

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS, AMERICA, INC.,

Petitioners

v.

CERENCE OPERATING COMPANY,

Patent Owner

Case IPR2024-01267

U.S. Patent No. 9,026,428

**DECLARATION OF JEAN RENARD WARD IN SUPPORT
OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 9,026,428**

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I, Jean Renard Ward, declare that:

I. INTRODUCTION

1. My name is Jean Renard Ward. I have been retained by counsel on behalf of 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 \$500/hour plus actual expenses for my services in this proceeding. This is consistent with the rate I generally charge for this sort of work.

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

4. I expect to make myself available for deposition in this matter. This Declaration is based on information currently available to me. I reserve the right to continue my investigation and study, which may include a review of documents and information that may be produced, as well as a review of deposition testimony from depositions for which transcripts are not yet available or that may yet have taken place in this matter. Therefore, I expressly reserve the right to expand or modify my opinions as my investigation and

study continue, and to supplement my opinions in response to any additional information that becomes available to me, any matters raised by the parties involved or by the Patent Office, and/or other opinions provided by an expert for a party in this matter, or in light of any relevant orders by an appropriate authoritative body.

5. I have been asked to consider whether certain references disclose and/or suggest the features recited in claims 1-3, 7-9, and 12-13 of U.S. Patent No. 9,026,428 (“the ’428 patent”) (Ex. 1001).¹ My opinions are set forth below.

II. BACKGROUND AND QUALIFICATIONS

6. 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 knowledge of handwriting recognition systems, touchscreen operations, programming/coding and mobile devices.

7. 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 experience, is included as Ex. 1003 in this proceeding. The following provides an overview of

¹ Where appropriate, I refer to exhibits which I understand will be attached to the petition for *inter partes* review of the ’428 patent (the “Petition”).

some of my experience that is relevant to the matters set forth in this declaration.

8. I received an SBEE degree (combined program in Electrical Engineering and Computer Science) from the Massachusetts Institute of Technology as a member of the class of 1973.

9. I am a practicing engineer. For approximately the past 30 years, I have primarily been doing consulting projects and contract development work as an independent consultant under the business name of Rueters-Ward Services. I have worked professionally in the general field of software engineering and relevant hardware for approximately 50 years, primarily in pen/touch computing and related technologies, applications of public-key cryptography, and web development. Since 2010, a majority of my consulting projects have concerned pen/touch computing: also referred to simply as pen computing or touch computing. Pen computing refers to computing that makes use of a pen, stylus (including a finger), or other touch-sensitive tool, and a tablet or touchscreen. This is contrasted with computing that makes use of devices such as a physical keyboard or a physical mouse. Pen computing makes extensive use of machine recognition of text handwriting (“on-line handwriting recognition”) and handwritten gestures.

10. During and immediately after my university studies, from 1973 to

1977, I worked at Data General Corporation on compilers and source-level emulation tools for a number of programming languages.

11. For the next approximately 17 years, I worked primarily on various aspects of pen computing, both software and hardware, at a number of development companies. From 1977 to 1987, I was heavily involved in the development of base technology and three generations of pen computing products of Pencept Inc., a pioneering commercial company for pen computing technology that I co-founded. Pencept filed for and was granted a number of patents for my work concerning technologies of tablet/touchscreens and handwriting recognition during that time. My contributions included developing novel techniques for gesture and handwriting recognition, new paradigms for pen-based and stylus-based user interfaces, two generations of an applicative computer language for gesture and handwriting recognition, and engineering solutions to problems with touchscreens and digitizing tablets.

12. While at Pencept, I participated in the re-engineering of off-the-shelf commercial tablets that detected touch from an electronic stylus; the technical evaluation of off-the-shelf tablet technologies, including at least one having transparent touchscreen sensors that responded both to finger touches and to touch by a specialized stylus; and the design of a custom electronic tablet responsive to an electromagnetic stylus.

13. During that time and in the years following, I authored or co-authored a number of peer-reviewed articles concerning pen computing, generative models for handwriting variability, and digitizer/touchscreen technologies and error behaviors. These articles are listed in my CV.

14. In addition, I gave presentations on relevant topics. In 1987, I made presentations concerning gesture input for Pencept and its competitors to the Graphical Kernel System (GKS) and Programmer's Hierarchical Interactive Graphics System (PHIGS) standardization committees for computer graphics systems, and organized and chaired a panel discussion concerning real-world problems of handwriting recognition technology at the 1987 CHI+GI Conference on Human Factors in Computing Systems and Graphics Interface, in Toronto, Canada. In 1990, I presented an invited paper on handwriting recognition at the 1990 International Workshop on Frontiers in Handwriting Recognition in Montreal, Canada. I have also been invited to visit and speak to the research groups in pen computing at a number of major computer technology companies, including IBM in the United States and the AEG-Telefunken Research Center in Germany.

15. In 1989, I joined the Freestyle development group at Wang Laboratories as a Software Architect. Freestyle was a direct-manipulation pen computing system that integrated stylus-based and voice-based input and

annotations. During my tenure there, Wang filed for and later was granted U.S. and international patents for my work on simulating virtual keyboard and mouse input from handwriting and stylus user input on a touch-sensitive tablet. As one of my other contributions, I implemented on-line handwriting recognition into Freestyle technologies. In addition, I was the lead engineer for Wang on a joint hardware project for a low-power, touchscreen product using a capacitive stylus for a line of highly-portable handheld computers.

16. In 1991, I joined Slate Corporation, a company formed to develop pen-centric applications for both the new Pen-Point (GO Corporation) and Pen Windows (Microsoft) operating systems for tablet and touchscreen computers. During that time, I was Slate's representative and the co-chair of a number of meetings involving GO Corporation, Microsoft, and other companies concerning the JOT² cross-platform storage-level standard for compressed electronic ink data, and was the primary author of the first draft for that standard. I made presentations regarding the history of pen computing to technical groups interested in the topic. I also conducted tutorials on touchscreen/pen interfaces and technology at two annual meetings of the

² The term "JOT" was not an acronym, but rather the name chosen by the working group to call the interchange format standard.

Society for Information Display, the leading engineering society for display technologies.

17. From approximately 1993 onward, my professional work has been primarily as an independent developer and consultant in the areas of applications of public-key cryptography and computer security, in addition to pen/touch computing. For example, in 1993, I was a consultant for Termiflex Corporation for an object-based programming language for applications in hand-held touchpad industrial controller terminals. From 1996 to 2008, I consulted or worked for six different companies (e-parcel.com, Siemens-Nixdorf USA, CertCo Incorporated, Digimarc, Cylant Security, Bluesocket, Inc.) involved in the development/design of computer security and/or cryptography, resulting in multiple patent applications. During this time, I also continued to investigate and consult on touch/pen computing, for example, in patent matters.

18. From 2001 to present, the majority of my consulting and expert work has involved touch/gesture-related user-interfaces, including touchscreen integration, multi-touch hardware, touch haptics, touchscreen gestures, styli for capacitive touchscreens, pen-based computers, display hardware, touchscreen materials and fabrication, and capacitive touch sensing technologies.

19. Since the late 1980s (pre-Internet), I have maintained an extensive

library and annotated bibliography of references relating to pen computing, touchscreens, and related technical subjects. I have used this bibliography in preparing technical articles and reports. When the Internet became available in the early 1990s, I began posting my bibliography online. I have continued to expand and publish a working annotated bibliography of these references on the Internet for the past 30 years, which is currently available on my professional web site at www.ruetersward.com. In more recent years, because of my professional work, the bibliography also contains references related to computer security, cryptography, and DRM digital rights management. It has been my usual practice to update the bibliography several times a year or more often, as I have time. The bibliography has been cited in refereed technical papers by others, by the USPTO, and in academic degree theses at such institutions as M.I.T. I have read the references in my bibliography because of my professional work, my intellectual interests, to keep up to date with developments in pen computing and other fields, and/or to record the history of the field.

III. MATERIALS REVIEWED

20. 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 implementation of handwriting recognition systems.

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

- U.S. Patent 9,026,428 (“’428 *patent*”) (Ex. 1001);
- File History of U.S. Patent 9,026,428 (Ex. 1004);
- Certified Translation of JP 2006323502A (“*Arai*”) (Ex. 1005);
- U.S. Patent 5,161,245 (“*Fenwick*”) (Ex. 1006);
- EP0830668B1 (“*Baker*”) (Ex. 1007);
- U.S. Patent 6,636,749 (“*Holmes*”) (Ex. 1008);
- Excerpts from Microsoft Computer Dictionary (5th ed. 2002) (Ex. 1009);
- Excerpts from Merriam-Webster’s Collegiate Dictionary (10th ed. 1996) (Ex. 1010);

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

22. In addition, in Section VII, I provide a brief overview of the state of the art as of October 15, 2012, and cite to the following references that exemplify the state of the art.

- U.S. 5,528,266 (“*Arbeitman*”) (Ex. 1011);
- U.S. Pub. 2011/0310581 (“*Yokote*”) (Ex. 1012);

- RAND REVIEW, Vol. 22, No. 1 (Fall 1998) (“*Rand Review*”) (Ex. 1013);
- Tappert, IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, The State of the Art in On-Line Handwriting Recognition, Vol. 12, No. 8 (Aug. 1990) (“*Tappert*”) (Ex. 1014);
- U.S. 6,005,973 (“*Seybold*”) (Ex. 1015);
- U.S. 7,158,678 (“*Nagel*”) (Ex. 1016); and
- U.S. 5,491,495 (“*Ward* ’495”) (Ex. 1017).

23. 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 having ordinary skill in the art would have understood the claims and the specification of the ’428 patent at the time of the alleged invention, which I have been asked to initially consider as early as October 15, 2012: for convenience, I may refer to this as the Critical Date. My opinions reflect how one of ordinary skill in the art would have understood the ’428 patent, the prior art to the patent, and the state of the art at the time of the alleged invention.

24. It is my opinion that certain references disclose and/or suggest all the features recited in claims 1-3, 7-9, and 12-13 (“Challenged Claims”) of the ’428 patent, as I discuss in detail below.

IV. LEVEL OF ORDINARY SKILL IN THE ART

25. 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 and is aware of 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.

26. 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 ’428 patent in October 2012. Based on my consideration of the factors above, I believe a person having ordinary skill in the art would have had at least a Bachelor’s of Science Degree (or equivalent) in electrical engineering, computer science, or computer engineering, or a related technical field and two years of experience working with handwriting recognition, user interfaces incorporating on-line recognition

technologies, or related technical fields. A greater amount of professional education could compensate for fewer years of work experience, and vice versa.

27. As of October 15, 2012, I met, and in a number of aspects exceeded, the qualifications of a person having ordinary skill in the art. I have also worked with people who fit the qualifications of a person having ordinary skill in the art, and I am familiar with their level of skill in and around the Critical Date. 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

28. My knowledge of the law is that of a lay person. As I am not a legal expert, I offer no opinions on the law. Unless noted otherwise, wherever I use a term that also has a special legal meaning, I am not using it in that context. Further, as I have no special expertise in the law, I am likely unaware whether a term even might or might not have a special legal meaning. However, in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a person having skill in the art.

29. 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.

30. Petitioners' counsel has informed me that the transitional phrase "comprising" as used in a claim's preamble holds a specific meaning within the context of patent claim drafting. More particularly, I have been informed that when this term is used, it means that the claim encompasses not only the listed elements but also allows for the inclusion of other additional elements.

31. Petitioner's counsel has informed me that for the prior art to disclose a claimed limitation inherently, the prior art need not expressly disclose the limitation, so long as the claimed limitation necessarily flows from a disclosure in the prior art. I also understand that it is acceptable to examine evidence outside the prior art reference (extrinsic evidence) in determining whether a feature, while not expressly discussed in the reference, is necessarily present in that reference.

32. Petitioner's counsel has informed me that a patent claim can be considered to have been obvious to a person having ordinary skill in the art at the time the application was filed. I have been informed that 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 having ordinary skill in the art at the time of the invention.

33. I have been informed by Petitioners' counsel 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;
- what differences, if any, existed between the claimed invention and the prior art; and
- any "secondary indicia" of non-obviousness, if they are of record.

34. I have been informed by Petitioners' counsel that a single reference can render a patent claim obvious if any differences between that reference and the claims would have been obvious to a person having ordinary skill in the art. Alternatively, I understand that 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, the following are examples of approaches and rationales that may be considered:

- 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 having 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 having skill 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.

35. I understand that “secondary indicia” of non-obviousness may include certain objective factors, such as: commercial success of products practicing the claimed invention; long-felt but unsolved need; teaching away; unexpected results; copying; and praise by others in the field. These factors are generally referred to as “secondary considerations” or “objective indicia” of

non-obviousness. I understand, however, that for such objective evidence to be relevant to the (non)obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence, and that this nexus must be based on a novel element of the claim rather than something in the prior art. I also understand that even when they are present, secondary considerations may be unable to overcome primary evidence of obviousness (such as motivation to combine with predictable results) that is sufficiently strong.

36. I have been informed by Petitioners’ counsel 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, obviousness may not be determined using the benefit of hindsight, including hindsight derived from the patent being considered.

VI. SUMMARY OF OPINIONS

37. For the reasons I discuss below, it is my opinion that claims 1-3, 7-9, and 12-13 of the ’428 patent are rendered obvious by the prior art.

VII. OVERVIEW OF THE STATE OF THE RELEVANT ART

38. As part of my analysis and review, I have considered what would have been known and understood by a person having ordinary skill in the art as of the Critical Date, which counsel has informed me may be as early as October

15, 2012. In this section, I have provided an overview on the background knowledge of a person having ordinary skill in the art.

39. The following is not intended to provide a narrow definition of any term, but to show the breadth of what a person having ordinary skill in the art would have been aware of and understood in considering the art and teachings of the art. This overview is not exhaustive.

40. For the sake of readability, I have greatly limited the number of exemplary references and teachings. A more complete set of references can be found in my bibliography discussed above, which can be accessed at <https://ruetersward.com/biblio.html>. My bibliography contains hundreds of references relevant to the '428 patent's field of art. I should note that specific citations made within references below are merely exemplary, and in no way do I imply that they are the only relevant teachings in a particular reference, or known in the art, or that they are only found in a single reference.

A. An Overview of Touch Panels, Touch Screens, and Similar Devices

41. A person having ordinary skill in the art would have understood that touch panels and touchscreens broadly include a class of devices that sense a touch or contact in some fashion and produce a useful signal in response.

Touch panel or touchscreen devices are often intended to detect touches by a finger or a special stylus.

42. A person having skill in the art would have been aware of the prior art involving touch panel and touchscreen devices and that at least functionally, they are equivalent devices. For example, a touchscreen can be considered a touch panel integrated with a display. For clarity, I will generally use “touchscreen” to refer to a coordinate-input surface integrated with a display, and “touch panel” to refer to a separate coordinate-input surface that nonetheless may be installed over or integrated with a display as a component of a touchscreen. *See, for example*, Ex. 1011, 3:44-46 (“The combination of the touch panel and display is referred to hereinafter as a ‘touch screen’¹⁹.”); Ex. 1012 ¶[0022] (“The touch screen module 11 is formed, for example, by laying a transparent touch panel 11a on the display section of a liquid display.”). A person having ordinary skill in the art also would have known that touch panels and touchscreens are *both* input devices used to input a position or location through touch on a device. The interchangeability of the terms “touchscreen” and “touch panel” would be understood by a person having ordinary skill in the art.

43. Further, a person having ordinary skill in the art would have known that devices capable of receiving touch input are referred to by a

plethora of terms, such as touchpad, digitizing tablet, touchscreen, touch-sensitive display, touch panel, electronic writing tablet, touch-sensitive surface, stylus input device, electronic whiteboard, electronic pantograph, coordinate-input surface, pen tablet, etc. A person having ordinary skill in the art would have understood how each of these terms are functionally equivalent, such that teachings for one may be applied to the other.

B. Overview of Handwriting Recognition

44. As a first point in discussing handwriting recognition, a person having ordinary skill in the art would have understood both off-line and on-line handwriting recognition. Stated briefly, on-line handwriting recognition is recognition of a string of time-sequential coordinate data (“strokes”) entered on a touch panel or touchscreen. Off-line handwriting recognition is recognition from a static optical image (as in OCR, or optical character recognition). A person having ordinary skill in the art would have understood the techniques and differences of both.

45. A person having ordinary skill in the art also would have been aware of the long history of handwriting recognition using a touchscreen or equivalent, such as with the RAND tablet. The RAND tablet is frequently cited as the first electronic writing tablet for interactive use with a computer. Ex. 1013at 2 (“The ‘RAND Tablet’ was the first two-dimensional writing surface

allowing instant communication with computers.”). The RAND tablet was used in the early 1960s for on-line handwriting recognition. *Id.*

46. A person having ordinary skill in the art also would have understood the prior art’s teachings concerning the parsing or grouping of strokes, and the ambiguities of spacing (e.g., whether two sequential strokes represent a “13” or a “B”). For example, it was well-known that systems would use a time-out period between “the end of a stroke and the beginning of the next” to determine that a character has been completed. Ex. 1014 at 4.

47. Further, it was known that recognition candidates may be shown in a temporary display and sent to an application, in the absence of receiving user input, for example by the candidate sequence having a probability or confidence score above a certain threshold. *See, for example*, Ex. 1015, 4:2-10 (describing that automatic selection of candidate words was “understood in the art,” and explaining that for some applications it was preferable to “select whichever candidate word had the highest likelihood of being accurate”); Ex. 1016, 4:9-16 (describing that for a “confidence level [that] is above the preselected threshold value” it may insert words automatically into the application).

48. In addition, techniques of using a dictionary to correct recognition errors, to improve recognition results, or in computing chained or combined probabilities scores were also well-known in the art. *See, for example*, Ex. 1015,

3:24-25 (“identifying candidate words using dictionary entries), 3:55-65 (developing “candidate words . . . through reference to a dictionary,” to determine the likely input).

49. Further, a person having ordinary skill in the art would have been aware of editing recognition results in a buffer or temporary display—for example, to correct errors, or to select an alternative recognition result from a temporary display list—before sending them to an application. *See, for example*, Ex. 1017, 20:1-3 (“After characters have been recognized, the user can edit the string of recognized characters and can send the string to the application.”); Ex. 1015, Abstract (“The user can charge [sic] the selected word by choosing from the list, or edit the selected word.”), 4:37-38 (allowing “selection (307) by the user of a different word from the list”).

VIII. OVERVIEW OF THE ’428 PATENT

50. The ’428 patent, titled “Text/Character Input System, Such as for Use with Touch Screens on Mobile Phones,” relates to a “system and method for receiving character input from a user,” “disambiguate[ing] the inputs,” storing a “first recognized character” in memory, “display[ing] to the user for editing,” “remov[ing] the first recognize character from” memory after “subsequent input [of] characters,” and “includ[ing] a programmed processor.” Ex. 1001, Abstract.

51. The method involves receiving an input from a user and performing character recognition:

The process begins at block 205 where the *user interface receives a single character input from a user*. As explained in further detail below, the user can create the single character input through one or a series of strokes or input features (e.g., using a finger and/or a stylus on a touch screen interface). At block 210, the process the context text preceding this in the application is changed from “I can” to “I like” then the engine may find a better string candidate in the word “you” instead of “go” and that buffer may be updated accordingly with *200 performs character recognition on the input character* from block 205. Character recognition can take many forms such as, for example, *comparing a best match between one or more strokes/gestures input at a touch-sensitive input device* to a database of recognized characters.³

Id., 4:33-43, *see also id.* FIG. 2.

52. The method further discloses determining a best match, storing it in a buffer and determining whether at least a portion of the sequence “is a committable sequence.” *Id.*, 4:43-50.

[A]fter finding a best match, the process 200 determines whether at least a portion of the sequence in the temporary editable character buffer, which may be presented to the user. . . . *[B]ased on a*

³ I have added all emphases/annotations/color unless I note otherwise.

sequence of one or more characters in the current buffer the process 200 determines whether at least a portion of the sequence in the temporary editable character buffer is a committable sequence.

Id.

53. The '428 patent further describes that “one or more characters can be committed,” by using “elaborate linguistic knowledge” to identify, for example, “the end of one word and beginning of the next without the need to detect a space gesture between two words.” *Id.*, 2:54-62.

54. In addition, the '428 patent discloses that committing a sequence occurs based on linguistic context “as opposed to requiring a user to input a space gesture, select a commit button, or other user input.” *Id.*, 2:56-58.

55. After determining whether a sequence is committable, the sequence “is sent to the current application and removed from the buffer.” *Id.*, 4:58-61. If any characters remain in the buffer, the method will display those characters. *Id.*, 5:1-2.

56. The method continues to repeat these steps so long as a user continues writing. *Id.*, 5:12-16 (“At block 235, the process 200 monitors a character input area for additional text input. If the user continues the writing process, for example, by entering one or more characters, the 15 process 200 returns to block 205 to process the recognition of the additional text entry.”); *see also id.*, FIG. 2. Once no further text is detected, it will “display one or more candidate

sequences” to allow a user to select from those choices. For example, the ’428 patent discloses:

If, however, no further text input is detected, the process 200 at block 240 displays one or more candidate sequences and monitors a candidate display area to receive user input indicative of a selection of one of the candidate sequences.

Id., 5:17-21.

57. While sequences may commit automatically in the manner described above, the ’428 patent also teaches that “the system may employ a time-out feature,” to automatically select a word in the buffer. *Id.* 7:33-36 (“[T]he system may employ a time-out feature, so the user may wait a selected time (e.g., one second) and the system will automatically select the word in the buffer, then clear the buffer.”).

58. These foregoing steps are also shown in figure 2 below. *Id.*, FIG. 2.

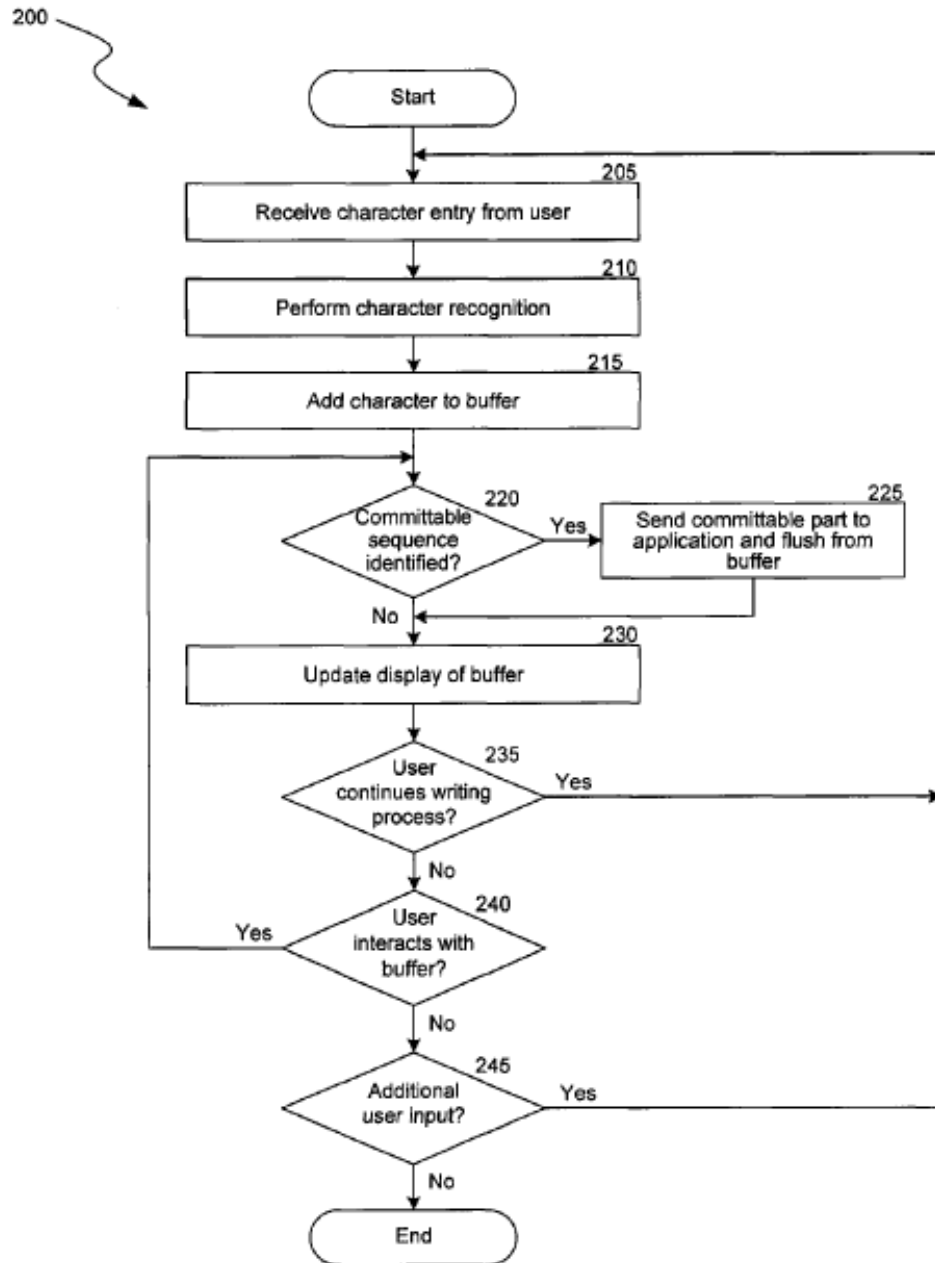


FIG. 2

Ex. 1001, FIG. 2

59. The '428 patent further discloses that in addition to English, it can receive characters “in any number of languages, including Japanese, Chinese,

and/or Korean.” *Id.*, 7:49-51. For these non-English languages, “Chinese, Japanese, and/or Korean dictionaries may also be included.” *Id.* 13:42-43.

IX. OVERVIEW OF THE PRIMARY PRIOR ART REFERENCES

A. Analogous Art

60. I have analyzed the prior art references I discuss in the grounds below, and it is my opinion that they are analogous to the ’428 patent because they are within the same field of endeavor and reasonably pertinent to at least one problem addressed by the ’428 patent.

61. In particular, *Arai* (like the ’428 patent) is directed to techniques for handwriting recognition on a mobile device that uses linguistic tools to determine efficiently and accurately best matches for characters and words corresponding to the user’s handwritten input.

62. *Fenwick* provides a conventional handwriting recognition system that is directed to similar pattern recognition techniques for determining possible word candidates based on dictionary data and linguistic tools like those discussed in the ’428 patent. *Fenwick* further provides implementation details of a temporary buffer storage and removal therefrom as disclosed in the ’428 patent.

63. *Baker* is directed to a conventional handwriting recognition system that teaches the use of a dictionary stored or implemented in a database to recognize characters/words.

64. A person having ordinary skill in the art would have been able to combine these references readily, and have motivations to do so, as discussed below.

B. Arai⁴

65. *Arai* is titled “Information Processing Device and Controlling Method and Program Thereof” *Arai*, (54). *Arai* discloses a “mobile information device, such as a PDA (Personal Digital Assistant), mobile telephone, digital camera, notebook PC (personal computer), or the like” for handwritten character recognition. Ex. 1005 ¶[0022].

66. *Arai* further discloses that it seeks to execute character recognition efficiently and accurately.

The present invention enables the provision of an information processing device, and a control method and program thereof, so as to

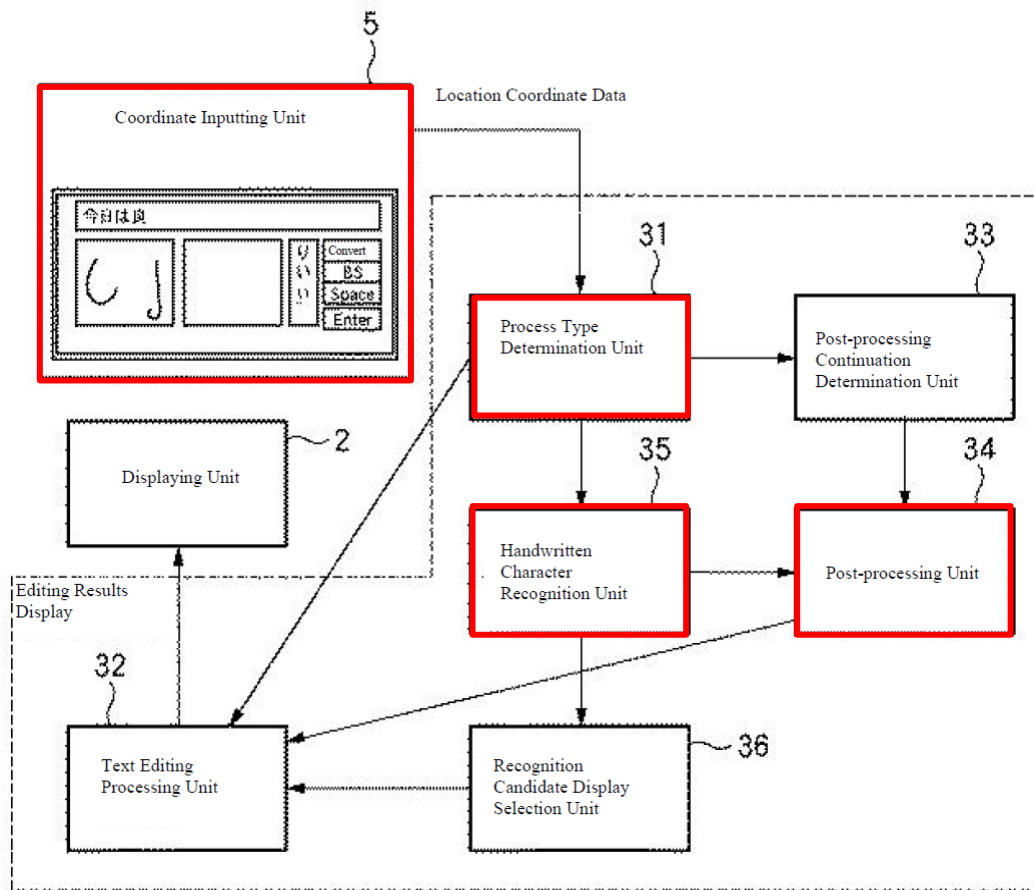
⁴ *Arai* is Exhibit 1005. The version of Exhibit 1005 that I have reviewed is comprised of a first part (page 1) that is the Translator’s Declaration, a second part (pages 2-45) that is an English-language translation of *Arai*, and a third part (pages 46-72) that is *Arai* in its original Japanese language.

be able to execute handwritten character recognition efficiently and accurately.

Id. ¶[0017]; *see also id.* Abstract.

67. *Arai's* Figure 3 (below) illustrates aspects of *Arai's* device and method.

[FIG. 3]



Ex. 1005, FIG. 3 (annotated)

68. Initially, handwritten inputs are received through the “touch panel” on the device’s “coordinate input unit 5.” *Id.* ¶[0032]. *Arai* discloses:

A common transparent resistance film digitizer (known as a “touch panel”) for inputting coordinates, can be achieved through disposing the coordinate input unit 5 overlaying the top face of the display unit 2. The user is able to input stroke data through pressing, with a stylus 3, on the coordinate input surface of the coordinate input unit 5 (the display screen of the display unit 2).

Id.; *see also id.* FIG 3.

69. The device first determines through the “process type determination unit 31” whether the user is pressing a button or inputting handwriting.

In FIG. 3, 31 is a process type determination unit, for determining a process type in response to a range of position coordinate data received from the coordinate input unit 2. Additionally, depending on the identified process type, processing is carried out with the input coordinate data allocated to various processing portions.

Id. ¶[0050]; *see also id.* ¶[0105] (disclosing that the determination of type “is achieved through the process type determination unit 31 of FIG. 3, as described above”).

70. In particular, *Arai* determines handwriting inputs, when a user enters strokes into regions 67a and 67b of area 67, in which switching between 67a and 67b indicates that the input stroke relates to a new character. *Id.*

¶[0096]-[0099] (discussing characters being entered alternately between regions 67a and 67b). Specifically, *Arai* discloses:

For example, when a “㇏” is *written into the area 67a followed by writing the first stroke for forming “天” in handwriting in area 67b*, the input of “㇏” in area 67a is confirmed and the recognition process on this “㇏” is commenced. Here, at the instant that recognition of the “㇏” has been completed, the first candidate for the recognition result of “㇏” will be displayed in the input character buffer area 61, and at that instant the strokes of the handwritten character that have been inputted into the area 67a will be erased.

Id. ¶[0096].

Processing is next carried out for area 67b. At the instant that inputting of the handwritten strokes for forming the character “天” has been completed, then, if there is a subsequent character to draw and drawing of this subsequent character is started in the area 67a, the recognition process on “天” is commenced.

Id. ¶[0097].

On the other hand, *if there is no subsequent character to input, then at the instant that a prescribed time interval* (the pen-up time) has elapsed after the moment at which the stylus 3 (for example, pressing) was operated, *it is confirmed that inputting of the “天” has been completed*, and the recognition process is carried out.

Id. ¶[0098].

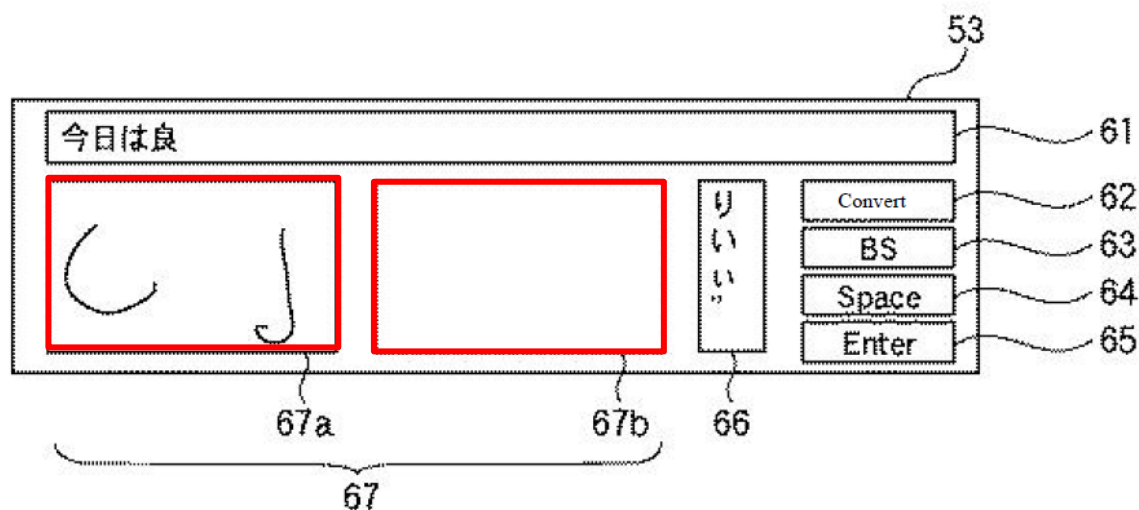
Given this, at the instant that the recognition process for “天” has been completed, the first candidate for the recognition result for “天” will be displayed on the right side of the character that is the recognition result for “㇏” in the input character buffer area 61, and *the*

handwritten strokes that form the public “天” character in area 67b will be erased.

Id. ¶[0099].

71. In addition, *Arai* explains that “[f]or the position coordinate data for the strokes for a single character that is to be recognized, stroke data that is inputted into the respective areas, through areas 67a and 67b in the handwritten character input area 67 of FIG. 6, are inputted as stroke data for a single character.”). *Id.* ¶[0140], FIG. 6 (below).

[FIG. 6]



Ex. 1005, FIG. 6 (annotated)

72. After receiving a handwritten input, *Arai*’s “handwritten character recognition unit 35” compares the handwritten input to a “reference character dictionary data within the recognition dictionary.” *Id.* ¶[0055] (“35 is a handwritten character recognition unit, which receives, from the process

type determination unit 31, a position coordinate data string⁵ for the handwritten character, to output candidate character codes through a process of matching with reference character dictionary data within the recognition dictionary.”).

73. This process of inputting and recognizing characters is repeated for each handwritten input. For example, as long as a user enters characters into regions 67a and 67b of area 67, the system will continue to receive those inputs and recognize those characters. *Id.* ¶¶[0096]-[0099] (described above).

74. After the initial recognition, a “post-processing unit 34” receives a string of characters for further evaluation. Ex. 1005 ¶¶[0113]-[0114]. For example, *Arai* discloses:

Following this, candidates for a first candidate through fourth candidate other than the inputted handwritten character are determined, in the sequence of the reference character dictionary data with the highest degree of matching of the distinctive features, through a process of matching the distinctive feature data and the standard character dictionary data (standard character distinctive feature data) within the

⁵ A person having ordinary skill in the art would have understood *Arai* to use “position coordinate data string” synonymously for data of a sequence of one or more strokes.

recognition dictionary. Given this, the character codes that correspond respectively to *the first candidate through fourth candidate that have been determined, and the evaluation value for the degree of matching, are passed to the post-processing unit 34.*

Id. ¶[0113].

The post-processing unit 34 determines, from the character candidate strings, which comprise the character codes and the evaluation values for the recognition candidates, *the combinations that have the highest chain probabilities between the character strings*, to change the display within the input character buffer area 61 to display the combination with the highest value as the first candidate.

Id. ¶[0114].

75. *Arai* also discloses that the post-processing unit 34 uses “post-processing dictionary data (dictionary data for chain probability calculation).”

Id. ¶[0027] (“ROM 8 stores . . . post-processing dictionary data (dictionary data for chain probability calculation), various types of table and setting data, and the like.”). *Arai* explains that the post-processing unit determines whether characters should be “linked together.”

34 is the post-processing unit. Here post-processing is carried out, in particular, by the character string unit, and an algorithm that is similar to the algorithm taught in Japanese Unexamined Patent Application Publication H10-198759, for example, may be used. Specifically, an inputted handwritten character string recognition candidate is determined *through considering the probability that the characters in the candidate character string*, recognized by the handwritten

character recognition unit 35, *are linked together, and considering the degree of match* with reference character dictionary data within the recognition dictionary.

Id. ¶[0053].

76. The post-processing unit 34 will select the candidate with the highest probability of being correct and display the resulting text to the user. *Id.* ¶[0114] (determining “the combinations that have the highest chain probabilities between the character strings, to change the display within the input character buffer area 61 to display the combination with the highest value as the first candidate”).

77. *Arai* also discloses “a text editing processing unit” allowing for the modification of character strings. For example, *Arai* discloses:

32 is a *text editing processing unit, which executes editing processes* on a text character string obtained from the handwritten character recognition unit 35, such as *deletion, kana-kanji conversion, insertion into a character input area of an application*, and the like.

Id. ¶[0051].

78. To insert a character into an application, *Arai* discloses “a handwritten character input utility program” for “an electronic mail application that runs on the mobile information device” (*id.* ¶ [0068]), but also discloses that the invention could equally apply to “other application programs” (*id.*

¶[0069]). *See also Id.* ¶¶[0070]-[0071] (disclosing an area for inputting text into

“electronic mail” using a “handwritten character input utility program”), [0072]
(using a “handwritten character input utility program” to “input text into an
arbitrary application program”).

79. *Arai* further teaches that the “Enter Key button” can be used to
send character strings to applications.

If a character string is displayed in the input character buffer area 61
and this *button 65 is pressed* using the stylus 3, this character string
is confirmed and *the character string is inserted to the right side of
the cursor that is displayed in the application*. On the other hand, if
no text is present in the input character buffer area 61, a line break
code is inserted on the right side of the cursor that is displayed in the
application, and the cursor is moved to the next line.

Id. ¶[0091].

C. *Fenwick*

80. *Fenwick* is titled “Pattern Recognition System Having Inter-Pattern
Spacing Correction.” Ex. 1006, (54). *Fenwick* discloses a system of pattern
recognition that determines where to place spaces between inputted individual

characters to create words. Input may be done using an electronic writing tablet.⁶

81. *Fenwick's* system comprises receiving characters, storing characters in a buffer, determining if the buffer contains an actual word, deleting buffers that do not match the beginning of a known word, and repeating these steps:

The pattern recognition system of the preferred embodiment of the present invention recognizes words and determines where to place spaces between those words by (a) ***storing each input character in one or more buffers in memory***, (b) ***comparing*** the last entry of each buffer ***against a dictionary of known words***, (c) copying last entries which match words to new buffers and placing a space after the last entry in the old buffer, (d) ***deleting a buffer*** when a last entry from that buffer does ***not at least match the beginning of a known word*** in the dictionary, (e) ***repeating steps (a) through (d)*** until all of the buffers have been deleted or until an end character, such as a carriage return or period has been stored in each buffer, (f) again comparing the last entries from each buffer to the dictionary and deleting any buffer having a last entry which is not a known word in the dictionary

⁶ I note that while *Fenwick* does not use the term “touchscreen,” referring instead to an “electronic writing tablet” and a “display screen.” These were functionally equivalent, as discussed above in §VII.A.

or which does not end with a space followed by an end character, and
(g) *saving and/or outputting the remaining words*.

Id., 2:45-63.

82. In addition, anytime during this process, if the same word appears in all the buffers, the system determines the word to have “been positively identified.” *Id.*, 2:63-65 (“ Common words which appear in each buffer, and *have therefore been positively identified*, can be saved or output to reduce the size of each buffer at any point in the process.”).

83. For positively identified words, *Fenwick* teaches that it deletes the common words from the buffers and outputs to an output device. For example, *Fenwick* discloses:

If there are no more old buffers to check, block 78, the system looks to see *if there is any word*, which is not a last entry, *which is common to all of the remaining buffers*, block 84. *If there is such a word*, then that *word has been properly identified* and can be saved with its appended blank space in memory, block 86. After saving the word and blank space, both are *deleted from each of the buffers, block 88*. The word and blank space are *then output to the output device, block 90*, and the new buffer designations are removed so that these buffers can be checked by the system during its next pass. At this point, or if there was no word common to all of the buffers from block 84, the process is ended, block 92, until the next character is selected from memory.

Id., 6:26-30; *see also id.*, FIG. 4 (blocks 88, 90).

84. In this way, *Fenwick's* system determines final words, sends them to an output device, and removes them from the buffer once sent.

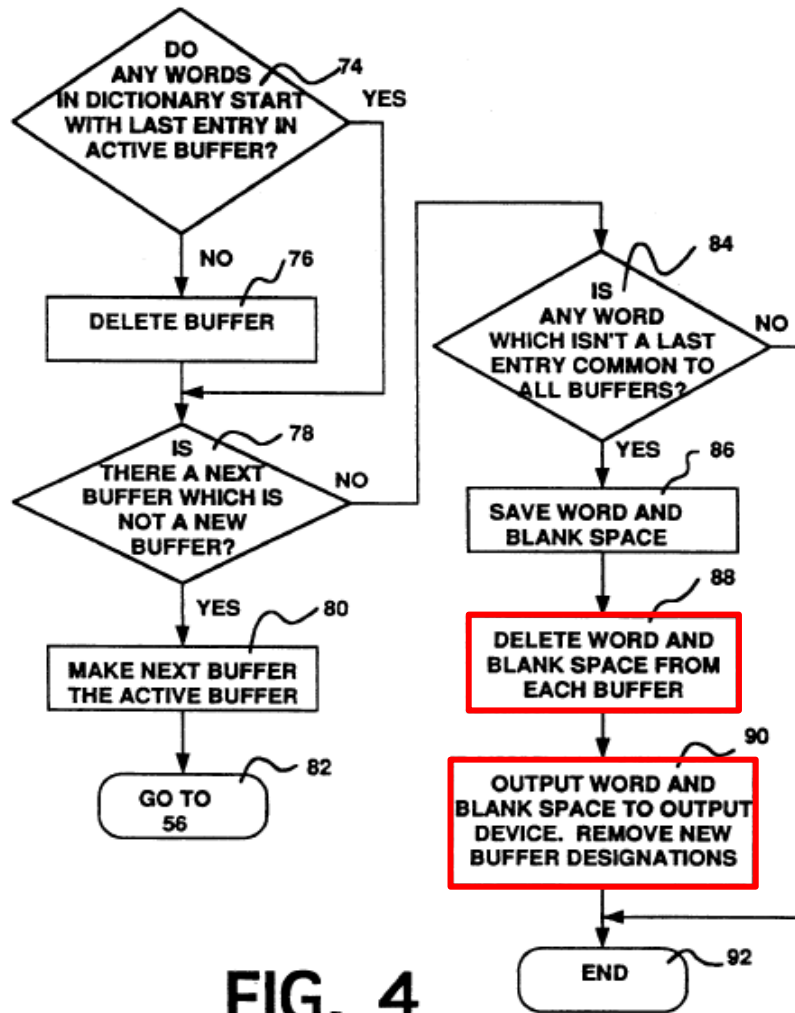


FIG. 4

Ex. 1006, FIG. 4 (annotated)

X. CLAIM CONSTRUCTION

85. For the purposes of my analysis, I have given all the claim terms their plain and ordinary meaning, as would have been understood by a person

having ordinary skill in the art at the time of the alleged invention, which I understand is October 15, 2012, having taken into consideration the language of the claims, the specification, and the prosecution history of record. I reserve the right to respond to any construction questions that may be raised in this matter.

XI. SPECIFIC GROUNDS FOR OBVIOUSNESS

A. GROUND 1: *ARAI* IN COMBINATION WITH *FENWICK* RENDERS OBVIOUS CLAIMS 1-3, 7-9, AND 12-13

86. In the sections below, I explain in detail how claims 1-3, 7-9, and 12-13 of the '428 patent are obvious in view of *Arai* in combination with *Fenwick*.

1. Claim 1

a. I[pre]: “A method for data input on a touchscreen of a mobile device, the method comprising:”

87. I understand that “[a] method for data input on a touchscreen of a mobile device, the method comprising” is the preamble to claim 1 of the '428 patent. I have been asked to assume that the preamble is a claim limitation. Under that assumption, in my opinion, *Arai* discloses or suggests “[a] method for data input on a touchscreen of a mobile device.”

88. For example, *Arai* discloses:

The present invention relates to an information processing device and controlling method and program thereof for *inputting stroke data* of a

handwritten character and performing character recognition, and executing post-processing in relation to the character recognition result. Ex. 1005 ¶[0001]; *see also id.* Claim 9 (disclosing a “controlling method . . . comprising: an input step for inputting the stroke data”).

89. In addition, *Arai* discloses “***a mobile information device, such as a PDA (Personal Digital Assistant), mobile telephone***, digital camera, notebook PC (personal computer), or the like” for performing the method of the invention. *Id.* ¶[0022]; *see, for example, id.* ¶¶[0021] (“FIG. 2 is a diagram depicting a hardware structure for a mobile information device that functions as the character recognition device according to the first embodiment according to the present invention.”). In fact the disclosure of a “mobile information device” is ubiquitous in *Arai*’s specification. *See, for example, id.* [0023]-[0025], [0027]-[0028], [0030], [0034]-[0035], [0046]-[0049] (disclosing the hardware configuration of a “mobile information device”).

90. A person having ordinary skill in the art would have understood that PDAs were mobile devices that generally employed touch screens. For example, the Microsoft Computer Dictionary includes in its definition of PDA that “[m]any PDA devices rely on a pen or other pointing device for input instead of a keyboard or mouse.” Ex. 1009 at 5.

91. Further, a person having ordinary skill in the art would have understood that a touch screen as discussed in the '428 patent and as recited in claim 1 referred to a computer screen designed or modified to recognize the location of a touch input on its surface. For example, the Microsoft Computer Dictionary defines “touch screen” as:

[a] computer *screen designed or modified to recognize the location of a touch on its surface*. By touching the screen, the user can make a selection or move a cursor. The simplest type of touch screen is made up of a grid of sensing lines, which *determine the location of a touch by matching vertical and horizontal contacts*.

Ex. 1009 at 7.⁷ The '428 patent's references to a touch screen are consistent with this understanding of the term:

“[T]he user can create the single character input through one or a series of strokes or input features (e.g., *using a finger and/or a stylus* on a touch screen interface).”

Ex. 1001, 4:35-38.

⁷ To be clear, here and throughout my declaration, I use the Microsoft Computer Dictionary (Ex. 1009) as evidence of what would have been known to a person having ordinary skill in that art and/or the state of the art. I am not using the Microsoft Computer Dictionary as part of the unpatentability grounds.

The recognition engine 613 receives user input data from the operating system, including data related to a user's input with the touch screen 603, and uses the received input data to identify a committed character sequence (e.g., one or more words), which it may provide to an application program. For example, the recognition engine 613 may receive a series of notifications from the operating system 611 of finger down events (when a user depresses a point on the touch screen), finger move events (e.g., when a user moves his finger while depressing the screen), and finger up events (e.g., when a user lifts their finger from the touch screen). (*While generally described herein as using a finger, the user may use anything to touch or actuate the touch screen, such as a stylus.*) Each of the received notifications may include *a time series of position data, e.g., an X-Y set of coordinates (x, y)* with a timestamp *t* (i.e., the coordinates (x, y, t)), which reflect the user's tactile input to the touch screen 603. Additionally, if the touch screen 603 comprises pressure sensors, the received notifications may include a time series of position and pressure data, e.g., a set of coordinates (x, y, t, p) that reflect the user's tactile input to the touch screen 603, including the applied pressure, *p*. The operating system 611 may also provide other kinds of input data to the recognition engine 613, including multitouch inputs (e.g., additional sets of simultaneous coordinates (x, y, t) representing a second finger simultaneously contacting the touch screen), audio inputs (e.g., voice inputs), visual inputs, accelerometer inputs, location data, sensor data, etc.

Ex. 1001, 12:4-30.

92. *Arai's disclosure is consistent with a person having ordinary skill in the art's understanding of touch screen. For example, Arai discloses that a user of the mobile information device can "input stroke data through **pressing, with a stylus 3**, on the coordinate input surface of the coordinate input unit 5 (the display screen of the display unit 2)." Ex. 1005 ¶[0032]. The coordinate input surface includes a "transparent resistance film digitizer (known as a '**touch panel**')."* *Id.*

93. *Arai also disclose a touch screen that accepts inputs through a stylus.*

*This **mobile information device 1 is equipped with: a display unit 2; a stylus 3**; a camera unit 4; **a coordinate input unit 5**; a CPU 6; a RAM 7; a ROM 8; a media interface (I/F) 9 that is equipped with a slot for insertion of a storing medium (for example, a Smart Media, a CompactFlash (registered trademark), or the like); a keyboard 10 (which may be an ordinary keyboard or a soft keyboard that is displayed on the display unit 2); an external interface (USB, Bluetooth, or the like) 11 for connecting to another information device; and a network interface 12.*

Id. ¶[0023].

3 is a stylus, used for inputting handwriting stroke data, soft buttons and soft keyboards on the display screen,⁸ and the like.

Id. ¶[0036].

In FIG. 5, area 51 is an area that comprises a variety of input fields for inputting a destination and subject for the *electronic mail*. For example, a cursor for text input will be displayed in the corresponding input field through *pressing an arbitrary position within the area 51 using the stylus 3*. The user may, in this state, use the handwritten character input utility program to execute inputting of text into this input field.

Id. ¶[0070]; *see also id.* ¶[0209] (listing “stylus” in figures), FIGs. 1-2 (showing stylus 3 that is used for inputting through the display screen).

94. When “the stylus 3” presses “on the coordinate input surface of the coordinate input unit 5, the CPU 6 is notified of position coordinate data for a position that is pressed.” *Id.* ¶[0033].

⁸As I noted above in §VII.A, a person having ordinary skill in the art would have understood this to be the functionality of a touchscreen. For that matter, *Arai* describes directly a very conventional construction of a touchscreen, namely using a transparent digitizer disposed overlaying the top face of the display unit. Ex. 1005 ¶[0032].

95. Therefore, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest a method for inputting data with a stylus on a touch panel of a display screen (“method for data input on a touchscreen”) of a mobile information device (“of a mobile device”).

b. 1[a]: “receiving a first user input, wherein the first user input is handwritten input received on the touchscreen of the mobile device;”

96. In my opinion, *Arai* discloses or suggests “receiving a first user input, wherein the first user input is handwritten input received on the touchscreen of the mobile device.”

97. For example, *Arai* discloses that a “***user*** is able to input stroke data through pressing, with a stylus 3” on a “touch panel.” Ex. 1005 ¶[0032]; *see also id.* ¶[0036] (describing the stylus as being “used for inputting ***handwriting*** stroke data ... on the display screen”).

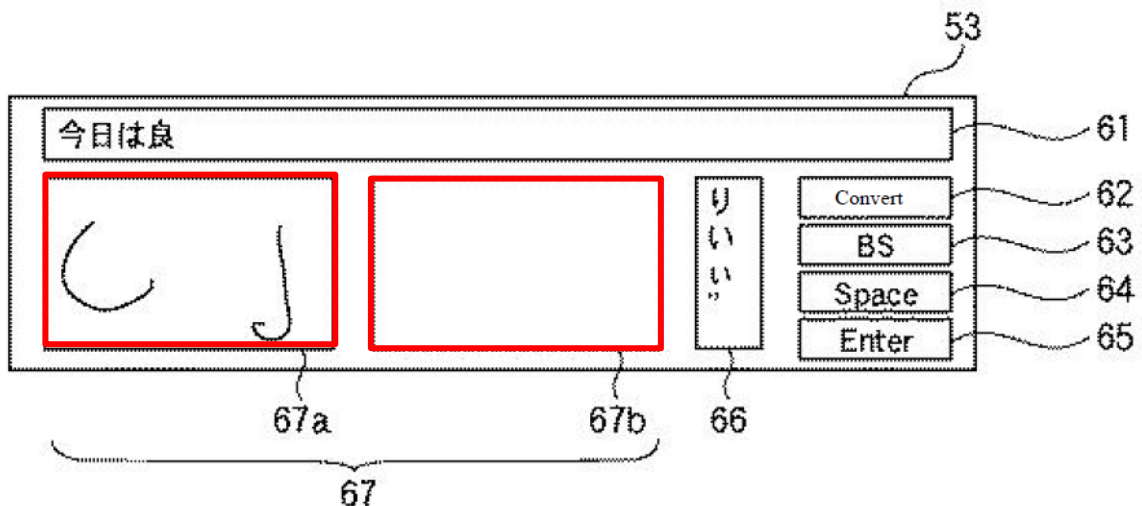
98. *Arai* further discloses a handwritten character input area 67 comprised of two regions 67a and 67b for detecting handwritten character input, as the user alternates between the two regions. For example, *Arai* discloses:

The area 67 is a handwritten character input area. Character input can be carried out through alternately filling in handwritten character into the two regions 67a and 67b.

Id. ¶[0095]; *see also* §IX.B above (quoting *Arai* ¶¶[0095]-[0099] which disclose characters being entered alternately between regions 67a and 67b).

99. In addition, *Arai* discloses that for “the position coordinate data for the strokes for a single character that is to be recognized, stroke data that is inputted into the respective areas, through areas 67a and 67b in the handwritten character input area 67 of FIG. 6, are inputted as stroke data for a single character.” *Id.* ¶[0140]; *see also id.* FIG. 6.

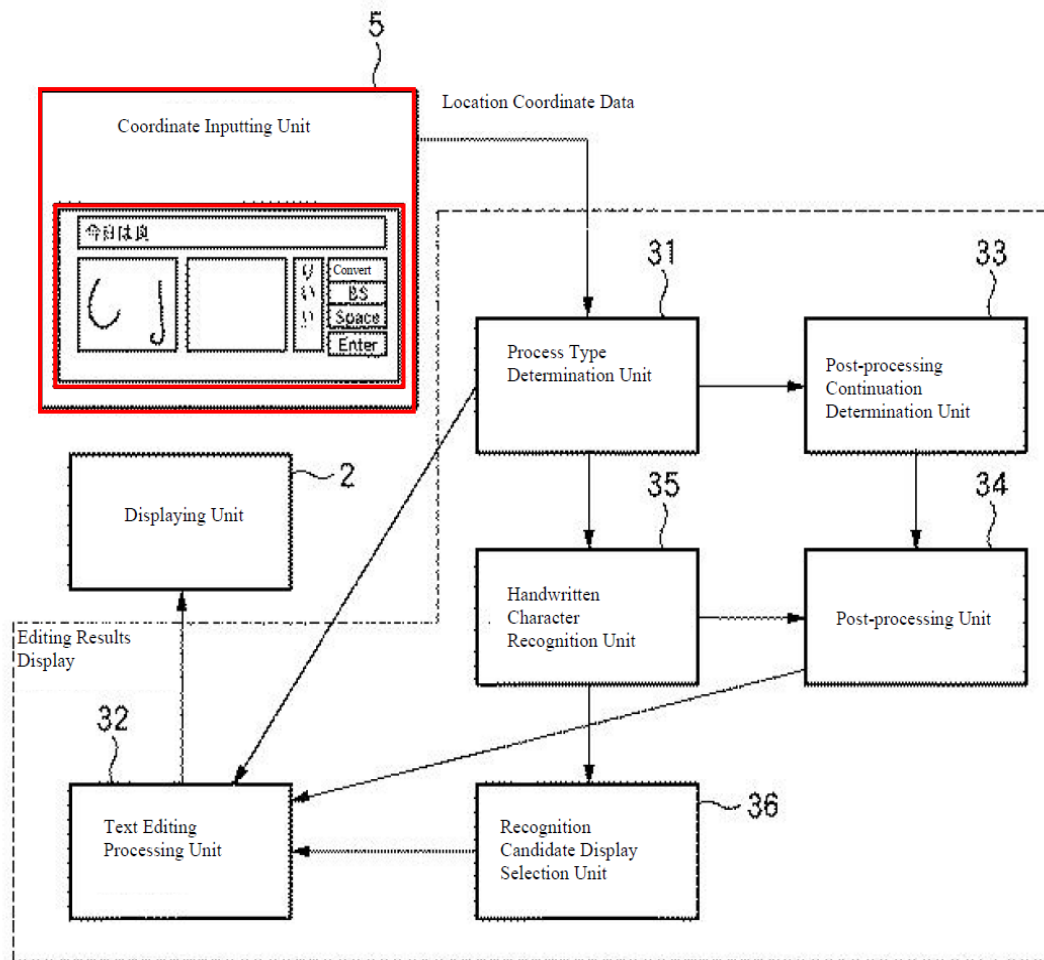
[FIG. 6]



Ex. 1005, FIG. 6 (annotated)

100. In my opinion, a person having ordinary skill in the art would have understood handwritten character input area 67 to be a portion of *Arai*’s coordinate input surface 5 (i.e., “touchscreen”). For example, *Arai*’s figure 3 shows *Arai*’s figure 6 inside the coordinate inputting unit 5.

[FIG. 3]



Arai, FIG. 3 (annotated)

Handwritten character input area 67 (as its name suggests) receives handwritten character input, and Arai discloses:

A common *transparent resistance film digitizer (known as a ‘touch panel’) for inputting coordinates*, can be achieved through disposing the *coordinate input unit 5 overlaying the top face of the display unit 2*. The user is able to *input stroke data through pressing, with a stylus 3, on the coordinate input surface* of the coordinate input unit 5 (the display screen of the display unit 2).

Id. ¶[0032].

101. It is also demonstrative of *Arai*'s input to look at an example. In particular, *Arai* describes receiving two handwritten Japanese characters—工 and 場. *Id.* ¶[0144] (“Here the explanation will be for a case wherein the handwritten character ‘工場’ has been inputted.”). *Arai* discloses that 工場 consists of two inputs. On this point, *Arai* discloses that “first ‘工’ is inputted” (*id.* ¶[0150]), and then later “the character ‘場’ is inputted” (*id.* ¶[0151]).

When this series of processes is explained as a time series, when ***first*** “工” ***is inputted*** and then the first stroke of the next character, “場” is inputted, at that instant the recognition result of “工” by the handwritten character recognition unit 35 for the “工” that has been inputted will be displayed in the input character buffer area 61.

Id. ¶[0150].

Next, ***when the character “場” is inputted***, and is confirmed through, for example, the character cutoff time, recognition by the handwritten character recognition unit 35 is started on the “場”, and if the first-ranked recognition result is “揚”, the display will be “工場” as the recognition result in the input character buffer area 61.

Id. ¶[0151].

102. A person having ordinary skill in the art would have understood “工場” to be Japanese characters, because the original patent is written in Japanese (*id.*, (11) (“Japanese Unexamined Patent Application Publication Number”), (12) (“Japanese Unexamined Patent Application Publication”)).

Reviewing Ex. 1005, and comparing, for example, ¶[0144] in the original Japanese publication to ¶[0144] in the certified translation, a person having ordinary skill in the art would have recognized that in the certified translation of *Arai* “工場” remains in the original Japanese. *Compare id.* ¶[0144] (translated version reading, in part: “Here the explanation will be for a case wherein the handwritten character “工場” has been inputted”) *with id.* ¶[0144] (original Japanese version, reading in part: “ここで、例えば、「工場」という手書き文字が入力された場合について説明する”).

103. Therefore, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest a user inputting by handwriting “工場,” of which the 工 is the first input (“receiving a first user input, wherein the first user input is handwritten input”), and the handwritten characters are input through areas 67a and 67b on a touch panel of a mobile information device (“received on the touchscreen of the mobile device”).

c. 1[b]: “determining a first recognized sequence based on the first user input; wherein the first recognized sequence is a best match of the first user input;”

104. In my opinion, *Arai* discloses or suggests “determining a first recognized sequence based on the first user input; wherein the first recognized sequence is a best match of the first user input.”

105. For example, *Arai* discloses that “a recognition process is executed on the stroke data that has been obtained, where candidate characters (character codes) that are the recognition results are stored in the RAM 7.” Ex. 1005 ¶[0142]. *Arai* takes the “distinctive feature data for the stroke data” and conducts “a matching process,” by comparing stroke data to “the recognition dictionary.” *Id.* Using the “reference character dictionary data” the system calculates “the values for the degree of matching (the evaluation values),” and stores those “recognition result candidates” for those having the “highest degrees of matching.” *Id.*

106. Returning to the same example from §XI.A.1.b, *Arai* analyzes each handwritten input of 工 and 場 in the handwritten character recognition unit 35 to determine a recognized sequence for each character. *Arai* discloses:

Here the explanation will be for a *case wherein the handwritten character ‘工場’ has been inputted*. First the first candidate character in the recognition result for “工”, by the handwritten character recognition unit 35, is “工,” and the *evaluation value is 100*, where the second candidate character is “𠂇”, with an *evaluation value of 100*, and the third candidate character is “𠂈”, with an *evaluation value of 90*.

Id. ¶[0144].

107. Similarly, the system determines the first candidate for the recognition result for 場.

Next the first candidate character for the recognition result for ‘場’ is ‘揚’, *with an evaluation value of 98*, where the second candidate character is ‘場’, *with the evaluation value for the degree of matching being 96*.

Id. ¶[0145]. *Arai* equates the “values for the degree of matching” with “evaluation values.”

Here a matching process is carried out between the distinctive feature data for the stroke data, extracted in Step S902, and reference character dictionary data of the recognition dictionary. Given this, the character codes, and the *values for the degree of matching (the evaluation values)*, corresponding to the reference character dictionary data that have the highest degrees of matching, are stored as the recognition results, where character codes corresponding to the reference character dictionary data that have sequentially the highest degrees of matching are stored as recognition result candidates.

Id. ¶[0142]; *see also* ¶[0145] (describing “the evaluation value for the degree of matching being 96”).

108. Using evaluation values, *Arai* determines that the first recognized sequence matches the input of 工. *Id.* ¶[0144] (“First the first candidate character in the recognition result for ‘工’ . . . is ‘工’.”). *Arai* also indicates that the best recognized sequence for the second input of 場 does not match the intended input, but rather results in a different character, 揚. *Id.* ¶[0145] (“Next the first candidate character for the recognition result for ‘場’ is ‘揚’.”).

109. Thus, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest $\perp$ to be the first recognized sequence of the first input of $\perp$ (“determining a first recognized sequence based on the first user input”) wherein $\perp$ is selected as the first recognized sequence with an evaluation value of 100 based on comparison of the stroke data with the recognition dictionary (“wherein the first recognized sequence is a best match of the first user input”).

d. 1[c]: “writing the first recognized sequence to a memory storage buffer of the mobile device;”

110. In my opinion, *Arai* discloses or suggests “writing the first recognized sequence to a memory storage buffer of the mobile device.”

111. For example, *Arai* discloses that “a recognition process is executed on the stroke data [where] the ***recognition results*** are ***stored in the RAM 7.***”

Ex. 1005 ¶[0142]. Furthermore, the “RAM 7 . . . functions as a data work area and ***temporary storage area.***” *Id.* ¶[0026]. Further, *Arai* discloses the RAM work areas being used by the handwritten character recognition unit:

Note that when the handwritten character recognition process is started, the ***work areas, and the like, in the RAM 7, used by the processes, are first initialized, and these processes are executed primarily by the handwritten character recognition unit 35.***

Id. ¶[0140].

112. A person having ordinary skill in the art would have understood from *Arai*'s disclosure that the RAM to which the recognition results (e.g., each of 工 and 揚) are written to constitute a memory storage buffer as recited in the claim.

113. I note that while the term "memory storage buffer" appears in the claims of the '428 patent, it does not appear in the specification. Rather, the '428 patent specification repeatedly refers to a "temporary storage buffer," "buffer," or "recognized character buffer." *See, for example*, Ex. 1001, Abstract, 6:4-7, 6:46-47. In my opinion, a person having ordinary skill in the art would have understood the '428 patent to interchangeably use the terms "buffer," "temporary storage buffer," and "memory storage buffer" to refer to a memory, buffer storage or storage device (or portion thereof) used to store information temporarily.

114. A person having ordinary skill in the art would have understood "buffer" to mean "[a] region of memory reserved for use as an intermediate repository in which data is temporarily held while waiting to be transferred between two locations or devices," and "buffer storage" to mean "[t]he use of a special area in memory to hold data temporarily for processing until a program or operating system is ready to deal with it." Ex. 1009 at 3. Further, "in common usage, [memory] refers only to a computer's main memory, the fast

semiconductor storage (RAM) directly connected to the processor.” *Id.* at 4. In my opinion, a person having ordinary skill in the art would have understood *Arai*’s RAM (i.e., random access memory) to constitute a “memory storage buffer” because it is RAM that serves the purpose of temporarily storing recognition results by the character recognition unit 35 of stroke data inputted through *Arai*’s touch panel for later use by, for example, *Arai*’s post-processing unit 34.

115. A person having ordinary skill in the art also would have understood *Arai*’s disclosure that the recognition results are “stored in the RAM 7” (Ex. 1005 ¶[0142]), to constitute “writing . . . to a memory storage buffer” as recited in the claim. More particularly, a person having ordinary skill in the art would have understood that the process of storing information in RAM was commonly referred to as “writing” to RAM. For example, in providing the definition of RAM, the Microsoft Computer Dictionary describes RAM as “[s]emiconductor-based memory that can be read and *written* by the central processing unit (CPU) or other hardware devices.” Ex. 1009 at 6. The same dictionary defines “write” as “transfer[ing] information either to a storage

device, such as a disk, or to an output device, such as a monitor or a printer.” *Id.* at 8.⁹

116. Therefore, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest temporarily storing (“writing”) “工” (“the first recognized sequence”) in the RAM (“to a memory storage buffer”) of a mobile information device (“of the mobile device”).

e. [d]: “generating a first candidate sequence, wherein the first candidate sequence is a best match of one or more recognized sequences;”

117. In my opinion, *Arai* discloses or suggests “generating a first candidate sequence, wherein the first candidate sequence is a best match of one or more recognized sequences.”

118. As I discussed in prior sections, *Arai* receives the two inputs 工 and 場 (§XI.A.1.b), determines the recognized sequence for each, namely, 工 and 場 (§XI.A.1.c), and from these two sequences, *Arai* generates a first candidate sequence, namely 工場. Because *Arai* generates 工場 using an “evaluation value” and “first-ranked recognition result,” a person having ordinary skill in the art, in my opinion, would have understood this first candidate sequence 工場 to be a

⁹ *Supra* note 7.

best match of the first and second recognized sequences (工 and 揚). Ex. 1005

¶¶[0144], [0145] and [0151]. In particular, *Arai* discloses:

Here the explanation will be for a *case wherein the handwritten character “工場” has been inputted*. First the first candidate character in the recognition result for “工”, by the handwritten character recognition unit 35, is “工,” and the *evaluation value is 100*, where the second candidate character is “𠄎”, with an *evaluation value of 100*, and the third candidate character is “𠄎”, with an *evaluation value of 90*.

Id. ¶[0144].

Next the first candidate character for the recognition result for “場” is “揚”, with an *evaluation value of 98*, where the second candidate character is “場”, with the *evaluation value for the degree of matching being 96*.

Id. ¶[0145].

Next, when the character “場” is inputted, and is confirmed through, for example, the character cutoff time, recognition by the handwritten character recognition unit 35 *is started on the “場”, and if the first-ranked recognition result is “揚”, the display will be “工場” as the recognition result in the input character buffer area 61*.

Id. ¶[0151].

119. Thus, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest determining 工場 as a sequence (“generating a first candidate sequence”) wherein the sequence is

comprised of the two recognized sequences 工 and 揚, in which each had the highest evaluation values for the inputs 工 and 揚, respectively (“wherein the first candidate sequence is a best match of one or more recognized sequences”).

f. 1[e]: “presenting the first candidate sequence to the user, wherein the presenting includes displaying the first candidate sequence to the user and allowing the user to edit the first candidate sequence;”

120. In my opinion, *Arai* discloses or suggests “presenting the first candidate sequence to the user, wherein the presenting includes displaying the first candidate sequence to the user and allowing the user to edit the first candidate sequence.”

121. Continuing with the same example from the prior sections, *Arai* discloses displaying the first candidate sequence 工揚. *Arai* discloses that “the display will be ‘工揚’ as the recognition result in the input character buffer area 61.” Ex. 1005 ¶[0151]. Elsewhere, *Arai* explains that characters in the input character buffer area 61 are displayed. *Id.* ¶¶[0084] (“In FIG. 6, the area 61 is an input character buffer area, and **displays** a first candidate for the handwritten character recognition result”), [0085] (“[I]f a character that is not the intended candidate is comprised in the set of characters that is **displayed** in the input character buffer area 61, the user can replace the candidate.”), [0087] (“[T]he set of first candidate characters that is **displayed** in the input character buffer

area 61 will reflect, as-is, the rank order of the recognition candidates in the recognition result by the handwritten character recognition unit 35.”).

122. In addition, *Arai* describes the text editing processing unit:

32 is a text editing processing unit, which executes editing processes on a text character string obtained from the handwritten character recognition unit 35, such as deletion, kana-kanji conversion, insertion into a character input area of an application, and the like.

Id. ¶[0051].

123. *Arai* also teaches that a user may edit any of the characters displayed in the “input character buffer area 61” (e.g., 工場) by deleting a character using the “Backspace key button (the deletion button).” *Id.* ¶[0089].

Arai further discloses other forms of text editing, namely selecting different characters and kana-kanji conversion:

Specifically, when the user selects, through tapping, an arbitrary character within the input character buffer area 61, a group of the first through fourth candidates for that character will be displayed, in the rank order of the candidates, in the candidate display area 66. Given this, if the intended candidate is included in this set of candidates, ***through pressing that candidate with the stylus 3 the user can replace the character for the first candidate, that is selected in the input character buffer area 61, with the character selected in the candidate display area 66.***

Id. ¶[0086].

The button 62 is the Conversion button. ***Kana-kanji conversion is carried out for the hiragana character in the input character buffer area 61 when this button 62 is pressed using the stylus 3.*** For example, if, in a state wherein “あいゝが” has been inputted into the input character buffer area 61, this button 62 is pressed, it will be converted to, for example “愛が”. If the conversion candidate is not what was intended, pressing this button 62 again will display the next candidate.

Id. ¶[0088].

124. Therefore, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest displaying 工場 in the input character buffer area (“presenting the first candidate sequence to the user, wherein the presenting includes displaying the first candidate sequence to the user”) and allowing at least deletion, replacement of candidate sequence or kana-kanji conversion of the sequence in the input character buffer area (“and allowing the user to edit the first candidate sequence”).

g. 1[f]: “identifying at least a first sequence portion of the first candidate sequence wherein the identifying is at least partially based on one or more rules or dictionaries of words accessible to the mobile device;”

125. In my opinion, *Arai* discloses or suggests “identifying at least a first sequence portion of the first candidate sequence wherein the identifying is

at least partially based on one or more rules or dictionaries of words accessible to the mobile device.”

126. For example, *Arai* discloses a “post-processing dictionary data (dictionary data for chain probability calculation)” stored in “ROM 8” of the “mobile information device.” Ex. 1005 ¶[0027]. *Arai* discloses the post-processing unit 34 determines a character string “through considering the probability that the characters in the candidate character string . . . are linked together, and considering the degree of match with reference character dictionary data within the recognition dictionary.” *Id.* ¶[0053]. In my opinion, a person having ordinary skill in the art would have understood that the post-processing unit 34 makes this determination using the post-processing dictionary data. *Id.* ¶¶[0146] (“In this case, in the post-processing unit 34 the chain probabilities for the character strings combining these candidates are calculated using a dictionary for post-processing. The combinations are, for example, ‘工場’, ‘工場’, ‘工場’, ‘工場’, ‘工場’, ‘工場’. Given this, the post-processing unit 34 determines the candidate character string with the highest chain probability among these accommodations.”).

127. “The post-processing unit 34 [selects the candidate] combinations that have the highest chain probabilities between the character strings, to

change the display within the input character buffer area 61 to display the combination with the highest value as the first candidate.” *Id.* ¶[0114].

128. For example, using chain probabilities and a dictionary, *Arai* determines that 工揚 should probably be 工場. *Arai* discloses using a dictionary in post-processing:

In this case, in the post-processing unit 34 the chain probabilities for the character strings combining these candidates are calculated *using a dictionary for post-processing*. The combinations are, for example, ‘工揚’, ‘工場’, ‘工揚’, ‘工場’, ‘工揚’, ‘工場’. Given this, the post-processing unit 34 determines the candidate character string with the highest chain probability among these accommodations.

Id. ¶[0146]. *Arai* further determines highest chain probability in post-processing:

As described above, when ‘工場’, is inputted as the handwritten characters, then even if the recognition results by the handwritten character recognition unit 35 are ‘工揚’, the process in the post-processing unit 34 in Step S904 *will determine that the candidate character string with the highest chain probability* is ‘工場,’ so ‘工場’ is read out as the candidate character string for the handwritten character. In this case, here the ‘工揚’ that is the recognition result by the handwritten character recognition processing unit 35 may be replaced with ‘工場’.

Id. ¶[0148]. *Arai* discloses that the character string with the highest chain probability will replace the recognized character string:

Next the candidate character string that has *the highest chain probability*, for a combination among the recognition candidates by the handwritten character recognition unit 35, *is recognized, and if that candidate character string is “工場,” then the “工場”* of the display of the input character buffer area 61 *will be replaced with “工場”* by the post-processing unit 34.

Id. ¶[0152].

129. Moreover, in my opinion, a person having ordinary skill in the art would have understood *Arai*'s post-processing dictionary data to include words. More particularly, a person having ordinary skill in the art would have understood references in *Arai* to “dictionary data” and “dictionary” to encompass a data set comprising words. For example, the Merriam-Webster's Collegiate Dictionary defined “dictionary” as “a reference book containing words usu. alphabetically arranged along with information about their forms, pronunciations, functions, etymologies, meaning, and syntactical and idiomatic uses.” Ex. 1010 at 3.¹⁰

¹⁰ To be clear, here, I am using Merriam-Webster's Collegiate Dictionary (Ex. 1010) as evidence of what would have been known to a person having ordinary skill in that art and/or the state of the art. I am not using Merriam-Webster's Collegiate Dictionary as part of the unpatentability grounds.

130. Thus, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest determining that 工場 should probably be 工場, where 工 is a portion of the first candidate sequence 工場 (“identifying at least a first sequence portion of the first candidate sequence”) using a dictionary and chain probabilities (“wherein the identifying is at least partially based on one or more rules or dictionaries of words”) stored in the ROM of a mobile information device and accessible to the mobile device’s post-processing unit 34 (“accessible to the mobile device”).

h. 1[g]: “removing the first sequence portion from the memory storage buffer, wherein the removing is performed in the absence of receiving user input editing the first candidate sequence, representing a space character, or selecting a word; and”

131. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “removing the first sequence portion from the memory storage buffer, wherein the removing is performed in the absence of receiving user input editing the first candidate sequence, representing a space character, or selecting a word.”

132. As I discussed in §XI.A.1.d, *Arai* discloses or suggests writing handwritten character recognition results to a temporary memory such as RAM. *Arai* is silent as to when and under what conditions results are deleted or

removed from RAM. However, *Arai* states that conventional handwritten character recognition techniques may be used to implement its invention:

Conventionally there have been character recognition devices for identifying paths (strokes) of inputted handwritten characters.

Ex. 1005 ¶¶[0002].

Input stroke data can be recognized into a corresponding character code, by a handwritten character recognition function that has existed conventionally, to be inputted into the mobile information device 1.

Id. ¶ [0028].

Following this, distinctive feature data of the character is extracted from the position coordinate data using an online handwritten character recognition algorithm that has existed conventionally.

Id. ¶ [0112].

Given this, feature points (distinctive feature data) are extracted through performing normalization of the position coordinate data using a conventional algorithm.

Id. ¶[0141]. As such, *Arai* itself explicitly provides the motivation to combine with conventional algorithms or systems.

133. One example of such a conventional handwritten character recognition system is *Fenwick*, which relates “to a pattern recognition system for recognizing known patterns or groups of pattern.” Ex. 1006, 1:7-9. *Fenwick*, similarly to *Arai*, discloses a system for handwritten input. *Id.*, 3:16-22. In particular, *Fenwick* discloses:

FIG. 1 illustrates a simplified block diagram of a computer system 10 for implementing the pattern recognition system of the present invention. Patterns or *characters are entered into the system by pattern input device 12*, which could be any of a number of different types of devices, *such as an electronic writing tablet* or an optical scanner. *Id. Fenwick* further discloses “[w]riting tablets” and the “process of recognizing characters.” *Id.*, 1:13-21.

134. In my opinion, a person having ordinary skill in the art would have understood that *Fenwick*’s pattern recognition includes handwriting recognition because it discloses an “electronic writing tablet” as an input device and also discloses overcoming the problem of “sloppy handwriting” and other problems of “handwriting recognition systems.” *Id.*, 1:6-48. In particular, *Fenwick* discloses:

The present invention. . . [for] correcting spacing errors.

. . .

Writing tablets and optical character readers typically digitize input data, such as alphanumeric character strings, and output pattern data to a computer system for further analysis.

. . .

A significant problem with this prior technique is that a relatively large inter-pattern distance between adjacent patterns can sometimes be mistakenly identified as a space between pattern groups For example, in a word recognition system where certain combinations of characters or the manner in which those *characters are input (i.e.,*

*nonuniform or sloppy handwriting may result in all kinds of recognition problems) can create irregular inter-character spacing, this technique may result in the letters within a word being incorrectly recognized as belonging to separate words. **Inter-character spacing problems are of particular significance in handwriting recognition systems where writing styles and writing clarity can vary substantially.***

Id.

135. Further, *Fenwick*'s handwritten character recognition system describes storing recognized characters to memory buffers. In particular, *Fenwick* discloses that after retrieving a character, it will check to see if a memory buffer is available, and if not, "an empty buffer is created." *Id.*, 4:40-49. *Fenwick* explains that it designates an "active buffer so that the system always starts from a consistent memory location." *Id.*, 4:49-51. The above-retrieved character is then "appended to the content of all of the available buffers." *Id.*, 4:52-54. "If the character is stored in an empty buffer, this character would form the first character of a series of characters to be stored in the buffer. If the character is stored in a buffer containing other characters, this character is added to the preexisting series of characters in that buffer, thereby continuing formation of the series in that buffer." *Id.*, 4:54-60; *see also id.*, FIG. 2 (blocks 32 (retrieving a character), 38 (appending a character to all buffers)).

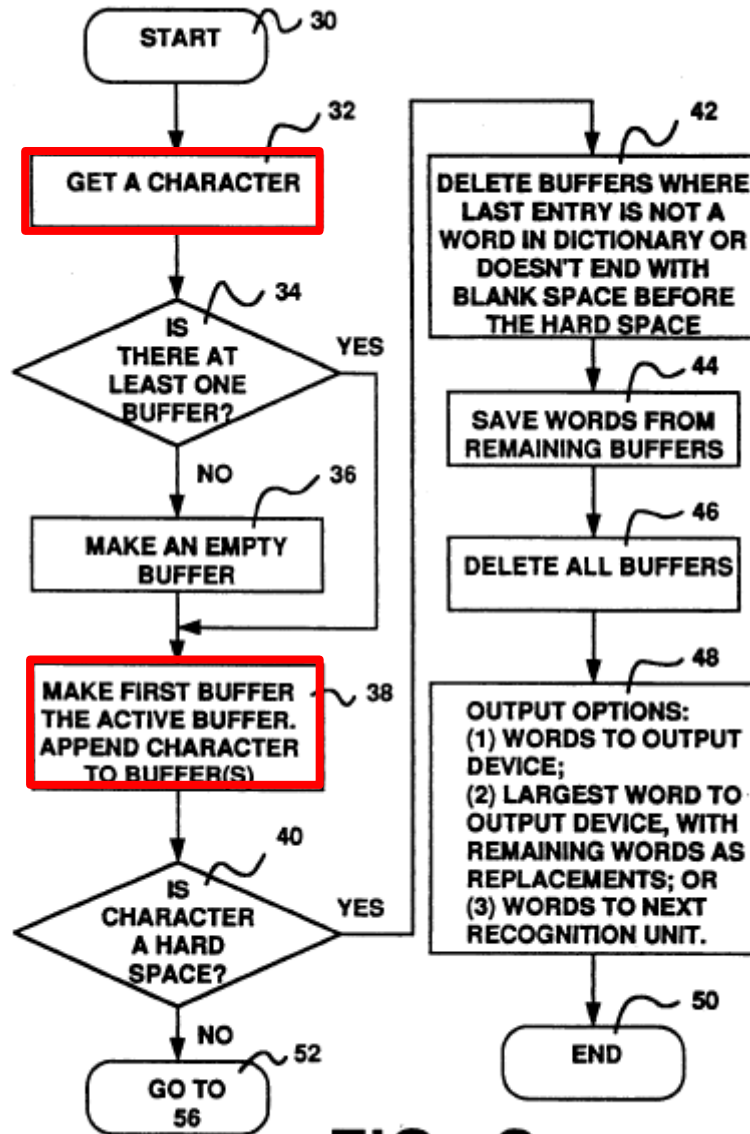


FIG. 2

Ex. 1006, FIG. 2 (annotated)

136. *Fenwick* analyzes the data in its buffers, and if there is a word “common to all of the remaining buffers . . . then that word has been *properly identified* and can be saved with its appended blank space in memory.” *Id.*, 6:21-26. “After saving the word and blank space, both are deleted from each of

the buffers, block 88. The word and blank space are then output to the output device, block 90.” *Id.*, 6:26-29; *see also id.*, FIG. 4 (blocks 88, 90).

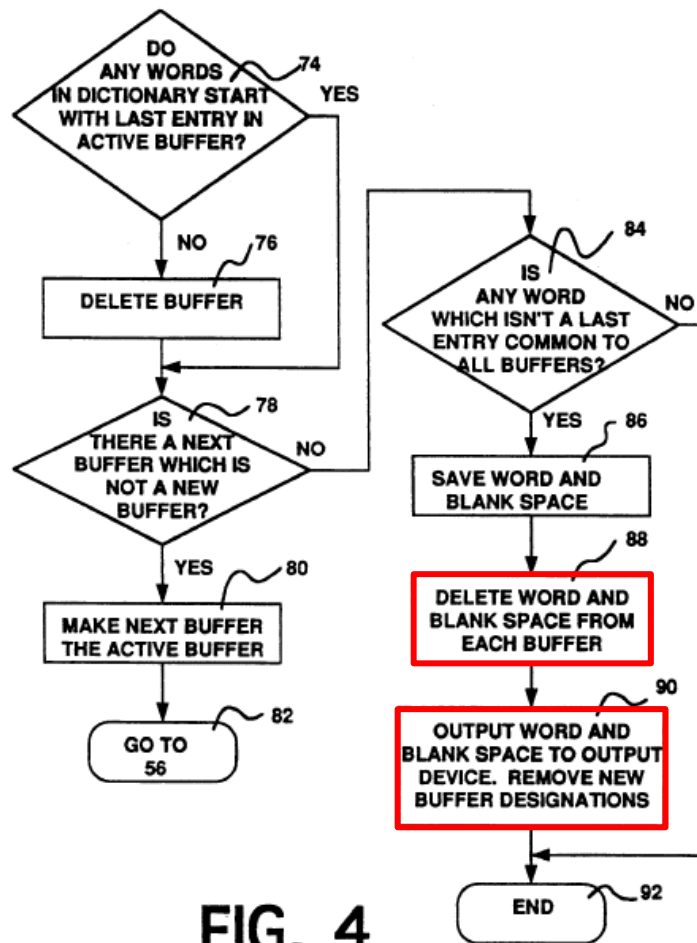


FIG. 4

Ex. 1006, FIG. 4 (annotated)

137. Moreover, *Fenwick* depicts the automatic (i.e., absent user input) removal of a word in rows 6 and 7 of Figure 5a, in which the word “the” is deleted from the buffer. *Id.*, FIG. 5a. *Fenwick* deletes the word “the” once it has properly identified “the” as the correct word based on user input and

comparisons to words in a dictionary. *Id.*, 7:18-26. In particular, *Fenwick* discloses:

In Pass 6, another word was formed in Buffer 1, so its contents were copied to Buffer 3, which was deleted in Pass 5, and a space was appended to the last entry of Buffer 1. Since the last entry in Buffer 2 ‘ew’ did not correspond to the start of any word in the dictionary, Buffer 2 was deleted. In addition, the word ‘the’ was saved from Buffers 1 and 3 and then deleted because ‘the’ was a common word in all of the remaining buffers.”); *see also id.*, FIG. 5a.

Id.

PASS	100 BUFFER 1	102 BUFFER 2	104 BUFFER 3	106 BUFFER 3	108 BUFFER 4
1	t				
2	th				
3	the_	the			
4	the_n	then_	then		
5	the_ne	then_e	~~there~~		
6	the_new_	~~the_ew~~	the_new		
7	new_t	newt	newt_		
8	new_to_	newto	newt_o		new_to

Ex. 1006, FIG. 5a (annotated)

138. Thus, a person having ordinary skill in the art would have understood *Fenwick* to teach removing a word from the buffer after it has been

confirmed as the correct word without receiving user input editing the candidate sequence, representing a space character or selecting a word.

139. In my opinion, a person having ordinary skill in the art would have found it obvious to incorporate these teachings of *Fenwick* into *Arai* to delete the recognition results from the RAM when, for example, the candidate sequence 工場 (which includes the identified first sequence portion 工) is identified as the correct sequence. A person having ordinary skill in the art would have been motivated to combine *Arai* and *Fenwick*, because *Arai* seeks to solve the problem of a user being “forced to perform other input operations in addition to the actual intended character input, adversely affecting a natural use experience.” Ex. 1005 ¶[0004]. More particularly, *Arai* seeks to:

achieve[] post-processing naturally, and by appropriate processing units, through the post-processing continuation determination unit, ***without the user consciously making any particular inputs instructing the end*** or continuation, or the like, of a text element. *Id.* ¶[0019]. In fact, *Arai* discloses that it is “possible to achieve a handwritten character recognition environment wherein character input and editing operations are carried out naturally without the user having to be aware of continuing or confirming the post-processing on the inputted character string (that is, without having to execute an operation to designate breaks in the post-processing unit). This enables a handwritten character recognition environment

wherein the user can input the intended text easily.” *Id.* ¶[0156]. While *Arai* requires hitting the Enter Key to send a word (or words) to the application (*id.* ¶[0091]), *Fenwick* performs this function automatically (*Fenwick*, 6:21-34; FIG. 4 (blocks 88, 90)). In my opinion, a person having ordinary skill in the art would have been motivated to incorporate *Fenwick*’s teachings regarding automatically sending recognized words to an application into *Arai* because this would have furthered *Arai*’s purpose of having a natural, uninterrupted flow in entering characters without having to press extra keys.

140. In my opinion, the combination would also have been obvious as amounting to applying a known technique (*Fenwick*’s recognition of words without additional user input and deletion of words from the buffer when no longer needed—e.g., when the recognition results are sent to an application) to a known method (*Arai*’s method of performing handwriting recognition which also uses temporary memory for storing handwritten character recognition results) ready for improvement to yield predictable results (the *Arai-Fenwick* combination in which recognition results are sent to an application without further user input—e.g., pressing the Enter Key—and handwritten character recognition results are removed from the temporary memory such as RAM when the recognition results are sent to the application).

141. To be sure, *Fenwick* also discloses removing words from the buffers with a user input comprising a “hard space,” which arguably may represent a space character. *Fenwick* discloses that “[a] ‘hard space’ or ‘end character’ is any character, symbol, pattern, or large blank space which indicates that an end of a sentence or line of characters has been reached.” *Id.*, 4:65-68. For example, *Fenwick* discloses that it deletes all non-words or less preferable words from the buffers:

If the character is a “hard space” the system proceeds to ***delete the content of all of the buffers where the last entry in the buffer is not in the dictionary or database, or where the last entry doesn’t end with a blank space before the hard space***, block 42. The last entry in the buffer is defined as all of the characters in the buffer if the buffer contains no spaces or the last collection of characters stored in the buffer after one space and before the final space and hard space. As will be further explained below, ***this step cleans out the buffers whose pattern group content did not completely match words stored in the dictionary or who had a more preferable counterpart already stored in another buffer***. The remaining buffers contain the final matched series of characters left from the recognition process, meaning each buffer only contains one or more known words.

Id., 5:9-24.

142. Next, as demonstrated in figure 2, *Fenwick* saves words from buffers (step 44), deletes words from buffers (step 46), and outputs the words

(step 48), all as a result of the user entering a hard space character. *Id.*, 5:25-47,

Fig. 2.

The known words contained within *the remaining buffers are then saved in memory 16, or within memory of the CPU 14, block 44.*

The content of all of *the buffers is then deleted* to prepare the system to process the next character string, *block 46*. At this point, the user of the system has a number of predetermined options which are typically preselected by the user. *In option (1) of block 48, the saved words are simply output from memory to the output device 18 and the process is terminated, block 50.* Alternatively, where a number of different words have been formed from the same character string, options (2) and (3) of block 48 may be more desirable. *In option (2) of block 48, only the largest saved word is output to the output device* with the remaining words saved as replacement words so the user can make a choice as to which word or combination of words is most desirable. Option (2) of block 48 will be explained in greater detail with reference to FIG. 5 below. *In option (3) of block 48, all of the saved words are output to another recognition unit*, which then decides which word or combination of words is best to use in the context of the most recent previously recognized words.

Id., 5:25-47.

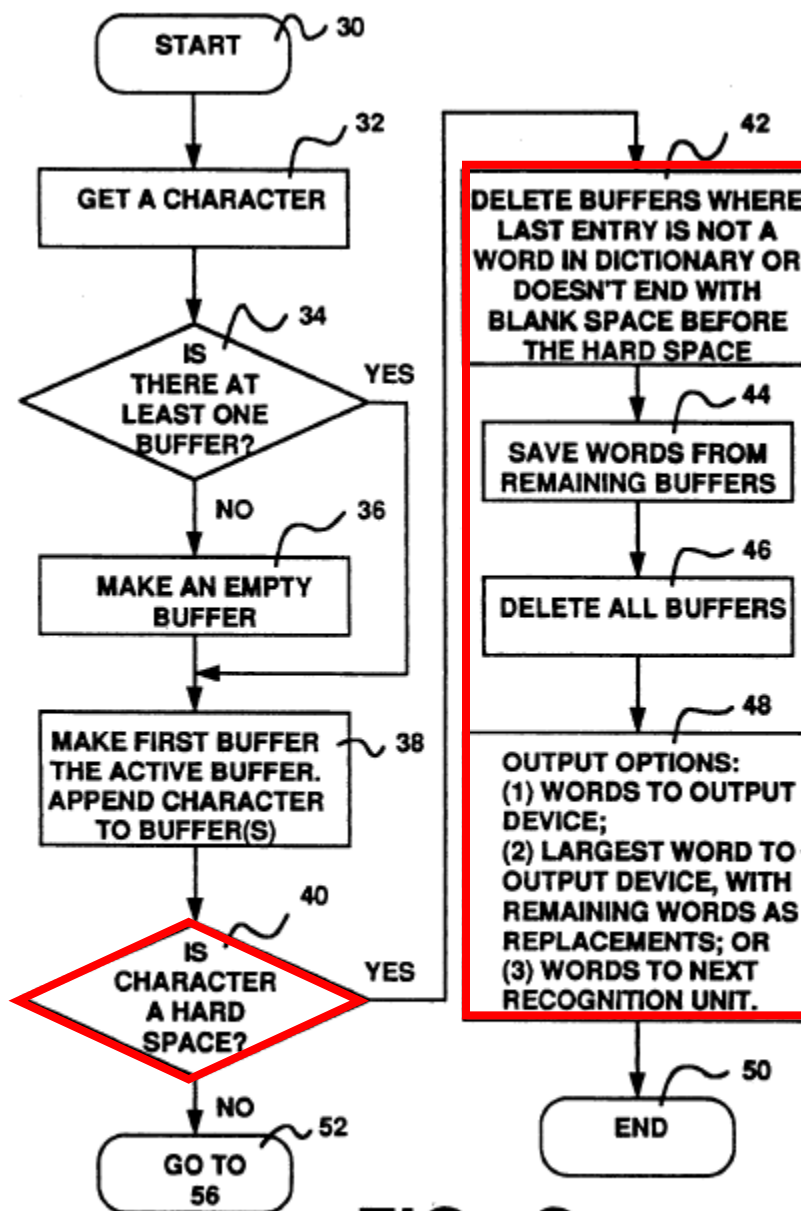


FIG. 2

Ex. 1006, FIG. 2 (annotated)

This, however, is merely an alternative disclosure in *Fenwick* for removal of words from the buffers and does not teach away from removal of a word from

the buffer absent user inputs as described in the preceding paragraphs. Nothing in the '428 patent or the claim language precludes sometimes removing a sequence of characters from memory as a result of a user input representing a space character, editing a sequence or selecting a word, so long as the requirements of 1[g] are also performed/met.

143. In fact, the '428 patent expressly contemplates that a user may select from “one of the candidate sequences” or “edit the text,” or “the system may auto-commit the sequence.” *'428 patent*, 7:17-29. The '428 patent discloses:

After the user enters the third character 316, if the user's desired sequence is displayed in the selection area 308, *the user can, for example, select from either the input candidate display 320 or one of the candidate sequences 322*. Otherwise, the user can, for example, continue to enter an additional series of input features until the desired word is displayed in the selection area 308. *The user can alternatively select the contents of the input candidate display 320 shown in the text display 307 and edit the text* using, for example, one of the suitable text input methods described herein. *Furthermore, the system may auto-commit the sequence* shown in the text display 307 if the next recognized input does not match a known word or character sequence. *Id.* 7:17-29. Moreover, the '428 patent describes:

The content of *the buffer can then be modified in at least four different ways*:

1. The user enters or writes more characters (in which case The candidate list is updated and what is displayed in the UI is likewise updated, including the highlighted part)
2. The *user selects a candidate from the candidate list*, such as by editing the displayed sequence (or by interacting with the highlighted area in the UI). In this case *the engine will know that the user has interacted with the buffer and can therefore flush the buffer and “commit” it to the application* (which will remove the highlight).
...
4. *Auto-commit*: The engine uses linguistics and or other heuristic rules to identify that part of *the current content can be flushed from the engine buffer* (and no longer be modifiable by the engine).

Id., 3:22-47.

144. Thus, a person having ordinary skill in the art would have understood the *Arai-Fenwick* combination to disclose or suggest deleting recognition results from a buffer after being properly identified (“removing the first sequence portion from the memory storage buffer”) wherein deletion from the buffer occurs based on comparison of recognition results to a dictionary without further user input—e.g., pressing the Enter Key (“wherein the removing is performed in the absence of receiving user input editing the first candidate sequence, representing a space character, or selecting a word”).

i. ***1[h]: “sending the first sequence portion to an application running on the mobile device.”***

145. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “sending the first sequence portion to an application running on the mobile device.”

146. For example, *Arai* discloses that “the present invention” includes “an electronic mail application that ***runs on the mobile information device.***”

Ex. 1005 ¶[0068]. In order to enter a confirmed character string from the input character buffer area 61 into the application (e.g., electronic mail application (*id.* [0071])), the Enter Key can be pressed (*id.* [0091]). *Arai* explains:

The button 65 is an Enter Key button (a candidate character string confirmation/line break input button). ***If a character string is displayed in the input character buffer area 61 and this button 65 is pressed using the stylus 3, this character string is confirmed and the character string is inserted to the right side of the cursor that is displayed in the application.*** On the other hand, if no text is present in the input character buffer area 61, a line break code is inserted on the right side of the cursor that is displayed in the application, and the cursor is moved to the next line.

Id. ¶[0091].

147. For the reasons that I explained above in §XI.A.1.h, in the *Arai-Fenwick* combination the method recognizing 工場 as the correct input, sends

the sequence 工場 to the current application, such as the body of an electronic mail without the user having to press the Enter Key.

148. Therefore, in my opinion, a person having ordinary skill in the art would have understood the *Arai-Fenwick* combination to disclose or suggest sending the sequence 工場 to an electronic mail application (“sending the first sequence portion to an application”) that runs on a mobile information device (“running on a mobile device”).

2. Claim 2

a. 2[a]: “The method of claim 1, further comprising: receiving at least a second user input;”

149. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “receiving at least a second user input” for the reasons I explained above in §XI.A.1.b, in which *Arai* discloses a second input “場”.

b. 2[b]: “determining a second recognized sequence based on the second user input; and”

150. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “determining a second recognized sequence based on the second user input” for the reasons I explained above in §XI.A.1.c, in which *Arai* determines a second recognized sequence, 揚, based on the second user input 場.

- c. ***2[c]: “revising the first candidate sequence, wherein the revised first candidate sequence is based on the first recognized sequence and the second recognized sequence.”***

151. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “revising the first candidate sequence, wherein the revised first candidate sequence is based on the first recognized sequence and the second recognized sequence” for the reasons I explained above in §XI.A.1.e (generating the first candidate sequence 工場) and §XI.A.1.g (replacing 工場 after post-processing with a revised first candidate sequence 工場).

3. **Claim 3: “The method of claim 1, further comprising: determining at least a second candidate sequence based on the first user input; and presenting at least the second candidate sequence to the user.”**

152. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “determining at least a second candidate sequence based on the first user input; and presenting at least the second candidate sequence to the user.”

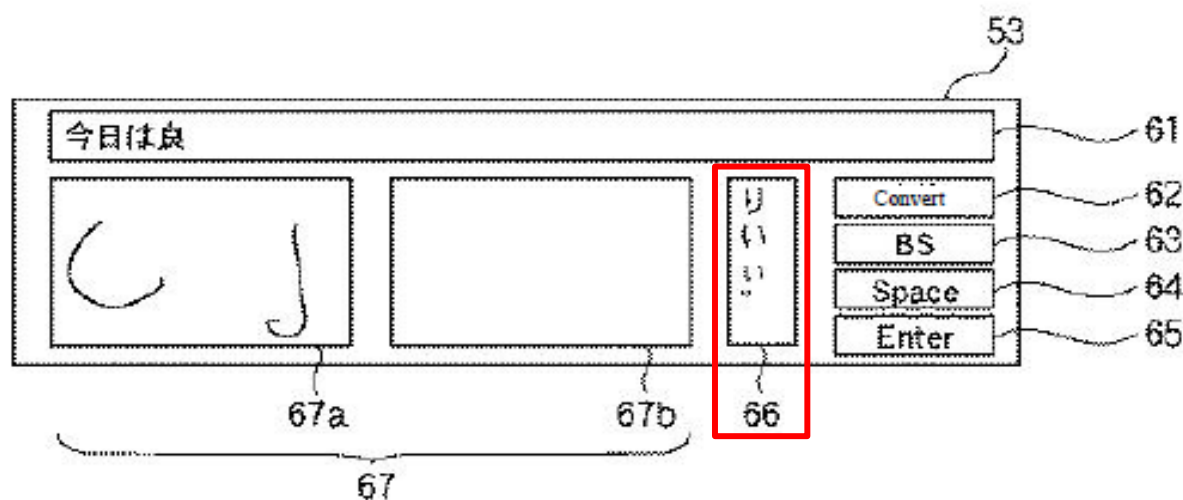
153. For example, *Arai* discloses “the first candidate character in the recognition result for ‘工,’ by the handwritten character recognition unit 35, is ‘工,’ and the evaluation value is 100, where the second candidate character is ‘𠂇’.” Ex. 1005 ¶[0144].

154. *Arai* also discloses that 工 is “displayed in the input character buffer area 61.” *Id.* ¶[0150]. *Arai* explains:

when the user selects, through tapping, an arbitrary character within the input character buffer area 61, a group of the first through fourth candidates for that character will be displayed, in the rank order of the candidates, in the candidate display area 66.

Id. ¶[0086]; see also *id.*, FIG. 6 (area 66).

[FIG. 6]



Arai FIG. 6 (annotated)

155. In my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest that tapping on じ would result in the display of the first through fourth candidates for じ, meaning that *Arai* discloses at least a second candidate sequence being presented to the user, the second candidate sequence being based on the same first user input.

156. Therefore, in my opinion, a person having ordinary skill in the art would have understood the *Arai-Fenwick* combination to disclose or suggest determining from the first input じ a first candidate sequence じ and a second

candidate sequence 工 (“determining at least a second candidate sequence based on the first user input; and”) which will be displayed in box 66 of Figure 6 along with two other candidates related to the input 工 when the user taps on 工 in the input character buffer 61 (“presenting at least the second candidate sequence to the user”).

4. Claim 7: “The method of claim 1, wherein the dictionaries of words include words in Chinese, Japanese, or Korean languages.”

157. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “wherein the dictionaries of words include words in Chinese, Japanese, or Korean languages.”

158. As I discussed in §XI.A.1.g, *Arai* determines that 工場 should probably be 工場 using a post-processing dictionary for chain probability calculations. For example, *Arai* teaches that it uses “recognition dictionary data for recognizing handwritten characters [and] post-processing dictionary data.” Ex. 1005 ¶[0027] (“ROM 8 stores . . . post-processing dictionary data (dictionary data for chain probability calculation), various types of table and setting data, and the like.”). *Arai* further discloses a “recognition dictionary.” *Id.* ¶[0053] (“considering the degree of match with reference character dictionary data within the recognition dictionary”), [0055] (“matching [character codes) with reference character dictionary data within the recognition

dictionary”). As an example, *Arai* describes comparing 今日は, which a person having ordinary skill in the art would have understood to be Japanese characters to “shapes that are registered in the recognition dictionary.” *Id.* ¶[0084].

159. While *Arai* does not explicitly state that the dictionary is in Japanese, in my opinion, a person having ordinary skill in the art would have understood that the dictionaries to which *Arai* refers would be Japanese dictionaries because *Arai* is concerned with Japanese language handwriting recognition. At a minimum, it would have been obvious to a person having ordinary skill in the art to use a Japanese dictionary to look up Japanese characters/words.

160. Thus, in my opinion, a person having ordinary skill in the art would have understood the *Arai-Fenwick* combination to disclose or suggest at least a Japanese language post-processing dictionary to perform post-processing chain probability determinations of Japanese characters (“wherein the dictionaries of words include words in Chinese, Japanese, or Korean languages”).

5. Claim 8: “The method of claim 1, wherein the first user input includes at least one of a Chinese character, a Japanese character, or a Korean character.”

161. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “wherein the first user input includes at least one of a Chinese

character, a Japanese character, or a Korean character” for the reasons I explained above in §§XI.A.1.b and XI.A.4.

6. Claim 9

- a. 9[pre]: “At least one non-transitory computer-readable storage medium storing instructions for data input, wherein the data input is performed at a wireless device having a processor and a memory, comprising:”*

162. I understand that “[a]t least one non-transitory computer-readable storage medium storing instructions for data input, wherein the data input is performed at a wireless device having a processor and a memory, comprising” is the preamble to claim 9 of the ’428 patent. I have been asked to assume that the preamble is a claim limitation. Under that assumption, in my opinion, *Arai* discloses or suggests this feature.

163. For example, *Arai* discloses a mobile information device with a non-transitory computer-readable storage medium storing instructions. *Arai* discloses a CPU 6 and a ROM 8 (*id.* ¶[0023]), in which the “CPU 6 is connected through a system bus 13 to the various constituent elements of the mobile information device 1, such as . . . the ROM 8, the coordinate input unit 5, the display unit 2, and the like. Moreover, the CPU 6 executes various types of control through programs that are stored in the ROM 8” (*id.* ¶[0025]).

164. Further, *Arai* discloses that “the present invention may be formed as, for example, . . . a storage medium, or the like.” Ex. 1005 ¶[0199]. In particular, *Arai* discloses:

While in the above exemplary embodiments were described in detail, ***the present invention may be formed as***, for example, a system, a device, a method, a program, ***a storage medium***, or the like, and, specifically, may also be applied as a system that is structured from a plurality of devices, and may be applied as a device that is constituted from a single device.

Id. ¶[0199].

165. *Arai* explains further:

Note that ***the present invention includes a case that is achieved by a software program for achieving the functions of the embodiments***, set forth above (a program corresponding to the flowchart that is shown in a diagram in an embodiment), supplied either directly or remotely to a system or device, ***where a computer of the system or device reads out and executes the supplied program code***.

Id. ¶[0200]; *see also id.* ¶[0201] (stating that the program code “is an implementation of the present invention”).

166. The medium for supplying the “program may be, for example, a Floppy (registered trademark) disk, a hard disk, an optical disc, a magneto-optical disc, an MO, a CD-ROM, a CDR, a CD-RW, a magnetic tape, a nonvolatile memory card, a ROM, a DVD (a DVD-ROM, DVD-R), or the

like.” *Id.* ¶[0203]. A person having ordinary skill in the art would have understood these media to be examples of non-transitory computer readable medium.

167. *Arai* also discloses data input performed on a mobile information device, as I explained above in §§XI.A.1.a and XI.A.1.b. In my opinion, a person having ordinary skill in the art would have understood that *Arai*’s disclosure of a mobile information device “such as a PDA (Personal Digital Assistant), mobile telephone . . . or the like” (Ex. 1005 ¶[0022]), would be a “wireless device.” This is corroborated, for example, by *Holmes*.

168. *Holmes* discloses PDAs and mobile devices, similar to those disclosed in *Arai*. Ex. 1008, Abstract, claim 39. In particular, *Holmes* discloses that a device such as a PDA is one of many types of “wireless devices.” *Id.*, 3:50-54; *see also id.*, claims 30 (disclosing a PDA as a “wireless device”), 31 (same), 4:14-22 (discussing a “wireless transmission between a wide variety of devices” including PDAs). *Holmes* further discloses that a mobile telephone is a

type of “wireless device.” *Id.*, claims 39 (disclosing a mobile telephone as a “wireless device”), 47 (same), 58 (same).¹¹

169. Therefore, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest that the ROM stores programs for performing the method described in *Arai*, including data input (“[a]t least one non-transitory computer-readable storage medium storing instructions for data input”) where the handwritten input occurs on a mobile information device capable of wireless communication with a CPU, ROM and RAM (“wherein the data input is performed at a wireless device having a processor and a memory”).

b. 9[a]: “receiving a first user input and at least a second user input;”

170. In my opinion, *Arai* discloses or suggests “receiving a first user input and at least a second user input” for the reasons I explained above in §XI.A.1.b (discussing two user inputs, 工 and 場).

¹¹ To be clear, I am using *Holmes* (Ex. 1008) in this paragraph, as evidence of what would have been known to a person having ordinary skill in the art and/or the state of the art. *Holmes* is not part of the unpatentability grounds.

- c. 9[b]: “wherein the first and second user input are handwritten input received on a handwriting input area of the wireless device;”**

171. In my opinion, *Arai* discloses or suggests “wherein the first and second user input are handwritten input received on a handwriting input area of the wireless device” for the reasons I explained above in §XI.A.1.b (discussing receiving two handwritten inputs, 工 and 場, in “two regions 67a and 67b” for “alternatingly filling in handwritten character[s]”), and §XI.A.6.a (explaining that the mobile information device is a “wireless device”).

- d. 9[c]: “determining a first sequence based on a best match of the first and second user inputs, wherein the first sequence includes at least the first input;”**

172. In my opinion, *Arai* discloses or suggests “determining a first sequence based on a best match of the first and second user inputs, wherein the first sequence includes at least the first input.” For the reasons I explained above in §XI.A.1.e, *Arai* determines the first sequence 工場 based on the best match of the first user input 工, and the second user input 場. A person having ordinary skill in the art would have understood that this first sequence 工場 includes “at least the first input,” because it includes 工.

- e. 9[d]: “storing the first sequence to a memory of the mobile device;”**

173. In my opinion, *Arai* discloses or suggests “storing the first sequence to a memory of the mobile device.” For the reasons I explained above

in §XI.A.1.d, each of 工 and 揚 in the sequence 工場 are stored in the mobile device's RAM.

f. 9[e]: “automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word; and”

174. In my opinion, *Arai* discloses or suggests “automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word.”

175. For example, *Arai* discloses sending the sequence 工場 to the post-processing unit 34 for additional processing. Ex. 1005 ¶[0146] (disclosing the six possible combinations of the sequence to be evaluated); *see also id.* ¶[0143] (disclosing that “the recognition result candidates are saved into the post-processing unit 34”). The post-processing unit 34 receives “character candidate strings” and determines “the combinations that have the highest chain probabilities . . . to display the combination with the highest value.” *Id.* ¶[0114]. *Arai* discloses:

The post-processing unit 34 determines, from the character candidate strings, which comprise the character codes and the evaluation values for the recognition candidates, the combinations that have the highest chain probabilities between the character strings, to change the display

within the input character buffer area 61 to display the combination with the highest value as the first candidate.

Id.

176. *Arai* also discloses the use of dictionaries and chain probabilities. For example, *Arai* determines that 工場 should probably be 工場 (*id.* ¶[0148]) based on chain probabilities “calculated using a dictionary for post-processing” (*id.* ¶[0146]). *Arai* explains that six possible:

combinations are, for example, ‘工場’, ‘工場’, ‘工場’, ‘工場’, ‘工場’, ‘工場’. Given this, the post-processing unit 34 determines the candidate character string with the highest chain probability among these accommodations.

Id. ¶[0146].

177. A person having ordinary skill in the art would have understood that these six combinations comprise at least acceptable words pulled from a dictionary or database as the system would not offer non-words. At a minimum, a person having ordinary skill in the art would have understood that at least the combinations with the highest values after post processing would result in a combination with acceptable words or phrases.

178. As I discussed in §XI.A.1.g, *Arai* includes a specific example in which for the given sequence 工場, the post-processing unit returns 工場 as the most probable correct sequence based on chain probabilities. *See id.* ¶[0148] (disclosing that “the recognition result by the handwritten character recognition

processing unit 35 *may be replaced* with ‘工場’). However, *Arai* also contemplates that the post-processing unit could return any of the character strings 工揚, 工場, 工揚, 工場, 工揚, 工場, and that it would be possible for the first sequence 工場 to be determined to have the highest chain probability. *See id.* ¶[0146]. In my opinion, a person having ordinary skill in the art would have understood that *Arai* contemplates that any of the six combinations may have the highest chain probability, including the first sequence 工場.

179. With regards to post-processing, *Arai* discloses the use of “post-processing dictionary data (dictionary data for chain probability calculation), various types of table and setting data, and the like.” *Id.* ¶[0027]. In my opinion, a person having ordinary skill in the art would have understood this disclosure to encompass that the dictionary data would be stored in a database or other similar data structure.

180. For example, *Baker* is an example of a conventional character/word recognition system that was known at the time. *Baker* also uses a dictionary to recognize characters/words. Ex. 1007 ¶¶[0049] (disclosing a “reference database 40 that includes a dictionary”), [0072] (disclosing that the “reference database 40 can be a dictionary, thesaurus,” etc.), [0095] (same).

Thus, *Baker* is evidence that a person of ordinary skill in the art would have known that dictionaries were commonly stored/implemented in a database.”¹²

181. In addition, *Arai* automatically conducts post-processing without the user having to input a space or select a word. Figure 4 of *Arai* describes scenarios when the system will continue post-processing versus when it will evaluate whether to stop post-processing. *Arai*, FIG. 4 (indicating potential termination of post-processing for “Candidate Change process” and “Space Input,” for example); *see also id.* ¶[0062] (determining for “candidate change process” whether “to temporarily stop, at that time, post-processing the character that was inputted prior to the candidate selection instruction”). A person having ordinary skill in the art would have understood *Arai* to disclose or suggest that, as long as the user continues “Handwritten Character Input,” *Arai* continues post-processing on that input. *Arai*, FIG. 4 (continuation of post-processing for “Handwritten Character Input”). Fundamentally, because *Arai* continues post-processing while the user continues handwritten character input, a person having ordinary skill in the art would have understood that *Arai*

¹² To be clear, here, I am using *Baker* (Ex. 1007) as evidence of what would have been known to a person having ordinary skill in that art and/or the state of the art. I am not using *Baker* as part of the combination in Ground 1.

determines that at least a portion of the sequence matches a word or phrase without the user entering a space or selecting a word.

182. Thus, in my opinion, a person having ordinary skill in the art would have understood *Arai* to disclose or suggest that the sequence 工揚 could be the combination with the highest chain probability based on post-processing dictionary data or various types of table and setting data (“determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases”) without the user entering the space key or selecting another candidate (“automatically determining . . . without the user inputting a space or selecting a word”).

g. 9[f]: “sending the first sequence to an application or service running on, or accessible by, the wireless device, wherein the sending comprises removing the first sequence from the memory storage buffer, and wherein the sending is performed in the absence of user editing of the first sequence”

183. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests “sending the first sequence to an application or service running on, or accessible by, the wireless device, wherein the sending comprises removing the first sequence from the memory storage buffer, and wherein the sending is performed in the absence of user editing of the first sequence.”

184. As I explained in §XI.A.6.f, *Arai* discloses or suggests a scenario in which in response to the first sequence 工揚, post-processing unit 34

determines 工揚 to have the highest chain probabilities. In this scenario, the *Arai-Fenwick* combination discloses or suggests removing the sequence 工揚 from memory,¹³ in the same manner and for the same reasons as I discussed above in §XI.A.1.h.

185. A person having ordinary skill in the art would have been motivated to combine *Arai* and *Fenwick* for the same reasons as I discussed above in §§XI.A.1.d and XI.A.1.h to send the first sequence 工揚 to an application (for example, an electronic mail application) in the absence of the user editing the first sequence.

186. Further, as I discussed in §XI.A.6.a, the mobile information device is a wireless device, and as I discussed in §XI.A.1.i, it has at least an electronic mail application running on the mobile information device.

187. Therefore, in my opinion, a person having ordinary skill in the art would have understood the *Arai-Fenwick* combination to disclose or suggest sending the first sequence 工揚 to an electronic mail application on the wireless

¹³ I note that the language of this limitation requires removal from “*the* memory storage buffer,” but this is the first appearance of this term in claim 9. For the purposes of my analysis, I have assumed that the antecedent basis for “the memory storage buffer” is “a memory” in claim limitation 9[d].

mobile information device (“sending the first sequence to an application or service running on, or accessible by, the wireless device”), wherein, 工揚 is also removed from the buffers without the user editing 工揚 (“wherein the sending comprises removing the first sequence from the memory storage buffer, and wherein the sending is performed in the absence of user editing of the first sequence”).

7. **Claim 12: “The computer readable medium of claim 9 further comprising: presenting the first sequence to the user, wherein the presenting includes displaying the first sequence to the user and allowing the user to edit the first sequence.”**

188. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests this claim for the same reasons I explained above in §XI.A.1.f (“presenting the first sequence to the user, wherein the presenting includes displaying the first sequence to the user and allowing the user to edit the first sequence”).

8. **Claim 13: “The computer readable medium of claim 9, wherein the first user input and the second user input include at least one of a Chinese character, a Japanese character, or a Korean character.”**

189. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests this claim for the same reasons I explained above in §XI.A.5, as well as in §§XI.A.1.b and XI.A.4.

B. GROUND 2: *ARAI* IN COMBINATION WITH *FENWICK* AND *BAKER* RENDERS OBVIOUS CLAIMS 9 AND 12-13

1. Claim 9

a. 9[pre] through 9[d] and 9[f]

190. In my opinion, *Arai* in combination with *Fenwick* discloses or suggests 9[pre] through 9[d], and 9[f] for the same reasons that I discussed in §§XI.A.6.a through XI.A.6.e, and XI.A.6.g, respectively.

b. 9[e]: “automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word; and”

191. For the reasons I discussed in §XI.A.6.f, it is my opinion that the *Arai-Fenwick* combination discloses or suggests this limitation, including “a database of acceptable words and/or phrases.” To the extent that the Board may disagree that *Arai*’s disclosure encompasses that its dictionary data would be stored in a database or other similar data structure, it is my opinion that *Arai* in combination with *Fenwick* and *Baker* discloses or suggests this limitation including “a database of acceptable words and/or phrases.”

192. *Baker* relates “generally to methods and systems for word¹⁴ recognition,” including “a [handwritten] character recognition process.” Ex. 1007 ¶¶[0001] (“This invention relates generally to methods and systems for word recognition, and, more particularly, to methods and systems that employ context and meaning to recognize a word, or a series of words.”), [0004] (“**Word recognition, such as** speech recognition or **character recognition**, is an alternative procedure for entering commands and information into a computer. In a word recognition procedure, an automated system recognizes each word by its sound, the shape of its letters, or some other characteristic, and generates the appropriate numerical data code. . . . [I]n a character recognition process where there is handwritten input or an operator scans a document into a computer, the computer recognizes the shape of each character and generates the appropriate

¹⁴ I note that *Baker* refers to “word recognition” throughout the specification. However, it also explains that the term “word” encompasses characters. Ex. 1007 ¶[0033] (“‘Word’, as the term is used herein, may be a word or a phrase and may be spoken, written, or represented as electronic data signals. The term **word may also encompass** a tone, **a character**, punctuation symbols, numerals and any symbol expressive of one or more meanings such as an object, concept, condition. or action.”)

binary code as if the document were being retyped into the computer.”) *Baker* also “employ[s] context and meaning to recognize a word, or a series of words.” *Id.* ¶[0001].

193. To perform character recognition, *Baker* teaches that it uses “known techniques” to “offer several words as choice words to replace [an] unrecognized word.” *Id.* ¶¶[0025]. One method of determining the unrecognized word is to use a dictionary. *See, for example, id.* ¶¶[0037] (disclosing use of “an established reference source, such as a dictionary . . . [t]o evaluate a choice word”), [0040] (disclosing that “the reference source is a conventional dictionary”).

194. *Baker*’s handwritten character recognition system further teaches a database including a dictionary. In particular, *Baker* discloses:

The word list generator 16, depicted in Fig. 1, is one particular and optional embodiment of a passage list generator that can connect to the reference database 40 to identify passages of language knowledge which are semantically relevant to an associated choice word, or in other embodiments, context words. . . .For example, the passage list generator ***can connect to a reference database 40 that includes a dictionary.*** The passage list generator can ***select passages from the dictionary by comparing the choice words 20 to the dictionary headwords.*** Passages that have headwords that match, or substantially match, a choice word, are selected as a passage of text that is related to the matched choice word 20.

Id. ¶[0049]; *see also id.* ¶¶ [0072] (disclosing that the “reference database 40 can be a dictionary, thesaurus,” etc.), [0095] (same).

195. More particularly, *Baker* discloses that it compares choice words to a “reference database 40 [that] can be a dictionary” (*id.* ¶[0072]), to determine context and whether the “dictionary definition” is “semantically related to the respective choice word 20” (*id.* ¶[0073]).

196. In my opinion, a person having ordinary skill in the art would have been motivated to use *Baker*’s teachings about using a database to store/implement the dictionary of the *Arai-Fenwick* combination. *Arai* discloses the use of a dictionary without disclosing how the dictionary is stored/implemented. *See* Ex. 1005 ¶¶[0027] (disclosing “post-processing dictionary data”), [0146] (“using a dictionary for post-processing”). *Baker* provides the details for how to store/implement such a dictionary (for example, in a database). *See* Ex. 1007 ¶¶[0049], [0072]. For that matter, *Baker* also teaches that a dictionary in itself may be a database. *See id.* ¶[0095].

197. In my opinion, a person having ordinary skill in the art would have found it obvious to combine *Baker* with the *Arai-Fenwick* combination because it would have been the mere application of a known technique (*Baker*’s use of a database to store/implement a dictionary) to a known device (the *Arai-Fenwick* combination that uses a dictionary to calculate chain probabilities in post

processing) ready for improvement to yield predictable results (the *Arai-Fenwick-Baker* combination in which the dictionary is stored/implemented in a database).

198. The remainder of the features of this limitation would have been disclosed or suggested by the *Arai-Fenwick-Baker* combination for the same reasons I discussed in §XI.A.6.f.

199. Thus, in my opinion, a person having ordinary skill in the art would have understood the *Arai-Fenwick-Baker* combination to disclose or suggest that the sequence 工場 could be the combination with the highest chain probability based on a post-processing dictionary data stored in a database (“determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases”) without the user entering the space key or selecting another candidate (“automatically determining . . . without the user inputting a space or selecting a word”).

2. Claims 12 and 13

200. In my opinion, *Arai* in combination with *Fenwick* and *Baker* discloses or suggests claims 12 and 13 for the same reasons discussed in §§XI.A.7 and XI.A.8, respectively.

XII. SECONDARY CONSIDERATIONS

201. I am not aware of any evidence in the '428 patent's prosecution history or elsewhere supporting any secondary considerations arguments, or evidence of nexus of such alleged evidence to the Challenged Claims. *See generally* Ex. 1004. To the extent Patent Owner asserts the existence of any secondary considerations in its responses, I reserve the right to address any such assertions or evidence.

XIII. CONCLUSION

I declare that all statements made herein of my knowledge are true, 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.

Executed on: 8/8/2024



Jean Renard Ward