US008760678B2

(12) **United States Patent**
Umi et al.

(10) **Patent No.: US 8,760,678 B2**
(45) **Date of Patent: Jun. 24, 2014**

(54) **IMAGE DISPLAYING APPARATUS, IMAGE DISPLAYING METHOD, AND IMAGE DISPLAYING PROGRAM FOR DETECTING AND DISPLAYING MULTIFEED**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 54 days.

(21) Appl. No.: **13/043,937**

(22) Filed: **Mar. 9, 2011**

(65) **Prior Publication Data**

US 2011/0279849 A1 Nov. 17, 2011

(30) **Foreign Application Priority Data**

May 14, 2010 (JP) 2010-112444

(51) **Int. Cl.**
G06K 15/00 (2006.01)

(52) **U.S. Cl.**
USPC **358/1.14**; 358/498; 271/91; 271/8.1; 271/121; 271/122; 271/123

(58) **Field of Classification Search**
CPC H04N 1/0044; H04N 1/00453; H04N 1/00461; H04N 1/00474; H04N 1/00588; H04N 1/00602; H04N 1/00615; H04N 1/3263; H04N 1/32657
USPC 271/91, 8.1, 121–124; 358/1.14, 498
See application file for complete search history.

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Japanese Office Action issued in Japanese Application No. 2010-112444 with Date mailed Feb. 25, 2014, with English Translation.

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(57) **ABSTRACT**

An image displaying apparatus includes a control unit and a display unit. The image displaying apparatus is connected to an image reading apparatus that includes a multifeed detecting mechanism. The control unit includes a display control unit that displays (i) an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism and (ii) a multifeed detected portion detected by the multifeed detecting mechanism on the display unit.

8 Claims, 8 Drawing Sheets

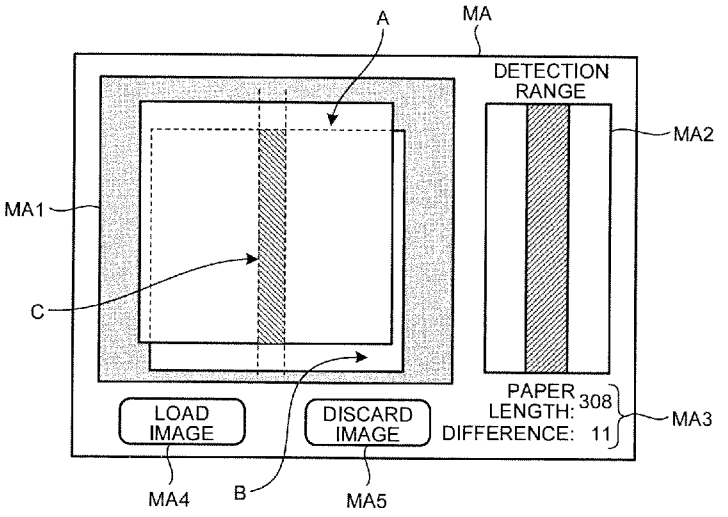

FIG.1

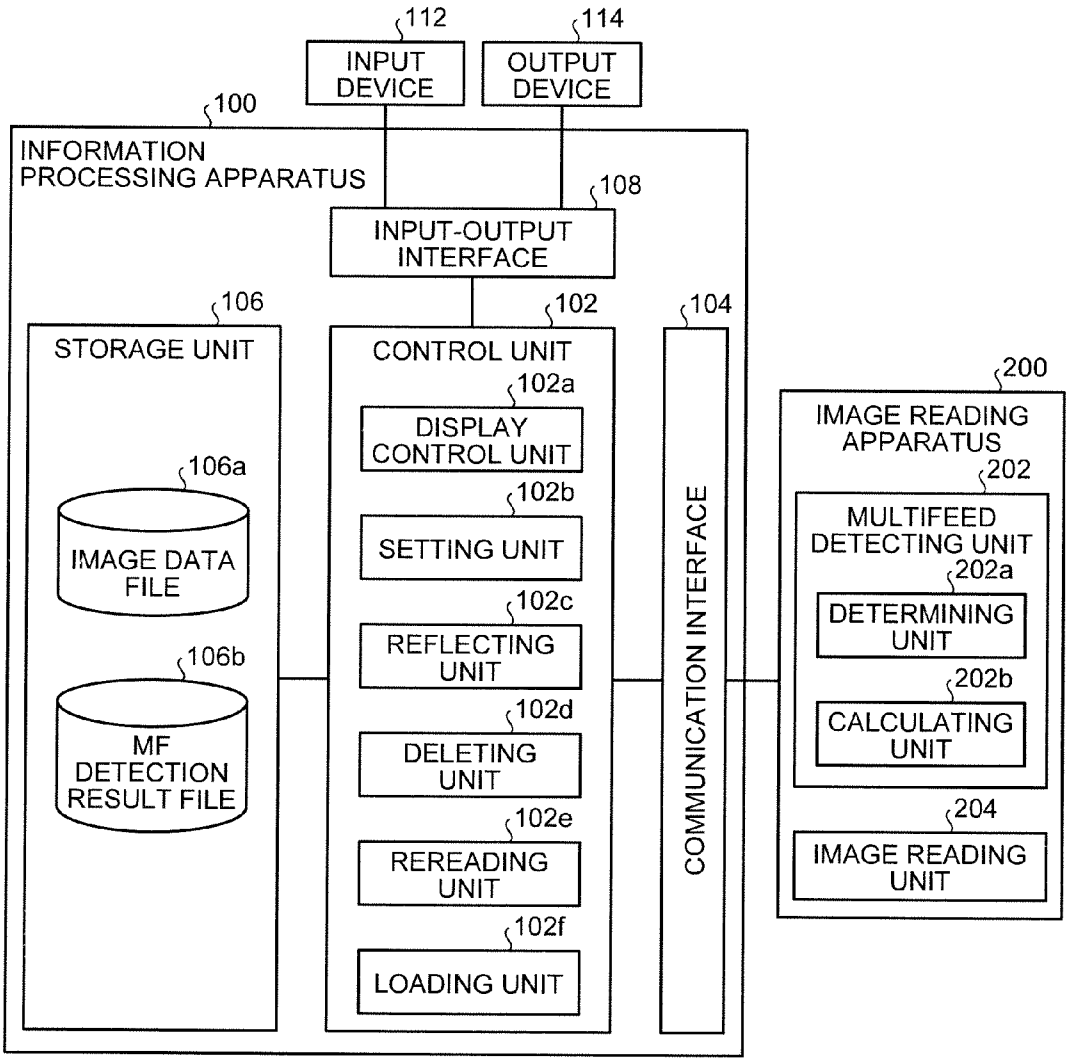
112
INPUT DEVICE
114
OUTPUT DEVICE
100
INFORMATION PROCESSING APPARATUS
108
INPUT-OUTPUT INTERFACE
106
STORAGE UNIT
106a
IMAGE DATA FILE
106b
MF DETECTION RESULT FILE
102
CONTROL UNIT
102a
DISPLAY CONTROL UNIT
102b
SETTING UNIT
102c
REFLECTING UNIT
102d
DELETING UNIT
102e
REREADING UNIT
102f
LOADING UNIT
104
COMMUNICATION INTERFACE
200
IMAGE READING APPARATUS
202
MULTIFEED DETECTING UNIT
202a
DETERMINING UNIT
202b
CALCULATING UNIT
204
IMAGE READING UNIT

FIG.2

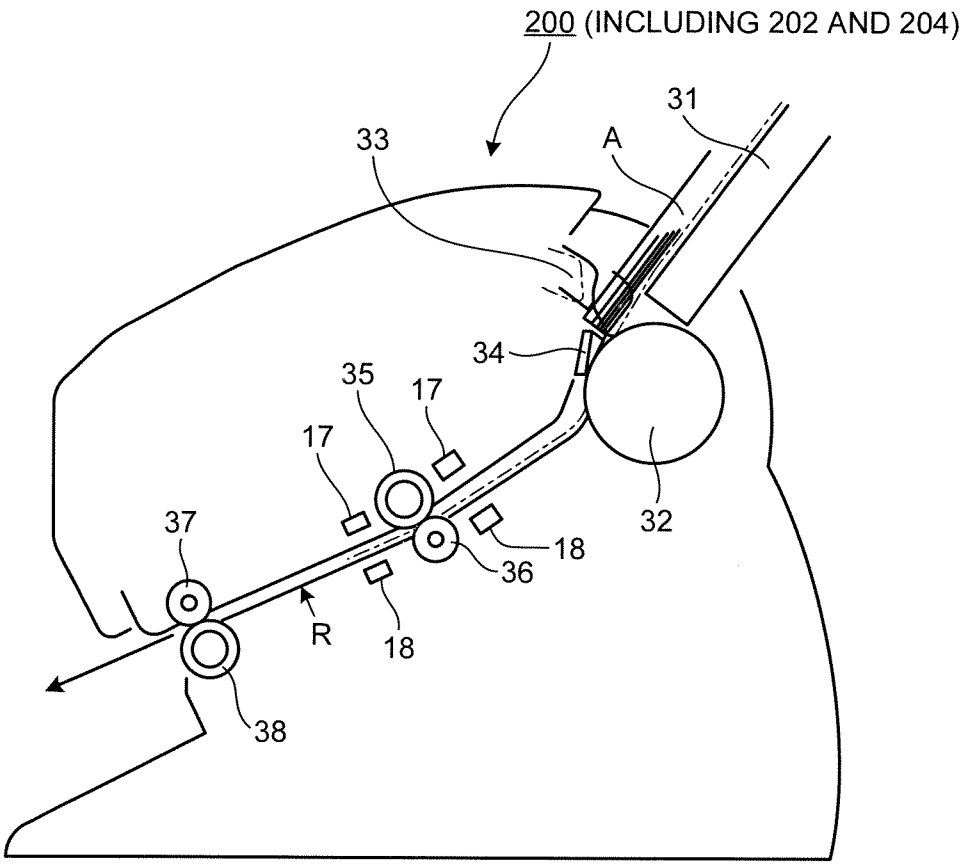

FIG.3

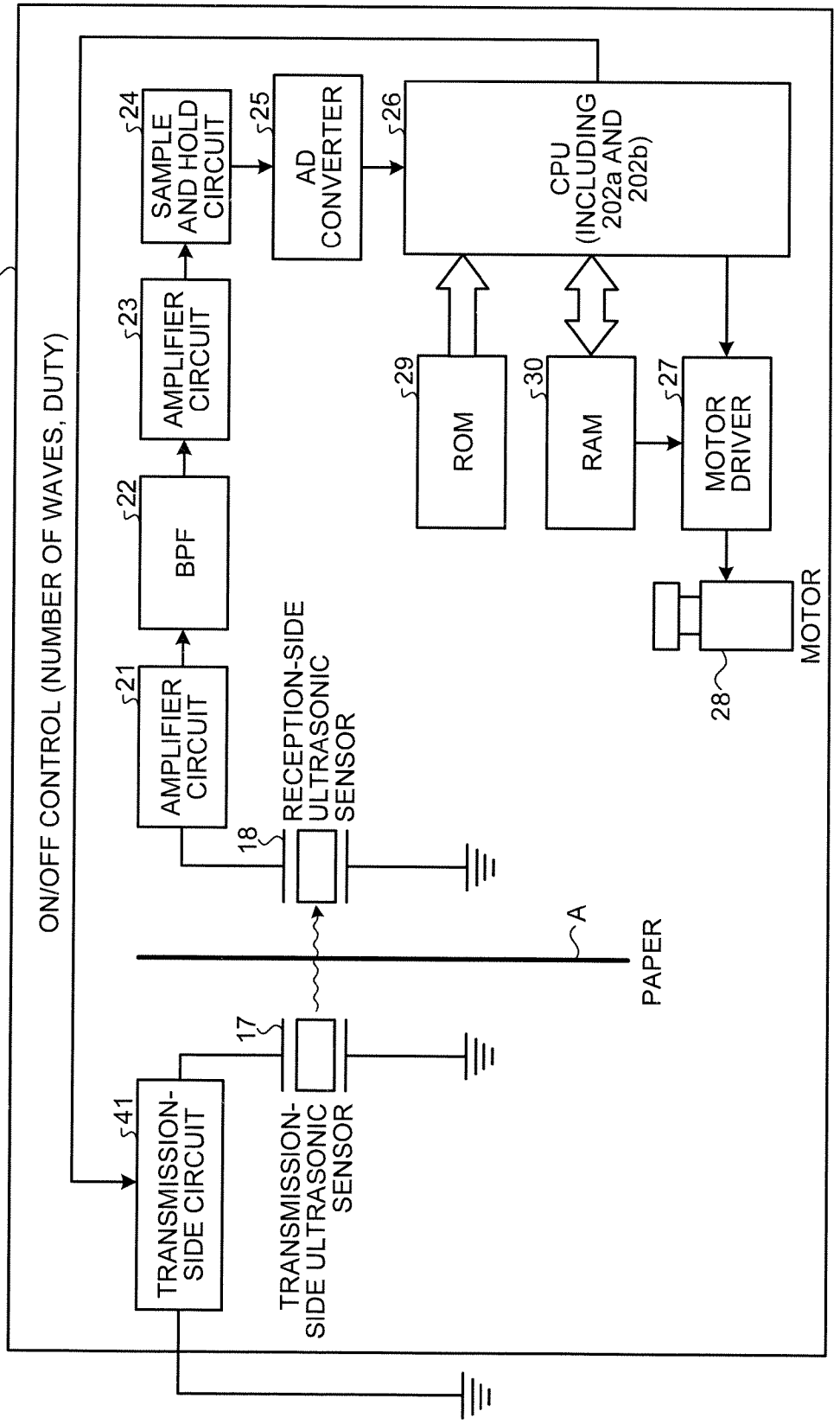
202
ON/OFF CONTROL (NUMBER OF WAVES, DUTY)
41
TRANSMISSION-SIDE CIRCUIT
17
TRANSMISSION-SIDE ULTRASONIC SENSOR
A
PAPER
18
RECEPTION-SIDE ULTRASONIC SENSOR
21
AMPLIFIER CIRCUIT
22
BPF
23
AMPLIFIER CIRCUIT
24
SAMPLE AND HOLD CIRCUIT
25
AD CONVERTER
26
CPU (INCLUDING 202a AND 202b)
29
ROM
30
RAM
27
MOTOR DRIVER
28
MOTOR

FIG.4

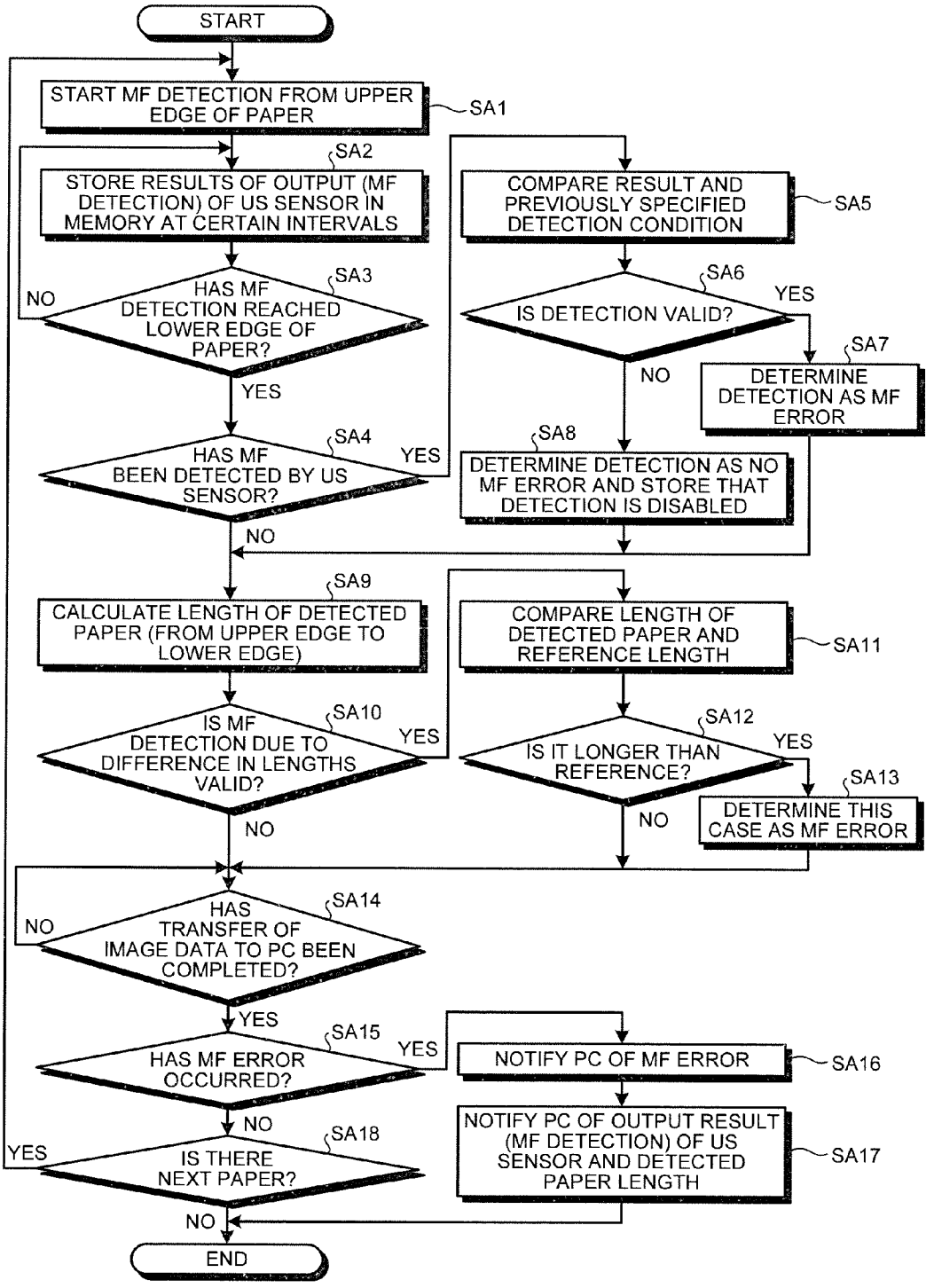
START
START MF DETECTION FROM UPPER EDGE OF PAPER
SA1
SA2
STORE RESULTS OF OUTPUT (MF DETECTION) OF US SENSOR IN MEMORY AT CERTAIN INTERVALS
SA3
HAS MF DETECTION REACHED LOWER EDGE OF PAPER?
NO
YES
SA4
HAS MF BEEN DETECTED BY US SENSOR?
YES
NO
SA5
COMPARE RESULT AND PREVIOUSLY SPECIFIED DETECTION CONDITION
SA6
IS DETECTION VALID?
YES
NO
SA7
DETERMINE DETECTION AS MF ERROR
SA8
DETERMINE DETECTION AS NO MF ERROR AND STORE THAT DETECTION IS DISABLED
SA9
CALCULATE LENGTH OF DETECTED PAPER (FROM UPPER EDGE TO LOWER EDGE)
SA10
IS MF DETECTION DUE TO DIFFERENCE IN LENGTHS VALID?
YES
NO
SA11
COMPARE LENGTH OF DETECTED PAPER AND REFERENCE LENGTH
SA12
IS IT LONGER THAN REFERENCE?
YES
NO
SA13
DETERMINE THIS CASE AS MF ERROR
SA14
HAS TRANSFER OF IMAGE DATA TO PC BEEN COMPLETED?
NO
YES
SA15
HAS MF ERROR OCCURRED?
YES
NO
SA16
NOTIFY PC OF MF ERROR
SA17
NOTIFY PC OF OUTPUT RESULT (MF DETECTION) OF US SENSOR AND DETECTED PAPER LENGTH
SA18
IS THERE NEXT PAPER?
YES
NO
END

FIG.5

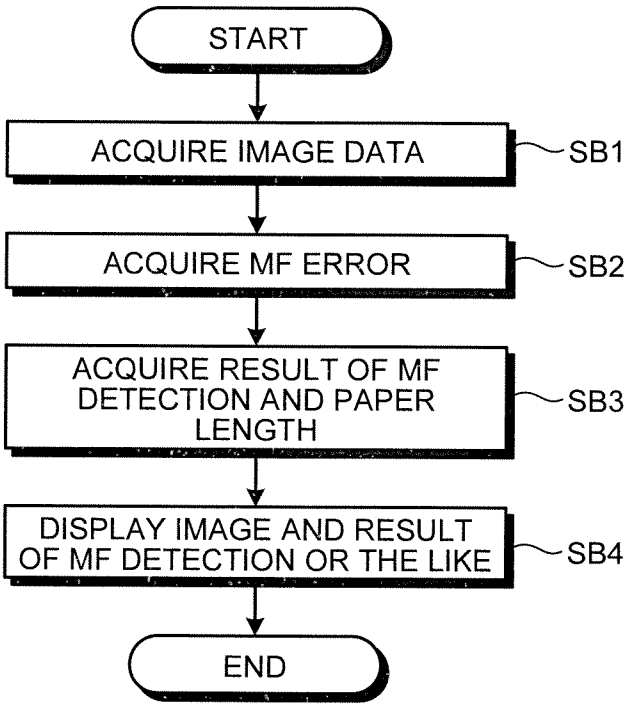
START
ACQUIRE IMAGE DATA
SB1
ACQUIRE MF ERROR
SB2
ACQUIRE RESULT OF MF DETECTION AND PAPER LENGTH
SB3
DISPLAY IMAGE AND RESULT OF MF DETECTION OR THE LIKE
SB4
END

FIG.6

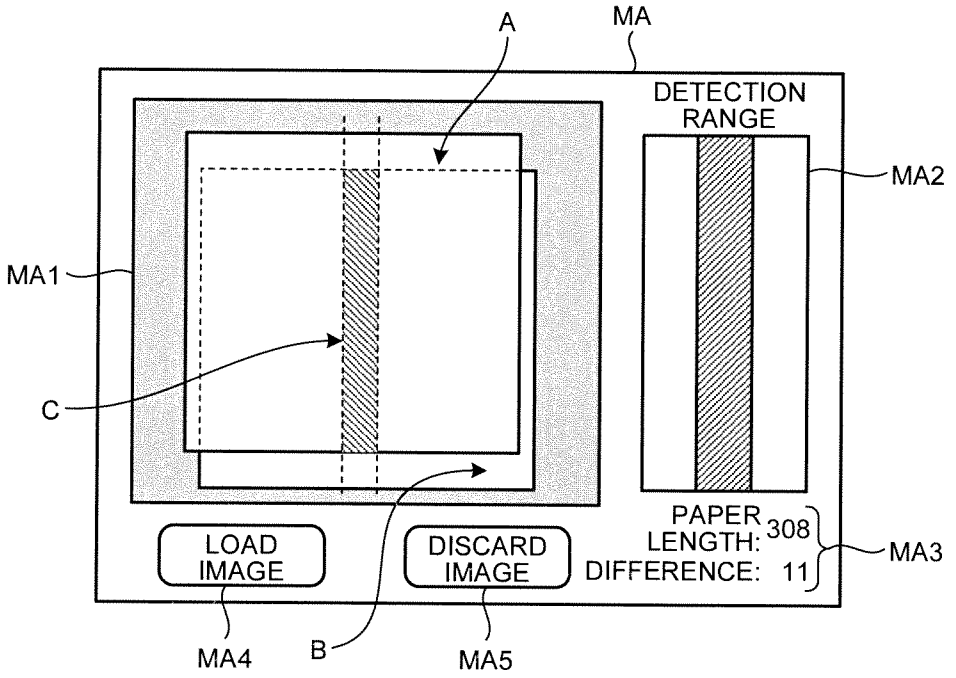
A
MA
DETECTION RANGE
MA2
MA1
C
PAPER LENGTH: 308
DIFFERENCE: 11
MA3
LOAD IMAGE
DISCARD IMAGE
MA4
B
MA5

FIG.7

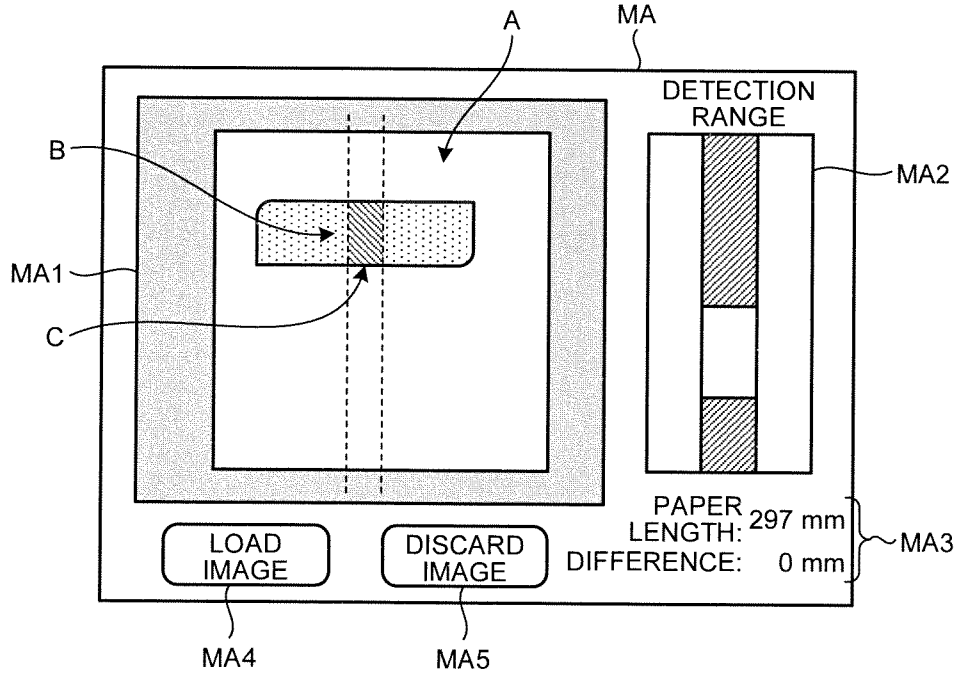
A
MA
DETECTION RANGE
B
MA2
MA1
C
PAPER LENGTH: 297 mm
DIFFERENCE: 0 mm
MA3
LOAD IMAGE
DISCARD IMAGE
MA4
MA5

FIG.8

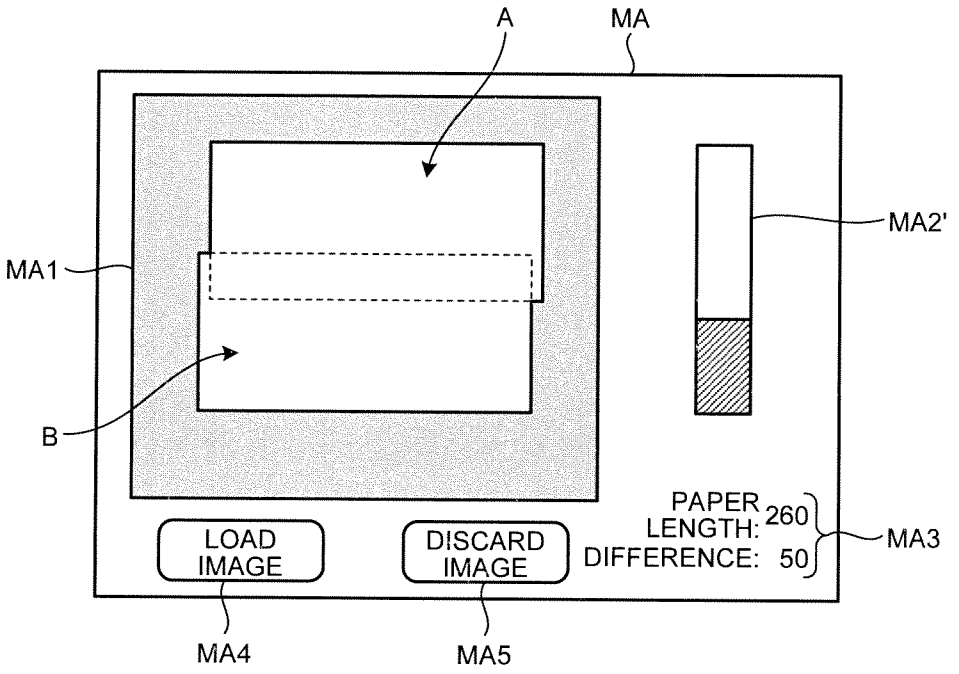
A
MA
MA1
B
MA2'
PAPER LENGTH: 260
DIFFERENCE: 50
MA3
LOAD IMAGE
DISCARD IMAGE
MA4
MA5

FIG.9

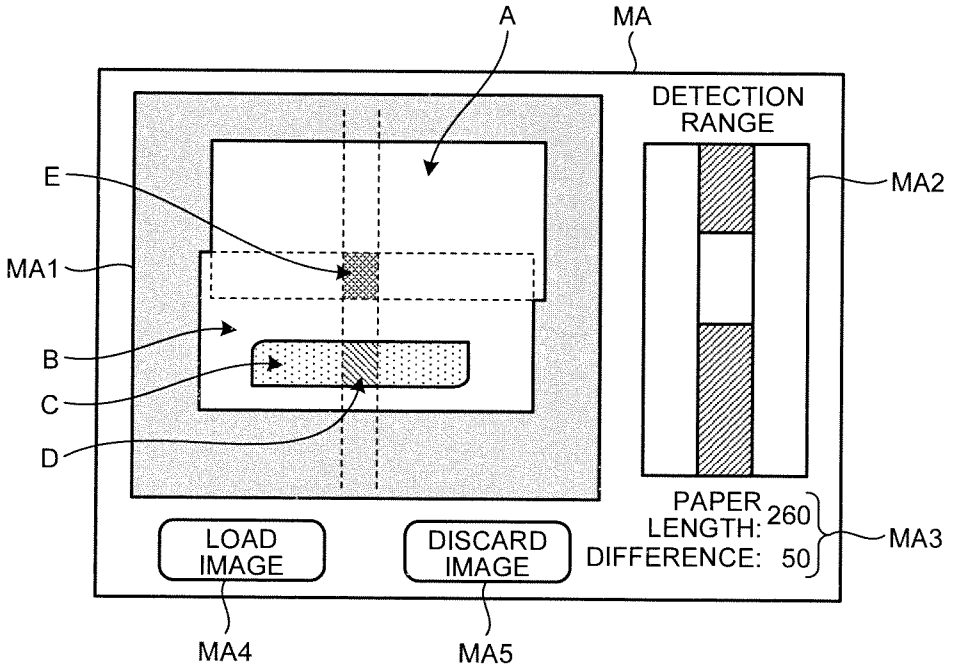
A
MA
DETECTION RANGE
E
MA1
B
C
D
MA2
PAPER LENGTH: 260
DIFFERENCE: 50
MA3
LOAD IMAGE
DISCARD IMAGE
MA4
MA5

FIG.10

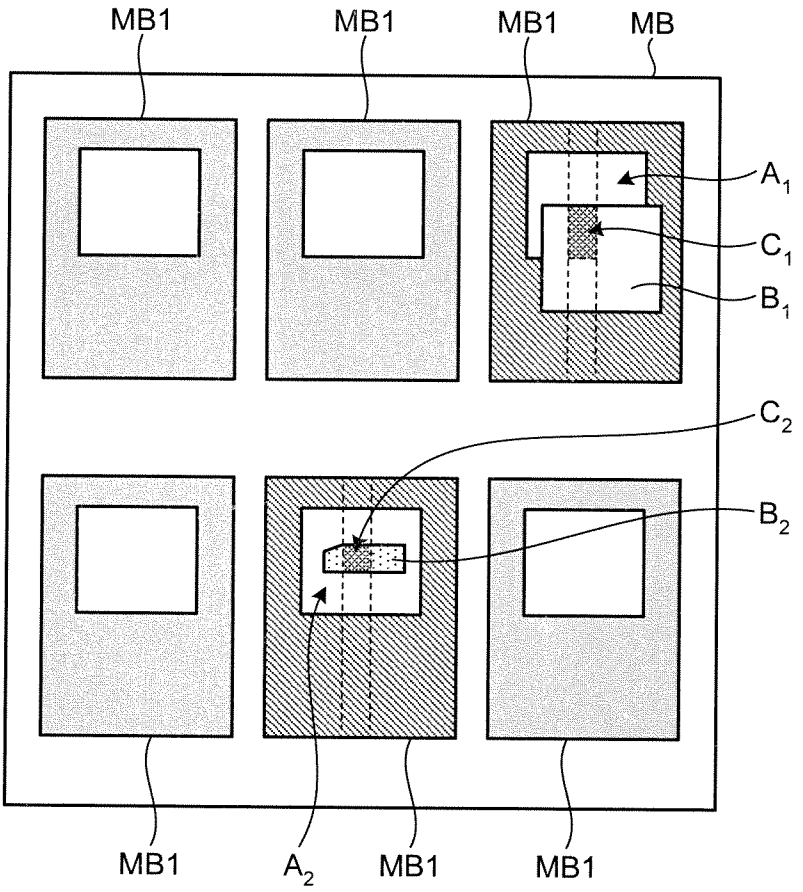

IMAGE DISPLAYING APPARATUS, IMAGE DISPLAYING METHOD, AND IMAGE DISPLAYING PROGRAM FOR DETECTING AND DISPLAYING MULTIFEED

CROSS-REFERENCE TO RELATED APPLICATION

This application is based upon and claims the benefit of priority from Japanese Patent Application No. 2010-112444, filed on May 14, 2010, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image displaying apparatus, an image displaying method, and an image displaying program for displaying image data in which multifeed is detected by a multifeed detecting function of an image reading apparatus (e.g., a scanner, a copier, and a facsimile).

2. Description of the Related Art

In an image reading apparatus (image scanner apparatus), there is widely used a multifeed detecting function using an ultrasonic sensor that can detect an overlap of papers (e.g., Japanese Patent Application Laid-open No. 2004-269241). However, there is a case where the multifeed detecting function erroneously detects a paper with a photo or a sticky note or the like attached thereto as a multifeed.

As means for avoiding this case, United States Patent Application No. 2005/0228535 discloses a technology for previously setting a length with which multifeed detection is disabled through a panel on a scanner before reading is started, and user manual (functional detail) of scanner "DR-X10C" released in home page of canon inc. "http://cweb-.canon.jp/manual/dr/pdf/drx10c-usermanua12.pdf" discloses a technology for previously setting a starting position and an ending position at which multifeed detection is disabled through a screen on a personal computer connected to a scanner before reading is started.

In addition, a technology for displaying a multifeed-detected image on a screen and causing an operator to determine whether the image is to be loaded or discarded.

However, according to the conventional technologies, there is a problem that the length and the position to be disabled have to be previously set, and this causes an operator to carry out complicated and troublesome operations for the setting. Moreover, there is another problem that it is difficult for an operator to identify a cause of multifeed error only by images displayed on the screen.

SUMMARY OF THE INVENTION

It is an object of the present invention to at least partially solve the problems in the conventional technology.

An image displaying apparatus according to one aspect of the present invention includes a control unit and a display unit. The image displaying apparatus is connected to an image reading apparatus that includes a multifeed detecting mechanism. The control unit includes a display control unit that displays an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion detected by the multifeed detecting mechanism on the display unit.

An image displaying method according to one aspect of the present invention is implemented by a control unit of an image displaying apparatus that includes the control unit and a display unit and is connected to an image reading apparatus including a multifeed detecting mechanism. The image displaying method includes a display controlling step of displaying an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion detected by the multifeed detecting mechanism on the display unit.

An image displaying program product according to one aspect of the present invention makes a control unit of an image displaying apparatus that includes the control unit and a display unit and is connected to an image reading apparatus including a multifeed detecting mechanism implement an image displaying method. The image displaying method includes a display controlling step of displaying an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion detected by the multifeed detecting mechanism on the display unit.

A recording medium according to one aspect of the present invention includes the image displaying program product described above.

The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram representing one example of a configuration of an information processing apparatus according to a present embodiment;

FIG. **2** is a schematic representing a configuration of a scanner being a specific example of an image reading apparatus according to the present embodiment;

FIG. **3** is a diagram representing one example of a configuration of a multifeed detecting unit included in the scanner shown in FIG. **2**;

FIG. **4** is a flowchart representing one example of a scanner-side main process according to the present embodiment;

FIG. **5** is a flowchart representing one example of a PC-side main process according to the present embodiment;

FIG. **6** is a schematic representing one example of an MF detection check screen;

FIG. **7** is a schematic representing one example of the MF detection check screen;

FIG. **8** is a schematic representing one example of the MF detection check screen;

FIG. **9** is a schematic representing one example of the MF detection check screen; and

FIG. **10** is a schematic representing one example of the MF detection check screen.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of an image displaying apparatus, an image displaying method, and an image displaying program according to the present invention will be explained in detail below with reference to the accompanying drawings. It should be noted that the present invention is not limited by the embodiments.

1. Configuration of Present Embodiment

1-1. Overview of Configuration

First, the overview of a configuration of an information processing apparatus **100** according to a present embodiment will be explained with reference to FIG. **1**. FIG. **1** is a diagram representing the overview of the configuration of the information processing apparatus according to the present embodiment applied to the image displaying apparatus according to the present invention.

The information processing apparatus **100** is specifically a personal computer (PC), and includes a control unit **102**, a communication interface **104**, a storage unit **106**, and an input-output interface **108**, which are communicably connected to each other through an arbitrary communication path. The information processing apparatus **100** is communicably connected to an image reading apparatus **200**.

Here, the image reading apparatus **200** is specifically a scanner, a copier, a facsimile, or the like, and includes a multifeed detecting unit **202** and an image reading unit **204**. The multifeed detecting unit **202** is a mechanism for detecting (sensing) a multifeed (MF) of a fed paper, and includes, for example, an ultrasonic (US) sensor (hardware) for detecting an overlap of papers and the thickness thereof using ultrasonic waves and a processing unit (software) for detecting whether MF occurs from the output of the US sensor. The multifeed detecting unit **202** includes a determining unit **202***a* and a calculating unit **202***b* as processing units. When MF is detected by the US sensor, the determining unit **202***a* compares a portion where the MF is detected with a preset MF detection range (including an area or a length where MF detection of the US sensor is regarded as valid, or including an area or a length where MF detection of the US sensor is regarded as invalid), and determines whether the portion is regarded as MF error. The calculating unit **202***b* calculates a length of the paper (a length from an upper edge to a lower edge of the paper) from an output result of the US sensor or image data read by the image reading unit **204**. When the length of the paper is calculated by the calculating unit **202***b*, the determining unit **202***a* compares the length and a preset reference length (e.g., a length of a first sheet of paper+10 mm), and determines whether the paper is regarded as MF error. A specific example of the configuration of the multifeed detecting unit **202** will be explained in detail later in "1-2. Specific Example of Configuration". The image reading unit **204** is a mechanism for reading a fed paper by a paper sensor and generating an image of the paper.

The communication interface **104** communicably connects the information processing apparatus **100** to the image reading apparatus **200** and other terminals through a communication device such as a router and a wired or wireless communication line such as a dedicated line.

The storage unit **106** stores therein various types of databases, tables, and files, or the like. The storage unit **106** is a storage unit, which can be a memory device such as RAM (Random Access Memory) and ROM (Read Only Memory), a fixed disk drive such as a hard disk, a flexible disk, and an optical disc, or the like. The storage unit **106**, as shown in this figure, stores therein an image data file **106***a* and an MF detection result file **106***b*. The image data file **106***a* stores therein image data for the paper read by the image reading apparatus **200**. The MF detection result file **106***b* stores therein output results (specifically, the MF detection range, and the like) of the US sensor included in the multifeed detecting unit **202** of the image reading apparatus **200**.

The input-output interface **108** connects an input device **112** and an output device **114** to the information processing apparatus **100**. Here, as the output device **114**, a speaker and a printer, in addition to a monitor (including a home-use television) can be used (hereinafter, the output device **114** may sometimes be described as a monitor **114**). As the input device **112**, in addition to a keyboard, a mouse, and a microphone, a monitor for achieving a pointing device function in cooperation with the mouse can be used.

The control unit **102** includes a CPU (Central Processing Unit) for integrally controlling the information processing apparatus **100**, and the like. The control unit **102** includes an internal memory for storing therein a control program such as OS (Operating System) and programs defining various processing procedures or the like and also storing therein required data, and performs information processing for executing various processes based on the programs. As shown in this figure, the control unit **102** roughly includes a display control unit **102***a*, a setting unit **102***b*, a reflecting unit **102***c*, a deleting unit **102***d*, a rereading unit **102***e*, and a loading unit **102***f*.

The display control unit **102***a* displays (i) images of papers which are read by the image reading apparatus **200** and in which MF is detected by the multifeed detecting mechanism **202** and (ii) an MF detected portion (MF detected area) detected by the multifeed detecting mechanism **202**, on the monitor **114**.

The display control unit **102***a* displays the MF detected portion detected within the area or the length, set by the setting unit **102***b* explained later, in which multifeed detection detected by the multifeed detecting mechanism **202** is disabled, on the monitor **114** characteristically (specifically, the MF detected portion is applied with a color or a pattern or the like different from that in the other MF detected portions).

The display control unit **102***a* notifies an operator of the fact that the MF detected portion is detected within the area or the length, set by the setting unit **102***b* explained later, in which multifeed detection detected by the multifeed detecting mechanism **202** is disabled, after the image reading apparatus **200** finishes the reading. Specifically, after the image reading apparatus **200** completes the reading of a plurality of papers, the display control unit **102***a* displays the read images of the papers in thumbnail form on the monitor **114** and highlights the image including the MF detected portion detected in the area or the length where the multifeed detection is disabled, using a color or a pattern or the like.

The display control unit **102***a* displays a length of the paper and a difference between the length and a preset reference length on the monitor **114**.

The setting unit **102***b* causes the operator to set an MF detection range including an area or a length where multifeed detection performed by the multifeed detecting mechanism **202** is enabled or disabled. The reflecting unit **102***c* reflects (previews) the MF detection range set by the setting unit **102***b* in the MF detected portion displayed on the monitor **114**.

The deleting unit **102***d* deletes the image displayed on the monitor **114**. The rereading unit **102***e* causes the image reading apparatus **200** to reread the paper. The loading unit **102***f* loads (stores) the image displayed on the monitor **114** into the image data file **106***a*.

1-2. Specific Example of Configuration

Next, a specific example of the configuration of the image reading apparatus **200** connected with the information processing apparatus **100** configured in the above manner will be explained in detail with reference to FIG. **2** and FIG. **3**. A specific configuration of the image reading apparatus which is a scanner is explained herein, however, the image reading apparatus is not limited to the scanner, and thus can be applied to a copier, a facsimile, and the like.

FIG. **2** is a schematic representing an overview of a cross section of a scanner as the image reading apparatus **200** (hereinafter, sometimes described as "scanner **200**"), and this figure shows an overview of the configuration of the scanner to which the multifeed processing unit **202** and the image reading unit **204** are applied.

As shown in FIG. **2**, the scanner **200** includes a paper mounting table (shooter) **31**, a pick roller **32**, a pick arm **33**, a separation pad **34**, feed rollers **35** and **36**, and ejection rollers **37** and **38**. The scanner **200** also includes a transmission-side ultrasonic sensor **17** and a reception-side ultrasonic sensor **18** of an ultrasonic detector, which is explained later, corresponding to the multifeed detecting unit **202**. In FIG. **2**, a dashed two-dotted line indicates a feed path of a paper A, and an arrow R indicates a reading position of the paper A.

Papers A placed on the paper mounting table (shooter) **31** are picked by the pick roller **32** in a state where the papers A are applied with an appropriate pressing force by the pick arm **33**. At this time, the papers A are sequentially separated from their lower side sheet by sheet by the pick roller **32** and the separation pad **34**. The picked paper A is further fed to the feed rollers **35** and **36** by the pick roller **32**, is fed to a reading position by the feed rollers **35** and **36**, is read by the image reading unit **204** at the reading position, and is ejected by the ejection rollers **37** and **38**. During feeding of the paper A along the feed path, a plurality of sheets (usually two sheets) or multiply fed papers A which are not separated into one sheet each even by the separation pad **34** are detected by the transmission-side ultrasonic sensor **17** and the reception-side ultrasonic sensor **18**. Therefore, as shown in FIG. **2**, the transmission-side ultrasonic sensor **17** and the reception-side ultrasonic sensor **18** are disposed on the upstream side of the reading position where the paper is read by the image reading unit **204** in the feed path. Particularly, the sensors are disposed on the downstream side or the upstream side of the feed rollers **35** and **36**.

FIG. **3** is a diagram representing one example of a specific configuration of the multifeed detecting unit **202**. In FIG. **3**, the ultrasonic detector corresponding to the multifeed detecting unit **202** detects feeding of a plurality of papers A using ultrasonic waves. The ultrasonic detector includes the transmission-side ultrasonic sensor **17**, a drive circuit thereof (transmission-side circuit, hereinafter the same) **41**, the reception-side ultrasonic sensor **18**, a setting unit (**26**) for setting a threshold used to detect feeding of a plurality of papers A (multifeed), and a detector (**26**) for detecting the feeding of the plurality of papers A.

The transmission-side ultrasonic sensor **17** emits an ultrasonic wave. The drive circuit **41** supplies a drive signal for driving the transmission-side ultrasonic sensor **17** thereto. The drive circuit **41** is configured with a circuit (which can ON/OFF control) that oscillates at a frequency near a resonant frequency of the transmission-side ultrasonic sensor **17**. The reception-side ultrasonic sensor **18** is disposed so as to face the transmission-side ultrasonic sensor **17** across a paper feed path, and receives the ultrasonic wave. The setting unit sets a threshold used to detect the feeding of the plurality of papers A using an output of the reception-side ultrasonic sensor **18** as a reference value when an output of the transmission-side ultrasonic sensor **17** is stopped by the drive circuit **41**. The detector compares the output of the reception-side ultrasonic sensor **18** and the threshold, and detects the feeding of the plurality of papers A.

The ultrasonic detector further includes an amplifier circuit **21** (at a first stage), a BPF (Band Pass Filter) **22**, an amplifier circuit **23** (at a second stage), a sample and hold (S&H) circuit **24**, an AD (Analog to Digital) converter **25**, CPU **26**, a motor driver **27**, a motor **28**, ROM **29**, and RAM **30**. These components constitute a reception-side circuit. More specifically, the reception-side ultrasonic sensor **18** outputs an electrical signal according to the ultrasonic wave received from the transmission-side ultrasonic sensor **17**, the amplifier circuit **21** amplifies the electrical signal, the BPF removes noise therefrom, and, thereafter, the amplifier circuit **23** further amplifies the signal after the noise is removed. Then, after the sample and hold circuit **24** samples and holds (SH) a peak value of the signal, the AD converter **25** converts the peak value (analog signal) into a digital value (digital signal). The AD converter **25** inputs the digital signal (input signal) to the CPU **26** (the setting unit and the detector therein), where it is analyzed. More specifically, the setting unit and the detector implemented by a setting and detection processing program (and hardware) on the CPU **26** analyze the input signal. The setting and detection processing program is stored in, for example, the ROM **29** and/or the RAM **30**. When a multifeed is detected, the CPU **26** (or detector) transmits the drive signal to the motor driver **27**, and causes the motor **28** to drive so as to stop feeding of (a plurality of) papers A. The CPU **26** includes the determining unit **202***a* and the calculating unit **202***b*, and when MF is detected, the CPU **26** (or detector) transfers the result of output of the ultrasonic sensor to the determining unit **202***a* and the calculating unit **202***b*.

The ultrasonic detector includes the transmission-side circuit (drive circuit) **41**. The transmission-side circuit **41** is configured from a drive IC, a resistance/frequency-controlled oscillator (OSC), and a variable resistor. The drive IC is a drive circuit for supplying a drive signal to drive the transmission-side ultrasonic sensor **17** thereto. This causes the transmission-side ultrasonic sensor **17** to emit an ultrasonic wave. The reception-side ultrasonic sensor **18** receives the ultrasonic wave, and outputs a detection signal according to the intensity of the received ultrasonic wave. For example, when the paper A is not present between the transmission-side ultrasonic sensor **17** and the reception-side ultrasonic sensor **18**, the reception-side ultrasonic sensor **18** detects a signal with a certain level (ordinary level), and detects a signal with a level (normal level) less than the ordinary level but more than a predetermined threshold when a sheet of paper A is present. When two sheets (or more) of paper A are present, the reception-side ultrasonic sensor **18** detects a signal with a level (abnormal level) less than the ordinary level and the threshold. For example, before feeding of the paper A, the drive IC is controlled so that the reception-side ultrasonic sensor **18** detects the signal with the ordinary level (in actual cases, the signal with a level equal to or more than the ordinary level). More specifically, the drive IC is controlled so that the drive frequency of the drive signal coincides with the resonant frequency of the transmission-side ultrasonic sensor **17** based on the ultrasonic wave received by the reception-side ultrasonic sensor **18** without using the variable resistor.

The setting unit sets (generates) a threshold used to detect feeding of a plurality of papers A using an output of the reception-side ultrasonic sensor **18** as a reference value when an output of the transmission-side ultrasonic sensor **17** is stopped by the drive circuit **41**. The threshold is determined by adding a fixed value (correction value) to the output (average value of input signals from the reception-side ultrasonic sensor **18**) of the reception-side ultrasonic sensor **18** when an output of the transmission-side ultrasonic sensor **17** is stopped. More specifically, the CPU **26** (sensor control unit therein) transmits a control signal to the transmission-side circuit **41** and causes the oscillation of the transmission-side circuit **41** to stop. The CPU **26** (sensor control unit therein) applies a predetermined bias voltage to the amplifier circuit

23 (computation amplifier therein). In this state, the CPU **26** (generation unit therein) repeatedly receives the input signals, tens of times, for example, 32 times, from the reception-side ultrasonic sensor **18** through the AD converter **25**, and calculates an average value thereof to set the value as a reference value. More specifically, the signals at 32 points within, for example, one raster are measured. The CPU **26** (generation unit therein) corrects to add the correction value to the reference value and generates the threshold, and stores the threshold in the CPU **26** (register therein). Here, the correction value is determined empirically for each device to be installed allowing for the influence of noise or the like. It should be noted that the correction value may be determined beforehand and that the correction value may be determined, each time it is required, as a variable value for each device for allowing for influence of variation in sensitivity/sound pressure of the ultrasonic sensor, variation in fixture, surroundings, and adhesion of paper dust or the like.

The detector compares the output of the reception-side ultrasonic sensor **18** and the threshold, and detects feeding of a plurality of papers A. The CPU **26** (sensor control unit therein) transmits a control signal to the transmission-side circuit **41** and the like to cause the transmission-side circuit **41** to oscillate. Moreover, the CPU **26** (sensor control unit therein) applies a predetermined bias voltage to the amplifier circuit **23** (computation amplifier therein). In this state, the CPU **26** (comparator therein) repeatedly receives the input signals (digital values), tens of times, for example, 32 times, from the reception-side ultrasonic sensor **18** through the AD converter **25**, and holds the received signals. At this time, the oscillation (transmission-side drive pulses) of the transmission-side circuit **41** is stopped and the signals at a plurality of predetermined positions, for example, at 32 points are measured. The measuring position is set to once in, for example, each raster or once in a plurality of rasters. When an output waveform of the reception-side ultrasonic sensor **18** is getting larger to become a maximum value, the maximum value is sampled and held. Next, the CPU **26** (sensor control unit or comparator therein) sets a timer for SH interrupt, and determines whether an interrupt occurs. The SH interrupt is set so as to occur 32 times when, for example, 32 input signals are to be obtained as explained above. In other words, the SH interrupt triggers continuous outputs of drive pulses in the transmission side. For example, 32 times of SH interrupts occur in once in each raster with the passage of a predetermined time. When the interrupt does not occur, the determination of occurrence of the interrupt is repeated. When an interrupt occurs, an average value of 32 values previously received and held, for example, a moving average value is calculated, and this value is determined as a value of an input signal used to detect the multifeed (MF). Thereafter, the CPU **26** (comparator therein) compares the value of the input signal with the threshold of the register. When the value of the input signal is equal to or more than the threshold, the CPU **26** (comparator therein) determines that the result is normal paper feeding, while when the value of the input signal is less than the threshold, the CPU **26** (comparator therein) determines whether the number of times in this case is predetermined times, for example, ten times or more.

When it is determined that the number of times is 10 times or more, the CPU **26** (comparator therein) determines that a multifeed occurs, and outputs an error signal. When it is determined that the number of times is not 10 times or more, the following processes performed after the timer is set are repeated. The error signal is then input to the determining unit **202***a* of the CPU **26**.

2. Processes of Present Embodiment

Here, one examples of processes respectively executed in the information processing apparatus **100** (hereinafter, sometimes described as "PC **100**") and the image reading apparatus **200** (hereinafter, sometimes described as "scanner **200**") configured in the above manner will be explained with reference to FIG. **4**, FIG. **5**, and the like.

At first, one example of a main process executed in the scanner **200** side will be explained with reference to FIG. **4**.

First, when MF detection being valid is selected (when MF detection is set as valid), the multifeed detecting unit **202** of the scanner **200** starts MF detection from the upper edge (leading edge) of the paper using the ultrasonic (US) sensor (Step SA**1**).

Next, the multifeed detecting unit **202** stores output results (MF detection results) of the US sensor in a memory at certain intervals (Step SA**2**).

Next, the multifeed detecting unit **202** checks whether MF detection by the US sensor has reached the lower edge of the paper. When the MF detection has not reached the lower edge (No at Step SA**3**), the multifeed detecting unit **202** performs again Step SA**2**.

Then, when the MF detection has reached the lower edge (Yes at Step SA**3**) and when the US sensor further detects MF during the upper edge to the lower edge of the paper (Yes at Step SA**4**), the determining unit **202***a* of the multifeed detecting unit **202** compares the output result of the US sensor (specifically, an MF detected area) with a previously specified (set) detection condition (Step SA**5**). Specifically, the determining unit **202***a* (1) determines whether the MF detected area where MF is detected by the US sensor is within a preset valid area (or length regarded as valid) or invalid area (or length regarded as invalid) of the MF detection by the US sensor, and (2) determines the MF detection performed by the US sensor as valid when the MF detected area is within the valid area or is not within the invalid area and determines the MF detection performed by the US sensor as invalid when the MF detected area is not within the valid area or is within the invalid area.

Next, when the MF detection performed by the US sensor is determined as valid (Yes at Step SA**6**), the determining unit **202***a* determines this case as "MF error" according to the MF detection performed by the US sensor (Step SA**7**).

Meanwhile, when the MF detection performed by the US sensor is determined as invalid (No at Step SA**6**), the determining unit **202***a* ignores the MF detection performed by the US sensor and determines this case as "No MF error" and also stores information indicating that the MF detection performed by the US sensor is determined as invalid in the output result of the US sensor (specifically, the MF detection range of the US sensor and the information indicating that the MF detection is determined as invalid are stored in association with each other) (Step SA**8**).

Next, the calculating unit **202***b* of the multifeed detecting unit **202** calculates the length of the paper (specifically, the length from the upper edge to the lower edge of the paper) from the image data of the read paper or the output result of the US sensor (Step SA**9**).

Next, when a detection mode to detect MF due to a difference in lengths of papers is selected to its valid state (Yes at Step SA**10**), the determining unit **202***a* compares the length of the paper calculated at Step SA**9** and the preset reference length (e.g., a length of the first sheet of paper+10 mm) (Step SA**11**).

Next, when the result of comparison at Step SA**11** is "longer than the reference length" (Yes at Step SA**12**), the determining unit **202***a* determines this case as "MF error" (Step SA**13**).

Next, the scanner **200** checks whether transfer of the image data to the PC **100** has been finished. When the transfer to the PC **100** has been completed (Yes at Step SA**14**) and if "MF error" is further determined (Yes at Step SA**15**), the scanner **200** notifies the PC **100** of the MF error (Step SA**16**), and notifies the PC **100** of the output result of the US sensor (specifically, the MF detection range) stored in the memory and of the paper length calculated at Step SA**9** (Step SA**17**). Meanwhile, when "MF error" is not determined (No at Step SA**15**) and if there is next paper (Yes at Step SA**18**), the scanner **200** performs again the processes at Step SA**1** and thereafter.

As mentioned above, the one example of the main process performed in the scanner **200** side has been explained. As a result of performing the main process, the image data for each read paper is transferred to the PC **100**. In addition, when "MF error" is determined by the scanner **200**, then the determination result of the MF error, the output result of the US sensor (which, specifically, includes the MF detected area and the information indicating that the range is determined as invalid in some cases), and the paper length are transferred thereto.

Subsequently, one example of the main process performed in the PC **100** side will be explained with reference to FIG. **5** and the like.

First, the control unit **102** of the PC **100** acquires the image data transferred from the scanner **200** (Step SB**1**).

Next, when it is determined as "MF error" by the scanner **200**, the control unit **102** acquires the determination result of MF error notified from the scanner **200** (Step SB**2**).

Next, when it is determined as "MF error" by the scanner **200**, the control unit **102** acquires the output result of the US sensor (which, specifically, includes the MF detected area and the information indicating that the range is determined as invalid in some cases) notified from the scanner **200** and also acquires the paper length, and stores the acquired data in a predetermined memory area of the MF detection result file **106***b* (Step SB**3**).

Then, when it is determined as "MF error" by the scanner **200**, the display control unit **102***a* displays MF detection check screens MA as shown in, for example, FIG. **6** to FIG. **9** on the monitor **114** based on the image data, the output result of the US sensor (MF detected area), the paper length, the preset MF detection range (which is, specifically, the MF detection range including the valid area (or the length regarded as valid) and/or the invalid area (or the length regarded as invalid) of the MF detection by the US sensor) and also based on the preset reference length (Step SB**4**). When it is not determined as "MF error" by the scanner **200**, the display control unit **102***a* displays an MF detection check screen MB as shown in FIG. **10** on the monitor **114** (Step SB**4**).

Specifically, when two or more sheets of paper overlapped are determined as MF error by the scanner **200**, the display control unit **102***a* performs the following processes (11) to (13) in an arbitrary order, to display the MF detection check screen MA as shown in FIG. **6** on the monitor **114**. Here, one example of the MF detection check screen MA will be explained with reference to FIG. **6**. The MF detection check screen MA includes an image display area MA**1** to display image data, a variable display area MA**2** to variably display an MF detection range including a valid area and/or an invalid area, a display area MA**3** to display a numerical value of the paper length and a numerical value of a difference between the paper length and the reference length, an image load button MA**4** to instruct loading (storage) of the image data displayed on the image display area MA**1**, and an image discard button MA**5** to instruct discard (delete) of the image data displayed on the image display area MA**1**.

(11) Image data showing MF-detected paper A and paper B is displayed in the image display area MA**1**. Moreover, an MF detected area C in an overlap range of the paper A and the paper B MF-detected by the US sensor is displayed in a color or a pattern or the like.

(12) A preset MF detection range is displayed in the variable display area MA**2** so as to be capable of discriminating the valid area from the invalid area using a color or a pattern or the like. It should be noted that the variable display area MA**2** shown in FIG. **6** is one example in which the MF detection range including only the valid area is set.

(13) A numerical value of the paper length and a numerical value of a difference between the paper length and the reference length are displayed in the display area MA**3**.

Consequently, a source of the MF error can be easily checked on the screen. In addition, it is easily determined whether the image is loaded or discarded.

Moreover, in a specific case where a paper with an attached seal is determined as MF error by the scanner **200**, the display control unit **102***a* performs the following processes (21) to (23) in an arbitrary order, and displays an MF detection check screen MA as shown in FIG. **7** on the monitor **114**.

(21) Image data showing the MF-detected paper A and a seal B attached to the paper A is displayed in the image display area MA**1**. Moreover, an MF detected area C in the seal B MF-detected by the US sensor is displayed in a color or a pattern or the like.

(22) A preset MF detection range is displayed in the variable display area MA**2** so as to be capable of discriminating the valid area from the invalid area using a color and a pattern or the like. It should be noted that the variable display area MA**2** shown in FIG. **7** is one example in which the MF detection range including the valid area and the invalid area is set. Here, sizes and positions of the valid area and the invalid area displayed in the variable display area MA**2** can be arbitrarily changed by the operator operating the input device **112**.

Specifically, the sizes and positions of the valid area and the invalid area can be arbitrarily changed from the state shown in FIG. **7**. When the operator changes the sizes and positions of the valid area and the invalid area, the setting unit **102***b* transfers the setting of the valid area and the invalid area after the change to the scanner **200** and updates the setting of the valid area and the invalid area in the scanner **200**. The reflecting unit **102***c* reflects (previews) the changed setting of the valid area and the invalid area in the MF detection check screen MA (specifically, in the MF detected area C displayed in the image display area MA**1**).

(23) A numerical value of the paper length and unit (e.g., "mm"), and a numerical value of a difference between the paper length and the reference length and unit are displayed in the display area MA**3**.

Consequently, the set detection range (length) is reflected to an US-sensor output of the screen. The result of MF error is previously known through a preview function. Therefore, an unnecessary operation to be performed again can be omitted.

Moreover, in a specific case where MF error is detected due to a difference in lengths of the papers by the scanner **200** (when Step SA**13** of the main process in the scanner **200** side shown in FIG. **4** is performed), the display control unit **102***a* performs the following processes (31) to (33) in an arbitrary

order, and displays an MF detection check screen MA as shown in FIG. **8** on the monitor **114**.

(31) Image data showing MF-detected paper A and paper B is displayed in the image display area MA**1**.

(32) A length (size) of a display area MA**2'** (an area for displaying a paper length and a difference between the paper length and the reference length (e.g., ordinary paper length+10 mm)) provided instead of the variable display area MA**2** is changed to a length corresponding to the paper length, and thus the paper length can be recognized on the display. Moreover, a color or a pattern or the like is applied to a portion (specifically, a portion longer than the reference length) corresponding to the difference between the paper length and the reference length in the display area MA**2'**, and thus the difference can be recognized on the display.

(33) A numerical value of the paper length and a numerical value of a difference between the paper length and the reference length are displayed in the display area MA**3**.

Consequently, when a paper of a fixed size is to be fed, information for making a decision is provided. A source of MF error can be easily checked on the screen.

Moreover, in a specific case where MF error is detected within the valid area and MF is also detected in the invalid area by the scanner **200** (when there is an MF detected area which is determined as "MF error" and there is also an MF detected area which is determined as "No MF error" in the scanner-side main process as shown in FIG. **4**), the display control unit **102***a* performs the following processes (41) to (43) in an arbitrary order, and displays an MF detection check screen MA as shown in FIG. **9** on the monitor **114**.

(41) Image data showing MF-detected paper A and paper B, and a seal C attached to the paper B is displayed in the image display area MA**1**. Moreover, an MF detected area D (area determined as "MF error") in the seal C MF-detected in the valid area is applied with a color or a pattern or the like and is displayed in the image display area MA**1**. In addition, an MF detected area E (area determined as "No MF error") within an overlap range of the paper A and the paper B MF-detected in the invalid area is applied with a different color or pattern or the like from the MF detected area D and is displayed in the image display area MA**1**.

(42) A preset MF detection range is displayed in the variable display area MA**2** so as to be capable of discriminating the valid area from the invalid area using a color or a pattern or the like.

(43) A numerical value of the paper length and a numerical value of a difference between the paper length and the reference length are displayed in the display area MA**3**.

Consequently, a source of MF error can be easily checked on the screen.

Moreover, in a specific case where MF is detected within invalid areas of some sheets of papers when the scanner **200** is reading the papers (when there is no MF detected area determined as "MF error" but there is an MF detected area determined as "No MF error" in the scanner-side main process as shown in FIG. **4**), the display control unit **102***a* performs the following processes (51) to (53) after the reading of all the papers by the scanner **200** is completed, and displays the MF detection check screen MB as shown in FIG. **10** on the monitor **114**. Here, one example of the MF detection check screen MB will be explained with reference to FIG. **10**. The MF detection check screen MB is a screen to display a plurality of image data in the form of thumbnail, and includes a plurality of image display areas MB**1** to display image data.

(51) A plurality of image data are thumbnail-displayed in the image display areas MB**1**, respectively.

(52) The image display area MB**1** (image display area located at the right side of the upper portion in FIG. **10**) displayed with image data showing the paper A_1 and the paper B_1 MF-detected in the invalid area is highlighted with a characteristic color or pattern or the like. Moreover, an MF detected area C_1 (area determined as "No MF error") within an overlap range of the paper A_1 and the paper B_1 MF-detected in the invalid area is applied with a color or a pattern or the like, and is displayed in the image display area MB**1**.

(53) The image display area MB**1** (image display area located at the center of the lower portion in FIG. **10**) displayed with image data showing the paper A_2 and the seal B_2 attached to the paper A_2 MF-detected in the invalid area is highlighted with a characteristic color or pattern or the like. Moreover, an MF detected area C_2 (area determined as "No MF error") within the seal B_2 MF-detected in the invalid area is applied with a color or a pattern or the like, and is displayed in the image display area MB**1**.

Consequently, it is possible to perform checking again after the reading is completed, which allows improved reliability of MF error detection.

The operator then checks the MF detection check screen MA or the MF detection check screen MB displayed on the monitor **114** to identify (verify) the cause of the MF error.

Specifically, when the papers overlap, the operator presses the image discard button MA**5** included in the MF detection check screen MA by operating the input device **112**, to return the papers to the shooter (or hopper) of the scanner **200**. When receiving the press, the deleting unit **102***d* discards the image data displayed in the image display areas MA**1**, and the rereading unit **102***e* transfers an instruction to rescan (reread) the paper, to the scanner **200**.

Specifically, when the size and the position of an object attached to the paper are fixed, the operator appropriately adjusts the MF detection range of the variable display area MA**2** by operating the input device **112** while viewing the MF detection check screen MA. After the adjustment is finished, the setting unit **102***b* transfers the adjusted MF detection range to the scanner **200** to update the setting of the MF detection range of the scanner **200**. The reflecting unit **102***c* reflects the adjusted MF detection range in the MF detection check screen MA (specifically, the displayed MF detected area).

Specifically, when MF is not caused by an overlap of papers, the operator presses the image load button MA**4** included in the MF detection check screen MA by operating the input device **112**. When receiving the press, the loading unit **102***f* stores (loads) the image data displayed in the image display area MA**1** in a predetermined memory area of the image data file **106***a*.

3. Summary of Present Embodiment, and Other Embodiments

As mentioned above, according to the present embodiment, not only the MF-detected image but also the output of the US sensor (MF detected portion) is further displayed in the MF detection check screen upon MF detection. Consequently, the cause of MF can be easily identified without causing the operator to perform complicated and troublesome setting operations of valid/invalid areas of MF detection. Moreover, a position on the paper at which MF is detected can be more clearly shown. In addition, the operability when the paper with attached sticky note or photo or the like is determined as MF can be improved.

Although only the MF-detected image is displayed so far, the cause of the MF error is difficult to be identified only by the image. Specifically, it is difficult to check a boundary of the papers only by the image, and it is also difficult to find out a portion at which the MF has occurred. Moreover, it is also necessary to check an MF-detected actual paper, and it is also troublesome to set a valid/invalid area of MF detection.

According to the present embodiment, therefore, when MF is detected, not only a screen for checking an MF-detected image is displayed on the PC but also an output of the US sensor (portion where MF is detected) is displayed on the screen. Consequently, a source of MF error can be easily checked on the screen. In addition, it is easily determined whether the image is loaded or discarded.

Moreover, according to the present embodiment, the valid/invalid area of MF detection is caused to be set through the MF detection check screen and is previewed. In addition, according to the present embodiment, the length regarded as MF detection is caused to be set through the MF detection check screen and is previewed. As a result, when the size and the attached position of an attachment such as a seal and a slip attached to the paper are fixed, the operator can arbitrarily set the valid area or the invalid area of the MF detection according to the attachment. By previewing the set area or length on the monitor, this enables the operator to know the result of MF error beforehand, thus omitting an unnecessary operation to be performed again (rereading operation of a medium).

According to the present embodiment, the detected paper length and the difference between the paper length and the reference length are displayed on the MF detection check screen. Consequently, when a paper of a fixed size is to be fed, the operator can easily check the source of the multifeed error. It should be noted that a method of determining MF with a change in the length of a fed paper is extremely effective in a scanner without the US sensor or the like.

According to the present embodiment, an output of the US sensor indicating MF detection within the preset invalid area is displayed in a different color or the like. This allows the cause of the multifeed to be more easily identified.

According to the present embodiment, even if MF is detected within the preset invalid area but it is not determined as MF error, the detection in the invalid area is notified to the user after the reading is finished so that the user can check it again. The image data is thumbnail-displayed, and a background color of the display area of the image data detected in the invalid area among thumbnail images is featured and highlighted. Consequently, the operator can check again the read state of each paper after the reading is completed, thus, improving the reliability of MF error detection.

According to the present embodiment, the user checks a highlighted image (the background is changed in the thumbnail screen), and deletes the image or causes the paper to be reread if necessary. Consequently, when papers overlap, the operator can easily implement discard of the image and rescan of the paper.

Moreover, the present invention may be implemented in various different embodiments in the scope of technical idea described in the appended claims other than the embodiment. For example, of the processes explained in the embodiment, all or part of the processes explained as automatically performed ones can be manually performed, or all or part of the processes explained as manually performed ones can be also automatically performed using known methods. A specific configuration of distribution or integration of the apparatuses is not limited to the illustrated one. The apparatuses can be configured by functionally or physically distributing or integrating all or part of the apparatuses in arbitrary units according to various types of additions or the like or according to functional loads. In addition, the process procedures, the control procedures, the specific names, and the screen examples shown in the present specification and the drawings can be arbitrarily modified unless otherwise specified.

The constituent elements of the information processing apparatus **100** shown in the drawings are functionally conceptual, and need not be physically configured as illustrated. For example, for the process functions provided in the information processing apparatus **100**, especially for the process functions performed in the control unit **102**, all or any part thereof may be implemented by a CPU and programs interpreted and executed in the CPU, and may be implemented as hardware by wired logic. The programs are recorded in a recording medium, explained later, and they are mechanically loaded into the information processing apparatus **100** as required. More specifically, computer programs to perform various processes are recorded in the storage unit **106** such as ROM or HD (Hard Disk). The computer programs are executed by being loaded into RAM, and form the control unit in cooperation with the CPU.

The image displaying apparatus according to the present invention may be configured as an information processing apparatus (including an information processing apparatus connected with arbitrary peripheral devices) such as known personal computer and work station. The image displaying apparatus according to the present invention can be achieved by installing software (including the programs, the data, and the like) to cause the information processing apparatus to implement the image display method according to the present invention. The image displaying program according to the present invention may be stored in a computer-readable recording medium, or can be configured as a program product. The "recording medium" mentioned here includes any "portable physical medium" such as a flexible disk, a magneto-optical disc, ROM, EPROM (Erasable Programmable Read Only Memory), EEPROM (Electronically Erasable and Programmable Read Only Memory), CD-ROM (Compact Disk Read Only Memory), MO (Magneto-Optical disk), and DVD (Digital Versatile Disk) or includes a "communication medium" that temporarily holds a program, such as a communication line and a carrier used to transmit the program through a network such as LAN (Local Area Network), WAN (Wide Area Network), and the Internet. The "program" mentioned here is a data processing method described in arbitrary language and description method, and thus any form such as a source code and a binary code is acceptable. It should be noted that the "program" is not necessarily limited to a program configured as a single unit, and, therefore, includes those distributedly configured as a plurality of modules and libraries and those in which the function of the program is achieved in cooperation with separate programs represented as OS. Regarding a specific configuration and a reading procedure to read a recording medium by the apparatuses shown in the embodiments, or an installation procedure after the reading, or the like, known configuration and procedures can be used.

According to the present invention, an image of a medium which is read by an image reading apparatus and where multifeed is detected by a multifeed detecting mechanism and a multifeed detected portion detected by the multifeed detecting mechanism are displayed on a display unit. Thus, there is such an effect that the cause of multifeed can be easily identified without causing an operator to perform complicated and troublesome operations.

According to the present invention, an area or a length in which the multifeed detection detected by the multifeed detecting mechanism is enabled or disabled is caused to be set, and the set area or length is reflected in the multifeed detected portion displayed on the display unit. Thus, there is such an effect that when the size and the attached position of an attachment such as a seal and a slip attached to the medium are fixed, the operator can arbitrarily set the valid area or

length or the invalid area or length of the MF detection according to the attachment. There is such an effect that by previewing the set area or length on the display unit, this enables the operator to know the result of MF error beforehand, thus omitting an unnecessary operation to be performed again (rereading operation of a medium).

According to the present invention, the multifeed detected portion detected in the set area or length in which the multifeed detection is disabled is displayed on the display unit characteristically (specifically, in a color or pattern or the like different from that in the other multifeed detected portions). Thus, there is such an effect that this allows the cause of the multifeed to be more easily identified.

According to the present invention, after the image reading apparatus finishes reading, it is notified that the multifeed detected portion is detected in the set area or length in which the multifeed detection is disabled. Specifically, after the reading of a plurality of mediums is completed, the read images of the mediums are displayed in thumbnail form on the display unit, and the image including the multifeed detected portion detected in the area or the length where the multifeed detection is disabled is highlighted. Thus, there is such an effect that the operator can check again the read state of each medium after the reading is completed, thus, improving the reliability of multifeed error detection.

According to the present invention, a length of the medium and a difference between the length and a preset reference length are displayed on the display unit. Thus, there is such an effect that when a medium of a fixed size is to be fed, the operator can easily check the source of the multifeed error.

According to the present invention, the image is deleted, and the image reading apparatus is caused to reread the medium. Thus, there is such an effect that when mediums overlap, the operator can easily implement discard of the image and rescan of the medium.

Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

What is claimed is:

1. An image displaying apparatus comprising:

a control unit; and

a display unit, the image displaying apparatus being connected to an image reading apparatus that includes a multifeed detecting mechanism,

wherein the control unit includes

a display control unit that displays an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion which is detected by the multifeed detecting mechanism and is a portion of the medium, on the display unit, the multifeed detected portion being displayed on the image, and

the display control unit displays, on the display unit, a multifeed detection check screen including an image display area to display the image and the multifeed detected portion and a variable display area to variably display a multifeed detection range including an area or a length in which the multifeed detected by the multifeed detecting mechanism is enabled or disabled.

2. The image displaying apparatus according to claim **1**, wherein the control unit further includes

a setting unit that causes the area or the length to be set by operating the multifeed detection range, and

a reflecting unit that reflects the area or the length set by the setting unit in the multifeed detected portion displayed on the image display area.

3. The image displaying apparatus according to claim **2**, wherein the display control unit characteristically displays the multifeed detected portion detected in the area or the length, set by the setting unit, in which the multifeed detection is disabled, on the image display area.

4. The image displaying apparatus according to claim **2**, wherein the display control unit notifies, after the image reading apparatus finishes reading, that the multifeed detected portion is detected in the area or the length, set by the setting unit, in which the multifeed detection is disabled.

5. The image displaying apparatus according to claim **1**, wherein the multifeed detection check screen further includes a display area to display a length of the medium and a difference between the length of the medium and a preset reference length, and the display control unit displays the length of the medium and the difference on the display area.

6. The image displaying apparatus according to claim **1**, wherein the control unit further includes

a deleting unit that deletes the image, and

a rereading unit that causes the image reading apparatus to reread the medium.

7. An image displaying method implemented by a control unit of an image displaying apparatus that includes the control unit and a display unit and is connected to an image reading apparatus including a multifeed detecting mechanism, the image displaying method comprising:

a display controlling step of displaying an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion which is detected by the multifeed detecting mechanism and is a portion of the medium, on the display unit, the multifeed detected portion being displayed on the image,

wherein the display control step displays, on the display unit, a multifeed detection check screen including an image display area to display the image and the multifeed detected portion and a variable display area to variably display a multifeed detection range including an area or a length in which the multifeed detected by the multifeed detecting mechanism is enabled or disabled.

8. A non-transitory tangible computer readable medium having instructions for a control unit of an image displaying apparatus that includes the control unit and a display unit and is connected to an image reading apparatus including a multifeed detecting mechanism, the instructions, when executed, causing the control unit to perform:

a display controlling step of displaying an image of a medium which is read by the image reading apparatus and in which multifeed is detected by the multifeed detecting mechanism, and a multifeed detected portion which is detected by the multifeed detecting mechanism and is a portion of the medium, on the display unit, the multifeed detected portion being displayed on the image,

wherein the display control step displays, on the display unit, a multifeed detection check screen including an image display area to display the image and the multifeed detected portion and a variable display area to variably display a multifeed detection range including an area or a length in which the multifeed detected by the multifeed detecting mechanism is enabled or disabled.

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