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(54) **Thermal transfer recording apparatus and facsimile apparatus utilizing the same.**

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Description

The present invention relates to a thermal transfer recording apparatus for image recording on a recording medium by transfer of ink from an ink sheet, and a facsimile apparatus utilizing such recording apparatus, in accordance with the precharacterizing part of claims 1 and 6, respectively.

In general the thermal transfer printer utilizes an ink sheet consisting of a substrate film coated with heat-fusible (or heat-sublimable) ink, and effects image recording by selectively heating said ink sheet with a thermal head according to an image signal, thereby transferring thus fused (or sublimed) ink onto a recording sheet. Since said ink sheet is generally so-called one-time ink sheet in which the ink is completely transferred to the recording sheet by a single image recording, it is necessary, after the image recording of a character or a line, to advance the ink sheet corresponding to the recorded length, thereby securely bringing an unused portion of the ink sheet to the next recording position. Consequently the amount of use of the ink sheet increases, and such thermal transfer printers tend to have a higher running cost in comparison with ordinary thermal printers utilizing thermosensitive recording paper.

In order to prevent such drawback, there have already been proposed thermal transfer printers in which the recording sheet and the ink sheet are transported with different speeds, as disclosed in the Japanese Patent Appln. Laid-Open No. 57-83471 and No. 58-201686 and in the Japanese Patent Publication No. 62-58917.

Also for use in such thermal transfer printers, there is already known a multi-print ink sheet capable of plural (n) image recordings. In continuous image recording of a length L, such ink sheet allows to reduce the length thereof, transported during or after said image recording, to a value smaller than L (said value being L/n; $n > 1$). The efficiency of use of the ink sheet can therefore be increased to n times of the conventional efficiency, and a reduction in the running cost of the thermal transfer printer can be expected. Such recording method will hereinafter be called the multi printing method.

In such multi printing, the ink constituting the ink layer of the ink sheet is heated n times, and the ink transfer to the recording sheet is achieved by generating a shearing force between an ink layer portion fused in each heating and an unfused ink layer portion. In such printing method, if the recording of a line does not take place immediately after the recording of a preceding line, the temperature of the ink layer is lowered, and the shearing strength between the fused ink layer portion transferred to the recording sheet and the unfused ink layer portion increases so that it becomes more difficult to separate the ink sheet from the recording sheet. Such phenomenon becomes more conspicuous when the recording data of a line contains a large number of black data.

EP-A-0 295 953 discloses an apparatus according to the precharacterizing part of claim 1 and of claim 6. To prevent that a thermal head and a transfer ink sheet are adhered together, the ink sheet is heated to a certain extent between completion of printing of one line and initiation of transport of the recording paper to the next line. Said heating is effected in each of such intervals.

In consideration of the foregoing, the object of the present invention is to provide a thermal transfer recording apparatus capable of preventing damage or sticking of the ink sheet, and a facsimile apparatus utilizing said recording apparatus.

This is achieved according to the characterizing part of claim 1 and claim 6, respectively.

According to the present invention there is provided a thermal transfer recording apparatus capable of preventing damage or sticking of the ink sheet, in which, for example at an interruption in the recording operation, the ink sheet and the recording medium are separated by heating said ink sheet and then transporting the recording medium by a predetermined amount.

The foregoing and still other objects of the present invention will become fully apparent from the following description which is to be taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing electric connections between a control unit and a recording unit in a facsimile apparatus constituting an embodiment of the present invention;

Fig. 2 is a block diagram showing schematic structure of the facsimile apparatus of said embodiment;

Fig. 3 is a lateral cross-sectional view of the mechanism of said facsimile apparatus;

Fig. 4 is a perspective view of a transport mechanism for the recording sheet and the ink sheet of said embodiment;

Fig. 5 is a flow chart of the recording sequence in the facsimile apparatus of said embodiment;

Fig. 6 is a flow chart of the recording sequence in another embodiment;

Fig. 7 is a cross-sectional view showing the state of the recording sheet and the ink sheet in a multi printing operation of said embodiment; and

Fig. 8 is a cross-sectional view of the multi ink sheet employed in said embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now the present invention will be clarified in detail by preferred embodiments thereof, with reference to the attached drawings.

[Facsimile apparatus (Figs. 1 to 4)]

Figs. 1 to 4 show a thermal transfer recording apparatus embodying the present invention and applied to a facsimile apparatus, wherein Fig. 1 is a block diagram showing electrical connections between a control unit 101 and a recording unit 102 of the facsimile apparatus; Fig. 2 is a block diagram of the schematic structure of said facsimile apparatus; Fig. 3 is a lateral cross-sectional view of the facsimile apparatus; and Fig. 4 is a perspective view of a transport mechanism for a recording sheet 1 and an ink sheet 14 in the recording unit 102.

At first reference is made to Fig. 2 for explaining the schematic structure of the facsimile apparatus constituting an embodiment of the present invention.

A reader unit 100 for photoelectrically reading an original image and sending a digital image signal to a control unit 101, is provided with an original transporting motor and a CCD image sensor. The control unit 101 is constructed in the following manner. A line memory 110, for storing image data of each line, serves to store the image data of a line from the reader unit 100 in case of the original transmitting or copying mode, or the received and decoded image data of a line in case of the image data receiving mode. The image formation is conducted by transferring thus stored data to the recording unit 102. An encoder/decoder unit 111 encodes the image information to be transmitted for example by MH encoding, and decodes the received encoded data into image data. A buffer memory 112 stores image data which are to be transmitted or which have been received. These units of the control unit 101 are controlled by a CPU 113 composed for example of a microprocessor. The control unit 101 is further provided with a ROM 114 storing control programs of the CPU 113 and other various data, and a RAM 115 functioning as a work area for the CPU 113 and serving to temporarily store various data.

A recording unit 102 is provided with a thermal line head and serves to record an image on the recording sheet by thermal transfer recording method. The details of said recording unit will be explained later with reference to Fig. 3. An operation console unit 103 is provided with various functional keys for example for starting the transmission, and telephone number input keys. A key 103a thereof, used for instructing the kind of the ink sheet used, indicates a multi-printing ink sheet or an ordinary ink sheet respectively when said switch 103a is on or off. There are also provided a display unit 104, usually positioned next to the operation console unit and used for displaying the state of various functions or of the apparatus; a power source unit 105 for supplying the entire apparatus with electric power; a modem (modulator/demodulator) 106; a network control unit (NCU) 107 for effecting an automatic call receiving operation by detecting the call tone and a line controlling operation; and a telephone unit 108.

In the following there will be given a detailed explanation on the structure of the recording unit 102 with reference to Fig. 3, in which same components as those in the preceding drawings are represented by same numbers.

Referring to Fig. 3, a sheet roll 10, composed of plain recording paper 11 wound on a core 10a, is rotatably supported in the apparatus so as to feed the recording sheet 11 to a thermal head 13 by the rotation of a platen roller 12 in a direction indicated by an arrow. A sheet roll holding unit 10b removably holds the sheet roll 10. The platen roller 12 serves to transport the recording sheet 11 in a direction b, and to press an ink sheet 14 and the recording sheet 11 toward heat-generating resistors 132 of the thermal head 13. The recording sheet 11, which has been subjected to image recording by the heat generation of the thermal head 13, is transported toward discharge rollers 16 (16a, 16b) by further rotation of the platen roller 12, and, upon completion of image recording of a page, is cut into a page-sized sheet by mutual engagement of cutter members 15 (15a, 15b).

An ink sheet feeding roller 17 on which the ink sheet 14 is wound, and an ink sheet take-up roller 18 are driven by an ink sheet transport motor to be explained later, thereby taking up the ink sheet 14 in a direction a. Said ink sheet feeding roller 17 and ink sheet take-up roller 18 are detachably loaded in an ink sheet loading unit 70 in the main body of the apparatus. There are also provided a sensor 19 for detecting the remaining amount and the transport speed of the ink sheet 14; an ink sheet sensor 20 for detecting presence or absence of the ink sheet 14; a spring 21 for pressing the thermal head 13 to the platen roller 12 across the recording sheet 11 and the ink sheet 14; and a recording sheet sensor 22 for detecting presence or absence of the recording sheet.

In the following explained is the structure of the reader unit 100.

A light source 30 illuminates an original 32. The light reflected by said original 32 passes through an optical system (mirrors 50, 51 and a lens 52), enters a CCD sensor 31 and converted

into electrical signals therein. The original 32 is transported with a speed corresponding to the reading speed of said original 32, by transport rollers 53, 54, 55, 56 driven by an unrepresented transport motor. An original stacker table 57 supports plural originals 32 which are separated one by one and advanced to the reader unit 100, through the cooperation of a transport roller 54 and a separating member 58.

A control circuit board 41, constituting the principal part of the control unit 101, sends various control signals to various parts of the apparatus. There are also provided a power source unit 105 for supplying electric power to the various parts of the apparatus; a modem board unit 106; and a NCU board unit 107 for making connection with the external telephone lines.

Fig. 4 shows the details of the transport mechanism for the ink sheet 14 and the recording sheet 11.

In Fig. 4 there are shown a recording sheet transport motor 24 for rotating the platen roller 12 thereby transporting the recording sheet 11 in a direction b opposite to the direction a; an ink sheet transport motor 25 for transporting the ink sheet 14 in the direction a by means of a capstan roller 71 and a pinch roller 72; gears 26, 27 for transmitting the rotation of the recording sheet transport motor 24 to the platen roller 12; gears 73, 74 for transmitting the rotation of the ink sheet transport motor 25 to the capstan roller 71; and a slip clutch unit 75.

The ink sheet 14 advanced by the capstan roller 71 can be securely wound on the take-up roller 18, by selecting the ratio of the gears 74, 75 in such a manner that the length of the ink sheet 14 wound on the take-up roller 18 by the rotation of the gear 75a is larger than that transported by the capstan roller 71. The difference between the length of the ink sheet 14 wound by the take-up roller 18 and that advanced by the capstan roller 71 is absorbed by the slip clutch unit 75. It is thus made possible to prevent fluctuation in the transport speed (or amount) of the ink sheet 14, resulting from change in the winding diameter of the take-up roller 18.

Fig. 1 shows the electric connections of the control unit 101 and the recording unit 102 of the facsimile apparatus of the present embodiment, wherein same components as those in other drawings are represented by same numbers.

The thermal head 13, constructed as a line head, is provided with a shift register 130 for receiving serial recording data or shift clock signals 43 of a line from the control unit 101, a latch circuit 131 for latching the data of the shift register 130 by a latch signal 44; and heat-generating resistors 132 of a line, which are divided into m blocks for driving, as illustrated by 132-1 - 132-m.

A temperature sensor 133 is mounted on the thermal head 13 for detecting the temperature thereof. An output signal 42 of said sensor 133 is A/D converted in the control unit 101 and supplied to the CPU 113, which thus detects the temperature of the thermal head 13 and regulates the energy supplied thereto according to the characteristics of the ink sheet 14, for example by varying the pulse duration of a strobe signal 47 or the driving voltage of the thermal head 13. A programmable timer 116 is set for the measurement of a time by the CPU 113, starts time measurement upon receiving a command therefor, and sends an interruption signal or a time-out signal to the CPU 113 after the lapse of each designated time.

The characteristic or kind of the ink sheet 14 may be identified by the state of the switch 103a of the operation console unit 103 explained before, or by a mark printed on said ink sheet 14, or by a mark, a notch or a projection provided on the cartridge of the ink sheet.

A drive circuit 46 receives drive signals for the thermal head 13 from the control unit 101, and releases strobe signals 47 for driving each block of the thermal head 13. Said drive circuit 46 is capable, in response to an instruction from the control unit 101, of varying the voltage supplied to a power supply line 45 for driving the heat-generating resistors 132 of the thermal head 13, thereby varying the energy supplied thereto. A drive circuit 36 for the cutter members 15 includes a cutter driving motor. A sheet discharge motor 39 drives the sheet discharge rollers 16. Drive circuits 35, 48, 49 are provided for respectively driving the sheet discharge motor 39, recording sheet transport motor 24 and ink sheet transport motor 25. These motors are composed of stepping motors in the present embodiment, but other motors, for example DC motors, may be employed for this purpose.

[Recording process (Figs. 1 - 5)]

Fig. 5 is a flow chart of a recording sequence in the facsimile apparatus of the present embodiment, and a corresponding control program is stored in the ROM 114 of the control unit 101. This sequence is activated when facsimile data are received and decoded and image data of a line are stored in the line memory 110. It is assumed that the control unit 101 detects the loading of a multi ink sheet for example through the switch 103a.

At first a step S1 transfers the recording data of a line to the shift register 130 of the thermal head 13, and a step S2 releases a latch signal 44 to store the recording data of a line in the latch circuit 131. Then a step S3 starts the transportation of the ink sheet 14 by 1/n of a line pitch, and a step S4 starts the transportation of the recording

sheet by a line pitch (1/15.4 mm).

Then a step S5 energizes one of the blocks of the heat generating resistors 132 of the thermal head 13, and a step S6 discriminates whether all the blocks of the heat generating resistors 312 have been energized. If not, the sequence proceeds to a step S14, and steps S14 - S17 transfer the recording data of a next line to the shift register 130 of the thermal head 13. When the step S16 identifies completion of energizing time (600 μs) for a block, the sequence returns to the step S5 for effecting the energization of a next block. In the present embodiment, the thermal head 13 is driven in four blocks (m = 4), so that the time required for the recording of a line is about 2.5 ms (600 μs x 4 blocks).

When the step S6 identifies the completion of energization of all the four blocks, or the completion of recording of a line, a step S7 discriminates whether the recording of a page has been completed. After recording of a page, a step S18 advances the recording sheet 11 by a predetermined amount toward the discharge rollers 16 (16a, 16b), and a step S19 drives the cutter members 15 (15a, 15b) thereby cutting the recording sheet 11 into a page length. The cut sheet 11 is discharged by the rollers 16 from the apparatus, and a step S20 reverses the remaining recording sheet 11 by an amount corresponding to the distance between the thermal head 13 and the cutter members 15 (predetermined amount - α).

On the other hand, if the step S7 identifies that the recording of a page has not been completed, a step S8 discriminates whether the communication has been interrupted. If not, a step S9 discriminates whether the data of a next line are present and have been transferred to the thermal head 13. The sequence returns to the step S2 if said data have been transferred. If the transfer has not been completed, a step S10 transfers the data of the next line to the thermal head 13 and the sequence returns to the step S2.

On the other hand, if the step S8 identifies an interrupted communication, the sequence proceeds to a step S11 for transferring all-black line data to the thermal head 13. Then steps S12 and S13 energize the heat generating resistor 132 by the blocks thereof, thereby heating said resistors in order to prevent temperature decrease in the ink layer of the ink sheet 14. While the ink layer is maintained at a high temperature in this manner, the sequence proceeds to the aforementioned step S18 to effect transportation, cutting and discharge of the recording sheet 11. The energizing time of the thermal head 13 in said steps S12 may be selected shorter than that in the image recording in the step S5. The above-mentioned interruption in communication may result from the depression of a stop key in the transmitting equipment or from a deterioration in the state of communication line.

In the present embodiment, as explained in the foregoing, when the recording operation is interrupted by an interruption in the communication, the separation of the ink sheet 14 and the recording sheet 11 is facilitated by energizing the thermal head 13 to maintain a high temperature state in the ink layer and advancing the recording sheet 11 in such state. In this manner there can be prevented damage in the ink sheet resulting for example from sticking thereof to the recording sheet 11.

[Other embodiments (Fig. 6)]

In the foregoing embodiment, the energization of the thermal head 13 and the transportation of the recording sheet 11 are conducted at an interruption of communication, but such separating process for the ink sheet 14 and the recording sheet 11 may be conducted, in general, when the interval between recording of a line and that of a next line exceeds a predetermined time.

Such sequence is shown in a flow sheet in Fig. 6 and is executed when the discrimination of the step S7 in Fig. 5 turns out negative. At first a step S31 starts the timer 116, and a step S32 discriminates whether data of a next line to be recorded are present. In case of absence of such data, the sequence proceeds to a step S36. If the data of the next line are present, a step S33 discriminates whether all the data of the next line have been transferred to the thermal head 13. If the data transfer has been completed, a step S34 stops the timer 116, and the sequence proceeds to the step S2.

If the step S33 identifies that the transfer of data of the next line is not yet complete, the sequence proceeds to a step S35 for transferring the data of next line to the thermal head 13. Then a step S36 discriminates, based on the time measurement by the timer 116, whether a predetermined time has elapsed after the recording of the present line, and, if said predetermined time has elapsed, a step S37 stops the timer 116 and the sequence proceeds to the step S11 in Fig. 5 for effecting the heat generation of the thermal head 13. In the flow chart shown in Fig. 5, the recording sheet 11 is cut and discharged in said heat generation process, but, if continued printing is desired on the same page, it is also possible to simply heat the ink sheet 14 and to return the sequence to the step S31 thereby awaiting the data of next line and transferring said data to the thermal head 13.

{Recording principle (Fig. 7)]

Fig. 7 illustrates the state of image recording, employing a multi ink sheet in the thermal transfer printer of the present embodiment, with mutually opposite transporting directions for the recording sheet 11 and the ink sheet 14.

The recording sheet 11 and the ink sheet 14 are pinched between the platen roller 12 and the thermal head 13, which is pressed to the platen roller 12 under a predetermined pressure exerted by the spring 21. The recording sheet 11 is transported in a direction b with a speed V_P, by the rotation of the platen roller 12, while the ink sheet 14 is transported in a direction a with a speed V_I by the rotation of the ink sheet transport motor 25.

When the heat generating resistors 132 of the thermal head 13 is energized by the power source 105, a hatched portion 81 of the ink sheet 14 is heated. The ink sheet 14 is composed of a substrate film 14a, and an ink layer 14b. The ink of thus heated ink layer 81 is fused, and a part 82 thereof is transferred onto the recording sheet 11. The transferred ink layer portion 82 corresponds approximately to 1/n of the ink layer 81.

[Ink sheet (Fig. 8)]

Fig. 8 is a cross-sectional view of the ink sheet employed in the multi printing process of the present embodiment and composed of four layers in this case.

A substrate film of the ink sheet 14 constitutes a second layer. In case of multi printing, as a same part of the ink sheet is subjected to thermal energy application plural times, said substrate is advantageously composed of an aromatic polyamide film or a condenser paper with a high thermal resistance, but a conventional polyester film may also be used for this purpose. The thickness is preferably as small as possible for improving the print quality, but is desirably in a range of 6 - 8 microns in consideration of the strength.

A third layer is an ink layer containing ink in an amount enough for transfers of n times onto the recording sheet. Said ink layer is principally composed of a resinous adhesive such as EVA, a coloring material such as carbon black or nigrosin dye, and a binding material such as Calnauba wax or paraffin wax, so mixed as to enable the transfers of n times in a same place. The coating amount of said ink layer is generally in a range of 4 - 8 g/m^2, but can be arbitrarily selected according to the desired sensitivity and density.

A fourth layer is a top coating for preventing the trnasfer of the third layer by pressure to the recording sheet in a non-printed area, and is composed for example of transparent wax. Thus the transfer by pressure takes place only in the fourth layer, and the recording sheet can be protected from the background smudge. A first layer is a heat resistant coating for protecting the substrate film of the second layer from the heat of the thermal head 13. Such top coating is preferable for the multi-printing ink sheet in which thermal energy of n lines may be applied to a same position (when black information continues), but the presence or absence of such top coating may be arbitrarily selected. Also such top coating is effective for a substrate film of a relatively low thermal resistance, such as a polyester film.

The structure of the ink sheet 14 is not limited to the embodiment explained above, but may also be composed of a substrate layer and a porous ink holding layer containing ink therein and provided on a side of said substrate layer, or of a heat resistant ink layer consisting of a porous network structure formed on a substrate film and impregnated with ink. Also said substrate film may be composed, for example, of polyamide, polyethylene, polyester, polyvinyl chloride, triacetyl cellulose, nylon or paper. Also the heat resistant top coating, which is not necessarily indispensable, may be composed, for example, of silicone resin, epoxy resin, fluorinated resin or nitrocellulose.

Also an ink sheet with heat-sublimable ink can be composed, for example, of a substrate film of polyethylene terephthalate, polyethylene naphthalate or aromatic polyamide, and a coloring material layer formed thereon and containing dyes and spacer particles formed from guanamine resin and fluorinated resin.

Also the heating in the thermal transfer printer is not limited to the thermal head method explained above, but may also be achieved for example by direct current supply or by laser beam irradiation.

Also the foregoing embodiments have been limited to the printers with a thermal line head, but the present invention is likewise applicable to the thermal transfer printers of so-called serial type.

Also the recording medium is not limited to a recording paper but can be of any material capable of accepting ink transfer, such as cloth, or plastic sheet. Furthermore the ink sheet is not limited to the rolled structure shown in the foregoing embodiments, but can be of so-called ink sheet cassette structure, in which a casing incorporating ink sheet is detachably mounted in the main body of the apparatus.

Furthermore, though the foregoing embodiments have been limited to facsimile apparatus, the present invention is not limited to such embodiments and is likewise applicable to a word processor, a typewriter, a copying machine or the like.

Furthermore, the advancement of the ink sheet may be achieved by the winding operation of the

take-up roller 18.

As explained in the foregoing embodiments, when the recording operation is interrupted or when the interval of the recording operations exceeds a predetermined time, the thermal head 13 is energized to heat the ink sheet 14 and the ink sheet 14 is separated from the recording sheet 11 in this state, whereby the damage or breakage in the ink sheet 14, resulting from sticking thereof to the recording sheet 11, can be prevented.

Claims

1. A thermal transfer recording apparatus for recording an image on a recording medium by transferring ink thereto from an ink sheet, comprising:
- ink sheet transport means (17, 18, 25, 70-75) for transporting said ink sheet (14),
- recording medium transport means (24, 26, 27) for transporting said recording medium (11),
- recording means (13) for acting on the ink sheet transported by said ink sheet transport means (17, 18, 25, 70-75), thereby recording an image on said recording medium (11) and
- timer means (16) for measuring the time elapsed from the last performed printing operation, and
- control means (101) for effecting a control for heating said ink sheet (14),

characterized in that
said control means (101) being adapted to heat said ink sheet (14) when the interval measured by said timer means (116) is equal to or larger than a predetermined time, said predetermined time being a reference time for judging whether or not it is possible to continue a printing operation.

2. An apparatus according to claim 1, wherein
said recording means (13) comprises plural heat generating elements (132) capable of generating heat by current supply.

3. An apparatus according to claim 2, wherein
said control means (101) is adapted to drive the plural heat generating elements (132) of said recording means (13) according to the output of said timer means (116).

4. An apparatus according to claim 3, wherein
said recording means (13) comprises an array of plural heat generating elements (132) over the entire width of the recording area of said recording medium (11), and said control means (101) is adapted to drive said plural heat generating elements (132) arranged over the entire width of said recording area, according to same data.

5. An apparatus according to claim 4, wherein
said data are black data.

6. A facsimile apparatus utilizing a thermal transfer recording apparatus for recording an image on a recording medium (11) by transferring ink thereto from an ink sheet (14), comprising:
- communication means (106-108) for transmitting image data,
- ink sheet transport means (17, 18, 25, 70-75) for transporting said ink sheet,
- recording medium transport means (24, 26, 27) for transporting said recording medium (11),
- recording means (13) for acting on the ink sheet (14) transported by said ink sheet transport means (17, 18, 25, 70-75) according to the image data received by said communication means (106-108), thereby recording an image on said recording medium (11), and
- control means (101) for effecting a control for heating said ink sheet (14) when the recording by said recording means is interrupted,

characterized in that
said control means (101) is adapted to identify an interruption of the communication of image data to the facsimile apparatus and to effect said heating of the ink sheet (14) in response to such identification, if the print job is going to be aborted.

7. A facsimile apparatus according to claim 6, wherein
said control means (101) is adapted, after said heating of the ink sheet (14), to transport said recording medium (11) by a predetermined amount by said recording medium transport means (24, 26, 27).

8. A facsimile apparatus according to claim 6, wherein
said recording means (13) comprises plural heat generating elements (132) capable of generating heat by current supply.

9. A facsimile apparatus according to claim 8, wherein
said control means (101) is adapted to drive the plural heat generating elements (132) of said recording means (13), according to the output of a timer means (116).

10. A facsimile apparatus according to claim 9, wherein
said recording means (13) comprises an array of plural heat generating elements (132) over the entire width of the recording area of said recording medium (11), and said control means (101) is adapted to drive said plural heat generating elements (132) arranged over the entire width of said recording area, according to same data.

11. A facsimile apparatus according to claim 9, wherein
said data are black data.

Patentansprüche

1. Thermotransfer-Aufzeichnungsvorrichtung zur Aufzeichnung eines Bildes auf ein Aufzeichnungsmedium durch Übertragung von Tinte von einem Tintentuch auf dieses, mit:
- einer Tintentuch-Transportvorrichtung (17, 18, 25, 70-75) zum Transport des Tintentuches (14),
- einer Aufzeichnungsmedium-Transportvorrichtung (24, 26, 27) zum Transport des Aufzeichnungsmediums (11),
- einer Aufzeichnungsvorrichtung (13) zur Einwirkung auf das durch die Tintentuch-Transportvorrichtung (17, 18, 25, 70-75) transportierte Tintentuch , wodurch ein Bild auf das Aufzeichnungsmedium (11) aufgezeichnet wird, und
- einer Zeitgebereinrichtung (16) zum Messen der vom letzten ausgeführten Druckvorgang verstrichenen Zeit und
- einer Steuereinrichtung (101) zum Bewirken einer Steuerung zum Erwärmen des Tintentuches (14),

dadurch gekennzeichnet, daß
die Steuereinrichtung (101) so ausgebildet ist, daß sie das Tintentuch (14) erwärmt, wenn das durch die Zeitgebereinrichtung (116) gemessene Intervall gleich einer oder größer als eine vorbestimmte Zeit ist, wobei die vorbestimmte Zeit eine Bezugszeit zur Beurteilung dessen ist, ob es möglich oder nicht möglich ist, einen Druckvorgang fortzusetzen.

2. Vorrichtung nach Anspruch 1, wobei
die Aufzeichnungsvorrichtung (13) mehrere wärmeerzeugende Elemente (132), die zur Erzeugung von Wärme durch Zuführung eines Stromes fähig sind, aufweist.

3. Vorrichtung nach Anspruch 2, wobei
die Steuereinrichtung (101) so ausgebildet ist, daß sie die mehreren wärmeerzeugenden Elemente (132) der Aufzeichnungsvorrichtung (13) entsprechend der Ausgabe der Zeitgebereinrichtung (116) ansteuert.

4. Vorrichtung nach Anspruch 3, wobei
die Aufzeichnungsvorrichtung (13) eine Anordnung von mehreren wärmeerzeugenden Elementen (132) über die gesamte Breite des Aufzeichnungsgebietes des Aufzeichnungsmediums (11) aufweist und die Steuereinrichtung (101) so ausgebildet ist, daß sie die mehreren wärmeerzeugenden Elemente (132), die über die gesamte Breite des Aufzeichnungsgebietes angeordnet sind, entsprechend denselben Daten ansteuert.

5. Vorrichtung nach Anspruch 4, wobei
die Daten Schwarz-Daten sind.

6. Faksimilegerät unter Verwendung einer Thermotransfer-Aufzeichnungsvorrichtung zur Aufzeichnung eines Bildes auf ein Aufzeichnungsmedium (11) durch Übertragung von Tinte von einem Tintentuch (14) auf dieses, mit:
- einer Übermittlungseinrichtung (106-108) zur Übertragung von Bilddaten,
- einer Tintentuch-Transportvorrichtung (17, 18, 25, 70-75) zum Transport des Tintentuches,
- einer Aufzeichnungsmedium-Transportvorrichtung (24, 26, 27) zum Transport des Aufzeichnungsmediums (11),
- einer Aufzeichnungsvorrichtung (13) zur Einwirkung auf das durch die Tintentuch-Transportvorrichtung (17, 18, 25, 70-75) transportierten Tintentuches (14) entsprechend den durch die Übermittlungseinrichtung (106-108) empfangenen Bilddaten, wodurch ein Bild auf das Aufzeichnungsmedium (11) aufgezeichnet wird, und
- einer Steuereinrichtung (101) zum Bewirken einer Steuerung zum Erwärmen des Tintentuches (14), wenn die Aufzeichnung durch die Aufzeichnungsvorrichtung unterbrochen wird,

dadurch gekennzeichnet, daß
die Steuereinrichtung (101) so ausgebildet ist, daß sie eine Unterbrechung der Übermittlung der Bilddaten an das Faksimilegerät nachweist und die Erwärmung des Tintentuches (14) in Reaktion auf einen solchen Nachweis bewirkt, wenn der Druckvorgang abgebrochen werden soll.

7. Faksimilegerät nach Anspruch 6, wobei
die Steuereinrichtung (101) so ausgebildet ist, daß sie nach der Erwärmung des Tintentuches

(14) das Aufzeichnungsmedium (11) um einen vorbestimmten Betrag durch die Aufzeichnungsmedium-Transportvorrichtung (24, 26, 27) transportiert.

8. Faksimilegerät nach Anspruch 6, wobei die Aufzeichnungsvorrichtung (13) mehrere wärmeerzeugende Elemente (132) aufweist, die zur Erzeugung von Wärme durch eine Stromzufuhr fähig sind.

9. Faksimilegerät nach Anspruch 8, wobei die Steuereinrichtung (101) so ausgebildet ist, daß sie die mehreren wärmeerzeugenden Elemente (132) der Aufzeichnungsvorrichtung (13) entsprechend der Ausgabe einer Zeitgebereinrichtung (116) ansteuert.

10. Faksimilegerät nach Anspruch 9, wobei die Aufzeichnungsvorrichtung (13) eine Anordnung von mehreren wärmeerzeugenden Elementen (132) über die gesamte Breite des Aufzeichnungsgebietes des Aufzeichnungsmediums (11) aufweist und die Steuereinrichtung (101) so ausgebildet ist, daß sie die mehreren wärmeerzeugenden Elemente (132), die über die gesamte Breite des Aufzeichnungsgebietes angeordnet sind, entsprechend denselben Daten ansteuert.

11. Faksimilegerät nach Anspruch 9, wobei die Daten Schwarz-Daten sind.

Revendications

1. Appareil d'enregistrement par transfert thermique pour enregistrer une image sur un support d'enregistrement en y transférant de l'encre à partir d'une feuille encreuse, comportant :

- des moyens (17, 18, 25, 70-75) de transport de feuille encreuse destinés à transporter ladite feuille encreuse (14),
- des moyens (24, 26, 27) de transport de support d'enregistrement destinés à transporter ledit support (11) d'enregistrement,
- les moyens d'enregistrement (13) destinés à agir sur la feuille encreuse transportés par lesdits moyens (17, 18, 25, 70-75) de transport de feuille encreuse afin d'enregistrer sur ledit support (11) d'enregistrement, et
- des moyens (16) de minutage destinés à mesurer le temps écoulé depuis la dernière opération d'impression effectuée, et
- des moyens (101) de commande destinés à effectuer une commande pour chauffer ladite feuille encreuse (14),

caractérisé en ce que

lesdits moyens (101) de commande sont conçus pour chauffer ladite feuille encreuse (14) lorsque l'intervalle mesuré par lesdits moyens de minutage (116) est égal ou supérieur à un temps prédéterminé, ledit temps prédéterminé étant un temps de référence pour estimer s'il est possible ou non de continuer une opération d'impression.

2. Appareil selon la revendication 1, dans lequel lesdits moyens (13) d'enregistrement comprennent plusieurs éléments (132) de génération de chaleur capables de générer de la chaleur en étant alimentés en courant.

3. Appareil selon la revendication 2, dans lequel lesdits moyens (101) de commande sont conçus pour attaquer les divers éléments (132) de génération de chaleur desdits moyens (13) d'enregistrement conformément au signal de sortie desdits moyens (116) de minutage.

4. Appareil selon la revendication 3, dans lequel lesdits moyens (13) d'enregistrement comprennent un réseau de plusieurs éléments (132) de génération de chaleur sur toute la largeur de la zone d'enregistrement dudit support (11) d'enregistrement, et lesdits moyens (101) de commande sont conçus pour attaquer lesdits éléments (132) de génération de chaleur disposés au-dessus de toute la largeur de ladite zone d'enregistrement, conformément aux mêmes données.

5. Appareil selon la revendication 4, dans lequel lesdites données sont des données de noir.

6. Appareil de télécopie utilisant un appareil d'enregistrement par transfert thermique pour enregistrer une image sur le support (11) d'enregistrement en y tranférant de l'encre à partir d'une feuille encreuse (14), comportant :

- des moyens (106-108) de communication destinés à transmettre des données d'images,
- des moyens (17, 18, 25, 70-75) de transport de feuille encreuse destinés à transporter ladite feuille encreuse,
- des moyens (24, 26, 27) de transport de support d'enregistrement destinés à transporter ledit support (11) d'enregistrement,
- des moyens (13) d'enregistrement destinés à agir sur la feuille encreuse (14) transportée par lesdits moyens (17, 18, 25, 70-75) de transport de feuille encreuse conformément aux données d'images

reçues par lesdits moyens (106-108) de communication, afin d'enregistrer une image sur ledit support (11) d'enregistrement, et

- des moyens (101) de commande destinés à effectuer une commande pour chauffer ladite feuille encreuse (14) lorsque l'enregistrement par lesdits moyens d'enregistrement est interrompu,

caractérisé en ce que

lesdits moyens (101) de commande sont conçus pour identifier une interruption de la communication de données d'images à l'appareil de télécopie et pour effectuer ledit chauffage de la feuille encreuse (14) en réponse à cette identification, si le travail d'impression est sur le point d'être suspendu.

7. Appareil de télécopie selon la revendication 6, dans lequel

lesdits moyens (101) de commande sont conçus, après ledit chauffage de la feuille encreuse (14), pour transporter ledit support (11) d'enregistrement sur une distance prédéterminée à l'aide desdits moyens (24, 26, 27) de transport de support d'enregistrement.

8. Appareil de télécopie selon la revendication 6, dans lequel

lesdits moyens (13) d'enregistrement comprennent plusieurs éléments (132) de génération de chaleur capables de générer de la chaleur en étant alimentés en courant.

9. Appareil de télécopie selon la revendication 8, dans lequel

lesdits moyens (101) de commande sont conçus pour attaquer les éléments (132) de génération de chaleur desdits moyens (13) d'enregistrement, conformément au signal de sortie d'un moyen (116) de minutage.

10. Appareil de télécopie selon la revendication 9, dans lequel

lesdits moyens (13) d'enregistrement comprennent un réseau de plusieurs éléments (132) de génération de chaleur sur toute la largeur de la zone d'enregistrement dudit support (11) d'enregistrement, et lesdits moyens (101) de commande sont conçus pour attaquer lesdits éléments (132) de génération de chaleur disposés sur toute la largeur de ladite zone d'enregistrement, conformément aux mêmes données.

11. Appareil de télécopie selon la revendication 9, dans lequel

lesdites données sont des données de noir.

FIG. 1

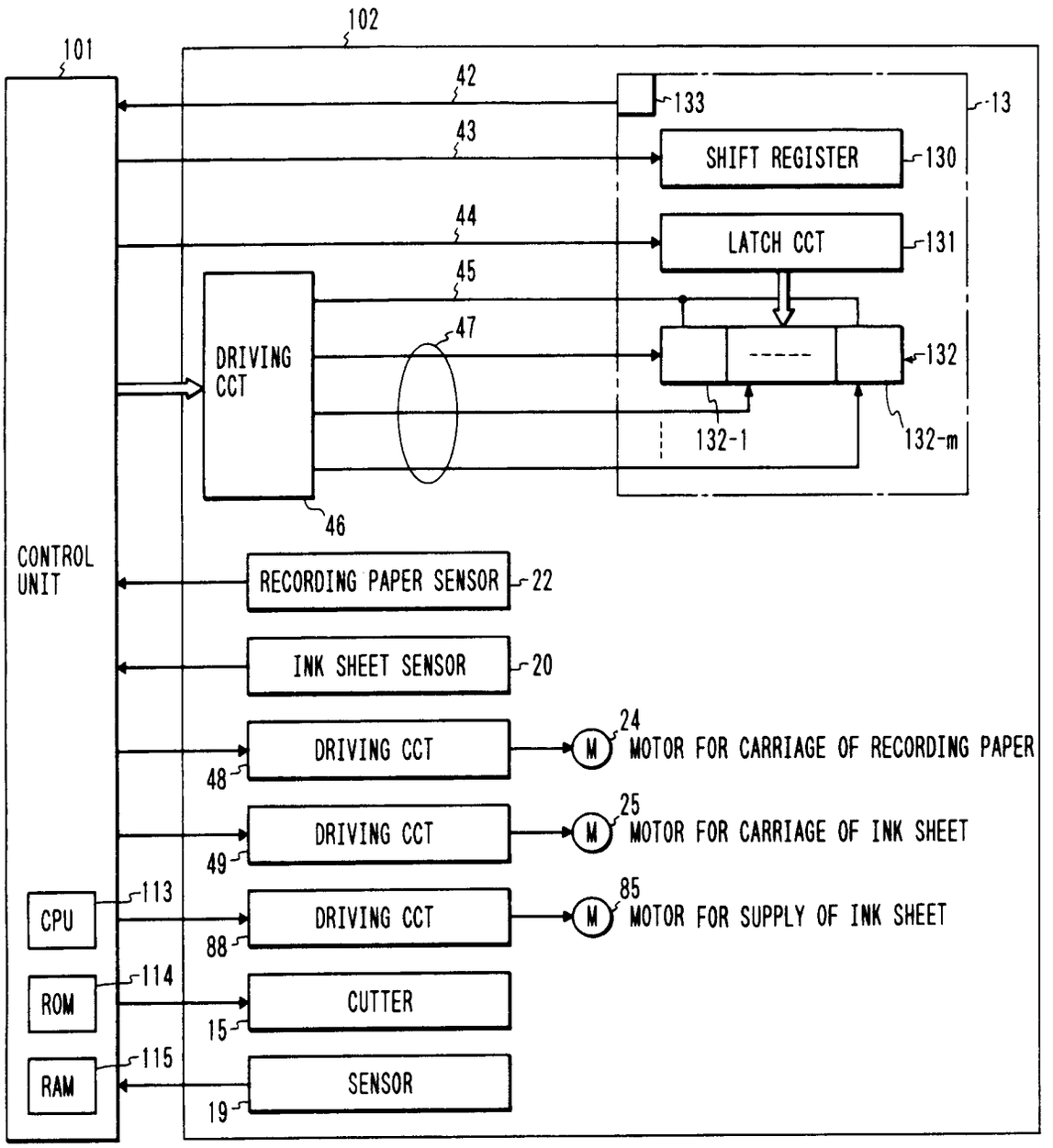

101
102
42
43
44
45
47
133
13
SHIFT REGISTER
130
LATCH CCT
131
132
132-1
132-m
DRIVING CCT
46
CONTROL UNIT
RECORDING PAPER SENSOR
22
INK SHEET SENSOR
20
DRIVING CCT
48
24
M
MOTOR FOR CARRIAGE OF RECORDING PAPER
DRIVING CCT
49
25
MOTOR FOR CARRIAGE OF INK SHEET
CPU
113
DRIVING CCT
88
85
MOTOR FOR SUPPLY OF INK SHEET
ROM
114
CUTTER
15
RAM
115
SENSOR
19

FIG. 2

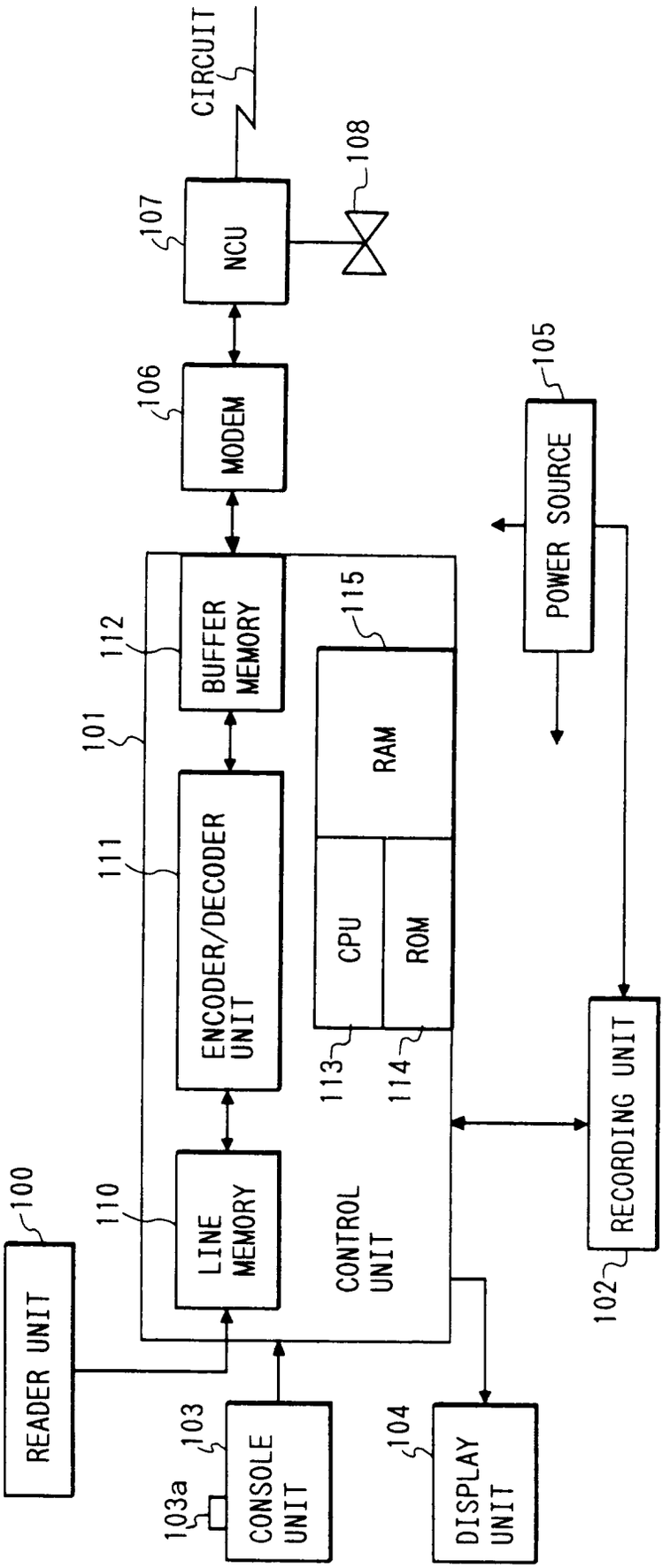

CIRCUIT
108
107
NCU
106
MODEM
105
POWER SOURCE
112
BUFFER MEMORY
115
RAM
101
111
ENCODER/DECODER UNIT
CPU
ROM
113
114
100
110
LINE MEMORY
CONTROL UNIT
RECORDING UNIT
102
READER UNIT
103
103a
CONSOLE UNIT
104
DISPLAY UNIT

FIG. 3

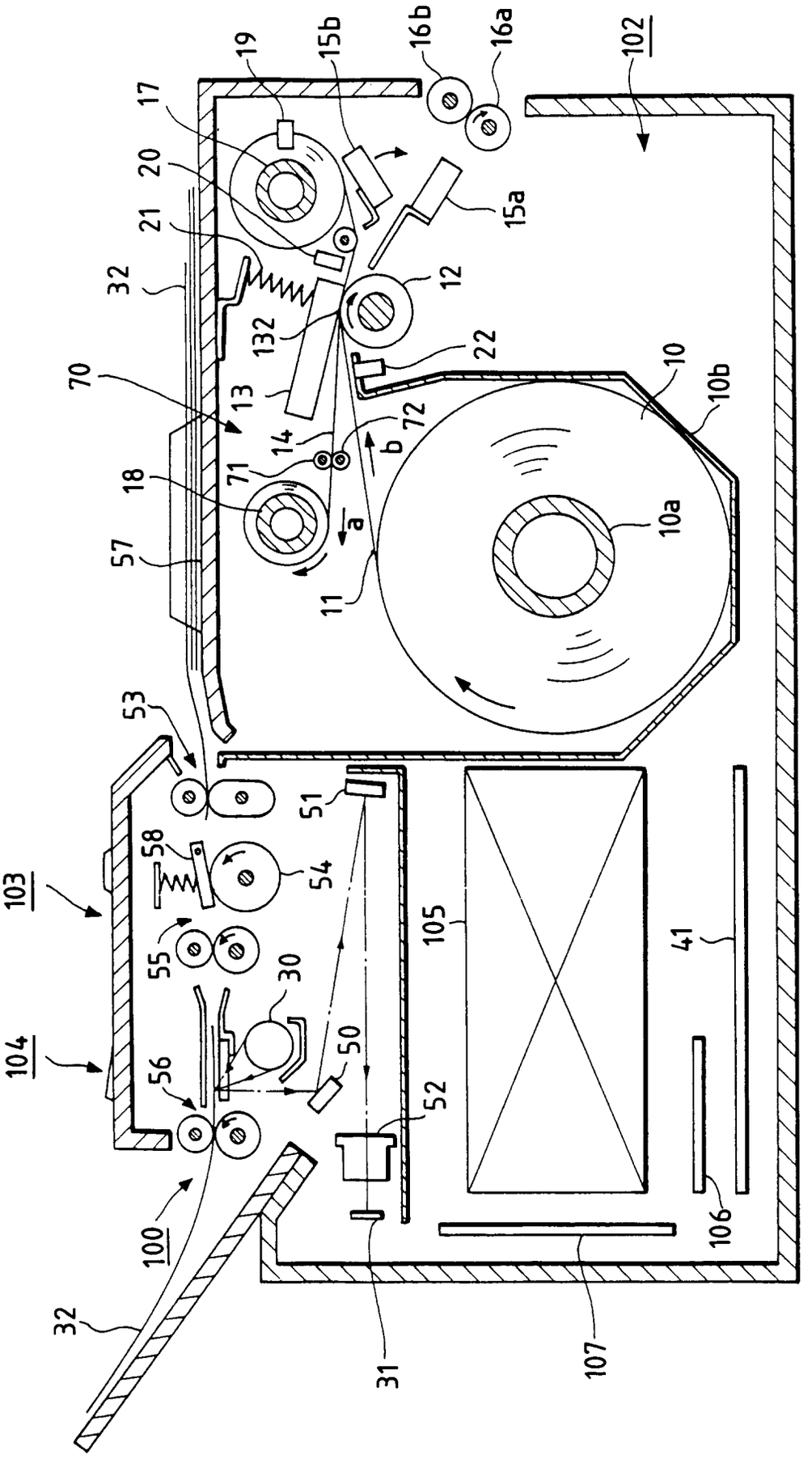

19
15b
16b
16a
102
17
20
21
15a
32
12
132
22
70
13
10
10b
72
14
b
71
18
a
10a
57
11
53
51
58
54
103
55
105
41
30
104
50
56
52
100
106
32
31
107

FIG. 4

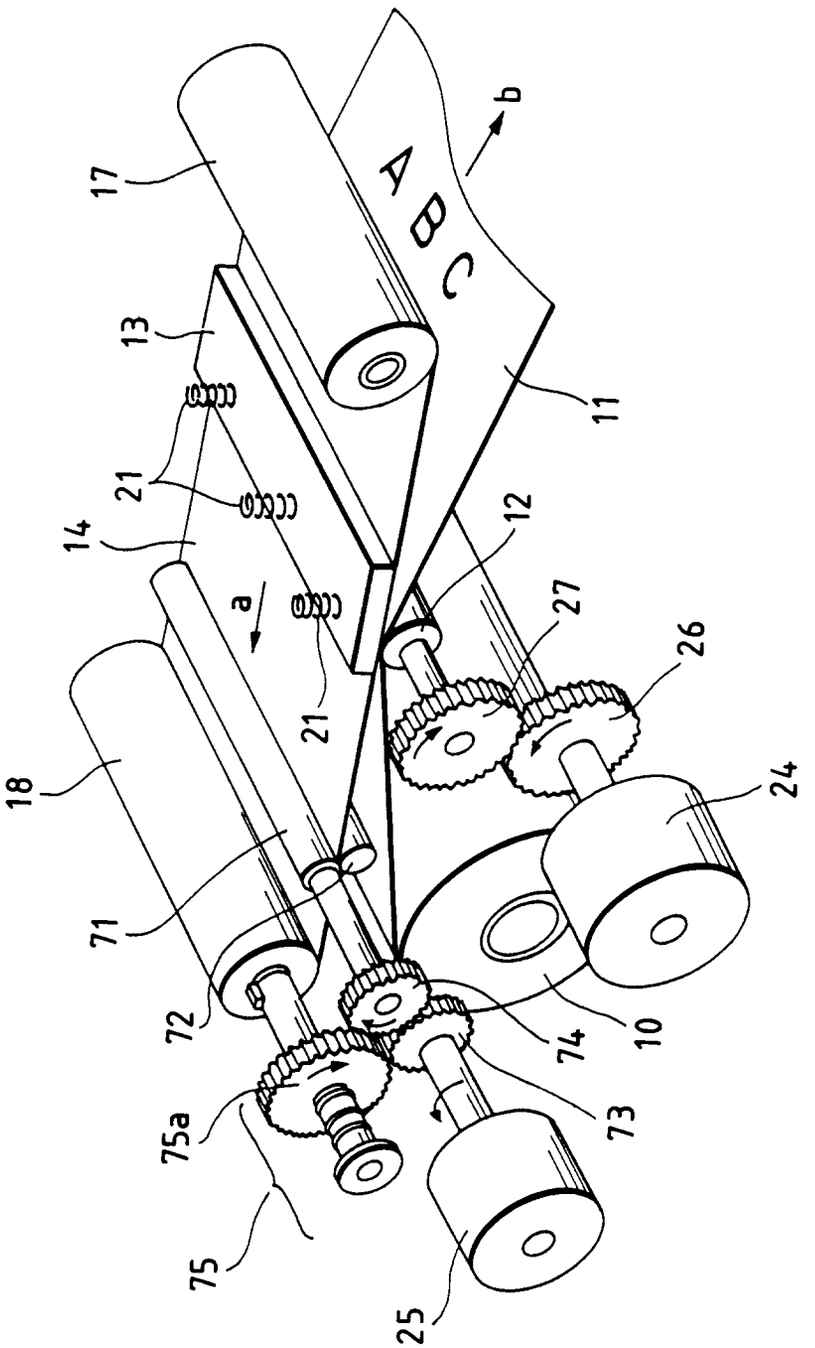


FIG. 5

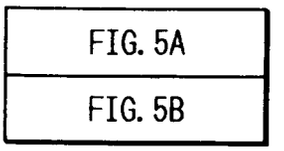


FIG. 5A
FIG. 5B

FIG. 5A

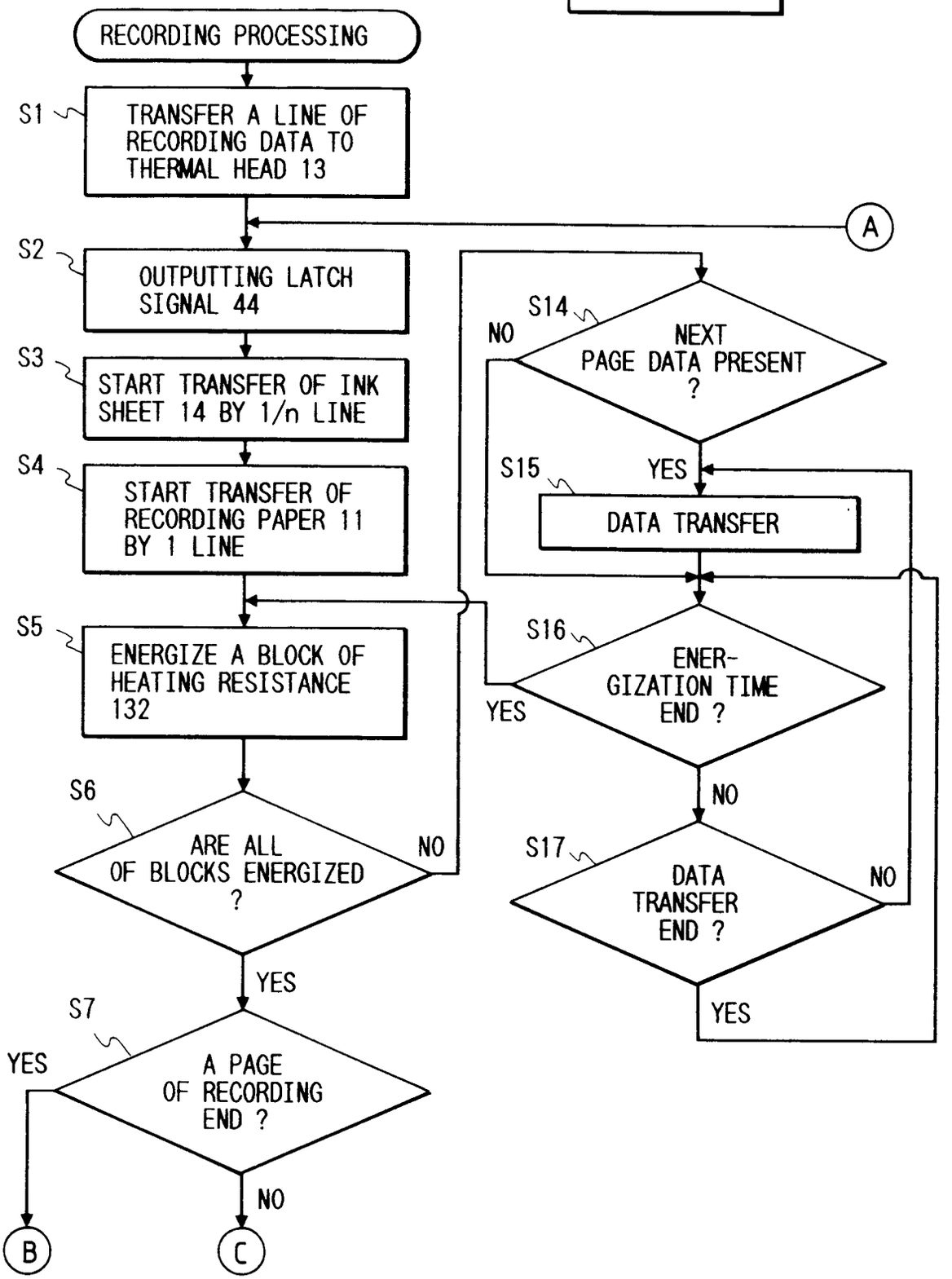

RECORDING PROCESSING
S1
TRANSFER A LINE OF RECORDING DATA TO THERMAL HEAD 13
S2
OUTPUTTING LATCH SIGNAL 44
S3
START TRANSFER OF INK SHEET 14 BY 1/n LINE
S4
START TRANSFER OF RECORDING PAPER 11 BY 1 LINE
S5
ENERGIZE A BLOCK OF HEATING RESISTANCE 132
S6
ARE ALL OF BLOCKS ENERGIZED ?
NO
YES
S7
A PAGE OF RECORDING END ?
YES
NO
B
C
A
S14
NEXT PAGE DATA PRESENT ?
NO
YES
S15
DATA TRANSFER
S16
ENER-GIZATION TIME END ?
YES
NO
S17
DATA TRANSFER END ?
NO
YES

FIG. 5B

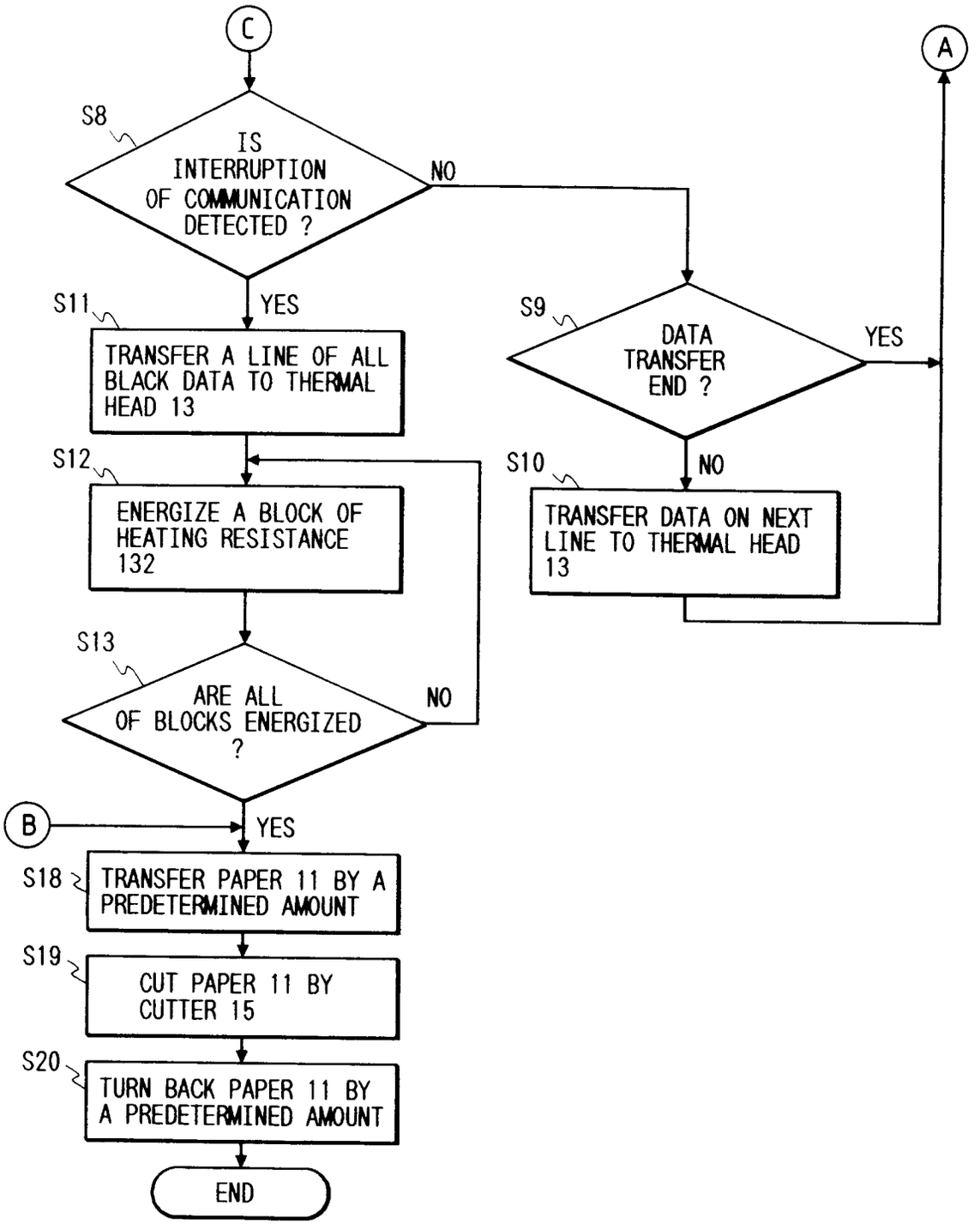

C
S8
IS INTERRUPTION OF COMMUNICATION DETECTED ?
NO
YES
S11
TRANSFER A LINE OF ALL BLACK DATA TO THERMAL HEAD 13
S12
ENERGIZE A BLOCK OF HEATING RESISTANCE 132
S13
ARE ALL OF BLOCKS ENERGIZED ?
NO
B
YES
S18
TRANSFER PAPER 11 BY A PREDETERMINED AMOUNT
S19
CUT PAPER 11 BY CUTTER 15
S20
TURN BACK PAPER 11 BY A PREDETERMINED AMOUNT
END
S9
DATA TRANSFER END ?
YES
NO
S10
TRANSFER DATA ON NEXT LINE TO THERMAL HEAD 13
A

FIG. 6

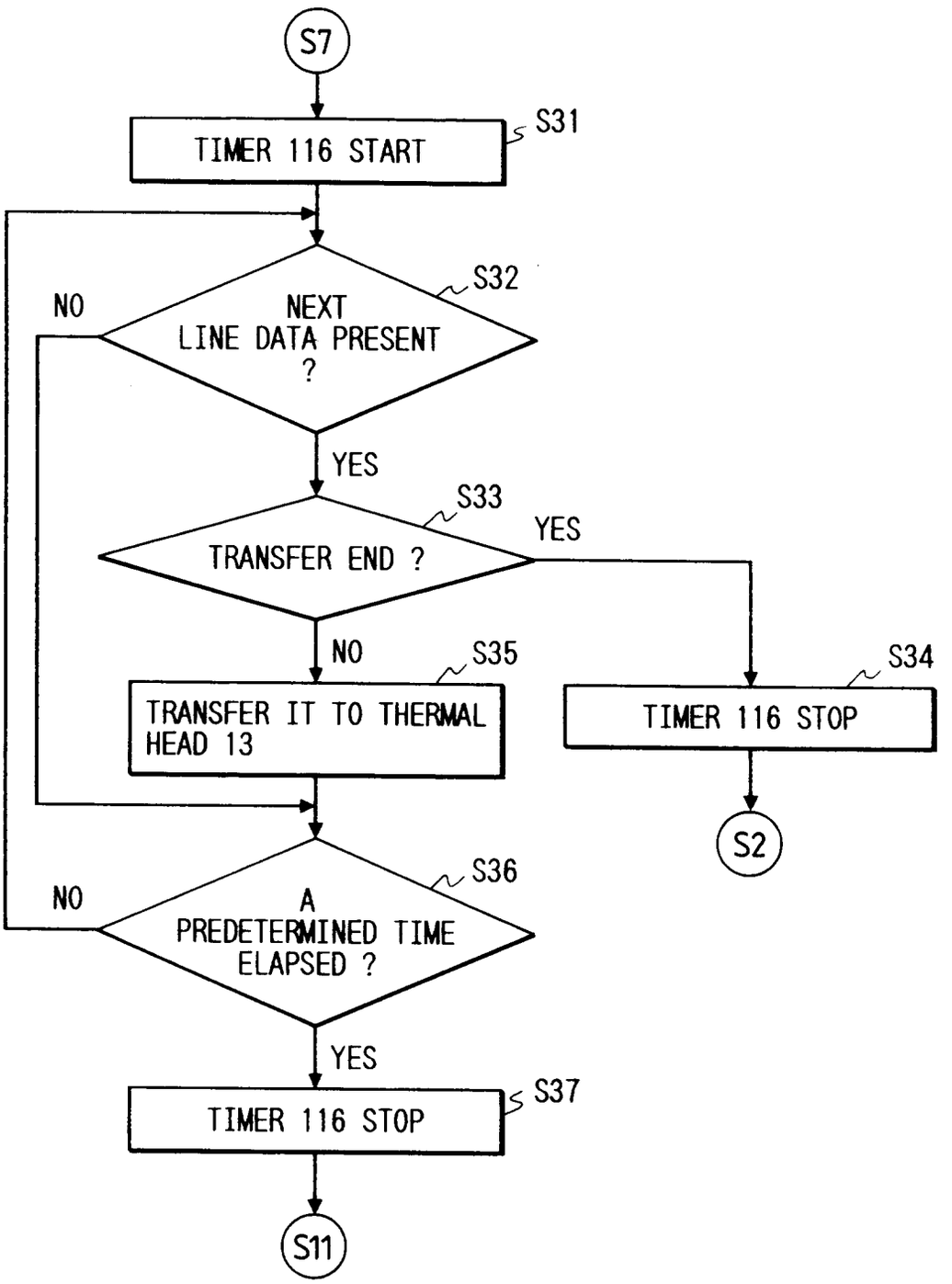

S7
TIMER 116 START
S31
NEXT LINE DATA PRESENT ?
S32
NO
YES
TRANSFER END ?
S33
YES
NO
TRANSFER IT TO THERMAL HEAD 13
S35
TIMER 116 STOP
S34
S2
A PREDETERMINED TIME ELAPSED ?
S36
NO
YES
TIMER 116 STOP
S37
S11

FIG. 7

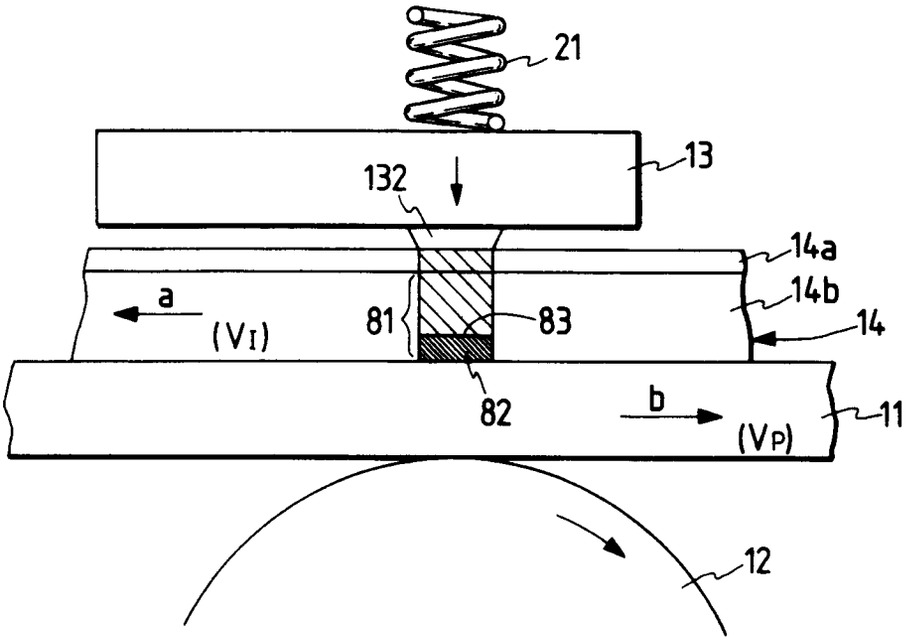
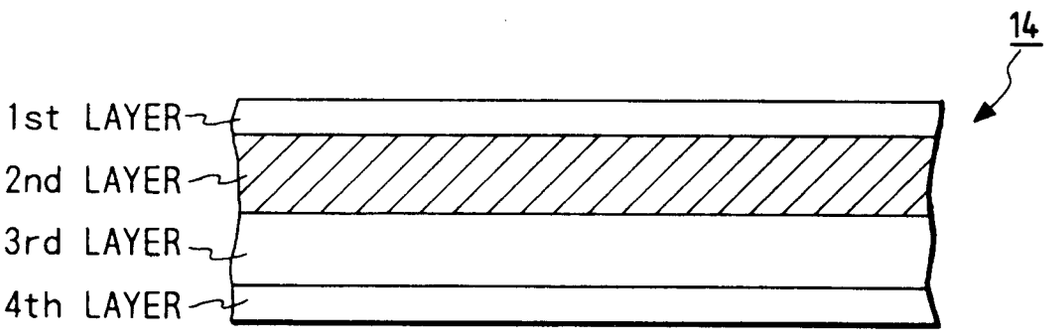

21
13
132
14a
14b
14
a
(VI)
81
83
82
b
(VP)
11
12

FIG. 8


14
1st LAYER
2nd LAYER
3rd LAYER
4th LAYER