

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

Omni MedSci, Inc.,

Plaintiff,

v.

Apple Inc.,

Defendant.

Case No. 2:18-cv-429

**COMPLAINT FOR PATENT INFRINGEMENT AND
DEMAND FOR JURY TRIAL**

Plaintiff, Omni MedSci, Inc. (“Omni MedSci”), alleges as follows:

The Parties

1. Plaintiff Omni MedSci is a Michigan corporation having its principal place of business at 1718 Newport Creek Drive, Ann Arbor, Michigan 48103. Dr. Mohammed N. Islam is the principal of Omni MedSci. Dr. Islam is a tenured Professor of Optics and Photonics in the Electrical and Computer Engineering Department, and a Professor of Biomedical Engineering, at the University of Michigan’s College of Engineering. Omni MedSci is part of the Omni family of companies, which create, develop, and commercialize Dr. Islam’s optical technology in various fields. The Omni companies also develop and provide unique optical products to the U.S. Department of Defense and intelligence community.

2. Defendant Apple Inc. (“Apple”) is a California corporation, having a regular and established place of business at 1 Infinite Loop, Cupertino, California 95014. Apple may be served

with process through its registered agent for service of process C T Corporation System (C0168406).

Jurisdiction and Venue

3. This is a complaint for patent infringement under 35 U.S.C. §§ 101, *et seq.* The Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338.

4. The court has personal jurisdiction over Apple, and venue under 28 U.S.C. §§1391(a)(1) and 1400(b) is proper in this district, because Apple has two regular and established places of business in this district and because Apple offers for sale and sells infringing Apple Watches in this district at those locations.

5. A lawsuit, Case No. 2:18-cv-134-RWS, is currently pending in this district between Omni MedSci and Apple involving several of the same patents and much of the same Apple Watch technology as is at issue in the present lawsuit.

The Patents-in-Suit

6. On October 16, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 10,098,546 (“the ‘546 patent”) (Issue Notification attached as Exhibit A) to Dr. Mohammed N. Islam.

7. On January 9, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 9,861,286 (“the ‘286 patent”) (Exhibit B) to Dr. Mohammed N. Islam. This patent is also asserted against Apple in Case No. 2:18-cv-134-RWS. In the present lawsuit, the ‘286 patent is asserted only against the Series 4 Apple Watch, a watch that did not exist at the time of the complaint in Case No. 2:18-cv-134-RWS and was not accused in that Case.

8. On February 6, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 9,885,698 (“the ‘698 patent”) (Exhibit C) to Dr. Mohammed N. Islam. This patent is also asserted

against Apple in Case No. 2:18-cv-134-RWS. In the present lawsuit, the ‘698 patent is asserted only against the Series 4 Apple Watch, a watch that did not exist at the time of the complaint in Case No. 2:18-cv-134-RWS and was not accused in that Case.

9. The ‘546 patent, the ‘286 patent, and the ‘698 patent are, collectively, the “Patents-in-Suit.”

10. Omni MedSci has been, and remains, the owner by assignment of the Patents-in-Suit.

Background Facts

11. By 2012, Omni MedSci had invented technology for using lasers in medical and other applications, including wearable measurement devices incorporating lasers and other components that can detect and monitor physiological parameters such as glucose, ketones, heart rate, blood constituents, and dental carries.

12. On December 31, 2012, Omni MedSci filed a set of patent applications covering its developments using lasers for medical and other applications.

13. Between June 2014 and July 2016, Dr. Islam had a series of meetings and email exchanges with Apple personnel regarding the technology underlying his then-pending patent applications, including some of the now-issued Patents-in-Suit. In those exchanges, Apple was offered the opportunity to license or acquire Omni MedSci’s patented and patent-pending technology, but Apple declined.

14. On June 11-12, 2014, Dr. Islam met with Apple employees Drs. Michael O’Reilly and Michael Hillman at Apple’s headquarters in Cupertino, California to discuss Omni MedSci’s then patent-pending technology.

15. Dr. Hillman then arranged for a meeting with Dr. Islam and approximately ten Apple employees at Apple's headquarters in Cupertino, California to discuss technical details of Omni MedSci's then patent-pending technology. The meeting took place at Apple on February 5, 2015.

16. On July 14, 2016, Apple employee Greg Joswiak emailed Dr. Islam inviting him to provide additional information about his technology. Mr. Joswiak indicated that he would share the information with his team at Apple.

17. Four days later, Apple employees Drs. Ed Hull and Shonn Hendee arranged a meeting with Dr. Islam and approximately ten Apple employees at Apple's headquarters in Cupertino, California to discuss technical details of Omni MedSci's then patent-pending technology. The meeting took place at Apple on July 18, 2016. At the meeting, Dr. Islam shared the published patent application for the '546 patent and the published parent patent applications for the '698 and '286 patents.

18. Dr. Islam continued to correspond with Apple employees regarding the status of his pending patent applications and technological development. On December 21, 2017, Dr. Islam emailed Drs. O'Reilly, Hull, and Hendee enclosing copies of the allowed claims for the '268 and '698 patents. In response, Dr. O'Reilly emailed Dr. Islam stating, "We [Apple] don't wish to receive any information about any of your IP [Intellectual Property]."

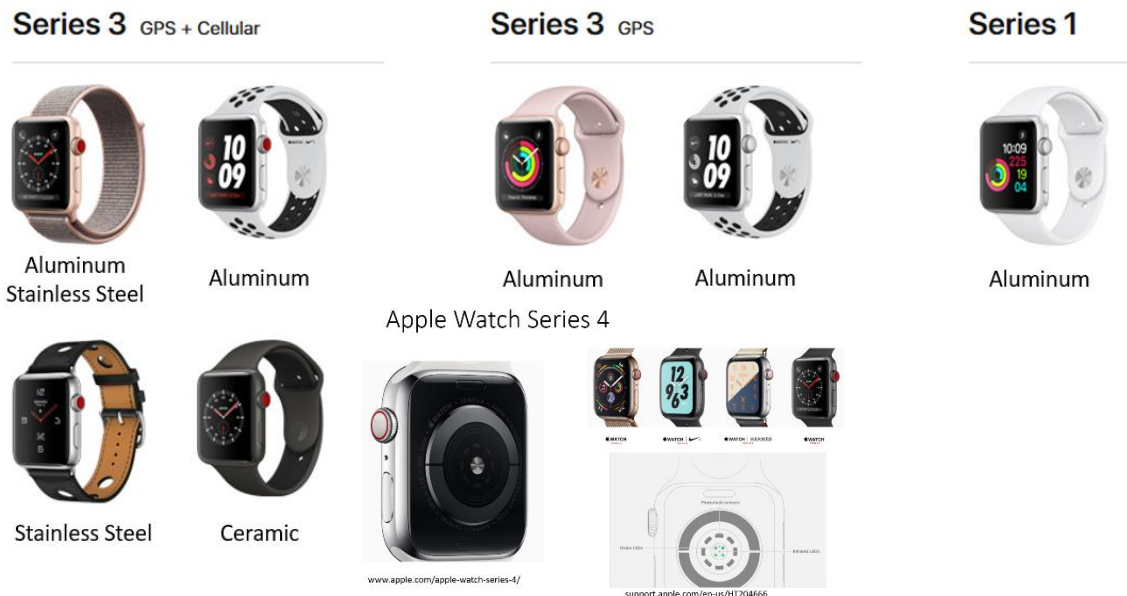
Apple's Infringing Apple Watch Products

19. On information and belief,¹ Apple has made and sold several models of its Apple Watch product, including, for example, "Series 1," "Series 2," "Series 3 GPS," "Series 3 GPS +

¹ For allegations based on information and belief, Omni MedSci believes that the allegations will have evidentiary support after a reasonable opportunity for investigation and discovery.

Cellular,” and “Series 4” watches. Omni MedSci asserts infringement by all models, including the models sold to date and models sold in the future, which are covered by the claims of the Patents-in-Suit (collectively, “Watches”). Exemplary Watches advertised on Apple’s web site (<https://www.apple.com/watch/compare/>, captured on March 8, 2018 and October 10, 2018) as shown below:

Exemplary Apple Watches



20. The Watches are wearable devices that measure a physiological parameter, namely, heart rate.
21. The Watches measure heart rate non-invasively using light emitting diodes (“LEDs”).
22. The light emitted from the LEDs in the Watches includes near-infrared wavelengths.
23. The Watches can modulate the light emitted from the LEDs.

24. The Watches can use a lock-in technique, such as synchronous demodulation, which is used to detect the modulation frequency.

25. The Watches can improve the signal-to-noise ratio of the LED light reflected from the skin by increasing the intensity of the light emitted from the LEDs.

26. The Watches can also improve the signal-to-noise ratio of the LED light reflected from the skin by increasing the pulse rate of the LEDs.

27. The Watches have one or more lenses that deliver the light from the LEDs to a Watch wearer's skin.

28. The one or more lenses in the Watches include a spectral filter.

29. The Watches have at least two detectors that receive LED light reflected from the skin.

30. The detectors in the Watches capture light while the LEDs are off.

31. The Watches have one or more analog to digital converters that process the reflected light received by the detectors.

32. A receiver in the Watches can be synchronized to the LED light sources.

33. The Watches can capture light while the LEDs are off to improve the signal-to-noise ratio of the light captured from the LED light reflected from the skin by differencing between the light captured while the LEDs are off and the light captured from the LED light reflected from the skin.

34. The Watches can communicate with an Apple smart phone or tablet.

Count 1 – Infringement of the '546 Patent

35. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

36. Apple has directly infringed and is directly infringing the ‘546 patent by making using, offering for sale, and selling the Watches, and importing the Watches into the United States.

37. Based on publicly available information, the Watches infringe at least claims 1, 2, 4, 5, 7-13, and 15-18 of the ‘546 patent. Omni MedSci may assert additional claims of the ‘546 patent after a reasonable opportunity for investigation and discovery.

38. Apple’s infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

39. Claim 1 recites: “A wearable device, comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters.” Apple sells Watches, which are wearable, and that include a measurement device that can measure heart rate, which is a physiological parameter. The measurement device in the Watches uses multiple light emitting diodes for measuring the heart rate. *See, e.g.,* Apple’s website at support.apple.com/en-us/HT204666 and www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521.

40. Claim 1 further recites: “the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity, an optical beam having a plurality of optical wavelengths, wherein at least a portion of the optical beam includes a near-infrared wavelength between 700 nanometers and 2500 nanometers.” The Watches include infrared LEDs, which emit an optical beam with more than one wavelength. At least a portion of the wavelengths emitted are between 700 nanometers and 2500 nanometers. The LEDs are modulated and have an initial light intensity. *See, e.g.,* Apple website at support.apple.com/en-us/HT204666; www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; U.S. Patent Publication No. 2017/0281024.

41. Claim 1 further recites: “the measurement device comprising one or more lenses configured to receive and to deliver at least a portion of the optical beam to tissue.” The Watches include one or more lenses that receive the optical beam from the LEDs and deliver a portion of that beam to a wearer’s tissue.



42. Claim 1 further recites: “wherein the tissue reflects at least a portion of the optical beam delivered to the tissue.” The wearer’s tissue reflects at least part of the optical beam delivered to the tissue. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

43. Claim 1 further recites: “the measurement device further comprising a receiver, the receiver having a plurality of spatially separated detectors.” The Watches include a receiver, with multiple photodiode detectors, each detector being separated from the others in space. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

44. Claim 1 further recites that the receiver includes “one or more analog to digital converters coupled to the spatially separated detectors, the one or more analog to digital converters configured to generate at least two receiver outputs.” The receiver in the Watches uses analog to digital converters, coupled to the detectors, which generate at least two output signals. *See, e.g.*,

www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045.

45. Claim 1 further recites: “the receiver configured to: capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and to convert the captured light into a second signal, the captured light including at least a portion of the optical beam reflected from the tissue.” The receiver in the Watches can capture light while the LEDs are off and convert that light into a first signal. It also captures light from the LEDs, which light includes light reflected from the tissue, and converts that light into a second signal. *See, e.g.*, U.S. Pub. No. 2016/0058367.

46. Claim 1 further recites: “the measurement device configured to improve a signal-to-noise ratio of the optical beam reflected from the tissue by differencing the first signal and the second signal and by differencing the two receiver outputs.” The measurement device in the Watches improves the signal-to-noise ratio of the light reflected from the tissue by differencing the first signal and the second signal. It also improves the signal-to-noise ratio of the light reflected from the tissue by differencing the two receiver outputs. *See, e.g.*, U.S. Pub. No. 2016/0058367; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045; U.S. Pub. No. 2016/0296173

47. Claim 1 further recites: “the measurement device configured to further improve the signal-to-noise ratio of the optical beam reflected from the tissue by increasing the light intensity relative to the initial light intensity from at least one of the LEDs.” The measurement device in the Watches improves the signal-to-noise ratio of the light reflected from the tissue by increasing LED brightness. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>.

48. Claim 1 further recites: “the measurement device further configured to generate an output signal representing at least in part a non-invasive measurement on blood contained within

the tissue.” The measurement device in the Watches generates a signal that represents the heart rate of the blood in the tissue. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Pub. No. 2016/0058367.

49. Claim 1 further recites: “wherein the output signal is generated at least in part by using a Fourier transform of signals from the receiver including at least one of the first and second signals and signals from the at least two receiver outputs.” The Watches apply a Fourier transform to at least one of the signals from the receiver to, in part, generate the output signal. *See, e.g.*, U.S. Pub. No. 2016/0051201.

50. Claim 1 further recites: “wherein the receiver further comprises one or more spectral filters positioned in front of at least some of the plurality of spatially separated detectors.” The Watches include spectral filters in front of one or more of the Watch lenses.

Count 2 – Infringement of the ‘286 Patent

51. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

52. Apple has directly infringed and is directly infringing the ‘286 patent by making using, offering for sale, and selling the Series 4 Watch, and importing the Series 4 Watch into the United States.

53. Based on publicly available information, the Series 4 Watch infringes at least claims 16 and 19 of the ‘286 patent. Omni MedSci may assert additional claims of the ‘286 patent after a reasonable opportunity for investigation and discovery.

54. Apple’s infringement is described further below with respect to exemplary claim 16. The analysis below is based on publicly available information.

55. Claim 16 recites: “A wearable device for use with a smart phone or tablet, the wearable device comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters.” Apple sells Series 4 Watches, which are wearable devices that use multiple light emitting diodes. *See, e.g.*, Apple’s website at <http://support.apple.com/en-us/HT204666>.

56. Claim 16 further recites: “the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity.” The Series 4 Watch modulates at least one of the LEDs, which fluctuate in brightness (intensity). *See, e.g.*, Apple’s website at <http://support.apple.com/en-us/HT204666>.

57. Claim 16 further recites: “an optical beam having a plurality of optical wavelengths, wherein at least a portion of the plurality of optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers.” The Series 4 Watch includes infrared LEDs, which emit wavelengths between 700 nanometers and 2500 nanometers. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2017/0281024.

58. Claim 16 further recites: “the measurement device comprising one or more lenses configured to receive and to deliver a portion of the optical beam to tissue.” The Series 4 Watch includes one or more lenses capable of receiving and delivering a portion of an optical beam to skin.



59. Claim 16 further recites: “wherein the tissue reflects at least a portion of the optical beam delivered to the tissue.” When the Series 4 Watch delivers the optical beam to the skin, the skin reflects at least a portion of that optical beam. *See, e.g.*, U.S. Patent Publication Nos. 2016/0058309 and 2016/0058367.

60. Claim 16 further recites: “wherein the measurement device is adapted to be placed on a wrist or an ear of a user.” The Series 4 Watch is adapted to be placed on the user’s wrist.

61. Claim 16 further recites: “the measurement device further comprising a receiver configured to: capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the optical beam reflected from the tissue.” The Series 4 Watch includes a receiver with sensors, which capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the input optical beam reflected from the skin. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2016/0058367.

62. Claim 16 further recites: “the measurement device configured to improve a signal-to-noise ratio of the optical beam reflected from the tissue by differencing the first signal and the

second signal.” The Series 4 Watch reduces the signal-to-noise ratio of the optical beam received from the skin by differencing the first signal and the second signal. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

63. Claim 16 further recites: “the light source configured to further improve the signal-to-noise ratio of the optical beam reflected from the tissue by increasing the light intensity relative to the initial light intensity from at least one of the LEDs.” The Series 4 Watch improves the signal-to-noise ratio of the optical beam reflected from the skin by increasing the brightness (intensity) of the Series 4 Watch LEDs. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>.

64. Claim 16 further recites: “the measurement device further configured to generate an output signal representing at least in part a non-invasive measurement on blood contained within the tissue.” The Series 4 Watch can generate an output signal, which represents the user’s heart rate. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2016/0058367.

65. Claim 16 further recites: “wherein the receiver includes a plurality of spatially separated detectors.” The Series 4 Watch includes a receiver with multiple photodiode sensors, which are spatially separated. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>.

66. Claim 16 further recites: “wherein at least one analog to digital converter is coupled to the spatially separated detectors.” The Series 4 Watch includes at least one analog to digital converter, which is coupled to the spatially separated photodiode sensors. *See, e.g.*, U.S. Patent Publication No. 2019/0038045.

Count 3 – Infringement of the ‘698 Patent

67. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

68. Apple has directly infringed and is directly infringing the ‘698 patent by making using, offering for sale, and selling the Series 4 Watch, and importing the Series 4 Watch into the United States.

69. Based on publicly available information, the Series 4 Watch infringes at least claims 1, 2, 3 and 5 of the ‘698 patent. Omni MedSci may assert additional claims of the ‘698 patent after a reasonable opportunity for investigation and discovery.

70. Apple’s infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

71. Claim 1 recites: “A wearable device, comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters.” Apple sells Series 4 Watches, which are wearable devices that use multiple light emitting diodes. *See, e.g.*, Apple’s website at <http://support.apple.com/en-us/HT204666>.

72. Claim 1 further recites: “the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity.” The Series 4 Watch modulates at least one of the LEDs by fluctuating the LEDs’ brightness (intensity). *See, e.g.*, Apple’s website at <http://support.apple.com/en-us/HT204666>.

73. Claim 1 further recites: “an input optical beam having one or more optical wavelengths, wherein at least a portion of the one or more optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers.” The Series 4 Watch includes infrared

LEDs, which emit wavelengths between 700 nanometers and 2500 nanometers. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2017/0281024.

74. Claim 1 further recites: “the measurement device comprising one or more lenses configured to receive and to deliver a portion of the input optical beam to tissue.” The Series 4 Watch includes one or more lenses capable of receiving and delivering a portion of an optical beam to skin.



75. Claim 1 further recites: “wherein the tissue reflects at least a portion of the input optical beam delivered to the tissue.” When the Series 4 Watch delivers the optical beam to the skin, the skin reflects at least a portion of that optical beam. *See, e.g.*, U.S. Patent Publication Nos. 2016/0058309 and 2016/0058367.

76. Claim 1 further recites: “the measurement device further comprising a receiver, wherein the receiver includes a plurality of spatially separated detectors.” The Series 4 Watch includes a receiver with multiple photodiode sensors that are spatially separated. *See, e.g.*, Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2016/0058367.

77. Claim 1 further recites: “the detectors configured to: capture light while the LEDs are off and convert the captured light into a first signal; and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least

a portion of the input optical beam reflected from the tissue.” The Series 4 Watch includes sensors, which capture light while the LEDs are off and convert the captured light into a first signal; and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the input optical beam reflected from the skin. *See, e.g.,* Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2016/0058367.

78. Claim 1 further recites: “wherein at least one analog to digital converter is coupled to the spatially separated detectors and is configured to generate at least a first data signal from the first signal and at least a second data signal from the second signal.” The Series 4 Watch includes at least one analog to digital converter, which is coupled to the spatially separated photodiode sensors, and is configured to generate at least a first data signal from the first signal and at least a second data signal from the second signal. *See, e.g.,* U.S. Patent Publication No. 2019/0038045.

79. Claim 1 further recites: “the measurement device configured to improve a signal-to-noise ratio of the input optical beam reflected from the tissue by differencing the first data signal and the second data signal.” The Series 4 Watch reduces the signal-to-noise ratio of the optical beam received from the skin by differencing the first signal and the second signal. *See, e.g.,* U.S. Patent Publication No. 2016/0058367.

80. Claim 1 further recites: “to generate an output signal representing at least in part a non-invasive measurement on blood contained within the tissue.” The Series 4 Watch can generate an output signal, which represents the user’s heart rate. *See, e.g.,* Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2016/0058367.

81. Claim 1 further recites: “wherein the modulating at least one of the LEDs has a modulation frequency and wherein the receiver is configured to use a lock-in technique that detects

the modulation frequency.” The Series 4 Watch LEDs have a modulation frequency of hundreds of times per second. Further, on information and belief, the Series 4 Watch receiver uses a lock-in technique that detects the modulation frequency. *See, e.g.,* Apple website at <http://support.apple.com/en-us/HT204666>; U.S. Patent Publication No. 2008/0297487.

Count 5 – Willful Infringement

82. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

83. Based on the communications and meetings between Dr. Islam and Apple personnel, Apple knew of its infringement of the Patents-in-Suit or was willfully blind to its infringement.

84. Apple’s infringement of the Patents-in-Suit has been willful.

Demand for Relief

WHEREFORE, Omni MedSci requests entry of judgment against Apple as follows:

A. Finding Apple liable for infringement of the Patents-in-Suit and that the infringement has been willful;

B. Awarding Omni MedSci damages under 35 U.S.C. § 271 adequate to compensate for Apple’s infringement;

C. Permanently enjoining Apple, together with any officers, agents, servants, employees, and attorneys, and such other persons in active concert of participation with them, who receive actual notice of the Order, from further infringement of the Patents-in-Suit;

D. A declaration this case is exceptional within the meaning of 35 U.S.C. § 285 and awarding Omni MedSci its reasonable attorney fees, costs, and disbursements;

E. Awarding Omni MedSci interest in all damages awarded; and

F. Granting Omni MedSci all other relief to which it is entitled.

Demand for Jury Trial

Omni MedSci demands trial by jury for all issues so triable.

Dated: October 16, 2018

Respectfully submitted,

/s/ John S. LeRoy

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