 includes the connectors (power source connectors) CNA and CNB for the cables A and B, and the inter-fan connectors CNC and CND explained above.” Ex[1007] at [0084].

“In FIG. 14, the connectors CNA and CNB are connected to the cables A and B that are connected to a main body unit of server 1, respectively, as explained above. However, the cables A and B can only be connected to the connectors CNA and CNB of the first fan unit 10. The connectors CNC and CND connect the adjacent fan units 10 as explained above.

The connector CNA of the first fan unit 10 is connected to the main body unit of server 1 via the cable A, and is connected to a power source and a signal (a power supply VCCA, an I2C control / monitoring signal line (SCL, SDL) I2CA, an alarm signal Alma, a ground GND) of a first system A. Similarly, the connector CNB of the first fan unit 10 is connected to the main body unit of server 1 via the cable B, and is connected to a power source and a signal (a power supply VCCB, an I2C control / monitoring signal line I2CB, an alarm signal AlmB, the ground GND) of a second system B.

Moreover, in FIG. 14, VCC indicates the power source, and GND indicates ground. Moreover, a character "o" assigned to signals \*ALo, I2Co, S0o, S1o, S2o indicates this signal is output from the respective fan unit 10. Similarly, a character "i" assigned to signals \*ALi, I2Ci, S0i, S1i, S2i indicates this signal is input to the respective fan unit 10.” Ex[1007] at [0091]-[0093].

“Each fan controller 13 according to the present embodiment is monitored by the monitoring unit 7 via the I2C interface, and can control the rotation speed of the cooling fan 11 (driving motor) by a pulse width modulation (PWM) signal.” Ex[1007] at [0124].

“In FIG. 4, an example of a method in which hot swapping the fan unit 110 is performed without using the power rails shown in FIG. 3. Furthermore, FIG. 4 is a diagram showing a fourth example of the related technology. In FIG. 4, three serially-connected fan units 110 are moveably provided so as to slide in the horizontal direction. At the time of a normal operation, power is supplied from the internal power source 120 of server 100 to the three fan units 110 via a power cable 141. Power is supplied from the internal power source 130 to the three fan units 110, which are the units to be swapped, via a power cable 142. The adjacent fan units 110 are connected via a connector, and power is supplied between the fan units via the connector. In a configuration shown in FIG. 4, by pushing in the three fan units 110 to be swapped from the right side, the three fan units 110 arranged inside server 100 are pushed out from the left side. Subsequently, the power cable 141 is connected to the three fan units 110 that are pushed out so as to supply power from the internal power source 120. Accordingly, the three fan units 110 are hot-swapped. In the example shown in FIG. 4, hot swapping of the fan unit 110 can be performed without using the power rails as shown in FIG. 3. However, because the plurality of the fan units 110 are hot-swapped in a batch, only a part of the fan units 110 among the plurality of the fan units 110 cannot be hot-swapped. In other words, only the fan unit 110 that needs to be swapped cannot be swapped.” Ex[1007] at [0018].

92. When the power is supplied to the power socket, one of the LED's will light up. A POSITA would understand from the Figure 15 circuit that if both VCCA and VCCB are powered, the green LED will illuminate. If only one of VCCA or VCCB is powered, the yellow LED will illuminate. This is corroborated by the specification text.

“As shown in FIG. 15, the LED lighting circuit 20 is configured so as to control the lighting color (luminescent color) of the insertable / removable indicator lamp 12 when hot-swapping fan unit 10, as explained above while referring to FIG. 7A. LED lighting circuit 20 includes an AND gate 21. In FIG. 15, VCC A indicates a power

source of the first system A supplied from the connector CNA, and VCCB indicates a power source of the second system B supplied from the connector CNB.” Ex[1007] at [0096].

“Accordingly, when the cables A and B are respectively connected to the connectors CNA and CNB, that is, the cables A and B is in the insertable / removable state (the state in which the power supply is not interrupted even when one of the cables is removed), the insertable / removable indicator lamp 12 is controlled to be in the green color state. On the other hand, when only one of the cables A and B is connected to the connector CNA and CNB (hereinafter, a state in which the power supply is interrupted when the cable is removed), the insertable / removable indicator lamp 12 is controlled to be in the yellow color state.” Ex[1007] at [0098].

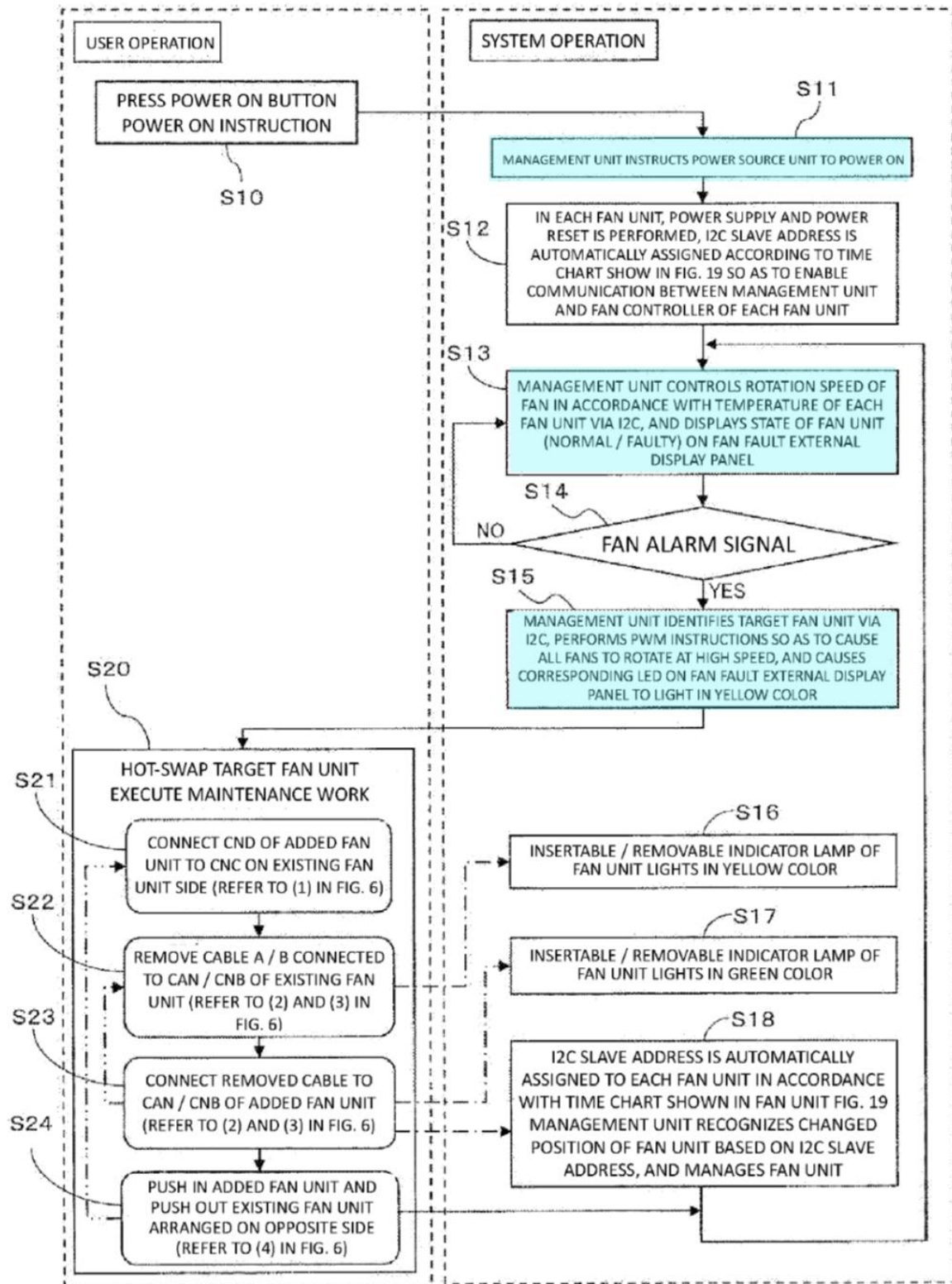
“Furthermore, as shown in FIG. 7A, an insertable / removable indicator lamp 12 is provided on the right side surface when viewed from the front surface of each fan unit 10. Because the right side surface is exposed to the outside when fan unit 10 is arranged on the right-most side of the plurality of fan units 10 (when fan unit 10 is added), the maintenance person can check a lighting state of the insertable / removable indicator lamp 12. The insertable / removable indicator lamp 12 is, for example, a dual-colored LED. The lighting color (luminescent color) of the insertable / removable indicator lamp 12 is controlled by a later-explained LED lighting circuit 20 (refer to FIGS. 14 and 15). For example, when the cables A and B are respectively connected to the connectors CNA and CNB, that is, the cables A and B are in a insertable / removable state (a state in which the power supply is not interrupted even when one of the cables is removed), the insertable / removable indicator lamp 12 is controlled to be in a green color state (to lit up in green color). On the other hand, when only one of the cables A and B is connected to the connector CNA and CNB (hereinafter, a state in which the power supply is interrupted when a cable is removed), the insertable / removable indicator lamp 12 is controlled to be in a yellow color state (to lit up in yellow color).” Ex[1007] at [0040].

“At this time, the maintenance person confirms that the insertable / removable indicator lamp 12 provided on the right side of fan unit 10 arranged on the right-most side among the already installed fan units

10 inside server 1 is in the green color state. In other words, the maintenance person confirms that the connectors CNA and CNB of fan unit 10 arranged on the right-most side is connected to the cables A and B, and is in a state in which the cable can be inserted / removed.” Ex[1007] at [0043].

“Subsequently, the maintenance person removes the cable A that is connected to the connector CNA of fan unit 10 on the right-most side, and connects the same to the connector CNA of the additionally-linked new fan unit 10, as shown by Arrow (2) of FIG. 6. At this step, the insertable / removable indicator lamp 12 switches from the green color state to the yellow color state when the cable A is removed, and switches back to the green color when the cable A is connected to the connector CNA of the new fan unit 10.” Ex[1007] at [0045].

93. When the power is supplied to the power socket, the fan will rotate with a speed corresponding to the temperature. The steps illustrated in Figure 20 show this. This is corroborated by the specification text. Additionally, it would be obvious to a POSITA to simply substitute a basic fan circuit that rotates at a fixed speed whenever power is present.



Ex[1007] at Figure 20 (annotated)

“The present embodiment discloses a technology that resolves various problems and issues of the related technology explained above while referring to FIGS. 1 to 4. Particularly, in the present embodiment, a technology that enables automatic assignment to each fan unit of the position and the associated address (ID) of each fan unit even after hot-swapping the fan unit in the electronic devices such as server is disclosed.” Ex[1007] at [0024].

“Each fan unit 10 includes a cooling fan 11 that is driven rotationally by a motor (not-shown), and a controlling unit (not-shown). The controlling unit controls each fan unit 10, and includes a fan controller 13, circuits 20, 30, 40, and 50, and a counter 60 (refer to FIG. 14) explained later. The fan controller 13 monitors and controls the operation of the cooling fan 11. Particularly, the controlling unit performs a function of assigning to its own fan unit (fan controller 13) an address that identifies its own fan unit among the plurality of fan units 10 (for example, I2C slave address) by corresponding thereof with the connection position of its own fan unit among the plurality of fan units 10.” Ex[1007] at [0027].

“The four fan units 10 are serially connected, and cool down the electronic apparatus including the CPU 3, the MEM 4, and the HDD 5. Each fan unit 10 includes a cooling fan 11 that is driven rotationally by a not-shown motor. Moreover, the four fan units 10 are configured so as to be hot-swappable by performing the sliding operation of a part of fan units 10 as explained above while referring to FIGS. 5 to 11.” Ex[1007] at [0080].

Furthermore, in the present embodiment, each fan controller 13 is configured to switch the rotation state of the cooling fan 11 between a 100% high speed rotation and a normal rotation. When a fault in the cooling fan 11 is detected, or when a cable is connected to connector CNA or the connector CNB, that is, when it is recognized that it is time for hot-swapping of fan unit 10, the management unit 7 can forcefully switch the rotation state of the cooling fan 11 to the high speed rotation.” Ex[1007] at [0132].

94. Tsuji also teaches that when the first connector of the body is connected with a second connector of a body of another illumination fan, a fan and an illumination area of the body of another illumination fan are respectively driven into rotation and illumination. A POSITA would understand this from Figures 14 and 19, but it is also corroborated by the specification text.

“To resolve such a problem, in a structure in which the fan units are hot-swappable by sliding operation as explained above, it is possible to adopt a serial interface capable of monitoring and controlling the fan units by using fewer signal lines. For example, the plurality of the fan units is connected in a daisy chain form by using a serial interface such as Inter-Integrated Circuit (I2C). In such a case, the management and monitoring unit monitors and controls each fan unit while identifying each fan unit by a unique address (ID; identification information) assigned to each fan unit beforehand.” Ex[1007] at [0006].

“To resolve such a problem, in a structure in which the fan units 110 are hot-swappable by sliding operation, it is possible to use a serial interface capable of monitoring and controlling the fan units 110 by using fewer signal lines. For example, the plurality of the fan units 110 is connected in a daisy chain form by using a serial interface such as I2C. In such a case, the management and monitoring unit monitors and controls each fan unit 110 while identifying each fan unit 110 by using a unique address (ID; identification information) assigned to each fan unit 110 beforehand.” Ex[1007] at [0020].

“The power is supplied to the serially-connected plurality of fan units 10 from the power supplying unit 2 via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above in a sequence. Moreover, the management unit 7 (I2C master; refer to FIGS. 8 to 13) and the fan controllers 13 of the plurality of fan units 10 (I2C slaves; refer to FIGS. 12 and 13) are connected in a daisy chain form by a serial interface such as I2C. Accordingly, the control signal (pulse signal) from the management unit 7 or the adjacent fan

unit 10 is transmitted to the serially-connected plurality of fan units 10 via the cables A and B and the connectors CNA, CNB, CNC, and CND explained above. Therefore, fan unit 10 can be hot-swapped without having to stop the system (server 1).” Ex[1007] at [0041].

“In the present embodiment, the power line and the control / monitoring signal line of the four fan units 10 inside server 1 are joined in a daisy chain form via the cables A and B, and the connectors CNA, CNB, CNC, and CND. Particularly, as shown in FIG. 13, monitoring unit 7, which is the I2C master, and the fan controller 13, which is the I2C slave in each fan unit 10, are connected by the control / monitoring signal lines SCL and SDL that form the I2C serial interface. SCL is an abbreviation of Serial Clock Line, and SDL is an abbreviation of Serial Data [sic, Data] Line.” Ex[1007] at [0076].

“FIG. 19 is a time chart explaining an operation that is performed when the four fan units shown in FIG. 14.” Ex[1007] at [0012].

“Next, the operation of fan unit 10 according to the present embodiment will be explained while referring to FIG. 19. Here, operation performed when four fan units 10 shown in FIGS. 14 to 18 are serially connected (function of each fan module 10 as the controlling unit explained above) is explained in accordance with the time chart shown in FIG. 19. Particularly, an operation in which the I2C slave address is automatically generated, assigned, and set to the fan controller 13 of each fan unit 10 is explained. Furthermore, in FIG. 19, t1 to t11 indicate timing of a fixed time interval (for example, the time width DL1 in the present embodiment). For example, t1 indicates connection timing of cable A, and t3 indicates connection timing of the cable B.” Ex[1007] at [0111].

“In FIG. 4, an example of a method in which hot swapping the fan unit 110 is performed without using the power rails shown in FIG. 3. Furthermore, FIG. 4 is a diagram showing a fourth example of the related technology. In FIG. 4, three serially-connected fan units 110 are moveably provided so as to slide in the horizontal direction. At the time of a normal operation, power is supplied from the internal power source 120 of server 100 to the three fan units 110 via a power cable 141. Power is supplied from the internal power source 130 to the three

fan units 110, which are the units to be swapped, via a power cable 142. The adjacent fan units 110 are connected via a connector, and power is supplied between the fan units via the connector. In a configuration shown in FIG. 4, by pushing in the three fan units 110 to be swapped from the right side, the three fan units 110 arranged inside server 100 are pushed out from the left side. Subsequently, the power cable 141 is connected to the three fan units 110 that are pushed out so as to supply power from the internal power source 120. Accordingly, the three fan units 110 are hot-swapped. In the example shown in FIG. 4, hot swapping of the fan unit 110 can be performed without using the power rails as shown in FIG. 3. However, because the plurality of the fan units 110 are hot-swapped in a batch, only a part of the fan units 110 among the plurality of the fan units 110 cannot be hot-swapped. In other words, only the fan unit 110 that needs to be swapped cannot be swapped.” Ex[1007] at [0018].

95. To the extent that the fans do not begin to rotate until the appropriate signals are received to start rotation, Figures 18 and 19 indicate that the normal, expected operation taught by Tsuji includes generating signals to start the rotation of each fan shortly after power is supplied. Figure 20 corroborates that this is the case. Additionally, it would be obvious to a POSITA to simply substitute a basic fan circuit that rotates at a fixed speed whenever power is present.

**4.4.1.8. 6(A) (vi): a second connector disposed on the second side of the body;**

96. Tsuji discloses a second connector CND on the second another side of the body. *See* Ex[1007] at Figure 7.

**4.4.1.9. 6(B): the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power via the power socket's electrical connection with the second connector, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and**

97. Tsuji teaches that the power socket is electrically connected to the first connector, the second connector, the fan, and the illumination area. *See* Ex[1007] Figures 14-15 and generally section 4.4.1.7. If power is applied to the second connector it will also indirectly be provided to the power socket. Tsuji already teaches that all 4 current connectors share power connections. If CNC were split into a signal connector and a power connector, then both would have power connections connected to each other. Power can be supplied to the power pins on CND which would then also indirectly reach CNA, CNB, and the power pins on CNC in a second connector housing and signals can be provided to CNC though the CNC signal pins.

**4.4.1.10. 6(C): when the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.**

98. Tsuji discloses that the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an

illumination area of the body of the second illumination fan are respectively driven into rotation and illumination. *See* section 4.4.1.7 above.

**4.4.1.11. 7pre: A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein:**

99. To the extent that the preamble is limiting, Tsuji (Ex[1017]) discloses a system comprising a first illumination fan for a computer connectable with a second illumination fan for a computer. *See* 4.4.1.1 above.

**4.4.1.12. 7(A): the first illumination fan comprises:**

100. *See* 6(A).

**4.4.1.13. 7(A)(i): a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;**

101. *See* 6(A)(i).

**4.4.1.14. 7(A)(ii): a center fan located in a center of the body;**

102. *See* 6(A)(ii).

**4.4.1.15. 7(A)(iii): an illumination area located at the top of the body and disposed on at least two sides of the fan**

103. *See* 6(A)(iii).

**4.4.1.16. 7(A)(iv): a power socket comprising an opening disposed on the first side of the body; and**

104. *See* 6(A)(iv).

**4.4.1.17. 7(A)(v): a first connector comprising a first flat surface disposed on the first side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first flat surface comprises a first electrical terminal that is round and configured to electrically connect with a second electrical terminal of the second illumination fan; and**

105. See 6(A)(v).

106. Using a connector comprising a flat surface was widely known in the art. Section 4.3.2 above explains why using such a connector would have been obvious to a POSITA. Moreover, a POSITA would have been motivated to combine Tsuji and Huang with the teachings of the art discussed in Section 4.3.2.

**4.4.1.18. 7(A)(vi): a second connector comprising a second flat surface disposed on the second side of the body;**

107. See 6(A)(vi).

108. Using a connector comprising a flat surface was widely known in the art. Section 4.3.2 above explains why using such a connector would have been obvious to a POSITA. Moreover, a POSITA would have been motivated to combine Tsuji and Huang with the teachings of the art discussed in Section 4.3.2.

**4.4.1.19. 7(B): the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and**

109. See 6(B).

**4.4.1.20. 7(C): when the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.**

110. See 6(C).

**4.4.2. Ground 2a - 2017/0314777 (“Lai”) in view of 2005051085 (“Hasegawa”) renders new claims 6-7 obvious.**

**4.4.2.1. 6pre: A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein:**

111. To the extent that the preamble is limiting, Lai (Ex[1012]) discloses at least one illumination fan for a computer connected with a second illumination fan for a computer. Figure 2 illustrates a speed-adjustable fan with 4 LED lights. Figure 1 illustrates “several conventional LED fans” as known in the prior art. Ex[1012] at [0002]. Figure 3 illustrates that it is connected with another illumination fan.

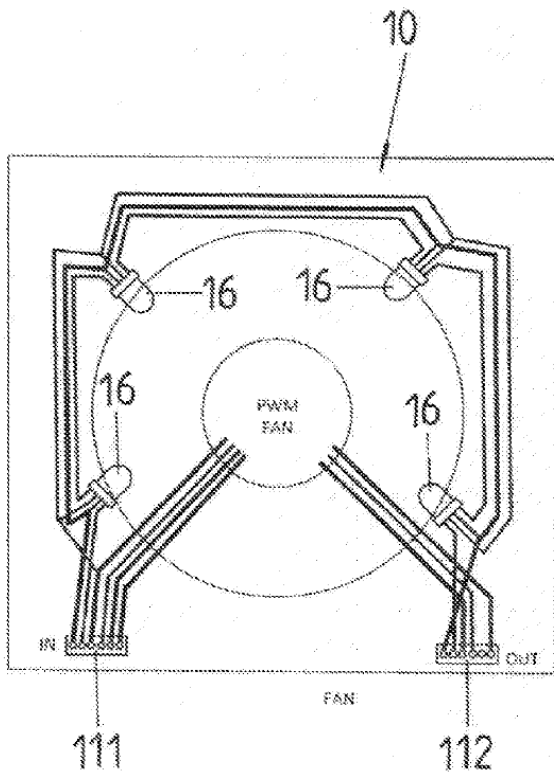


FIG.2

Ex[1012] at Figure 2

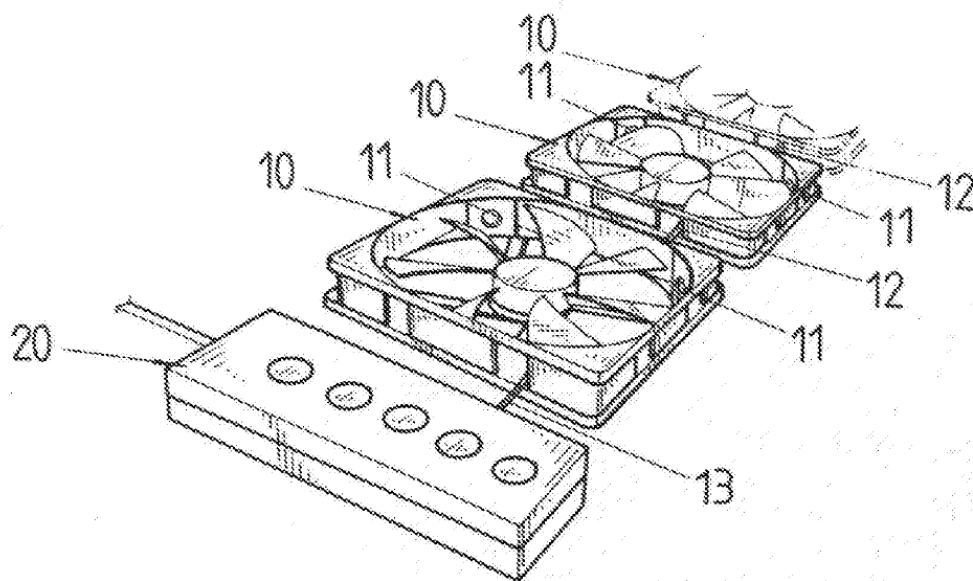


FIG.3

Ex[1012] at Figure 3

“FIG. 1 shows a schematic view of a conventional LED fan controller device, which connects several LED fans.

FIG. 2 shows a schematic view of an LED fan controller device, which links several LED fans, according to the present invention.”  
Ex[1012] at [0005]-[0006].

“The primary objective of the present invention is to provide an LED fan controller device that connects multiple fans, and synchs each individual LED light to the user's preference, while maintaining the speed of each fan.” Ex[1012] at [0003].

“Referring to FIG. 3, which shows a planar view of an LED fan, according to the present invention, wherein LED fans 10 are linked together using a single transmission line 12, and LED fans 10 are linked together with controller 20 by another transmission line 13”  
Ex[1012] at [0012].

**4.4.2.2. 6(A): the first illumination fan comprises:**

112. The first illumination fan comprises the elements discussed below:

**4.4.2.3. 6(A)(i) a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;**

113. Lai discloses a body (e.g., LED Fan 10) which includes a top, a bottom, and at least a first and second side. *See, e.g., Fig. 3.*

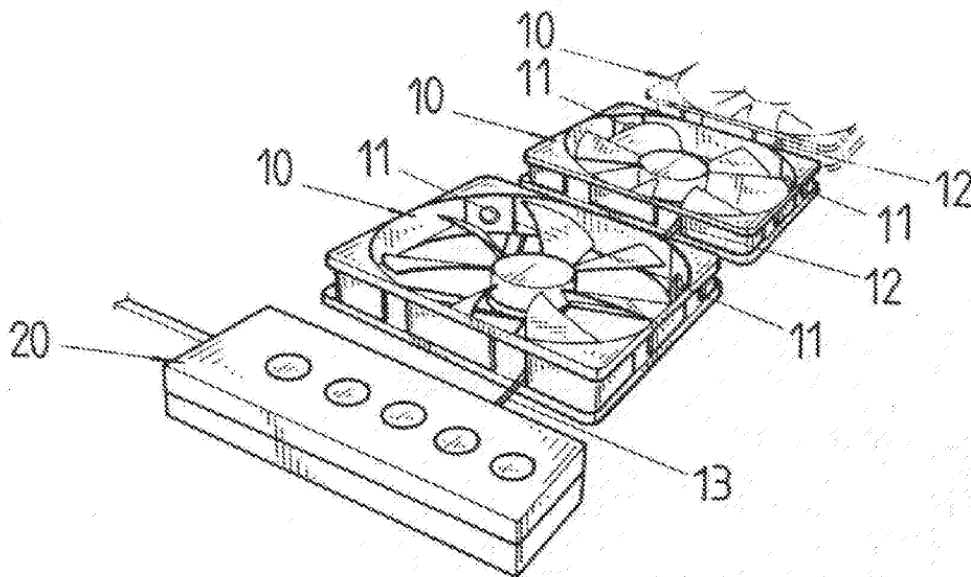


**FIG.3**

Ex[1012] at Figure 3

**4.4.2.4. 6(A)(ii): a center fan located in a center of the body**

114. Lai discloses a body (e.g. LED Fan 10) which includes a fan motor and blades that are substantially in the center of the body. *See, e.g.*, Ex[1012] at Figures 1-3.

“Each LED fan 10 is provided respectively with a control motor 15 and each control motor 15 linked together with a mother board (MB) 30.” Ex[1012] at [0013].

“Each LED fan 10 is provided with a control motor 15, and at the end of each control motor 15 is linked with the microcontroller 17; whereas, the control motor 15 is linked with the controller 20.” Ex[1012] at [0015].

**4.4.2.5. 6(A)(iii): an illumination area located at the top of the body and disposed on at least two sides of the center fan body;**

115. Lai discloses a plurality of RGB LEDs in each fan.

“[E]ach LED fan 10 on the LED fan controller device of the present invention is provided with various addressable RGB (Red-Green-Blue) LEDs 16. Each addressable RGB LED 16 is built in with an IC (Integrated Circuit) control chip which is equipped with a one-wire bus control function and can be connected in a series freely.” Ex[1012] at [0011].

116. In the embodiment illustrated in Figures 2 and 3, these LEDs are on the left and right sides of the fan and are visible from the top of the body. They illuminate a portion of the fan body through direct illumination, reflection, and diffusion that extends to the top of the body on at least two sides of the center fan body. The ordinary RGB LEDs illustrated would be known by a POSITA to have

a wide viewing area as I illustrated in section 3.2. Moreover, Lai explains that the purpose of these LEDs is to provide decorative lighting which would be understood to be visible from outside the housing when the fans are normally mounted. Ex[1012] at [0011], claim 1.

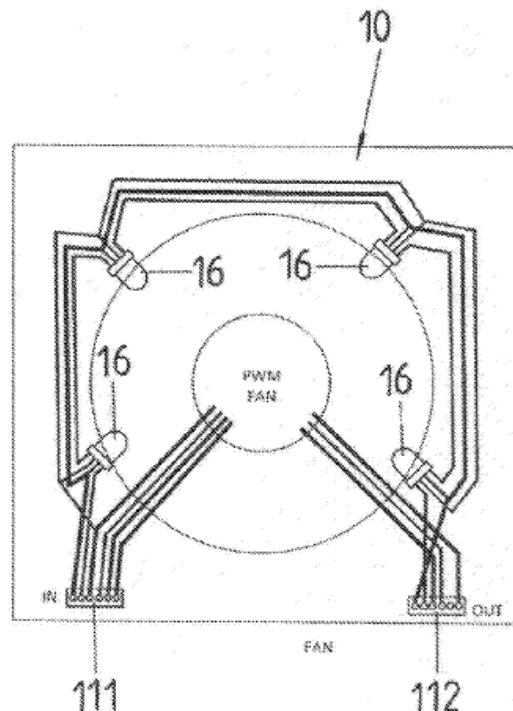


FIG. 2

Ex[1012] Figure 2

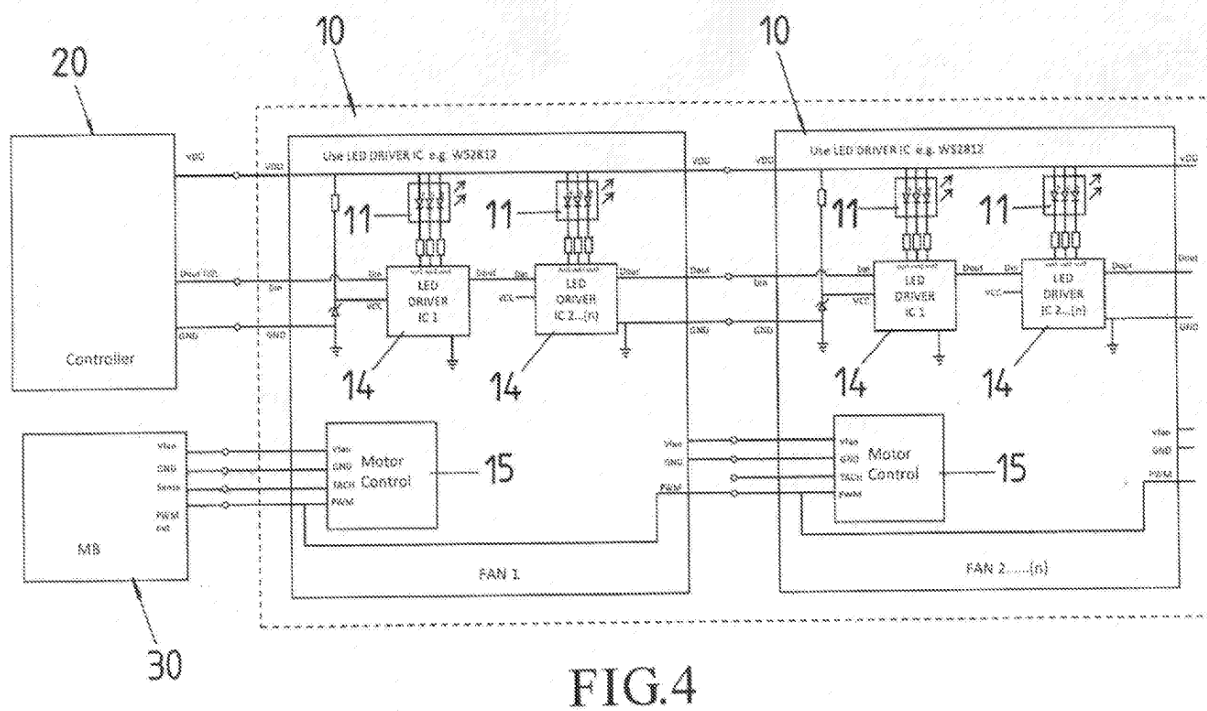
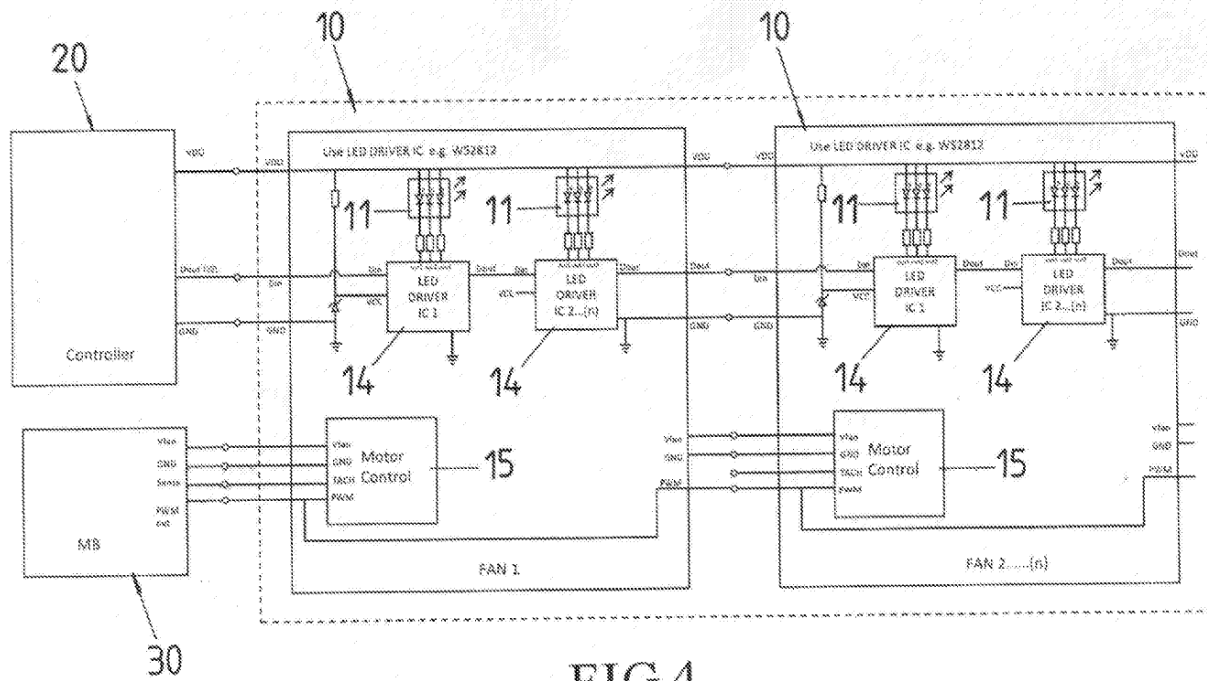
117. To the extent that one was to interpret the claim to require the lights to face a specific direction other than what is illustrated in figure 2 (which I do not) it would be obvious to mount them on a different surface of the fan housing or pointing in a different direction. Lai already indicates that lights should be visible

from outside, including from the top, of the fan body. There are no physical limitations that prevent or discourage moving them to the top surface. Wire lengths would not need to substantially change and there are no obstacles to avoid. Electronics modules are commonly available in a choice of light configurations, e.g. top or corner or side lights, to facilitate wiring. Furthermore, it would be obvious to add a diffuser on top of the LEDs given that (1) Lai discloses an intent to view the LEDs from above the fan body, and (2) the LEDs are illustrated and disclosed with LED packages that include structures to diffuse, reflect, and reorient the light.

**4.4.2.6. 6(A) (iv): a power socket comprising an opening disposed on the first side of the body; and**

118. Lai discloses a power socket comprising an opening disposed on the first side of the body. On the left side of the body as illustrated in figure 2, the power socket and first connector comprise input 111. Input 111 is illustrated in figure 2 as including 6 connectors, which corresponds to the embodiments illustrated in figures 4 and 5. (Note that Figure 2 shows a single ground connection on input 111 connected to both the fan and the lights.) The power socket is comprised of the ground connector and the two VCC connectors. The first connector is comprised of the LED data signal, the PWM signal, and the sense signal. Alternatively, it would be obvious to include separate power and ground signals as suggested by Figure 6 on the first connector. Figures 4, 5, and 6 all

suggest that there are two places where power and ground are required in the fan system and illustrate two sets of connections on one side. It would have been obvious therefore to have two connectors on one side that each have power and ground and each have control signals. Either one could be the power socket and the other would be the first connector. It would additionally be obvious to a POSITA to separate a first connector and the power socket into two housings for the same reasons stated in section 4.3.1. A plurality of signals can be combined onto a single connector housing or split between two as a matter of simple design choice in this application. To the extent that the power and ground terminals are not a “socket” it would be obvious to a POSITA to use a socket-style power connector. These were common in the art and often used for fans. *See, e.g.,* Tsuji above. They would be a trivial substitute for a connector that was not considered a “socket”. Both male and female connectors are commonly available and for low-voltage applications can be interchangeable as to which is on the cable, and which is on the device.





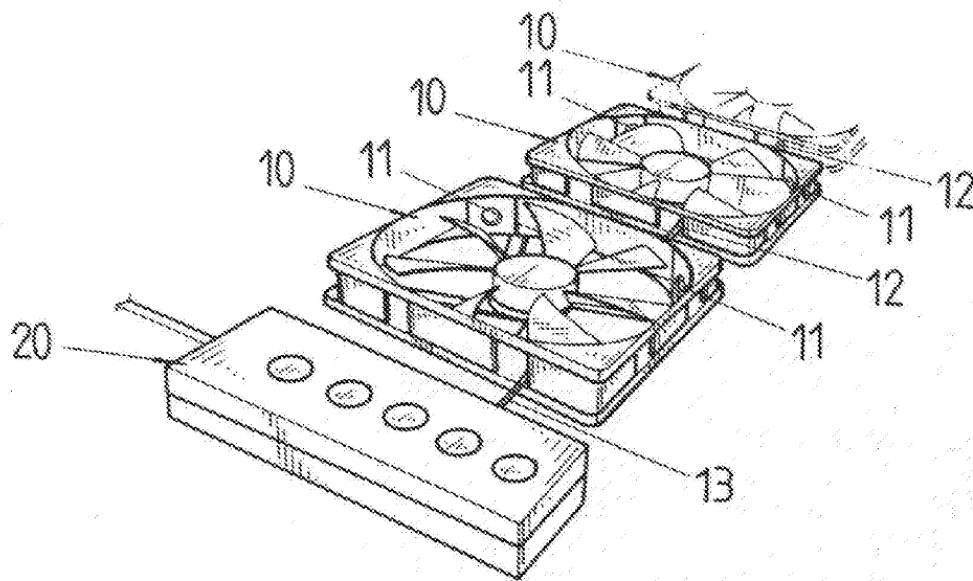


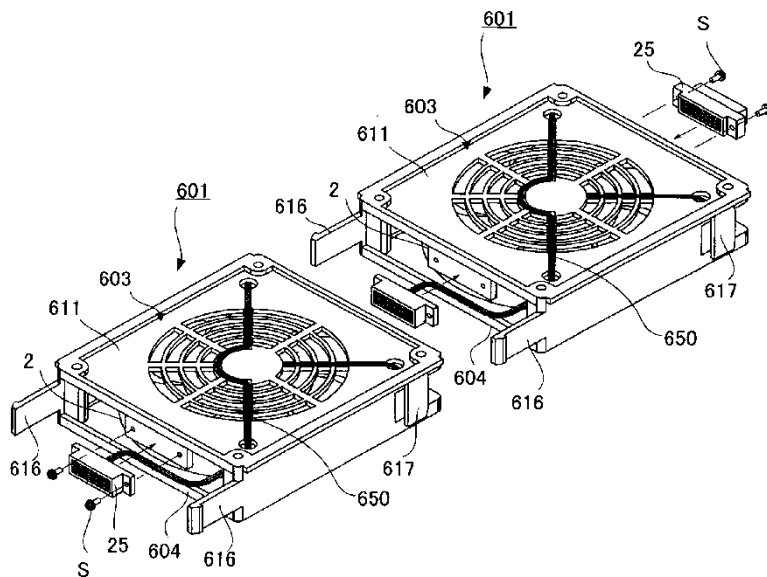
FIG.3

Ex[1012] at Figure 3

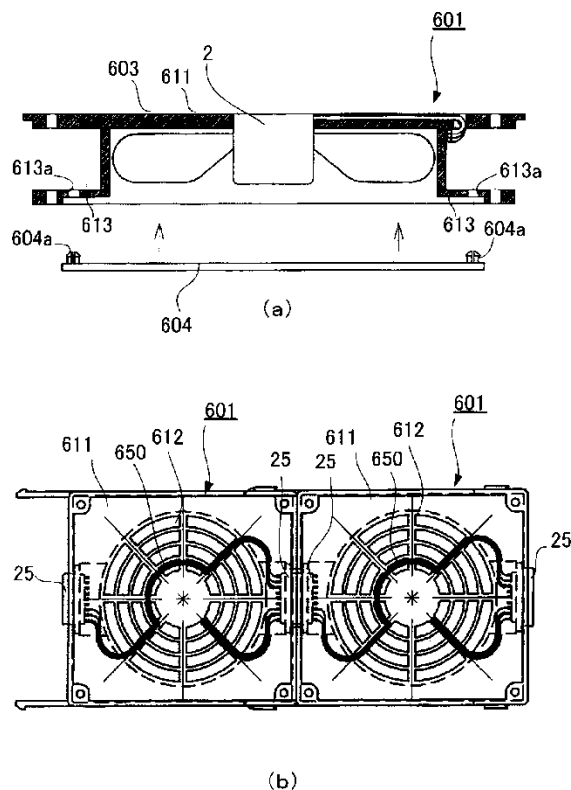
120. To the extent that one was to understand Lai not to disclose the power socket on the side of the fan body, it would be obvious to a POSITA that Lai's connectors can be moved to the left and right edges of the fan body without any substantial impact to the structure or operation of Lai's embodiments. Lai already indicates that one connector should be near the left corner, and one should be near the right corner. There are no physical limitations that prevent or discourage moving them around the corner to the sides. Wire lengths would not need to substantially change and there are no obstacles to avoid. Electronics modules are commonly available in a choice of connector configurations, e.g. top or bottom or

side connectors, to facilitate wiring. Side-mounted connectors would reduce or eliminate the cabling required to connect adjacent fans as suggested in Lai figure 3. The NZXT art discussed above makes it clear that a POSITA would have been well aware of placing two connectors on one side of an illumination fan.

121. Furthermore, a POSITA would be motivated to look to Hasegawa (Ex[1014]) to see an alternative positioning of the connectors for serial connection of fans and modify Lai to place connectors on opposing sides. The connectors on two sides are illustrated in figures 29 and 31. A POSITA would understand that Lai and Hasegawa are analogous art, both describing fans in generally rectangular/square housings with input and output connectors for daisy-chain connection of the fan modules.

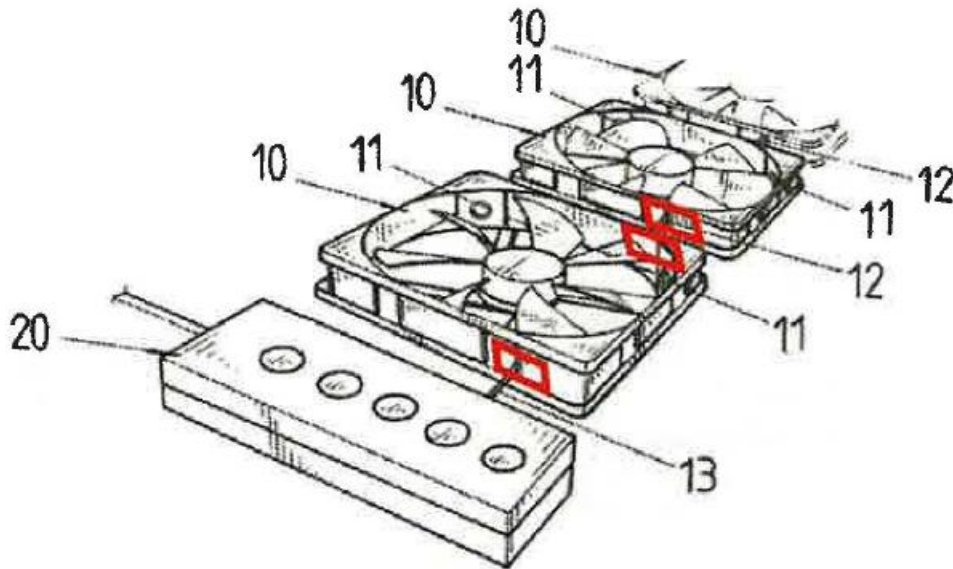


Ex[1014] at Figure 29



Ex[1014] at Figure 31

122. The combination of Lai and Hasegawa would have involved applying Hasegawa's known technique of placing cooling fan connectors on the fan body sides to the known LED fans of Lai to yield predictable results of connecting the fans in series. The combination would have appeared similar to Figure 3 of Lai, but with visible connectors on the fan body sides as shown below in red boxes and not just visible transmission lines:



Ex[1012] at Figure 3 (modified)

123. In this combination, it would still be obvious to include the connection in the illustrated opening so the fans could be abutted as shown in Figure 3 and described in Lai.

**4.4.2.7. 6(A) (v): a first connector disposed on the first one side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first connector comprises a first electrical terminal configured to electrically connect with a second electrical terminal of the second illumination fan and**

124. Lai discloses a first connector disposed on the first one side of the body. On the left side of the body as illustrated in figure 2, the power socket and first connector comprise input 111. Input 111 is illustrated in figure 2 as including 6 connectors, which corresponds to the embodiments illustrated in figures 4 and 5. (Note that Figure 2 shows a single ground connection on input 111 connected to

both the fan and the lights.) The power socket is comprised of the ground connector and the two VCC connectors. The first connector is comprised of the LED data signal, the PWM signal, and the sense signal. It would be obvious to include separate power and ground signals as suggested by Figure 6 on the first connector. Figures 4, 5, and 6 all suggest that there are two places where power and ground are required in the fan system and illustrate two sets of connections on one side. It would have been obvious therefore to have two structurally distinct and separable connectors, a power socket and a first connector, on one side that each have power and ground whereby the first connector includes the control signals. It would additionally be obvious to a POSITA to separate a first connector and the power socket into two housings for the same reasons stated in section 4.3.1. A plurality of signals can be combined onto a single connector housing or split between two as a matter of simple design choice in this application.

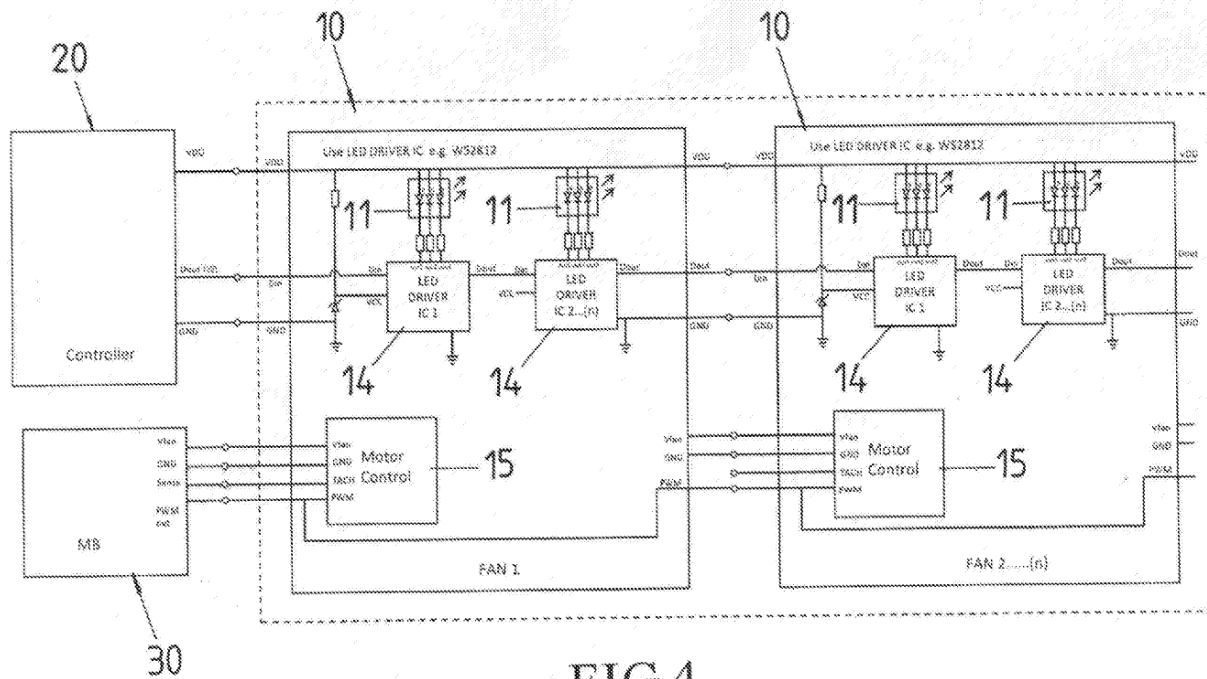


FIG. 4

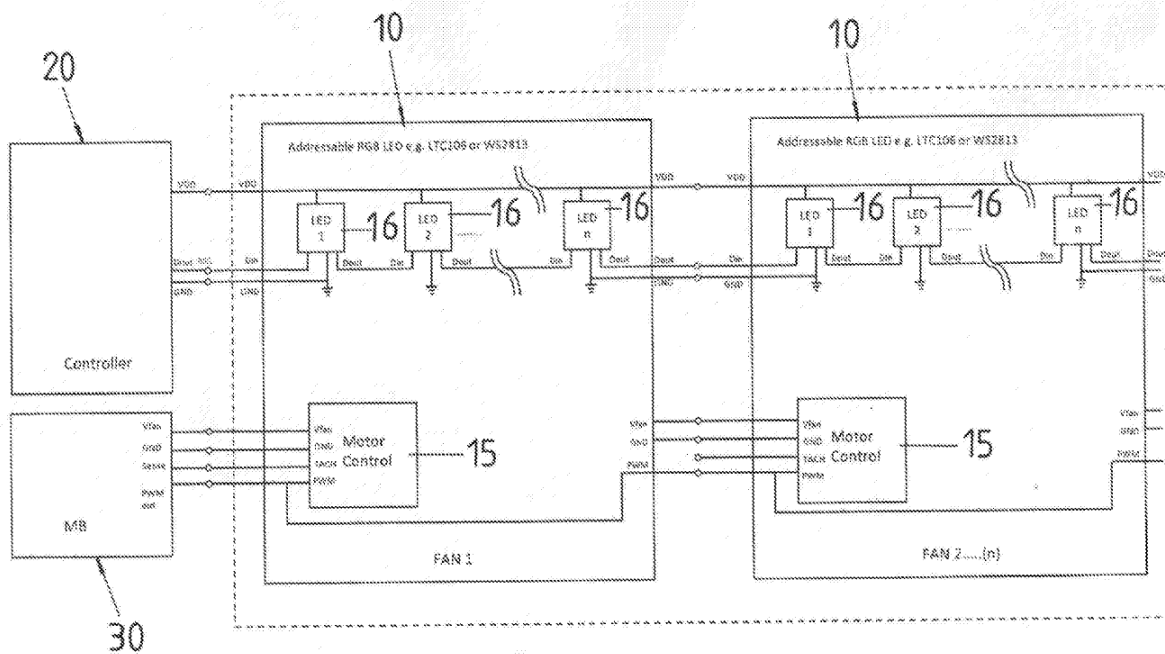


FIG. 5

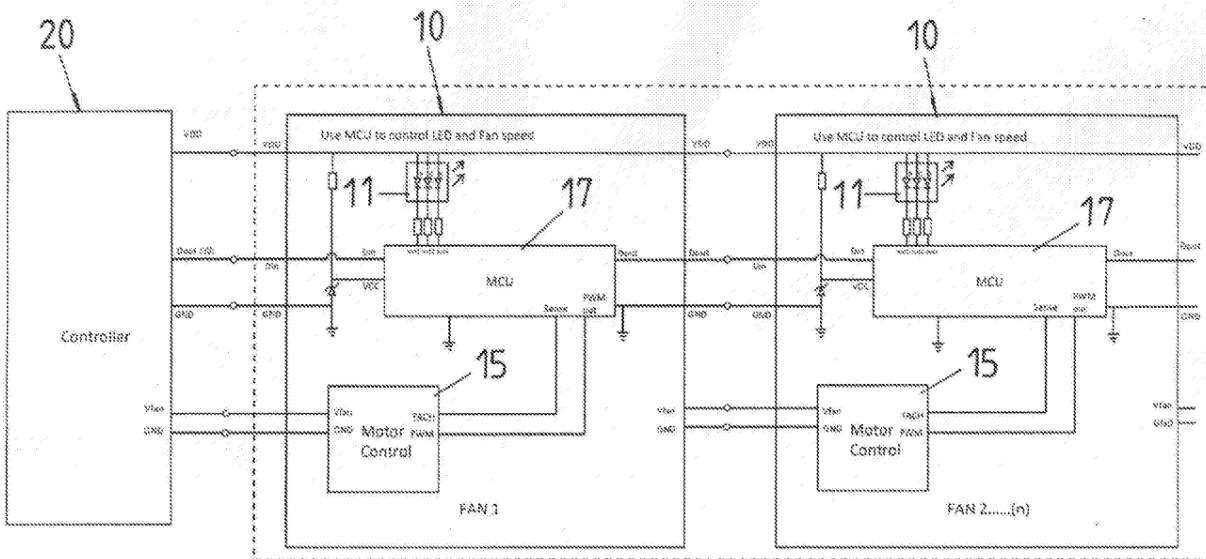


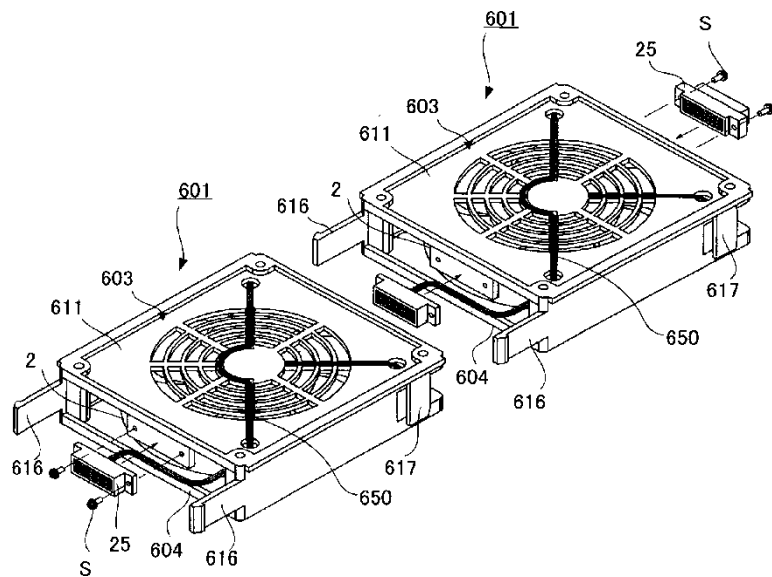
FIG. 6

125. Alternatively, it would have been obvious, therefore, to have two connectors on one side that each have power and ground and each have control signals. Either one could be the power socket and the other would be the first connector. Since the proposed new claim 6 includes a limitation that the power socket is electrically connected with the first connector, it must encompass the situation where both the power socket and first connector include power and ground signals.

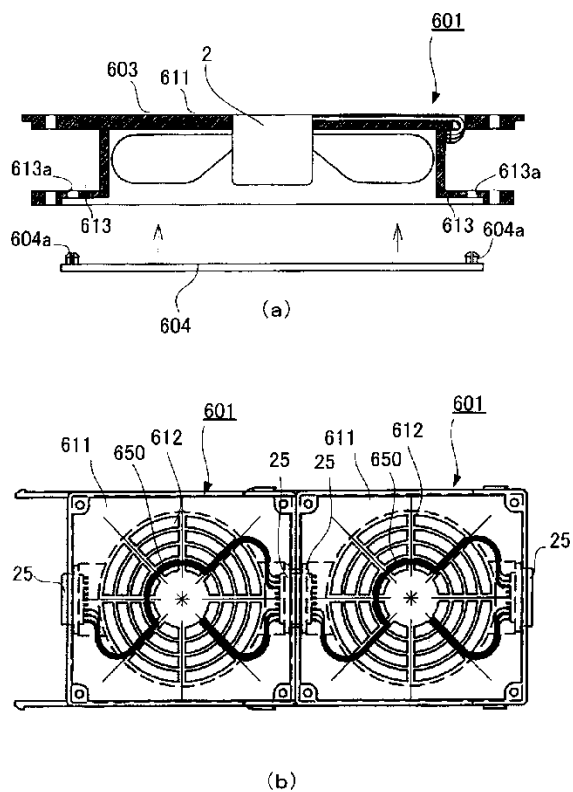
126. To the extent that one was to understand Lai not to disclose the first connector on the side of the fan body, it would be obvious to a POSITA that Lai's connectors can be moved to the left and right edges of the fan body without any substantial impact to the structure or operation of Lai's embodiments. Lai already

indicates that one connector should be near the left corner, and one should be near the right corner. There are no physical limitations that prevent or discourage moving them around the corner to the sides. Wire lengths would not need to substantially change and there are no obstacles to avoid. Electronics modules are commonly available in a choice of connector configurations, e.g. top or bottom or side connectors, to facilitate wiring. Side-mounted connectors would reduce or eliminate the cabling required to connect adjacent fans as suggested in Lai figure 3.

127. Furthermore, a POSITA would be motivated to look to Hasegawa (Ex[1014]) to see an alternative positioning of the connectors for serial connection of fans and modify Lai to place connectors on opposing sides. The connectors on two sides are illustrated in figures 29 and 31. A POSITA would understand that Lai and Hasegawa are analogous art, both describing fans in generally rectangular/square housings with input and output connectors for daisy-chain connection of the fan modules.



Ex[1014] at Figure 29



Ex[1014] at Figure 31

128. The combination of Lai and Hasegawa would have involved applying Hasegawa's known technique of placing cooling fan connectors on the fan body sides to the known LED fans of Lai to yield predictable results of connecting the fans in series. The combination would have appeared similar to Figure 3 of Lai, but with visible connectors on the fan body sides as shown below in red boxes and not just visible transmission lines:

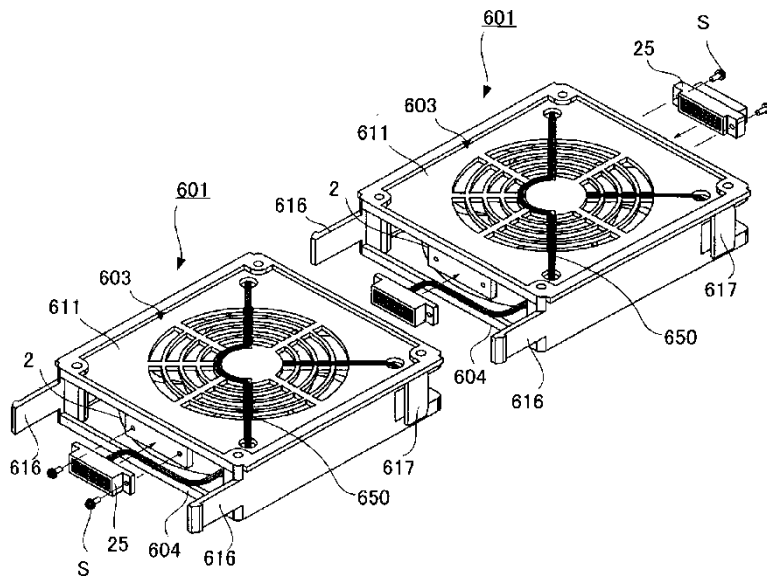
**4.4.2.8. 6(A) (vi): a second connector disposed on the second side of the body;**

129. Lai discloses a second connector 112 on the right side of the fan body. The second connector is comprised of the ground connector and the two VCC connectors, LED data signal, and the PWM signal. *See* Ex[1012] at Figures 3-6.

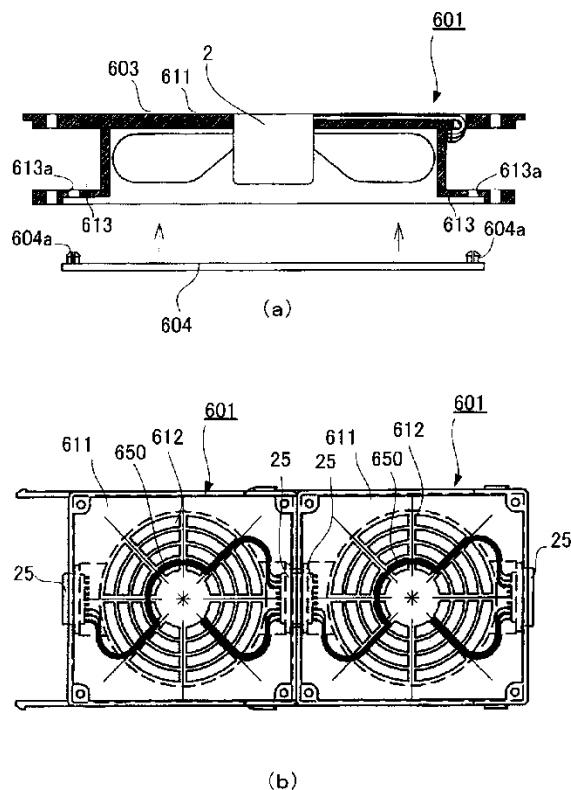
130. To the extent that one was to understand Lai not to disclose the second connector on the other side of the fan body, it would be obvious to a POSITA that Lai's connectors can be moved to the left and right edges of the fan body without any substantial impact to the structure or operation of Lai's embodiments. Lai already indicates that one connector should be near the left corner, and one should be near the right corner. There are no physical limitations that prevent or discourage moving them around the corner to the sides. Wire lengths would not need to substantially change and there are no obstacles to avoid. Electronics modules are commonly available in a choice of connector configurations, e.g. top or bottom or side connectors, to facilitate wiring. Side-

mounted connectors would reduce or eliminate the cabling required to connect adjacent fans as suggested in Lai figure 3.

131. Furthermore, a POSITA would be motivated to look to Hasegawa (Ex[1014]) to see an alternative positioning of the connectors for serial connection of fans and modify Lai to place connectors on opposing sides. The connectors on two sides are illustrated in figures 29 and 31. A POSITA would understand that Lai and Hasegawa are analogous art, both describing fans in generally rectangular/square housings with input and output connectors for daisy-chain connection of the fan modules.

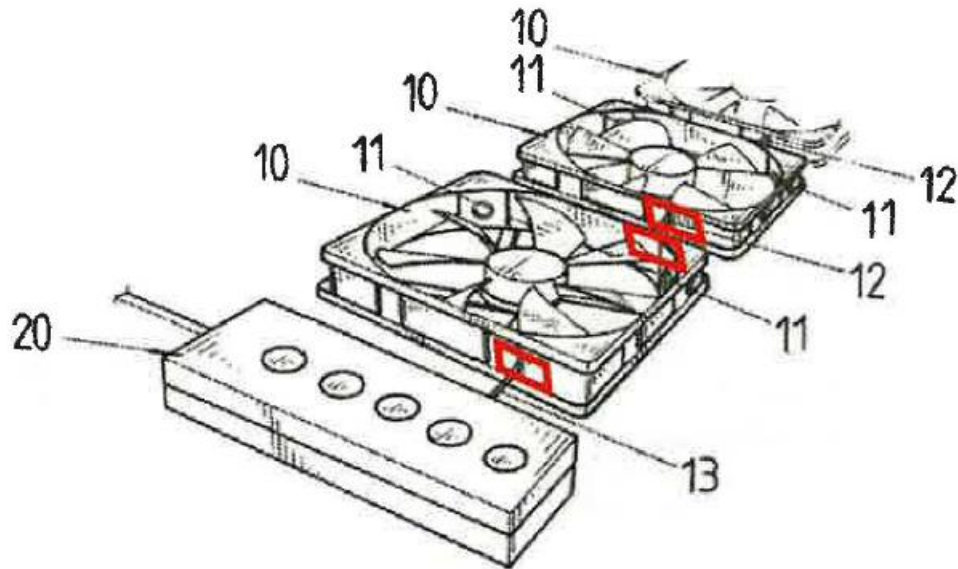


Ex[1014] at Figure 29



Ex[1014] at Figure 31

132. The combination of Lai and Hasegawa would have involved applying Hasegawa's known technique of placing cooling fan connectors on the fan body sides to the known LED fans of Lai to yield predictable results of connecting the fans in series. The combination would have appeared similar to Figure 3 of Lai, but with visible connectors on the fan body sides as shown below in red boxes and not just visible transmission lines:



Ex[1012] at Figure 3 (modified)

**4.4.2.9. 6(B): the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power via the power socket's electrical connection with the second connector, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and**

133. Lai teaches that the power socket is electrically connected to the first connector, the second connector, the fan, and the illumination area. In particular, the ground line illustrated in Figure 3, Figure 4, Figure 5, and Figure 6 is connected to the power socket, the first connector, the second connector, the fan, and the illumination area. Additionally, the VCC signal is connected to the power socket, the first connector, the second connector, the fan, and the illumination area.

134. Lai explains that conventional fans can be connected in a series. “A conventional fan controller device allow user to control fan(s) by altering their rotational speeds and control the LEDs as a series, but only as a series and not individually.” Ex[1012] at [0002].

135. Additionally, Lai clearly intends to serially connect his fans in a manner that when they are connected together, the fans all spin when powered and so instructed with the PWM signal and the lights all illuminate when programmed with a color via the serial connection. *See also* Ex[1012] at Figs 3-6.

“Each addressable RGB LED is built in with an IC (Integrated Circuit) control chip, which is equipped with a one-wire bus control function and can be connected in a series freely.” Ex[1012] at abstract.

“A multiLED fan controller apparatus, wherein a device can control each LED light on multiple fans and also the rotation speed of each LED fans by being linked together on the single device.” Ex[1012] at Claim 1.

“The neighboring LED fans are linked with one another, and the LED driver IC is linked with the controller; Furthermore, each LED fan is provided with a control motor, and each control motor is linked with a mother board (MB).” Ex[1012] at Claim 3.

“The present invention relates to an LED (Light Emitting Diode) fan control device, which connects multiple fans by wiring each one to a single controller device. By doing this, each individual LED light and the fan's rotational speed can be adjusted.” Ex[1012] at [0001].

“Referring to FIG. 3, which shows a planar view of an LED fan, according to the present invention, wherein LED fans 10 are linked together using a single transmission line 12, and LED fans 10 are

linked together with controller 20 by another transmission line 13”  
Ex[1012] at [0012].

136. A POSITA would understand from these disclosures that when the power socket on the one side of the body is supplied with power, the fan and the illumination area of the body are respectively driven into rotation and illumination, and when the first connector of the body is connected with a second connector of a body of another illumination fan, a fan and an illumination area of the body of another illumination fan are respectively driven into rotation and illumination. The mere act of connecting the fans in this manner and applying power provides power to the fans and illumination area. The text, including the citations above, clearly indicates that the disclosed operation is that the fans would rotate, and the lights would illuminate, at this time. Since these power connections are shared, providing power to the second connector would also provide power to the power socket, the fan, and the LEDs. A POSITA would understand that the required control signals are provided. In an ordinary implementation that would be continuously provided.

137. To the extent that the Lai design requires an RGB control signal and a PWM signal to illuminate and rotate, respectively, it would be obvious to have a default illumination value and rotation speed whenever power is applied. A POSITA would understand that complex lighting effects and primarily decorative

and that simply lighting to a default illumination (such as the light turns on when power is applied) would generally suffice for any functional requirements.

Moreover, this simple alternative (turning on a light when power is applied) was well known and easy and cheap to implement. Similarly, a POSITA would understand that reduced fan speeds (less than 100%) are primarily used to reduce noise and that the system can function, at least initially, at 100% fan speed.

Furthermore, a slower default fan speed such as 35% may be sufficient at power on since little heat is present at that time. The simple alternative of turning on the fan when power is applied) was well known and easy and cheap to implement. Also, a typical computer fan defaults to full speed when power is applied and no PWM signal is provided, since in the case of a failure or loose connection it is preferable to have maximum cooling than to have none. Additionally, it would be obvious to substitute a fixed-speed fan and/or a fixed-illumination LED into this design as both were well known at the time and had identical form factors to what is illustrated in Lai's embodiment.

**4.4.2.10. 6(C): when the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.**

138. Lai discloses that the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an

illumination area of the body of the second illumination fan are respectively driven into rotation and illumination. *See* section 4.4.2.9 above.

**4.4.2.11. 7pre: 7pre: A system comprising a first illumination fan for a computer connected with a second illumination fan for the computer, wherein**

139. To the extent that the preamble is limiting, Lai (Ex[1012]) discloses a system comprising a first illumination fan for a computer connected with a second illumination fan for a computer. *See* 4.4.2.1 above.

**4.4.2.12. 7(A): the first illumination fan comprises:**

140. *See* 6(A)(i).

**4.4.2.13. 7(A)(i): a body comprising a top, a bottom, and sides, wherein the sides include at least a first side and a second side;**

141. *See* 6(A)(ii).

**4.4.2.14. 7(A)(ii): a center fan located in a center of the body;**

142. *See* 6(A)(iii).

**4.4.2.15. 7(A)(iii): an illumination area located at the top of the body and disposed on at least two sides of the fan**

143. *See* 6(A)(iv).

**4.4.2.16. 7(A)(iv): a power socket comprising an opening disposed on the first side of the body; and**

144. *See* 6(A)(iv).

**4.4.2.17. 7(A)(v): a first connector comprising a first flat surface disposed on the first side of the body, wherein the first connector is structurally distinct and separable from the power socket, and wherein the first connector comprises a first electrical terminal configured to electrically connect with a second electrical terminal of the second illumination fan; and**

145. See 6(A)(v).

146. Using a connector comprising a flat surface was widely known in the art. Section 4.3.2 above explains why using such a connector would have been obvious to a POSITA. It would have been obvious to a POSITA to employ connectors comprising a flat surface with Lai based on Lai's disclosure that the fan bodies should be placed adjacent to one another so that their sides touch and based on the general availability of connectors comprising a flat surface as a design choice.

**4.4.2.18. 7(A)(vi): a second connector comprising a second flat surface disposed on the second side of the body;**

147. See 6(A)(vi).

148. Using a connector comprising a flat surface was widely known in the art. Section 4.3.2 above explains why using such a connector would have been obvious to a POSITA. It would have been obvious to a POSITA to employ connectors comprising a flat surface with Lai based on Lai's disclosure that the fan bodies should be placed adjacent to one another so that their sides touch and based

on the general availability of connectors comprising a flat surface as a design choice.

**4.4.2.19. 7(B): the power socket is electrically connected with the first connector, the second connector, the center fan and the illumination area, such that when the power socket on the first side of the body is supplied with power, the center fan and the illumination area of the body of the first illumination fan are respectively driven into rotation and illumination; and**

149. See 6(B).

**4.4.2.20. 7(C): when the first connector of the body is connected with a second connector of a body of the second illumination fan, a center fan and an illumination area of the body of the second illumination fan are respectively driven into rotation and illumination.**

150. See 6(C).

I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both pursuant to 18 U.S.C.

§ 1004.

Date: 10/29/25

A handwritten signature in black ink, appearing to read 'Andrew Wolfe', written in a cursive style.

Andrew Wolfe, Ph.D.