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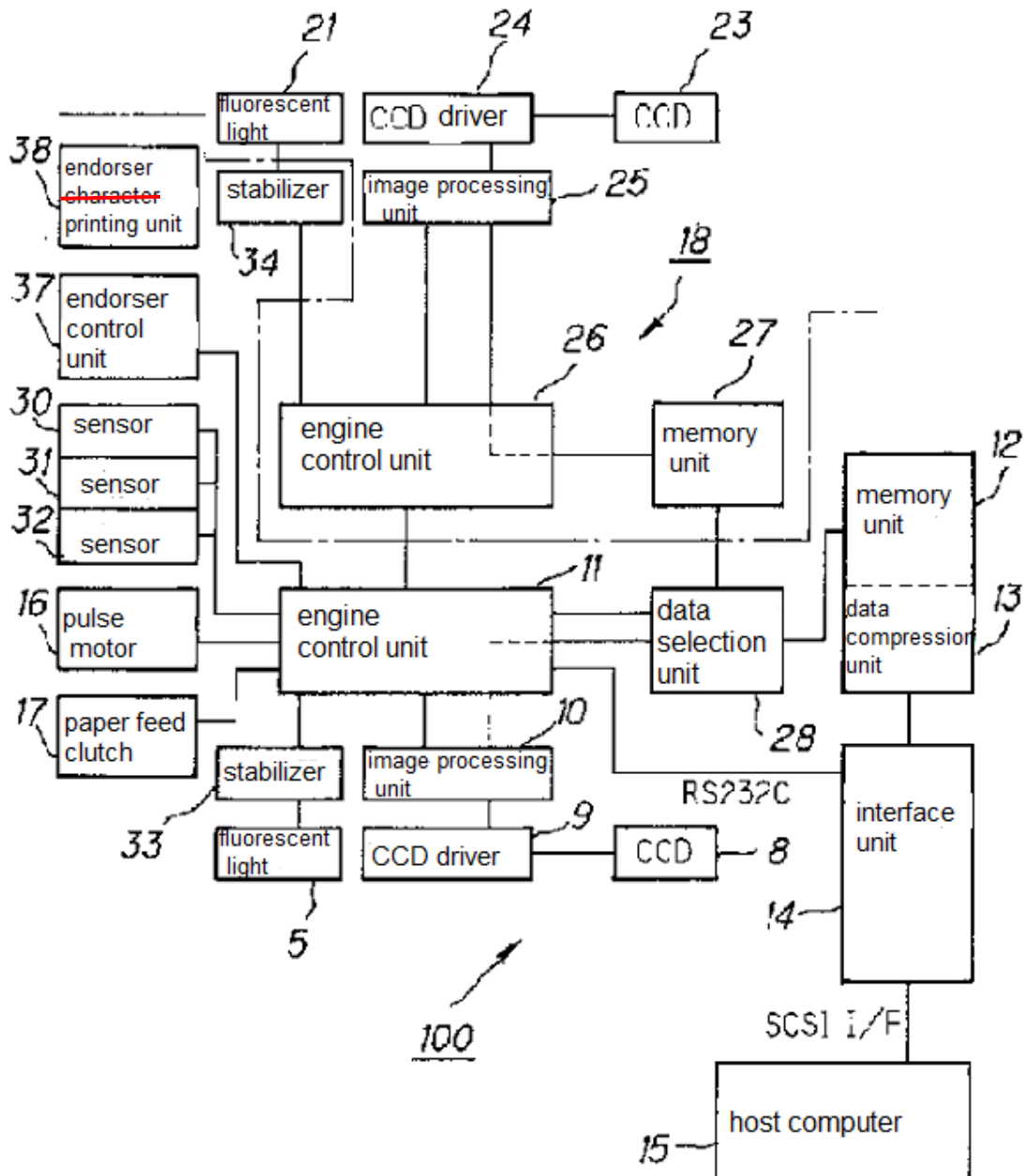
(54) [Title of Invention] Image Reading Device

(57) [Abstract]
[Purpose] To upgrade the throughput when reading the image of an original according to a command from a host computer and transferring the image data to the host computer.

[Configuration] Control unit 11 is operated as follows. When an original read is terminated, the read original is ejected; when the next original is in place, that original is fed; when read end signal EMPTY is received from memory unit 12, the next original is read and transfer processing is carried out. Interface unit 14 does not output a read command for each original to control unit 11.

[Figure 1]

21 24 23

fluorescent light

CCD driver

CCD

38 endorser ~~character~~ printing unit

stabilizer

image processing unit

25

18

34

37 endorser control unit

26

27

30 sensor

engine control unit

memory unit

12

31 sensor

memory unit

32 sensor

11

13

16 pulse motor

engine control unit

data selection unit

data compression unit

17 paper feed clutch

image processing unit

10

28

RS232C

interface unit

stabilizer

9

33 fluorescent light

CCD driver

CCD

8

5

14

100

SCSI I/F

15 host computer

[Claim]
[Claim 1]
An image reading device comprising:
an automatic original conveying device for conveying an original to an image reading device one by one;
a reader means for reading the original conveyed by the automatic original conveying device;
a storage means for storing image data read by the reader means;
a control means for controlling the automatic original conveying device and the reader means and for storing the image data in the storage means;
an interface for controlling read of the control means and the storage means according to a command from the host,
wherein the storage means outputs EMPTY signals to the control means if the image data read by the interface is completed and the control means starts read operations for the next original by the reader means using the EMPTY signals as a trigger.
[Claim 2]
The image reading device according to Claim 1, wherein the control means completes the read operations of the reader means based on the number of sheets of the original read from the interface.
[Claim 3]
The image reading device according to Claim 1, wherein the storage means outputs EMPTY signals when the unused capacity is greater than the quantity of image data in the next original.
[Claim 4]
An image reading device comprising:
an automatic original conveying device for conveying sheets of an original to an image read position one by one;
a first and a second reader means for reading each of the first face and the second face of the original conveyed by the automatic original conveying device;
a first and a second storage means for storing each image data read by the first and the second reader means;
a control means for controlling the automatic original conveying device, the first and the second reader means and to store the image data in the first and the second storage means;
an interface for controlling read of the control means and the storage means according to an instruction from the host,
wherein the first and the second storage means output EMPTY signals to the control means when image data read by the interface is completed and the control means switches selectively the read paths for the first and the second storage means using the EMPTY signals as a trigger.

[Detailed Description of Invention]
[0001]
[Field of Industrial Applicability]
The present invention relates to an image reading device for reading an original image according to a command from a host computer and transferring image data to a host computer

[0002]
[Prior Art]

Image reading devices for reading the image of an original according to a command from a host computer and transferring the image data to a host computer generally comprises an automatic original conveying device for conveying sheets of an original to an image reading position one by one; and a reading means (scanner) for reading an original conveyed by the automatic original conveying device. Conventional image reading devices comprised a control unit 110 for controlling conveying of the original as well as reading, a memory unit, an image compression unit 120 and an interface unit 140 for controlling control unit 110, memory unit and image compression unit 120 based on commands from the host, so that image data is transferred to host side, as indicated in Figure 18.

[0003]
In addition, read images are first saved in FIFO memory 12b through video I/F12a in the memory unit and image compression unit 12, as indicated in detail in Figure 19. Furthermore, first-in and first-out in FIFO memory 12b is controlled by FIFO controller 12c. Then, image data saved in FIFO memory 12b are compressed by image compression block 13a and outputted to interface unit 140 via output I/F 13b.

[0004]
In this case, interface unit 140 obtains the image format, the contrast, the dithering and the information about the image compression mode when interface unit 140 receive an image read command from the host computer. Each of information on image format, contrast and dithering is set to control unit 110 in Step S21 and information on the image compression mode is set in memory unit 120 in Step S22. Then, the read command (Q command) is sent to control unit 110 (Step S23), the image data are read from memory unit 120 and transferred to the host computer (Step S24). In addition, if the next original to be read exists, the read command is sent to control unit 110 and this is repeated (Steps S23 through S25).

[0005]
Meanwhile, when control unit 110 receives an image read command, original is fed (Steps S1, S2), as indicated in Figure 21; the read data are transferred to memory unit 120 by moving on to image transfer processing, as indicated in detail in Figure 7 (Step S3). In Step S4, the read original is fed (Steps S6) when the next original exists (Steps S5), thereby terminating the series of scanning operations.

[0006]
[Problems Solved by the Invention]
However, in the conventional image reading device, interface unit 140 transferred image data to the host computer, as indicated in Figure 20, (Step S24), then a read command for the next original was sent to control unit 11 (Step S23), thereby a gap time is occurred, in FIFO memory 12b, between the completing reading and the next reading. As a result, there was a problem in that the processing efficiency (throughput) was poor. In particular, when the interface between interface unit 14 and control unit 110 was RS232C, this gap time became longer.

[0007]

Taking note of the abovementioned problems, it is an object of the present invention to provide an image reading device which can improve throughput when an original image is read according to acommand from a host computer and image data is transferred to the host computer.

[0008]
[Means of Solving the Problems]
In order to attain the abovementioned objective, the first means is characterized by comprising an automatic original conveying device for conveying sheets of an original to an image read position one by one;
a reader means for reading the original conveyed by the automatic original conveying device; a storage means for storing image data read by the reader means; a control means for controlling the automatic original conveying means and the reader means to store the image data in the storage means; and an interface for controlling the control means and the storage means according to a command from the host; wherein the storage means outputs EMPTY signals to the control means if the image data read by the interface is completed; the control means starts read operations for the next original by the reader means using the EMPTY signals as a trigger. The second means is characterized in that the control means of the first means completes the read operations by the reader means based on the number of sheets of the original read from the interface.

[0009]
The third means is characterized in that the storage means of the first means outputs EMPTY signals when the unused capacity is greater than quantity of the image data.

[0010]
The fourth means is characterized by comprising an automatic original conveying device for conveying sheets of the original to an image read position one by one; a first and a second reader means for reading each of the first face and the second face of the original conveyed by the automatic original conveying device; a first and a second storage means for storing each image data read by the first and the second reader means; and a control means for controlling the automatic original conveying device, the first and the second reader means to store the image data in the first and the second storage means; and an interface for controlling reading of the control means and the storage means according to a command from the host; wherein the first and the second storage means outputs EMPTY signals to the control means when reading of the image data by the interface is completed and the control means switches selectively the read paths of the first and the second storage means using the EMPTY signals as a trigger.

[0011]
[Actions]
Thanks to the abovementioned configuration in the first means, the control means starts read operations of the reader means using EMPTY signals from the storage device as a trigger; the control means can start read operations for the next original without waiting for a read command from the interface; as a result, the throughput can be improved when the original image is read according to a command from the host computer and the image data is transferred to the host computer.

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