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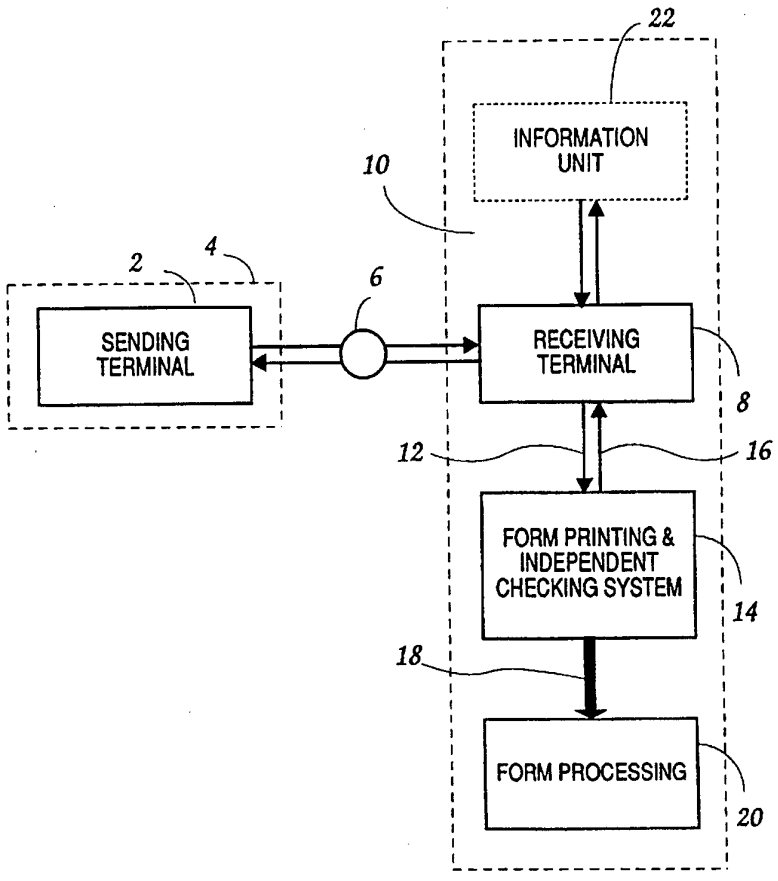
(54) Title: METHOD AND APPARATUS FOR FILLING-OUT INDIVIDUAL FORMS, PARTICULARLY LOTTERY FORMS

(57) Abstract

A method and apparatus for filling out individual forms at a central location (10) with data inputted by individual users located at a plurality of different local sites (4). At each local site (4), the data to be included in the filled-out form is inputted via a user's local terminal (2) over a communication network (6) to a receiving terminal (8) at the central location (10). At the central location (10), the transmitted data is received and verified and a verification signal is transmitted to the respective local terminal (2). The verification at the central location (10) is performed by printing out an individual form with the data transmitted by the respective local terminal (2), optically reading the filled out form, and comparing the data on it with the data received from the respective local terminal (2).



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METHOD AND APPARATUS FOR FILLING-OUT INDIVIDUAL FORMS, PARTICUARLY LOTTERY FORMS

The present invention relates to a method and apparatus for filling-out individual forms at a central location with data inputted by individual users located at a plurality of different local sites. The invention is particularly useful for filling-out lottery forms, and is therefore described below with respect to this application.

In order to fill-out a form, one must usually go to the office or location where the forms are available and either fill-out the form there, or subsequently return the filled-out form if filled-out at another (e.g., more convenient) location. In cases where the issuers of the forms are interested in encouraging people to fill them out, for example as in a lottery, the inconvenience of having to make one or two trips to fill-out the form, or of having to fill-out the form at the issuing office, can greatly reduce the number of potential customers.

An object of the present invention is to provide a method and also apparatus enabling users to fill out forms at the convenience of their homes or offices for transmission to a central location.

According to one aspect of the present invention, there is provided a method of filling out individual forms at a central location with data inputted by individual users located at a plurality of different local sites, comprising: at each such local site, inputting into a user's local terminal the data to be included in the filled-out form; transmitting the data from the local terminals over a communication network to a receiving terminal at the central location; at the central location, receiving the transmitted data from the local terminals, verifying the transmitted data for each of the individual forms, and upon verification transmitting via the communication network a verification signal to the respective local terminal; and at each local site upon receiving a verification signal, printing out at

the local site a verification identifying the transmitted data.

According to further features in the described preferred embodiment of the invention, the central location prints out an individual form with the data transmitted by the respective local terminal, and verifies the transmitted data by optically reading the individual form filled-out with said transmitted data and comparing the data with the data received from the respective local terminal.

According to another aspect of the invention, there is also provided a local terminal for use in filling-out individual forms at a central location with data inputted by individual users located at a plurality of different local sites according to the above-described method, comprising: a panel including a plurality of input devices physically arrayed according to the data to be included in the filled-out form; a modem for transmitting the data via a communication network to a central station; and a printer for printing out the inputted data with a verification indicating the data has been verified by the central station.

As will be more apparent from the description below, such a method and system enables forms to be filled out at the convenience of the user's home or office by using such "personal terminals" provided the individual users. The method and apparatus are thus particularly useful for filling out lottery forms, but could be used in many other applications as well.

Further features and advantages of the invention will be apparent from the description below.

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a block diagram illustrating one form of method and apparatus in accordance with the present invention;

Fig. 2 illustrates one form of control panel which may be used in the local terminal of the present invention;

Fig. 3 is a block diagram illustrating the operation of the local terminal of Fig. 2;

Figs. 4 and 5 are block diagrams illustrating two arrangements for processing and verifying the data received at the central station;

Fig. 6 is a block diagram illustrating one manner, utilizing an LED matrix, for inputting the data into the local terminal;

Figs. 7 and 8 illustrate the "standby" and energized operations, respectively, of the light-emitting diodes in the LED matrix of Fig. 6;

and Fig. 9 illustrates a preferred example of a control panel which may be included in the local terminal constructed in accordance with the present invention.

In the block diagrams to be described, thin arrows represent communication network lines, and thick arrows represent physical transfer of forms from one place to another.

Fig. 1 illustrates the transmission of an "electronic form" prepared by inputting data into a local terminal 2 provided each user at a local site 4, convenient to the user, such as the user's home or place of work. The data inputted via the local terminal 2 is transmitted over a communication network 6 to a receiving terminal 8 situated at a central location 10. The communication network 6 may be any type of network, such as a telephone, radio, or satellite network. A preferred network is the regular telephone system. The data received by receiving terminal 8 at the central location is transmitted (arrrow 12) to a form printing and independent checking system 14, where a form is printed and filled-out with the data transmitted by the local terminal 2, and checked for errors, as will be described below. If the filled-out data on the physical form has been found to match the transmitted data, a verification signal is transmitted (line 16) back to the receiving terminal 8 of the central station, and from there to the local terminal 2 so that the user receives confirmation that a valid form has been printed at the

center 10.

The above-described process takes but a few seconds for each electronic form transmitted. The printed form produced at the center is then handled as any other form, including those filled out in the conventional manner. It will usually be transferred (arrow 18) to a form processing unit 20 which may be located at the site of the center 10 or at another location.

As an optional feature, the center 10 may have a computerized information unit 22 containing updated information regarding the forms. For example, if the forms are for a sports lottery, information unit 22 would contain information regarding the teams playing at the respective time, prices for participating in the lottery, statistics of previous games, etc. This information can be requested by the user via the user's local terminal 2 and received by that terminal via the communication network 6. It is contemplated that several regional centers could be set up, each having its own information unit 22 connected to a main computer at the central station.

Fig. 2 illustrates one example of a control panel for use in a local terminal 2 designed particularly with respect to filling-out football pool lottery forms. The control panel includes a keypad 24, a display 26, a printer 28, and a selection panel 30.

Keypad 24 would include a number of operational control keys for controlling the operation of the local terminal as will be described more particularly below. Display 26 may be of any standard display, such as a liquid-crystal display (LCD). Printer 28 is preferably a mini-printer of the thermal type.

Selection panel 30 includes a plurality of input devices for inputting the data to be included in the "electronic form" transmitted to the central station 10. When using the local terminal for filling out a conventional football pool lottery form, the input devices would be physically arrayed according to the data to be included in such a filled-out form. In the illustrated example, the

forms are arranged according to a rectangular matrix of three vertical columns 32, 34, 36, and a plurality of horizontal rows. Each horizontal row represents a match between two teams, and each vertical column represents one of the three choices that may be made for the respective match; that is, column 32 would select a "win" by the first team, column 34 would select a "tie", and column 36 would select a "win" by the second team. Thus, a "game" would include selected choices for a predetermined number of matches, e.g., 10 or 15 matches. One form may include up to a predetermined number of games, e.g., ten games.

The control panel further includes a space 38 for receiving a list of the teams involved in the matches of the respective football pool. Space 38 is preferably located close to the selection panel 30, and the information provided it is preferably arranged according to the same format as the rectangular matrix of input devices in the selection panel 30, to faciliate making the selections via the selection panel. The printed information provided in space 38 may be obtained via the printer 28, or from another source, e.g., blank lottery form, information printed in the newspaper, etc.

The control panel illustrated in Fig. 2 further includes, if desired, a keyhole 40 for a user-only access key, and a card reader slot 42 for receiving a user's card for billing, identification, or other purposes.

Fig. 3 illustrates one manner of operation of the local terminal 2. The local terminal is plugged into a telephone jack and activated by an access key 44, which can be a mechanical key or a number code keyed into the keypad 24. A "telephone" key in keypad 24 is then pressed, and the terminal is automatically connected to the receiving terminal 8 at the central location 10 via a modem 46 controlled by a microprocessor 48. Connection with the receiving terminal 8 is necessary only when the local terminal 2 is actually transmitting to, or receiving data from, the receiving terminal 8 at the central station.

If the user does not know the list of games participating in the current lottery, this can be requested from the information unit 22 at the center, and the requested information is transmitted via the modem 46 and microprocessor 48 to the printer 28 of the local terminal. The printed list of games can be received in space 38 of the local terminal so as to be conveniently viewable by the user when making these selections via the selection panel 30. The local terminal further includes a buzzer 47 which is actuated to produce a sound when a selection is made via the selection panel 30.

After the user has selected the desired combination of game results via the selection panel 30, the display 26 will show the number of games selected and the cost therefor. If the user decides to fill-out another form, the data corresponding to the filled-out form is first entered into the memory of the microprocessor by pressing the memory key 49, and the terminal is ready to receive a new form.

A limit can be introduced into the local terminal limiting the total costs that can be accumulated using that terminal. If the total entered in the terminal exceeds the limit, a warning will appear on the display 26, and additional forms will not be accepted.

When the user is ready to transmit the filled-out forms, a "print" key in the keypad 24 is depressed, and the forms are printed out by the printer 28. In this way, the user can make a last check of the chosen combinations. The "telephone" key in the keypad 24 may then be pressed to reconnect the terminal to the telephone line. The access key 44, if provided, would then be operated. If the magnetic card reader 42 is provided, a credit card would then be passed through slot 42 (Fig. 2) for billing purposes. The data would then be transmitted via the modem 46 to the receiving terminal 8.

As described below, the transmitted data is received by the receiving terminal 8 at the central location 10, and an individual form is printed out with the

transmitted data. This form is verified by optically reading the filled-out data on the printed form, and comparing it with that received from the respective local terminal. Upon verification, the central station 10 transmits a verification signal to the respective local terminal 2. The respective local terminal, upon receiving a verification signal, prints out a receipt of the verification of the transmitted data.

Figs. 4 and 5 illustrate examples of two printing and checking systems indicated by block 14 in Fig. 1.

As shown in Fig. 4, the data 12 sent by the local terminal 2 is received in microprocessor 50 of the receiving terminal 8 at the central station 10. The central station also includes a form-feeder and printer unit 52 which prints out a printed form filled out with the combination of choices for the various matches as chosen by the user. The printed form is physically transferred (arrow 54) to an optical reader 56 which reads the form and transforms the optically-read analog data into digital data (arrow 58) for inputting into the microprocessor 50. Microprocessor 50 then compares this optically-read data with the data 12 received directly from the local terminal 2.

If the optically-read data is identical with the received data 12, the printed form is considered valid and sent to be processed, as shown by arrow 60. At the same time, a verification signal 16 is sent back to the user via the receiving terminal 8 (Fig. 1) and the communication network 6. If, on the other hand, the two compared data are not identical, the form printed by printer 52 is considered defective, and the microprocessor 50 outputs a "defective" signal via its line 64 to indicate that manual intervention is required. The foregoing procedure may be repeated until an accurate form is filled out.

It will thus be seen that the system described above checks the printed form with the data actually received from the local terminal to ensure an error-free transfer of the"electronic form" data, before the so-transmitted data is validated to the local terminal.

Fig. 5 illustrates a more comprehensive validation procedure at the central station 10. In this system, after the microprocessor 50 has received the data 58 from the optical reader 56 and has determined that the printed form is valid, it sends a signal to a sorter 66 which physically transfers the form to a pile of valid forms 68. A valid form sensor 70 validates that the valid form actually has been placed in the correct pile, and sends a validation signal via line 72 to the microprocessor. Only then does the microprocessor send a validation signal 16 to the local terminal of the respective user. If sensor 70 does not sense the valid form, an alert signal is sent to the microprocessor via line 72, whereupon manual intervention may be made (64), to check the cause of the error signal.

If the form was found to be defective, the sorter 66 receives a signal from the microprocessor to transfer the form to a pile of defective forms 74. A defective form sensor 76 operates similarly to sensor 70 to ensure that a defective form reaches its proper pile. The sensor 76 then sends a signal via line 77 to the microprocessor to process a new form, and the process begins anew.

Selection panel 30 (Fig. 2) preferably includes optical devices for inputting the selected data. Fig. 6 illustrates the optical input devices as including an LED matrix 90 and a hand-holdable optical pen 92 for inputting the data. When the system is turned on, the LEDs of the matrix 90 are energized for short periods of time (Fig. 7), in the order of a few microseconds (e.g., 2 μS) by short current signals transmitted to them by a microprocessor 94. Each LED is energized in turn, so that every LED is energized once per period, e.g., of approximately 10 mS. The tip of the optical pen includes a photosensitive device, e.g., a photodiode which detects light emitted by the LEDs. The optical pen is used to switch the LEDs on and off, and to inform the microprocessor 94 which LEDs have been selected.

A selection of an LED is made by slightly pressing the head of the optical pen 92 against the selected LED.

This causes the photodiode of the pen to detect the short light pulses produced in the LED by the short current signal, and to transmit this information to the microprocessor. The microprocessor then stores this information and also energizes the selected LED substantially continuously (as shown in Fig. 8) so that the selected LED, appearing non-energized before selection, now appears energized after selection. Pressing the head of the optical pen against an energized LED will automatically erase it. The optical pen may include two photodiodes, both of which must receive light signals simultaneously in order to minimize errors.

Fig. 9 illustrates a further example of a control panel that can be used for the local terminal 2. This control panel is provided with a display 101, similar to display 26 in Fig. 2; an on/off LED 102; and a set of LEDs 103 which may be selected for requesting assistance, including a menu LED 103a, a help LED 103b, an up/scroll LED 103c, and a down/scroll LED 103d. The control panel further includes a pair of communication LEDs 104: LED 104a is used for requesting a game list from the information unit 22 at the central location, and LED 104b is used for transmitting the filled-out data to the central location.

Control panel 100 further includes printer controls 105, including a forward control LED 105a and a print control LED 105b, for controlling the printer 111. A pair of validation LEDs 106 include an OK LED 106a and a cancel LED 106b for validating or cancelling a request. For example, after pressing LED 104b the price is calculated and displayed, and the user must then validate or cancel the transaction. An erase LED 107 permits an inputted selection to be erased.

Another group of LEDs 108 enable the user to identify the form being filled in as a regular form (LED 108a), a multiple form (LED 108b), or another type of form (LED 108c). Thus, some betting pools permit the user to fill out a form to cover various combinations and/or permutations of inputted data. Some pools also permit the

user to use the same form for a number of games. For this purpose, the control panel 100 includes another set of LEDs 109 which enable the user to select up to ten games.

The selection panel 10 in the control panel 100 of Fig. 8 consists of a rectangular matrix of LEDs arranged in three vertical columns and fifteen horizontal rows to enable one to select one of three choices in each game match for a total of fifteen game matches. Next to the selection panel 110 is a space 112 for receiving a list of the current games. For this purpose, space 12 may be covered by a transparent lid which is pivotally mounted to enable the insertion of a current game list.

Fig. 9 also illustrates the optical pen 115 which is held by the user who presses its head 115a pressed against one of the LEDs on the control panel in order to make a selection, and to indicate the selection by the energization of the selected LED.

Preferably, the terminal used with the control panel of Fig. 9 has its own identification number, which is transferred to the central location via the communication line. This enables billing to be made directly from the user's bank account and not through a credit card.

While the invention has been described using LEDs and an optical pen as the input devices for making selections, it will be appreciated that other input devices could be used, e.g., keys depressible to operate electrical or optical switches. Also, while the invention has been described with respect to filling out betting lottery forms, it will be appreciated that the invention could be used for filling out other types of forms. Many other variations, modifications and applications of the invention will be apparent.

CLAIMS

1. A method of filling out individual forms at a central location with data inputted by individual users located at a plurality of different local sites, comprising: at each such local site, inputting into a user's local terminal the data to be included in the filled-out form; transmitting said data from the local terminals over a communication network to a receiving terminal at the central location; at said central location, receiving said transmitted data from the local terminals, verifying said transmitted data for each of said individual forms, and upon verification transmitting via said communication network a verification signal to the respective local terminal; and at each local site upon receiving a verification signal, printing out at said local site a verification identifying said transmitted data.

2. The method according to Claim 1, wherein said central location prints out an individual form with the data transmitted by the respective local terminal, and verifies said transmitted data by optically reading the individual form filled-out with said transmitted data and comparing said data with the data received from the respective local terminal.

3. The method according to Claim 1, wherein said central location stores data corresponding to forms to be filled out and, upon request from a local terminal for such data transmits to the local terminal the requested data, and the requesting local terminal prints out said data.

4. The method according to Claim 1, wherein said data is optically inputted into the user's local terminal by means of an optical pen.

5. The method according to Claim 1, wherein said forms are lottery forms.

6. A local terminal for use in filling-out individual forms at a central location with data inputted by individual users located at a plurality of different local sites according to the method of Claim 1, comprising: a panel including a plurality of input devices physically

arrayed according to the data to be included in the filled-out form; a modem for transmitting said data via a communication network to a central station; and a printer for printing out the inputted data with a verification indicating said data has been verified by the central station.

7. The local terminal according to Claim 6, wherein said plurality of input devices are arranged on said panel in a rectangular matrix including a plurality of horizontal rows and vertical columns.

8. The local terminal according to Claim 6, wherein said input devices on the panel are optical devices and cooperate with a hand-holdable optical pen for inputting the data.

9. The local terminal according to Claim 8, wherein said input devices on the panel are light-emitting diodes, and said optical pen includes a photosensitive device.

10. The local terminal according to Claim 9, wherein said light-emitting diodes are sequentially energized for periods of a few microseconds.

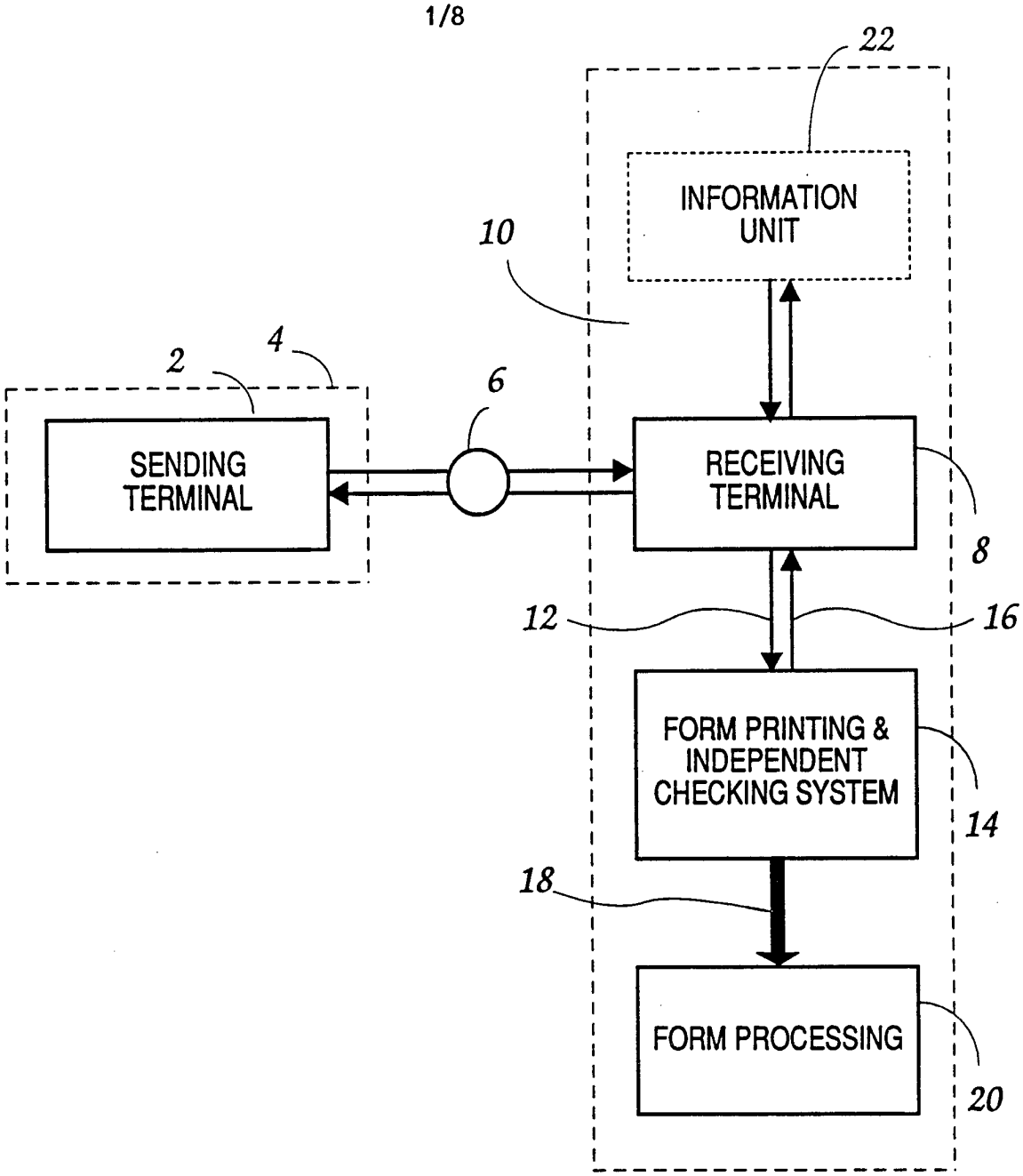

22
INFORMATION UNIT
10
2
4
6
SENDING TERMINAL
RECEIVING TERMINAL
8
12
16
FORM PRINTING & INDEPENDENT CHECKING SYSTEM
14
18
FORM PROCESSING
20

FIG. 1

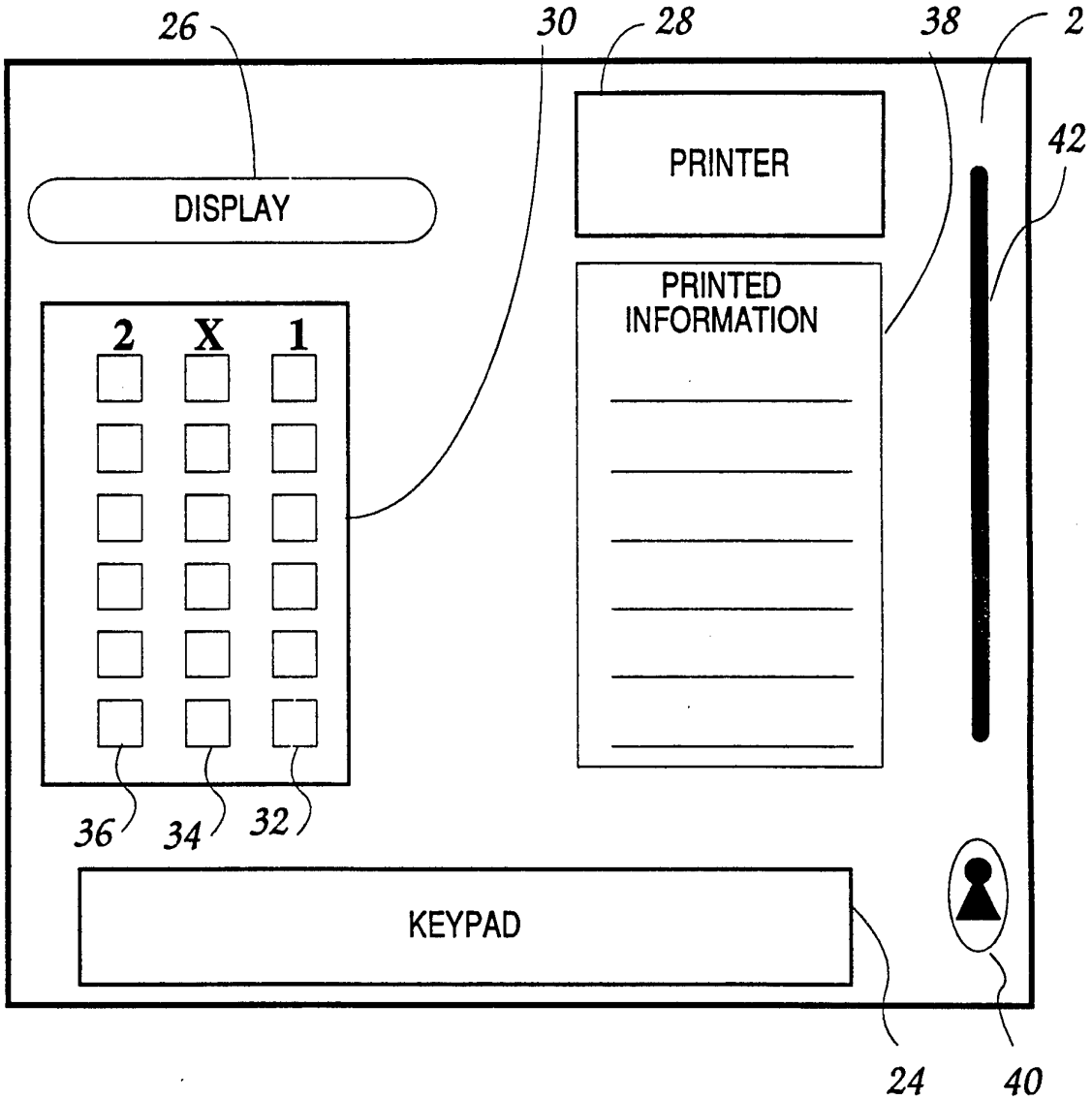

26
30
28
38
2
42
DISPLAY
PRINTER
PRINTED
INFORMATION
2
X
1
36
34
32
KEYPAD
24
40

FIG. 2

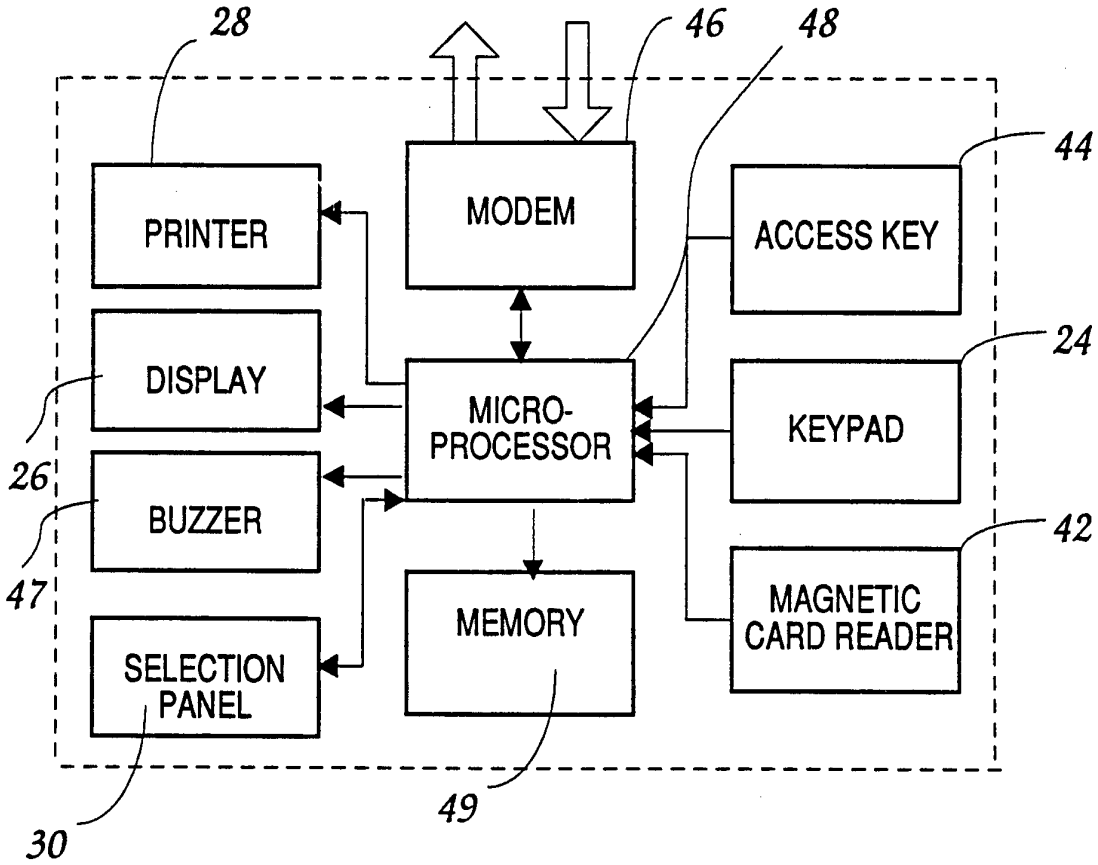

28
46
48
44
PRINTER
MODEM
ACCESS KEY
DISPLAY
24
MICRO-
PROCESSOR
KEYPAD
26
BUZZER
42
47
MEMORY
MAGNETIC
CARD READER
SELECTION
PANEL
49
30

FIG. 3

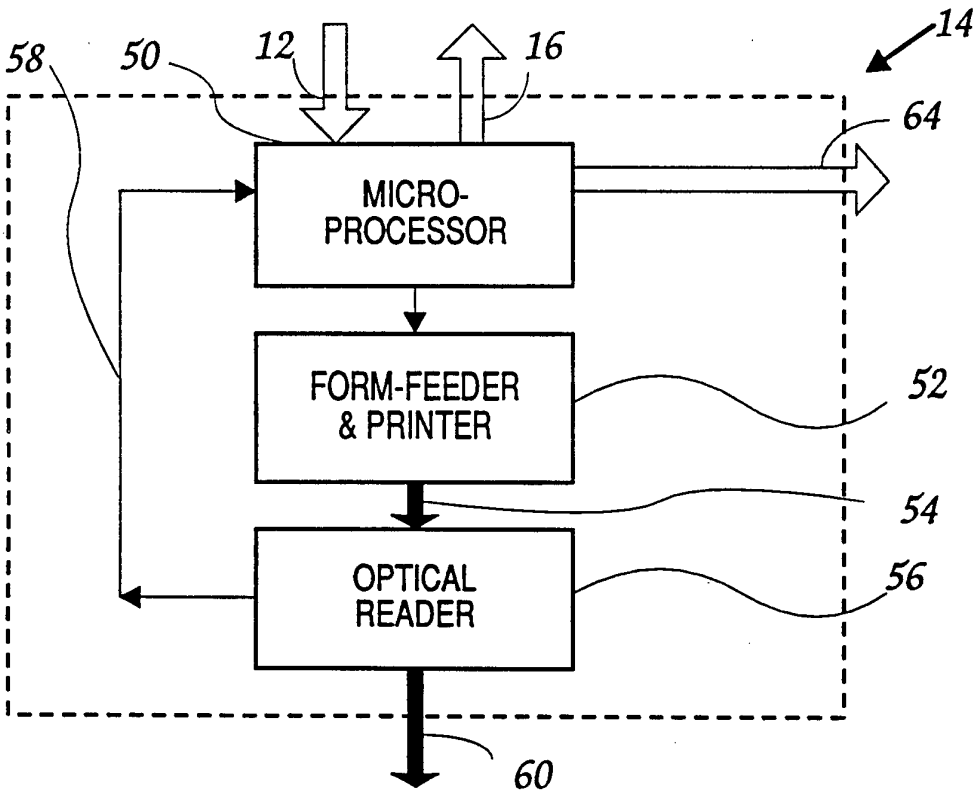

14
58
50
12
16
64
MICRO-
PROCESSOR
FORM-FEEDER
& PRINTER
52
54
OPTICAL
READER
56
60

FIG. 4

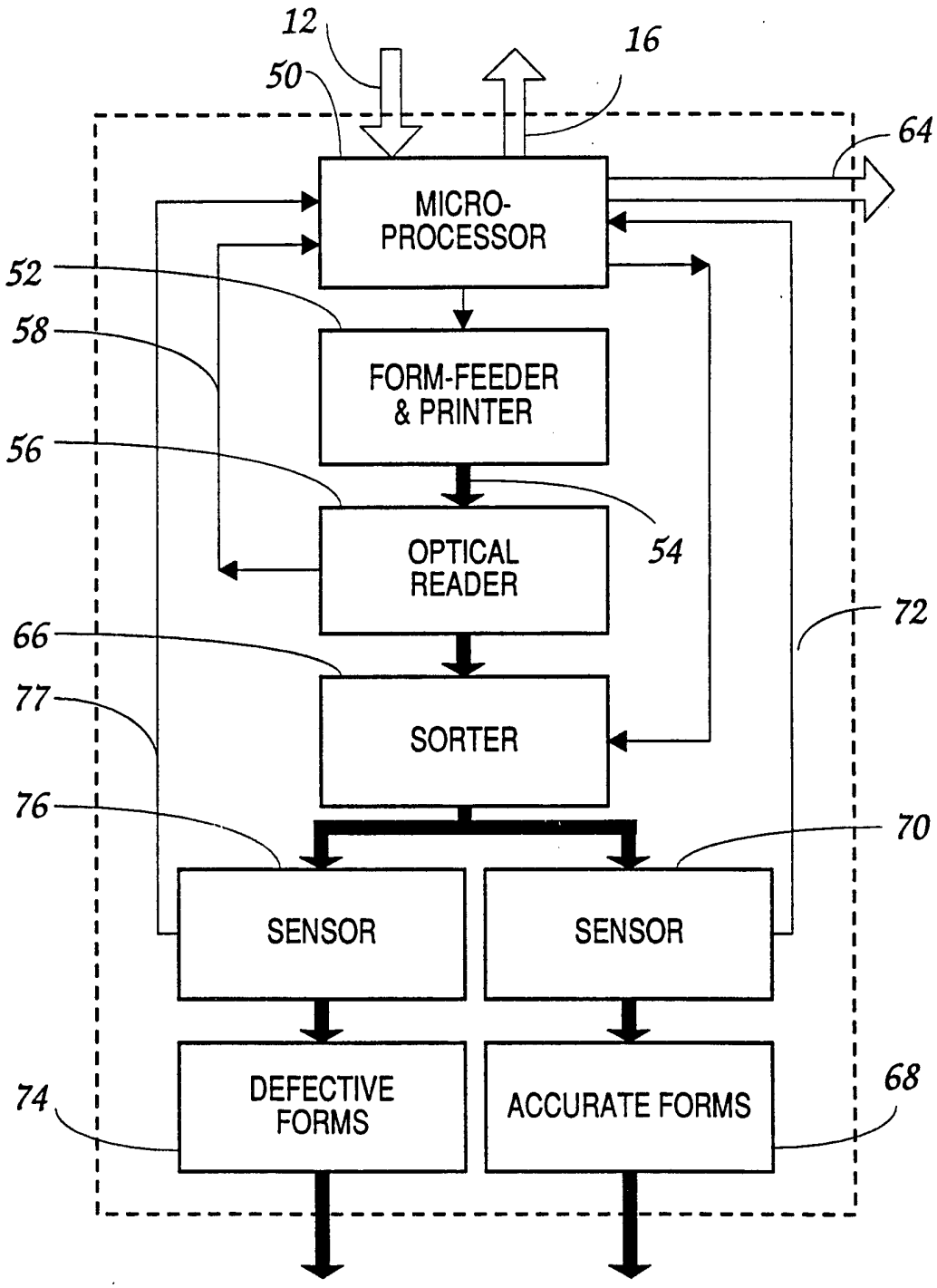

12
16
50
64
MICRO-
PROCESSOR
52
58
FORM-FEEDER
& PRINTER
56
54
OPTICAL
READER
72
66
77
SORTER
76
70
SENSOR
SENSOR
74
DEFECTIVE
FORMS
ACCURATE FORMS
68

FIG. 5

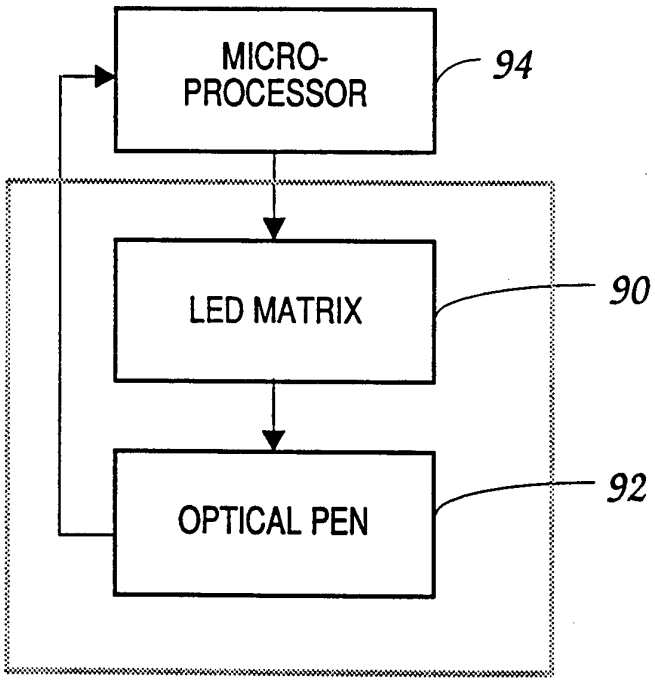


FIG. 6

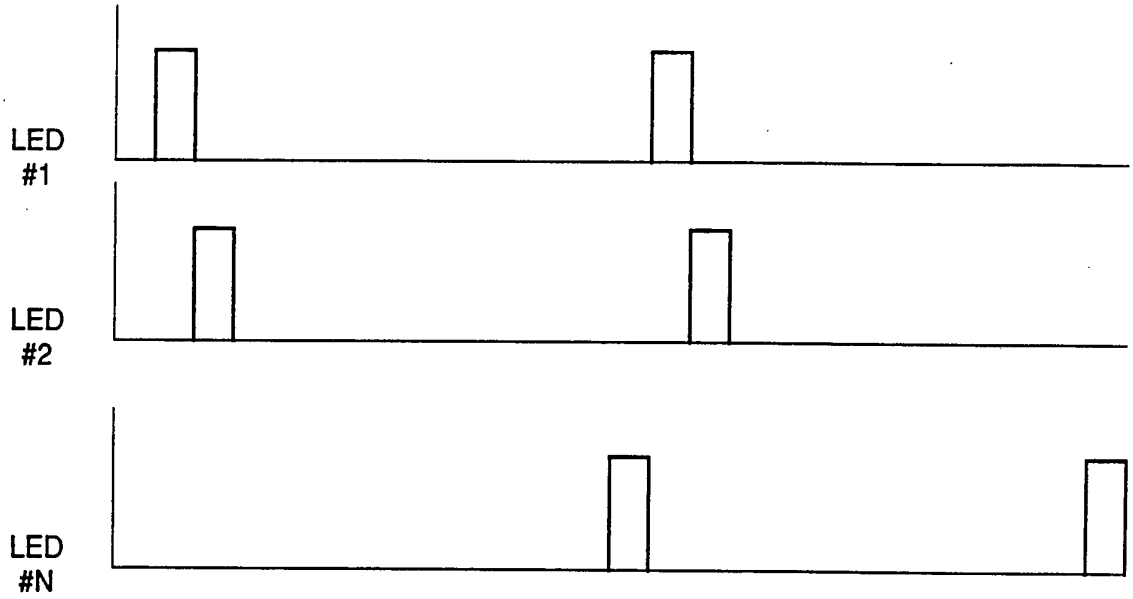


FIG. 7

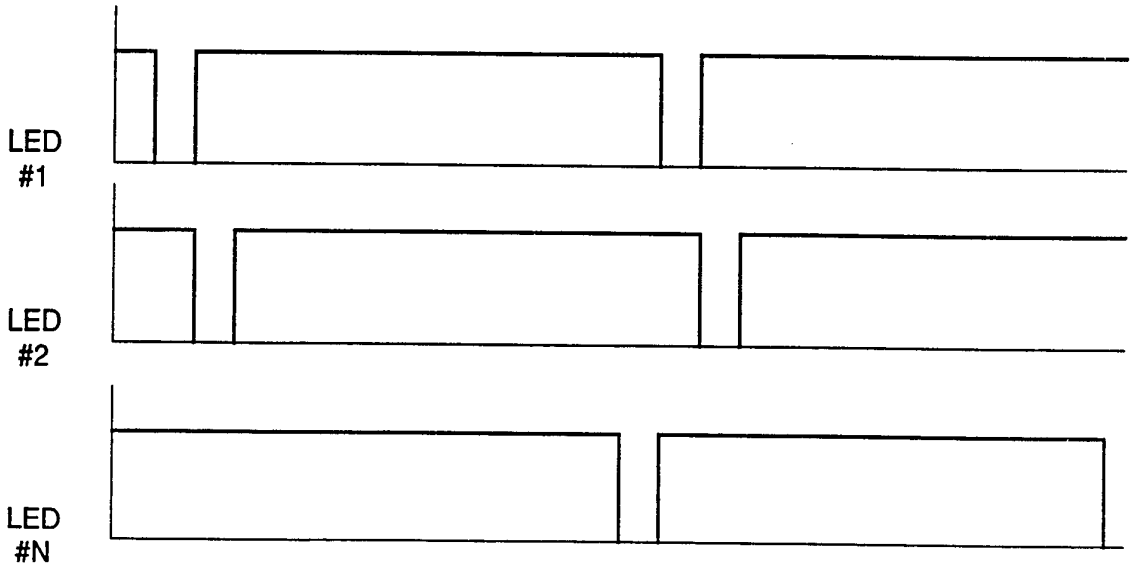
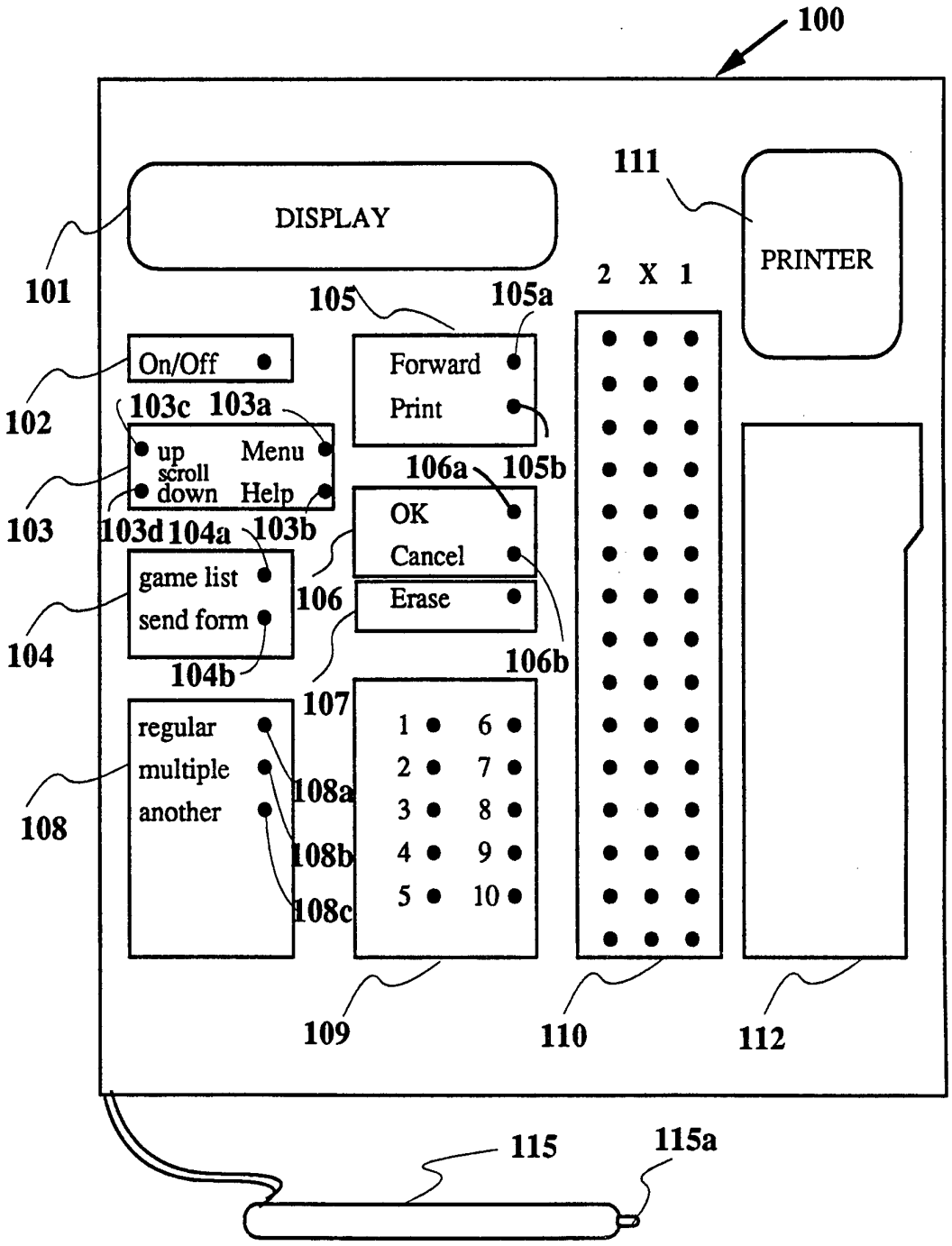


FIG. 8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DISPLAY
101
111
PRINTER
2 X 1
105
105a
Forward
Print
On/Off
102
103c 103a
up
scroll
down
Menu
Help
103
103d 104a
103b
106a
105b
OK
Cancel
106
Erase
game list
send form
104
104b
106b
107
regular
multiple
another
108
108a
108b
108c
1 6
2 7
3 8
4 9
5 10
109
110
112
115
115a

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/02416

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G06F 15/28, 15/44; G06G 7/48
US CL :364/412; 235/375, 454
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)

U.S. : 364/410, 411, 412; 235/27, 375, 454, 465, 469; 382/17

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

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

APS:
print?, optical reader, verif?, form#, fill or filling, optical pen, light emitting diode# or led#, photosensitive, light pen or lightpen, photodetector or photo detector

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 3,768,073 (Rawson et al) 23 OCTOBER 1973 see col. 1, lines 31-35; col. 2, lines 65-68; col. 3, lines 1-10	4, 6-10
A	US, A, 3,869,599 (Sansone) 4 MARCH 1975 see entire document	4
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[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"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
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Date of the actual completion of the international search 11 MAY 1994	Date of mailing of the international search report 14 JUN 1994
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. NOT APPLICABLE	Authorized officer B. Hayes for ROY N. ENVALL, JR. Telephone No. (703) 305-3800

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/02416

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US, A, 4,842,278 (Markowicz) 27 JUNE 1989 see col. 3, lines 43-68; col. 4, lines 1-46	1, 3, 5 ------- 2, 4, 6-10
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X - Y	US, A, 5,119,295 (Kapur) 2 JUNE 1992 see col. 4, lines 37-47; col. 5, lines 10-40; col. 7, lines 56-68; col. 8, lines 1 and 2; col. 9, lines 11-17	1, 3, 5 ------- 2, 4, 6-10