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(54) **IMAGE DISPLAY UNIT AND IMAGE FORMING APPARATUS INCLUDING THE SAME**

(71) Applicant: **SHARP KABUSHIKI KAISHA**, Sakai, Osaka (JP)

(72) Inventors: **Yoichi Kimura**, Osaka (JP); **Kunihisa Chiba**, Sakai (JP); **Kazuyuki Ogida**, Sakai (JP)

(73) Assignee: **SHARP KABUSHIKI KAISHA**, Sakai, Osaka (JP)

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G03G 15/00 (2006.01)
H04N 1/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H04N 1/00448*** (2013.01); ***G03G 15/502*** (2013.01); ***G03G 15/5016*** (2013.01);
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(58) **Field of Classification Search**
CPC H04N 1/00448; H04N 1/0048; H04N 1/00442; H04N 1/00445; H04N 1/00477;
(Continued)

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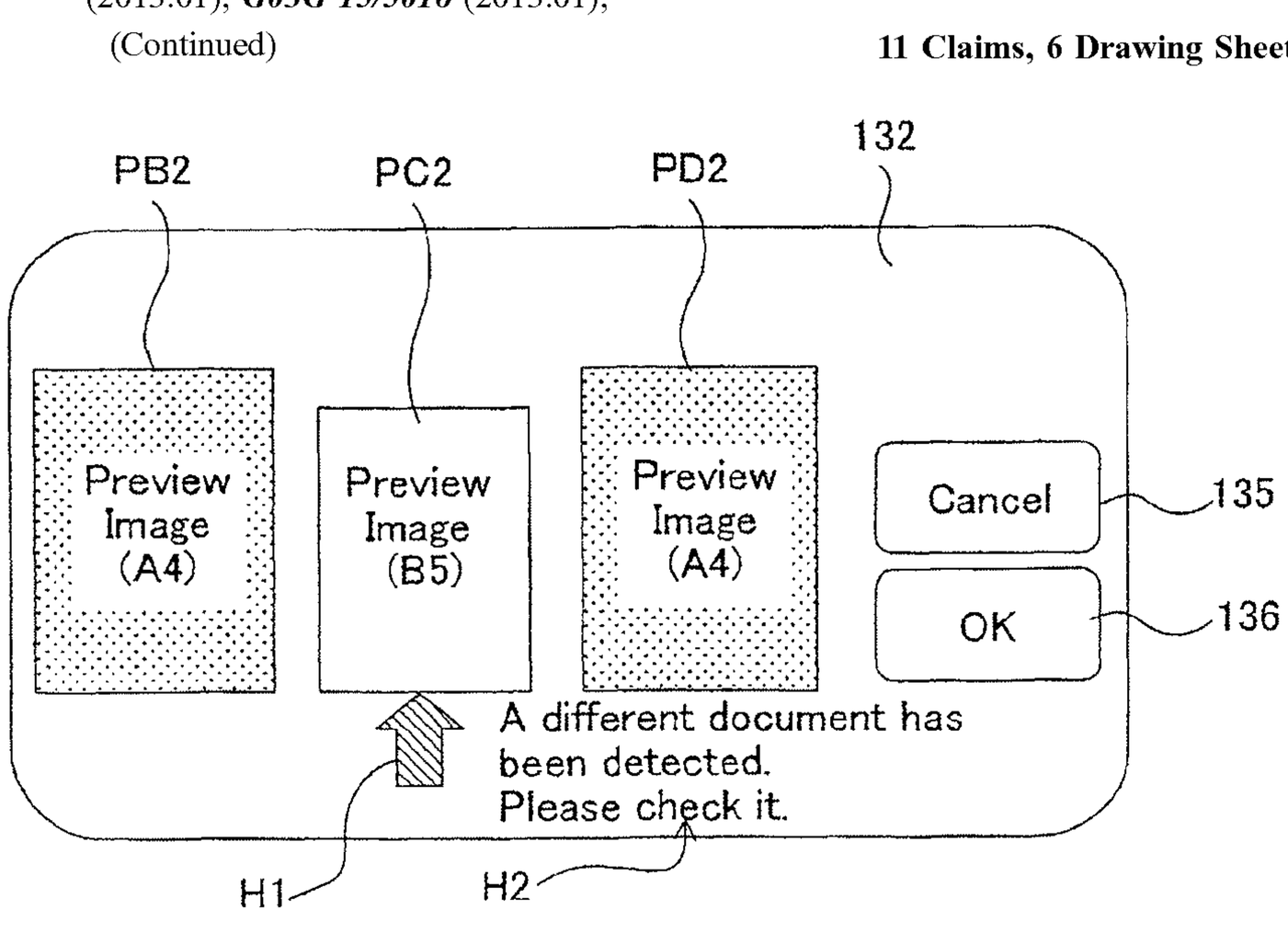
Primary Examiner — Yuzhen Ge
(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

An image display unit capable of displaying image data page-wise includes: a scanner portion; a display panel for displaying input image data in preview representation; an input condition determiner that compares the image data successively input through the scanner portion, as to input condition and determines whether there is any change in the image data input condition; and a display controller that, when the input condition determiner determines that the input image data has changed in the input condition, makes control such as to display the image data that was determined to have changed in the input condition and the image data input immediately before the image data in question, together on the display panel.

11 Claims, 6 Drawing Sheets



(52) **U.S. Cl.**
CPC ***G03G 15/5087*** (2013.01); ***H04N 1/0048*** (2013.01); ***H04N 1/00442*** (2013.01); ***H04N 1/00445*** (2013.01); ***H04N 1/00477*** (2013.01); ***H04N 1/00708*** (2013.01); ***H04N 1/00724*** (2013.01); *G03G 2215/00109* (2013.01); *H04N 2201/0005* (2013.01); *H04N 2201/0094* (2013.01)

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CPC H04N 1/00708; H04N 1/00724; H04N 2201/0005; H04N 2201/0094; G03G 15/502; G03G 15/5016; G03G 15/5087; G03G 2215/00109
See application file for complete search history.

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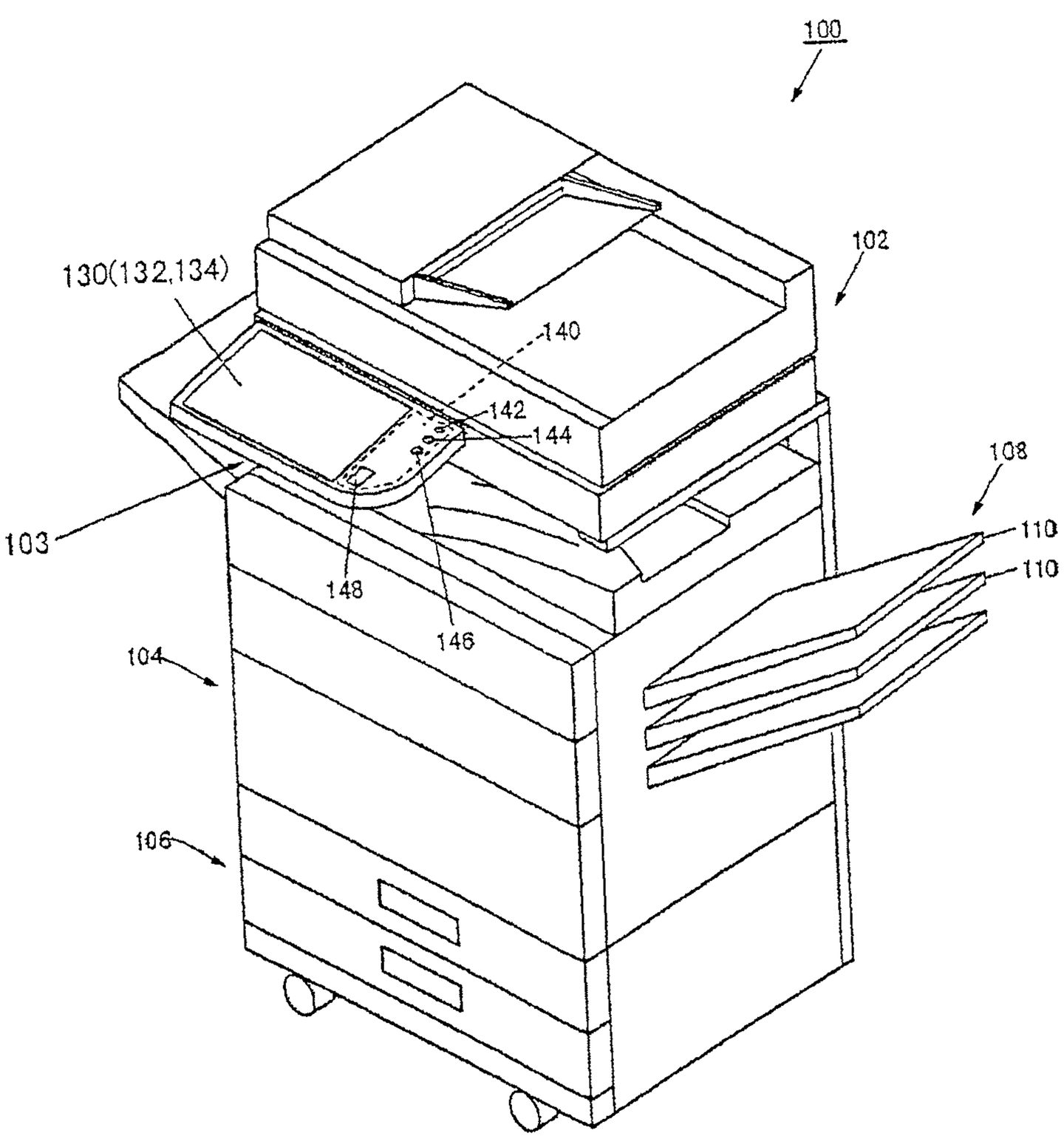
FIG. 1



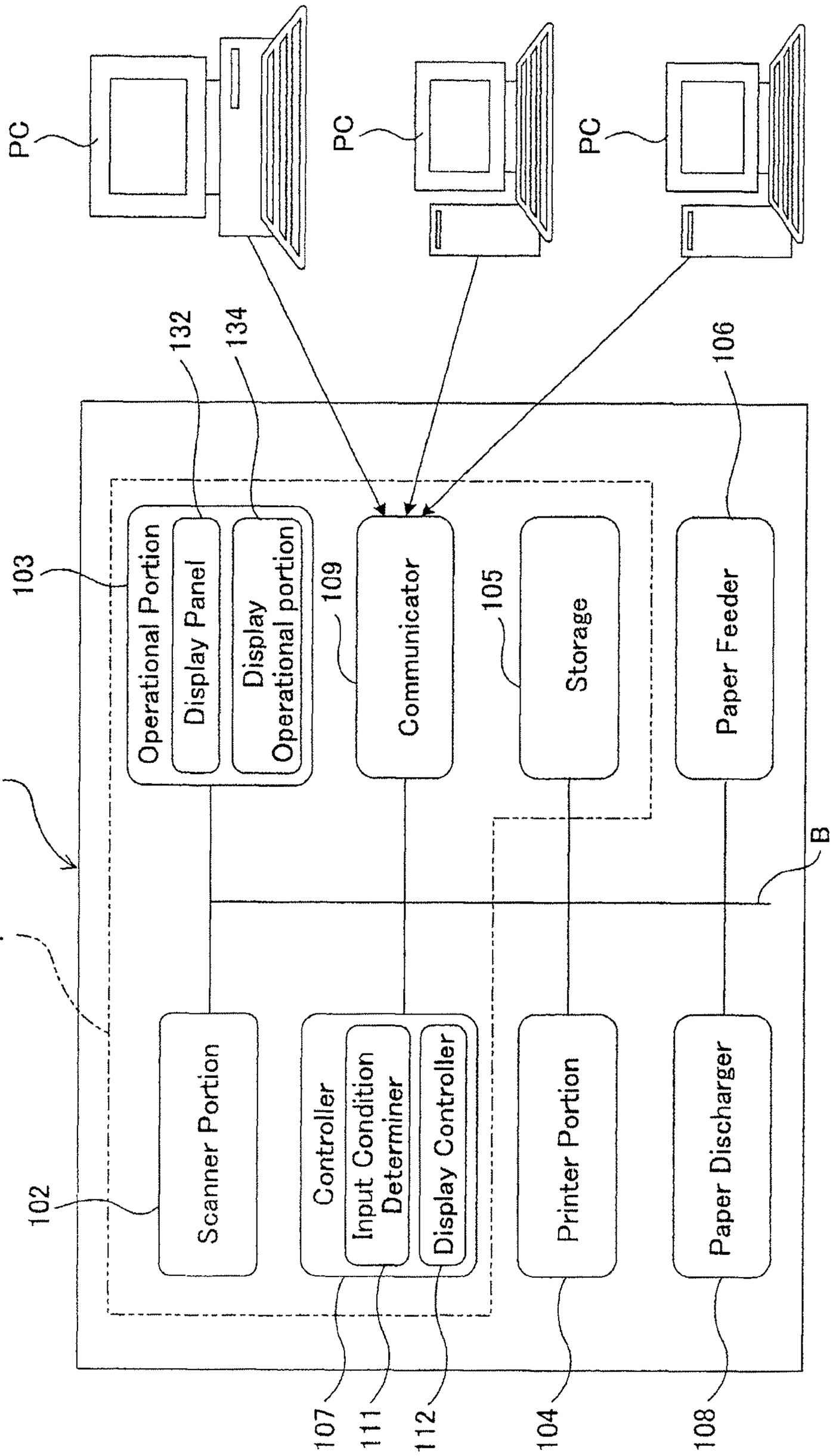

PC
PC
PC
132
134
106
103
Operational Portion
Display Panel
Display Operational portion
109
Communicator
105
Storage
Paper Feeder
100
B
1
Scanner Portion
Controller
Input Condition Determiner
Display Controller
Printer Portion
Paper Discharger
102
107
111
112
104
108

FIG. 2

FIG. 3a

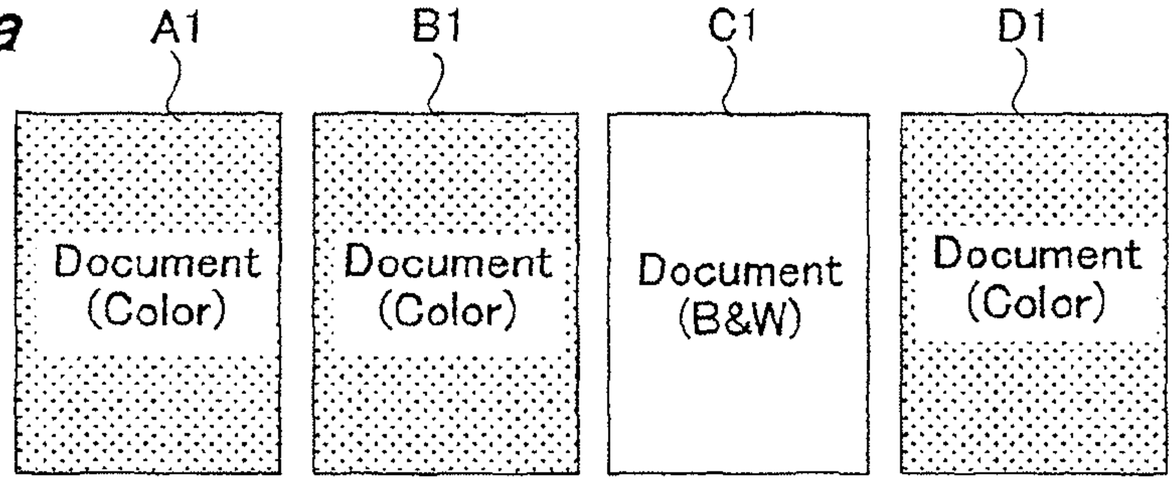


FIG. 3b

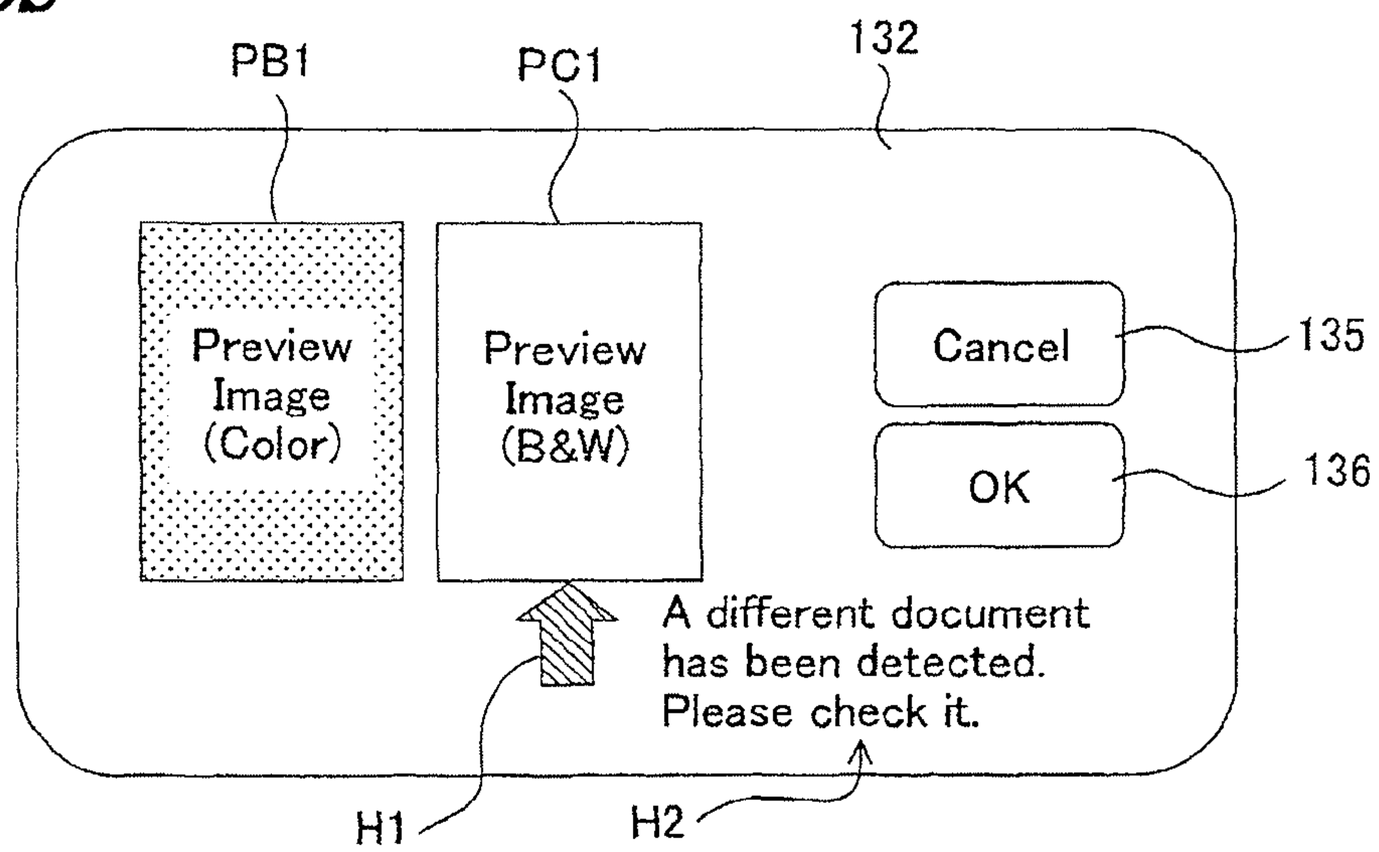


FIG. 3c

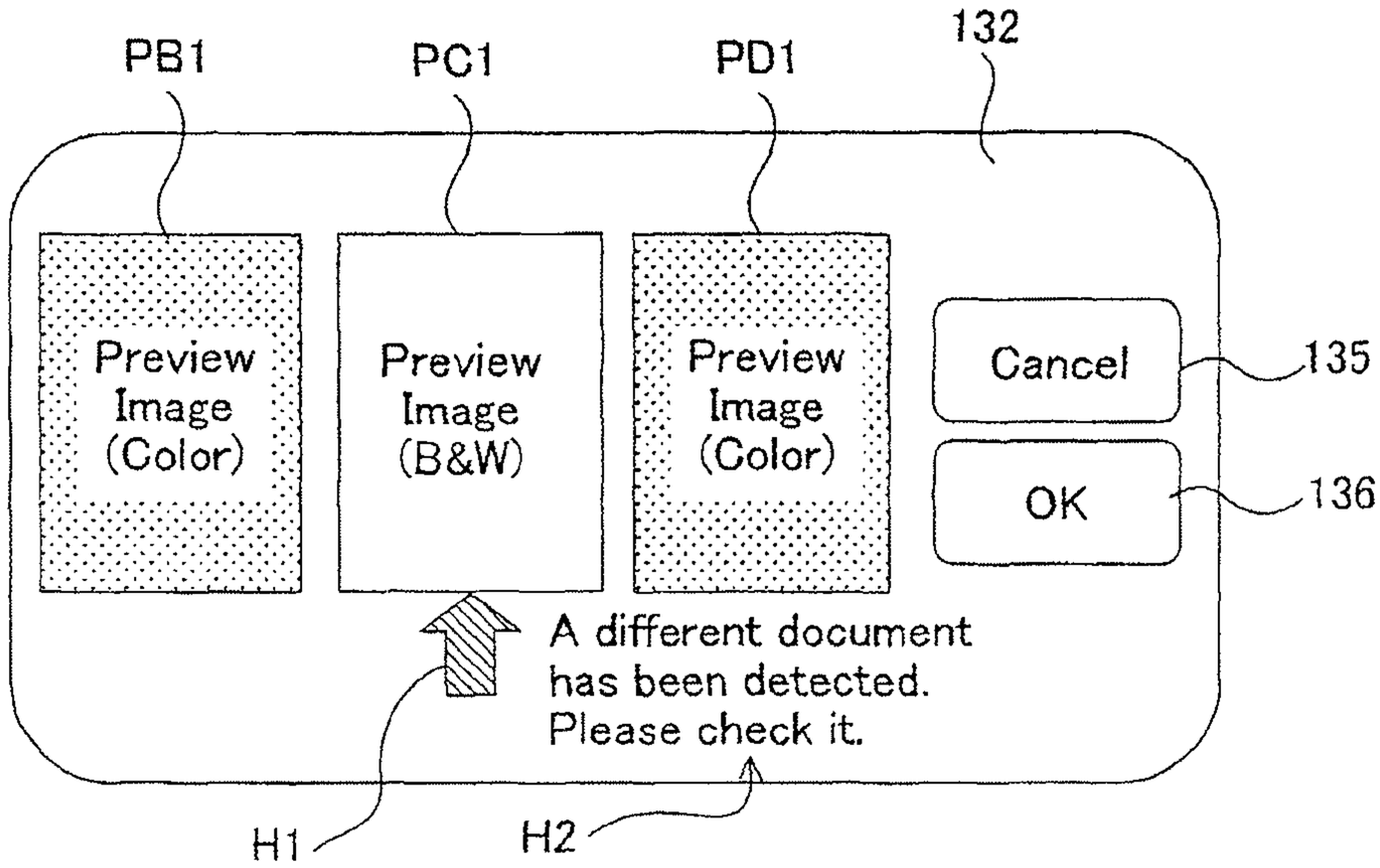


FIG. 4a

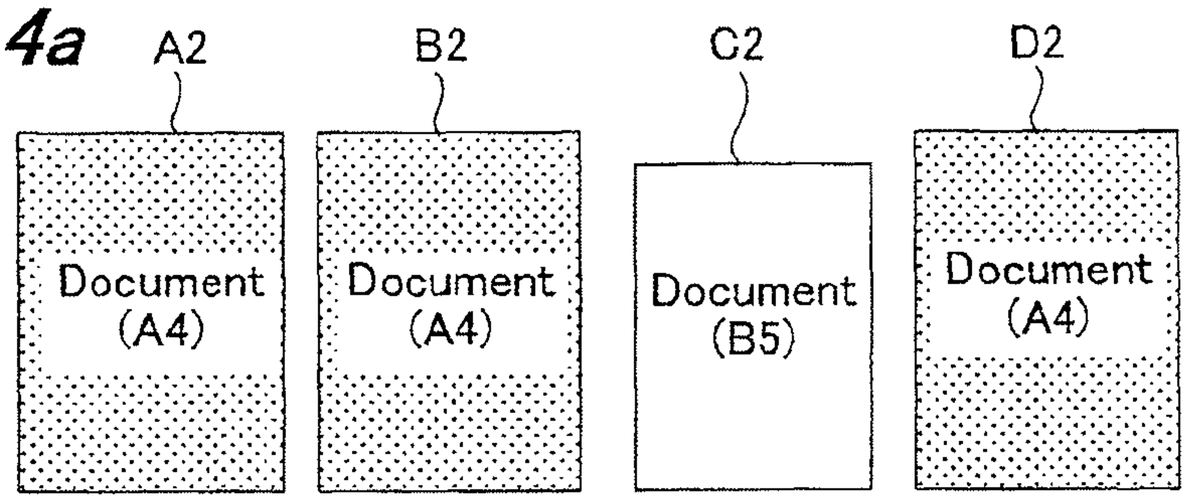


FIG. 4b

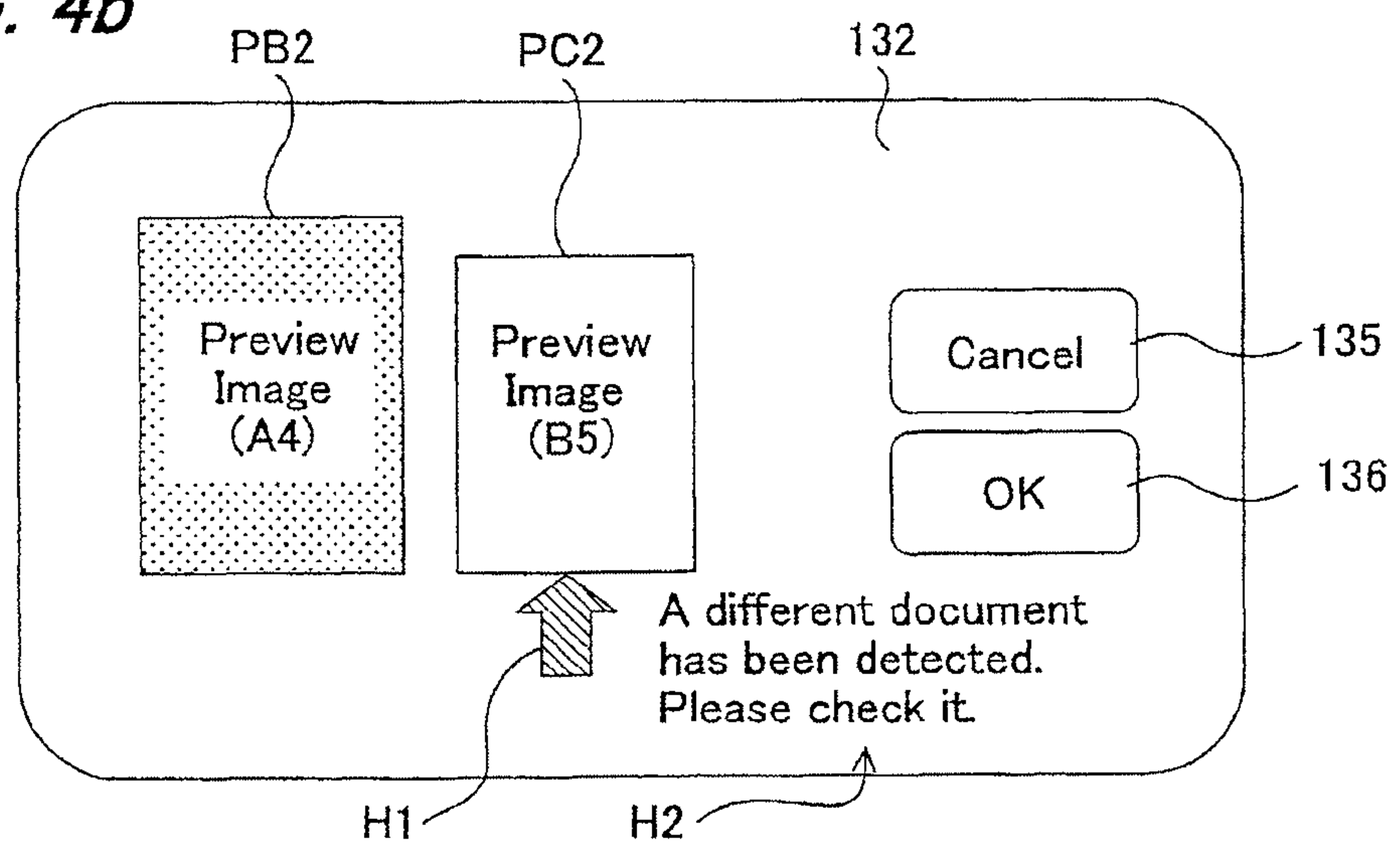


FIG. 4c

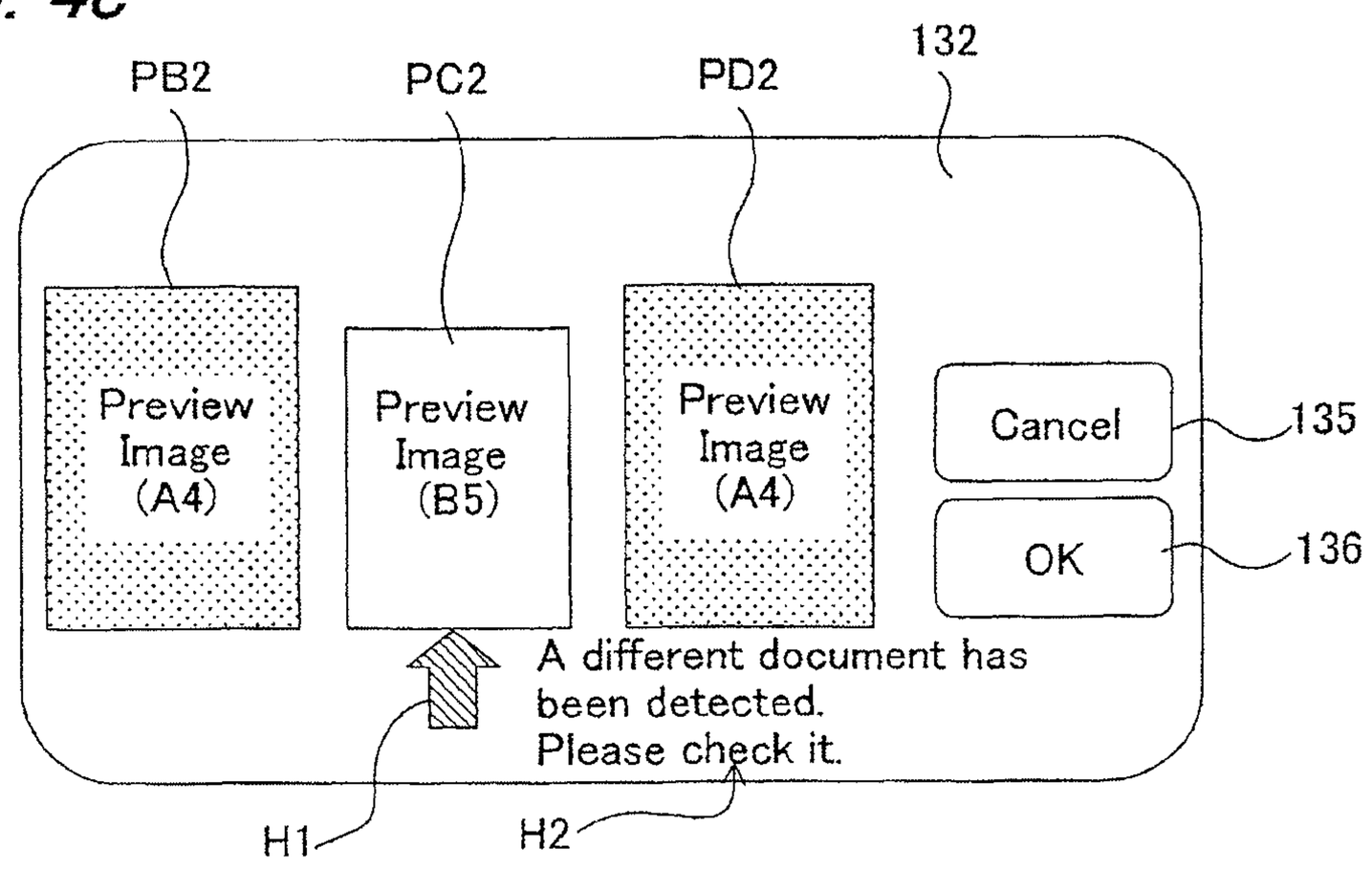


FIG. 5

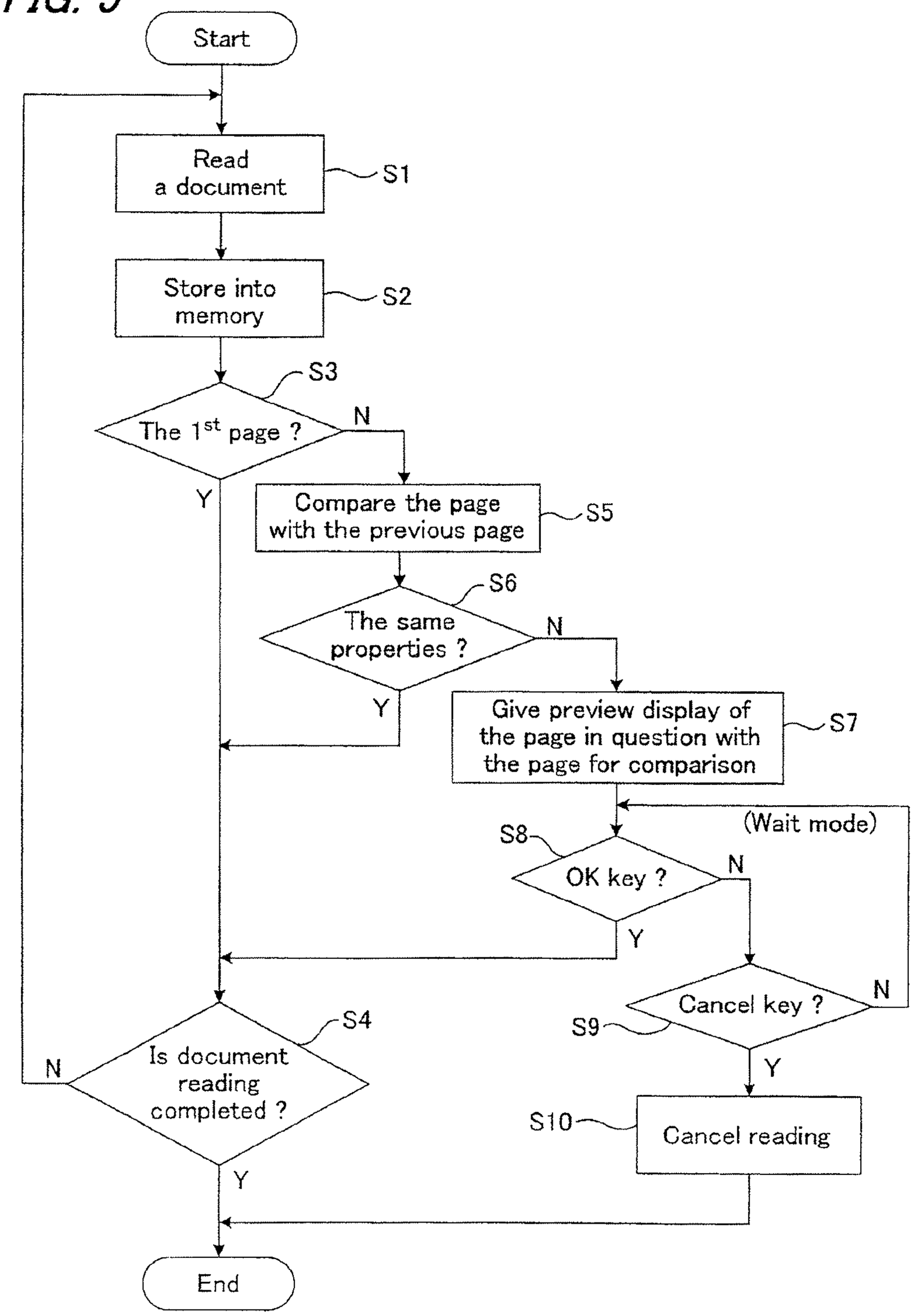

Start
Read a document
S1
Store into memory
S2
S3
The 1st page ?
N
Y
Compare the page with the previous page
S5
S6
The same properties ?
N
Y
Give preview display of the page in question with the page for comparison
S7
(Wait mode)
S8
OK key ?
N
Y
Cancel key ?
S9
N
Y
S10
Cancel reading
S4
Is document reading completed ?
N
Y
End

FIG. 6

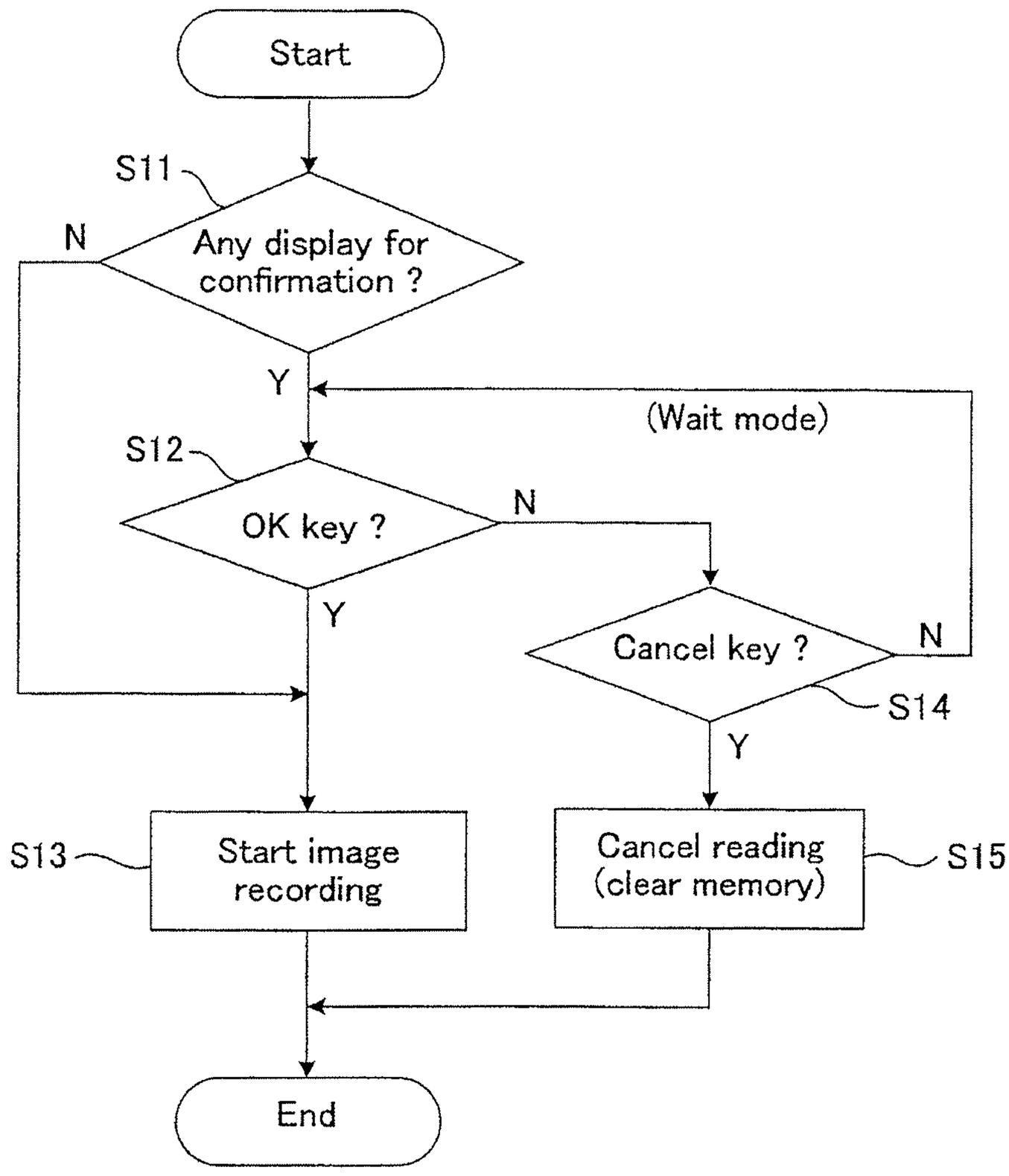

Start
S11
Any display for confirmation ?
N
Y
(Wait mode)
S12
OK key ?
N
Y
Cancel key ?
N
S14
Y
S13
Start image recording
Cancel reading (clear memory)
S15
End

IMAGE DISPLAY UNIT AND IMAGE FORMING APPARATUS INCLUDING THE SAME

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

[CROSS-REFERENCE] *CROSS REFERENCE* TO RELATED APPLICATIONS

[This application is a Continuation of Copending application Ser. No. 13/104,692, filed on May 10, 2011, which claims priority under 35 U.S.C. §119(a) on patent application No. 2010-109394 filed in Japan on 11 May 2010, all of which are hereby expressly incorporated by reference into the present application.] *This application is a Reissue Application of U.S. Pat. No. 9,473,652, issued on Oct. 18, 2016 which issued from application Ser. No. 14/524,723 filed on Oct. 27, 2014, which claims priority under 35 U.S.C. § 119(a) to application Ser. No. 13/104,692, filed in the U.S. on May 10, 2011, which claims priority under 35 U.S.C. § 119(a) to JP Application No. 2010-109394, filed in Japan on May 11, 2010, all of which are hereby expressly incorporated by reference into the present application.*

Applicants have filed a continuation of the present reissue application, Reissue Continuation application Ser. No. 15/961,442 filed on Apr. 24, 2018 and currently pending which is accordingly a second Reissue application of U.S. Pat. No. 9,473,652.

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to an image display unit for use in an electrophotographic image forming apparatus such a copier, printer, facsimile machine or the like and an image forming apparatus including the display device, in particular, relating to an image display unit capable of displaying plural pages of document images in a preview representation as well as to an image forming apparatus including the same.

(2) Description of the Related Art

A conventional digital multifunctional machine including an image forming unit, scanner and the like, captures document images as image data through the scanner, stores the image data into memory and performs image recording of the image data based on the stored image data in the memory, in accordance with the conditions the user designates, such as the number of copies etc., to complete recorded matter.

In this digital multifunctional machine, if the document set on the scanner consists of multiple pages, the bundle of documents is set on the document tray of a conventionally existing automatic document feeder so that the documents are delivered one by one towards the document reader of the scanner, whereby the image of each document can be read.

In this sequential reading process of documents, some conventional apparatuses have been adapted to successively compare one document to the next and ask the operator to confirm continuation of the current job if any change of documents in image color type (color or monochrome), size, etc., was found by the comparison.

As a conventional technology, there is a disclosure of an image forming apparatus which gives a warning to ask the user to check when the color type (color or monochrome) of the output image designated by the user is different from the color type (color or monochrome) of the original images that have been actually scanned (see Patent Document 1).

As other examples, there is a technology in which if a change in document characteristics (common properties: document size, color document or monochrome document) is observed during scanning multiple documents, scanning is suspended to inform the user of that fact and ask the user to check the documents (see Patent Document 2). There is still another technology in which the document being scanned is determined to be color or monochrome so as to display a preview of the image of the document only when the document is a color one (see Patent Document 3).

Patent Document 1:

Japanese Patent Application Laid-open 2005-189537

Patent Document 2:

Japanese Patent Application Laid-open H07-23147

Patent Document 3:

Japanese Patent Application Laid-open 2009-88693

However, any of the aforementioned prior art technologies are to warn the user to check the size and/or color type (color or monochrome) of the original documents, so that they were not to seek user confirmation after informing the user of the status of the documents. Therefore, the user still had to check what state the documents is in.

SUMMARY OF THE INVENTION

The present invention has been devised in view of the above problems, it is therefore an object of the invention to provide an image display unit as well as an image forming apparatus including this, in which, when data of multiple images is input, the user is able to easily confirm the change of conditions such as the document size and color type of the input image data.

The first aspect of the present invention resides in an image display unit capable of displaying image data pagewise; comprising: an image data input portion for receiving input image data; a display portion for displaying the image data input from the image data input portion in preview representation; an input condition determiner that compares the image data successively input through the image data input portion, as to image data input condition so as to determine whether there is any change in the image data input condition; and, a display controller that, when the input condition determiner determines that the input image data has changed in the input condition, makes control such as to display the image data that was determined to have changed in the input condition and the image data input immediately before the image data in question (i.e., the image data located on the previous page), together on the display portion.

The second aspect of the present invention is characterized in that the display controller makes control such as to display also the image data input immediately after the image data (i.e., the image data located on the next page) that was determined to have changed in the input condition, on the display portion.

The third aspect of the invention is characterized in that the input condition is document size information.

The fourth aspect of the invention is characterized in that the input condition is color type information.

The fifth aspect of the invention resides in an image forming apparatus including the image display unit having any one of the above first to fourth aspects.

According to the first aspect of the present invention, since the image data that was determined to have changed in the input condition of image data and the image data for reference, i.e., the image data input immediately before the image data in question(image data located on the previous page) can be displayed together on the display portion, it is possible for the user to easily confirm how the input condition of the input image data has changed.

According to the second aspect of the present invention, the page of image data that was determined to have changed is displayed in preview representation by being placed between the images on the pages located before and after the page in question, hence it is possible to easily confirm change of pages.

According to the third aspect of the present invention, it is possible to easily confirm the status of existence of documents different in size.

According to the fourth aspect of the present invention, for example, by checking change in color, i.e., monochrome or color, or existence of both, it is possible to easily confirm the mixed status of monochrome and color images.

According to the fifth aspect of the present invention, since the image data that was determined to have changed in the input condition of image data and the image data for reference, or the image data input immediately before the image data in question (image data located on the previous page) can be displayed together on the display portion, it is possible for the user to easily confirm how the input condition of the input image data has changed. As a result it is possible to realize optimal image output in conformity with document images.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustrative view showing an overall configuration of an image forming apparatus to which an image display unit according to the embodiment of the present invention is applied;

FIG. **2** is an illustrative view with a block diagram of the image forming apparatus, showing terminal computers being connected to the image forming apparatus via communication lines;

FIG. **3**a is an illustrative view showing an example where a plurality of documents to be scanned by the image forming apparatus include documents having document images different in color type;

FIG. **3**b is an illustrative view showing a display panel of the image forming apparatus, on which a preview image of a document having a document image different in color type from a reference document and a preview image of a document (the reference document) scanned immediately before the document in question, are displayed side by side;

FIG. **3**c is an illustrative view showing a display panel of the image forming apparatus, on which a preview image of a document having a document image different in color type from a reference document and preview images of documents that are scanned before and after the document in question, are displayed side by side;

FIG. **4**a is an illustrative view showing an example where a plurality of documents to be scanned by the image forming apparatus include documents different in size;

FIG. **4**b is an illustrative view showing a display panel of the image forming apparatus, on which a preview image of a document different in size from a reference document and a preview image of a document (the reference document) scanned immediately before the document in question, are displayed side by side;

FIG. **4**c is an illustrative view showing a display panel of the image forming apparatus, on which a preview image of a document different in size from a reference document and preview images of documents that are scanned before and after the document in question, are displayed side by side;

FIG. **5** is a flowchart for illustrating the processing steps to be implemented by an image display unit in the image forming apparatus to read a plurality of documents and perform preview display based on determined result; and,

FIG. **6** is a flow chart for illustrating the image data processing steps to be implemented after preview display by an image display unit in the image forming apparatus.

DETAILED DESCRIPTION OF THE INVENTION

The embodiment of the present invention will hereinafter be described in detail with reference to the accompanying drawings.

FIG. **1** is an illustrative view showing an overall configuration of an image forming apparatus **100** to which an image display unit **1** (FIG. **2**) according to the present embodiment of the invention is applied.

As shown in FIG. **1**, image forming apparatus **100** includes: a scanner portion (image data input unit) **102** for capturing image data; and an operational portion **103** having a display panel (display portion) **132** for providing preview display of image data captured and input by scanner portion **102**. Display panel (display portion) **132** can display multiple preview images of page-wise image data.

Though the present embodiment will be described on the assumption that the preview images of multiple document images displayed on display panel **132** are given as image data (a bundle of documents given as a job) of documents captured by scanner portion **102** etc., of image forming apparatus **100**, the image data taken in by image forming apparatus **100** may be given as image data input in communication with a terminal computer outside image forming apparatus **100** or image data that is stored in an external memory and loaded through a memory card slot or radio communication.

The apparatus to which image display unit **1** is mounted is not limited to image forming apparatus **100**, but may be an image processing apparatus or electronic device other than image forming apparatus **100**.

This image forming apparatus **100** forms images on recording paper based on electrophotography.

Further, image forming apparatus **100** includes, as its operation mode, copy mode, facsimile mode (FAX mode), document filing mode (a mode in which scanned images are stored in a storage inside the image forming apparatus) and mail mode (a mode in which scanned images are transmitted in the form of a file attached to an e-mail). This image forming apparatus **100** may further have a network printer mode.

To begin with, image forming apparatus **100** will be described.

As shown in FIG. **1**, image forming apparatus **100** includes image display unit **1** (FIG. **2**) essentially comprised of scanner portion **102** and an operational portion **103**, a printer portion **104**, a paper feeder **106** and a paper discharger (paper output processor) **108**.

Scanner portion **102** is mounted on top of the apparatus body and reads image information from documents.

Operational portion **103** includes a touch-panel display **130** and a display control portion **140**, and is arranged at the top of the apparatus body on the user' operating side (front side).

Touch panel display **130** is comprised of a display panel **132** of a liquid crystal panel and the like and a touch panel **134** that is laid over display panel **132** to detect the positions the user presses with fingers.

Display control portion **140** includes an indication lamp **142**, a power key **144**, an energy-save key **146** and a home key **148**. Home key **148** is the key that resets the display content on touch panel display **130** to the home screen for operational mode selection.

In this way, image forming apparatus **100** has touch panel display **130** as a main control device and also has display control portion **140** that includes hardware keys and indication lamp. The keys (power key **144**, energy-save key **146** and home key **148**) on display control portion **140** are given as hardware buttons, in contrast to software buttons formed by touch panel display **130**.

It should be noted that display control portion **140** may be formed of touch panel display **130** only by replacing the aforementioned hardware buttons with software buttons.

In paper discharger **108**, a plurality of recording sheets are sorted and discharged to individual paper output trays **110**, and/or each set of recording sheets is punched or stapled. For example, when multiple copies of printed documents are prepared, the printed recording sheets are sorted and discharged to individual paper output trays **110** so that each set of recording paper is allotted to different paper output tray **110**. The thus sorted recording sheets on each paper output tray **110** are individually punched or stapled into individual printed matter.

Next, the configuration of image forming apparatus **100** will be described with reference to a block diagram.

FIG. **2** is an illustrative view with a block diagram of image forming apparatus **100**, showing terminal computers PC being connected to the image forming apparatus **100** via communication lines.

As shown in FIG. **2**, image funning apparatus **100** includes scanner portion **102**, operational portion **103**, printer portion **104**, a storage **105**, paper feeder **106**, a controller **107**, paper discharger **108** and a communicator **109**, each being connected to a bus B.

Image display unit **1** is mainly comprised of scanner portion **102**, operational portion **103**, storage **105** and controller **107**.

Scanner portion **102** is arranged on top of the apparatus body and reads document images.

Operational portion **103** receives image forming conditions and a start command to the apparatus from the user and gives notice of information to be notified from the apparatus to the user by means of display panel **132**.

Storage **105** offers a function as a working memory for temporarily storing the result of operations and processing by controller **107** and a function as a frame memory for recording image data. Accordingly, storage **105** records the image data input from external terminal computers PC and the like to this apparatus and image data of documents captured by scanner portion **102**.

Controller **107** controls the operation of image display unit **1** as well as the mechanisms of the whole apparatus. Controller **107** includes an input condition determiner **111** and a display controller **112**.

Input condition determiner **111** successively compares multiple pages of image data on multiple document images of one job, captured by image display unit **1**, or compares one page with the next, so as to determine whether there is a change in input conditions (e.g., document size, the color type of document image (color or monochrome)) of the document images in the job. That is, input condition determiner **111** compares the input conditions of the image data of two consecutive documents scanned successively by scanner portion **102** to determine whether there is any change in the input conditions between the image data of the two consecutive documents.

In the present embodiment, input condition determiner **111** has a function of determining whether or not the documents have changed in size based on the document size information (document size determining function) and a function of determining whether or not the documents have changed in color type (e.g., color or monochrome) based on the color type information on image data (document image color type determining function), as the capabilities to determine the input conditions of the image data of the documents captured by scanner portion **102**.

When a change in input conditions has been detected from the input image data, display controller **112** makes control based on the determined result from input condition determiner **111** so as to display the image data that was determined to have changed in input conditions and the image data input immediately before the image data in question, together on display panel **132**.

Further, when a change in input conditions has been detected from the input image data by input condition determiner **111**, display controller **112** may make control so as to display the image data in question and the image data input immediately after the image data in question, together on display panel **132**. Thus, image display unit **1** is configured.

Printer portion **104** performs image forming based on image data input to image forming apparatus **100**.

Paper feeder **106** pulls out recording paper, one sheet at a time, from a stack of recording paper accommodated in the paper cassette (not shown) inside image forming apparatus **100** or the recording paper stacked on a manual feed tray (not shown) outside the apparatus, and delivers the sheet to printer portion **104**.

Paper discharger **108** discharges recorded matter that is formed by image forming apparatus **100**.

Communicator **109** is connected to terminal computers PC outside image forming apparatus **100** to enable communication with the terminal computers PC.

Specifically, a public line for exchange of image data is connected to communicator **109** of image forming apparatus **100** while a network line is connected to an unillustrated network interface. This network line may be connected to external terminal computers PC that use this image forming portion **100** as a network support printer or may be connected via the internet to a computer etc. that is designated by a URL (Uniform Resource Locator). When connected to the Internet in this way, the image forming apparatus **100** can obtain the necessary information by way of the Internet.

Referring next to the drawings, specific description will be made on the preview display of document images in image display unit **1** when image forming apparatus **100** reads documents.

EXAMPLE 1

To begin with, a case where a plurality of documents to be read include documents having images different in color (color type) will be described.

FIG. **3**a is an illustrative view showing an example where a plurality of documents A**1**-D**1** to be scanned by the image forming apparatus of the present embodiment include documents with document images different in color type.

FIG. **3**b is an illustrative view showing display panel **132** of the image forming apparatus, on which a preview image PC**1** of a document C**1** having a document image different in color type from a reference document and a preview image PB**1** of a document B**1** (the reference document) scanned immediately before the document C**1**, are displayed side by side.

FIG. **3**c is an illustrative view showing display panel **132** of the image forming apparatus, on which preview image PC**1** of document C**1** having a document image different in color type from the reference document and preview images PB**1** and PD**1** of documents (reference documents) B**1** and D**1** that are scanned before and after the document C**1**, are displayed side by side.

In example 1, multiple documents A**1**-D**1** input into image forming apparatus **100** include color documents A**1**, B**1** and D**1** and a monochrome document C**1**, as shown in FIG. **3**a.

Image data of documents A**1**, B**1**, C**1** and D**1** are successively read by scanner portion **102** of image display unit **1** and recorded into storage **105**. Then, based on the recorded image data (document page data), input condition determiner **111** successively determines whether there is a change in color type as one of the document image input conditions, between one document and the next.

As a result, input determiner **111** determines that the first two pages, i.e., the document images of documents A**1** and B**1** are color, the document image of document C**1** is monochrome, and that the color type of document C**1** is different from that of the previous page or document B**1**.

Then, based on the determined result from input condition determiner **111**, display controller **112** displays a preview image PC**1** of monochrome document C**1** having a document image different in color type from the other documents and a preview image PB**1** of document B**1** as the reference for comparison, on display panel **132**, as shown in FIG. **3**b.

At this time, an arrow H**1** that indicates preview image PC**1** of document C**1** to be checked is displayed on display panel **132**, with a message **112**, for example "A different document has been detected. Please check it" for promoting the user to confirm the document, arranged near arrow H**1**.

In the drawings, reference numerals **135** and **136** are "Cancel key" and "OK key" to allow the user having checked the preview display to input user confirmation to make reading of the document valid and invalid, respectively.

As described above, in example 1, image display unit **1** displays preview image PB**1** of the second document B**1** to be the reference for comparison on the document image color type as one of document input conditions and preview image PC**1** of the third document C**1** to be checked, at the same time. Accordingly, it is possible for the user to easily compare and confirm that there is difference in document image color type between document B**1** as the reference for comparison and the document image of document C**1**, among the multiple pages of documents A**1**, B**1**, C**1** and D**1**.

As a variation of example 1, the preview display by display controller **112** may be given such that in addition to preview image PB**1** of document B**1** or the previous page of document C**1** to be checked, preview image PD**1** of the next page, or document D**1** may be arranged so as to place the preview image PC**1** to be confirmed between the two. This arrangement enables the user to much more easily confirm how document C**1** to be checked is different from documents B**1** and D**1** as the reference for comparison, among the multiple pages of documents A**1**, B**1**, C**1** and D**1**.

EXAMPLE 2

Next, a case where a plurality of documents to be read include documents having different sizes will be described.

FIG. **4**a is an illustrative view showing an example where a plurality of documents A**2**-D**2** to be scanned by the image forming apparatus of the present embodiment include a document C**2** that is different in size from the others.

FIG. **4**b is an illustrative view showing display panel **132** of the image forming apparatus, on which a preview image PC**2** of a document C**2** different in size from a reference document and a preview image PB**2** of a document B**2** (the reference document) scanned immediately before the document C**2**, are displayed side by side.

FIG. **4**c is an illustrative view showing a display panel **132** of the image forming apparatus, on which a preview image PC**2** of document C**2** different in size from a reference document and preview images PB**2** and PD**2** of documents B**2** and D**2** (the reference documents) that are scanned before and after the document C**2**, are displayed side by side.

In example 2, multiple documents A**2**-D**2** input into image forming apparatus **100** include A4-sized documents A**2**, B**2** and D**2** and an B5-sized document C**2**, as shown in FIG. **4**a.

Image data of documents A**2**, B**2**, C**2** and D**2** are successively read by scanner portion **102** of image display unit **1** and recorded into storage **105**. Then, based on the recorded image data (document page data), input condition determiner **111** successively determines whether there is a change in document size as one of the document image input conditions, between one document and the next.

As a result, input determiner **111** determines that the first two pages, i.e., documents A**2** and B**2** are of A4 size, document C**2** is of B5 size, and that the size of document C**2** is different from that of the previous page or document B**2**.

Then, based on the determined result from input condition determiner **111**, display controller **112** displays a preview image PC**2** of document C**2** different in document size from the other documents and a preview image PB**2** of document B**2** as the reference for comparison, on display panel **132**, as shown in FIG. **4**b.

At this time, an arrow H**1** that indicates preview image PC**2** of document C**2** to be checked is displayed on display panel **132**, with a message H**2**, for example "A different document has been detected. Please check it" for promoting the user to confirm the document, arranged near arrow H**1**.

As described above, in example 2, image display unit **1** displays preview image PB**2** of the second document B**2** to be the reference for comparison on the document size as one of document input conditions and preview image PC**2** of the third document C**2** to be checked, at the same time. Accordingly, it is possible for the user to easily compare and confirm how document C**2** to be checked is different in size from document B**2** as the reference for comparison, among the multiple pages of documents A**2**, B**2**, C**2** and D**2**.

As a variation of example 2, the preview display by display controller **112** may be given such that in addition to preview image PB**2** of document B**2** or the previous page of document C**2** to be checked, preview image PD**2** of the next page, or document D**2** may be arranged so as to place the preview image PC**2** to be confirmed between the two. This arrangement enables the user to much more easily confirm how document C**2** to be checked is different in document

size from documents B2 and D2 as the reference for comparison, among the multiple pages of documents A2, B2, C2 and D2.

Next, determination of the document type at the time of reading a plurality of documents will be described with reference to a flow chart.

FIG. **5** is a flow chart illustrating the processing steps in image display unit **1** to read a plurality of documents and perform preview display based on a determined result.

As shown in FIG. **5**, when image display unit **1** in image forming apparatus **100** starts reading a plurality of documents, scanner portion **102** reads the documents page-wise (Step S**1**) and records the image data of the documents into storage **105** (Step S**2**).

Then, it is determined whether or not the read document is the first page (Step S**3**).

At Step S**3**, if it is determined that the document is the first page, the control goes to Step S**4**, where it is determined whether or not document reading has been completed.

If it is determined at Step S**4** that document reading has been completed, the processing of reading the documents is ended. If it is determined at Step S**4** that document reading has not been completed, the control goes to Step S**1** and reading of the next document is carried out.

On the other hand, if it is determined at Step S**3** that the document is not the first page, input condition determiner **111** compares the image data of that document with the image data of the document that was read last (the previous page) (Step S**5**) so as to determine whether the properties, i.e., the input conditions (document size, the color type of document image (color or monochrome)) of the current document are the same as those of the document that was read last (Step S**6**).

If it is determined at Step S**6** that the properties, i.e., the input conditions (document size, the color type of document image (color or monochrome), etc.) of that document and the previously read document, are the same, the control returns to Step S**4**.

On the other hand, if it is determined at Step S**6** that the input conditions of that document and the previously read document are different, the preview of the document image whose input conditions were determined to be different is displayed on display panel **132**, together with the preview of the previously read document image (the document image on the previous page) for comparison (Step S**7**). With this display, it is possible for the user to easily confirm how the document that was determined to be different in input conditions is dissimilar to the other document.

Then, at Step S**8**, it is selected whether an OK key **136** is pressed or not. When OK key **136** is pressed, the control goes to Step S**4**. If OK key **136** is not pressed, it is selected whether a cancel key **135** is pressed or not (Step S**9**).

As cancel key **135** is pressed, the action of document reading is canceled (Step S**10**) and the document reading process is ended. If cancel key **135** is not pressed, the control returns to Step S**8**, and the apparatus enters wait mode to wait for next instruction.

In the above way, image forming apparatus **1** reads a plurality of documents and determines whether there is any difference in input conditions between the read documents and display the result on display panel **132**. As a result it is possible for the user to easily confirm the difference in properties between the documents.

Here in the present embodiment, reading of documents are performed returning to Step Si if document reading has not been completed in Step S**4**. However, the present invention should not limit the processing sequence of document reading. For example, scanner portion **102** reads a plurality of documents first so that the image data of the read multiple documents are recorded in storage **105**. Thereafter, the image data to be compared may be successively loaded from storage **105** to be used for comparison.

Next, the image data process that follows the aforementioned document determination, after preview display of image display unit **1** in image forming apparatus **100** will be described with reference to a flow chart.

FIG. **6** is a flow chart for illustrating the image data processing steps to be implemented after preview display by image display unit **1**.

As shown in FIG. **6**, it is determined in image display unit **1**, whether the image of a document that was determined based on the document input conditions read by scanner portion **102** is displayed in preview representation on display panel **132** (Step S**11**).

If it is determined at Step S**11** that the image of the document that needs confirmation is displayed in preview representation on display panel **132**, it is selected whether or not OK key **136** is pressed (Step S**12**).

When OK key **136** is pressed at Step S**12**, the process of recording image onto the paper is started (Step S**13**), and image data processing is ended.

If OK key **136** is not pressed at Step S**12**, it is selected whether or not cancel key **135** is pressed or not (Step S**14**).

As cancel key **135** is pressed, the action of document reading is canceled while the memory is cleared (Step S**15**), and the image data processing is ended. If cancel key **135** is not pressed, the control returns to Step S**12**, and the apparatus enters wait mode to wait for next instruction.

In this way, it is possible to perform image output after the difference between the read documents has been clearly confirmed through image display unit **1**.

According to the present embodiment having the configuration described heretofore, since image display unit **1** in image forming apparatus **100** is provided with input condition determiner **111** and display controller **112**, when a plurality of documents are scanned (input) successive documents are compared to each other as to input conditions so that the preview image of a document to be the reference in comparison for the document input conditions and the preview image of a document to be confirmed are displayed at once on display panel **132**. As a result, it is possible for the user to easily compare and confirm how the document to be checked is different from the document as reference for comparison.

Further, in the present embodiment, as the capabilities to determine the input conditions of the image data of the documents captured by scanner portion **102**, input condition determiner **111** is provided with a function of determining whether or not the documents have changed in size based on the document size information (document size determining function) and a function of determining whether or not the documents have changed in color type (e.g., color or monochrome) based on the color type information on image data (document image color type determining function). Accordingly, it is possible to determine the difference in document size and in document image color type as document input conditions.

Further, since display controller **112** makes control based on the determined result from input condition determiner **111** so that the image data that was determined to have changed in input conditions and the image data input immediately before the image data in question are displayed together on display panel **132**, it is possible for the user to

easily compare and confirm how the document different in input conditions differs from the other.

Further, when input condition determiner **111** determines that the image data has changed in input conditions, display controller **112** functions to display the image data in question and the image data input immediately after the image data in question, together on display panel **132**, it is possible to make the user compare and clearly confirm how the document different in input conditions differs from the others.

The above embodiment was described taking an example in which image display unit **1** is applied to image forming apparatus **100** shown in FIG. **1**. However, as long as it is an image forming apparatus that can present document images in preview representation on the display panel or the like before printing, the invention can be developed to any other image forming apparatus and the like, not limited to the image forming apparatus and copier having the configuration described above.

Having described heretofore, the present invention is not limited to the above embodiment, various changes can be made within the scope of the appended claims. That is, it is apparent that various kinds of variations and modified examples will occur to those skilled in the art within the scope of the appended claims. That is, any embodied mode obtained by combination of technical means modified as appropriate without departing from the spirit and scope of the present invention should be included in the technical art of the present invention.

What is claimed is:

1. An image display unit capable of displaying image data page-wise, comprising:

a storage storing a plurality of successive pages of page-wise image data;

a display panel displaying the image data read from the storage in preview representation; and

a controller performing a determination process that determines whether there is any change in a second input condition of a determination image data as a second image data to be determined in comparison with a first input condition of a reference image data as a first image data,

wherein

the determination image data is an image data **[**subsequently stored**]** *subsequently-stored* immediately after the reference image data *is stored* into the storage, and

when the controller determines that there is a change in the second input condition compared with the first input condition, the controller controls the display panel to display, in parallel, the reference image data and the determination image data side-by-side.

2. The image display unit according to claim **1**, wherein the controller repeats the determination process, after completion of a previous determination process, by replacing the first image data as the reference image data with a second image data as the determination image data and by replacing the second image data as the determination image data with a third image data inputted.

3. The image display unit according to claim **1**, wherein when the controller determines that there is the change in the second input condition compared with the first input condition, the fact that there is the change is warned on the display panel.

4. The image display unit according to claim **1**, wherein the controller controls the display panel to display also the third image data input immediately after the image data that was determined to have changed in the input condition.

5. The image display unit according to claim **4**, wherein the first input condition is one page size of the first image data, and

the second input condition is one page size of the second image data.

6. The image display unit according to claim **4**, wherein the first input condition is color type information used in the first image data, and

the second input condition is color type information used in the second image data.

7. The image display unit according to claim **1**, wherein the first input condition is one page size of the first image data, and

the second input condition is one page size of the second image data.

8. The image display unit according to claim **1**, wherein the first input condition is color type information used in the first image data, and

the second input condition is page size of the second image data.

9. An image forming apparatus including the image display unit according to claim **1**.

10. The image display unit according to claim 1, wherein the image data having the change is indicated by an arrow.

11. The image display unit according to claim 1, wherein the image data is input from an external terminal or an external memory.

* * * * *