

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.,
Petitioners

v.

GUI Global Products, Ltd., D/B/A Gwee,
Patent Owner

Case IPR2021-00336

U.S. Patent No. 10,259,021

**DECLARATION OF DR. SAYFE KIAEI IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,259,021**

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I, Sayfe Kiaei, declare as follows:

I. INTRODUCTION

1. I have been retained by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Samsung” or “Petitioners”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”).

2. I am being compensated at a rate of \$610/hour for my services in this proceeding, which is my regular and customary rate.

3. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

4. I have been asked to consider whether certain references disclose or suggest the features recited in the claims of U.S. Patent No. 10,259,021 (“the ’021 patent”) (Ex. 1001).¹ My opinions are set forth below.

¹ Where appropriate, I refer to exhibits I understand will be attached to the petition for *inter partes* review of the ’021 patent (the “Petition”).

II. BACKGROUND AND QUALIFICATIONS

5. I am an independent consultant. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my education, experience, and knowledge regarding electrical engineering, computer science, and consumer electronics product design.

6. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. A copy of my current curriculum vitae, which details my education and professional and academic experience, is included as Ex. 1003 in this proceeding. The following provides an overview of some of my experience that is relevant to the matters set forth in this declaration.

7. Since 2001, I have held the position of Motorola Endowed Chair Professor in Analog and Radio Frequency Integrated Circuitry at the School of Electrical, Computer, and Energy Engineering at Arizona State University (“Arizona State”) in Tempe, Arizona. I am also the Director of the National Science Foundation Center, Connection One. Connection One is a research center focused on developing wireless communication system and networking technologies.

8. I received my doctorate in Electrical and Computer Engineering from Washington State University in 1987. I have several patents and over 100 journal and international conference publications. I have graduated over 70 MS and PhD students working under my supervision on their thesis, and many of them are professors in academia or have senior positions in industry. My research is funded by various sources, including industry, such as Motorola Inc., Intel Inc., Broadcom, Qualcomm, Raytheon, General Dynamics, and Texas Instruments; and federal agencies, such as NSF, USAID, DARPA, JPL, and NASA.

9. From 1987 to 1993, I was an assistant/associate professor at Oregon State University (“Oregon State”). From 1997 to 2002, I was also an adjunct professor at the University of Texas (“UT”) at Austin, while I worked full time at Motorola in Austin. From 2002 to present, I have been a professor at Arizona State University (“Arizona State”). At Oregon State, UT, and Arizona State, I taught courses in the areas of communication systems; wireline and wireless communication systems; radio frequency (“RF”) systems and circuits; radio-frequency identification (“RFID”); magnetic and electronic sensors; analog circuits; digital integrated circuits, including HDL, Verilog, and VHDL; digital signal processing; and related areas. At Arizona State, I developed a new course on the design of wireless and RF transceivers (EEE524) and wireless transceiver design

(EEE598). These courses cover transceiver architecture, wireless and sensor electronics, 1G through 4G wireless systems, and wireless transceivers (for example, Bluetooth transceivers).

10. I have been involved in research, teaching, and developing products in the areas of wireline systems, cellular systems, radio frequency integrated circuits (“RFIC”), analog and digital integrated circuits, sensors, electronics, communications, digital signal processing, and related areas for the last 30 years. I have worked in industry and academia on the first generation of mobile phones, as well as second generation (2G) and third generation (3G) mobile phone technologies including GSM, EDGE, IS-95, 1X CDMA, UMTS, and Wide band CDMA. I have also worked on other wireless data communication technologies including Bluetooth, the Global Positioning System (GPS), RFID, magnetic and electronic sensors, wireless local area networks (LAN) (or Wi-Fi), and related areas.

11. From 1993 to 2001, I worked at Motorola Wireless Integrated Technology Center and Motorola Analog/Digital Design groups. This group was responsible for the design and development of communication systems, architecture, digital signal processing (DSP, and analog, and RF integrated circuits. The products included first generation wireless phones (1G - AMPS, Digital AMPS), second generation wireless phones (2G - GSM, EDGE, GPRS), and third generation

wireless phones (3G - CDMA, WCDMA, UMTS, CDMA2000). The products included the Razr, iDEN, other Motorola flip phones, Talkabout radios, and CopperGold DSL MODEMS. I was responsible for the development of wireless system, cellular system, RF integrated circuits, Bluetooth, and GPS. I also worked on the development of CopperGold Motorola Digital Subscriber Lines (DSL) transceivers. The CopperGold system included ADSL, VDSL, and DSL.lite, with full legacy compatible system. The integrated solution contained integrated on-chip OFDM, FFT, custom fixed-point Motorola DSP, ADC and DAC, and over 50 input/output ports for communication, including ATM, ISDM, IrDA, and other ports. I was also involved with the IrDA system design, including specification, link budget, circuit blocks, optical and electrical requirements, and protocol. While I was at Motorola, I represented Motorola in ITU, ETSI and IEEE standard setting bodies. I was also involved in the Bluetooth SIG on behalf of Motorola, and also represented Motorola before the FCC related to the GPS-E911 mandate.

12. I have also been a consultant on various projects with Intel (designing 2G and 3G mobile telephone transceivers), Texas Instrument (developing 3G cellular and Bluetooth technologies), Sony Wireless (developing GPS technologies), Tektronix (designing wireless systems), and various other consultancies.

13. During my work in industry, I designed and contributed to the design of many radio transceivers for commercial products, including designs for 1G to 3G cellular systems, 2-way radio, Bluetooth, GPS, and other transceiver systems. Many of my designs are still in use today in products manufactured by the companies I have worked for, including Motorola, Intel, and Sony.

14. I am an IEEE Fellow, which is the highest level of IEEE membership awarded by the IEEE directors to recognize a high level of demonstrated extraordinary accomplishments. The IEEE Fellow Award is a special recognition for members with extraordinary accomplishments in the IEEE technical fields. To ensure that the recognition is extraordinary, the total number of recipients each year cannot exceed 0.1% of the total higher grade membership. The IEEE is the Institute of Electrical and Electronics Engineers, the world's largest association of technical professionals whose objectives include the educational and technical advancement of electrical and electronic engineering, telecommunications, computer engineering, and related disciplines.

15. I am a member of the IEEE Circuits and Systems Society, IEEE Solid State Circuits Society, IEEE Signal Processing Society, and IEEE Communication Society. I am also a member of the IEEE RF and Microwave committees, IEEE Low Power Symposium Committee, and IEEE Fellow Selection Committee. I was

one of the key organizers establishing the IEEE Radio Frequency Integrated Circuits (RFIC) symposium in 1995, and I have been on the executive and technical committees of RFIC for the last 16 years. The RFIC Symposium is now the premier international symposium in the world where the latest RF circuits and components are presented. I have been involved in several international conferences in the areas of RF, Communication, Signal Processing, and IC design.

16. I have received several awards including the Carter Best Teacher Award, the IEEE Darlington Award (which is given for the best technical paper on circuits and systems in the IEEE Circuits and Systems Society), and the Motorola 10X Rapid Design Cycle Reduction Award.

III. MATERIALS REVIEWED

17. The opinions contained in this declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding electrical engineering, computer science, and consumer electronics product design.

18. In forming my opinions expressed in this declaration, I reviewed the following materials:

- the '021 patent (Ex. 1001);
- the file history of the '021 patent (Ex. 1004);

- the File History of U.S. Provisional Application No. 61/515,752 (Ex. 1005);
- U.S. Patent Application Publication 2010/0227642 to Kim *et al.* (“*Kim*”) (Ex. 1010);
- Korean Patent Publication 10-2008-0093178 to Koh *et al.* (“*Koh*”) (Ex. 1012)²;
- U.S. Patent Application Publication 2010/0298032 to Lee *et al.* (“*Lee*”) (Ex. 1013);
- U.S. Patent No. 5,946,121 to Jiang *et al.* (“*Jiang*”) (Ex. 1014);
- U.S. Patent Application Publication No. 2008/0166005 to Terlizzi *et al.* (“*Terlizzi*”) (Ex. 1015);
- U.S. Patent Application Publication No. 2006/0152576 to Kiessling *et al.* (“*Kiessling*”) (Ex. 1016);

² I understand Ex. 1012 is a compilation comprising the English-language translation of *Kim* (Ex. 1012, 1-15), and its Korean language version (*id.*, 16-30), and an affidavit required by 37 C.F.R. § 42.63(b) (in the form of a declaration as permitted by 37 C.F.R. § 42.2) (*id.*, 31).

- U.S. Patent Application Publication No. 2003/0164895 to Viinikanoja *et al.* (“*Viinikanoja*”) (Ex. 1017);
- International Patent Publication No. WO 2010/142290 to Birger *et al.* (“*Birger*”) (Ex. 1018);
- U.S. Patent No. 6,809,774 to Yamazaki *et al.* (“*Yamazaki*”) (Ex. 1019);
- U.S. Patent No. 7,251,197 to Yoshida *et al.* (“*Yoshida*”) (Ex. 1020);
- U.S. Patent Application Publication 2011/0211297 to Griffin *et al.* (“*Griffin*”) (Ex. 1021);
- U.S. Patent Application Publication 2006/0071746 to Lylyharju (“*Lylyharju*”) (Ex. 1022);
- A Dictionary of Chemistry (5th ed. 2004) (Ex. 1023);

and any other materials I refer to in this declaration in support of my opinions.

19. All of the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the claims and the specification of the '021 patent at the time of the alleged invention, which I have been asked to initially consider as no earlier than November 3, 2011 (the filing date of U.S. Provisional Patent Application 61/555,310). My opinions reflect how one of ordinary skill in the art would have

understood the '021 patent, the prior art to the patent, and the state of the art at the time of the alleged invention.

20. Based on my experience and expertise, it is my opinion that certain references disclose and/or suggest, alone or in combination, all the features recited in claims 1-19 (“challenged claims”) of the '021 patent, as I discuss in detail below.

IV. LEVEL OF ORDINARY SKILL IN THE ART

21. I have been informed and understand that, in the context of an invalidity analysis, a person having ordinary skill in the art is a hypothetical person who looks to prior art at the time of the invention. I further understand that the factors that may be considered in determining the level of ordinary skill include: (1) the problems encountered in the art; (2) the prior art solutions to the problems encountered in the art; (3) the rapidity of innovation; (4) the sophistication of the technology; and (5) the education level of active workers in the field. I understand that these factors need not all be considered for the analysis and that one or more of these factors may control.

22. I was asked to provide my opinion on the level of one of ordinary skill in the art with respect to the alleged invention of the '021 patent as of November 3, 2011. Based on my consideration of the factors above, I believe a person of ordinary skill in the art would have had at least a bachelor’s degree in electrical engineering,

computer science, or a similar field and one year of experience in consumer electronics product design. More education can supplement practical experience and vice versa.

23. As of November 3, 2011, I met, and in fact exceeded, the qualifications of a person of ordinary skill in the art. To be clear, all of my opinions in this declaration are from the perspective of one of ordinary skill in the art as I have defined it here during the relevant timeframe.

V. RELEVANT LEGAL STANDARDS

24. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a person skilled in the art.

25. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to forming my opinions. My understanding of the law is as follows:

26. Petitioners' counsel has informed me that for the prior art to inherently disclose a claimed limitation, the prior art need not expressly disclose the limitation, so long as the claimed limitation necessarily flows from a disclosure in the prior art.

27. Petitioners' counsel has informed me that a patent claim can be considered to have been obvious to a person of ordinary skill in the art at the time

the application was filed in view of the prior art. This means that, even if all of the requirements of a claim are not found in a single prior art reference, the claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person of ordinary skill in the art at the relevant time, which I have been informed in this case is November 3, 2011.

28. Petitioners' counsel has informed me that a determination of whether a claim would have been obvious should be based upon several factors, including, among others:

- the level of ordinary skill in the art at the time the application was filed;
- the scope and content of the prior art; and
- what differences, if any, existed between the claimed invention and the prior art.

29. Petitioners' counsel has informed me that a single prior art reference can render a patent claim obvious if any differences between that reference and the claims would have been obvious to a person of ordinary skill in the art. Alternatively, the teachings of two or more references may be combined in the same way as disclosed in the claims, if such a combination would have been obvious to one having ordinary skill in the art. In determining whether a combination based on

either a single reference or multiple references would have been obvious, it is appropriate to consider, among other factors:

- whether the teachings of the prior art references disclose known concepts combined in familiar ways, and when combined, would yield predictable results;
- whether a person of ordinary skill in the art could implement a predictable variation, and would see the benefit of doing so;
- whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success by those skilled in the art;
- whether a person of ordinary skill would have recognized a reason to combine known elements in the manner described in the claim;
- whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and
- whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.

30. Petitioners' counsel has informed me that one of ordinary skill in the art has ordinary creativity and is not an automaton. Petitioners' counsel has also

informed me that in considering obviousness, it is important not to determine obviousness using the benefit of hindsight derived from the patent being considered.

VI. OVERVIEW OF THE '021 PATENT

31. The '021 patent, titled “Apparatus for Cleaning View Screens and Lenses and Method for the Use Thereof,” is generally directed to “[a] lens and/or a view screen of an electronic device having at least one case [that] can be cleaned by wiping the view screen with a cleaning component wherein the cleaning component is configured to selectively couple to the at least one case or some other substrate using a magnetic attractive force.” Ex. 1001, Abstract.

32. According to the '021 patent, “[c]leaning lenses has long been an issue for the users of devices employing them.” *Id.*, 1:38-39. The '021 patent explains that “[c]leaning the view screen of a portable electronic device can be problematic” and “[c]arrying appropriate cleaning materials is sometimes a problem.” *Id.*, 1:59-66. For at least these reasons, the '021 patent states the following:

It would be desirable in the art of manufacturing portable electronic devices to incorporate into such devices the cleaning apparatus. It would also be desirable in the art of providing accessories for portable electronic devices to provide a cleaning component that can be carried on an electronic device case.

Id., 2:3-8.

33. To address these alleged problems, the '021 patent describes several embodiments such as, for example, “a method of cleaning a view screen of an electronic device” (*id.*, 2:12-18), “a cleaning component for use on an electronic device view screen” (*id.*, 2:19-23), and “a switching device for use with a portable electronic device having a view screen” (*id.*, 3:64-4:11).

34. The majority of the '021 patent describes methods of cleaning and aspects of a cleaning device. However, the '021 patent also provides that:

In addition to their cleaning functionality, the cleaning components of the application have a functionality of being able to activ[ate] magnetic switches on devices having such switches. This is particularly useful in saving battery life as it does not require the cover of such devices to be closed (the normal mode for activation of such switches). In the use of tablet devices having a magnetic switch, the cleaning components are particularly useful as the tablet can be put into hibernation mode with a single touch to the cleaning component as compared to the multiple touches required to do the same thing using the touch pad of the tablet.

Id., 11:59-12:2. In one embodiment, the cleaning device may also have “additional functionality such as a remote control, laser pointer or the like.” *Id.*, 16:30-40. Such functionality may also include, “pointing devices,” “remote functionality,” “flash drive,” “earplugs,” “credit card reader, microphone, and the like.” *Id.*, 16:48-58.

Despite this disclosure, the '021 patent also provides that the cleaning device “may or may not include cleaning capabilities but will include a rare earth magnet or magnets.” *Id.*, 16:40-42.

35. The '021 patent further discloses the following:

One embodiment of the invention is *a switching device for use a portable electronic device having a view screen*, a switch for turning the portable device off and on that can be activated or deactivated by the application of a magnetic field and at least one case. The term portable electronic device means such devices having a view screen including, but not limited to, tablet computers, laptop computers, portable DVD players, and the like.

Id., 17:54-61 (emphasis added). This embodiment is depicted in FIG. 24 of the '021 patent, which I have provided below:

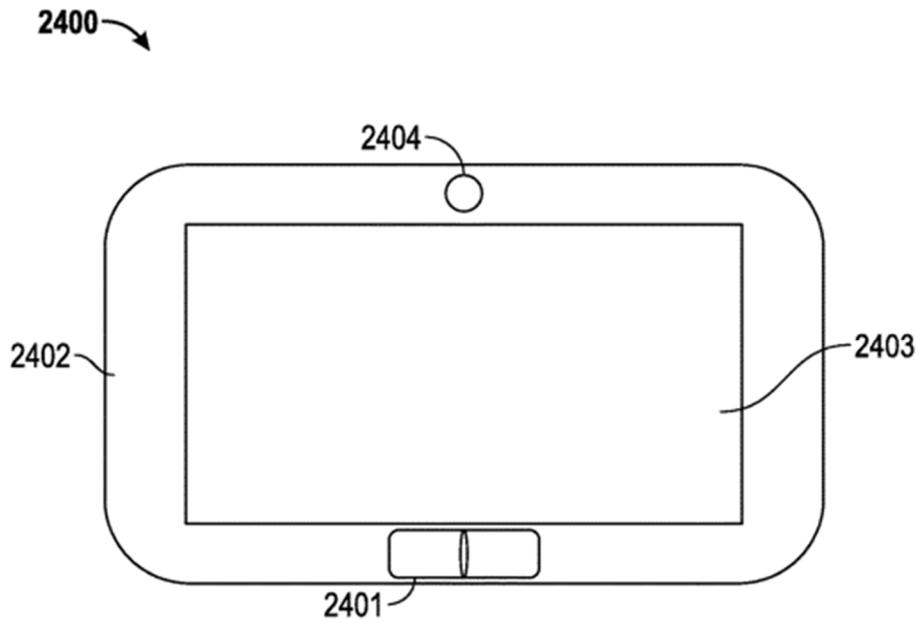


FIG. 24

Id., FIG. 24, 18:5-17.

36. The '021 patent also provides that “the switching device (2401) is selectively coupled to the front of the portable electronic device 2402 outside of the view screen 2403.” *Id.*, 18:7-11. A side view of the switching device 2401 is shown below:

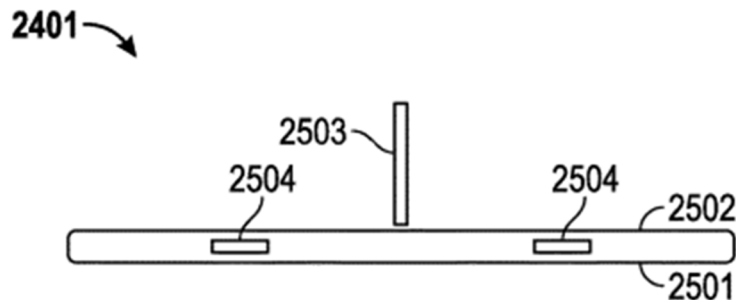


FIG. 25

Id., FIG. 25, 18:19-31. The '021 patent discloses that:

In this embodiment, the bottom of the switching device is in contact with portable electronic device and is composed of a material that is not abrasive to the portable electronic device generally and the view screen in particular. Except for this limitation, the switching devices may be prepared with any material known to be useful to those of ordinary skill in the art for such applications.

Id., 18:25-31.

37. The '021 patent further discloses that:

The switching devices have a functionality of being able to active[ate] magnetic switches on devices having such switches. This is particularly useful in saving battery life as it does not require the cover of such devices to be closed (the normal mode for activation of such switches). In the use of tablet devices having a magnetic switch, the switching devices are particularly useful as the tablet can be put into hibernation mode with a single touch to the switching device as compared to the multiple touches required to do the same thing using the touch pad of the tablet.

Id., 20:14-23.

38. In addition to the disclosure of the '021 patent, I have also reviewed the file history of the '021 patent (Ex. 1004) and U.S. Provisional Patent Application No. 61/515,752 (“the '752 provisional application”) (Ex. 1005), which I understand

is referenced in the '021 patent. The '752 provisional application does not disclose a switching device or a portable switching device, as recited in the '021 patent. *See generally* Ex. 1005.

VII. OVERVIEW OF THE PRIOR ART

A. *Kim*

39. The devices disclosed in *Kim* enable a user to activate and deactivate an electronic device with a separate switching device, and aim to achieve that purpose using the same features claimed in the '021 patent.

40. *Kim* is directed to a mobile terminal comprising a main device and sub-device(s) that are detachably coupled to the main device. Ex. 1010, Abstract. For example, *Kim* discloses:

A mobile terminal [that] includes a sub-device that is attached thereto or detached therefrom, to remotely control the operation and state of the terminal. The mobile terminal includes: a sub-device having an input/output unit and attached to or detached from the terminal; and a controller configured to receive a user input via a certain communication path from the sub-device when the sub-device is separated, and control elements and applications of the terminal according to the user input.

Id. *Kim* discloses that examples of “terminals” include “mobile terminals as well as stationary terminals, such as mobile phones, user equipment, smart phones, DTV,

computers, digital broadcast terminals, personal digital assistants, portable multimedia players (PMP) and/or navigators.” *Id.*, ¶69; *see also id.*, ¶70 (“A further description may be provided with regard to a mobile terminal, although such teachings may apply equally to other types of terminals.”). A person of skill in the art would have understood that at least mobile phones, smart phones, personal digital assistants, portable multimedia players (PMP) and/or navigators were “mobile terminals.”

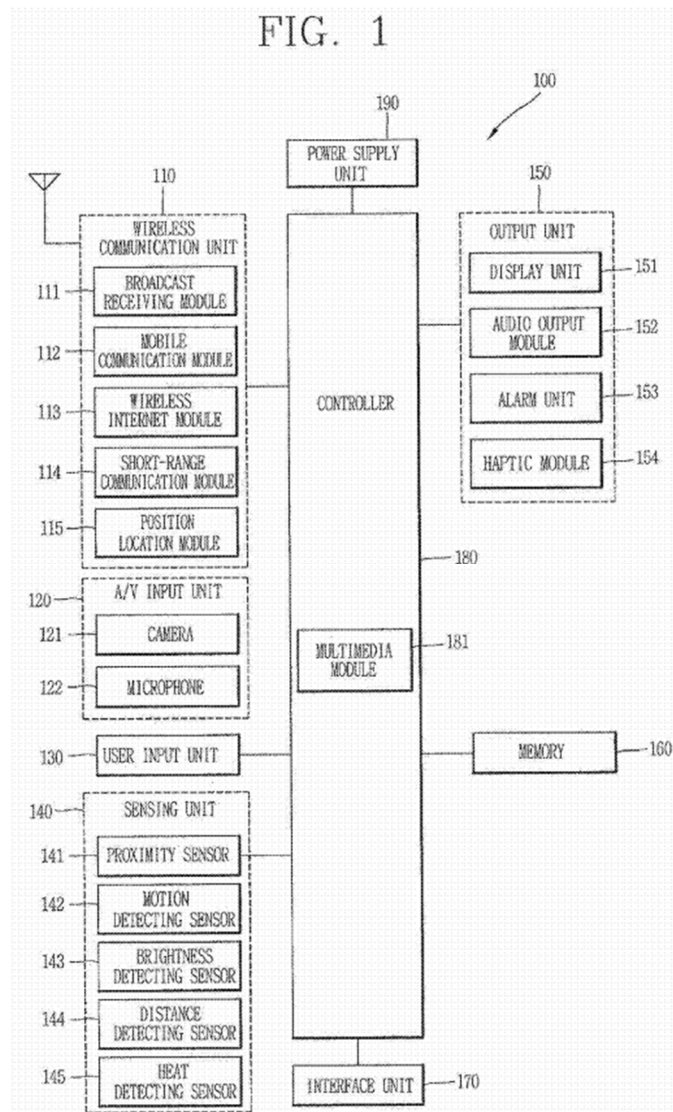
41. *Kim* describes the structure and functionality of the mobile terminal in a number of interrelated embodiments. *Kim* expressly notes that its embodiments can be combined together:

Embodiments for a control method in the mobile terminal 100 may now be described with reference to the accompanying drawings. Embodiments may be used singly and/or by being combined together. Embodiments may be implemented more easily when the display 151 includes the touchscreen.

Id. ¶179.

42. Initially, *Kim* discusses various features that are common to the mobile terminals. *Id.*, ¶¶71-122. For example, *Kim* states that “FIG. 1 is a block diagram of a mobile terminal” that includes “a wireless communication unit 110, an audio/video (A/V) input unit 120, a user input unit 130, a sensing unit 140, an output

unit 150, a memory 160, an interface unit 170, a controller 180 and a power supply 190.” *Id.*, ¶72. *Kim* explains, however, that the mobile terminal can include “more or less” components than shown in Figure 1. *Id.* ¶71. I have reproduced Figure 1 of *Kim* below:



Id., FIG. 1. *Kim* provides detailed descriptions of each of these “units.” *See id.*, ¶¶73-119 (describing the various units and modules in the mobile terminal). For

example, *Kim* describes the A/V unit 120 as including a camera:

The audio/video (A/V) input unit 120 may provide audio or video signal input to the mobile terminal 100. The A/V input unit 120 may include a camera 121 and a microphone 122. The camera 121 may receive and process image frames of still pictures and/or video.

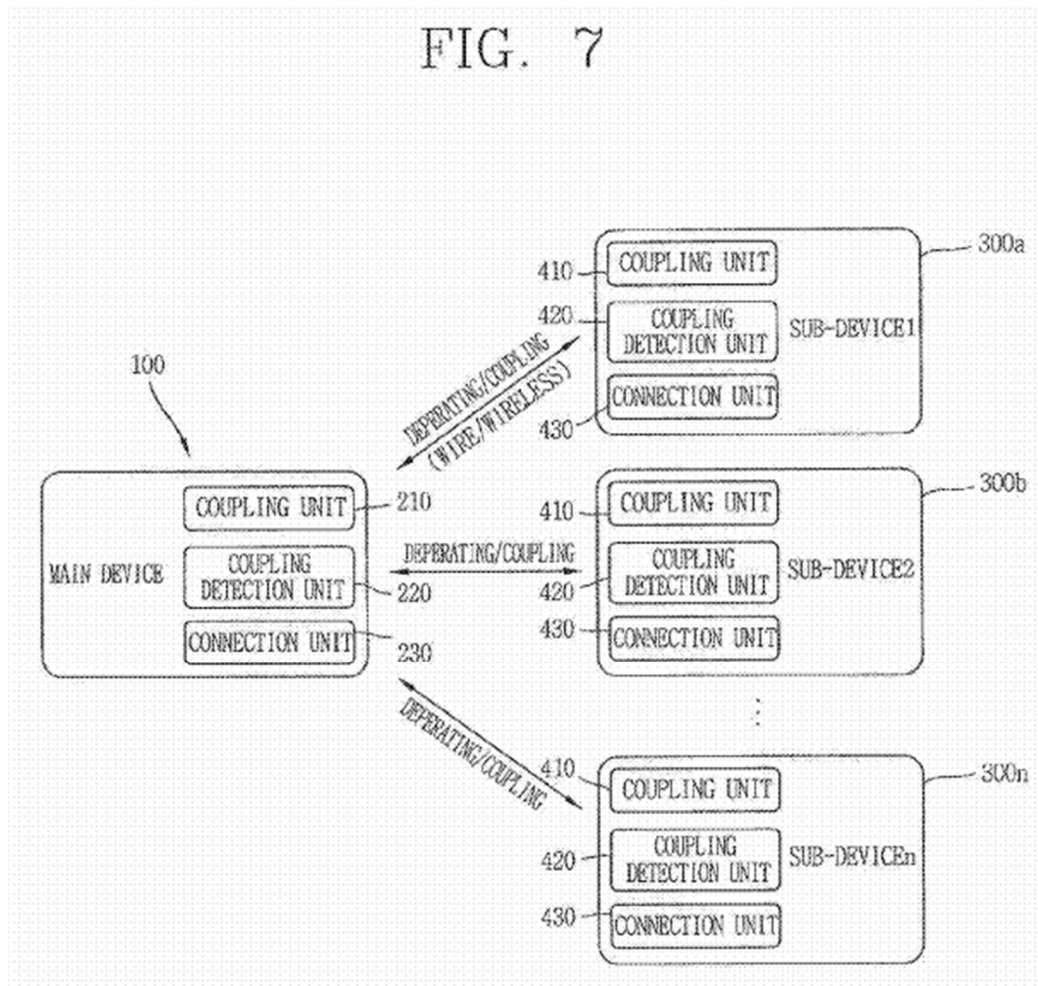
Id., ¶84. *Kim* describes the sensing unit 140 detecting an open/close status (or state) of the mobile terminal 100:

The sensing unit 140 may provide status measurements of various aspects of the mobile terminal 100. For example, the sensing unit 140 may detect an open/close status (or state) of the mobile terminal 100, a relative positioning of components (e.g., a display and a keypad) of the mobile terminal 100, a change of position of the mobile terminal 100 or a component of the mobile terminal 100, a presence or absence of user contact with the mobile terminal 100, and/or an orientation or acceleration/deceleration of the mobile terminal 100.

Id., ¶88.

43. *Kim* also discloses embodiments in which the mobile terminal includes a main device and one or more sub-devices: “As shown in FIG. 7, the present invention relates to a mobile terminal including *a main device (first device) 100 and one or more sub-devices (second devices) 300a to 300n* that can be detachably

attached to the main device.” *Id.*, ¶181 (emphasis added). *Kim* provides an illustration of this concept in Figure 7, which is reproduced below:



Id., FIG. 7.

44. *Kim* discloses that:

The main device (i.e., the first device) 100 may include all the elements of the mobile terminal as described above with reference to FIG. 1 and, besides those elements, the main device may additionally include a coupling unit 210 for mechanically

coupling the sub-de[v]ices (i.e., the second devices), a coupling detection unit 220 that detects whether or not the sub-devices are coupled, and a connection unit 230 that electrically connects the sub-devices and the main device to allow signals or data to be transmitted or received therebetween.

Id., ¶182. Accordingly, *Kim* provides for the main device 100 including all of the elements of the mobile terminal described with respect to Figure 1, along with a coupling unit, a coupling detection unit, and/or a connection unit. For example, *Kim* discloses:

The coupling unit 210 may be configured to mechanically couple the main device and the sub-devices, and the connection unit 230, a block for allowing communication between the main device and the sub-devices, is configured to directly connect the main device and the sub-devices by using a hardware connection terminal (not shown), connect them by using a fixed line such as a cable or a connector, or wirelessly connect them by using a wireless scheme (e.g., Bluetooth™, IrDA, or the like).

Id., ¶183.

45. *Kim* also discloses configuring the sub-devices 300 to include the same elements as those of the main device:

Each of the sub-devices 300 may be configured to include all the same elements as those of the main device. When only

functions dependent on the main device are implemented, each sub-device may limitedly include only the elements suitable for implementing the functions. Or, only one of the main device or the sub-device may include a particular element, and the other may remotely control the particular element. . . .

Id., ¶187 (emphasis added).

46. *Kim* provides various example configurations of the sub-device in Figures 9A to 9D. *See id.*, FIGs. 9A-9D; *see also id.*, ¶¶197-201 (discussing Figures 9A to 9D). *Kim* expressly teaches the sub-device including a display:

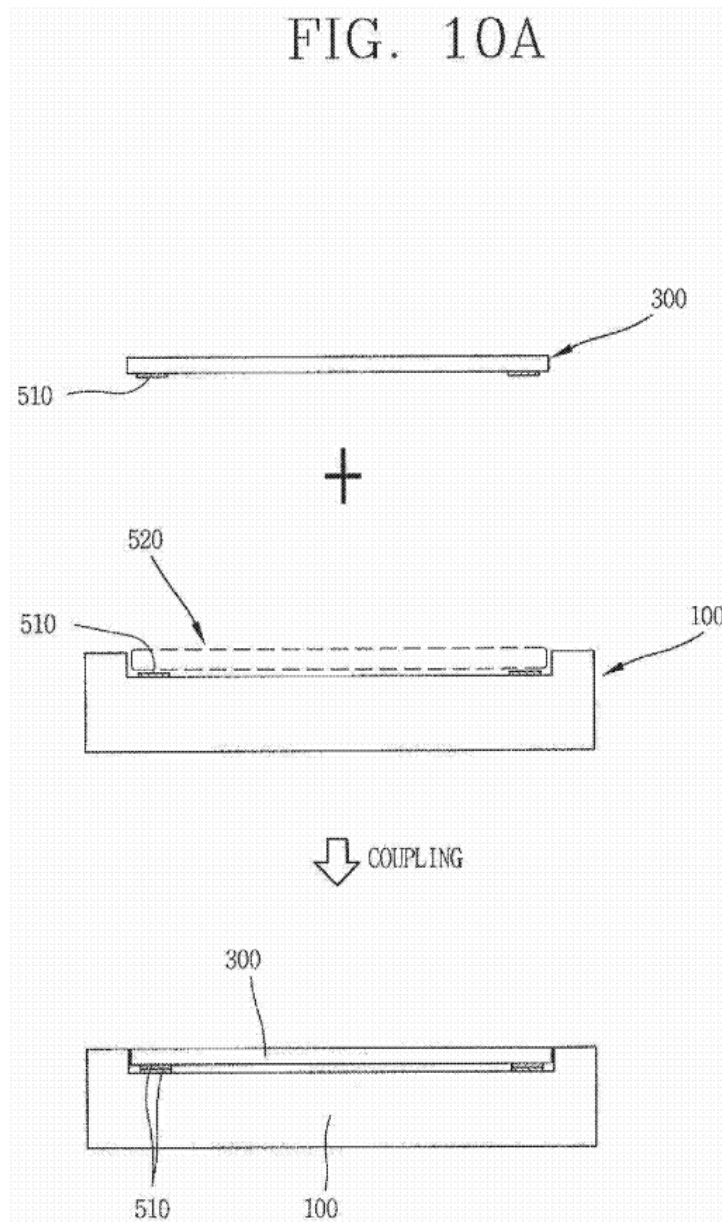
As shown in FIG 9a, the sub-device 300 may include the same elements as those of the main device. However, when various conditions such as volume or weight are considered, basically, the *sub-device 300 includes the display unit 251*, a controller 280, and a power supply unit 290. *The display unit 251* and the other elements (e.g., the controller, the power supply unit, the coupling unit, the coupling detection unit, the connection unit, and the output unit0 [sic] may be divided to be disposed at separated bodies 301 and 302. *The display unit 251* may be configured as a transparent touch pad (or a transparent touch screen) in consideration of the configuration that it *overlaps with the display unit 151 of the main device* when the sub-device 300 is copulated to the main device 100.

Id., ¶198 (emphases added); *see also id.*, ¶¶190-191 (describing the sub-device 300 including a display unit). As such, *Kim* teaches both the main device and the sub-device including a display.

47. In my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose the main device and the sub-device(s) each including suitable combinations of components, hardware, and/or functionality as disclosed, for example, in the various embodiments of *Kim* (including the components, hardware and/or functionality disclosed with respect to Figure 1). In my opinion, a person of ordinary skill in the art would have understood a suitable combination of components and hardware to be those required to build an operable device for performing the desired functions (*e.g.*, the functions that the person designing and building the mobile terminal intended the mobile terminal to have and/or perform).

48. My opinion is based at least on the fact that (i) *Kim* discloses various interrelated embodiments (*id.*, *passim*), (ii) *Kim* expressly discloses that its “[e]mbodiments may be used singly and/or by being combined together” (*id.*, ¶179), (iii) *Kim* discloses that mobile terminals can implement “more or less” components than disclosed in Figure 1 (*id.*, ¶71), and (iv) *Kim* discloses that sub-devices can be configured to include all the same elements as the main device or only the elements suitable for implementing certain functions (*id.*, ¶187).

49. *Kim* discloses several example embodiments for coupling the sub-device to the main device. In one example embodiment, as illustrated in Figure 10A, “the main device may have a recess 520 corresponding to the shape and size of the sub-device.” *Id.*, ¶203.



Id., FIG. 10A.

50. *Kim* further explains that “coupling members 510 such as a magnet may be respectively attached to one side of the main device 100 and one side of the sub-device 300, to easily couple or separate (i.e., couple or de-couple) the main device 100 and the sub-device.” *Id.*, ¶203. *Kim* expressly discloses configuring the sub-device in any number of different forms “such as necklace, glass, ring, card, ear ring, wrist watch, clip, pen, ear phone, or USB memory stick.” *Id.*, ¶194; *see also id.*, ¶266 (“[T]he sub-device is not limited to the clip type, but may have various forms or designs by including the coupling part and an output unit. For example, the sub-device may be configured in the form of ear phones, earrings, or necklaces.”).

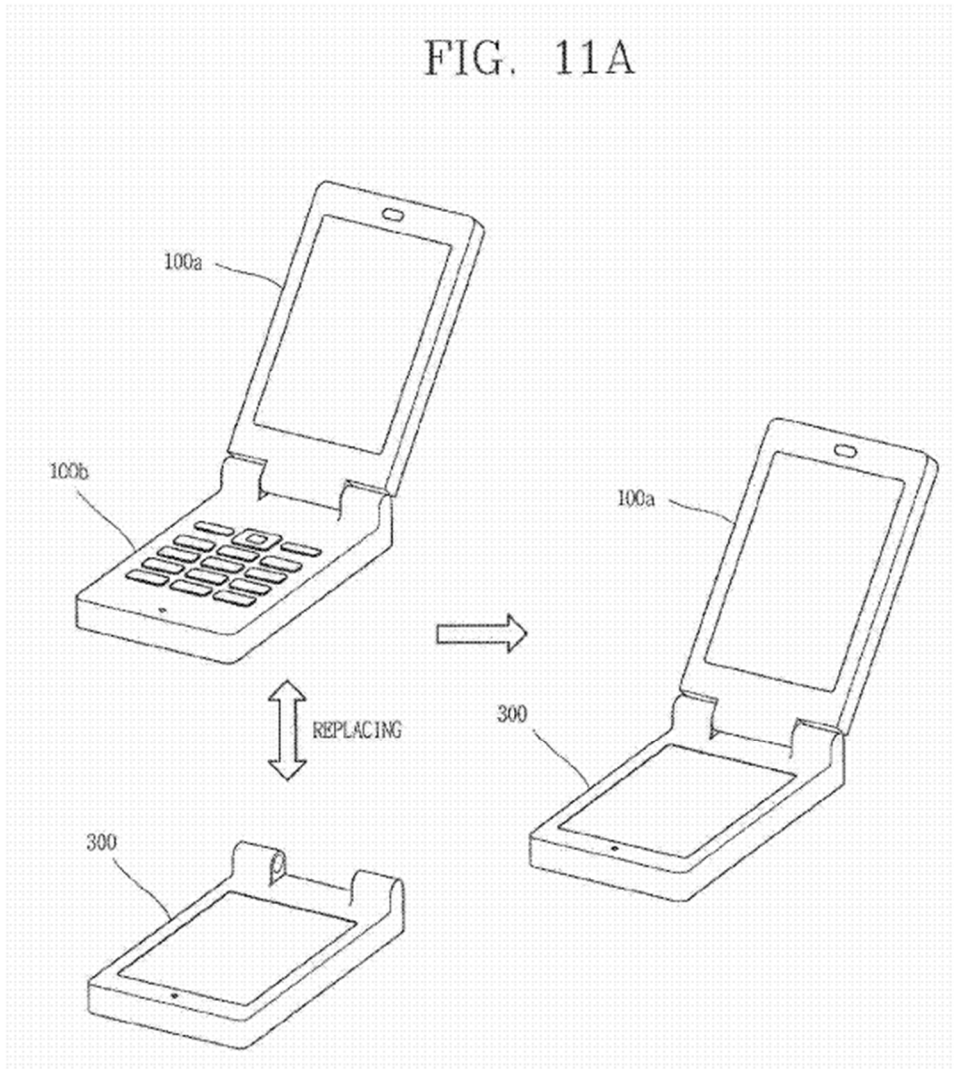
51. *Kim* describes at least five example types of main devices that structurally combine with at least one sub-device. For example, *Kim* describes that the main device can be a folder-type (*e.g.*, Figures 11A-11E), a slide-type (*e.g.*, Figures 12A-12E), a swivel-type (*e.g.*, Figures 13A-13D), a bar-type (*e.g.*, Figures 14A-14D), or a watch-type (*e.g.*, Figures 15A-15D). *Id.*, ¶¶124, 210; *see also id.*, ¶¶211-222 (describing the folder-type main device with respect to Figures 11A-11E); *id.*, ¶¶222-237 (describing the slide-type main device with respect to Figures 12A-12E); *id.*, ¶¶237-251 (describing the swivel-type main device with respect to Figures 13A-13D); *id.*, ¶¶252-254 (describing the bar-type main device with respect

to Figures 14A-14D); *id.*, ¶¶254-262 (describing the watch-type main device with respect to Figures 15A-15D).

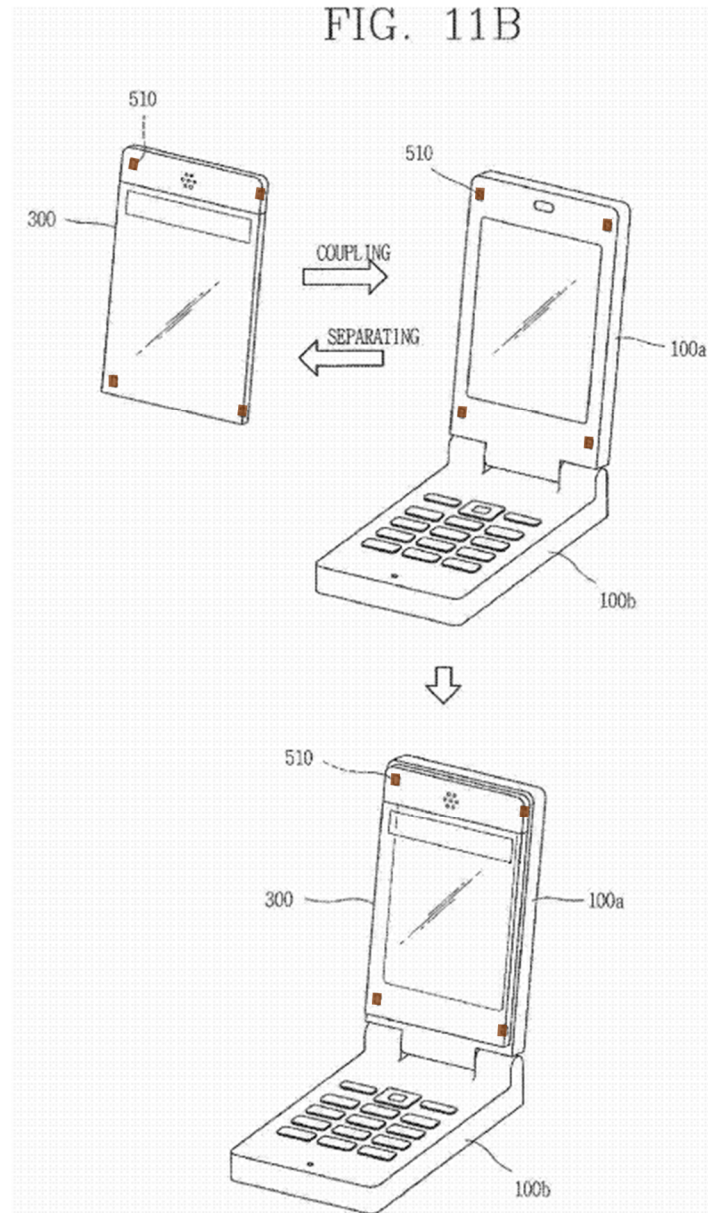
52. In one embodiment, *Kim* describes a folder-type main device that is depicted in Figures 11A-11E: “FIGS. 11*a* to 11*e* illustrate the structure and method for coupling or separating the sub-device to a folder type main device according to an embodiment of the present invention.” *Id.*, ¶211. *Kim* provides that the folder-type main device comprises a first body 100a connected to a second body 100b:

The folder-type main device features that a first body 100a having a display unit and a second body 100b having a keypad are coupled by using hinges. In this embodiment, if the sub-device is assumed as a third body 300, the third body may overlap to be coupled to the first or second body, or the third body may replace one of the first and second bodies and be coupled. In this embodiment, the second body 100b may not necessarily include the keypad, and it may include a display unit, a touch screen or a touch pad like the first body.

Id., ¶212. *Kim* discloses replacing one of the first and second bodies of the main device with the third body (*i.e.*, sub-device) with respect to Figure 11A:



Id., FIG. 11A, ¶¶213-217. Alternatively, *Kim* discloses coupling the third body (*i.e.*, sub-device) in an overlapping manner to one of the first and second bodies of the main device with respect to Figure 11B:



Id., FIG. 11B (annotated), ¶¶217-218. *Kim* explains that the coupling members 510 (annotated in brown), can be complementary recesses and hooks, or magnets. *Id.*, ¶¶218, 220; *Kim* describes connecting the first body 100a to the second body 100b such that they “may be folded or unfolded regardless of the coupling or separating of the sub-device.” *Id.*, ¶218.

53. Although sub-device 300 is depicted in Figure 11B and described in the accompanying description as coupled to the first body 100a of the main device, *Kim* states that this is merely for brevity and describes overlapping and coupling the sub-device to either one of the first and second bodies of the main device:

Here, *the third body may be overlapped to be coupled to one of the first and second bodies* in a state that the first and second bodies are coupled, but in the following description, the method of coupling the third body to the first body in an overlapping manner will now be described *for the brevity*.

Id., ¶217 (emphasis added).

54. Depending on the embodiment being discussed, *Kim* interchangeably uses the term “third body” to refer to a sub-device. For example, *Kim* explains: “The first and second bodies may be configured to be folded or unfolded regardless of the coupling or separating of *the third body (i.e., the sub-device)*.” *Id.*, ¶221 (emphasis added); *see also id.*, ¶212 (“In this embodiment, if the sub-device is assumed as a third body 300, the third body may overlap to be coupled to the first or second body, or the third body may replace one of the first and second bodies and be coupled.”). *Kim* discloses overlapping and coupling the third body (*i.e.*, sub-device) to the first body 100a of the main device using coupling member 510. *Id.*, ¶¶217-218. *Kim*

explains that the coupling members 510 can be complementary recesses and hooks, or magnets. For example, Kim discloses:

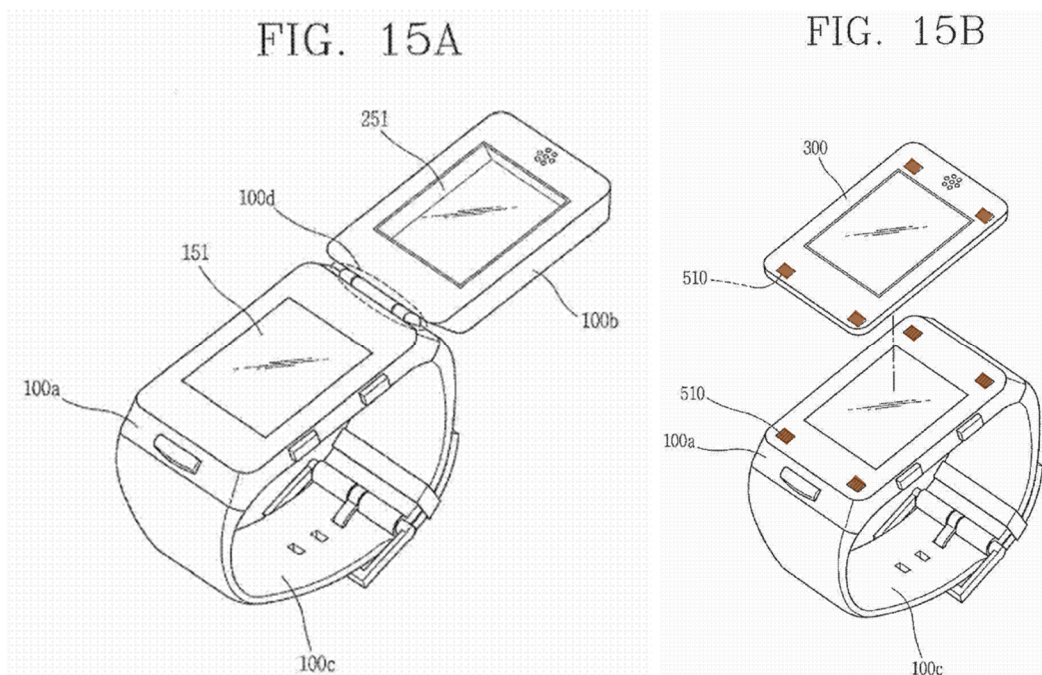
As shown in FIG. 11*b*, a coupling member 510 for fixing the sub-device is provided on at least one side of the first body of the main device, and the sub-device may be coupled such that it is press-fit to the position of the coupling member 510. [F]or example, *a recess or a hook is formed at one side of the first body of the main device, and the third body 300 may be coupled by using the recess or the hook. Or, a magnet may be provided to one side of the first body of the main device, and the third body 300 having a member that can be attached to the magnet may be coupled.* In this case, the first body 100*a* and the second body 100*b* may be folded or unfolded regardless of the coupling or separating of the sub-device.

Id., ¶218 (emphasis added); *see also id.*, ¶220 (“The coupling member 510 may include such holder or magnet as described above, and an arbitrary one of any other coupling members as known may be also used as the coupling member.”).

55. At least as noted in *Kim*’s paragraph 218 (see quote above), *Kim* expressly notes connecting the first body 100*a* and the second body 100*b* such that they can be folded or unfolded regardless of whether the sub-device is coupled to or separated from the main device.

56. *Kim* includes similar disclosures with respect to the watch-type embodiment of the main device depicted in Figures 15A-15D: “FIGS. 15a to 15d illustrate the structure and method for coupling or separating the sub-device to a watch type main device according to an embodiment of the present invention.” *Id.*,

¶255. I have reproduced Figure 15A and Figure 15B below:



Id., FIGs. 15A-15B (annotated).

57. *Kim*'s Figure 15A depicts a watch-type main device having a first body 100a and a second body 100b:

As shown in FIG. 15a, *the watch type mobile terminal includes the first body 100a* to which a band part 100c is connected *and the second body 100b* including a display unit and coupled to the first body [100a]. The second body may be configured to be

connected by a hinge 100d to one side of the first body so as to be open or closed.

Id., ¶256 (emphases added). *Kim* discloses a sub-device 300 overlapping and coupling to either the first body or the second body:

A method of coupling *the third body (i.e., the sub-device) is coupled to one of the first and second bodies* in a state that the first and second bodies are coupled will now be described. The method of coupling the sub-device in an overlapping manner to the second body will now be described for the sake of brevity.

Id., ¶260 (emphasis added).

58. Although Figure 15B, which immediately follows these statements, shows the sub-device coupled to body 100a and does not show body 100b, *Kim* states that Figure 15B was drawn as it was for the sake of brevity. *See id.*, ¶260 (stating immediately preceding the discussion of Figure 15B: “The method of coupling the sub-device in an overlapping manner to the second body will now be described for the sake of brevity.”).

59. *Kim* also discloses various functionality of the main device and the sub-device that is dependent on their coupling state. For example, *Kim* provides:

A control method of the mobile terminal that can be coupled and separated (i.e., detachable mobile terminal) will now be described with reference to the accompanying drawings.

The control method of the detachable mobile terminal may be divided into three stages: ‘Control method in coupling and separating’, ‘Control method in a separated state (Separate concept UI)’, and ‘Control method in a coupled state (Combine concept UI)’, and each step will now be described.

Id., ¶¶267-268; *see also id.*, ¶¶269-313 (describing “Control Method in Coupling and Separating the Mobile Terminal”); *id.*, ¶¶314-397 (describing “Control Method in Separated State (Separate Concept UI)”); *id.*, ¶¶398-423 (describing “Control Method in a Couple State (Combine Concept UI)”).

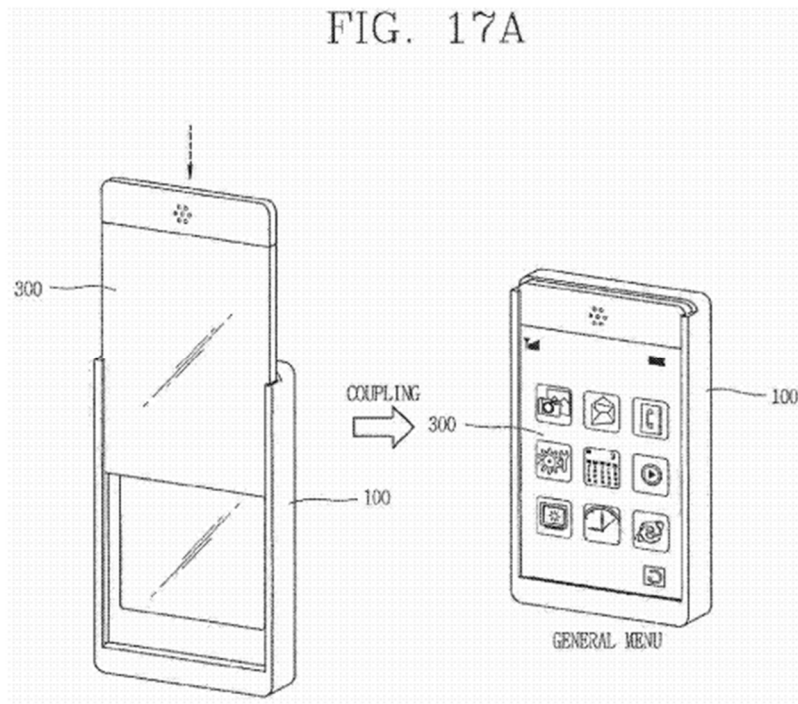
60. In particular, *Kim* discloses that the main device and sub-device operate differently when coupled and uncoupled from each other. For example, *Kim* provides that:

The control method in coupling/separating the mobile terminal according to an embodiment of the present invention relates to a method for ***controlling an operation and state of the main device 100 and the sub-device 300 when the sub-device 300 is coupled to the main device 100 of the mobile terminal or separated from the main device 100.***

Id., ¶270 (emphasis added). *Kim* also describes that “[t]he controller 180 differently controls the operations (*e.g.*, display) of the main device 100 and the sub-device 300 according to an engaged state.” *Id.*, ¶274. For example, *Kim* discloses:

As shown in FIG. 17a, when the main device 100 and the sub-device 300 are engaged in the vertical direction, the controller 180 displays a menu display method or menu items that can be conveniently manipulated in the horizontal display upon detection of it.

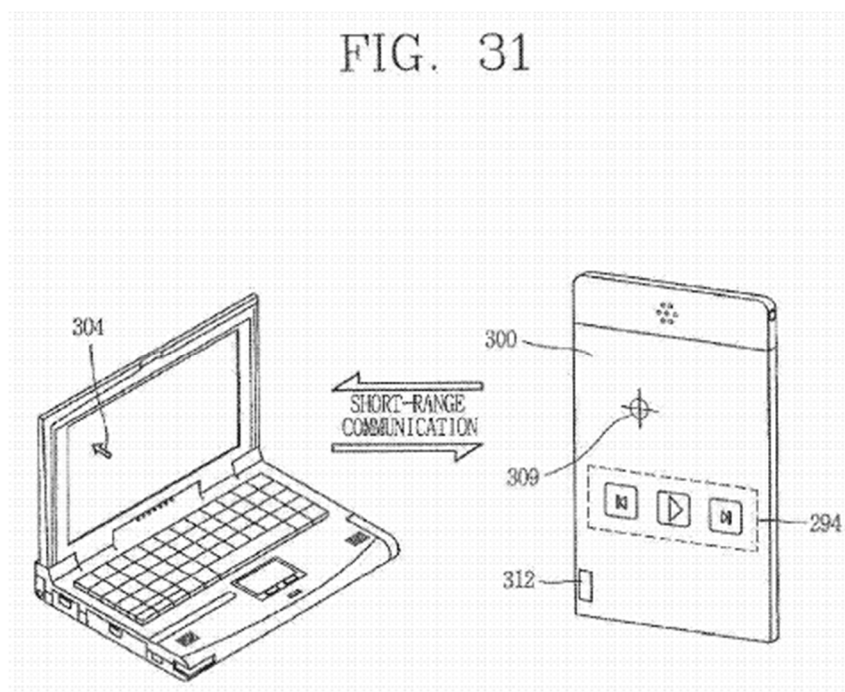
Id., ¶275. As illustrated in Figure 17A, for example, a screen is activated to display a specific menu when the sub-device is inserted and interacts with the main device:



Id., FIG. 17A, ¶275. *Kim* states that the embodiment of Figures 17A and 17B were drawn as they were for the sake of brevity. *See id.*, ¶273 (“A bar type mobile terminal will be described as an example for the sake of brevity.”).

61. *Kim* also discloses that coupling and decoupling the sub-device from the main device turns the power to the display of the main device on and off. *Id.*, ¶¶299-302, FIG. 24. *Kim* further discloses the sub-device turning the main device on or off by the user interacting with the sub-device. *Id.*, ¶¶316-319, 417-418, FIGs. 27, 42.

62. With respect to Figure 31, *Kim* further discloses that “the user may control various applications of a personal computer (e.g., a desktop computer, a notebook computer, etc.) by using the sub-device 300.” *Id.*, ¶342. I have reproduced Figure 31 of *Kim* below:



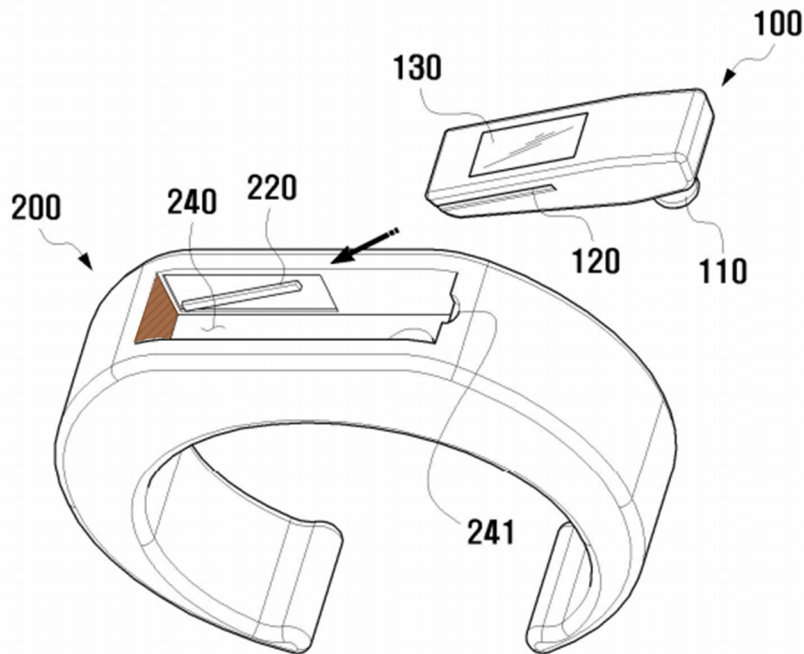
Id., FIG. 31. As illustrated in Figure 31, *Kim* further discloses the sub-device establishing a short-range communication path between the two devices to control

various applications of the person computer. *Id.*, ¶343. For example, *Kim* describes the user “execut[ing] music files or video files of the personal computer through a touch input via the sub-device 300.” *Id.*, ¶344.

B. *Koh*

63. *Koh* is generally directed to a portable electronic device module comprising “a portable electronic device and an electronic device storage unit.” Ex. 1012, Abstract. *Koh* explains that “[a]n object of the present invention is to provide a portable electronic device module that is easy to couple and convenient to store by sliding and coupling a portable electronic device to an electronic device storage unit.” *Id.*, ¶12.

64. In one embodiment, *Koh* describes the “portable electronic device module” as a wireless headset. *Id.*, ¶27 (“Hereinafter, among portable electronic devices, a wireless headset will be described as an embodiment.”). *Koh* explains that “the wireless headset 100 may be coupled to the electronic device storage unit 200.” *Id.*, ¶46. Figure 4A of *Koh*, reproduced below, shows the wireless headset 100 and an electronic device storage unit 200:



Id., FIG. 4A (annotated); *see also id.*, ¶45 (“FIGS. 4A and 4B are drawings showing that a wireless headset is coupled to an electronic device storage unit according to an embodiment of the present invention.”).

65. *Koh* explains that the wireless headset is stored in a compartment (240) formed in the storage unit 200:

The electronic device storage unit 200 is provided with a storage unit 240 capable of coupling a wireless headset. In this embodiment, the storage unit 240 is formed on the top of the electronic device storage unit 200. The storage unit 240 has the same shape as the external appearance of the wireless headset, and is filled when the wireless headset is coupled. A coupling protrusion 220 is formed on the side of the receiving unit 240. The coupling protrusion 220 is fitted into the guide groove of the

wireless headset when the wireless headset is coupled to the receiving unit 240.

Id., ¶37; *see also id.*, ¶¶38-45 (describing further the implementation of the coupling protrusion 220). *Koh* further discloses that:

The coupling protrusion 220 of the electronic device storage unit 200 is positioned slightly obliquely so that the outer end faces upward. ***The wireless headset 100 and the electronic device storage unit 200 are coupled in a sliding manner by inserting the coupling protrusion 220 of the electronic device storage unit 200 into the guide groove 120 of the wireless headset 100.*** Thereafter, when the upper portion of the wireless headset 100 where the speaker unit 110 is positioned is pressed, the coupling protrusion 220 rotates by a set angle. Due to this rotation, the wireless headset 100 is completely fitted into the receiving unit 240 of the electronic device storage unit 200.

Id., ¶46 (emphasis added).

66. *Koh* also discloses that:

The wireless headset 100 may mount a magnet on the insertion surface (a surface indicated by an arrow in FIG. 4A). The electronic device storage unit 200 may mount a magnet on the inner surface (a hatched surface in FIG. 4A) of the storage unit 240. ***Each of the magnets has a different polarity and thus attracts the other magnet when the wireless headset 100 is***

coupled to the electronic device storage unit 200. Therefore, the user can smoothly engage with little force.

Id., ¶48 (emphasis added). As such, *Koh* describes the storage unit 200 as including a magnet in the cross-hatched area of the compartment (240) (annotated in brown), and the headset including a magnet of opposite polarity on the surface of the headset. The two magnets attract each other such that “when the wireless headset is coupled to the electronic device storage unit, the magnets may be attracted to one other so as to be coupled.” *Id.*, ¶19.

67. *Koh* further discloses that the wireless headset includes a display unit 130 “typically formed on a surface opposite to the surface on which the speaker unit 110 is formed, so that the user can easily see the display unit 130 from the outside.” *Id.*, ¶33. The display unit can display information, such as connection state, power state, and remaining battery life. *Id.*, ¶33. Furthermore, *Koh* explains that “when the wireless headset 100 is coupled to the electronic device storage unit 200, the display unit 200 [sic] of the wireless headset 100 displays the current time.” *Id.*, ¶49. Thus, while wearing the electronic device storage unit 200, “the wireless headset 100 can be combined [with the electronic device storage unit 200] and used as a wristwatch.” *Id.*

C. *Lee*

68. *Lee* is generally directed to “a mobile terminal and a method of providing a graphic user interface using the same.” Ex. 1013, Abstract. *Lee* discloses that the mobile terminal can be, for example, a phone or a personal digital assistant:

The mobile terminal described in the specification can include a cellular phone, a Smart phone, a laptop computer, a digital broadcasting terminal, personal digital assistants (PDA), a portable multimedia player (PMP), a navigation system and so on.

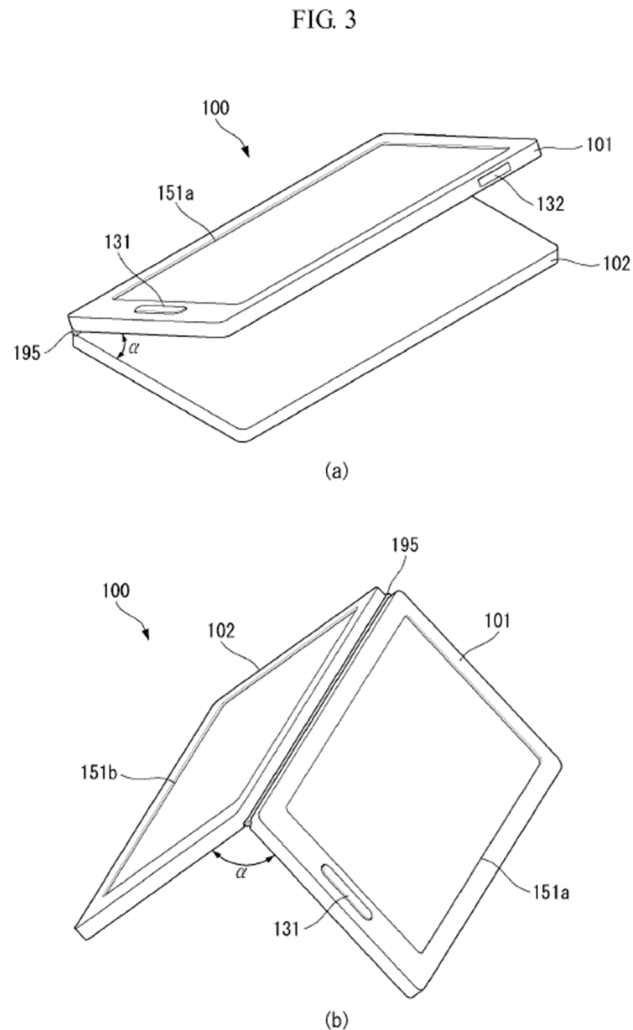
Id., ¶27.

69. *Lee* also describes the mobile terminal, like *Kim*, as having a folder-type form factor:

The mobile terminal 100 includes a first body 101 and a second body 102 which are combined with each other through a combining part 195.

The first body 101 and the second body can be combined with each other in various manners. For example, the combining part 195 can combine the first body 101 and the second body with each other in such a manner that the mobile terminal 100 is folded into the first body 101 and the second body 102.

Id., ¶¶71-72. Figure 3 of *Lee* illustrating the external apparatus of the mobile terminal is provided below:



Id., FIG. 3.

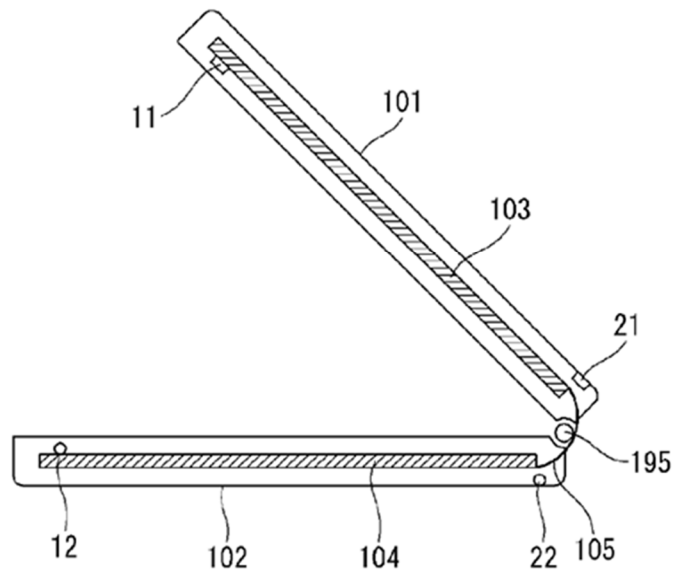
70. *Lee* further provides that the mobile terminal includes a sensing unit 140 to sense whether the mobile terminal is open or closed. *Id.*, ¶28.

[T]he sensing unit 140 senses the current state of the mobile terminal 100, such as an open/close state of the mobile terminal

100, the position of the mobile terminal 100, whether a user touches the mobile terminal 100, the direction of the mobile terminal 100 and the acceleration/deceleration of the mobile terminal 100, and generates a sensing signal for controlling the operation of the mobile terminal 100. For example, the sensing unit 140 can sense whether a slide phone is opened or closed when the mobile terminal 100 is the slide phone. Furthermore, the sensing unit 140 can sense whether the power supply 190 supplies power and whether the interface 170 is connected to an external device. The sensing unit 140 can also include a proximity sensor.

Id., ¶44. *Lee* discloses implementing the sensing unit using a Hall sensor to detect changes to a magnetic field (*e.g.*, based on the proximity of a magnet to the Hall sensor). *Id.*, ¶79. *Lee* discloses that “a magnet may be used as the sensed element and a hall sensor may be used as the sensing element. The hall sensor outputs a voltage varying with a magnetic field by using hall effect.” *Id.*, ¶119. Figure 13 of *Lee*, which I have reproduced below, shows the Hall sensor (designated sensing element 11) and magnet (designated sensed element 12):

FIG. 13



Id., FIG. 13; *see also id.*, ¶¶120-122 (describing the implementation of the Hall sensor and magnet to sense, for example, whether the mobile terminal is open or closed).

D. Jiang

71. *Jiang* is directed to a vertical cavity surface emitting laser (VCSEL) as a light source in an IrDA data link device:

A light source for use in an infra-red data association data link device including a vertical cavity surface emitting laser for emitting a beam of light along a path, and a diverger positioned in the path for diverging the emitted beam of light.

Ex. 1014, Abstract. For example, with respect to Figure 2, *Jiang* discloses:

Light source 20 includes a vertical cavity surface emitting laser (VCSEL) 22 which generates the light signal in the form of a laser beam designated 23. The use of a VCSEL greatly reduces power consumption while enhancing the ability to increase transmission speeds. This will be discussed in greater detail presently. VCSEL 22, in this embodiment, is carried by a conventional TO-head 24 having a base 25 and sidewalls 27. Further description of To-head 24 is omitted as it is well known in the art. VCSEL 22 is mounted on base 25 and enclosed by sidewall 27.

Id., 2:15-25. Figure 2 and Figure 3 of *Jiang* (reproduced below) illustrate embodiments of the VCSEL:

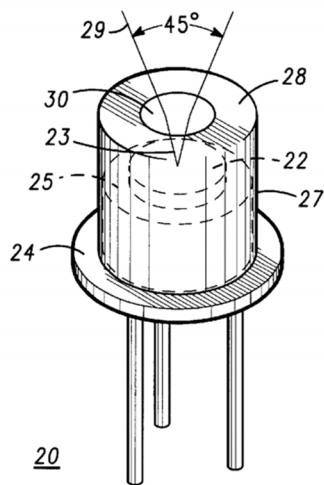


FIG. 2

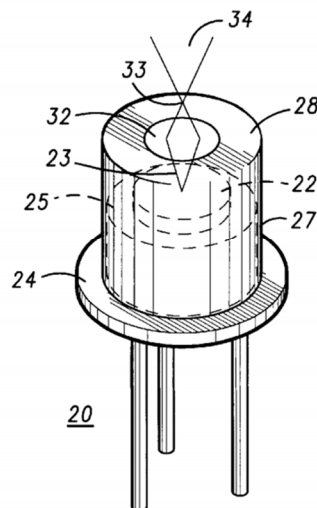


FIG. 3

Id., FIGs. 2-3.

VIII. CLAIM CONSTRUCTION

72. I have given all the claim terms of the challenged claims their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art, at the time of the alleged invention, which I understand is no earlier than November 3, 2011 (the filing date of U.S. Provisional Patent Application 61/555,310), having taken into consideration the language of the claims, the specification, and the prosecution history of record.

73. I understand that in a related litigation Petitioners intend to argue that applicants acted as their own lexicographer with respect to the term “portable electronic device” to mean “portable electronic device having a view screen” or a substantially similar construction. While I understand that Petitioners’ proposed constructions in the litigation stem from disputes over whether the asserted claims cover the accused products, I have not been asked to opine on any issues in the related litigation.

74. I have been asked to consider whether any of my opinions stated in this declaration would be different if the term “portable electronic device” was construed to mean “portable electronic device having a view screen” or a substantially similar construction. Even under this construction, my opinion remains that the combination of references described herein discloses and/or suggests all of the

features of claims 1-19 of the '021 patent for the reasons discussed in this declaration.

IX. THE PRIOR ART DISCLOSES OR SUGGESTS ALL OF THE FEATURES OF THE CHALLENGED CLAIMS

A. Grounds Challenging Claims 1-19 of the '021 Patent

75. I understand that the Petitioners are challenging claims 1-19 of the '021 patent as obvious under 35 U.S.C. § 103 on four separate grounds.

76. I understand that the *first ground* challenges claims 1-9, 11-15, and 19 of the '021 patent as obvious over *Kim*.

77. I understand that the *second ground* challenges claim 10 of the '021 patent as obvious over *Kim* and *Koh*.

78. I understand that the *third ground* challenges claims 16 and 17 of the '021 patent as obvious over *Kim* and *Lee*.

79. I understand that the *fourth ground* challenges claim 18 of the '021 patent as obvious over *Kim* and *Jiang*.

B. *Kim* Discloses or Suggests All of the Features of Claims 1-9, 11-15, and 19

80. I have reviewed *Kim*, and as described below, it is my opinion that *Kim* discloses or suggests all of the features of claims 1-9, 11-15, and 19 of the '021 patent.

1. Claim 1

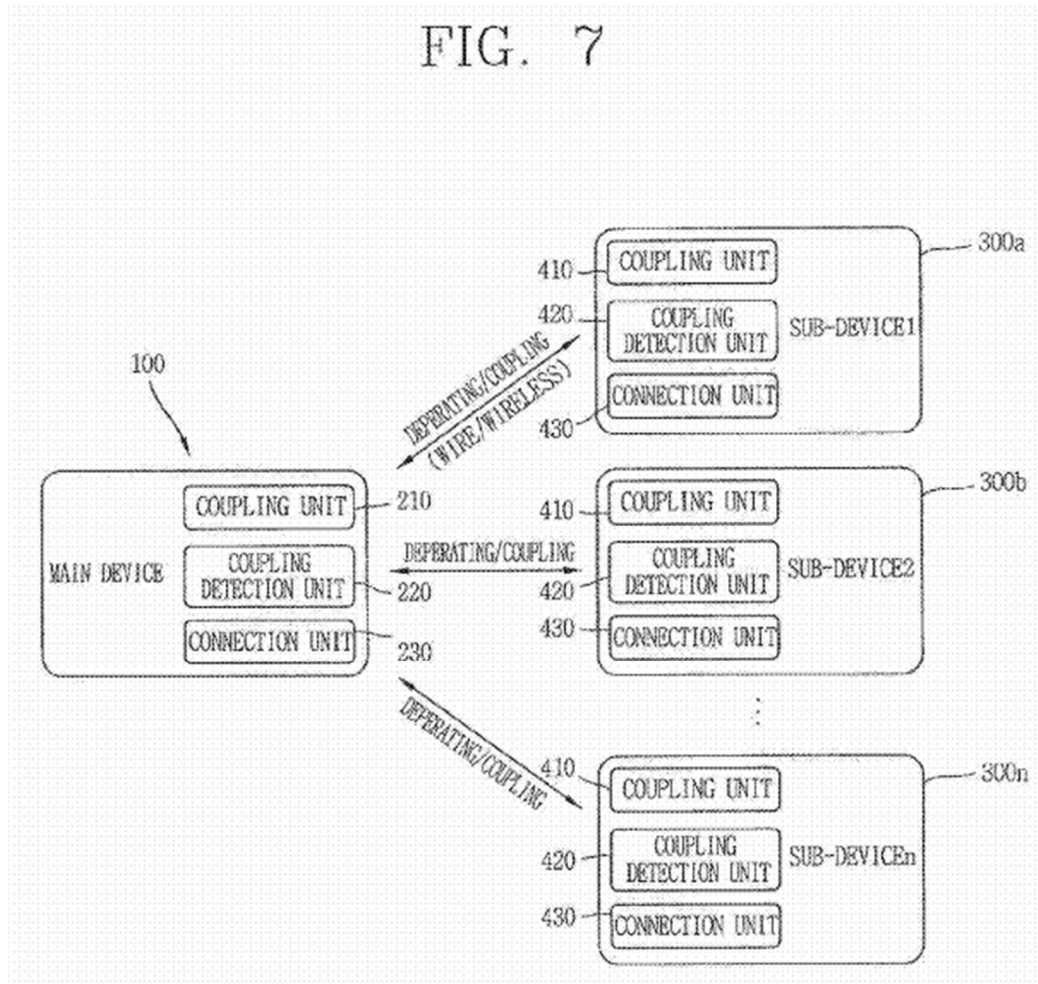
a. “A system comprising:”

81. I understand that “A system comprising:” is the preamble to claim 1 of the '021 patent. I have been asked to assume that the preamble is a claim limitation. Under that assumption, in my opinion *Kim* discloses this feature. For example, *Kim* discloses:

A mobile terminal [that] includes a sub-device that is attached thereto or detached therefrom, to remotely control the operation and state of the terminal. The mobile terminal includes: a sub-device having an input/output unit and attached to or detached from the terminal; and a controller configured to receive a user input via a certain communication path from the sub-device when the sub-device is separated, and control elements and applications of the terminal according to the user input.

Ex. 1010, Abstract; *see also id.*, ¶181 (“As shown in FIG. 7, the present invention relates to a mobile terminal including a main device (first device) 100 and one or more sub-devices (second devices) 300a to 300n that can be detachably attached to the main device.”), Claim 1 (“at least one sub-device configured to be attached to and detached from the main device such that the sub-device has an attached configuration and a detached configuration”). Accordingly, *Kim* discloses a mobile terminal comprising a main device and sub-device(s) detachably coupled to the main

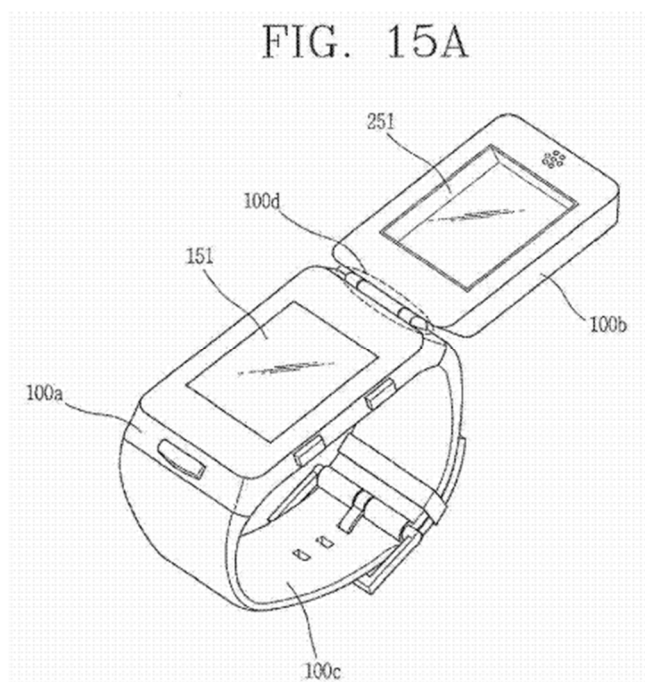
device. Figure 7 of *Kim*, reproduced below, illustrates this point with reference to main device 100 and sub-devices 300a to 300n:



Id., FIG. 7.

82. As I explained above in Section VII.A, *Kim* teaches the main device of the mobile terminal having different possible form factors, including a folder-type main device or a watch-type main device. *Id.*, ¶210 (“The structures for coupling the sub-device according to the types of the main devices (e.g., bar type, slide type,

folder type, swing type, swivel type, watch time, and the like) and their coupling and separating methods will now be described.”); *see also id.*, ¶¶211-222 (describing the folder-type main device with respect to Figures 11A-11E); *id.*, ¶¶254-262 (describing the watch-type main device with respect to Figures 15A-15D). *Kim* discloses the watch-type embodiment of the main device having a first body 100a attached to a band part 100c, and a second body 100b attached to the first body 100a. *Id.*, ¶¶255-256. The two bodies 100a and 100b are connected by hinge 100d so that the second body 100b can be opened or closed in a folding manner. *Id.*, ¶256. Figure 15A, which illustrates these features, is reproduced below:



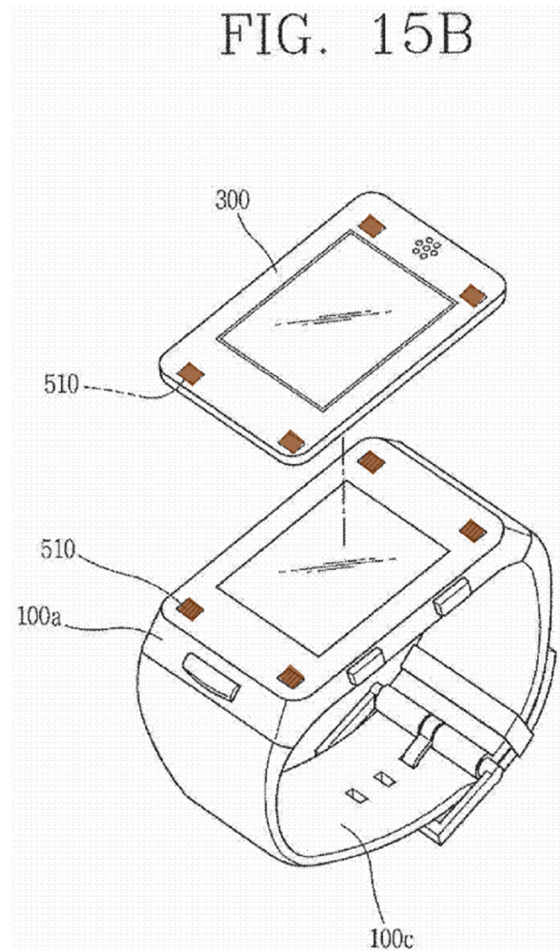
Id., FIG. 15A.

83. As I also explained in Section VII.A, *Kim* also discloses a sub-device 300 overlapping and detachably coupling to a first body or second body of a watch-type main device:

A method of coupling *the third body (i.e., the sub-device) is coupled to one of the first and second bodies* in a state that the first and second bodies are coupled will now be described. The method of coupling the sub-device in an overlapping manner to the second body will now be described for the sake of brevity.

Id., ¶260 (emphasis added).

84. Figure 15B, which immediately follows these statements, shows the sub-device coupled to body 100a and does not show body 100b. However, in my opinion, a person of ordinary skill in the art would have understood Figure 15B to be exemplary (and not limiting) because *Kim* states that Figure 15B was drawn as it was for the sake of brevity. *See id.*, ¶260 (stating immediately preceding the discussion of Figure 15B: “The method of coupling the sub-device in an overlapping manner to the second body will now be described for the sake of brevity.”). I have reproduced Figure 15B below:



Id., FIG. 15B (annotated).

85. Given these disclosures, a person of ordinary skill in the art would have understood *Kim* to disclose a watch-type main device comprising a first body 100a and a second body 100b that are connected to each other by a hinge 100d so that the second body 100b can be opened or closed in a folding manner (as depicted, for example, in Figure 15A), and to further disclose detachably coupling a third body (*i.e.*, sub-device) in an overlapping manner to either the first body 100a or the second

body 100b of such a main device using coupling members 510 (as explained, for example, with respect to Figure 15B).

86. *Kim* also expressly teaches that “a coupling member 510 [shown in brown above] for fixing the sub-device is provided on at least one side of the second body of the main device, and the sub-device may be adjusted to the position where the coupling member is formed, and pressed to be coupled.” *Id.*, ¶261.

87. In my opinion, a person of ordinary skill in the art would have understood, based on these disclosures, that *Kim* discloses an embodiment of the mobile terminal in which a watch-type main device comprises a first body 100a connected to a second body 100b by a hinge 100d so that the first and second bodies can be opened or closed with respect to each other, and wherein the mobile terminal further comprises *a sub-device 300 detachably coupled to the second body 100b*. In my opinion, below is a schematic representation of such a mobile terminal as a person of ordinary skill in the art would have understood is disclosed by *Kim*. For ease of reference, I have referred to this schematic representation depicting this embodiment as “Figure A” throughout the rest of this declaration.

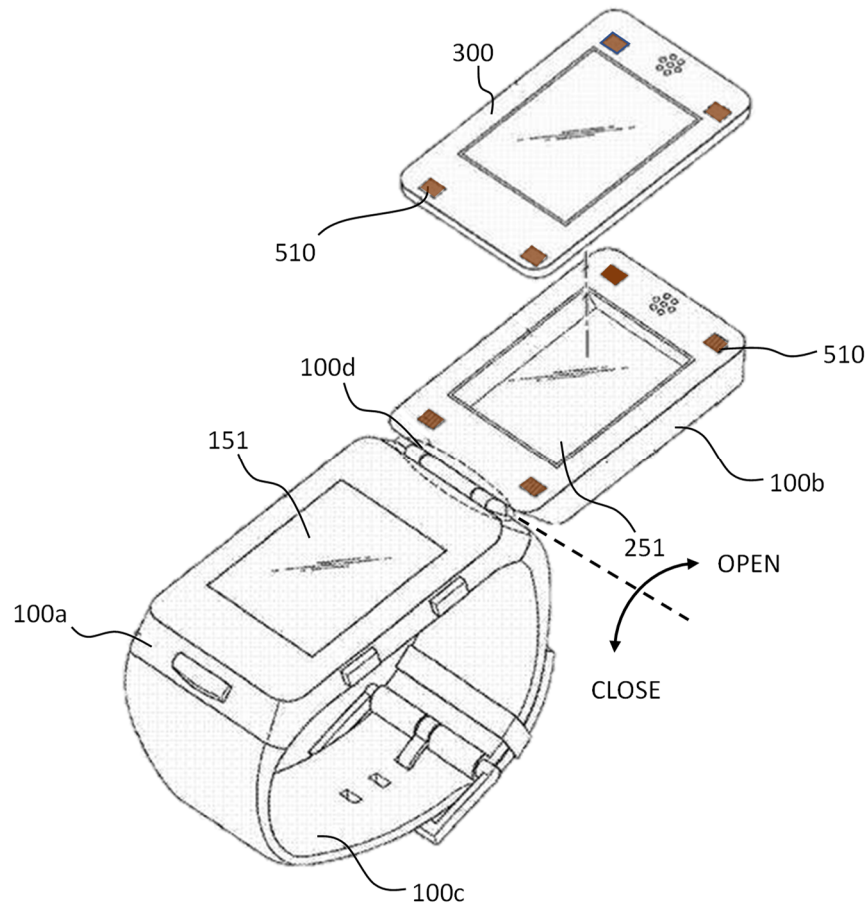


Figure A (based on *Kim*'s disclosure)

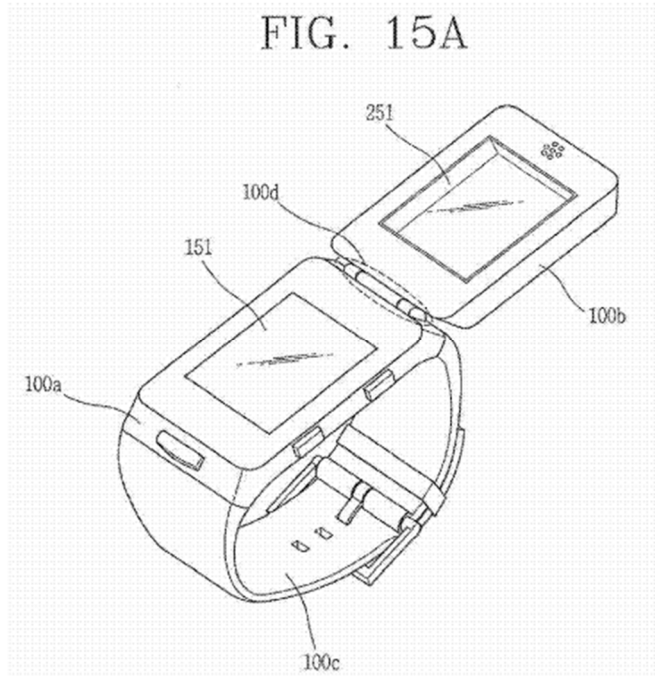
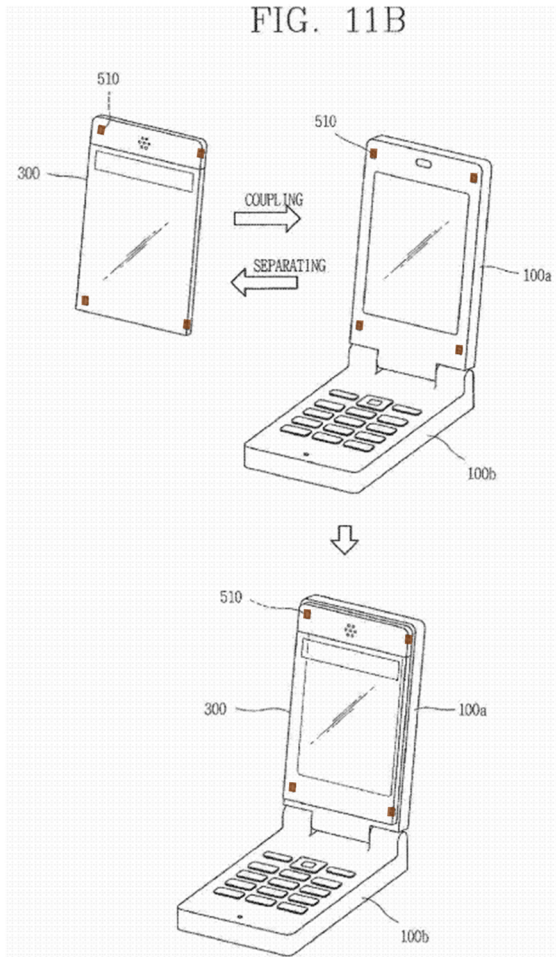
88. In my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose that, in the embodiment of the watch-type mobile terminal shown in Figure A, a sub-device 300 detachably couples to the second body 100b of the main device through coupling members 510 (annotated in brown). *Kim* further discloses that coupling members 510 can be corresponding recesses/hooks, or magnets. For example, *Kim* discloses:

The coupling unit 210 may be changed in various structures (or configurations) according to types (e.g., bar type, slide type, folder type, swing type, swivel type, watch type, and the like) of mobile terminals. In addition, the main device of the mobile terminal may further include an auxiliary member such as a magnet, a spring, a latch, or the like, to fix the sub-devices such that the sub-devices are not moved, shattered or released after being coupled at accurate positions, as well as changing the external configuration of the body.

Id., ¶185; *see also id.*, ¶218 (describing, with respect to a folder-type embodiment, coupling a third body (*i.e.*, sub-device 300) to a main device using corresponding recesses/hooks or magnets).

89. I have been asked to assume that Patent Owner may argue that *Kim* does not disclose the embodiment shown in Figure A. For the reasons I have discussed, I would disagree. Even if for the sake of argument one were to assume that *Kim* does not disclose the embodiment as shown in Figure A, in my opinion, such an embodiment would have been obvious to a person of ordinary skill in the art in view of *Kim's* disclosure.

90. In my opinion, a person of ordinary skill in the art would have recognized that the watch-type embodiment shown in Figure 15A is similar and closely related to the folder-type embodiment shown in Figure 11B:



Id., FIG. 11B, FIG. 15A. In my opinion, a person of ordinary skill in the art would have recognized at least the following similarities between the watch-type embodiment of the main device in Figure 15A and the folder-type embodiment of the main device in Figure 11B:

- the main device in both the watch-type embodiment of Figure 15A and the folder-type embodiment of Figure 11B comprises a first body 100a and a second body 100b;

- the first body 100a and the second body 100b in both the watch-type main device of Figure 15A and the folder-type main device of Figure 11B are connected to each other by a hinge so that the two bodies can open or close in a folding manner;
- the same reference numbers are used in both embodiments to refer to, *e.g.*, the main device 100 (including the first body 100a and the second body 100b), the sub-device 300, and coupling member 510; and
- coupling members 510 are provided in both the watch-type main device of Figure 15B and the folder-type main device of Figure 11B to couple a sub-device to one side of the first or second body of the main device (*compare id.*, ¶218 (“As shown in FIG. 11*b*, a coupling member 510 for fixing the sub-device is provided on at least one side of the first body of the main device, and the sub-device may be coupled such that it is press-fit to the position of the coupling member 510.”), *with id.*, ¶261 (“As shown in FIG. 15*b*, a coupling member 510 for fixing the sub-device is provided on at least one side of the second body of the main device, and the sub-device may be adjusted to the position where the coupling member is formed, and pressed to be coupled.”)).

91. *Kim* also includes similar disclosures with respect to the folder-type embodiment and the watch-type embodiment. For example, *Kim* states that in both the folder-type embodiment and the watch-type embodiment the main device comprises a first body 100a and a second body 100b:

Disclosure with respect to folder-type device	Disclosure with respect to watch-type device
<p>“The folder type main device features that a first body 100a having a display unit and a second body 100b having a keypad are coupled by using hinges.” <i>Id.</i>, ¶212</p>	<p>“As shown in FIG. 15 a, the watch type mobile terminal includes the first body 100a to which a band part 100c is connected and the second body 100b The second body may be configured to be connected by a hinge 100d to one side of the first body so as to be open or closed.” <i>Id.</i> ¶256.</p>

As another example, *Kim* discloses that in both the folder-type embodiment and the watch-type embodiment one of the first body 100a or the second body 100b can be replaced with sub-device 300 where the sub-device is detachably coupled to the main device by a hinge:

Disclosure with respect to folder-type device	Disclosure with respect to watch-type device
<p>“As shown in FIG. 11<i>a</i>, if the third body 300 replaces the second body 100<i>b</i>, the third body may operate as a folder part which is folded or unfolded. . . . In this case, in order to configure the third body 300 such that it operates as a folder part, the hinge portions for coupling the first and third bodies are configured such that they can be separated and coupled.” <i>Id.</i>, ¶213.</p>	<p>“In this embodiment, one of the first and second bodies may operate as a main device or a sub-device. For example, the first body may operate as a main device and the second body may operate as a sub-device. Accordingly, the hinge 100<i>d</i> may be configured to allow coupling and separating the first body (i.e., the main device) and the second body (i.e., the sub-device). The hinge part 100<i>d</i> for coupling the sub-device must have a structure allowing coupling and separating.” <i>Id.</i> ¶258.</p>

Kim additionally discloses that in both the folder-type embodiment and the watch-type embodiment, the sub-device 300 overlaps and detachably couples to either the first body 100*a* or the second body 100*b*:

Disclosure with respect to folder-type device	Disclosure with respect to watch-type device
“In this embodiment, if the sub-device is assumed as a third body 300, the third body may overlap to be coupled to the first or second body, or the third body may replace one of the first and second bodies and be coupled.” <i>Id.</i> , ¶212.	“A method of coupling the third body (i.e., the sub-device) is coupled to one of the first and second bodies in a state that the first and second bodies are coupled will now be described.” <i>Id.</i> ¶258.

Kim further discloses that in both the folder-type embodiment and the watch-type embodiment, coupling members 510 couple the sub-device to one side of the first or second body of the main device:

Disclosure with respect to folder-type device	Disclosure with respect to watch-type device
“As shown in FIG. 11 <i>b</i> , a coupling member 510 for fixing the sub-device is provided on at least one side of the first body of the main device, and the sub-device may be coupled such that it is press-fit to the position of the coupling member 510.” <i>Id.</i> , ¶218.	“As shown in FIG. 15 <i>b</i> , a coupling member 510 for fixing the sub-device is provided on at least one side of the second body of the main device, and the sub-device may be adjusted to the position where the coupling member is formed, and pressed to be coupled.” <i>Id.</i> ¶261.

92. Given the similarities between the folder-type embodiment and the watch-type embodiment in *Kim*, in my opinion, a person of ordinary skill in the art

would have recognized that *Kim*'s disclosure with respect to Figure 11B could have been adapted and applied to detachably couple sub-device 300 to the second body 100b of the watch-type embodiment in the manner shown in Figure A above.

93. Indeed, in my opinion, the embodiment shown in Figure A amounts to a mere adaptation and application of *Kim*'s teachings with respect to the folder-type embodiment shown in Figure 11B to implement the specific teaching in *Kim* of a watch-type device in which “the third body (i.e., the sub-device) is coupled to one of the first and second bodies in a state that the first and second bodies are coupled.” *Id.*, ¶260.

94. A person of ordinary skill in the art would additionally have been motivated to look to the folder-type embodiment disclosed in *Kim* for ways to implement a watch-type device in which “the third body (i.e., the sub-device) is coupled to one of the first and second bodies in a state that the first and second bodies are coupled” (*id.*, ¶260) because *Kim* itself teaches that the embodiments it describes “may be used singly and/or by being combined together” (*id.*, ¶179). Having reviewed the embodiment disclosed in *Kim*'s Figure 11B, a person of ordinary skill in the art would have recognized the feasibility and desirability of modifying the embodiment of *Kim*'s Figure 15A to detachably couple sub-device 300 to the second body 100b using coupling members 510.

95. In my opinion, the modification would have also been obvious to a person of ordinary skill in the art because it would have amounted to merely the use of a known technique (using coupling members to couple a sub-device to a folder-type main device having first and second bodies as shown in Figure 11B) to improve a similar device (a watch-type main device having two bodies that connect to each other in a folding manner) to obtain predictable results (detachably couple the sub-device to the watch-type main device's second body using coupling members).

96. In my opinion, the modification would additionally have been obvious to a person of ordinary skill in the art because it would have been the mere application of a known technique (attaching a sub-device to one of two bodies of a folder-type main device using coupling members) to a known device (a watch-type main device having two bodies that connect to each other in a folding manner) ready for improvement (to further couple a sub-device to the watch-type main device using coupling members) to yield predictable results (detachably couple the sub-device to the watch-type main device).

97. Thus, in my opinion, at least because *Kim*'s mobile terminal is made up of a main device and a sub-device, a person of ordinary skill in the art would have understood *Kim* to disclose that the mobile terminal is a "system." A person of ordinary skill in the art would have further understood that one particular

embodiment of such a system disclosed or suggested by *Kim* is a system in which a watch-type main device has a first and second body connected to each other by a hinge so that the first and second bodies can be opened or closed in a folding manner with a sub-device detachably coupled to one of the two bodies using coupling members such as magnets or complementary recesses/hooks.

b. “a portable switching device coupled to a portable electronic device; wherein:”

98. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses mobile terminals in which a sub-device 300 detachably couples to the main device 100. *Id.*, ¶181.

99. As I discussed above in Section VII.A, *Kim*'s disclosure focuses on *mobile terminals*, such as mobile phones, smart phones, or portable multimedia players. *Id.*, ¶¶69-70. *Kim* expressly discloses that a mobile terminal is a “portable terminal.” *Id.*, ¶5. In my opinion, a person of ordinary skill in the art would also have recognized that the mobile terminal comprising the watch-type main device and associated sub-device shown in Figure A was portable because it was designed to be worn on a user's wrist. Thus, the mobile terminal and all of its components—the main device and sub-device—are “portable.”

100. *Kim* explains that the sub-device includes the same components as the main device, such as display unit 251, a controller 280, and a power supply unit 290.

Id., ¶198. In my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose that a display unit, controller, and power supply unit comprise electronic components and, thus, the sub-device is an “electronic device.”

101. *Kim* further provides:

As described above with the reference drawings, the sub-device serves mechanically or electrically as an element of the main device when coupled to the main device, and when the sub-device is separated from the main device, it is easily carried around and remotely connected to the main device to serve as a client terminal of a server terminal and transmit/receive required information to/from the main device.

Id., ¶264. For at least the additional reason that the main device and sub-device of *Kim* are coupled electronically, and that the sub-device may “serve . . . electronically as an element of the main device when coupled to the main device,” a person of ordinary skill in the art would have further recognized that the sub-device of *Kim* comprises an “electronic device.”

102. *Kim* also discloses that the main device and the sub-device are coupled.

For example, *Kim* explains that:

The main device (i.e., the first device) 100 may include all the elements of the mobile terminal as described above with reference to FIG. 1 and, besides those elements, the main device

may additionally include a coupling unit 210 for mechanically coupling the sub-devices (i.e., the second devices), a coupling detection unit 220 that detects whether or not the sub-devices are coupled, and a connection unit 230 that electrically connects the sub-devices and the main device to allow signals or data to be transmitted or received therebetween.

The coupling unit 210 may be configured to mechanically couple the main device and the sub-devices, and the connection unit 230, a block for allowing communication between the main device and the sub-devices, is configured to directly connect the main device and the sub-devices by using a hardware connection terminal (not shown), connect them by using a fixed line such as a cable or a connector, or wirelessly connect them by using a wireless scheme (e.g., Bluetooth™, IrDA, or the like).

Id., ¶¶182-183. Based on the foregoing passages, a person of ordinary skill in the art would have understood *Kim* to disclose that the main device and sub-device are “coupled” both mechanically and electronically.

103. *Kim* further provides:

The main device may detect whether or not the sub-device 300 is coupled or separated by using the coupling detection unit 230. Accordingly, when the sub-device 300 is coupled to the main device 100, the main device 100 may automatically change its operation mode *or an operation mode of the sub-device*.

Id., ¶195 (emphasis added). *Kim* additionally provides:

The control method in coupling/separating the mobile terminal according to an embodiment of the present invention relates to a method for *controlling an operation and state of the main device 100 and the sub-device 300 when the sub-device 300 is coupled to the main device 100 of the mobile terminal or separated from the main device 100.*

Id., ¶270 (emphasis added). Thus, in my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose that the main device changes (“switches”) the state and/or operation of the sub-device based on whether the two are coupled. Accordingly, a person of ordinary skill in the art would have recognized that the main device is a “portable switching device.”

- c. **“the switching device and the electronic device are configured to selectively couple to each other employing magnetic force;”**

104. In my opinion, *Kim* discloses or suggests this feature. For example, as I explained above in Section VII.A, *Kim* discloses that the main device (“switching device”) and the sub-device (“electronic device”) are detachably coupled (“are configured to selectively couple to each other”) by way of coupling members 510. *Kim* also explains, with respect to Figure 10A for example, that “*coupling members 510 such as a magnet* may be respectively attached to one side of the main device

100 and one side of the sub-device 300, to easily couple or separate (i.e., couple or de-couple) the main device 100 and the sub-device.” *Id.*, ¶203 (emphasis added). As such, a person of ordinary skill in the art would have recognized that *Kim* discloses magnet coupling members 510 that employ magnetic force when used to couple or separate the main device and the sub-device. Accordingly, in my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose magnets in the sub-device (“electronic device”) coupling to magnets in the main device (“switching device) through (“employing”) magnetic force.

105. I have been asked to assume that Patent Owner may argue that the embodiment shown in Figure A would not have used magnets to detachably couple the sub-device 300 to the second body 100b of the watch-type main device because *Kim* states with respect to Figure 15B that “coupling member 510 for fixing the sub-device” to the second body is “pressed to be coupled.” *Id.*, ¶261. I would disagree.

106. In my view, *Kim*’s reference to “pressing” to couple the sub-device to the main device is not inconsistent with the concept of using magnets. For example, a person of ordinary skill in the art would have understood that when two magnets (*e.g.*, one in the sub-device and another in the second body of the main device) having opposite polarities are pressed together, they will couple to each other

through the application of magnetic force. Indeed, in connection with the bar-type embodiment shown in Figure 12B, *Kim* states:

As shown in FIG. 12*b*, a coupling member 510 for fixing the sub-device is provided on at least one side of the first body of the slide type mobile terminal, and the sub-device may be adjusted to the position where the coupling member is formed, and ***pressed to be coupled. For example, a recess or a hook may be formed on one side of the first body of the main device or a magnet is attached, and the third body may be coupled by using the recess, the hook or the magnet.***

Id., ¶233. In my opinion, a person of ordinary skill in the art would have understood based on this passage that *Kim* itself associates the concept of “pressing to couple” with both hooks/recesses and magnets.

107. Even if, for the sake of argument, one were to conclude that the concept of “pressing” only encompasses mechanical coupling and not magnetic coupling, in my opinion, it would have been obvious to a person of ordinary skill in the art to use magnets as coupling members 510 in the embodiment shown in Figure A instead of, or in addition to, mechanical coupling members (*e.g.*, recesses/hooks). In my opinion, this modification would have amounted to a simple substitution of one known element (magnets) for another (recesses/hooks) to obtain a predictable result (detachably coupling the sub-device to the main device).

108. Additionally, as I discussed above in Section IX.B.1.a, a person of ordinary skill in the art would have readily recognized the similarity and applicability of *Kim*'s disclosures with respect to the folder-type devices (*e.g.*, as shown in Figure 11B) to the watch-type devices discussed in *Kim* (*e.g.*, with respect to Figures 15A-15B).

109. With respect to the folder-type devices, *Kim* expressly discloses using magnets as the coupling members 510 to detachably couple the sub-device 300 to the body 100a. *See id.*, ¶218 (“Or, a magnet may be provided to one side of the first body of the main device, and the third body 300 having a member that can be attached to the magnet may be coupled. In this case, the first body 100a and the second body 100b may be folded or unfolded regardless of the coupling or separating of the sub-device.”); *id.*, ¶220 (“The coupling member 510 may include such holder or magnet as described above, and an arbitrary one of any other coupling members as known may be also used as the coupling member.”).

110. Thus, to a person of ordinary skill in the art, the modification would also have been obvious as merely the use of a known technique (using magnets to couple the sub-device to the main device as disclosed with respect to the folder-type devices) to improve similar devices (the main device in the watch-type embodiment

shown in Figure A having a detachable sub-device) in the same way (to detachably couple the sub-device to the main device using magnets).

111. In my opinion, a person of ordinary skill in the art would have had a reasonable expectation of success in using magnets to couple the sub-device to the main device in the watch-type embodiment shown in Figure A. For example, *Kim* discloses that magnets were a known and effective technique for coupling a sub-device to a main device. Specifically, *Kim* discloses that “coupling members 510 such as a magnet may be respectively attached to one side of the main device 100 and one side of the sub-device 300, to easily couple or separate (i.e. couple or de-couple) the main device 100 and the sub-device.” *Id.*, ¶203. Therefore, a person of ordinary skill in the art would have understood *Kim* to disclose using magnets to couple the sub-device to the main device in the watch-type embodiment shown in Figure A.

d. “the switching device comprises a first case;”

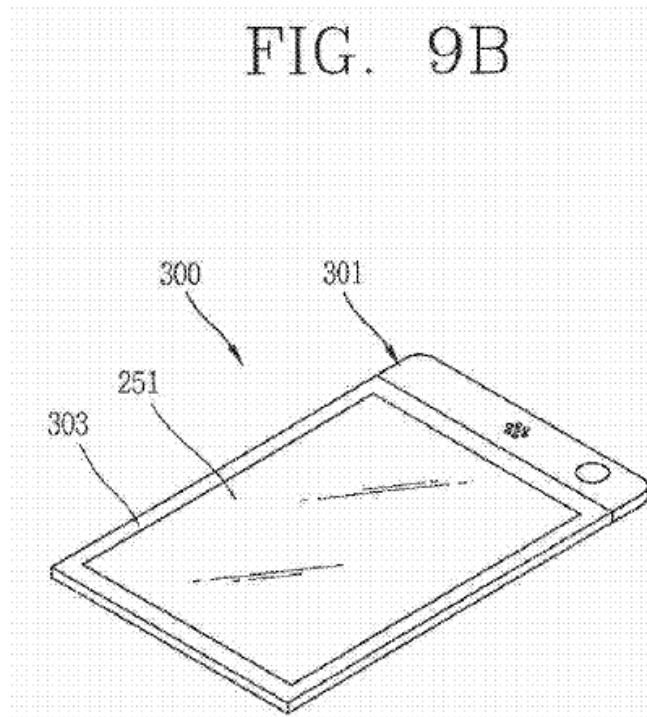
112. In my opinion, *Kim* discloses or suggests this feature. For example, in the watch-type embodiment shown in Figure A (*see* Section IX.B.1.a), the mobile terminal comprises a watch-type main device (“switching device”) having first body 100a and second body 100b. *Kim* discloses the following with respect to the “body” of the mobile terminal:

The body may include a case (casing, housing, cover, etc.) that forms an exterior of the terminal. The case may be divided into a front case 101 and a rear case 102. Various electric/electronic parts may be provided in a space between the front case 101 and the rear case 102. A middle case may be further provided between the front case 101 and the rear case 102.

Id., ¶125; *see also id.*, ¶124 (“Embodiments of the mobile terminal may be implemented in a variety of different configurations. Examples of such configurations may include a folder-type, a slide-type, a bar-type, a rotational-type, a swing-type and/or combinations thereof.”). Based on the foregoing passages of *Kim*, a person of ordinary skill in the art would have understood that *Kim* discloses that the first body 100a and second body 100b of the watch-type embodiment shown in Figure A comprise a case.

- e. “the electronic device comprises a second case and an electronic circuit that is responsive to the switching device;”**

113. In my opinion, *Kim* discloses or suggests this feature. For example, in one embodiment, *Kim* discloses that “as shown in FIG. 9b, the sub-device 300 may be configured to include a frame 303 surrounding the outer edges of the body 302 and the display unit 251 to improve firmness.” *Id.*, ¶199. I have reproduced Figure 9B below:



Id., FIG. 9B. In my opinion, a person of ordinary skill in the art would have understood the “frame” to be a case because, just like a case, a frame also protects the components of the device. That is, a frame (like a case) at a minimum protects the outer edges, outside, and/or externally exposed components of an electronic device. This understanding is further supported by the disclosure of the ’021 patent itself:

For the purposes of this application, the term ‘at least one case’ means the primary case used by a manufacturer to hold and protect the individual electronic components of which an electronic device is composed, *but it can also mean a protective case that functions to protect the primary case.*

Ex. 1001, 5:65-6:3 (emphasis added). In other words, a person of ordinary skill in the art would have understood the '021 patent to attribute a broad meaning to “case” as something that provides protective function and not limited to a device that completely encloses the internal components of a device.

114. A person of ordinary skill in the art would also have readily recognized the similarity and applicability of the sub-device depicted in Figure 9B of *Kim* to the sub-device depicted in Figure 15B (and also shown in Figure A). Ex. 1010, ¶197 (“FIGS. 9a to 9d illustrate various configuration of the sub-device according to an embodiment of the present invention.”). In addition to using the same reference number for the sub-device (*i.e.*, sub-device 300), the sub-device depicted in Figure 9B has the same form factor as sub-device 300 depicted in Figure 15B (and also shown in Figure A). As such, a person of ordinary skill in the art, in my opinion, would have recognized that sub-device 300 in the watch-type embodiment shown in Figure A also includes a frame, such as frame 303 shown in Figure 9B.

115. I have been asked to assume that Patent Owner may argue that *Kim* does not sufficiently disclose the sub-device (“the electronic device”) having a case. For the reasons I have discussed, I would disagree. Even if for the sake of argument one were to assume that *Kim* does not disclose the sub-device having a case, in my

opinion, it would have been obvious to a person of ordinary skill in the art to include a case to protect the components of the sub-device.

116. As I discussed above in Section VII.A, *Kim* discloses the sub-device including the same components as the main device (*id.*, ¶187), and the main device including, for example, “a wireless communication unit 110, an audio/video (A/V) input unit 120, a user input unit 130, a sensing unit 140, an output unit 150, a memory 160, an interface unit 170, a controller 180 and a power supply 190” (*id.*, ¶72, FIG. 1). As I discussed above in Section IX.B.1.d, *Kim* further discloses the main device having a case to enclose electronic components. In my opinion, a person of ordinary skill in the art would have considered it common sense to use a case to enclose components in the sub-device (the same way *Kim* teaches to do so with respect to the main device) to, for example, hold the components of the sub-device in a discrete mobile form factor and to protect the components against physical damage.

117. *Kim* also discloses that the sub-device (“electronic device”) comprises an electronic circuit that is “responsive” to the main device (“switching device”). Again, as I have explained, *Kim* discloses the sub-device including the same components as the main device (*id.*, ¶187), and the main device including the components shown in Figure 1, such as “a wireless communication unit 110, an audio/video (A/V) input unit 120, a user input unit 130, a sensing unit 140, an output

unit 150, a memory 160, an interface unit 170, a controller 180 and a power supply 190” (*id.*, ¶72, FIG. 1). In one implementation, “the sub-device 300 comprises a display unit 251, a controller 280, and a power supply unit 290.” *Id.* ¶198. In my opinion, a person of ordinary skill in the art would have understood that these components comprise electronic circuits. This is further supported by the disclosure of *Kim*, which provides that:

According to the hardware implementation, arrangements and embodiments may be implemented using at least one of application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, microcontrollers, microprocessors and electrical units for performing other functions. In some cases, embodiments may be implemented by the controller 180.

Id., ¶121. In my opinion, therefore, a person of ordinary skill in the art would have understood *Kim*’s sub-device to comprise electronic circuits because it includes the above discussed components.

118. *Kim* further discloses that, in operation, the main device controls the electronic circuits of the sub-device. For example, *Kim* discloses that:

The main device may detect whether or not the sub-device 300 is coupled or separated by using the coupling detection unit 230. Accordingly, when the sub-device 300 is coupled to the main device 100, the main device 100 may automatically change its operation mode *or an operation mode of the sub-device*.

Id., ¶195 (emphasis added). *Kim* also discloses that:

Like the other types of mobile terminals as described above, the main device and the sub-device may interwork, and *as the two devices are coupled or separated, types of information displayed on each device or display formats may be changed*.

Id., ¶259 (emphasis added). *Kim* also provides that:

The control method in coupling/separating the mobile terminal according to an embodiment of the present invention relates to a method for *controlling an operation and state of the main device 100 and the sub-device 300 when the sub-device 300 is coupled to the main device 100 of the mobile terminal or separated from the main device 100*.

Id., ¶270 (emphasis added). As such, *Kim* discloses the main device changing the state and/or operation of the sub-device when the sub-device is coupled to the main device. *Id.* I discuss one such example in *Kim* of the main device changing the state and/or operation of the sub-device upon coupling below in Section IX.B.1.h,

wherein upon coupling, the main device differently controls the sub-device (*e.g.*, its display):

The controller 180 differently controls the operations (*e.g.*, display) of the main device 100 and the sub-device 300 according to an engaged state (vertical or horizontal).

Ex. 1010, ¶274. Accordingly, a person of ordinary skill in the art would have recognized that *Kim* discloses a sub-device (“electronic device”) having electronic circuit components such as a display unit, a controller, a power supply, etc. (“comprises ... an electronic circuit”) whose state and/or operation are changed by (“responsive to”) the main device (“switching device”).

f. “a first magnet is fully disposed within the electronic device;”

119. In my opinion, *Kim* discloses or suggests this feature. For the reasons I discussed above in Section IX.B.1.a, a person of ordinary skill in the art would have understood *Kim* to disclose or suggest a watch-type mobile terminal as shown in Figure A (reproduced below), in which a sub-device 300 detachably couples to a second body 100b of the main device through coupling members 510 (annotated in brown).

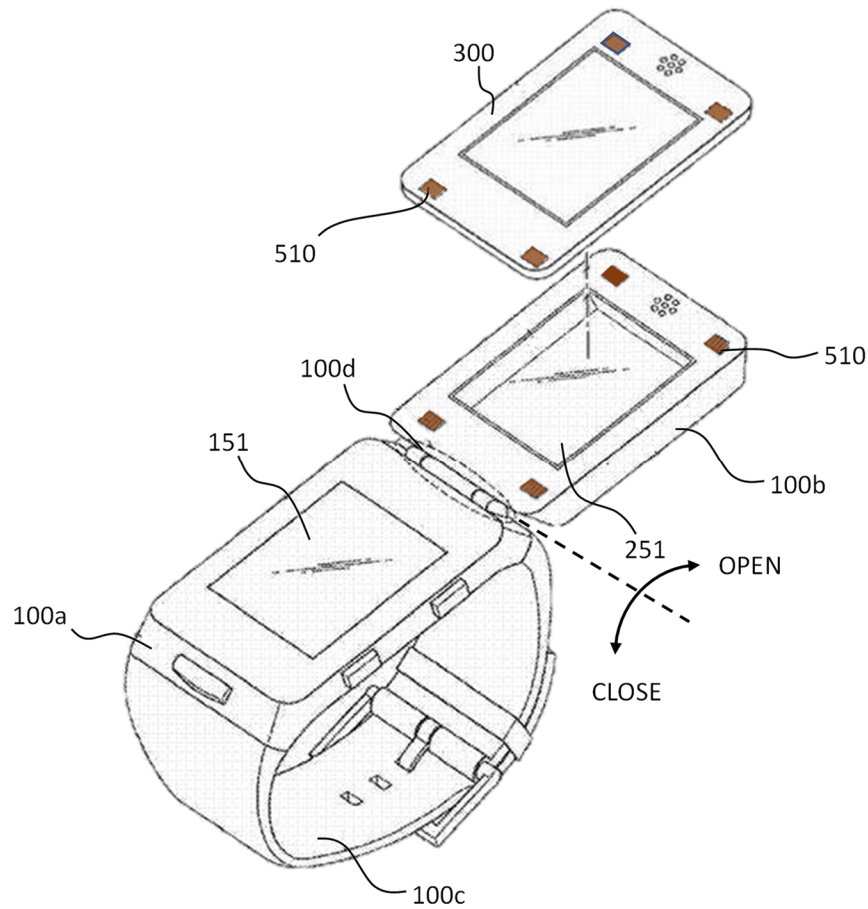


Figure A (based on *Kim*'s disclosure)

120. As I also explained in Sections IX.B.1.a and IX.B.1.c, *Kim* discloses or suggests using magnets as the coupling members 510 to detachably couple the sub-device (“electronic device”) in Figure A to the watch-type main device in Figure A.

121. In my opinion, a person of ordinary skill in the art would have recognized that in the watch-type embodiment shown in Figure A, the magnets (coupling members 510) would have been “fully” disposed within the sub-device

(“electronic device”) because they are shown to be in the sub-device and flush with the surface of the sub-device.

122. I have been asked to assume that Patent Owner may argue that *Kim* does not sufficiently disclose that the magnets are “fully” disposed in the sub-device. For the reasons I have discussed, I would disagree. Even if for the sake of argument one were to assume that *Kim* does not disclose “fully” disposing the magnets within the sub-device 300, it would have been obvious to a person of ordinary skill in the art to “fully” dispose the magnets within the sub-device 300.

123. Indeed, a person of ordinary skill in the art would have recognized that making the magnets “fully” disposed within the sub-device (“electronic device”) was one of a limited number of available design choices—*i.e.*, fully disposed, not fully disposed, or external. In my opinion, a person of ordinary skill in the art would have been motivated to pursue these limited known options and would have recognized “fully” disposing the magnets within the sub-device as an acceptable solution. Indeed, the ’021 patent does not disclose any critical or unexpected results associated with having the magnets fully disposed within the electronic device.

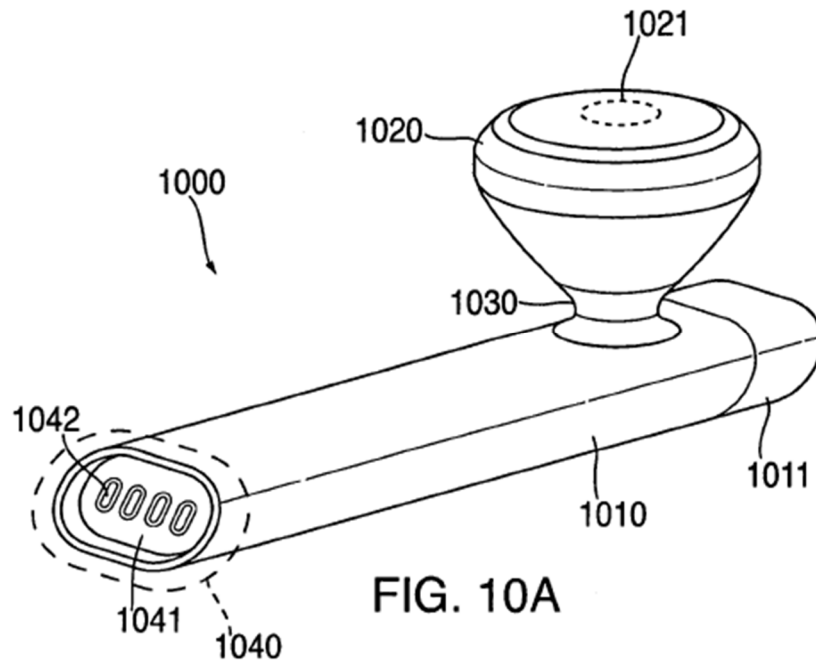
124. In my opinion, it also would have been an obvious engineering choice to a person of ordinary skill in the art to fully dispose the magnets within the sub-device and/or the main device’s second body to, for example, reduce the profile of

the joined components and allow a flush interface between the sub-device and the main device, thereby reducing the space that the combined devices occupy and reducing the risk of the sub-device detaching from the main device.

125. It would have been within a person of ordinary skill's knowledge and skill to use this technique (*i.e.*, fully disposing magnets within an electronic device) in order to create a flush interface between components to be magnetically coupled.

126. For example, *Terlizzi* is generally directed to “[a] wireless headset device that includes an earbud assembly and a primary housing assembly, fixed to the earbud assembly.” Ex. 1015, Abstract.³ Figure 10A of *Terlizzi* provides a perspective view of a headset 1000:

³ I am simply referring to Ex. 1015 (*Terlizzi*) to show that fully disposing magnets within an electronic device was a technique commonly known and well within the technical grasp and common sense of a person of ordinary skill in the art at the time of the alleged invention of the '021 patent.



Id., FIG. 10A, ¶144. *Terlizzi* discloses that “headset 1000 can include earbud 1020, neck 1030, primary housing 1010, antenna cap 1011 and connector 1040.” *Id.*, ¶145.

Terlizzi provides that:

Located at the connector end of primary housing 1010, connector 1040 includes at least one port (not shown in FIG. 10A) for enabling a microphone inside housing 1010 to receive acoustic signals (e.g., a user’s voice), and at least one contact 1042 for receiving power, data, or both from an external source.

Id., ¶146. *Terlizzi* also describes a “connector 6200 that is complementary to and capable of mating with connector 1040,” (*id.*, ¶306), and that connector 6200 may

include an array 6280 of magnetic components (*id.*, ¶307). Specifically, *Terlizzi* discloses:

Array 6280 can be installed in connector 6200 such that it forms a magnetic array structure, and each magnet of the array can be separated by a gap of predetermined size. ***Array 6280 of magnetic components can be embedded in connector housing 6210 so that the surface of components 6282, 6283 and 6284 can be flush with mating face 6286.*** These exposed components can extended all of the way to the surface of a corresponding connector plate so that the strongest magnetic forces are generated. ***However, a connector can have no exposed magnetic elements without deviating from the spirit of the present invention. For example, it can be desirable to recess magnetic components 6281 and 6285 in order to create a smaller connector.***

Id., ¶307 (emphases added). Accordingly, *Terlizzi* demonstrates that fully disposing magnets within an electronic device was a known technique to create a flush interface and a smaller connector at the time of the alleged invention of the '021 patent.

127. Thus, in my opinion, making the magnets fully disposed within the sub-device would have been obvious as the mere application of a known technique (magnets fully disposed within an electronic device) to a known device (the sub-

device) to yield a predictable result (incorporating a magnet fully within a sub-device).

- g. “the electronic device comprises at least one element selected from the group consisting of beveled edges, ridges, recessed areas, grooves, slots, indented shapes, bumps, raised shapes, and combinations thereof; configured to correspond to complementary surface elements on the switching device;”**

128. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses that:

The *coupling unit 210 may be configured to mechanically couple the main device and the sub-devices*, and the connection unit 230, a block for allowing communication between the main device and the sub-devices, is configured to directly connect the main device and the sub-devices by using a hardware connection terminal (not shown), connect them by using a fixed line such as a cable or a connector, or wirelessly connect them by using a wireless scheme (e.g., Bluetooth™, IrDA, or the like).

Ex. 1010, ¶183 (emphasis added). Accordingly, *Kim* discloses the main device (“switching device”) including a coupling unit 210 configured to physically couple the main device and the sub-devices.

129. As I discussed above in Section IX.B.1.a, *Kim* also discloses that:

The *coupling unit 210 may be changed in various structures (or configurations) according to types* (e.g., bar type, slide type,

folder type, swing type, swivel type, watch type, and the like) of mobile terminals. In addition, the main device of the mobile terminal may further include an auxiliary member such as a magnet, a spring, a latch, or the like, to fix the sub-devices such that the sub-devices are not moved, shattered or released after being coupled at accurate positions, as well as changing the external configuration of the body.

Id., ¶185 (emphasis added). As such, *Kim* discloses the coupling unit having various structures (or configurations) according to the type of mobile terminal. With respect to the sub-device (“electronic device”), *Kim* similarly discloses that “the coupling unit 410 of each sub-device may be configured in a structure (or configuration) corresponding to the coupling unit 210 of the main device.” *Id.*, ¶186.

130. As I explained above in Sections IX.B.1.a and IX.B.1.c with respect to the embodiment shown in Figure A, *Kim* discloses or suggests detachably coupling the sub-device (“electronic device”) to the main device (“switching device”) using magnets as the coupling members 510. However, *Kim* also discloses that the coupling members 510 may be complementary recesses/hooks on the sub-device and the main device. For example, *Kim* discloses:

As shown in FIG. 11*b*, a coupling member 510 for fixing the sub-device is provided on at least one side of the first body of the main device, and the sub-device may be coupled such that it is

press-fit to the position of the coupling member 510. *[F]or example, a recess or a hook is formed at one side of the first body of the main device, and the third body 300 may be coupled by using the recess or the hook.* Or, a magnet may be provided to one side of the first body of the main device, and the third body 300 having a member that can be attached to the magnet may be coupled.

Id., ¶218 (emphasis added). Although this discussion is with respect to the embodiment of Figure 11B, as I discussed above in Section IX.B.1.a, a person of ordinary skill in the art would have recognized that the disclosures with respect to Figure 11B could be adapted and applied to the watch-type embodiment shown in Figure A.

131. Based on the foregoing passage of *Kim*, a person of ordinary skill in the art would have recognized that *Kim* discloses that when recesses/hooks are used, one feature (*e.g.*, hooks) is on the sub-device and the corresponding feature (*e.g.*, recesses) is on the main device. *Id.*, ¶218; *see also id.*, ¶206 (further confirming the complementary nature of recesses/hooks by explaining that when a fixing member such as a hook is provided to prevent the sub-device from being released, “one side of the sub-device may have a recess . . . having a configuration allowing the hook to be caught therein”). A person of ordinary skill in the art would have understood that to engage with the recesses in the main device, the hooks on the sub-device would

have to be “raised shapes,” *i.e.*, extend beyond the plane of the surface of the sub-device in order to engage recessed areas in the plane of the surface of the main device.

132. In my opinion, a person of ordinary skill in the art would have been motivated to incorporate both magnetic and mechanical (*e.g.*, recesses/hooks) techniques for detachably coupling the sub-device and the main device of the embodiment shown in Figure A because it would have provided a more secure coupling between the two components with less propensity for accidental or unintentional detachment of the sub-device from the main device. Indeed, it was known to use both magnetic and mechanical attachment techniques to achieve a more secure (yet still detachable) coupling between two devices in an electronic system.

133. For example, *Birger* is generally directed to “an earphone system comprising a wireless earphone and a portable holding device, wherein the earphone comprises an ear hook for attaching the earphone to the ear of a user and the holding

device comprises an outer surface.” Ex. 1018, 1:7-10.⁴ Figure 11 of *Birger* provides a perspective view of an earphone system 23:

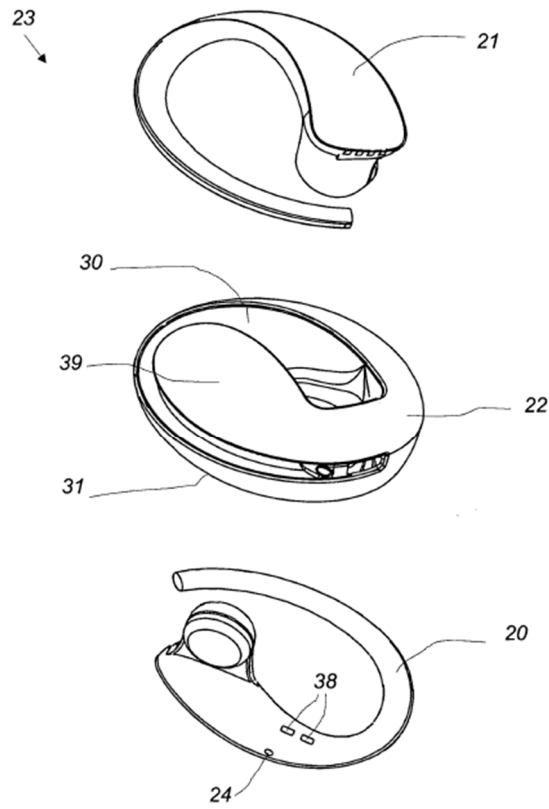


Fig. 11

Id., FIG. 11, 10:25-26.

⁴ I am simply referring to Ex. 1018 (*Birger*) to show that a person of ordinary skill in the art would have known at the time of the alleged invention of the '021 patent to use both magnetic and mechanical attachment techniques to achieve a more secure (yet still detachable) coupling between two devices in an electronic system.

134. *Birger* discloses that:

This earphone system comprises an earphone 21 for the right ear, an earphone 20 for the left ear and a holding device 22. ***The holding device 22 has two earphone receiving recesses 30, 31, where only the recess 30 for the right earphone 21 is visible in Fig. 11.*** It is not shown in Fig. 11, but this embodiment may also include release recesses, whereby the user easily can remove the earphones 21, 20 from the earphone receiving recesses 30, 31. This embodiment can be used for stereo music listening or as two hearing aids.

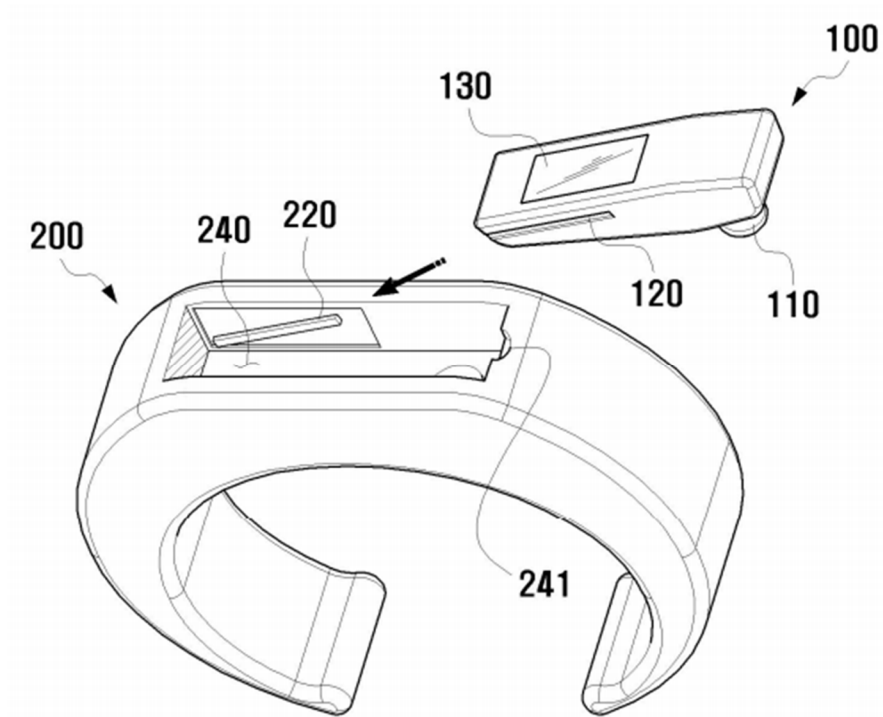
Id., 10:26-11:2 (emphasis added). *Birger* further provides that: “The earphone [21] and the holding device [22] can be provided with ***magnetic means*** to hold the earphone ***more firmly in the earphone receiving recess*** [31].” *Id.*, 11:17-19 (emphases added). Accordingly, *Birger* demonstrates that it was a known technique at the time of the alleged invention of the '021 patent to use both magnetic and mechanical attachment techniques to achieve a more secure (yet still detachable) coupling between two devices in an electronic system.

135. As I discussed above in Section VII.B, *Koh* is generally directed to a portable electronic device module comprising “a portable electronic device and an

electronic device storage unit.” Ex. 1012, Abstract.⁵ *Koh* explains that “[a]n object of the present invention is to provide a portable electronic device module that is easy to couple and convenient to store by sliding and coupling a portable electronic device to an electronic device storage unit.” *Id.*, ¶12.

136. In one embodiment, *Koh* describes the “portable electronic device module” as a wireless headset. *Id.*, ¶27 (“Hereinafter, among portable electronic devices, a wireless headset will be described as an embodiment.”). *Koh* explains that “the wireless headset 100 may be coupled to the electronic device storage unit 200.” *Id.*, ¶46. Figure 4A of *Koh*, reproduced below, shows the wireless headset 100 and the electronic device storage unit 200:

⁵ While it is my opinion in Section IX.C below that the combination of *Kim* and *Koh* discloses and/or suggests all of the features of claim 10 of the ’021 patent, I am simply referring to Ex. 1012 (*Koh*) with respect to claim 1 to show that a person of ordinary skill in the art would have known at the time of the alleged invention of the ’021 patent to use both magnetic and mechanical attachment techniques to achieve a more secure (yet still detachable) coupling between two devices in an electronic system.



Id., FIG. 4A; *see also id.*, ¶45 (“FIGS. 4A and 4B are drawings showing that a wireless headset is coupled to an electronic device storage unit according to an embodiment of the present invention.”).

137. *Koh* discloses that:

The coupling protrusion 220 of the electronic device storage unit 200 is positioned slightly obliquely so that the outer end faces upward. ***The wireless headset 100 and the electronic device storage unit 200 are coupled in a sliding manner by inserting the coupling protrusion 220 of the electronic device storage unit 200 into the guide groove 120 of the wireless headset 100.*** Thereafter, when the upper portion of the wireless headset 100 where the speaker unit 110 is positioned is pressed, the coupling

protrusion 220 rotates by a set angle. Due to this rotation, the wireless headset 100 is completely fitted into the receiving unit 240 of the electronic device storage unit 200.

Id., ¶46 (emphasis added). In my opinion, a person of ordinary skill in the art would have recognized that using the coupling protrusion 220 of storage unit 200 and the guide groove 120 of the wireless headset 100 to couple the wireless headset 100 to the storage unit 240 comprises using a mechanical attachment technique.

138. *Koh* also discloses that:

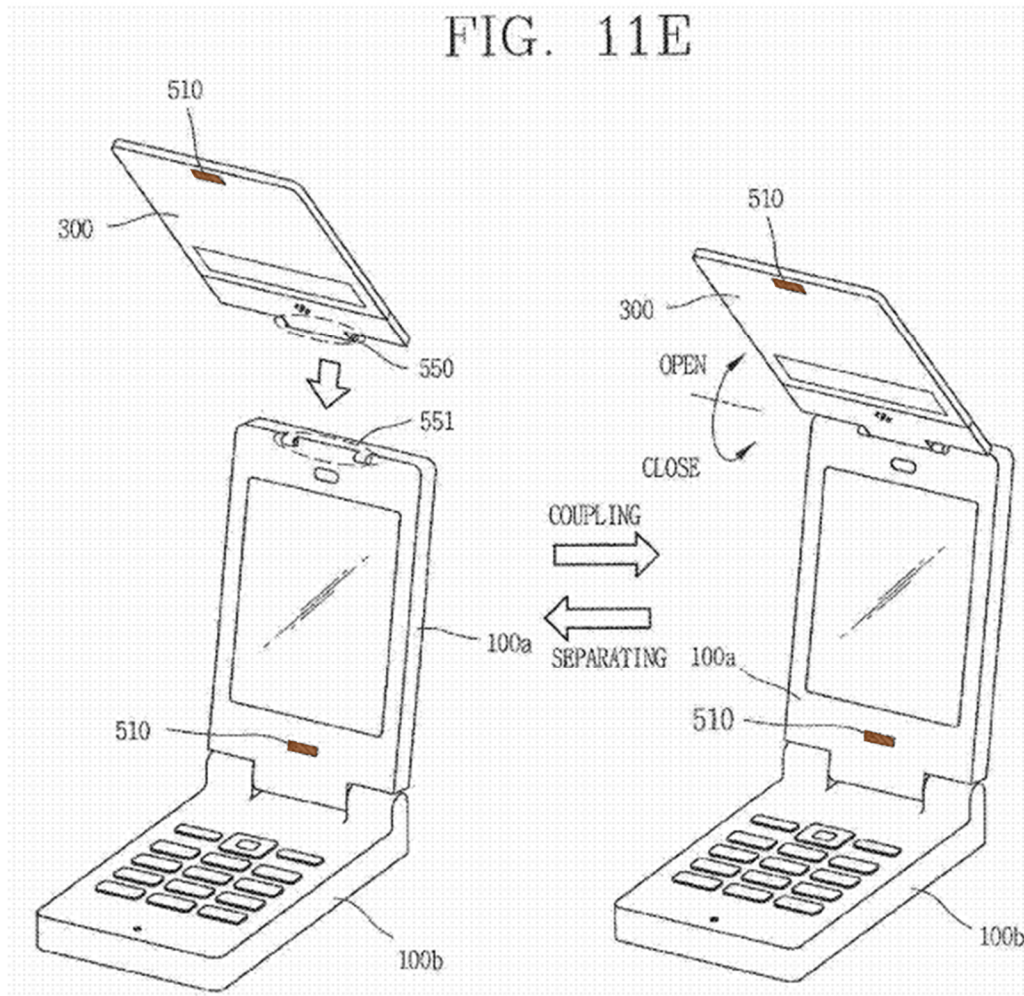
The wireless headset 100 may mount a magnet on the insertion surface (a surface indicated by an arrow in FIG. 4A). The electronic device storage unit 200 may mount a magnet on the inner surface (a hatched surface in FIG. 4A) of the storage unit 240. ***Each of the magnets has a different polarity and thus attracts the other magnet when the wireless headset 100 is coupled to the electronic device storage unit 200.*** Therefore, the user can smoothly engage with little force.

Id., ¶48 (emphasis added). *Koh* additionally notes that “[i]n the portable electronic device module according to the present invention, magnets are mounted on the insertion surface of the wireless headset and the inner surface of the receiving unit, and when the wireless headset is coupled to the electronic device storage unit, ***the magnets may be attracted to one other so as to be coupled.***” *Id.*, ¶19 (emphasis

added). In my opinion, a person of ordinary skill in the art would have recognized that using the magnet on the insertion surface of the wireless headset 100 and the magnet on the inner surface of the storage unit 240 to couple the wireless headset 100 to the storage unit 240 comprises using a magnetic attachment technique.

139. Thus, in my opinion, a person of ordinary skill in the art would also have recognized that *Koh* discloses using both the coupling protrusion 220 of storage unit 200 and the guide groove 120 of the wireless headset 100 *and* the magnet on the insertion surface of the wireless headset 100 and the magnet on the inner surface of the storage unit 240 to couple the wireless headset 100 to the storage unit 240. Accordingly, *Koh* too demonstrates that it was a known technique at the time of the alleged invention of the '021 patent to use both magnetic and mechanical attachment techniques to achieve a more secure (yet still detachable) coupling between two devices in an electronic system.

140. Indeed, *Kim* itself discloses incorporating multiple coupling techniques to connect a sub-device to a main device. For example, *Kim* discloses an embodiment with respect to Figure 11E (folder-type main device reproduced below) in which the sub-device is detachably coupled to the main device using both hinge part 550 and hinge part 551, as well as coupling members 510 (brown). I have reproduced Figure 11E below:



Id., FIG. 11E (annotated).

141. *Kim* discloses using a magnet as the coupling member 510 (brown) in the embodiment of Figure 11E:

The coupling member 510 may include such holder or magnet as described above, and an arbitrary one of any other coupling members as known may be also used as the coupling member.

Id., ¶220.

142. Thus, in my opinion, *Kim* confirms what was known to a person of ordinary skill in the art: using multiple techniques (mechanical and magnetic) to couple a sub-device to a main device to achieve a more secure coupling. And as I already explained, a person of ordinary skill in the art would have recognized that the disclosures with respect to the folder-type embodiment (*e.g.*, Figure 11E) could be adapted and applied to the watch-type embodiment shown in Figure A (*see* Section IX.B.1.a).

143. In my opinion, it would have been obvious to a person of ordinary skill in the art to modify the watch-type embodiment shown in Figure A to incorporate hooks into the sub-device (“electronic device comprises at least one element selected from the group consisting of ... raised shapes”) that engage recesses on the main device (“configured to correspond to complementary surface elements on the switching device”). Doing so would have amounted to the mere combination of prior art elements (magnetic coupling and mechanical coupling) according to known methods (as was known to a person of ordinary skill in the art) to yield predictable results (a more secure but still detachable coupling between the sub-device and the main device).

h. “the portable switching device is configured to activate, deactivate or send into hibernation the portable electronic device; and”

144. In my opinion, *Kim* discloses or suggests this feature. As I discussed above in Section IX.B.1.b, *Kim* discloses the main device (“portable switching device”) changing the state and/or operation of the sub-device (“portable electronic device”) based on the detected coupling state. For example, *Kim* discloses that:

The main device may detect whether or not the sub-device 300 is coupled or separated by using the coupling detection unit 230. Accordingly, when the sub-device 300 is coupled to the main device 100, the main device 100 may automatically change its operation mode or an operation mode of the sub-device.

Ex. 1010, ¶195. *Kim* also discloses that:

Like the other types of mobile terminals as described above, the main device and the sub-device may interwork, and *as the two devices are coupled or separated, types of information displayed on each device or display formats may be changed.*

Id., ¶259 (emphasis added). *Kim* also provides that:

The control method in coupling/separating the mobile terminal according to an embodiment of the present invention relates to a method for *controlling an operation and state of the main device 100 and the sub-device 300 when the sub-device 300 is*

coupled to the main device 100 of the mobile terminal or separated from the main device 100.

Id., ¶270 (emphasis added).

145. *Kim* further discloses that when the main device and the sub-device are coupled, the controller activates a display “according to an engaged state”:

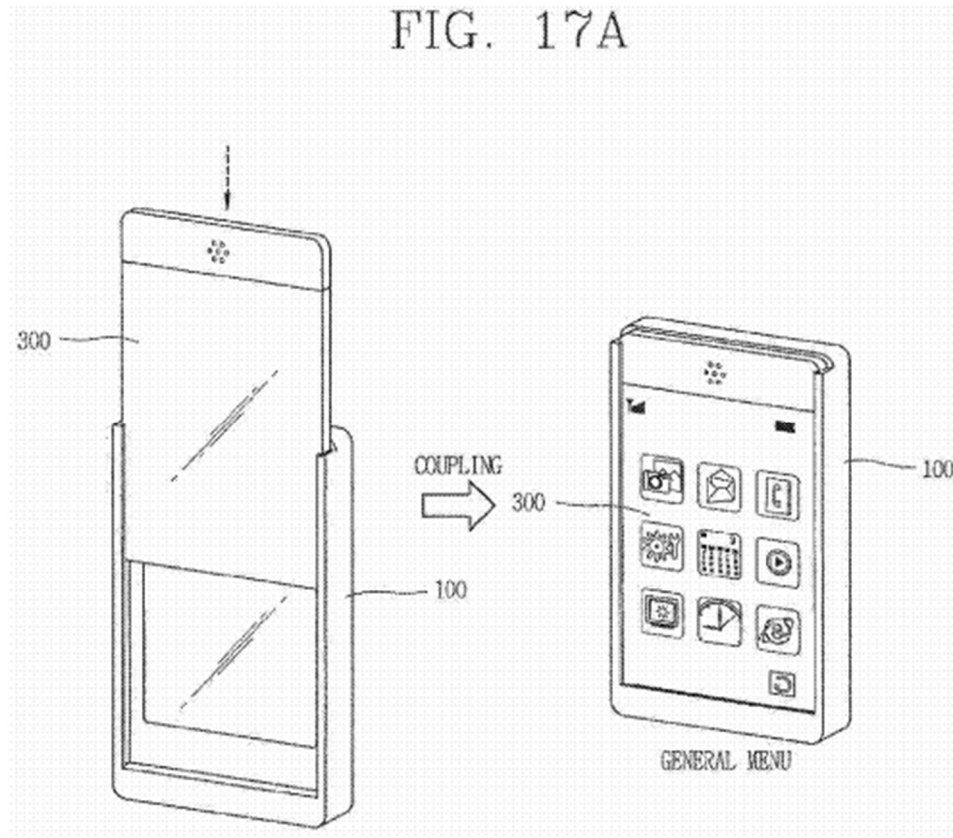
The controller 180 differently controls the operations (e.g., display) of the main device 100 and the sub-device 300 according to an engaged state (vertical or horizontal).

As shown in FIG. 17*a*, when the main device 100 and the sub-device 300 are engaged in the vertical direction, the controller 180 displays a menu display method or menu items that can be conveniently manipulated in the horizontal display upon detection of it.

If the main device 100 and the sub-device 300 are engaged in the horizontal direction as shown in FIG. 17*b*, the controller 180 displays menu items that can be conveniently manipulated in the horizontal display. For example, the controller displays multimedia menu items such as an image viewer, a broadcast view, a camera function, a video player, and the like.

Id., ¶¶274-276 (emphasis added). As such, with reference to Figures 17A-17B, *Kim* discloses the main device’s “*controller 180* differently control[ing] the operation (e.g., display) of the main device 100 and the sub-device 300 according to an

engaged state.” *Id.*, ¶¶274 (emphasis added). I have reproduced below Figure 17A of *Kim*:



Id., FIG. 17A. When the sub-device and the main device are coupled, “*the controller 180* displays a menu display method or menu items” *Id.*, ¶275 (emphasis added).

146. Although this disclosure is with respect to the bar-type mobile terminal, *Kim* states that this is described with respect to the bar type mobile terminal for the sake of brevity:

FIGS. 17a and 17b illustrate an example of automatic controlling of a terminal operation (menu display). A bar type mobile terminal will be described as an example *for the sake of brevity*.

Id., ¶273 (emphasis added). A person of ordinary skill in the art would have understood that the functionality described with respect to Figures 17A-17B are equally applicable to the other embodiments disclosed in *Kim* (e.g., the watch-type embodiment). For example, the described functionality, as well as my discussion that follows, would be equally applicable to a watch-type mobile terminal in which a sub-device having a display is coupled to the main device so as to overlap (e.g., cover) a display of the main device.

147. Having reviewed Figure 17A and the accompanying description in *Kim*, a person of ordinary skill in the art would have understood *Kim* to disclose that the sub-device is inactive before the sub-device and the main device are coupled (e.g., the display of the sub-device is shown to be off), and that after the coupling a menu is displayed. For example, in addition to the disclosures in *Kim* that I cite above, in Figure 17A the sub-device is shown with its display inactive on the left (*i.e.*, prior to coupling).

148. *Kim* discloses various display technologies as acceptable for the mobile terminal. These include non-transparent display technologies such as LCD, Ex.

1010, ¶161 (“display unit 156 provided on the main body may be a non-transmissive type (such as LCD)”), as well as transparent display technologies such as TOLED:

The display 151 may include at least one of a *liquid crystal display (LCD)*, a *thin film transistor liquid crystal display (TFT LCD)*, an *organic light-emitting diode (OLED)*, a flexible display, and a 3-dimensional display.

The display 151 may have a transparent or light-transmissive type configuration to enable an external environment to be seen through. This may be called a transparent display. *A transparent OLED (TOLED)* may be an example of a transparent display. A backside structure of the display 151 may also have the light-transmissive type configuration. In this configuration, a user may see an object located behind the terminal body through the area occupied by the display 151 of the terminal body.

Ex. 1010, ¶¶97-98 (emphases added). A person of ordinary skill in the art would have understood that all of these display technologies are acceptable for both the main device’s display 151 and the sub-device’s display 251 because *Kim* expressly acknowledges that “the sub-device 300 may include the same elements as the main device.” Ex. 1010, ¶198. *Kim* does not require that the sub-device’s display be transparent and indeed describes circumstances in which the sub-device display is not transparent:

In this case, if the display unit 251 of the third body 300 is configured as a transparent display (TOLED), it overlaps with the display unit 151 of the first body to obtain the effect of a dual-display. *Of course, even if the display unit is not necessarily configured as the transparent display*, when the first and second bodies are coupled, the effect of a double display of performing displaying from both surfaces (front and rear surfaces) of the mobile terminal can be obtained.

Ex. 1010, ¶226 (emphasis added). As such, a person of ordinary skill in the art would have understood *Kim* to disclose that the sub-device's display may be transparent or non-transparent (*i.e.*, that *Kim* discloses a non-transparent display such as an LCD to be an acceptable implementation option as the sub-device's display).

149. In my opinion, a person of ordinary skill in the art would have understood that in implementations in which the sub-device's display is non-transparent, the controller 180 would necessarily display the menu shown on the right on the sub-device's display. The main device's display would not be visible to the user because the sub-device's display is depicted in Figure 17A as fully covering the main device's display when coupled. Because the main device's display is fully covered by the sub-device when the devices are coupled, and because the left side of Figure 17A depicts the display of the sub-device as inactive before coupling,

displaying the menu shown on the right side of Figure 17A would have required turning on the sub-device's display. Accordingly, *Kim* discloses the main device's controller 180 ("portable switching device") causing ("is configured") the sub-device to turn on (*e.g.*, its display) to display the menu ("to activate ... the portable electronic device").

150. I have been asked to assume that Patent Owner may argue that *Kim* does not sufficiently disclose that the sub-device is activated by the main device upon coupling. For the reasons I have discussed, I would disagree. Even if for the sake of argument one were to assume that *Kim* does not disclose the main device activating the sub-device (*e.g.*, its display), in my opinion, it would have been obvious to a person of ordinary skill in the art to have the main device's controller 180 activate the sub-device (*e.g.*, its display) to show the menu when the sub-device and the main device are coupled.

151. As I discussed above, a person of ordinary skill in the art would have understood *Kim* to disclose the controller 180 of the main device activating a display to show a menu when the main device and the sub-device are coupled. *Id.*, ¶¶274-276. A person of ordinary skill in the art would have recognized that activating the sub-device and its display was one of two available choices to display the menu shown in Figure 17A when the sub-device and the main device are coupled—*i.e.*,

activating the sub-device and its display or activating the display of the main device.⁶ In my opinion, a person of ordinary skill in the art would have been motivated to pursue these limited known options and would have recognized turning on or activating the sub-device and its display as an acceptable solution.

152. Additionally, *Kim* discloses the sub-device changing the state and/or operation of the main device. Coupling or decoupling the sub-device to the main device automatically controls power to the main device to turn its display on or off, respectively, to save power:

FIG. 24 illustrates automatic controlling of power saving of the terminal.

In this embodiment, the controller 180 detects the coupling and separating (i.e. coupling or de-coupling) of the two devices 100 and 300 and controls the power supply to the display of the main device 100 to turn it on or off.

For example, when the coupled state of the two devices is released or separated (i.e. when the two devices are de-coupled

⁶ Activating the display of the main device is only an option in configurations where the sub-device's display is transparent, because otherwise the main device's display would not be visible, as explained in paragraph 149.

from each other), the controller 180 detects this and cuts off power supply to the display of the main device 100.

Thereafter, when the two devices 100 and 300 are coupled again, the controller 180 provides control to supply power to the display of the main device 100 to allow the main device to perform displaying. In this embodiment, automatic power controlling may be converted to hand-operated power controlling. When the automatic power controlling is converted into the hand-operated power controlling, power supplied to the display of the main device 100 is controlled by the user regardless of coupling or separating of the two devices 100 and 300.

Ex. 1010, ¶¶299-302.

153. *Kim* also discloses that using a power key provided on the sub-device turns power to the main device on or off when the main device and sub-device are coupled:

FIG. 42 illustrates controlling of power of the terminal.

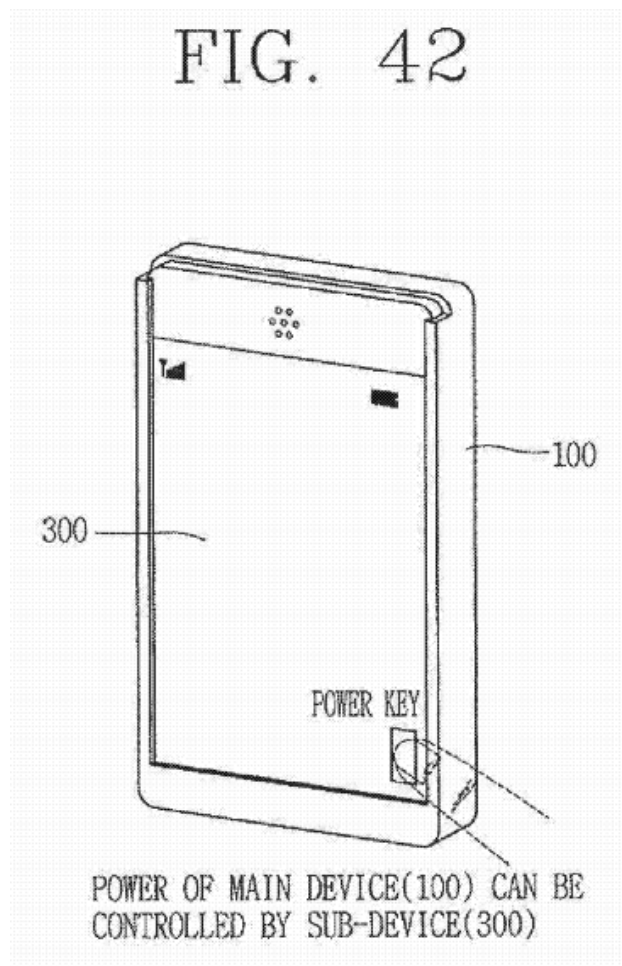
In this embodiment, when the main device 100 and the sub-device 300 are coupled, power of the main device 100 may be turned on or off by using a power key (e.g., hardware or software key) 426 provided at the sub-device.

When the input of the key 426 is detected, a signal generated by the key input is transferred to the controller 180 via a certain path

and the main device 100 is turned off as the controller 180 cuts off power supply.

Ex. 1010, ¶¶416-418.

154. As explained by *Kim* and depicted in Figure 42, such a power key may be a soft key displayed on the touch screen of the sub-device:



Ex. 1010, FIG. 42. And when the main device and sub-device are not coupled, *Kim* discloses transmitting a power control command remotely from the sub-device on short-range wireless communication turns power to the main device on or off:

FIG. 27 illustrates controlling of power of the main device 100.

In a state that the main device 100 and the sub-device 300 are separated, the user may manipulate only the sub-device 300 to turn on or off power of the main device 100. To this end, the sub-device 300 may have a software key (or hardware key) for power controlling or execute a menu for power controlling.

A power control command (e.g., ON or OFF) inputted by the user is transmitted on short-range wireless communication (e.g., Bluetooth™, radio frequency identification (RFID), infrared data association (IrDA), and the like) via the connection unit 230 of the sub-device 300.

Thereafter, when the power control command of the user is received by the main device 100, the controller 180 turns on or off power of the main device 100 according to the received power control command.

Ex. 1010, ¶¶316-319.

155. In my opinion, it would have been obvious to a person of ordinary skill in the art to implement this same functionality in the main device—*i.e.*, the main device turning the sub-device (or its screen) on or off. A person of ordinary skill in the art would have been motivated to make the modification because it would have allowed the user to have additional flexibility to control the sub-device and would

have been consistent with *Kim*'s teachings to have the main device control the state and/or operation of the sub-device.

156. A person of ordinary skill in the art would have been motivated to make the modification at least for the same reason as *Kim* discloses for control of the main device by the sub-device: to save power. *Kim* discloses the sub-device having a small battery or no battery at all:

For example, each sub-device may be configured to receive a radio signal transmitted from the main device and generate driving power by itself by using the radio signal as an energy resource, rather than including a weighty and voluminous battery. Accordingly, the sub-devices may be configured to be transparent or flexible to be bent, and because they do not include a battery, their volume can be reduced. Also, the sub-devices may have a small battery which may be charged by using an external power device or may be charged via the main device which the sub-devices are connected to the main device.

Ex. 1010, ¶186. Accordingly, a person of ordinary skill in the art would have recognized the need to conserve the sub-device's power when it is not coupled to the main device. As *Kim* already discloses using the sub-device to turn off the power of the main device when it is decoupled, a person of ordinary skill in the art would have been motivated to modify the main device to remotely turn off the power of the sub-

device in order to conserve its power in instances when it is decoupled and not being used.

157. As I explained previously, *Kim* discloses that the sub-device includes the same components as the main device. Ex. 1010, ¶198. A person of ordinary skill in the art would have recognized that the mobile terminal in *Kim* already includes the necessary components to make the modification, such as wireless communication between the main device and sub-device. The modification would have amounted to the mere combination of prior art elements according to known methods (the components already in the mobile terminal that allow the sub-device to remotely turn the main device on or off) to yield predictable results (allowing the main device to remotely turn the sub-device on or off).

158. Modifying the main device to remotely turn the sub-device on or off would additionally have been obvious as the application of known techniques (having one device turn another device on or off) to improve a similar device (*Kim*'s main device) in the same way (enabling the main device to control the state and/or operation of the sub-device to turn the sub-device on or off).

i. “when coupled, the first case functions to protect the second case.”

159. In my opinion, *Kim* discloses or suggests this feature. As I discussed above in Section IX.B.1.a, *Kim* discloses or suggests the embodiment shown in

Figure A (reproduced below) in which a sub-device 300 detachably couples to the second body 100b of the watch-type main device.

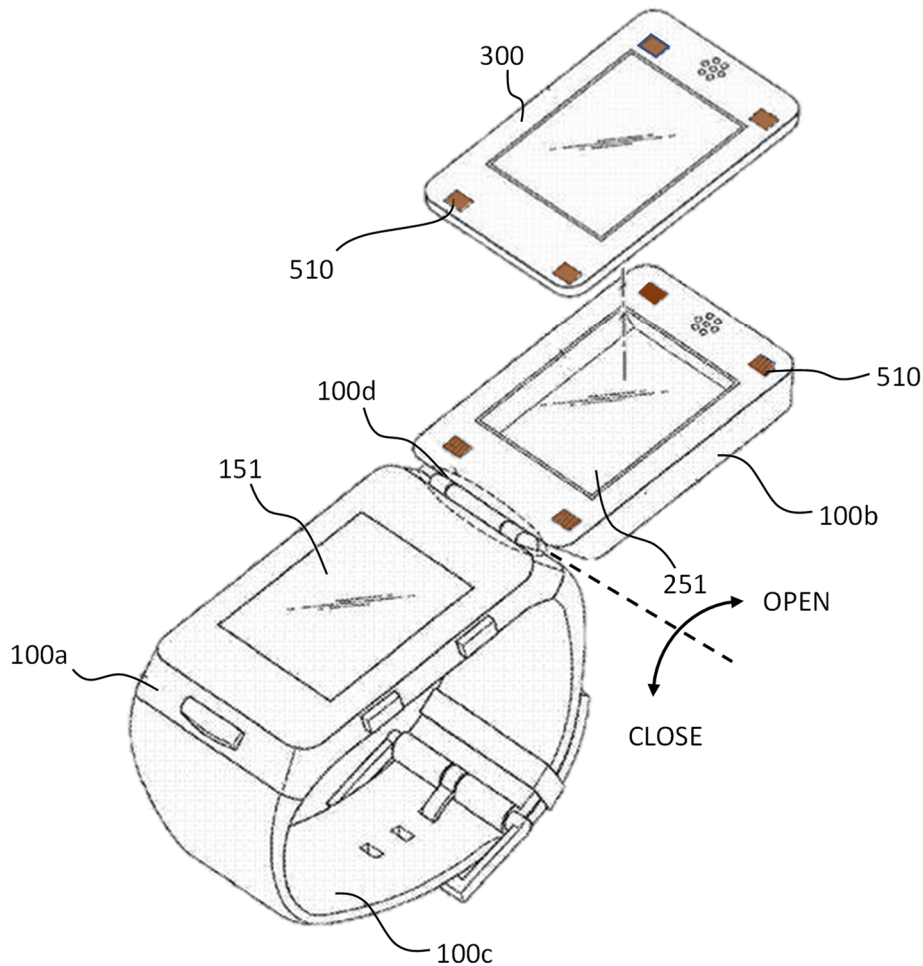


Figure A (based on Kim's disclosure)

160. In such an embodiment, the second body 100b and first body 100a are connected by a hinge 100d so that the first and second bodies can be opened or closed in a folding manner. *Id.*, ¶256 (“The second body may be configured to be connected by a hinge 100d to one side of the first body so as to be open or closed.”). *Kim*

discloses that the main device's first and second bodies can close even when the sub-device 300 is coupled to the second body 100b. *Id.*, ¶218 (“[T]he first body 100a and the second body 100b may be folded or unfolded regardless of the coupling or separating of the sub device.”). Although this discussion is with respect to the embodiment of Figure 11B, a person of ordinary skill in the art would have recognized for the reasons I discussed above in Section IX.B.1.a that the disclosures with respect to Figure 11B could be adapted and applied to the watch-type embodiment shown in Figure A.

161. In the embodiment shown in Figure A, the first body 100a and the second body 100b of the main device comprises a case (“first case”) (as I discussed above in Section IX.B.1.d), and the sub-device 300 also comprises a case (“second case”) (as I discussed above in Section IX.B.1.e). In my opinion, a person of ordinary skill in the art would have recognized that when the sub-device 300 is coupled to the second body 100b and the second body is folded to cover the first body 100a (“when coupled”), the first body 100a's and the second body 100b's case (“first case”) encloses and protects (“functions to protect”) the sub-device's case (“second case”).

162. This is further supported by the disclosure in *Kim* itself which discloses that when the sub-device is attached to the main device, the sub-device is fixed “such

that the sub-devices are *not* moved, *shattered* or released after being coupled at accurate positions.” *Id.*, ¶185. It is further supported by *Kim*’s disclosure that “[i]n addition, a cover may be provided to prevent the sub-device from being separated undesirably after it is coupled.” *Id.*, ¶193. Having reviewed the foregoing passage, a person of ordinary skill in the art would have recognized that when the sub-device 300 is coupled to the second body 100b of the watch-type embodiment shown in Figure A, and the second body 100b is folded to cover the first body 100a, the second body 100b’s case encloses and protects the sub-device 300’s case by preventing it from being moved, shattered, or released after being coupled.

2. Claim 2

a. “The system of claim 1 wherein the electronic device has a lens.”

163. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses that mobile terminal 100 depicted in Figure 1 includes an audio/video (A/V) input unit 120. *Id.*, FIG. 1, ¶72. With respect to audio/visual (A/V) input unit 120, *Kim* further provides:

The audio/video (A/V) input unit 120 may provide audio or video signal input to the mobile terminal 100. The A/V input unit 120 may include a camera 121 and a microphone 122. The camera 121 may receive and process image frames of still pictures and/or video.

Id., ¶84. As I discussed in Section VII.A above, a person of ordinary skill in the art would have understood that, for any of the disclosed embodiments in *Kim*, *Kim* teaches that the main device and the sub-device(s) each include suitable combinations of the components, hardware, and/or functionality as disclosed, for example, in the various embodiments of *Kim*. As such, having reviewed the foregoing passages of *Kim*, a person of ordinary skill in the art would have understood *Kim* to disclose a main device and/or a sub-device including an audio/video (A/V) input unit 120, such as camera 121. Accordingly, *Kim* discloses that the sub-device (“electronic device”) includes a camera.

164. This is further supported by the disclosure of *Kim* itself. For example, *Kim* discloses that:

As shown in FIG. 9c, the sub-device may include function keys (e.g., a hold function, a call transmission/reception function, an MP3 control function, a Bluetooth function, a mouse key function), *input units (e.g., a microphone, a camera)*, and output units (e.g., an audio output unit, an earphone connection unit, a beam output unit for projection, an infrared communication unit) on its front side or its side portion.

Id., ¶200. In my opinion, a person of ordinary skill in the art would have understood that *Kim* discloses the sub-device (“electronic device”) including a camera as an input unit. A person of ordinary skill in the art would have understood that a camera

suitable for incorporating into a portable consumer electronics device includes a lens.

165. For example, *Kiessling* is directed to mobile communication device with a camera module and discloses:

The mobile telephone is illustrated as being equipped with a camera module 120 attached to the main body 110. The camera module 120 is provided with a lens 122 for focusing incoming light onto an integrated image sensor for capturing digital images.

Ex. 1016, ¶34.

166. *Viinikanoja* is another publication directed to a camera system that is suitable for incorporating into a portable consumer electronics device and discloses:

The camera system includes a lens module and at least one mechanism for changing optical properties by interacting with the lens module. The camera system may be built into the mobile terminal or attached thereto as an external module.

Ex. 1017, Abstract.⁷ In my opinion, *Kiessling* and *Viinikanoja* demonstrate that a person of ordinary skill in the art at the time of the invention of the '021 patent would have known that cameras suitable for incorporating into portable consumer electronics devices of the type disclosed in *Kim* to include at least one lens.

167. Accordingly, a person of ordinary skill in the art would have recognized that *Kim* discloses or suggests the sub-device (“electronic device”) having a camera that includes a lens.

3. Claim 3

a. “The system of claim 1 wherein the electronic device has a view screen.”

168. In my opinion, *Kim* discloses or suggests this feature. As I explained above in Section IX.B.1.b, *Kim* discloses the sub-device (“electronic device”) including display unit 251. In my opinion, a person of ordinary skill in the art would have understood that a display unit is a “view screen” because a display unit displays

⁷ I am simply referring to Ex. 1016 (*Kiessling*) and Ex. 1017 (*Viinikanoja*) to show that a person of ordinary skill in the art would have known at the time of the alleged invention of the '021 patent that a camera suitable for incorporating into a portable consumer electronics device includes a lens.

information that can be viewed by a user. Ex. 1010, ¶215 (“For example, when the sub-device is coupled to the main device, the display unit 251 of the sub-device may operate as one of a main display or a sub-display.”). Accordingly, *Kim* discloses or suggests the sub-device (“electronic device”) having a display unit (“a view screen”).

4. Claim 4

a. “The system of claim 1 wherein the switching device has a lens.”

169. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses the main device including the elements of the mobile terminal as described with reference to Figure 1 (*id.*, ¶182), and “FIG. 1 shows that the mobile terminal 100 includes ... an audio/video (A/V) input unit 120” (*id.*, ¶72). *Kim* further explains that the “A/V input unit 120 may include a camera 121.” *Id.*, ¶84. As I explained above in Section IX.B.2, a person of ordinary skill in the art would have understood that a camera suitable for incorporating into portable consumer electronics devices of the type disclosed in *Kim* to include at least one lens.

170. Furthermore, it was well-known that cameras could be included in watch-type devices. For example, *Yamazaki* is directed to a wrist-carried camera having a watch function and discloses:

The present invention relates generally to a wrist-carried camera and watch-type information equipment, and more particularly to a camera shaped to be worn about the wrist of an operator like a wristwatch, a portable information terminal and other portable small information equipment.

Ex. 1019, 1:7-11.⁸ In my opinion, *Yamazaki* demonstrates that, at the time of the alleged invention of the '021 patent, it was well-known to and within the skill of a person of ordinary skill in the art to incorporate a camera into a watch-type device, as disclosed by *Kim*.

171. Accordingly, a person of ordinary skill in the art would have recognized that *Kim* discloses or suggests the main device (“switching device”) having a camera that includes a lens.

⁸ I am simply referring to Ex. 1019 (*Yamazaki*) to show that, at the time of the alleged invention of the '021 patent, it was well-known to and within the skill of a person of ordinary skill in the art to incorporate a camera into a watch-type device, as disclosed by *Kim*.

5. Claim 5

- a. “The system of claim 1 wherein the switching device has a view screen.”**

172. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses the main device (“switching device”) having one or more display units (“view screen”):

The display 151 may display (output) information processed by the terminal 100. For example, in case that the terminal is in a call mode, the display 151 may display a user interface (UI) or a graphic user interface (GUI) associated with the call. If the mobile terminal 100 is in a video communication mode or a photograph mode, the display 151 may display a photographed and/or received picture, a UI or a GUI.

Ex. 1010, ¶96; *see also id.*, ¶¶127-128.

The main device (i.e., the first device) 100 may include all the elements of the mobile terminal as described above with reference to FIG. 1 and, besides those elements, the main device may additionally include a coupling unit 210 for mechanically coupling the sub-devices (i.e., the second devices), a coupling detection unit 220 that detects whether or not the sub-devices are coupled, and a connection unit 230 that electrically connects the sub-devices and the main device to allow signals or data to be transmitted or received therebetween.

Id., ¶182.

As shown in FIG. 15*a*, the watch type mobile terminal includes the first body 100*a* to which a band part 100*c* is connected and the second body 100*b* including a display unit and coupled to the first body and. The second body may be configured to be connected by a hinge 100*d* to one side of the first body so as to be open or closed. The second body may be referred to as a cover, and the first body may include a display unit to configure a dual-display together with the display unit of the second body.

Id., ¶256; *see also id.*, ¶257.

173. For the reasons I discussed above in Section IX.B.3, a person of ordinary skill in the art would have understood that the main device's display unit is a "view screen."

6. Claim 6

- a. **"The system of claim 1 wherein the switching device includes a lid and hinge attaching the lid to the switching device."**

174. In my opinion, *Kim* discloses or suggests this feature. As I discussed above in Section IX.B.1.a, *Kim* discloses or suggests the watch-type embodiment as depicted below:

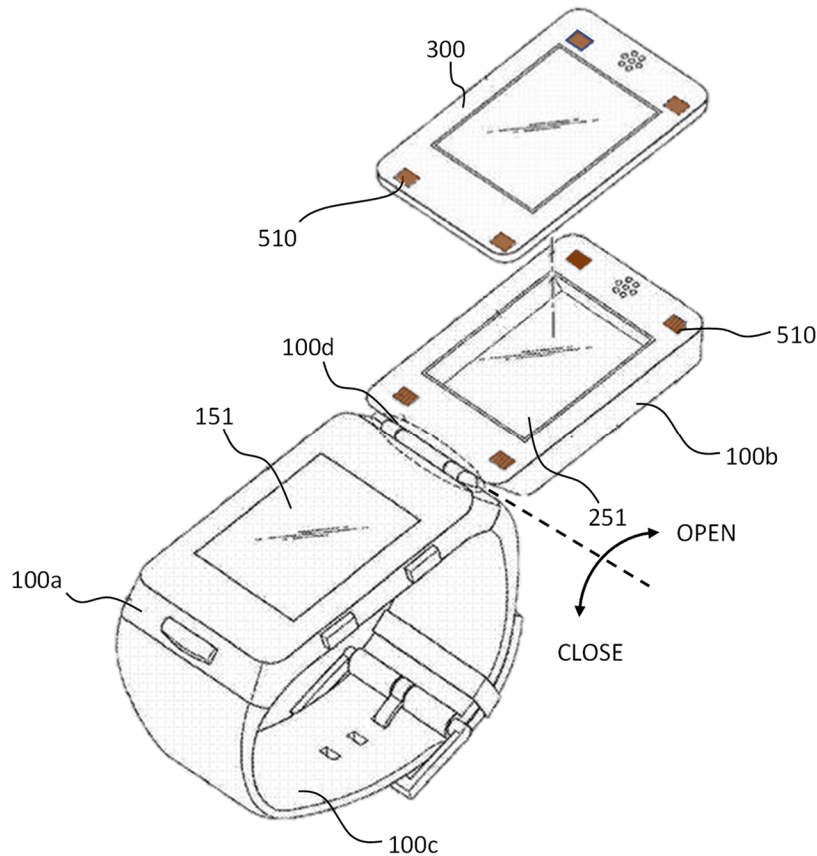
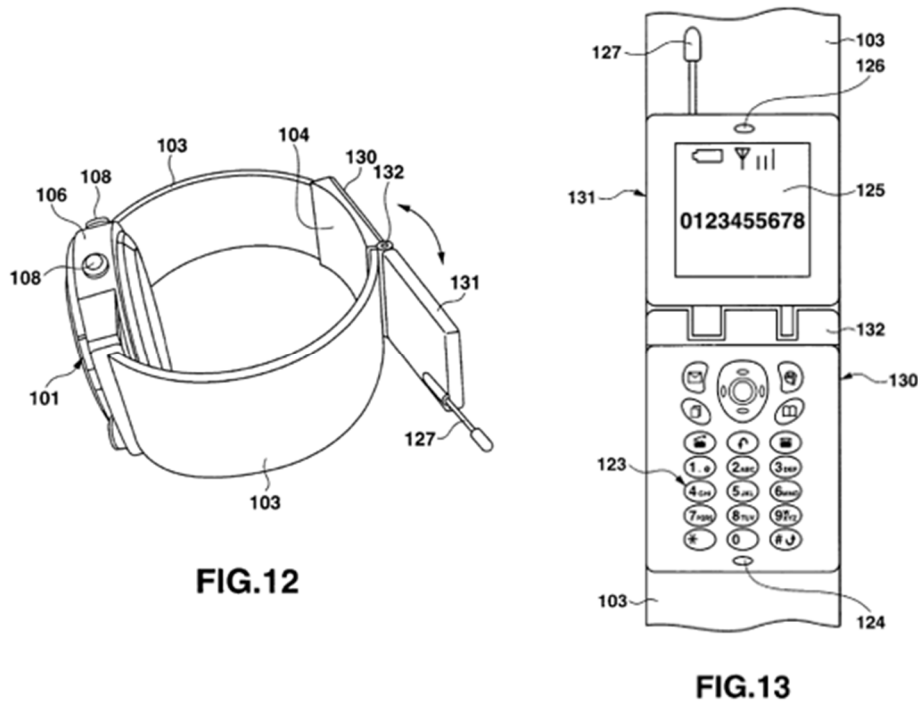


Figure A (based on *Kim*'s disclosure)

In my opinion, persons of ordinary skill in the art commonly used the term “lid” to refer to structures such as the second body 100b. That is, a person of ordinary skill in the art commonly referred to the cover of a folding-type or flip-type electronic device as a “lid.” *See id.*, ¶256 (stating with respect to the embodiment of Figure 15A that “[t]he second body may be referred to as a cover, and the first body may include a display unit to configure a dual-display together with the display unit of the second body”).

175. For example, *Yoshida* is directed to a communications apparatus worn on a user's wrist. Ex. 1020, Abstract.⁹ An embodiment of the "wrist-worn communications apparatus" is described with respect to Figure 12 and Figure 13 of *Yoshida*, which I have reproduced below:



Id., FIGs. 12-13; *see also id.*, 12:53-55 ("Next, referring to FIGS. 12 and 13, a fourth

⁹ I am simply referring to Ex. 1020 (*Yoshida*) to show that it was common for persons of ordinary skill in the art at the time of the alleged invention of the '021 patent to use the term "lid" to refer to structures similar to the second body 100b in the embodiment shown in Figure A.

embodiment of the wrist-worn communications apparatus will be described.”).

Yoshida provides that:

This apparatus has substantially the same structure as that of the second embodiment except that *a lid 131* is connected at one side edge by a hinge 132 to a side (upper edge in FIG. 13) of a communications unit 130 perpendicular to the extending direction of the bands and provided on the band buckle 104 such that *the lid 131 can be turned around the hinge 132* in the extending direction of the bands 103 to open or close the communications unit 130.

Id., 12:58-65 (emphasis added). In my opinion, a person of ordinary skill in the art would have recognized that the *Yoshida*'s embodiment depicted in Figure 12 and Figure 13 has a similar form factor as the embodiment shown in Figure A, wherein the communications unit 130 and lid 131 of *Yoshida* resemble the first body 100a and second body 100b of the embodiment shown in Figure A. Accordingly, *Yoshida* demonstrates that a person of ordinary skill in the art would have understood the second body 100b of the embodiment shown in Figure A to comprise a “lid.”

176. *Griffin* is directed to a mobile communication device comprising a connecting mechanism which rotatably couples a lid member and a base member at

a linked end of the device. Ex. 1021, Abstract.¹⁰ In my opinion, a person of ordinary skill in the art would have recognized that *Griffin* describes a mobile communication device with a similar form factor to the folder-type and watch-type main devices described in *Kim*. For example, Figures 12A-12C of *Griffin* is provided below:

¹⁰ I am simply referring to Ex. 1021 (*Griffin*) to show that it was common for persons of ordinary skill in the art at the time of the alleged invention of the '021 patent to use the term "lid" to refer to structures similar to the second body 100b in the embodiment shown in Figure A.

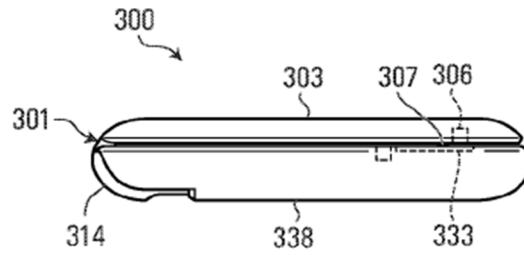


FIG. 12A

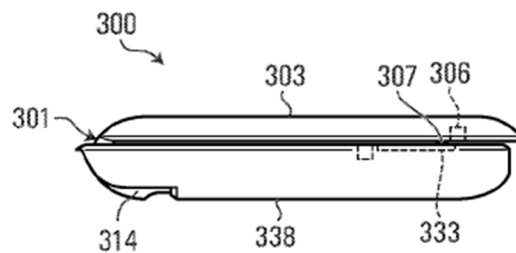


FIG. 12B

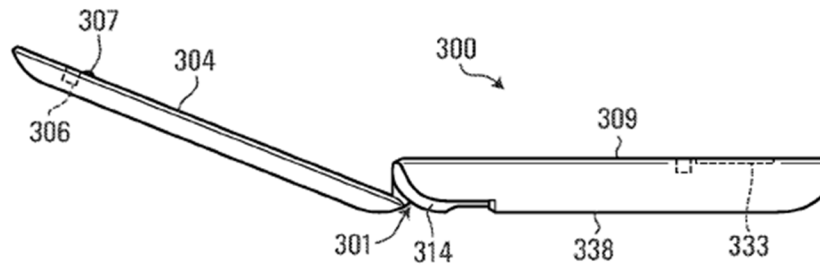


FIG. 12C

Id., FIGs. 12A-12C; *see also id.*, ¶101 (describing device 300 including “a first or lid member 303”); *id.*, ¶105 (describing device 300 including “a second or base member 338”). A person of ordinary skill in the art would also have recognized that *Griffin* describes the mobile communication device having a “first body member”

similar to second body 100b in the embodiment shown in Figure A and a “second body member” similar to first body 100a in the embodiment shown in Figure A.

177. *Griffin* explicitly provides that the first member (which is similar to second body 100b in the embodiment shown in Figure A) is commonly referred to as a lid:

A mobile communication device, such as a “flip phone” or “clamshell” type handheld mobile communication device, may have a linked end and an opposite free end. A flip phone device may include at least a first body member and a second body member which are coupled together at the linked end by a hinge or connecting mechanism such that the device can move between a closed position and an opened position. ***The first and second body members are commonly referred to as lid and base members respectively.***

The lid and base members may commonly include a graphical display and keyboard respectively. The graphical display and keyboard can be on respective inner surfaces of the lid and base members. In the closed position, the inner surfaces of the lid and base members may be adjacent and not accessible to a user of the device. In the opened position, the inner surfaces may be accessible, and the graphical display and keyboard may, therefore, also be accessible to a user of the device.

Id., ¶¶2-3 (emphasis added). *Griffin* also provides that:

It is to be understood that embodiments are not limited to flip phone or handheld mobile communication devices and some embodiments may be directed to other mobile communication devices such as portable computing devices.

Id., ¶37. *Griffin*, therefore, is additional evidence that it was common for persons of ordinary skill in the art at the time of the alleged invention of the '021 patent to use the term “lid” to refer to structures similar to the second body 100b in the embodiment shown in Figure A.

178. *Lylyharju* is generally directed to “a portable electronic apparatus, such as a mobile phone, comprising a body and at least partly covering lid pivotally mounted to the body by a hinge.” Ex. 1022, Abstract.¹¹ Figure 1 of *Lylyharju* is reproduced below:

¹¹ I am simply referring to Ex. 1022 (*Lylyharju*) to show that it was common for persons of ordinary skill in the art at the time of the alleged invention of the '021 patent to use the term “lid” to refer to structures similar to the second body 100b in the embodiment shown in Figure A.

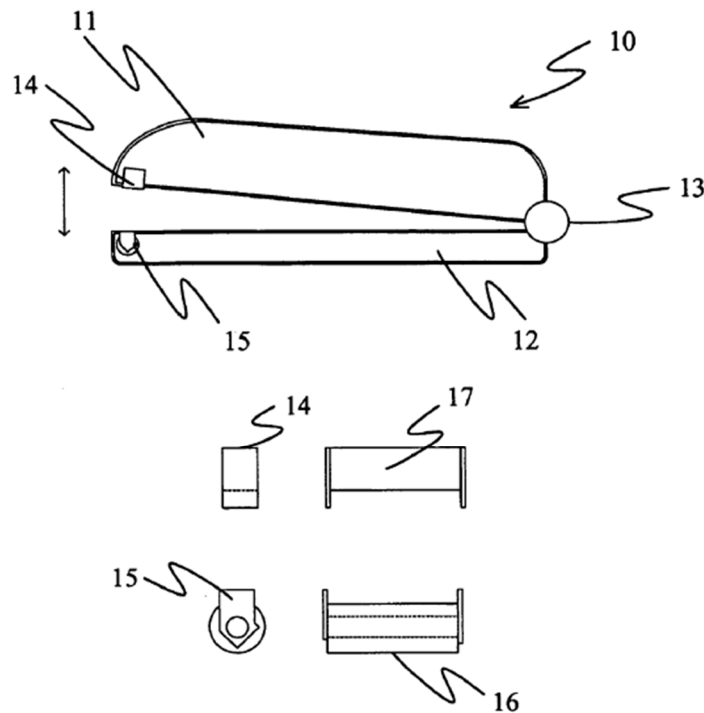


Fig. 1

Id., FIG. 1. *Lylyharju* also provides that:

Mechanical parts for a portable electronic apparatus according to the further embodiment of the invention are depicted in FIG. 1. ***A movable lid 11 is pivotally mounted to the body 12 of the portable electronic apparatus 10 by a hinge 13.*** The apparatus 10 includes an oblong permanent magnet 17 in the edge of lid 11 and is supported by the steel plates 14 from the ends of the magnet 17.

Id., ¶24 (emphasis added). The foregoing passage of *Lylyharju* similarly supports that it was common for persons of ordinary skill in the art at the time of the alleged

invention of the '021 patent to use the term “lid” to refer to structures similar to the second body 100b in the embodiment shown in Figure A.

179. In my opinion, a person of ordinary skill in the art would also have understood the second body 100b in the embodiment shown in Figure A to act as a lid to the first body 100a because, when the second body 100b is closed, it acts as a cover for the first body 100a. Ex. 1010, ¶256 (“The second body may be referred to as a cover.”).

180. Accordingly, *Kim* discloses a watch-type main device (“switching device”) that includes a second body 100b that acts as a cover for the first body 100a (“lid”), and that the second body 100b is connected to the watch-type main device by hinge 100d (“hinge attaching the lid to the switching device.”).

7. Claim 7

a. “The system of claim 6 wherein the lid is recessed to configure to the electronic device.”

181. In my opinion, *Kim* discloses or suggests this feature.

182. As I explained above in Section IX.B.1.a, *Kim* discloses or suggests a system comprising a sub-device 300 detachably coupled to the second body 100b of a watch-type main device using coupling members 510 (*e.g.*, recesses/hooks). As I also explained above in Section IX.B.1.g, *Kim* discloses or suggests incorporating recesses into the second body 100b and hooks into the sub-device 300 to detachably

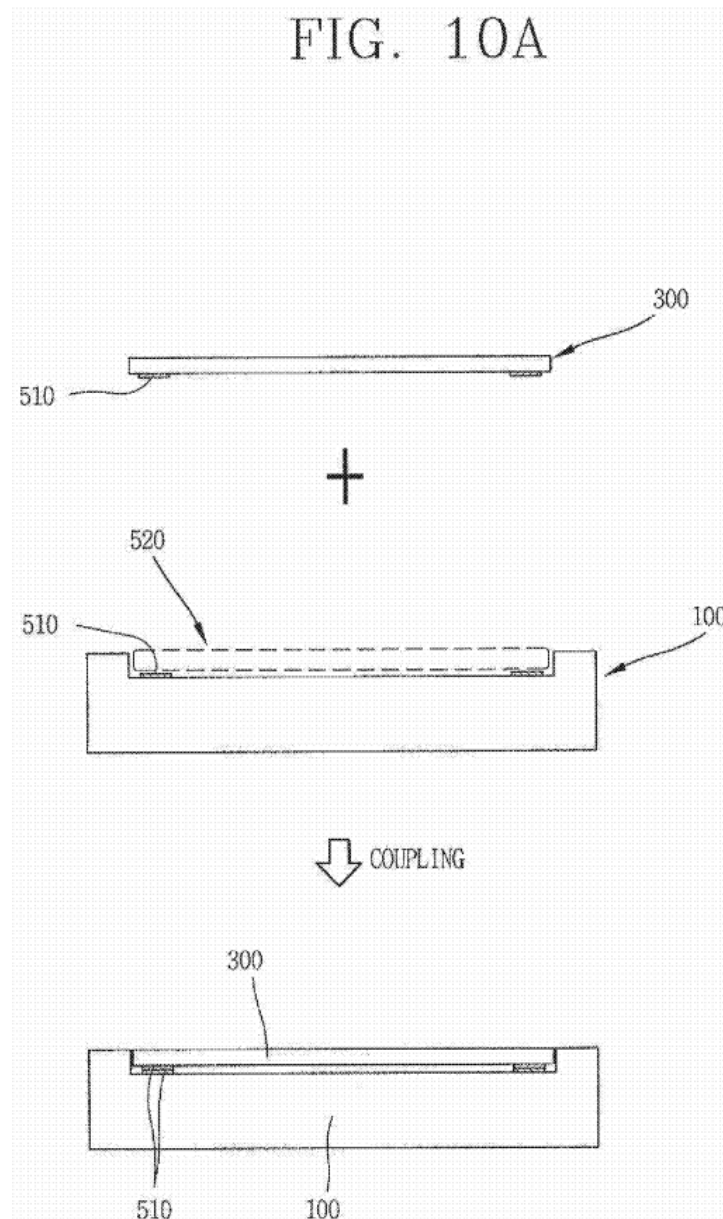
couple the two. And for the reasons I explained above in Section IX.B.6, a person of ordinary skill in the art would have understood the second body 100b in the embodiment shown in Figure A to be the “lid.” Accordingly, *Kim* discloses or suggests main device having a second body 100b (“lid”) including recesses (“is recessed”) that are configured to engage with hooks on the sub-device 300 (“to configure to the electronic device”).

183. In addition to the reasons stated in the preceding paragraph, it would also have been obvious to incorporate a recess in the second body 100b of the main device shown in Figure A that generally conforms to the shape of the sub-device 300. For example, *Kim* discloses the main device including a “recess 520 corresponding to the shape and size of the sub-device,” in which coupling members 510 are used to connect the sub-device to the main device. Ex. 1010, ¶203. More particularly, *Kim* discloses:

Specifically, FIG. 10a is a side sectional view illustrating a coupling method of the main device and the sub-device. As illustrated, coupling members 510 such as a magnet may be respectively attached to one side of the main device 100 and one side of the sub-device 300, to easily couple or separate (i.e., couple or de-couple) the main device 100 and the sub-device. Likewise, the main device may have a recess 520 corresponding to the shape and size of the sub-device, in which a magnet may

be installed. The depth of the recess 520 may vary depending on the design of the main device.

Id. I have reproduced Figure 10A of *Kim* below:



Id., FIG. 10A. A person of ordinary skill in the art would have understood *Kim* to disclose that using a recess 520 in the main device to conform to the shape of and

receive the sub-device remains compatible with using coupling members 510. This is evidenced, for example, from the fact that Figure 10A shows both a recess 520 and coupling members 510.

184. In my opinion, it would have been obvious to a person of ordinary skill in the art to modify the second body 100b of the watch-type embodiment shown in Figure A to further include a recess that generally conforms to the shape of and receives the sub-device 300. A person of ordinary skill in the art would have been motivated to make this combination because it would result in a flush surface between the sub-device 300 and the second body 100b and also results in an overall thinner form factor when the sub-device 300 is coupled to the second body 100b.

185. A person of ordinary skill in the art would have recognized that the second body 100b and sub-device 300 of the watch-type embodiment shown above have the same general form factor as the main device body and sub-device shown in Figure 10A. The combination would have amounted to mere use of a known technique (the main body having a recess configured to the shape of the sub-device as shown in Figure 10A) to improve similar devices (the second body 100b and sub-device 300 of the watch-type embodiment shown above) in the same way (achieve a flush surface when the second body 100b and sub-device 300 are coupled).

8. Claim 8

- a. “The system of claim 6 wherein the lid has a second magnet disposed within it.”**

186. In my opinion, *Kim* discloses or suggests this feature. As I explained in Sections IX.B.1.a and IX.B.1.f, *Kim* discloses or suggests the watch-type embodiment shown in Figure A, in which a second body 100b includes magnets for coupling the sub-device 300 to the second body. As I explained above in Section IX.B.6, a person of ordinary skill in the art would have understood the second body 100b to be a lid. Accordingly, *Kim* discloses or suggests a watch-type main device having a second body 100b (“lid”) having magnets (“a second magnet disposed within it”).

9. Claim 9

- a. “The system of claim 8 wherein the lid is configured to employ the second magnet to secure the lid in a closed position.”**

187. In my opinion, *Kim* discloses or suggests this feature.

188. As explained above in Sections IX.B.1.a, IX.B.6, and IX.B.8, *Kim* discloses or suggests a watch-type main device having a second body 100b (“lid”) including magnets (“magnets disposed within it”). *Kim* further describes that first body 100a and second body 100b of the watch-type main device can be in an open or closed position with respect to each other. *Id.*, ¶256 (“The second body may be

configured to be connected by a hinge 100d to one side of the first body so as to be open or closed.”); *see also id.*, ¶218 (explaining that the main device “may be folded or unfolded regardless of the coupling or separating of the sub-device”).

189. In the watch-type embodiment shown in Figure A, it would have been obvious, in my opinion, to a person of ordinary skill in the art to use one of the magnets in the second body 100b (“lid”) to secure the second body 100b in a closed position with respect to the first body 100a. For example, a person of ordinary skill in the art would have recognized that using one of the magnets in the second body 100b (“lid”) to secure the second body 100b in a closed position with respect to the first body 100a would have prevented the lid from unintentionally opening, for example, from movement of a user’s arm. Furthermore, using one or more magnets in the lid of a folder-type portable electronic device to secure the lid in a closed position was a technique that was well-known to a person of ordinary skill in the art for securing a lid in a closed position.

190. For example, as I discussed above in Section IX.B.6, *Griffin* is directed to a mobile communication device 100 comprising a connecting mechanism which rotatably couples a lid member and a base member at a linked end of the device. Ex.

1021, Abstract.¹² *Griffin* discloses that mobile communication device 100 may include lid member 103 and base member 136, first lid magnet 104 and second lid magnet 106, and first base magnet 132 and second base magnet 134. *See id.*, ¶39 (describing the elements of mobile communication device 100). *Griffin* further provides that:

The magnetic poles of the first lid magnet 104 and the first base magnet 132 are arranged in the lid member 103 and the base member body 136 respectively such that the first lid magnet 104 and the first base magnet 132 are attracted to each other when the lid member 103 and the base member 138 are adjacent and the first lid magnet 104 and the first base magnet 132 are vertically aligned. ...

Thus the first lid magnet 104 and the first base magnet 132 form a pair of retaining mechanism elements which engage to hold the device 100 closed when the device 100 is in the closed

¹² I am simply referring to Ex. 1021 (*Griffin*) to show that using one or more magnets to secure the lid of a folder-type portable electronic device in a closed position was a technique commonly known and well within the technical grasp and common sense of a person of ordinary skill in the art at the time of the alleged invention of the '021 patent.

position. The second lid magnet 106 and the second base magnet 134 are similarly arranged to form a pair of first and second retaining mechanism elements to provide an attractive force.

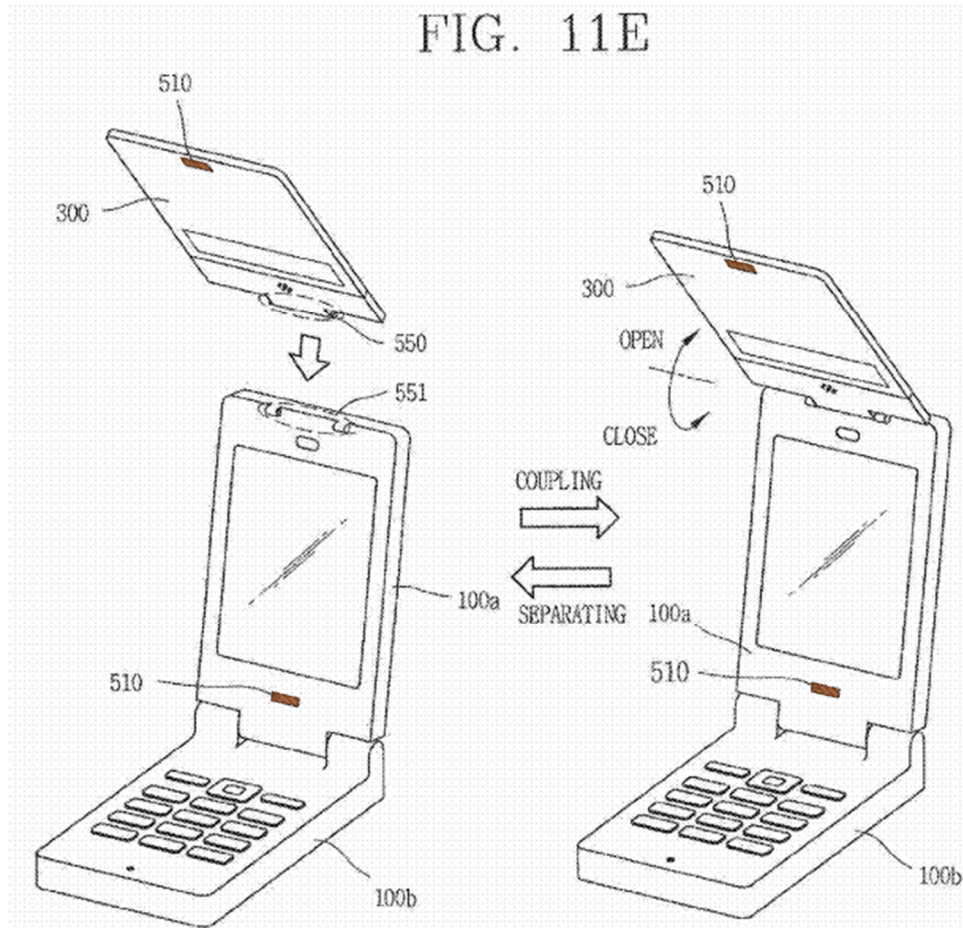
Id., ¶¶81-82 (emphasis added). *Griffin* further discloses that:

The attractive force provided by the first and second lid magnets 104/106 and the first and second base magnets 132/134 is sufficient to overcome the torsional opening force provided by the hinge assemblies 110 (shown in FIGS. 1 and 3) **and the device 100 may, therefore, remain closed without user interaction.** Therefore, the first and second lid magnets 104/106 and the first and second base magnets 132/134 together form two retaining mechanisms which are engaged when the device 100 is in the closed position.

Id., ¶88 (emphasis added). Accordingly, *Griffin* discloses using one or more magnets to secure the lid of a folder-type portable electronic device in a closed position.

191. *Kim* itself also discloses this technique for securing a first body to a second body in a folding-type relationship. More particularly, *Kim* discloses (and illustrates in connection with Figure 11E) that when a sub-device is connected to the main device by hinges, “coupling members 510 may be additionally provided to prevent the [sub-device] from being moved after it is folded.” *Id.*, ¶220. *Kim*’s

Figure 11E showing the sub-device connected to the main device by hinges is provided below:



Id., FIG. 11E (annotated).

192. Notably, a person of ordinary skill in the art would have understood that the coupling members 510 “prevent[ing] the [sub-device] from being moved after it is folded” does not mean that the sub-device 300 is permanently affixed to the main device 100. Such an interpretation would be contrary to the spirit and purpose of the mobile terminal described in *Kim*. See, e.g., *id.*, Abstract (“A mobile

terminal includes a sub-device that is attached thereto or detached therefrom, to remotely control the operation and state of the terminal.”); *id.*, ¶3 (describing the “Field of the Invention” as “a mobile terminal that allows a sub-device to be attached thereto or detached therefrom”); *id.*, ¶9 (“Another object of the present invention is to provide a method for controlling an operation and state of a mobile terminal when a main device and a sub-device of the mobile terminal are coupled or separated.”). Rather, a person of ordinary skill in the art would have understood *Kim* to be disclosing that the coupling member 510 in the embodiment shown in Figure 11E helps to keep the sub-device from unintentionally opening, moving, or “flapping” when the sub-device is coupled to the main device and folded such that the coupling members 510 engage.

193. In my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose using a magnet as the coupling member 510 (brown) in the embodiment of Figure 11E. *Id.*, ¶220 (“The coupling member 510 may include such holder or magnet as described above, and an arbitrary one of any other coupling members as known may be also used as the coupling member.”).

194. A person of ordinary skill in the art would also have recognized that the technique illustrated in Figure 11E could be adapted and applied to secure the second body 100b to the first body 100a when the two were in a closed position. For

example, the coupling between the body 100a and the sub-device 300 is accomplished the same way as the coupling between the body 100a and the body 100b (*i.e.*, using a hinge so that they can be opened or closed in a folding manner). A person of ordinary skill in the art would have recognized that the same technique used to prevent the sub-device 300 from moving after it is folded (*i.e.* coupling members 510 such as magnets) could also be adapted to prevent the body 100a from moving after it is folded over the body 100b.

195. In my opinion, modifying the watch-type embodiment shown in Figure A in the manner well-known in the art and suggested by *Kim*'s Figure 11E, would have been obvious to a person of ordinary skill in the art because it would have amounted to a mere application of a known technique (using a magnet to secure a lid in a closed position) to improve similar devices (the watch-type embodiment shown in Figure A in which the first and second bodies can be folded into a closed position) in the same way (securing the second body to the first body in a closed position using a magnet). The combination would also have been obvious because it amounted to no more than applying a known technique (use of a magnet to maintain a lid in a closed position) to a known device (the watch-type embodiment shown in Figure A in which the first and second bodies can be folded into a closed

position) ready for improvement to yield predictable results (securing the second body to the first body in a closed position using a magnet).

196. I have reviewed claim 9 and note that it does not require that the sub-device (“electronic device”) is coupled to the main device when the “lid” is secured in the closed position. Additionally, in my opinion, a person of ordinary skill in the art would have understood that the main device shown in Figure A can close or open regardless of whether the sub-device 300 is coupled to the main device. More particularly, *Kim* discloses with respect to Figure 11B that “the first body 100a and the second body 100b may be folded or unfolded regardless of the coupling or separating of the sub-device.”). *Id.*, ¶218. *Kim* also discloses a similar folding structure, but in a watch-type form, with respect to Figure 15A (*id.*, ¶256), and this watch-type structure is also depicted in the embodiment shown in Figure A. As I have explained in Section IX.B.1.a, a person of ordinary skill in the art would have understood that *Kim*’s disclosure with respect to the folder-type embodiment could be adapted and applied to the watch-type embodiment. Thus, in my opinion, a person of ordinary skill in the art would have understood that the watch-type embodiment shown in Figure A also folds or opens regardless of whether the sub-device is coupled to the second body 100b or not.

197. Accordingly, a person of ordinary skill in the art would have understood that at least when the sub-device 300 is not coupled to the main device, *Kim* discloses or suggests using a magnet in the second body 100b (“lid”) that interacts with the first body 100a (e.g., an opposite polarity magnet or a magnetically attractable surface in the first body 100a) to secure the second body 100b in a closed position (“secure the lid in a closed position”).

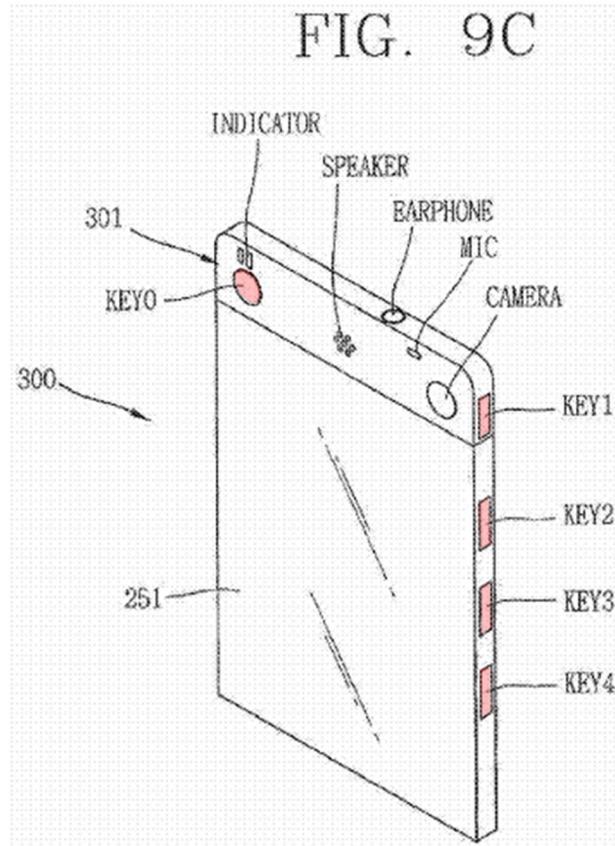
10. Claim 11

- a. “The system of claim 1 wherein the electronic device has a tab or knob configured to be manipulated by an external force.”**

198. In my opinion, *Kim* discloses or suggests this feature. For example, *Kim* discloses that:

As shown in FIG. 9c, the sub-device may include *function keys* (e.g., a hold function, a call transmission/reception function, an MP3 control function, a Bluetooth function, a mouse key function), input units (e.g., a microphone, a camera), and output units (e.g., an audio output unit, an earphone connection unit, a beam output unit for projection, an infrared communication unit) *on its front side or its side portion*.

Id., ¶200. A user manipulates these function keys to perform certain functions on the sub-device. *Id.* Annotated Figure 9C provided below shows these function keys (red) labeled as KEY0 through KEY4:



Id., FIG. 9C.

199. *Kim* further discloses that a user input unit (e.g., function keys KEY0 through KEY4) “may adopt any mechanism of a tactile manner that enables a user to perform a manipulation action by experiencing a tactile feeling.” Ex. 1010, ¶129. Although this discussion is with respect to user input units on the main device depicted in Figure 2 of *Kim*, a person of ordinary skill in the art would have recognized that a function key on a sub-device can include any user input unit that a user may manipulate to perform certain functions on the sub-device. Therefore, in my opinion, a person of ordinary skill in the art would have understood that the

function keys of the sub-device may include a user input unit as described in *Kim*. For example, *Kim* discloses that a user input unit may generate input data responsive to user manipulation of an associated input device or devices, and that “[e]xamples of such devices may include a keypad, a dome switch, a touchpad (e.g., static pressure/capacitance), a jog wheel and/or a jog switch.” *Id.*, ¶87; *see also id.* (“A specific example is one in which the user input unit 130 is configured as a touchpad in cooperation with a display, as will be described below.”)

200. Accordingly, *Kim* discloses or suggests the sub-device (“electronic device”) having keys (“tab or knob”) that can be manipulated by a user (“configured to be manipulated by an external force”).

11. Claim 12

- a. “The system of claim 2 wherein a surface of the first case is composed of a material nonabrasive to the lens.”**

201. In my opinion, *Kim* discloses or suggests this feature.

202. *Kim* is directed to a mobile terminal comprising a main device and a sub-device detachably coupled to each other. *Id.*, Abstract; *see also id.*, ¶181 (“[T]he present invention relates to a mobile terminal including a main device (first device) 100 and one or more sub-devices (second devices) 300a to 300n that can be detachably attached to the main device.”). As I discussed earlier in Sections

IX.B.1.d and IX.B.1.e, *Kim* discloses or suggests that each of the main device and the sub-device comprise a case to enclose and/or protect their respective electronic components. *Kim* also discloses that:

The cases may be formed by injection molding of synthetic resin or may be formed of metal substance such as stainless steel (STS), titanium (Ti) or the like.

Id., ¶126. In my opinion, a person of ordinary skill in the art would have understood synthetic resin to be used to make various forms of plastics. Ex. 1023, 3 (defining “plastics” as “[m]aterials that can be shaped by applying heat or pressure” and noting that “[m]ost plastics are made from polymeric synthetic resins”); *id.*, 5 (defining “resin” as “[a] synthetic or naturally polymer” and noting that “[s]ynthetic resins are used in making plastics”).

203. In my opinion, a person of ordinary skill in the art would also have understood that plastic and metal substances are material that can be used to form surfaces that are non-abrasive to the lens/view screen. In fact, a person of ordinary skill in the art would have recognized that these materials are the same materials the '021 patent identifies as suitable for making non-abrasive surfaces. For example, the '021 patent explains that:

There are available protective cases, often made of leather, rubber, and/or rigid are flexible plastic, that serve to prevent

scratches and blemishes on the primary case and sometimes to impart a bit of shock resistance as well.

Ex. 1001, 6:5-8; *see also id.*, 16:5-14 (making switch/cleaner from “plastic or even metal”). Thus, in my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose making the main device’s case (“surface of the first case”) using plastic or metal which are the same materials identified in the ’021 patent for making surfaces non-abrasive to the lens/view screen (“is composed of a material non-abrasive to the [lens/view screen]”).

12. Claim 13

- a. “The system of claim 3 wherein a surface of the first case is composed of a material nonabrasive to the view screen.”**

204. In my opinion, *Kim* discloses or suggests this feature for the same reasons I discussed above in Section IX.B.11.

13. Claim 14

- b. “The system of claim 4 wherein a surface of the first case is composed of a material nonabrasive to the lens.”**

205. In my opinion, *Kim* discloses or suggests this feature for the same reasons I discussed above in Section IX.B.11.

14. Claim 15

- c. “The system of claim 5 wherein a surface of the first case is composed of a material nonabrasive to the view screen.”**

206. In my opinion, *Kim* discloses or suggests this feature for the same reasons I discussed above in Section IX.B.11.

15. Claim 19

- a. “The system of claim 1 wherein the switching device can be employed to perform at least one function selected from the group consisting of: control volume, pause, play, next slide, switch on, switch off, and combinations thereof; to an electronic device.”**

207. As I discussed above in Section IX.B.1.h, a person of ordinary skill in the art would have understood that *Kim* discloses or suggests a system in which the main device turns the sub-device (or a component, *e.g.*, its display on or off). As such, a person of ordinary skill in the art would have understood that *Kim* discloses or suggests wherein the main device (“switching device”) turns on or off (“can be employed to perform at least one function selected from the group consisting of ... switch on, switch off”) the sub-device or its components (“electronic device”).

C. *Kim* and *Koh* Disclose or Suggest All of the Features of Claim 10

208. I have reviewed *Kim* and *Koh*, and as described below, it is my opinion that the combination of *Kim* and *Koh* discloses or suggests all of the features of claim 10 of the '021 patent.

1. Claim 10

a. “The system of claim 1 wherein the electronic device is wireless earplugs.”

209. In my opinion, *Kim* in combination with *Koh* discloses or suggests this feature.

210. As a preliminary matter, I would like to discuss a person of ordinary skill in the art’s understanding of the terms “earphone,” “headphone,” and “headset.” “Earphone” is typically used to refer to a device that converts electrical energy into sound waves and is worn on or inserted into a user’s ear. A “headphone” also converts electrical energy into sound waves and is typically used to refer to a device that fits over a user’s ear (*e.g.*, completely covers the ears). The difference between earphone and headphone is primarily one of form factor and the user’s preference. As far as the disclosures of the ’021 patent, *Kim*, and *Koh* are concerned, an earphone can have the capabilities of a headphone and vice versa. A “headset” can be an earphone or a headphone, and additionally includes a microphone for receiving audio (*e.g.*, a user’s speech).

211. While these terms have generally understood meanings as I’ve set out above, in my experience, they are not always used precisely. In other words, for example, a person of ordinary skill in the art may use the term “earphone” to refer to a “headset”, or vice versa. In fact, I note that the ’021 patent refers to “Bluetooth

ear plugs” and the claims refer to “ear plugs,” which arguably doesn’t even make sense inasmuch as the term “ear plug” is generally understood to refer to a device designed to block the ear (*e.g.*, to keep out water or sound).

212. For purposes of my analysis here, I don’t consider *Kim*’s or *Koh*’s references to earphones, headphones, or headsets to raise any compatibility or interoperability issues between their respective disclosures. To the extent that the references refer to an earphone or headphone, a person of ordinary skill in the art would have had the knowledge and skill to replace it with a headset if a microphone was also required in the proposed combination. Similarly, to the extent that the references refer to a headset, a person of ordinary skill in the art would have known that a headset could be used as an earphone or headphone, or person of ordinary skill in the art would have had the knowledge and skill to replace a headset with an earphone or headphone if the microphone was not needed.

213. As I discussed above in Section IX.B.1.a, *Kim* discloses or suggests a system comprising a sub-device detachably coupled to the second body 100b of a watch-type main device using coupling members 510 (brown), as depicted below:

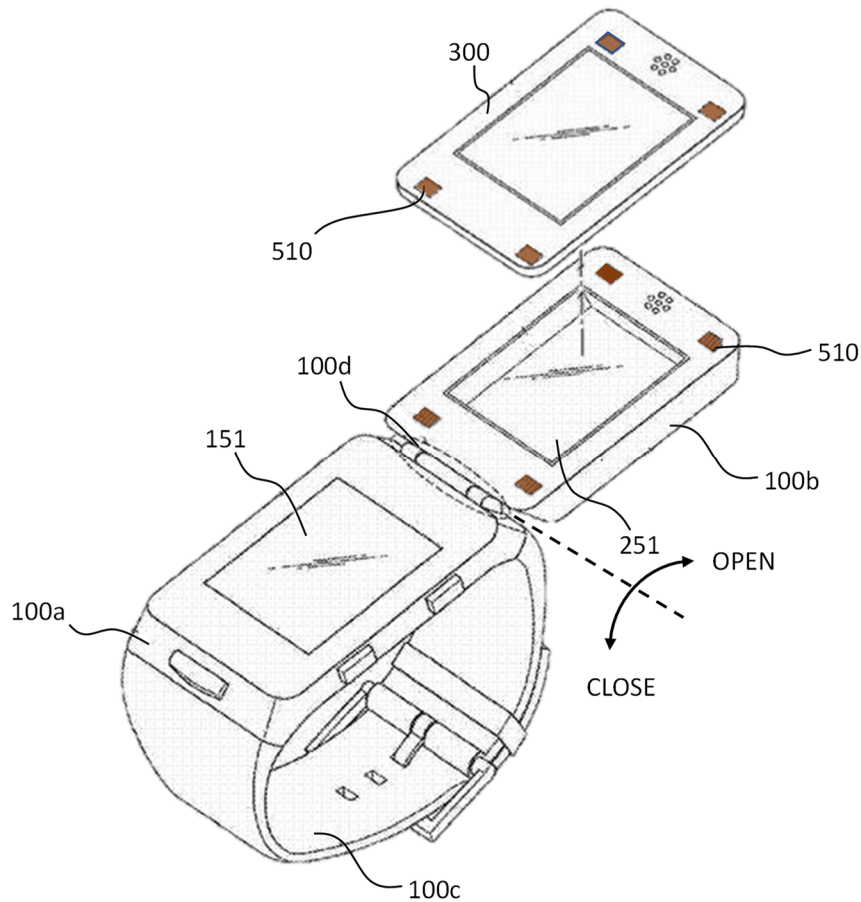


Figure A (based on Kim's disclosure)

214. Kim also discloses that:

In consideration of coupling with the main device 100 or in order to improve portability, *the sub-device 300 may be configured in one of various forms such as necklace, glass, ring, card, ear ring, wrist watch, clip, pen, ear phone, or USB memory stick.* Of course, *in this case, the coupling unit 210 of the main device may be configured to have a structure (or shape) that can attach the sub-device 300 to the interior of the exterior of the main device.*

Id., ¶194 (emphases added); *see also id.*, ¶266 (“In this embodiment, the sub-device is not limited to the clip type, but may have various forms or designs by including the coupling part and an output unit. For example, the sub-device may be configured in the form of ear phones, earrings, or necklaces.”). The foregoing passage of *Kim* discloses that sub-device 300 of *Kim* may come in various forms, including an earphone.

215. *Kim* also discloses, with respect to Figure 9C, that:

[T]he sub-device may include function keys (e.g., a hold function, a call transmission/reception function, an MP3 control function, a Bluetooth function, a mouse key function), input units (e.g., a microphone, a camera), and output units (e.g., an audio output unit, an earphone connection unit, a beam output unit for projection, an infrared communication unit) on its front side or its side portion.

Id., ¶200.

216. *Kim* also discloses earphones that are Bluetooth headsets:

When the first and second bodies 100 and 300 are separated, the controller 180 establishes a short range radio communication path between the two devices 100 and 300. Transmission of a control signal or a data signal between the two separated devices 100 and 300 is made via the established short-range radio communication path. ***When Bluetooth™ is adapted as the***

short-range radio communication method, the first body 100 or
the second body 300 may be used as a Bluetooth headset.

Id., ¶445 (emphases added).

217. Having reviewed the foregoing, a person of ordinary skill in the art would have understood *Kim* to disclose a sub-device in the form of an earphone having an audio output unit. *Kim* further discloses that “one or more sub-devices (second devices) 300a to 300n . . . can be detachably attached to the main device.”

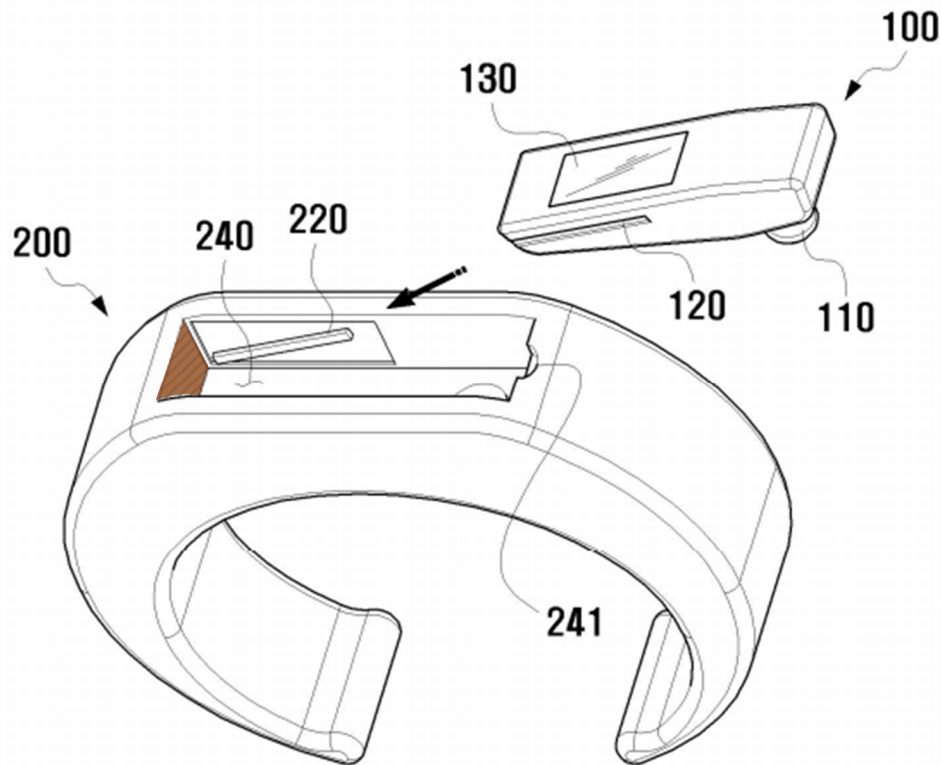
Id., ¶181 (emphasis added). *Kim* also discloses that the sub-device/earphone can be a wireless Bluetooth headset. Accordingly, *Kim* discloses detachably coupling one or more sub-devices in the form of wireless earphones to the main device.

218. Based on the foregoing passages of *Kim*, a person of ordinary skill in the art would have recognized, in my opinion, that *Kim* discloses or suggests an embodiment of the mobile terminal in which a watch-type main device comprises a first body 100a and a second body 100b connected to each other by hinge 100d so that the two bodies can be opened or closed in a folding manner, and wherein the mobile terminal further comprises one or more wireless earphones or headsets (*i.e.*, sub-devices) detachably coupled to the first body 100a or the second body 100b.

219. *Koh* is generally directed to a portable electronic device module comprising “a portable electronic device and an electronic device storage unit.” Ex.

1012, Abstract. *Koh* explains that “[a]n object of the present invention is to provide a portable electronic device module that is easy to couple and convenient to store by sliding and coupling a portable electronic device to an electronic device storage unit.” *Id.*, ¶12.

220. In one embodiment, *Koh* describes the “portable electronic device module” as a wireless headset. *Id.*, ¶27 (“Hereinafter, among portable electronic devices, a wireless headset will be described as an embodiment.”). *Koh* also describes communicating wirelessly using Bluetooth. *Id.*, ¶29 (“The wireless headset 100 comprises a wireless communication module for wireless communication with a portable terminal therein. As the wireless communication method, short-range communication such as Bluetooth and Zigbee may be used.”). *Koh* explains that the “electronic device storage unit 200 comprises a fastening unit to be worn on a user’s wrist” *Id.*, ¶36. *Koh* further explains that “the wireless headset 100 may be coupled to the electronic device storage unit 200.” *Id.*, ¶46. Figure 4A of *Koh*, reproduced below, shows the wireless headset 100 and the electronic device storage unit 200:



Id., FIG. 4A (annotated); *see also id.*, ¶45 (“FIGS. 4A and 4B are drawings showing that a wireless headset is coupled to an electronic device storage unit according to an embodiment of the present invention.”).

221. *Koh* explains that the wireless headset is stored in a compartment (240) formed in the storage unit 200:

The electronic device storage unit 200 is provided with a storage unit 240 capable of coupling a wireless headset. In this embodiment, the storage unit 240 is formed on the top of the electronic device storage unit 200. The storage unit 240 has the same shape as the external appearance of the wireless headset, and is filled when the wireless headset is coupled. A coupling

protrusion 220 is formed on the side of the receiving unit 240. The coupling protrusion 220 is fitted into the guide groove of the wireless headset when the wireless headset is coupled to the receiving unit 240.

Id., ¶37; *see also id.*, ¶¶38-45 (describing further the implementation of the coupling protrusion 220). *Koh* further discloses that:

The coupling protrusion 220 of the electronic device storage unit 200 is positioned slightly obliquely so that the outer end faces upward. ***The wireless headset 100 and the electronic device storage unit 200 are coupled in a sliding manner by inserting the coupling protrusion 220 of the electronic device storage unit 200 into the guide groove 120 of the wireless headset 100.*** Thereafter, when the upper portion of the wireless headset 100 where the speaker unit 110 is positioned is pressed, the coupling protrusion 220 rotates by a set angle. Due to this rotation, the wireless headset 100 is completely fitted into the receiving unit 240 of the electronic device storage unit 200.

Id., ¶46 (emphasis added). Based on the foregoing passages, a person of ordinary skill in the art would have recognized that the coupling protrusion of *Koh* is used to lock the headset in place.

222. *Koh* also discloses that:

The wireless headset 100 may mount a magnet on the insertion surface (a surface indicated by an arrow in FIG. 4A). The electronic device storage unit 200 may mount a magnet on the inner surface (a hatched surface in FIG. 4A) of the storage unit 240. *Each of the magnets has a different polarity and thus attracts the other magnet when the wireless headset 100 is coupled to the electronic device storage unit 200.* Therefore, the user can smoothly engage with little force.

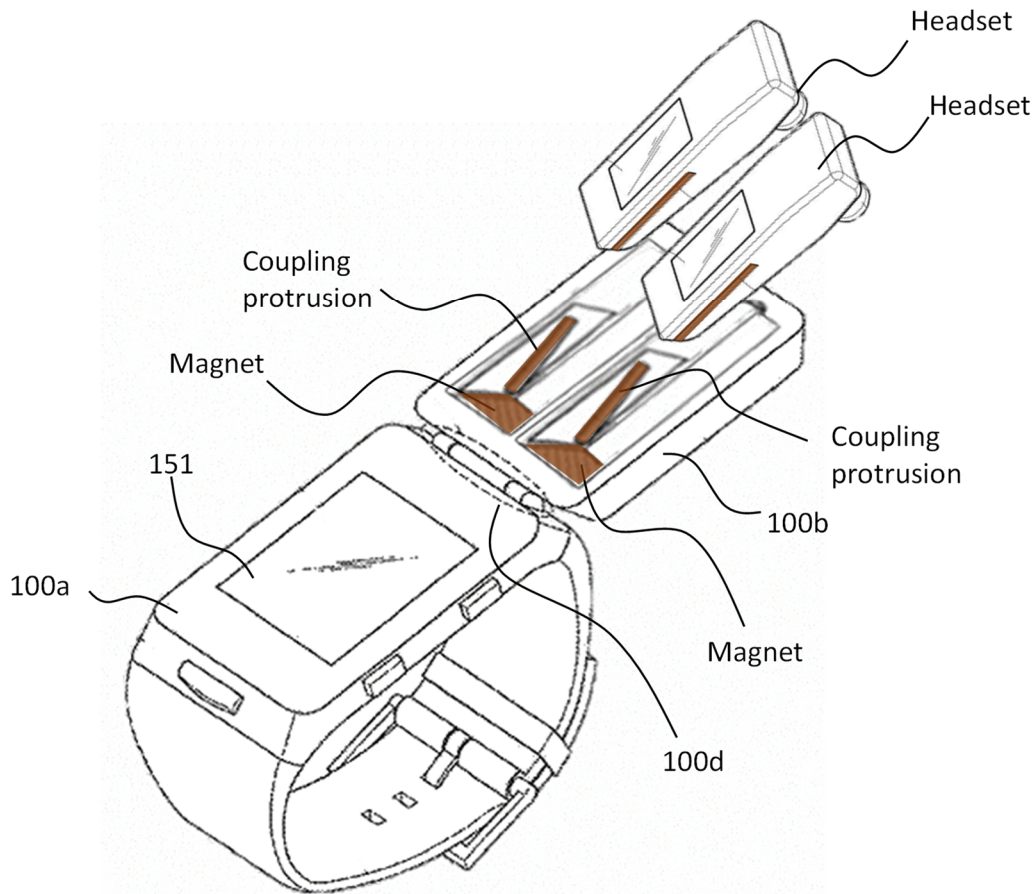
Id., ¶48 (emphasis added). As such, *Koh* describes the storage unit 200 including a magnet in the cross-hatched area of the compartment (240) (brown), and the headset including a magnet of opposite polarity on the surface of the headset. The two magnets attract each other such that “when the wireless headset is coupled to the electronic device storage unit, the magnets may be attracted to one other so as to be coupled.” *Id.*, ¶19.

223. *Koh* further discloses that the wireless headset includes a display unit 130 “typically formed on a surface opposite to the surface on which the speaker unit 110 is formed, so that the user can easily see the display unit 130 from the outside.” *Id.*, ¶33; *see also id.*, ¶30 (“[T]he wireless headset 100 comprises a speaker unit 110, a microphone unit (not shown), a guide groove 120, and a display unit 130, as shown in FIG. 1.”). The display unit can display information, such as connection state, power state, and remaining battery life. *Id.*, ¶33. Furthermore, *Koh* explains that

“when the wireless headset 100 is coupled to the electronic device storage unit 200, the display unit 200 [sic] of the wireless headset 100 displays the current time.” *Id.*, ¶49; *see id.*, ¶20 (“The wireless headset of the portable electronic device module according to the present invention may comprise a display unit. The display unit may display the time once the wireless headset and the electronic device storage unit are coupled.”). Thus, while wearing the electronic device storage unit 200, “the wireless headset 100 can be combined [with the electronic device storage unit 200] and used as a wristwatch.” *Id.*, ¶49.

224. In my opinion, a person of ordinary skill in the art would have recognized *Koh*'s teachings for detachably coupling a wireless headset to a watch-type device to be suitable for use with *Kim*'s watch-type mobile terminal. For example, *Koh* discloses using magnets and complementary protrusions/guide grooves to detachably couple a wireless headset to a watch-type device. Ex. 1012, ¶¶46-48. A person of ordinary skill in the art would have recognized that the coupling techniques disclosed by *Koh* were compatible with and could be adapted and applied to the second body 100b of *Kim*'s watch-type main device in place of the coupling members 510 when sub-device 300 is a wireless earphone and/or a Bluetooth headset. Below is a schematic representation of an example mobile

terminal as a person of ordinary skill in the art would have understood is disclosed or suggested by *Kim* in view of *Koh*:



225. In my opinion, a person of ordinary skill in the art would have understood that in the *Kim-Koh* watch-type mobile terminal shown above, the sub-devices (wireless headsets) detachably couple within a recess in a second body 100b (“lid”) of the main device via magnets and complementary protrusions/guide grooves (brown) as shown above. The main device, in turn, comprises a first body

100a connected to the second body 100b by a hinge 100d so that the first and second bodies can be opened or closed in a folding manner.

226. As I have discussed earlier, *Kim* discloses different interrelated embodiments and mobile terminals having different form factors. *See, e.g.*, Section VII.A. *Kim* also provides a detailed discussion of various functions and capabilities of mobile terminals according to its disclosures. *See, e.g.*, Sections VII.A, IX.B.1.h. These descriptions are sometimes provided with respect to one of the form factors disclosed in *Kim*, but *Kim* explains this is for the sake of brevity. *See, e.g.*, Ex. 1010, ¶¶189, 217, 226, 260. Accordingly, a person of ordinary skill in the art would have understood that the manner in which the main device of *Kim* controls the state and/or operation of the sub-device does not depend on the specific form factor of the main device or the sub-device. In other words, a person of ordinary skill in the art would have understood that in the *Kim-Koh* system, the watch-type main device controls the state and/or operation of the wireless earphone/headset sub-device in the same manner as I have discussed above, for example, in Section IX.B.1.e and Section IX.B.1.h.

Motivation to Combine *Kim* and *Koh*

227. In my opinion, a person of ordinary skill in the art would have found it obvious to incorporate *Koh*'s teachings with *Kim*'s watch-type mobile terminal. *Kim*

discloses detachably coupling wireless earphone(s) to the watch-type main device and configuring the main device to have a structure (or shape) to attach the earphone(s) to the interior of the main device. Ex. 1010, ¶194. *Kim* also discloses the sub-device 300 being a wireless Bluetooth headset. *Id.*, ¶445. However, *Kim* does not provide additional detail regarding how to implement these features. As such, a person of ordinary skill in the art would have been motivated to identify a compatible device and to locate additional detail regarding techniques for detachably coupling earphone(s) to *Kim*'s watch-type main device.

228. In my opinion, a person of ordinary skill in the art would have been motivated to combine *Koh*'s disclosure with *Kim*'s for several reasons. For example, *Koh* discloses a technique for detachably coupling a wireless headset to a device having a watch-type form factor. *Compare* Ex. 1012, ¶¶46-49 (describing coupling and decoupling of the wireless headset and storage device and explaining that when the wireless headset is coupled to the storage unit the combination acts as a wristwatch) *with* Ex. 1010, ¶¶181, 194, 255 (disclosing a main device having a watch-type form factor detachably coupling to a sub-device, such as earphones). *Koh* also provides additional detail regarding how to detachably couple wireless headset(s) to the watch-type main device. Ex. 1012, ¶¶46-49; *see also* Ex. 1010, ¶¶

193-194 (explaining that the earphone sub-device can be “coupled to the main device 100 such that it is inserted into the interior of the main device”).

229. *Koh* also provides abundant motivation to incorporate its technique into other systems, such as the watch-type main device of *Kim*. For example, *Koh* explains that storing portable electronic devices, like a wireless headset, in a bag or pocket increases the risk of loss as the size of the portable electronic device decreases. Ex. 1012, ¶11. Furthermore, the device can be scratched or damaged. *Id.* In my opinion, a person of ordinary skill in the art would have been particularly motivated to incorporate this technique in the context of *Kim*, which expressly discloses that the sub-device may be one or more earphones.

230. In my opinion, a person of ordinary skill in the art would have realized that the combination of *Kim* and *Koh* would have amounted to merely combining known prior art elements (*Kim*'s watch-type main device and *Koh*'s teaching of how to detachably couple a wireless headset to such a device) according to known methods (using magnets and complementary protrusions/grooves, which are discussed in both *Kim* and *Koh*) to yield predictable results (detachably coupling wireless headset sub-devices to the interior of *Kim*'s watch-type main device).

231. In my opinion, modifying *Kim* based on *Koh* in the manner explained above would also have been obvious to a person of ordinary skill in the art because

it would have amounted to applying a known technique (*Koh's* technique for detachably coupling wireless headsets to a watch-type device) to a known device (*Kim's* watch-type device) ready for improvement (*Kim* states that the sub-devices can be earphones and/or Bluetooth headsets but does not explain how to detachably couple earphones and/or headsets to the watch-type main device) to yield predictable results (detachably couple sub-devices that are wireless earphones and/or Bluetooth headsets to *Kim's* watch-type main device).

232. Although *Koh* discloses detachably coupling one wireless headset to the watch-type device, it would have been obvious to a person of ordinary skill in the art to detachably couple two wireless headsets to *Kim's* watch-type main device. For example, *Kim* discloses detachably coupling more than one sub-device to the main device. Ex. 1010, ¶181, FIG. 7. *Kim* also discloses the mobile terminal being a portable multimedia player. *Id.*, ¶69. And *Kim* further discloses a mobile terminal that “implement[s] a stereo function” with two speakers. *Id.*, 135. As such, a person of ordinary skill in the art would have been motivated to detachably couple two wireless earphones/headsets to *Kim's* watch-type device because doing so would permit a user to listen to stereo audio using two earphones/headsets instead of listening to mono audio through one earphone/headset. Incorporating two detachable wireless earphones/headsets into *Kim's* watch-type mobile terminal

would have been well within the skill of a person of ordinary skill in the art as it would have entailed merely implementing *Koh*'s techniques with respect to two wireless earphones/headsets instead of one.

D. *Kim* and *Lee* Disclose or Suggest All of the Features of Claims 16 and 17

233. I have reviewed *Kim* and *Lee*, and as described below, it is my opinion that the combination of *Kim* and *Lee* discloses and/or suggests all of the features of claims 16 and 17 of the '021 patent.

1. Claim 16

a. “The system of claim 1 wherein the first magnet is employed in actuating the electronic circuit.”

234. In my opinion, *Kim* in combination with *Lee* discloses or suggests this feature. As I discussed above in Sections IX.B.1.a and IX.B.1.f, *Kim* discloses or suggests a mobile terminal system comprising a sub-device having magnets (“first magnet”) detachably coupled to the second body 100b of a watch-type main device.

235. More particularly, *Kim* discloses or suggests an embodiment of the mobile terminal in which a watch-type main device comprises a first body 100a connected to a second body 100b via a hinge 100d so that the first and second bodies can be opened or closed with respect to each other, and wherein the mobile terminal further comprises a sub-device 300 detachably coupled to the second body 100b. I

again reproduce below Figure A, which depicts such an embodiment, as a person of ordinary skill in the art would have understood is disclosed by *Kim*.

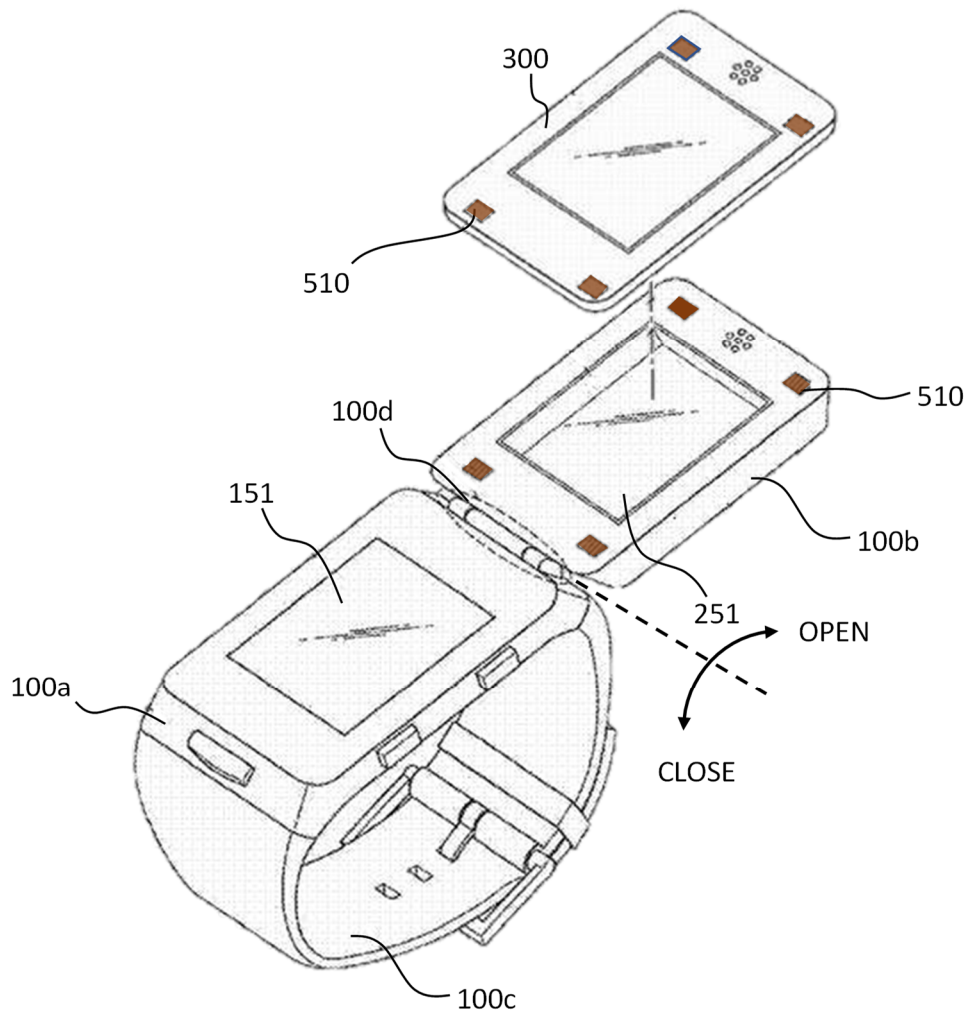


Figure A (based on *Kim*'s disclosure)

236. *Kim* further discloses or suggests that the mobile terminal detects whether the sub-device and the main device are coupled, and changes a state and/or operation of the sub-device based on the detected coupling status, for example, turning the sub-device (or a component, *e.g.*, its display) on or off. *Id.*, ¶¶181-185,

195, 270, 273-276, 299-302, FIGs. 7, 17A-17B, 19A; *see also* Section IX.B.1.h herein.

237. *Lee* is generally directed to “a mobile terminal and a method of providing a graphic user interface using the same.” Ex. 1013, Abstract. *Lee* discloses that the mobile terminal can be, for example, a phone or a personal digital assistant:

The mobile terminal described in the specification can include a cellular phone, a Smart phone, a laptop computer, a digital broadcasting terminal, personal digital assistants (PDA), a portable multimedia player (PMP), a navigation system and so on.

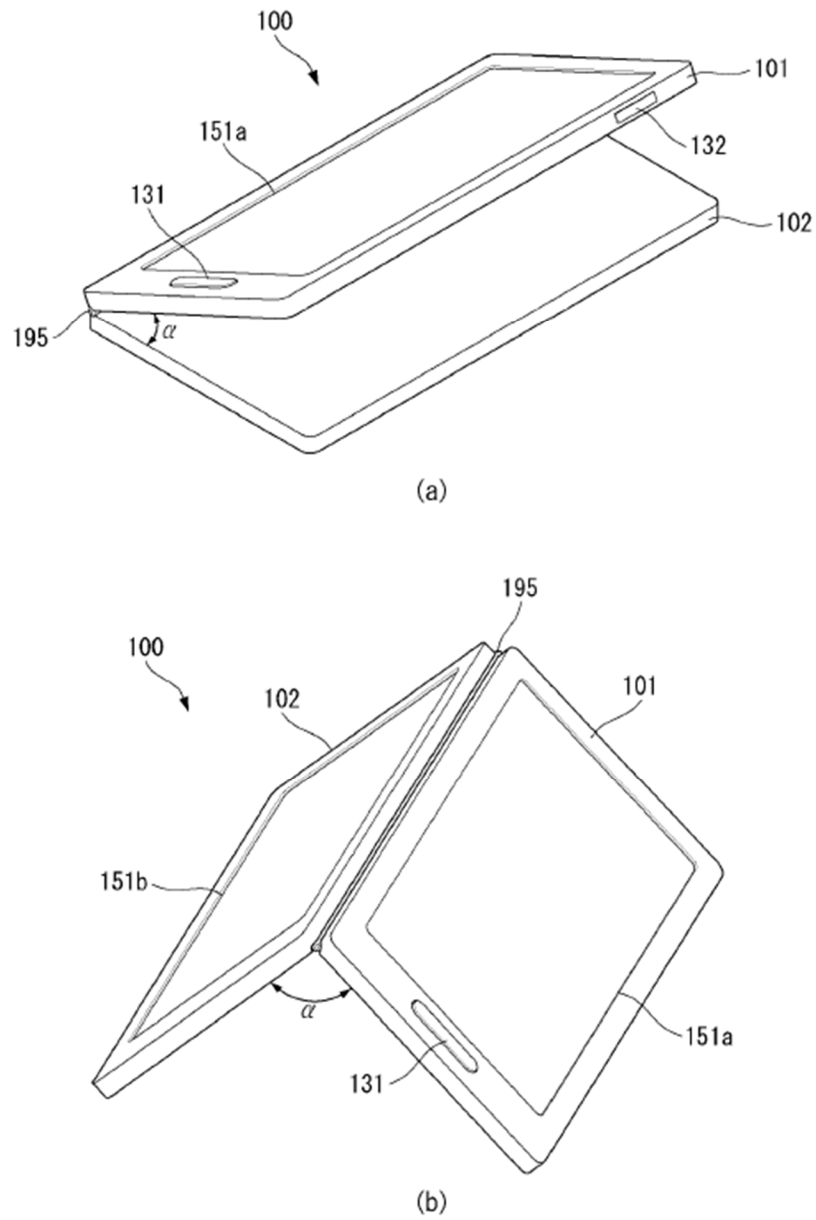
Id., ¶27. *Lee* also describes the mobile terminal, like *Kim*, as having a folder-type form factor:

The mobile terminal 100 includes a first body 101 and a second body 102 which are combined with each other through a combining part 195.

The first body 101 and the second body can be combined with each other in various manners. For example, the combining part 195 can combine the first body 101 and the second body with each other in such a manner that the mobile terminal 100 is folded into the first body 101 and the second body 102.

Id., ¶¶71-72. Figure 3 of *Lee* illustrating the external apparatus of the mobile terminal is provided below:

FIG. 3



Id., FIG. 3.

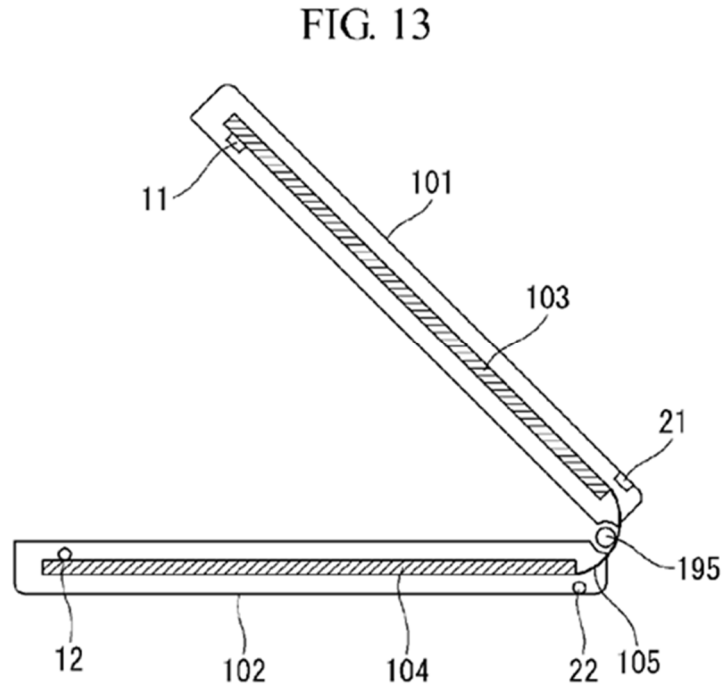
238. *Lee* further provides that the mobile terminal includes a sensing unit 140 to sense whether the mobile terminal is open or closed. *Id.*, ¶28.

[T]he sensing unit 140 senses the current state of the mobile terminal 100, such as an open/close state of the mobile terminal 100, the position of the mobile terminal 100, whether a user touches the mobile terminal 100, the direction of the mobile terminal 100 and the acceleration/deceleration of the mobile terminal 100, and generates a sensing signal for controlling the operation of the mobile terminal 100. For example, the sensing unit 140 can sense whether a slide phone is opened or closed when the mobile terminal 100 is the slide phone. Furthermore, the sensing unit 140 can sense whether the power supply 190 supplies power and whether the interface 170 is connected to an external device. The sensing unit 140 can also include a proximity sensor.

Id., ¶44.

239. *Lee* discloses implementing the sensing unit using a Hall sensor to detect changes to a magnetic field (*e.g.*, based on the proximity of a magnet to the Hall sensor). *Id.*, ¶¶79 (“The sensing unit 140 can include at least one of a hall sensor”). *Lee* further discloses that “a magnet may be used as the sensed element and a hall sensor may be used as the sensing element. The hall sensor outputs a voltage varying with a magnetic field by using hall effect.” *Id.*, ¶119. Figure 13 of *Lee*,

which I have reproduced below, shows the Hall sensor (*e.g.*, sensing element 11) and magnet (*e.g.*, sensed element 12):



Id., FIG. 13; *see also id.*, ¶¶120-122 (describing the implementation of the Hall sensor and magnet to sense, for example, whether the mobile terminal is open or closed).

240. In my opinion, a person of ordinary skill in the art would have understood *Lee*'s Hall sensor to be suitable for use in *Kim*'s mobile terminal system. For example, *Kim* discloses or suggests coupling a sub-device to a main device using magnets, and *Lee* discloses a Hall sensor to detect changes in a magnetic field created by a magnet to determine whether two bodies are coupled to each other. Thus, in my opinion, a person of ordinary skill in the art would have understood the *Kim-Lee*

system to disclose or suggest a watch-type main device with a second body 100b having a Hall sensor to detect the coupling status of the sub-device to the main device by detecting changes in a magnetic field created by the magnet in the sub-device 300. In such a system, changes in the magnetic field created by the magnet in the sub-device (“first magnet”) are detected by the Hall sensor in the second body 100b, causing the sub-device (or a component, *e.g.*, its display) (“electronic circuit”) to turn on (“the first magnet . . . is employed in actuating the electronic circuit”).

Motivation to Combine *Kim* and *Lee*

241. A person of ordinary skill in the art would have found it obvious to incorporate *Lee*’s Hall sensor into *Kim*’s watch-type main device shown in Figure A because *Kim* teaches detecting the coupling status of the sub-device to the main device without providing significant detail how to do this. A person of ordinary skill in the art under these circumstances would have been motivated to identify a system that is comparable to *Kim*’s and to locate additional detail regarding components that can be used to detect the coupling status of the sub-device to the main device.

242. In my opinion, a person of ordinary skill in the art would have been motivated to combine *Kim*’s and *Lee*’s disclosures for several reasons. For example, *Lee* is directed to a system that is comparable to and compatible with the systems disclosed in *Kim*. Compare Ex. 1013, ¶¶27-70 (discussing the structure,

components, and functionality of mobile electronic devices having folder-type and slide-type form factors), *with* Ex. 1010, ¶¶69-122 (discussing structure, components, and functionality of mobile electronic devices, including those having folder-type and slide-type form factors). *Lee* also provides additional detail regarding how to use a Hall sensor and a magnet to detect the coupling status of two bodies Ex. 1013, ¶¶119-121. *Lee* also provides abundant motivation to incorporate its technique into the system of *Kim*. Like *Kim*, *Lee*'s assignee is also LG Electronics, and *Lee* was filed in the same month. Ex. 1010, Cover; Ex. 1013, Cover. Moreover, *Lee* and *Kim* share portions of their specifications. *See, e.g.*, Ex. 1010, FIG.1; Ex. 1013, FIG. 1. In my opinion, a person of ordinary skill in the art would have thus understood that *Lee* provides details for detecting coupling of devices not included in *Kim*.

243. A person of ordinary skill in the art would have realized that the combination of *Kim* and *Lee* would have amounted to no more than the combination of known prior art elements (the mobile system of *Kim* detecting the coupling status of a sub-device to a main device, and the Hall sensor and magnet of *Lee* for detecting the coupling status of two bodies) to yield predictable results (detecting the coupling status of the sub-device and a main device using a magnet on the sub-device and a Hall sensor on the main device).

2. **Claim 17**

- a. **“The system of claim 8 wherein the second or a third magnet is employed in the lid to actuate the electronic circuit.”**

244. In my opinion, *Kim* in combination with *Lee* discloses or suggests this feature.

245. For the reasons I discussed earlier in Section IX.D.1, it would have been obvious to a person of ordinary skill in the art to incorporate *Lee*'s Hall sensor into *Kim*'s mobile terminal in which a sub-device is coupled to a main device using magnets to detect the coupling status of the sub-device to the main device. Further, as explained above in Sections IX.B.1.a and IX.B.8, in the watch-type embodiment shown in Figure A, second body 100b (“lid”) includes magnets (“second or a third magnet ... in the lid”) to detachably couple the second body to the sub-device.

246. In the embodiment of the *Kim-Lee* system I discussed earlier with respect to claim 16, the Hall sensor is deployed in the second body 100b and the magnet that is detected by the Hall sensor is deployed in the sub-device. In my opinion, it would have been obvious to a person of ordinary skill in the art to arrange the *Kim-Lee* system so that the Hall sensor is deployed in the sub-device and the magnet that is detected by the Hall sensor is deployed in the second body 100b. In such an arrangement, the magnet in the second body 100b (“second or a third magnet

. . . in the lid”) is detected by the Hall sensor in the sub-device, causing the sub-device (or a component, *e.g.*, its display) (“electronic circuit”) to activate (“second or a third magnet is employed . . . to actuate the electronic circuit”).

247. In my opinion, incorporating *Lee*’s Hall sensor in *Kim*’s sub-device would have been obvious to a person of ordinary skill in the art as one of two available choices—*i.e.*, Hall sensor in sub-device/magnet to be detected in second body, or magnet to be detected in sub-device/Hall sensor in second body. Furthermore, *Kim* discloses that the sub-device can have the same components as the main device. Ex. 1010, ¶187. Thus, incorporating the Hall sensor in the sub-device in order to employ the magnets in the second body (“second or a third magnet”) in turning on (“actuating”) the sub-device (*e.g.*, its display) (“electronic circuit”) would have been the application of a known technique (using a Hall sensor and a magnet to detect whether two bodies are coupled) to a known device (the watch-type mobile terminal disclosed or suggested by *Kim*) to yield a predictable result (detect the coupling of the sub-device to the main device).

E. *Kim* and *Jiang* Disclose or Suggest All of the Features of Claim 18

248. I have reviewed *Kim* and *Jiang*, and as described below, it is my opinion that the combination of *Kim* and *Jiang* discloses or suggests all of the features of claim 18 of the ’021 patent.

1. **Claim 18**

- a. **“The system of claim 1 wherein the switching device additionally comprises a laser.”**

249. In my opinion, *Kim* in combination with *Jiang* discloses or suggests this feature.

250. As I explained above in Section VII.A, *Kim* discloses the main device including all of the elements shown in Figure 1, including a wireless communication unit 110. Ex. 1010, ¶¶72-73, 182, FIG. 1. *Kim* discloses the wireless communication unit 110 including a short-range communication module 114. *Id.*, ¶73.

251. *Kim* explains that the short-range communication module 114 facilitates short-range communications using, for example, infrared data association (IrDA):

The short-range communication module 114 may facilitate short-range communications. *Suitable technologies for short-range communication may include*, but are not limited to, radio frequency identification (RFID), *infrared data association (IrDA)*, ultra-wideband (UWB), as well as networking technologies such as Bluetooth and ZigBee.

Id., ¶81 (emphases added). *Kim* further discloses that the main device and the sub-device wirelessly connect by using a wireless scheme (*e.g.*, IrDA):

The coupling unit 210 may be configured to mechanically couple the main device and the sub-devices, and the connection unit 230, a block for allowing communication between the main device and the sub-devices, is configured to directly connect the main device and the sub-devices by using a hardware connection terminal (not shown), connect them by using a fixed line such as a cable or a connector, or *wirelessly connect them by using a wireless scheme (e.g., Bluetooth™, IrDA, or the like)*.

Id., ¶183 (emphases added). Thus, in my opinion, a person of ordinary skill in the art would have understood *Kim* to disclose or suggest an IrDA communication module in the main device (“switching device”) and the sub-device (“electronic device”) for wireless communication. A person of ordinary skill in the art would also have known that IrDA communication modules include a light source. Ex. 1014, 1:10-16.

252. *Jiang* is directed to a vertical cavity surface emitting laser (VCSEL) as a light source in an IrDA data link device:

A light source for use in an infra-red data association data link device including a vertical cavity surface emitting laser for emitting a beam of light along a path, and a diverger positioned in the path for diverging the emitted beam of light.

Ex. 1014, Abstract. For example, with respect to Figure 2, *Jiang* discloses:

Light source 20 includes a vertical cavity surface emitting laser (VCSEL) 22 which generates the light signal in the form of a laser beam designated 23. The use of a VCSEL greatly reduces power consumption while enhancing the ability to increase transmission speeds. This will be discussed in greater detail presently. VCSEL 22, in this embodiment, is carried by a conventional TO-head 24 having a base 25 and sidewalls 27. Further description of To-head 24 is omitted as it is well known in the art. VCSEL 22 is mounted on base 25 and enclosed by sidewall 27.

Id., 2:15-25. Figure 2 and Figure 3 of *Jiang* (reproduced below) illustrate embodiments of the VCSEL:

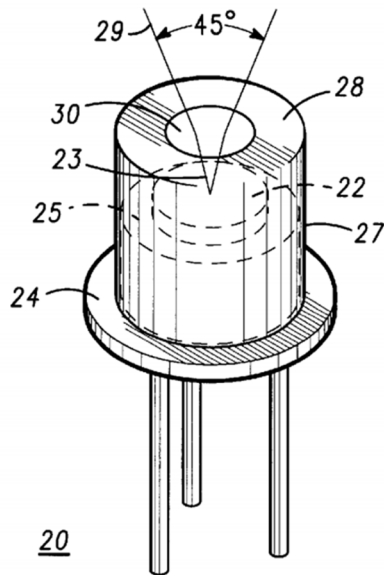


FIG. 2

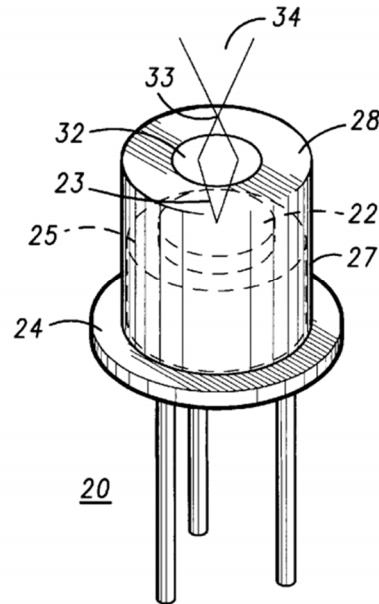


FIG. 3

Id., FIGs. 2-3.

253. In my opinion, a person of ordinary skill in the art would have been motivated to incorporate into the main device and the sub-device an IrDA communication module having a laser light source, such as *Jiang's* VCSEL light source, because *Jiang* explains the desirability of incorporating a laser light source into an IrDA communication module. Specifically, *Jiang* explains that conventional IrDA light sources (*e.g.*, LEDs) are energy inefficient, which is highly undesirable for portable applications:

A very efficient means of transmitting data is by using photonic devices. Currently, infra-red data association (IrDA) data link devices are used, generally in the form of transceivers. The transceivers employ light emitting diodes (LED) as the light generating source. These devices are highly effective, as an LED will generate sufficient light over a sufficiently large area to be easily received by a transmission medium such as an optical fiber.

While using an LED as a light source is effective, an LED is not energy efficient, requiring substantial current for operation. Large power consumption is highly undesirable for portable applications which are becoming increasingly more prevalent.

Id., 1:12:24 (emphasis added). *Jiang* also recognizes that LEDs suffer from slower communication speeds. *See id.*, 1:25-29 (“[A]s data becomes more complex and therefore grows in size correspondingly, higher transmissions speeds are required. Currently LED devices transmit at approximately 115.2 kbits/sec.”).

254. *Jiang* explains that these problem can be mitigated by using a VCSEL with “a diverger positioned in the path for diverging the emitted beam of light.” *Id.*, 1:44-50. For example, *Jiang* explains that:

VCSELs typically generate a beam of light having a very small divergence angle which is unsuitable as the light signals for data

links. A divergence device is used to diverge the emitted light so that it is readily receivable by the downstream element such as a free space medium. The diverger is positioned in the path of the beam, diverging the beam of light as much as 45 degrees.

Id., 2:26-33. *Jiang* also explains that using a VCSEL as a light source in an IrDA communication module can significantly reduce power consumption and improve communication speed:

By employing a VCSEL as a light source in a data link device, energy consumption is greatly reduced. This is extremely important for portable applications. As an example, employing a VCSEL in a light source resulting in a 45 degree viewing angle requires approximately 48 mA assuming slope efficiency of 0.4 W/A. This is a great improvement over the 250 mA pulsed at 30 degree viewing angle for a conventional LED. Furthermore, using a VCSEL in a light source can provide data transmission speeds of 10 Mbit/sec and 100 Mbits/sec.

Id., 2:66-3:8.

255. While *Jiang* describes with respect to Figure 1, a data link that includes a light transmitting device and a light receiving device coupled by a transmission medium such as an optical fiber (*id.*, 1:66-2:7), a person of ordinary skill in the art would have recognized that neither the problems nor the solutions described in *Jiang* are limited to an embodiment using an optical fiber. For example, *Jiang* describes

that the IrDA data link devices “work in a free space medium.” *Id.*, 2:10-13. In my opinion, a person of ordinary skill in the art would have understood operating in a free-space medium to mean operating through the air or through unobstructed space.

256. Additionally, a person of ordinary skill in the art would have understood the IrDA data link devices described in *Jiang* to operate without a fiber-optic cable because *Jiang* also describes using a diverger (e.g., a lens) to increase the divergence angle of an emitted laser light. *Id.*, 2:45-65. A person of ordinary skill in the art would have understood increasing the divergence angle of the laser light would not have been necessary if the laser light was intended to travel through an optical fiber because the light is contained within the fiber. Rather, a person of skill in the art would have understood that a diverger would be necessary when transmitting through free space to widen the light beam in order to increase the area in which it can be received. Accordingly, a person of ordinary skill in the art would have recognized the VCSEL disclosed in *Jiang* to be appropriate for incorporation onto IrDA communication modules intended to communicate through free space (e.g., through the air).

257. In my opinion, a person of ordinary skill in the art would have recognized the desirability of incorporating an IrDA communication module having a laser light source, such as *Jiang*'s VCSEL light source, into *Kim*'s main device and

sub-device because such a module would have mitigated the problem of excessive power consumption and slow transmission speed. Indeed, *Jiang* explains that the VCSEL is ideal for portable use. *Id.*, 1:39-41 (explaining that another objective of the VCSEL “is to provide a new data link light source having a low power consumption making it ideal for portable use”).

258. In my opinion, a person of ordinary skill in the art would have found using IrDA communication modules having a laser light source highly advantageous for wireless communication between *Kim*’s main device and sub-device because of the sub-device’s low power consumption needs and volume of data transmitted between the main device and the sub-device. For example, *Kim* explains that each sub-device 300 may include a battery or “each sub-device may be configured to receive a radio signal transmitted from the main device and generate driving power by itself by using the radio signal as an energy resource, rather than including a weighty and voluminous battery.” Ex. 1010, ¶186. *Kim* also explains:

In a state that the main device 100 and the sub-device 300 are separated, the sub-device 300 according to this embodiment may provide a multimedia reproduction function of the main device 100. To this end, the sub-device 300 may have the function key for reproducing multimedia (e.g., MP3 reproduction), the output unit (e.g., audio output unit, earphone connection unit, etc.) as shown in FIG. 9c.

With the two devices 100 and 300 separated, when the user inputs the MP3 function key, a signal of the inputted function key is transferred to the main device 100 via the connection unit 230. Upon receiving the signal of the function key, the controller 180 establishes a short-range wireless communication path between the two devices 100 and 300.

Thereafter, when a media reproduction and control signal is inputted by the user via the communication path, the controller 180 controls the multimedia player according to the inputted signal and transfers the reproduced music sound to the sub-device 300.

Ex. 1010, ¶¶327-329. As such, *Kim* describes transferring media files between main device 100 and sub-device 300 via “a short-range wireless communication path.

X. CONCLUSION

259. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.



Dated: December 29, 2020

By: _____
Sayfe Kiaei, Ph.D.