

(19) World Intellectual Property Organization
International Bureau



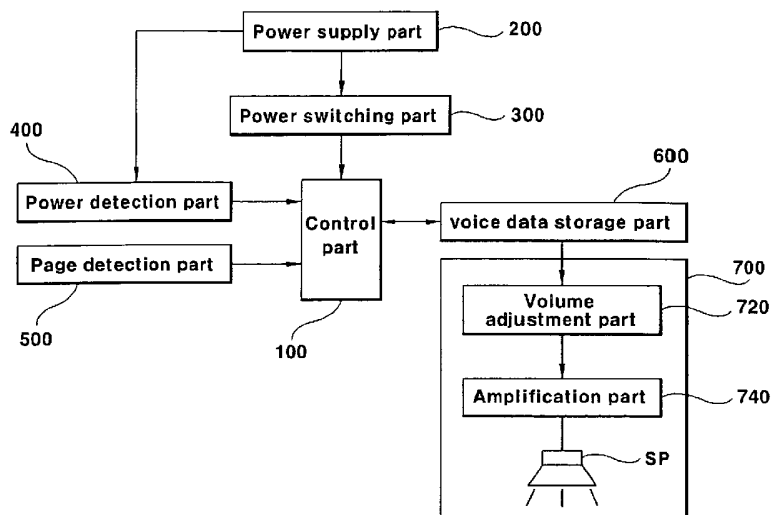
(43) International Publication Date
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number
WO 03/090180 A1

- (51) International Patent Classification⁷: G09B 5/06
- (21) International Application Number: PCT/KR03/00232
- (22) International Filing Date: 3 February 2003 (03.02.2003)
- (25) Filing Language: Korean
- (26) Publication Language: English
- (30) Priority Data:
10-2002-0022015 22 April 2002 (22.04.2002) KR
20-2002-0018507 18 June 2002 (18.06.2002) KR
- (71) Applicants and
(72) Inventors: OH, Choon-Geun [KR/KR]; 702-201, Jukong Apt., Boogae-2dong, Bupyeong-ku, Incheon-city 403-725 (KR). BAE, Chang-Beom [KR/KR]; 505, Serim Apt., 657-4, Naebalsan-dong, Kangseo-ku, Seoul 157-824 (KR). KIM, In-Seok [KR/KR]; 801-1212, 8danji Apt., Gaepo-dong, Kangnam-ku, Seoul 135-240 (KR). KIM, Cheol-Hee [KR/KR]; 244-18, GalHyeon-2dong, Eunpyeong-ku, Seoul 122-802 (KR).
- (74) Agent: DARAE PATENT FIRM; 10th Floor, KIPS, 647-9 Yeoksam-dong, Kangnam-gu, Seoul 135-980 (KR).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AUTO SOUNDBOOK APPARATUS USING THE CdS PHOTOCONDUCTIVE CELLS



(57) Abstract: Disclosed is an auto soundbook apparatus using CdS photoconductive cells installed in each page of the book, capable of automatically telling a story of a page or even pages a reader wants. The auto soundbook apparatus using CdS photoconductive cells includes a cover, a plurality of pages inside the cover; a page detection part for outputting a page detection signal with the help of CdS photoconductive cells installed in each of the pages for detecting an open state of respective pages, a voice data storage part for storing voice or sound data corresponding to each of the pages, a voice output part for outputting the voice or sound data stored in the voice data storage part, a control part for recognizing an opened page at a time of receiving the page detection signal from the page detection part, reading voice or sound data corresponding to the opened page from the voice data storage part, and commanding the voice output part to output part to output the voice and sound data; and a power supply part for supplying operational voltage to each of the parts.



WO 03/090180 A1

AUTO SOUNDBOOK APPARATUS USING THE CdS PHOTOCONDUCTIVE CELLS

BACKGROUND OF THE INVENTION

5

Field of the Invention

The present invention relates to an auto soundbook apparatus using CdS photoconductive cells, and more particularly, to an auto soundbook apparatus with CdS photoconductive cells installed in each page, thereby automatically telling a story of any opened page when a reader turns over one page or pages of the soundbook at once.

10

Description of the Related Art

In general, children's books give illustrations or pictures, and sentences (in diverse languages including English, Japanese, or Korean) so when parents read the books, children associate pictures in the books with the words or sentences they hear from their parents, and eventually they learn how to read. To aid children's learning, new soundbooks have been published, through which children hear the story on each page and its background music and thus engage in reading themselves.

15

This kind of soundbook is usually composed of a page-turning detection part mounted on the cover of the book, to detect turning of the pages; a memory part for storing voice data of sentences on each page; a voice output part for outputting the voice data stored in the memory; and a control part for reading the voice data of each page, in response to a page-turning detection signal received from the page-turning detection part, and for providing the voice data to the voice output part.

20
25

There are several methods for realizing the page-turning detection part of the soundbook in the related art. For example, each page has a bar code and a bar code reader for recognizing the page, and a separate voice output device is electrically connected to the bar code reader (Japanese Utility Model Application Laid-Open No. P2-62464 (May 10, 1990), Korean Utility Model Publication No. 19993-3334 (Feb 26, 1993), and Korean Utility Model Publication No. 1994-25407 (Nov 18, 1994). Also Korean Utility Model Publication No. 1996-38427 (Dec 18, 1996) disclosed a method for recognizing pages by printing a detection unit comprised of a plurality of dots in each page and installing a handset with a plurality of built-in photo sensors in the detection unit. These methods, however, proved to be ineffective in terms of learning because they require users, who are mostly toddlers and children without much knowledge in reading, to get involved in page recognition. In addition, high expense of manufacture was another problem since the page recognizing devices were separately installed apart from the soundbooks.

To overcome the above problems, Korean Utility Model Publication No. 1999-21943 (June 25, 1999) disclosed another embodiment of the page-turning detection unit. As shown in Figs. 1 and 2, a plurality of passing holes are formed on each page and phototransistors for detecting light that passes through the passing holes are mounted on the cover, or front base 12. Once the light passes through the passing hole 20a and it flows in only one phototransistor Q1. When a reader turns over a first page 22, the light gets exposed to two passing holes 20a and 20b and eventually flows in two phototransistors Q1 and Q2. In like manner, as the reader turns over more pages of the book, more passing holes are exposed to the light and the number of phototransistors where the light flows in is increased proportionally. Hence by the time the reader turns over the last page, every passing hole 20a ~ 20e

formed on a rear base 14 gets exposed to the light and the light flows in all the phototransistors Q1 ~Q5. Besides the above method for counting pages being turned over, the same publication disclosed a method for recognizing the page turning action. That is, a contact point switch is mounted on each page of the soundbook, and every time the reader turns over the pages the pressure between pages turns on/off the contact point switch.

The above Korean Utility Model Publication No. 1999-21943 (June 25, 1999), however, had several drawbacks. For example, when the light was shut out by the user's hand or head or passed through the holes in wrong directions because of other objects placed on an upper direction of the cover, page counting was not done properly. Also, sometimes the pressure between pages was not strong enough to press the contact point switches installed in each page, so the contact point switch often failed to operate.

As an attempt to solve these problems, manufacturers put a magnet on the opposite side to a read switch, to recognize the page-turning action. But two pieces of conductive plates composing the read switch often failed to be magnetized and thus, it was impossible to recognize pages being turned using magnetic force of the magnet itself. Meanwhile, other manufacturers had inserted a magnet into each page of the book and added a hole sensor on the top surface of the book support to recognize the page-turning action. However this method was problematic in the light of expense of manufacture because the separately-built book support, which is the means for recognizing pages, had a very complicated construction.

To be short, it was difficult to realize and to commercialize the above methods for recognizing pages of the related art in that they often failed to recognize pages being turned over, users had difficult time to operate complicated devices, the

devices often malfunctioned, and the complicated circuit built-in the cover of a book made the book thicker than necessary, consequently increasing the expense of manufacture.

5

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide an auto soundbook apparatus using CdS photoconductive cells installed in each page of the soundbook, capable of automatically telling a story of any opened page when a reader turns over one page or pages of the soundbook at once.

10

Another object of the present invention is to provide an auto soundbook apparatus using CdS photoconductive cells with minimized power consumption by installing a CdS cell for a power switch in a rear cover of the soundbook, so when the soundbook is opened, a power supply part provides power to a control part and the other parts, respectively.

15

Another object of the present invention is to provide an auto soundbook apparatus using CdS photoconductive cells for helping users to change a battery more easily by installing a power detection part for detecting the status of a power supply part, so when the voltage of the power supply part falls below a predetermined voltage, the power detection part transmits a low battery signal to a control part and the control part informs this to users through a buzzer BZ1 or LED.

20

To achieve the above object, there is provided an auto soundbook apparatus using CdS photoconductive cells includes a cover, a plurality of pages inside the cover; a page detection part for outputting a page detection signal with the help of CdS photoconductive cells installed in each of the pages for detecting an open state of respective pages, a voice data storage part for storing voice or sound data

25

corresponding to each of the pages, a voice output part for outputting the voice or sound data stored in the voice data storage part, a control part for recognizing an opened page at a time of receiving the page detection signal from the page detection part, reading voice or sound data corresponding to the opened page from the voice data storage part, and commanding the voice output part to output the voice and sound data; and a power supply part for supplying operational voltage to each of the parts.

Preferably, the apparatus further includes a power switching part for supplying power from the power supply part to the parts by detecting an open state of the cover or the plurality of pages.

Preferably, the power switching part further includes a CdS cell for the use of power switch for detecting the open state of the cover or the plurality of pages, the CdS cell being built in the cover at a position opposed to passing holes with the same size being formed on the same positions of the plurality of pages, in order to pass through light.

Preferably, the apparatus further includes a power detection part for detecting a voltage state of the power supply part and informing the control part about the voltage state.

20

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a soundbook of the related art;

25

Fig. 2 is a longitudinal cross-sectional view of a front cover of the

soundbook of Fig. 1 being closed, taken along line A-A';

Fig. 3 is a perspective view of an auto soundbook apparatus in which CdS photoconductive cells are inserted according to one embodiment of the present invention;

5 Fig. 4 is a longitudinal cross-sectional view of a front cover of the soundbook apparatus of Fig. 3 being closed, taken along line A-A';

Fig. 5 is a perspective view of an auto soundbook apparatus using CdS photoconductive cells where a circuit substrate is installed in a rear cover according to one embodiment of the present invention;

10 Fig. 6 is a functional block diagram depicting an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention;

Fig. 7 is a detailed circuit diagram showing a power supply part and power switching part of an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention;

15 Fig. 8 is a detailed circuit diagram showing a page detection part of an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention; and

Fig. 9 is a flow chart explaining a control procedure of an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described herein below with reference to the accompanying drawings. In the following description,

well-known functions or constructions are not described in detail since they would obscure the invention in unnecessary detail.

Fig. 3 is a perspective view of an auto soundbook apparatus in which CdS photoconductive cells are inserted according to one embodiment of the present invention; Fig. 4 is a longitudinal cross-sectional view of a front cover of the soundbook apparatus of Fig. 3 being closed, taken along line A-A'; and Fig. 5 is a perspective view of an auto soundbook apparatus using CdS photoconductive cells where a circuit substrate is installed in a rear cover according to one embodiment of the present invention;

As depicted in Figs. 3 through 5, the auto soundbook apparatus 10 using CdS photoconductive cells (hereinafter it is abbreviated as "book") of the present invention is composed of a front cover 10a, a rear cover 10b and a plurality of pages P1 ~ P16 between the front cover 10a and the rear cover 10b.

The rear cover 10b includes built-in a CdS cell 350 for the use of power switch for controlling the entire operation of the book 10, power supply part 200, speaker SP, connector 400a and PCT (Printed Circuit Board) mounted with other electronic components. Preferably, a plurality of passing holes (not shown) is formed on one side of the rear cover 10b, more specifically on the opposite side of the rear cover, to facilitate voice output from the speaker SP.

Each of the pages P1 ~ P6 is illustrated with sentences and pictures, and thin film-like CdS photoconductive cells C1 ~ C16 are installed in the pages. To be more specific, a first CdS photoconductive cell C1 is inserted into a first page P1, a second CdS photoconductive cell C2 is inserted into a second page P2, a third CdS photoconductive cell C3 is inserted into a third page P3,..., and a sixteenth CdS photoconductive cell C16 is inserted into a sixteenth page P16. In addition, on one

side of each of the pages P1 ~ P6 is a same-sized passing hole 350a at the exactly same position of each page, and a CdS cell 350 for the use of a power switch is built in the rear cover 10b opposite to the passing hole 350a.

The top surface of each of the CdS photoconductive cells C1 ~ C16 is taped.
5 This is because when toddlers or children might touch out of curiosity or detach the cells, the CdS photoconductive cells C1 ~ C16 are easily malfunctioned or damaged. Meanwhile the conducting lines from the plural CdS photoconductive cells C1 ~ C6 are connected, through a connector 400a, onto the circuit substrate built in the rear cover 10b.

10 Fig. 6 is a functional block diagram depicting an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention; Fig. 7 is a detailed circuit diagram showing a power supply part and power switching part of an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention; and Fig. 8 is a detailed circuit
15 diagram showing a page detection part of an auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention.

As illustrated in Figs. 6 through 8, the book 10 includes a control part 100 for controlling the entire operation of the book 100 according to the internal program, a power supply part 200 for supplying power to each part of the book 100, a power
20 switching part 300 for applying (not shown) the power from the power supply part 200 to each part of the book 100, a power detection part 400 for detecting power state of the power supply part 200, a page detection part 500 mounted with a plurality of CdS photoconductive cells C1 ~ C6 for detecting state of the book whether it is opened, a voice data storage part 600 for storing voice or sound data
25 corresponding to each of the pages P1 ~ P16, and a voice output part 700 for

outputting voice or sound data having stored in the voice data storage part 600.

To be more specific, the control part 100 receives a detection signal of an opened page (hereinafter referred to as "page detection signal") from the page detection part 500, recognizing that the opened page, and reads the voice or sound data in connection with the opened page from the voice data storage part 600, and commands the voice output part 700 to output the read voice or sound data. Preferably, a microprocessor being typically used in the related art is used as the control part 100.

The power supply part 200 uses direct voltage Vcc. An independent voltage source, namely four of 1.5V batteries that are available in the market also can be used for the power supply part. Moreover, a rectified alternating current source, now it being direct voltage, can be used for the power supply part.

The power switching part 300, as shown in Fig. 7, is the collection of electrical connections. That is, CdS cell 350 for the use of the power switch is separately built in the rear cover 10b of the book 10, and other elements, i.e. resistances R20 ~ R23, condensers Q20 and Q30, and transistors TR1 ~ TR3, are electrically connected to each other. When the user opens the front cover 10a of the book 10, the resistance value of the CdS cell 350 for the use of power switch is minimized (very close to 0Ω) under the influence of an incident light through the passing hole 350a. As a result, the transistor TR1 is turned off, and the transistor TR2 and transistor TR3 are turned on one by one. In this manner, the operational voltage Vcc from the power supply part 200 is supplied to the control part 100 and the other parts of the book through a power supply terminal Vout. This power supply mechanism is equally applied when one of the pages P1 ~ P16 is opened. In

other words, the CdS cell 350 for the use of power switch is influence of the incident light through the passing hole 350a, and the power supply part 200 supplies operational voltage V_{cc} to the control part 100 and the other parts of the book through the power supply terminal V_{out} . In the meantime, if the book 10 is closed, that is, if no light is incidented upon the CdS cell 350 for the use of power switch, its resistance value reaches the maximum (very close to Ω). As a result, the transistor TR1 is turned on, and the transistor TR2 and transistor TR3 are turned off one by one, cutting off the operational voltage V_{cc} of the power supply part 200 to be supplied to the control part 100 and the other parts of the book. In this manner, it becomes possible to minimize power consumption at the power supply part 200.

When the voltage V_{cc} of the power supply part 200 goes below the predetermined voltage, the power detection part 400 transmits a low battery signal to the control part 100. Upon receiving the low battery signal, the control part 100 informs the user about this through the buzzer BZ1 or LED. Hence the user can change the battery more conveniently.

The page detection part 500 detects if any of the pages P1 ~ P16 is being opened, and if so, transmits a page detection signal to the control part 100. Particularly, the page detection part 500 of the present invention is distinguished by its usage of CdS photoconductive cells C1 ~ C16 inserted into respective pages P1 ~ P16, where resistance values of the cells vary in response to the incident light upon the opened page and the page detection signal is output accordingly.

The construction of the page detection part 500 is same for all the pages. That is, as depicted in Fig. 8, the resistance R1 and the CdS photoconductive cell C1 are serially connected between the power supply terminal V_{out} and an earth terminal, and a condenser Q1 is connected to both ends of the CdS photoconductive cell C1.

Also, the contact point of the resistance R1 and the CdS photoconductive cell C1 is connected to an input terminal IN1 of the control part 100.

As such, when the user opens the first page P1 of the book 10, the resistance value of the CdS photoconductive cell C1 becomes the minimum (very close to 0Ω) under the influence of the incident light, and the electrical potential of the input terminal IN1 of the control part 100 falls to a low level. This low level signal is sent to the control part 100 in the form of the page detection signal. On the other hand, if the first page P1 of the book 10 is not opened, that is, if no light is incidented upon the CdS photoconductive cell C1, the resistance value of the cell reaches the maximum (very close to Ω), and the electrical potential of the input terminal IN1 of the control part 100 continues to be at a high level.

The voice data storage part 600 is composed of semiconductor IC (Integrated Circuit). In general, voice or sound data corresponding to stories (or sentences) of each page P1 ~ P16 is stored respectively in a memory. Because some pages could have more sentences, different time should be assigned proportionally to the amount of sentences. The memory is divided in accordance with the amounts of time assigned to pages, and voice or sound data is stored in the corresponding memory only in proportional to the time required. Thanks to the remarkable development of semiconductor IC memory technologies, a single IC memory being currently used for the soundbook can store data longer than 1 hour. For example, the first page P1 can store data for 2 minutes and 30 seconds, the second page P2 can store data for 3 minutes and 50 seconds, the third page P3 can store data for 5 minutes and 25 seconds,..., and the sixteenth page P4 can store data for 45 seconds. Shortly speaking, the voice data storage part 600 composed of one semiconductor IC is divided into different memory areas according to the time required of each page, and

voice or sound data of a page is stored in a corresponding memory area of the page.

The voice output part 700, being controlled by the control part 100, outputs the voice or sound data that is stored in the voice data storage part 600 through the speaker SP via a volume adjustment part 720 and amplification part 740. Here, the user can adjust the volume or voice output up to 1 Watt as he/she wants, using the volume adjustment part 720.

The following describes how the auto soundbook using CdS photoconductive cells is operated. Unless otherwise indicated, every step of the procedure is conducted by the control part 100.

Fig. 9 is a flow chart explaining a control procedure of the auto soundbook apparatus using CdS photoconductive cells according to one embodiment of the present invention.

As shown in Fig. 9, when the power of the book 100 is turned on (S10), the control part 100 decides whether a page detection signal has been detected from a plurality of CdS photoconductive cells C1 ~ C16 being inserted into respective pages P1 ~ P16 (S12).

If the page detection signal is detected from the plural CdS photoconductive cells C1 ~ C16 at step 12, the control part 100 reads voice or sound data of the opened page from the voice data storage part 600 (S14). Then, the control part 100 transmits the read voice or sound data from the voice data storage part 600 to the voice output part 700 (S16). Then the voice output part 700 outputs the voice or sound data through the speaker SP via the volume adjustment part 720 and amplification part 740. In short, the control part 100 recognizes an opened page with the help of the CdS photoconductive cells C1 ~ C16 inserted into each page P1 ~ P16, and reads voice or sound data corresponding to the story (or sentences) in the

opened page from the voice data storage part 600. Later this voice or sound data is output through the speaker SP.

Further, the control part 100 decides whether there has been a response from the plural CdS photoconductive cells C1 ~ C16 for the predetermined time (S18). If
5 there has been no response from the CdS photoconductive cells C1 ~ C16 for the predetermined time, that is, if the state of the page detection signal is not changed for the predetermined time, the voice or sound data from the voice data storage part 600 is repeatedly reproduced for a predetermined number of times and then the apparatus is automatically turned off. Therefore, even though the book 10 is opened for an
10 extended period of time, the battery is not wasted unnecessarily, consequently extending the lifespan of the battery.

However, if there has been a response from the CdS photoconductive cells C1 ~ C16 for the predetermined time, that is, if the state of the page detection signal is changed for the predetermined time, the procedure goes back to the step 12,
15 wherein the control part 100 decides whether the page detection signal was detected from the plural CdS photoconductive cells C1 ~ C6 inserted into each of the pages P1~ P6.

While the invention has been shown and described with reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that
20 various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

For example, the present invention can be applied not only to soundbooks but also to diverse fields including household appliances for reading a user's manual or caution, wireless terminals, menus, digital watches, marketing and so on.

25 In conclusion, the auto soundbook apparatus using CdS photoconductive

cells of the present invention, unlike the soundbook apparatuses of the related art using optical sensors, read switches, hole sensors and the like, can be advantageously used in that it has a very low possibility to fail to recognize the pages and to operate, and users can easily operate, and it solved the problems in connection with the thickness of the soundbook caused by the complicated circuit built in the cover of the soundbook of the related art and high expense of manufacture thereby.

In addition, users can change the battery of the soundbook apparatus much more conveniently with the help of the power detection part that detects the state of the power supply part. For instance, when the voltage of the power supply part falls below the predetermined voltage, the power detection part sends a low battery signal to the control part, and the control part informs users about this through a buzzer BZ1 or LED.

Further, the auto soundbook apparatus of the present invention is beneficial to minimize power consumption of the power supply part, by forming same-sized passing holes on the same positions of the pages of the book and by building the CdS cell for the use of power switch into the rear cover, namely on the opposite side of the passing holes, so when the book is opened, the CdS cell detects it and makes power from the power supply part be supplied to the control part and the other parts of the book.

20

What Is Claimed Is:

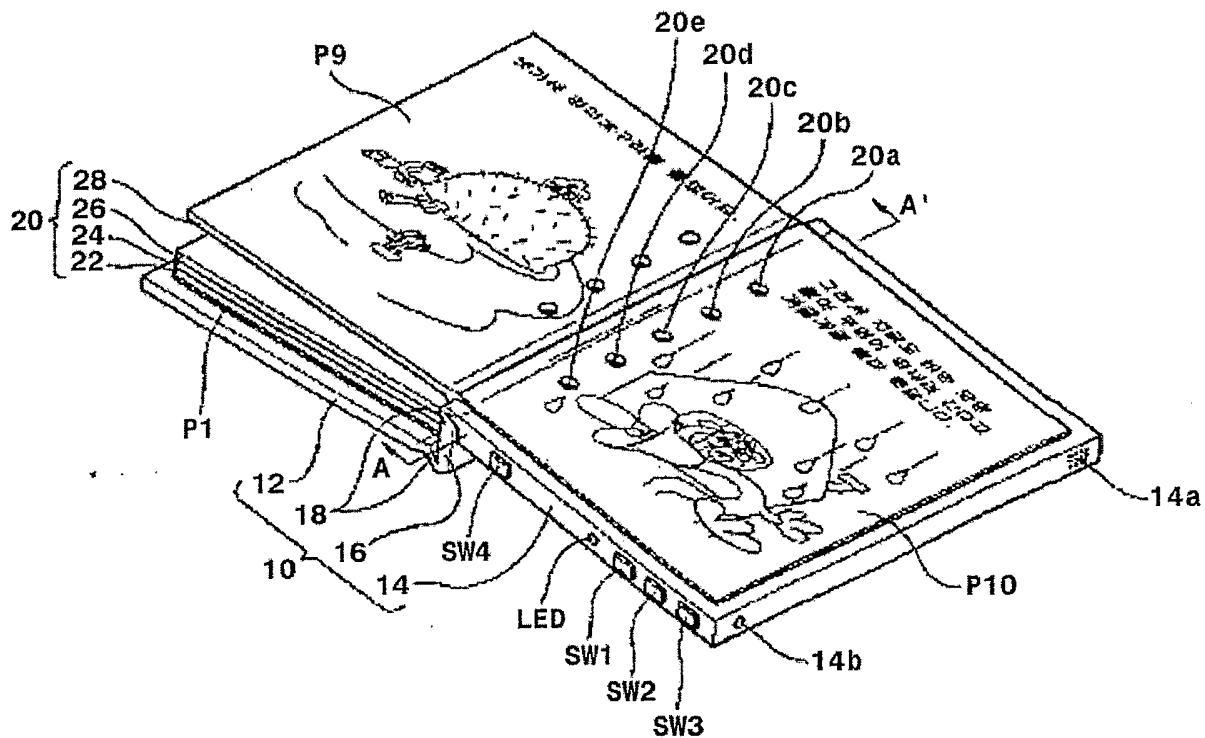
1. An auto soundbook apparatus using CdS photoconductive cells, the apparatus comprising:
 - 5 a cover;
 - a plurality of pages inside the cover;
 - a page detection part for outputting a page detection signal with the help of CdS photoconductive cells installed in each of the pages for detecting an open state of respective pages;
 - 10 a voice data storage part for storing voice or sound data corresponding to each of the pages;
 - a voice output part for outputting the voice or sound data stored in the voice data storage part;
 - a control part for recognizing an opened page at a time of receiving the page
15 detection signal from the page detection part, reading voice or sound data corresponding to the opened page from the voice data storage part, and commanding the voice output part to output the voice and sound data; and
 - a power supply part for supplying operational voltage to each of the parts.
- 20 2. The apparatus according to claim 1, further comprising:
 - a power switching part for supplying power from the power supply part to the parts by detecting an open state of the cover or the plurality of pages.
- 25 3. The apparatus according to claim 2, wherein the power switching part further comprises a CdS cell for the use of power switch for detecting the open state

of the cover or the plurality of pages, the CdS cell being built in the cover at a position opposed to passing holes with the same size being formed on the same positions of the plurality of pages, in order to pass through light.

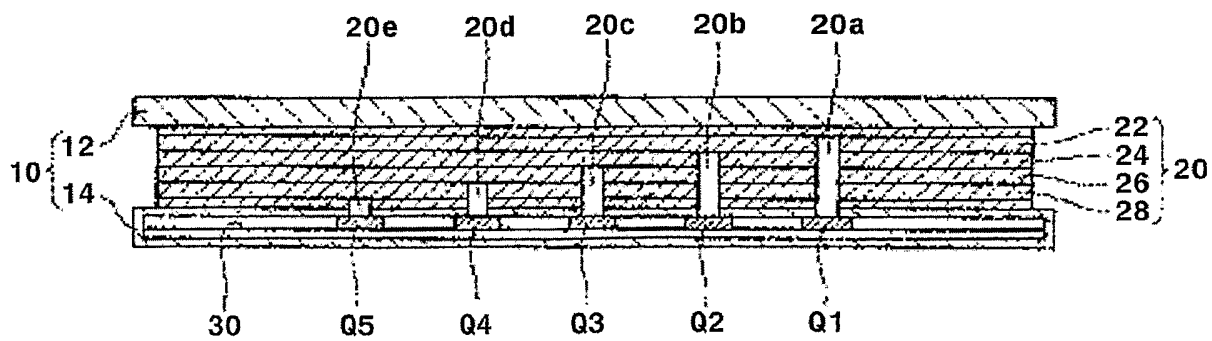
- 5 4. The apparatus according to one of claims 1 through 3, further comprising a power detection part for detecting a voltage state of the power supply part and informing the control part about the voltage state.

[DRAWING]

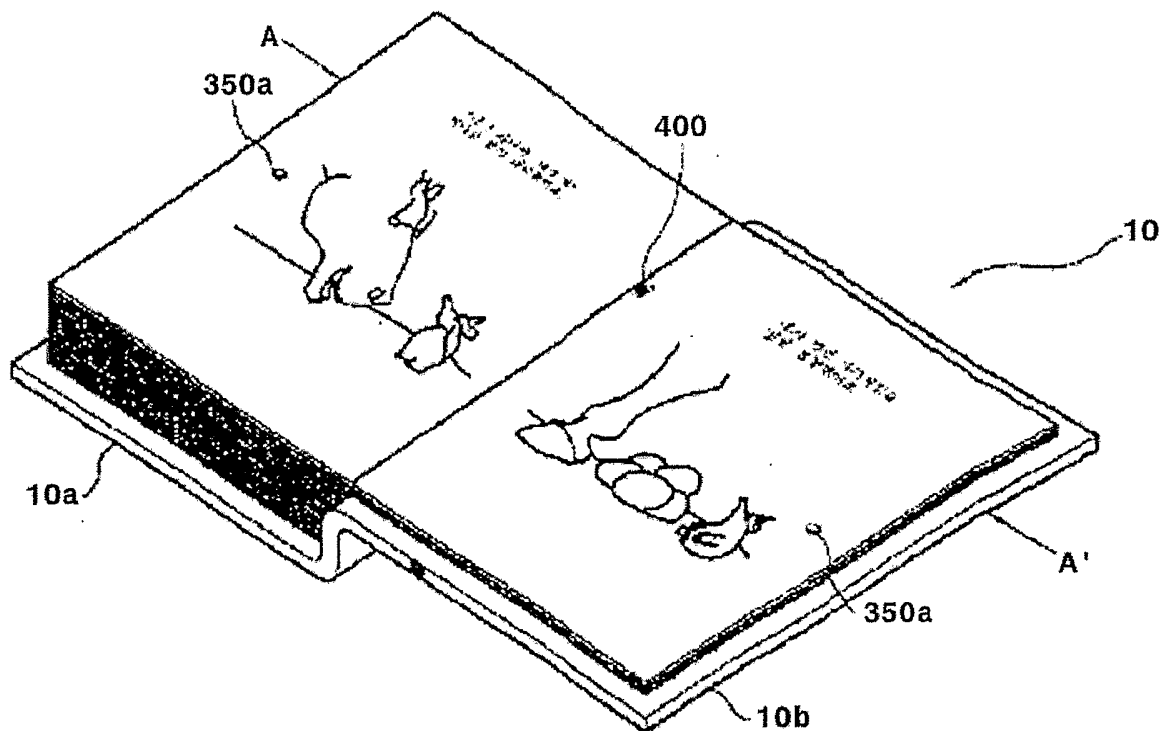
[FIG. 1]



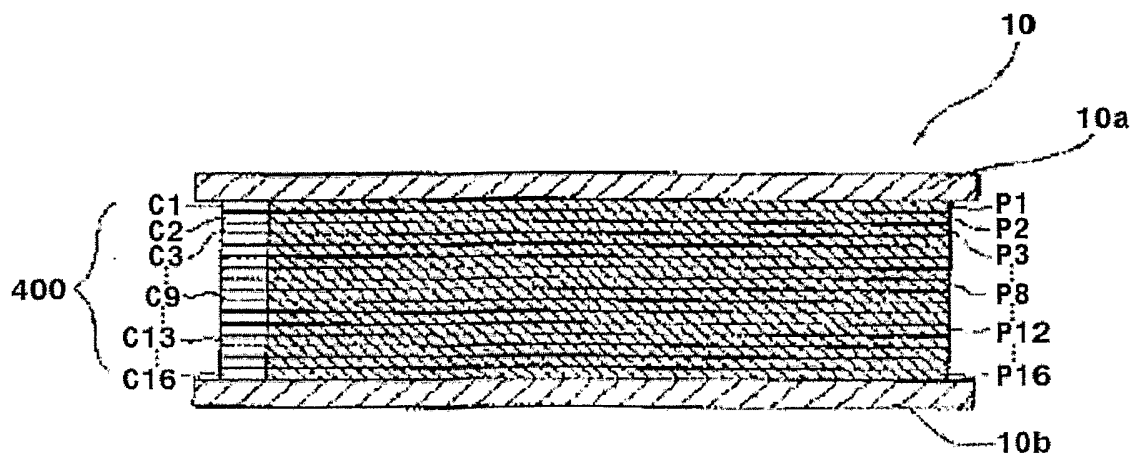
[FIG. 2]



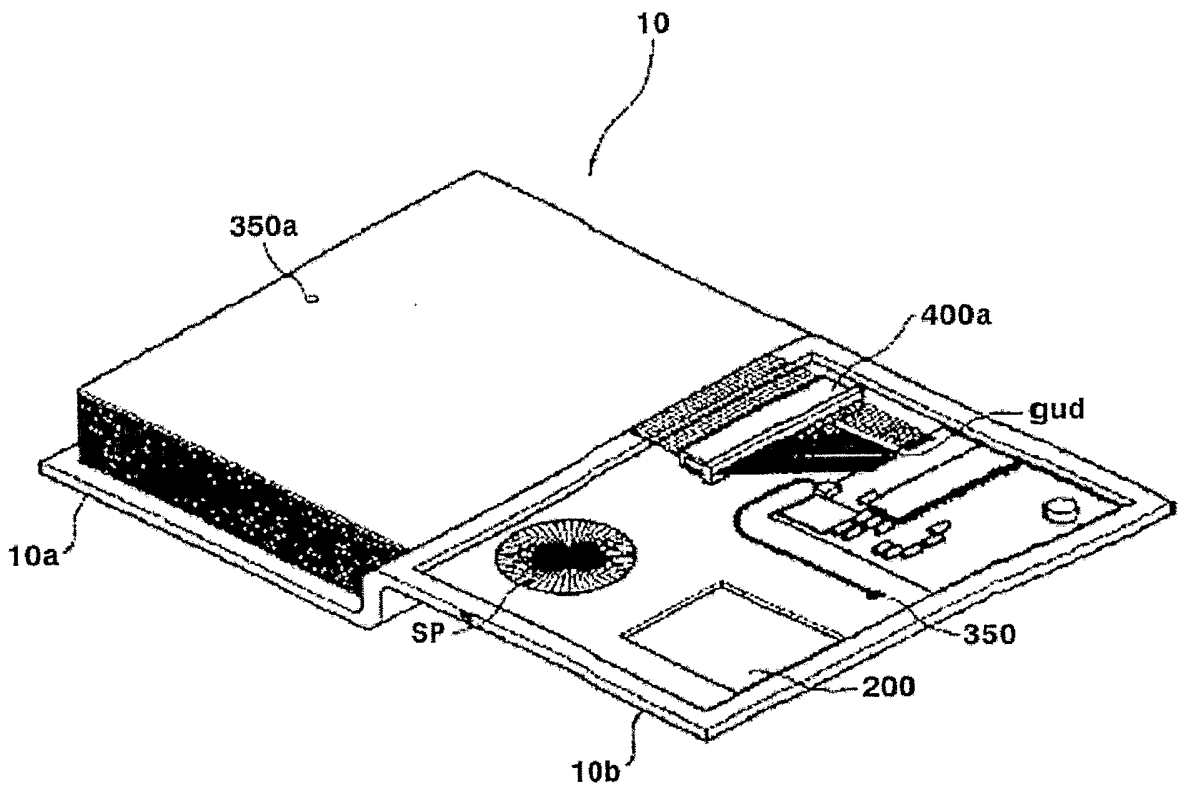
[FIG. 3]



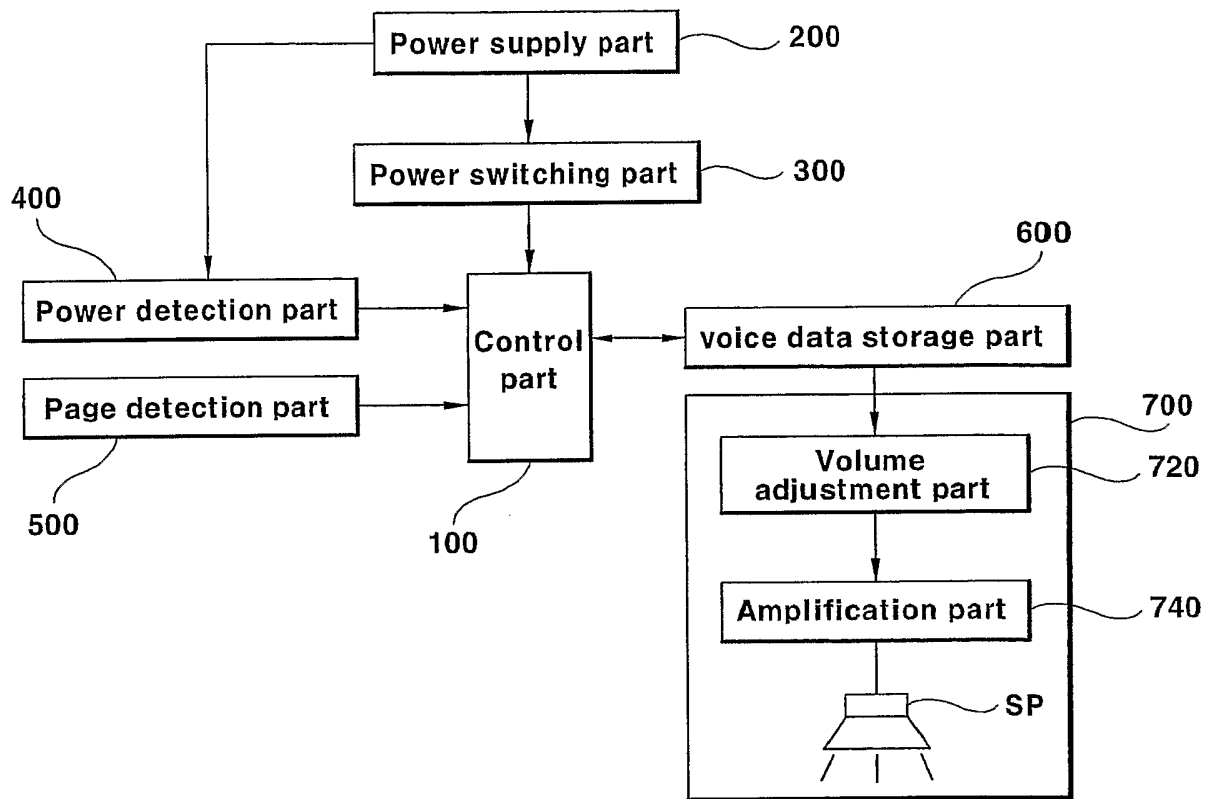
[FIG. 4]



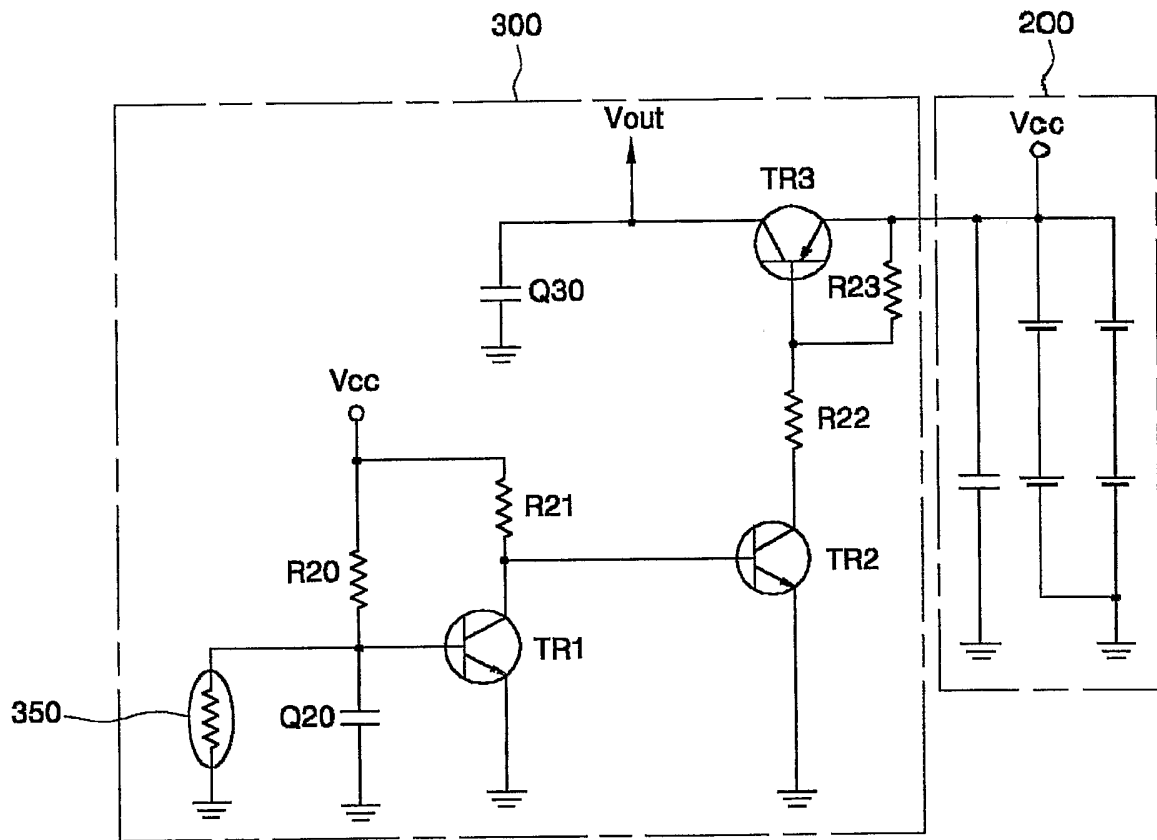
[FIG. 5]



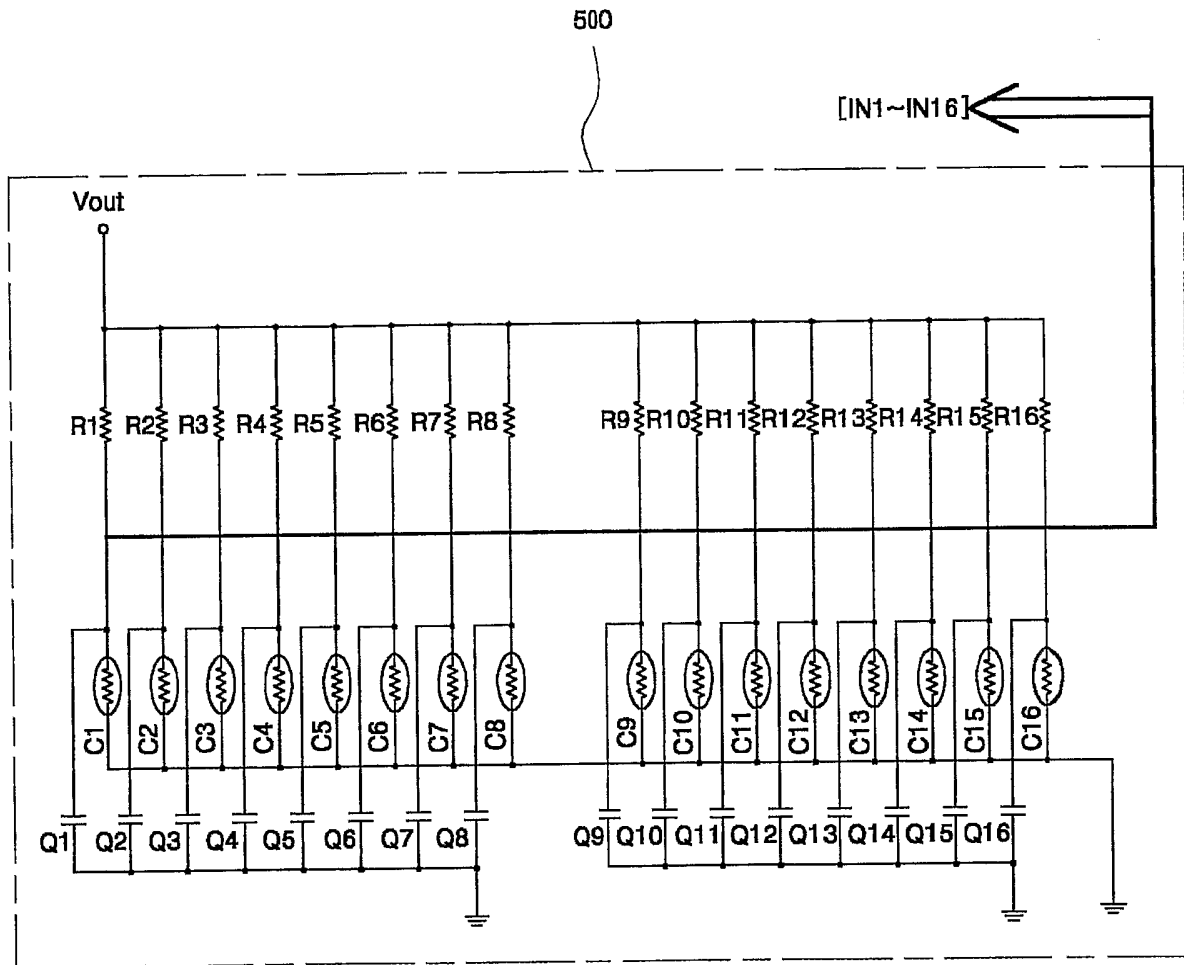
[FIG. 6]



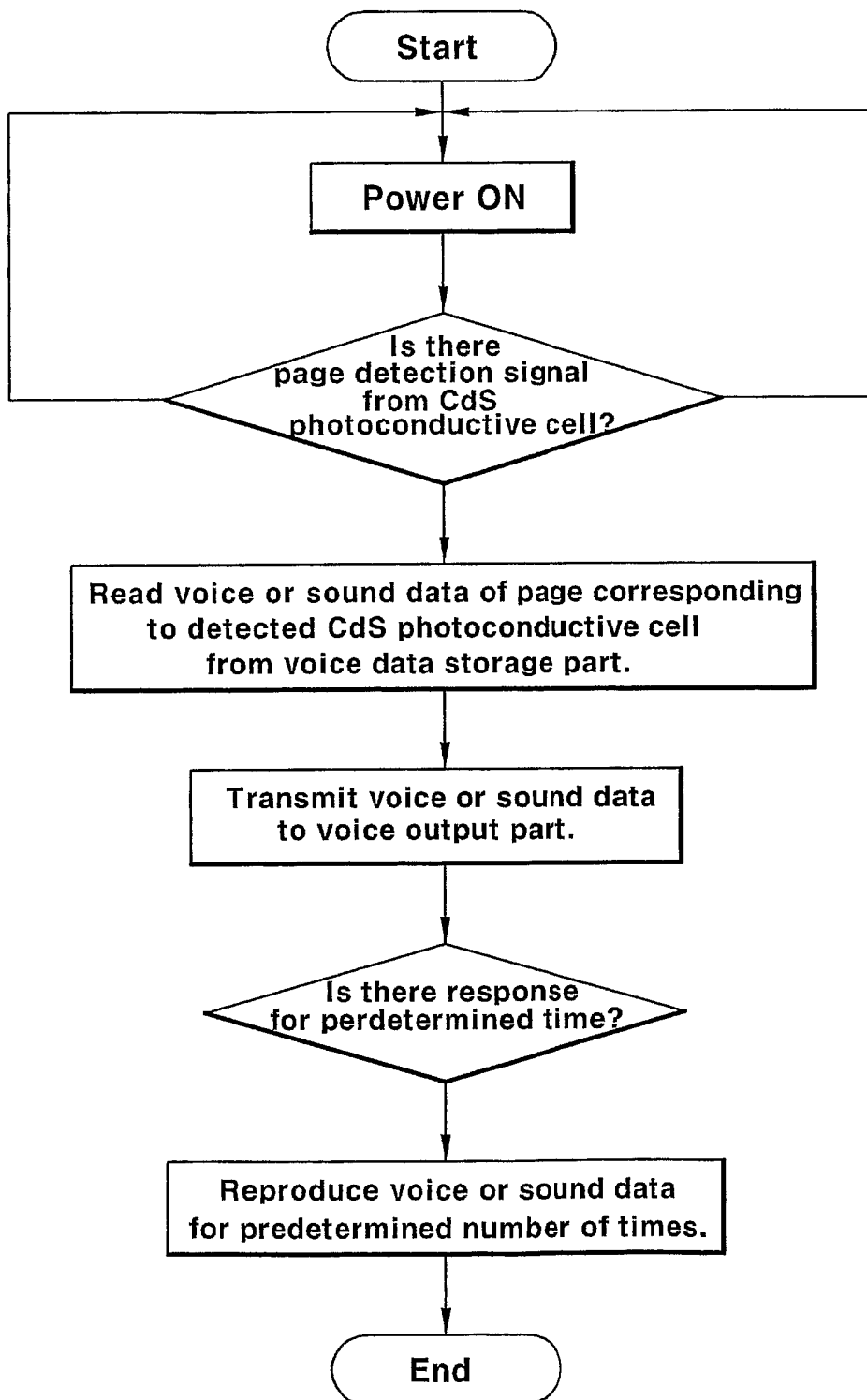
[FIG. 7]



[FIG. 8]



[FIG. 9]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR03/00232

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G09B 5/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 G09B 5/04, 5/06, 19/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975
Korean Utility models and applications for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 11-347260 A (SANYO ELECTRIC CO. LTD) 22 JUN. 2001	1 to 2
A	US 4,809,246 A (Jeng; Lih) 28 FEB. 1989	1 to 2
A	US 6,064,855 A (Ho; Frederick Pak Wai) 16 MAY 2000	1 to 2
A	US 4,636,881 A (Shaw; James T.) 13 JAN. 1987	1 to 2

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family


Date of the actual completion of the international search

23 MAY 2003 (23.05.2003)

Date of mailing of the international search report

24 MAY 2003 (24.05.2003)

Name and mailing address of the ISA/KR

 Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

HONG, Myung Gon

Telephone No. 82-42-481-5624



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR03/00232

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 11-347260 A	22 JUN. 2001	NONE	
US 4,809,246 A	28 FEB. 1989	NONE	
US 6,064,855 A	16 MAY 2000	CA 2328349 AA AU 4152099 A1 WO 9956265 A1 CN 1298531 T EP 1078347 A1	04.11.1999 16.11.1999 04.11.1999 06.06.2001 28.02.2001
US 4,636,881 A	13 JAN. 1987	JP 61067879 A2	08.04.1986