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(54) Electronic memorandum apparatus.

(57) An electronic memorandum apparatus for storing information and displaying the same on request comprises input means (31) for inputting data items including date and message, the input means having numeric keys, character keys and flag set keys. A flag setting means (30) is responsive to the operation of the flag setting keys for setting flag data related to the inputted data items, the flag data corresponding to each of the setting keys being different from each other. A memory means (28) is connected to the input means (31) and the flag setting means (30) for storing a plurality of information sets comprising said data items and flag data. A display means (33) is connected to the memory means (28) for displaying the data items. Time counting means (18) count present time and date. Comparison means (22) are connected to the time counting means (18) for comparing a present date with the date of a data item stored in the memory means (28). Flag testing means (26) is connected to the comparison means (22) for testing whether the information set includes the flag data and has means (25) for determining which flag data is included in the information set. Data changing means (34) changes the date of the data item by adding a predetermined value corresponding to the flag data thereof.

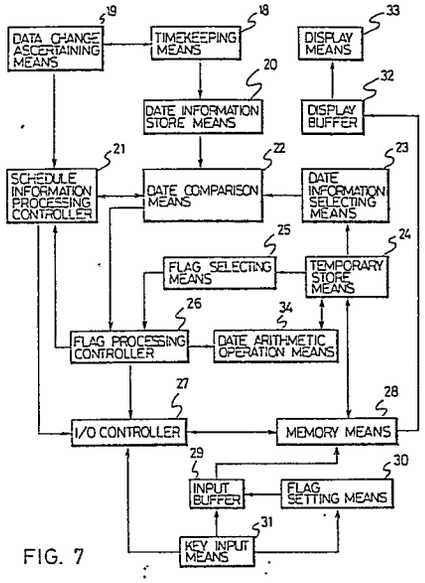

FIG. 7

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Description

ELECTRONIC MEMORANDUM APPARATUS

This invention relates to electronic memorandum apparatus for storing information and displaying it on request.

In recent years many types of portable electronic display apparatus have become available. Examples of such display apparatus are electronic diaries and electronic memorandum apparatus.

Schedules and messages may be stored electrically in electronic memorandum apparatus and be displayed. Thus, the schedule information stored in electronic memorandum apparatus can be ascertained even though the apparatus does not have a time management function.

An electronic diary which stores schedules and messages and displays the messages when real time is equal to a scheduled time is disclosed in US-A-3,999,050. In conventional electronic diaries, once the scheduled time has passed, the corresponding schedule information or message is deleted from the memory.

An electronic diary may store commemoration day information, e.g. birthdays. If the commemoration day is stored, the electronic diary will inform the user on that date of every year. Information can be stored in the electronic diary on an annual basis without the need to re-enter the message (see US-A-4,573,127 and US-A-4,712,923).

If it is intended to memorise schedule information such as a morning meeting every day, a Monday meeting every week, or a regular meeting at the beginning of a month and to display a schedule message in accordance with this schedule information in the electronic diary, it is necessary to memorise the schedule information to the maximum capacity of the memory and when the stored schedule information is ended, to re-write the schedule information for a subsequent date and to store it again.

Therefore, conventional electronic diaries have shortcomings in that they involve a troublesome procedure. The same schedule information which repeats on every day, month or year has to be re-stored as new schedule information by depressing the necessary keys for writing the information, and consequently the electronic diary does not operate naturally if the necessary re-entering is performed carelessly.

The present invention seeks to provide an electronic memorandum apparatus having a time management function for revising past dates of schedule information automatically. The present invention also seeks to provide an electronic memorandum apparatus capable of informing a schedule message every day, every week, every month, every year or the like, without requiring manual operation at all once the message has been stored in the apparatus. Furthermore, the present invention seeks to provide an electronic memorandum apparatus which revises automatically the date of schedule information to the next day, next week, next month or the like if the date of the schedule information has passed.

According to the present invention, there is provided an electronic memorandum apparatus for storing information and displaying the same on request characterised by comprising: input means for inputting data items including date and message, said input means having numeric keys, character keys and flag setting keys; flag setting means reponsive to operation of said flag setting keys for setting flag data related to the inputted data items, said flag data corresponding to each of said setting keys being different from each other; memory means connected to said input means and flag setting means for storing a plurality of information sets comprising said data items and flag data; display means connected to said memory means for displaying said data items; time counting means for counting present time and date; comparison means connected to said time counting means for comparing a present date with the date of a data item stored in the memory means; flag testing means connected to said comparison means for testing whether said information set includes said flag data and having means for determining which flag data is included in the information set; and date changing means for changing the date of the data items by adding a predetermined value corresponding to flag data thereto.

The electronic memorandum apparatus may include second comparison means connected to said time counting means for comparing a present time and date with the time and date of the data item, and controlling means connected to said second comparison means for controlling said display means so that the information set is displayed at scheduled time and date.

Preferably the electronic memorandum apparatus includes deleting means for deleting the information sets when the information sets are past, and restoring means for restoring the information sets if the information sets include flag data after changing the date.

In one embodiment the electronic memorandum apparatus includes information sets storing management means connected between said input means and memory means for controlling the stored position of the information sets so as to arrange the information sets in time sequence.

Means may be provided for adding a pointer representing a chronological order of the information sets to each of the information sets.

The date changing means may include calculating means for calculating a day of week of a renewed date.

Said display means preferably has means for displaying the contents of the flags.

In one embodiment said date changing means has means for changing the predetermined value corresponding to each of said flag data.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is an external view of an electronic

memorandum apparatus according to the present invention;

Figure 2 is a block circuit diagram of an electronic memorandum apparatus according to the present invention;

Figure 3 shows the format of schedule information and flags added to schedule information in the electronic memorandum apparatus of Figure 2;

Figure 4 is a flow chart illustrating the arrangement of schedule information in a time-series sequence on the basis of date thereof in the electronic memorandum apparatus of Figure 2;

Figure 5 is a flow chart illustrating control of schedule information at the time when a date is altered in an electronic memorandum apparatus according to the present invention;

Figure 6 is a flow chart illustrating alteration of a date in an electronic memorandum apparatus according to the present invention; and

Figure 7 is a structural diagram of an electronic memorandum apparatus according to the present invention.

Figure 1 is an external view of one embodiment of an electronic memorandum apparatus according to the present invention. A case 1 is about the size of a credit card, so as to fit easily in the user's pocket. In a front surface of the case 1 there is a display window 2 through which a display device, preferably a liquid crystal display device, can be viewed. On the display device schedules and messages are displayed. As illustrated in Figure 1, a message that a meeting is scheduled on December l4th, 1987, Monday in a room 203 is displayed. At the right hand end of the display window 2, the display device displays a mark W indicating that this schedule is renewed every week. Thus, for example, the schedule is altered to the date December 21st, 1987, Monday, automatically after December l4th 1987 has passed.

The case 1 is provided with ten numerical keys 3, from 1 to 0, twenty six alphabet keys 4, mode selector keys 5 for time display, schedule display, telephone number list display, etc., and four cursor and arithmetic operation keys 7 for "+", "-", etc., used in a calculator mode, and further is provided with flag setting keys 8 comprising a next day key, a next week key, a next month key and a next year key which are used in a schedule mode. Sound emitting holes 9 for emitting an alarm sound or the like are provided in the upper part of the case 1.

Figure 2 is a block diagram of an electronic memorandum apparatus according to the present invention. A ROM 11 stores a program for controlling the apparatus. A RAM 12 stores schedule information and other information. A time counter 14 outputs time information, and a CPU inputs the time information from the time counter 14 and schedule information from a keyboard 17, controlling the ROM 11 and the RAM 12 to input/output various information and further controlling a display driver 15 so that information is displayed by a display device 16.

Figure 3 shows an example of the format of schedule information and flags to be added to the schedule information. A code "01" of a flag denotes the schedule to be renewed next week, "03" denotes it to be renewed next year, and "00" denotes that the schedule is unnecessary after the date thereof passes. The user can define arbitrarily, of course, the number of days to be added, e.g. ten days or twenty days, for each additional information or flag, instead of the above. In this case, the schedule is altered every ten or twenty days. When based on these flags, processing of each schedule information can be conducted automatically and executed when the date is altered.

When schedule information is inputted to the RAM 12, the above described processing can be implemented smoothly by storing the schedule information in a prescribed spot according to a time series arranged flow chart shown in Figure 4. It is assumed that M bits of schedule information already stored in the memory means are arranged in a time series sequence. In other words, it is assumed that the information for the nearest future event is positioned nearest to this side of the arrangement and that past information is not contained therein. New schedule information is inputted (step 3-1), and the date and time information thereof is stored in a register A (step 3-2). When schedule information to be compared therewith is in the Nth position, N is set at 1 on the assumption that comparison is made first with the nearest schedule information (step 3-3). The date and time of the Nth schedule information in the RAM 12 is stored in a register B (step 3-4). The date and time information in the register A and that in the register B are compared with each other at a step 3-5, and a loop of steps 3-5, 3-6, 3-7 and 3-4 is repeated until the date information in the register A is determined to be a nearer event in the future than that in the register B. When all schedule information stored in the memory means are compared at step 3-7, the inputted schedule information is stored in the Nth position. When the determination is NO at step 3-5, it is assumed that the date and time information of the inputted schedule information is determined to be in a position before the date and time information of the Nth schedule information in the RAM 12. Then the N to Mth schedule information are shifted by one and re-stored in the (N+1) to (M+1) positions, respectively, (step 3-9), and the newly inputted schedule information is stored in the Nth position in the memory means (step 3-10). If the above stated processes are always executed when any schedule information is inputted, the schedule information stored in the RAM 12 will always be arranged in a time series sequence. Whilst the Nth position in the RAM 12 may be a physical position, it may also be one specified by a pointer, for instance, on a software basis. In this case, each schedule information has a pointer representing its chronological order. The alteration of the order is simply an alteration of the pointers.

Next, details of the construction and operation of the electronic memorandum apparatus will be described with reference to Figures 5, 6 and 7. Figure 7 is a structural diagram of an electronic memorandum apparatus according to the present invention, and Figure 5 is a flow chart of controls

implemented on an input information when a date is altered. Schedule information is initially stored in an input buffer 29 by a key input means 31. Meanwhile, in response to a flag setting means 30 from which a flag is outputted under the control of the key input means 31, the content of the flag is notified to the input buffer 29 and is stored therein temporarily. An I/O controller 27 receives an end signal outputted from the key input means 31 in response to the depression of an enter key at a time point when the input of all schedule information is completed, and the schedule information and the flag stored in the input buffer 29 are stored in prescribed parts of a memory means 28 under the control of the I/O controller 27.

The information stored in the memory means 28 can be stored temporarily in the display buffer means 32 for display and seen on a display means 33. If the schedule information has a flag, one of the markers representing period of repetition such as "W", "M", or "Y" is displayed in the display means in accordance with the condition of the flag.

The schedule information stored in the memory means 28 is inputted in accordance with the time series arranged flow chart of Figure 4. A time counting means 18 can output present date information and present time information. The date and time information of the nearest schedule information is compared with the present date and time outputted from the time counting means. At the scheduled date and time, the schedule information is displayed on the display means 33 and an alarm sound is emitted through a buzzer (not shown) under the control of a schedule management controller.

It is assumed, for instance, that such a specific schedule information as "September 7th, Monday, AM 10:00, preliminary team meeting, (01)" is stored in the memory means 28. A date information store means 20 stores the date information outputted from the time counting means 18. A date change ascertaining means 19 monitors the time information outputted from the time counting means 18 (a loop of steps 4-1 and 4-2), and when the date is altered, it notifies a schedule information processing controller 21 of the alteration of the date, while the schedule information processing controller 21 controls automatic processing of the schedule information. The schedule information processing controller 21 first demands the I/O controller 27 to output to an information temporary store means 24 the first schedule information stored in the memory means 28 (step 4-3). A date information selecting means 23 takes the date information out of the schedule information stored in the temporary store means 24 and outputs to a date comparison means 22 which takes out the date information. The schedule information processing controller 21 outputs a control to the date comparing means 22, and the date comparing means 22 compares the date information outputted from the date information store means 20 with that outputted from the date information selecting means 23 (step 4-4), and outputs an indication of the end of the procedure to the schedule information processing controller 21 when the schedule information of the date compared has not passed. In the case where the date is determined to have elapsed or is past schedule information at step 4-4, the schedule information processing controller 21 deletes the schedule information in the memory means 28 at a step 4-5, and shifts subsequent schedule information by one, whilst a flag processing controller 26 executes the control of processing of each schedule information in accordance with a set additional information or flag. First, a flag selecting means 25 takes the flag out of the schedule information stored in the temporary store means 24 and outputs said flag to the flag processing controller 26. The flag processing controller 26 determines whether the additional information is "00" (step 4-6), and when the information shows that the schedule information is unnecessary, the procedure returns to step 4-3. When the procedure shows other than the above, the flag processing controller 26 demands a date arithmetic operation means 34 to alter the date information of the schedule information stored in the temporary store means 24 (step 4-7).

The alteration of the date information at step 4-7 is executed in accordance with the flow chart shown in Figure 6. First it is determined whether the flag is "01" or not as shown in step 5-1. When it is not "01", whether the flag is "02" is determined at step 5-2. When it is not "02", the flag is determined to be "03", and then 1 is added to the present year to set a new year, at step 5-3, so as to alter the date of the schedule information concerned to the next year. In the case when the determination is YES, that is the flag is determined to be "01", step 5-1, the number obtained by adding 7 to the present date is set to a new date at step 5-4. After the new year, month or day is calculated in this way, a new day of the week of the schedule information is calculated in accordance with the actual calendar in view of a thirty one day month, a month with thirty or less days, a leap year, etc. at step 5-6. If it is intended to add an arbitrary number of days, months or years, it is only necessary to modify the number to be added at step 5-3, step 5-4 or step 5-5.

In the case where the additional information or flag is "01", in other words when the setting is to be made to renew the schedule information for the next week, the date arithmetic operation means 34 takes out the date information of September 7th stored in the temporary store means 24, outputting a date a week later, September l4th, by an operation, and setting it as a new date information for the schedule information stored in the temporary store 24. When the additional information flag is "02" instead of "01" in this case, the same day of the next month is outputted by the operation, and when the additional information or flag is "03" the same day of the next year is outputted thereby. Moreover, it is possible also to add an arbitrary number of days to be set as new schedule information. In this case, the number of days to be added and additional information or flag corresponding thereto must be defined beforehand in the date computation processing means to the key input means. After the completion of the above procedure, the flag processing controller 26 makes the information I/O controller 27 operate so

that the schedule information stored in the information temporary store means 24 is stored as a new schedule information in the memory means 24 in accordance with the time series arranged flow chart of Figure 3 (step 4-8). Since the processing of the flag for one schedule information is ended by the above, the flag processing controller 26 outputs procedure end information to the schedule information processing controller 21 and the procedure beginning with step 4-3 is repeated.

As desribed above, the present invention furnishes an electronic memorandum apparatus having the effect that, if information on a regular schedule, if any, and date information and additional information or flag therefor are set, the set schedule information is notified by, for example, sounding an alarm every day, every week, every month, every year as the case may be without requiring any manual operation.

Claims

1. Electronic memorandum apparatus for storing information and displaying the same on request characterised by comprising: input means (31) for inputting data items including date and message, said input means having numeric keys, character keys and flag setting keys; flag setting means (30) reponsive to operation of said flag setting keys for setting flag data related to the inputted data items, said flag data corresponding to each of said setting keys being different from each other; memory means (28) connected to said input means (31) and flag setting means (30) for storing a plurality of information sets comprising said data items and flag data; display means (33) connected to said memory means (28) for displaying said data items; time counting means (18) for counting present time and date; comparison means (22) connected to said time counting means (18) for comparing a present date with the date of a data item stored in the memory means (28); flag testing means (26) connected to said comparison means (22) for testing whether said information set includes said flag data and having means (25) for determining which flag data is included in the information set; and date changing means (34) for changing the date of the data items by adding a predetermined value corresponding to flag data thereto.

2. Electronic memorandum apparatus as claimed in claim 1 characterised by second comparison means (19) connected to said time counting means (18) for comparing a present time and date with the time and date of the data item, and controlling means (21) connected to said second comparison means for controlling said display means (33) so that the information set is displayed at scheduled time and date.

3. Electronic memorandum apparatus as claimed in claim 1 or 2 characterised by deleting means for deleting the information sets when the information sets are past, and restoring means for restoring the information sets if the information sets include flag data after changing the date.

4. Electronic memorandum apparatus as claimed in any preceding claim characterised by information sets storing management means (29) connected between said input means (31) and memory means (28) for controlling the stored position of the information sets so as to arrange the information sets in time sequence.

5. Electronic memorandum apparatus as claimed in any preceding claim characterised by means for adding a pointer representing a chronological order of the information sets to each of the information sets.

6. Electronic memorandum apparatus as claimed in any preceding claim characterised in that said date changing means (34) includes calculating means for calculating a day of week of a renewed date.

7. Electronic memorandum apparatus as claimed in any preceding claim characterised in that said display means (33) has means for displaying the contents of the flags.

8. Electronic memorandum apparatus as claimed in any preceding claim characterised in that said date changing means (34) has means for changing the predetermined value corresponding to each of said flag data.

FIG. 1

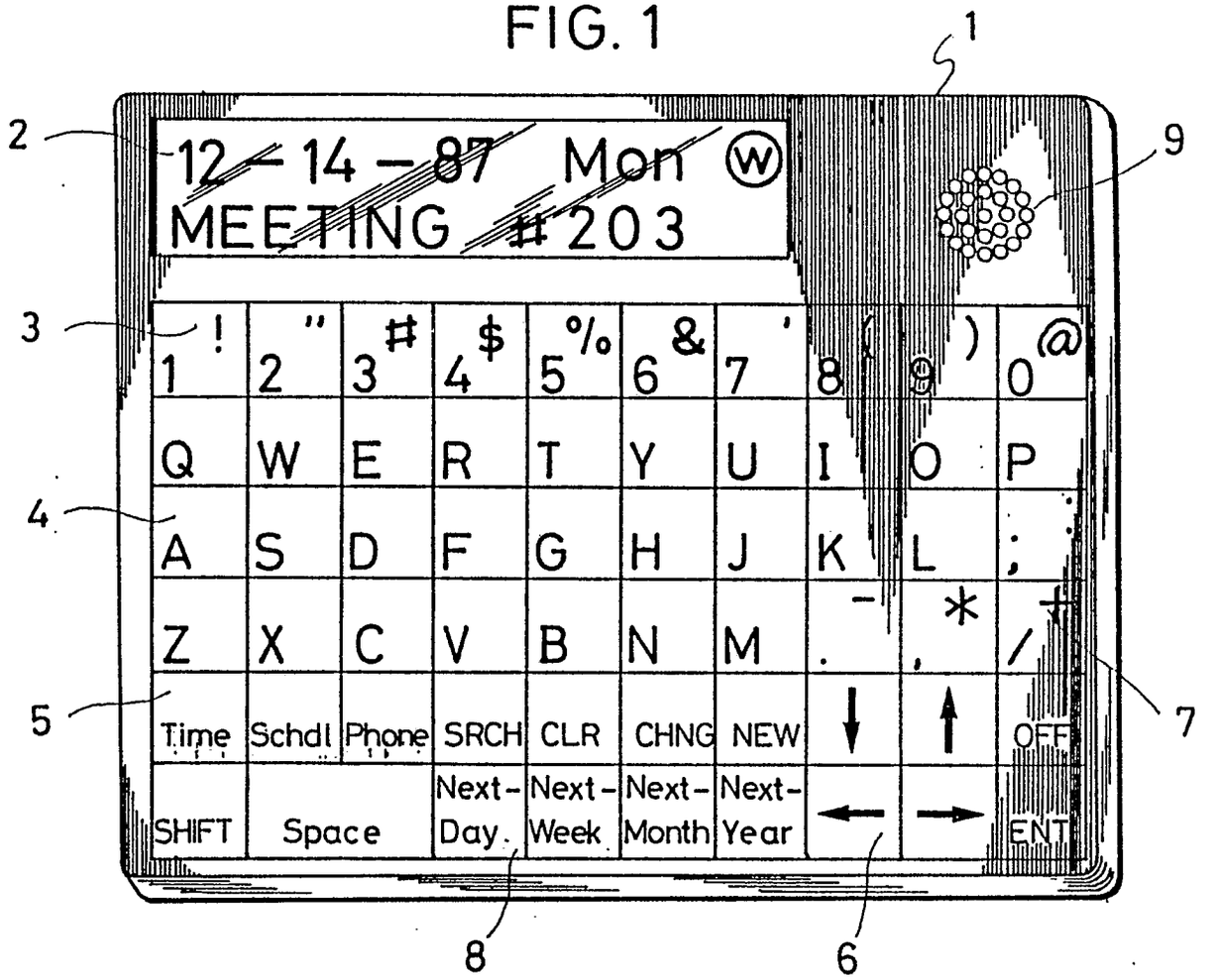

1
2
12 - 14 - 87 Mon
MEETING #203
3
4
5
6
7
8
9
Time
Schdl
Phone
SRCH
CLR
CHNG
NEW
OFF
SHIFT
Space
Next-Day
Next-Week
Next-Month
Next-Year
ENT

FIG. 2

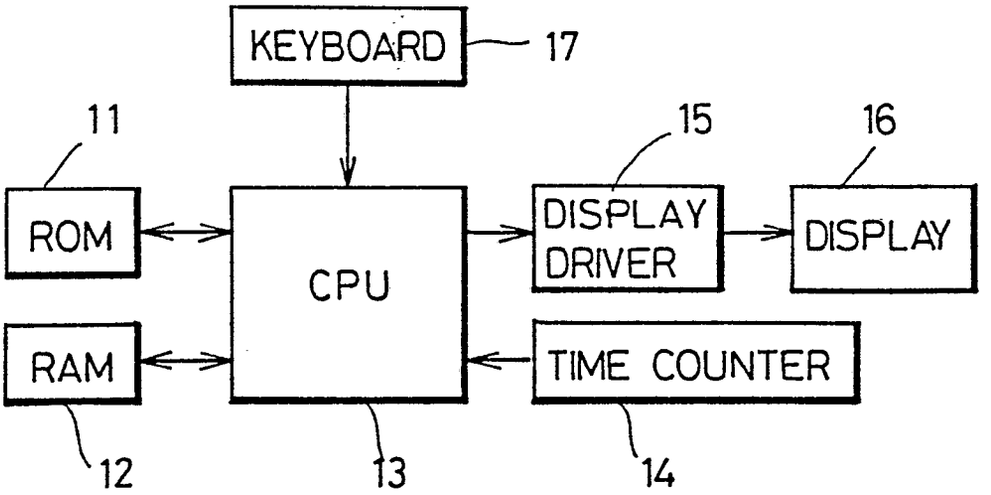


FIG. 3

SCHEDULE INFORMATION	FLAG
9-7(MAN) 10:00A TEAM MEETING	01
9-10(THU) 3:00P CALL "B" CO.	00
9-20(SUN) 11:00A FATHER'S BIRTHDAY	03

FIG. 4

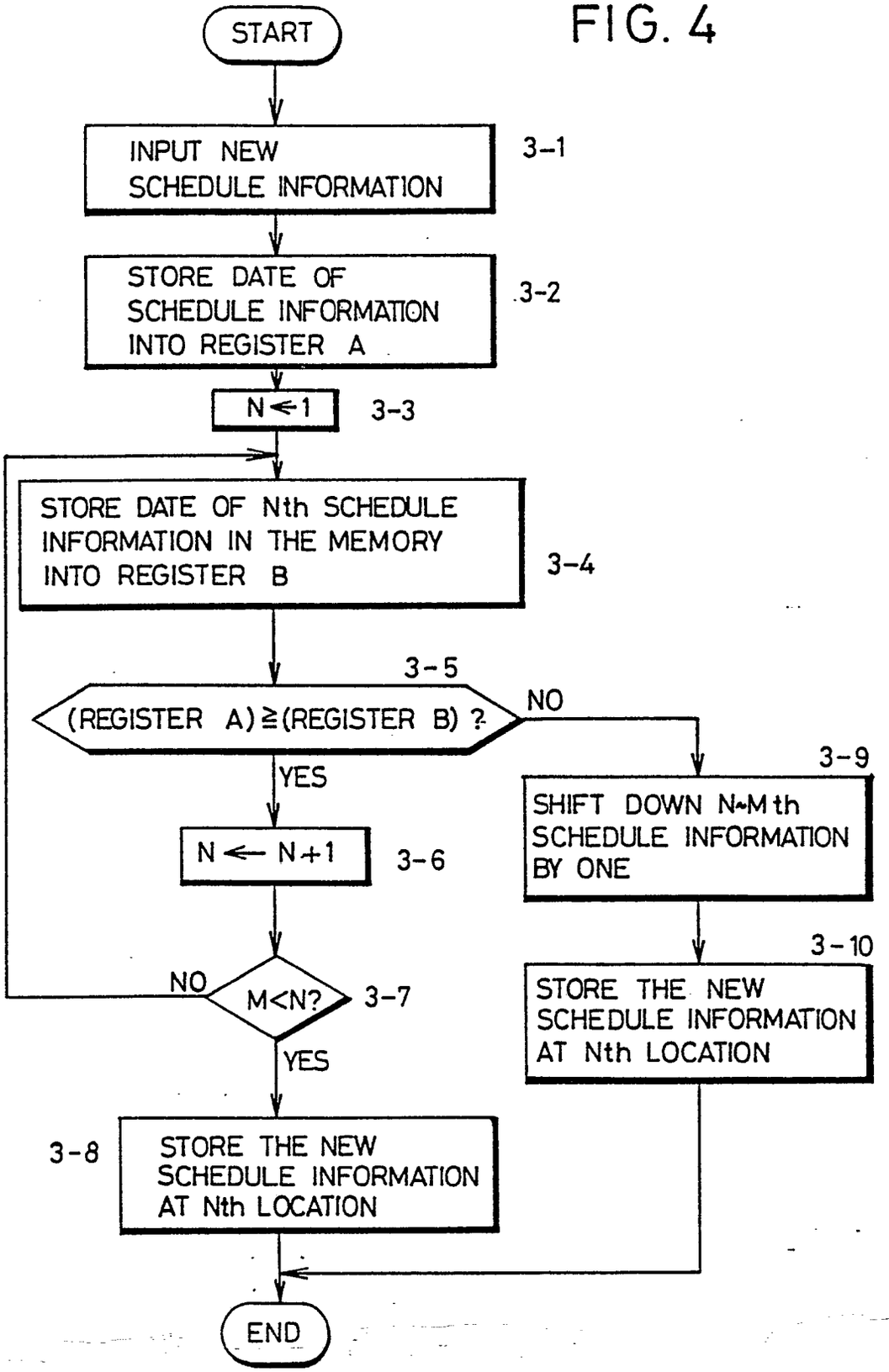

START
INPUT NEW SCHEDULE INFORMATION
3-1
STORE DATE OF SCHEDULE INFORMATION INTO REGISTER A
3-2
N←1
3-3
STORE DATE OF Nth SCHEDULE INFORMATION IN THE MEMORY INTO REGISTER B
3-4
3-5
(REGISTER A)≧(REGISTER B) ?
NO
YES
N ← N+1
3-6
NO
M<N?
3-7
YES
3-8
STORE THE NEW SCHEDULE INFORMATION AT Nth LOCATION
3-9
SHIFT DOWN N-M th SCHEDULE INFORMATION BY ONE
3-10
STORE THE NEW SCHEDULE INFORMATION AT Nth LOCATION
END

FIG. 5

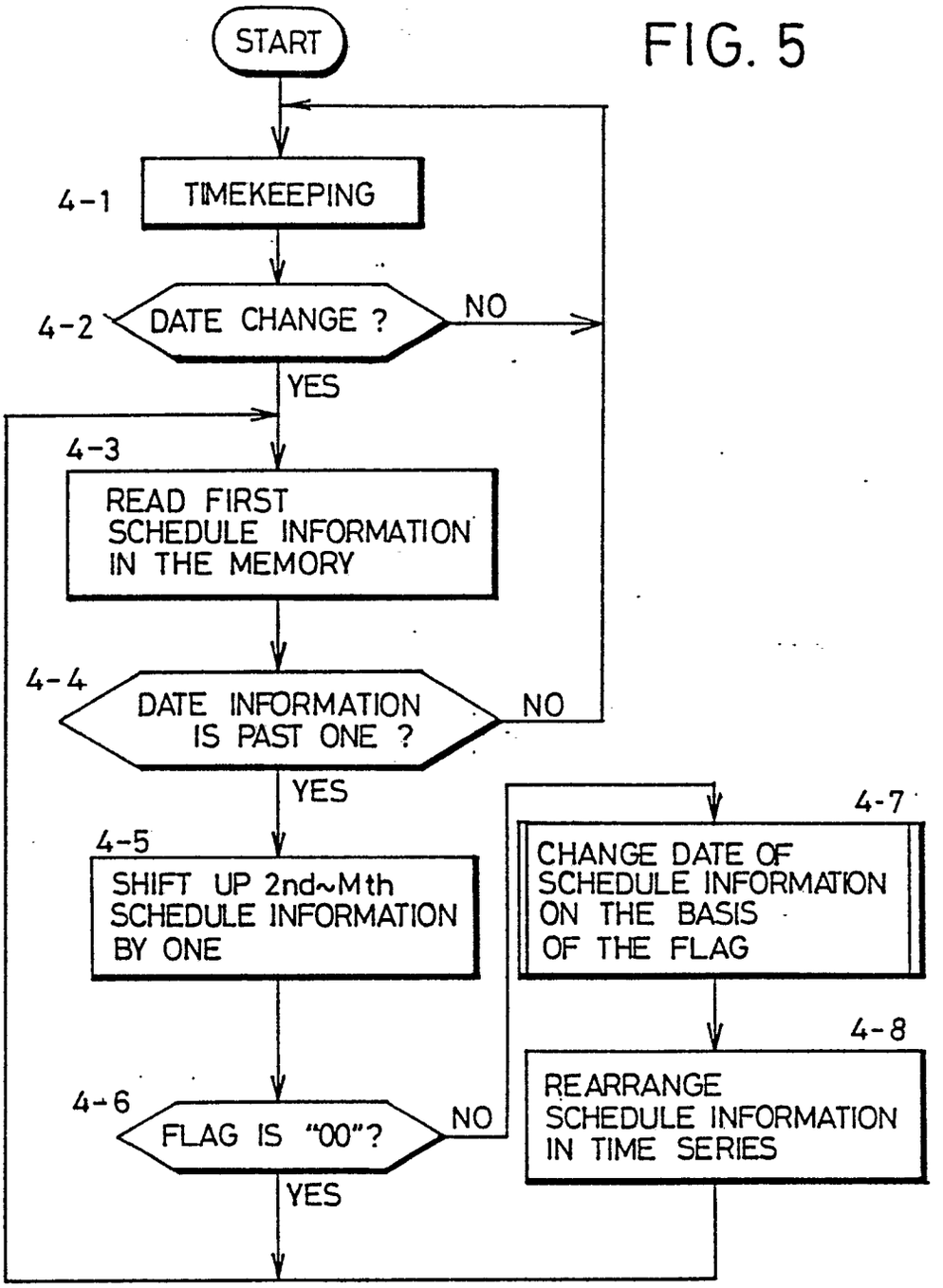
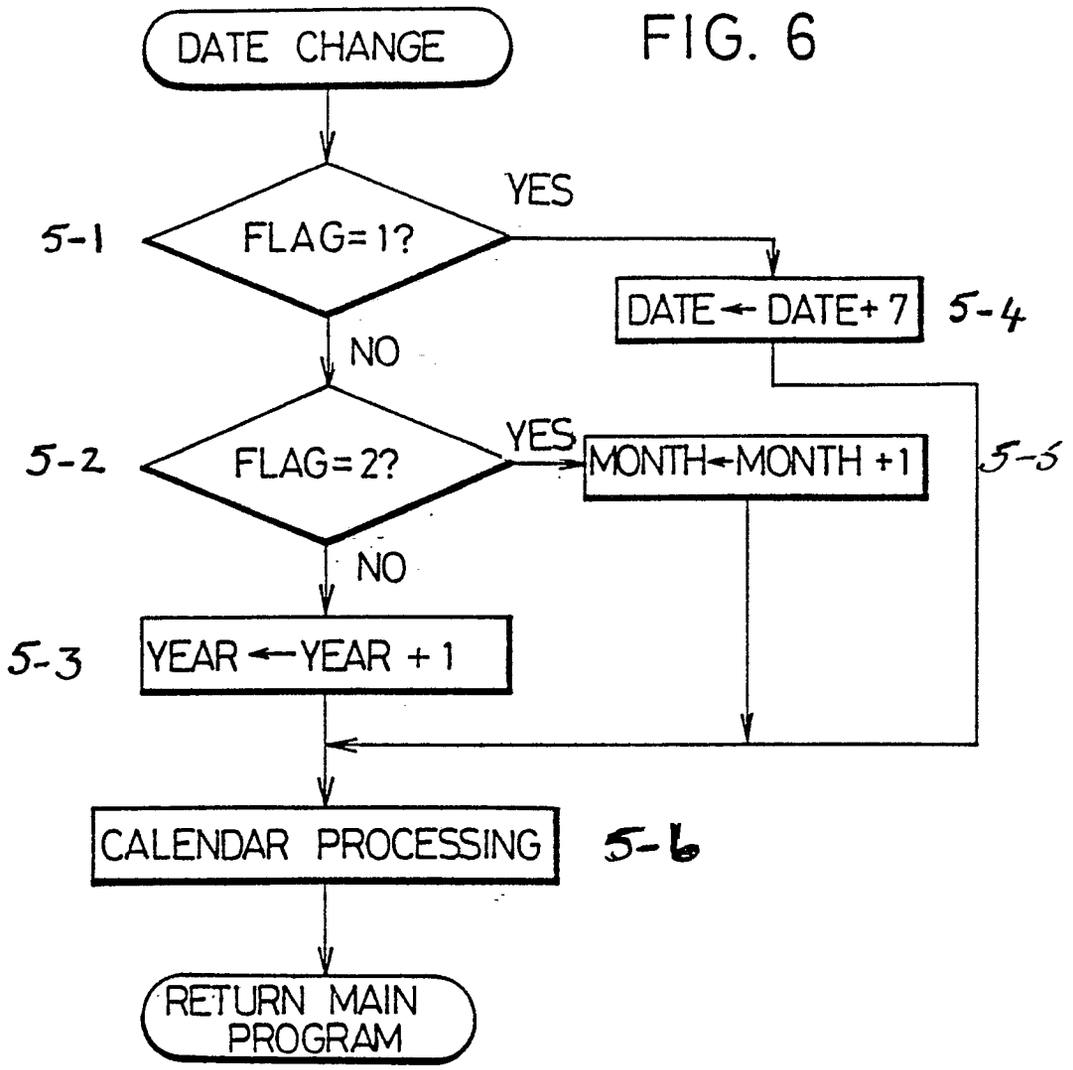

START
4-1
TIMEKEEPING
4-2
DATE CHANGE ?
NO
YES
4-3
READ FIRST SCHEDULE INFORMATION IN THE MEMORY
4-4
DATE INFORMATION IS PAST ONE ?
NO
YES
4-5
SHIFT UP 2nd~Mth SCHEDULE INFORMATION BY ONE
4-6
FLAG IS "00"?
NO
YES
4-7
CHANGE DATE OF SCHEDULE INFORMATION ON THE BASIS OF THE FLAG
4-8
REARRANGE SCHEDULE INFORMATION IN TIME SERIES

FIG. 6


DATE CHANGE
5-1
FLAG=1?
YES
NO
DATE←DATE+7
5-4
5-2
FLAG=2?
YES
NO
MONTH←MONTH+1
5-5
5-3
YEAR←YEAR+1
CALENDAR PROCESSING
5-6
RETURN MAIN PROGRAM

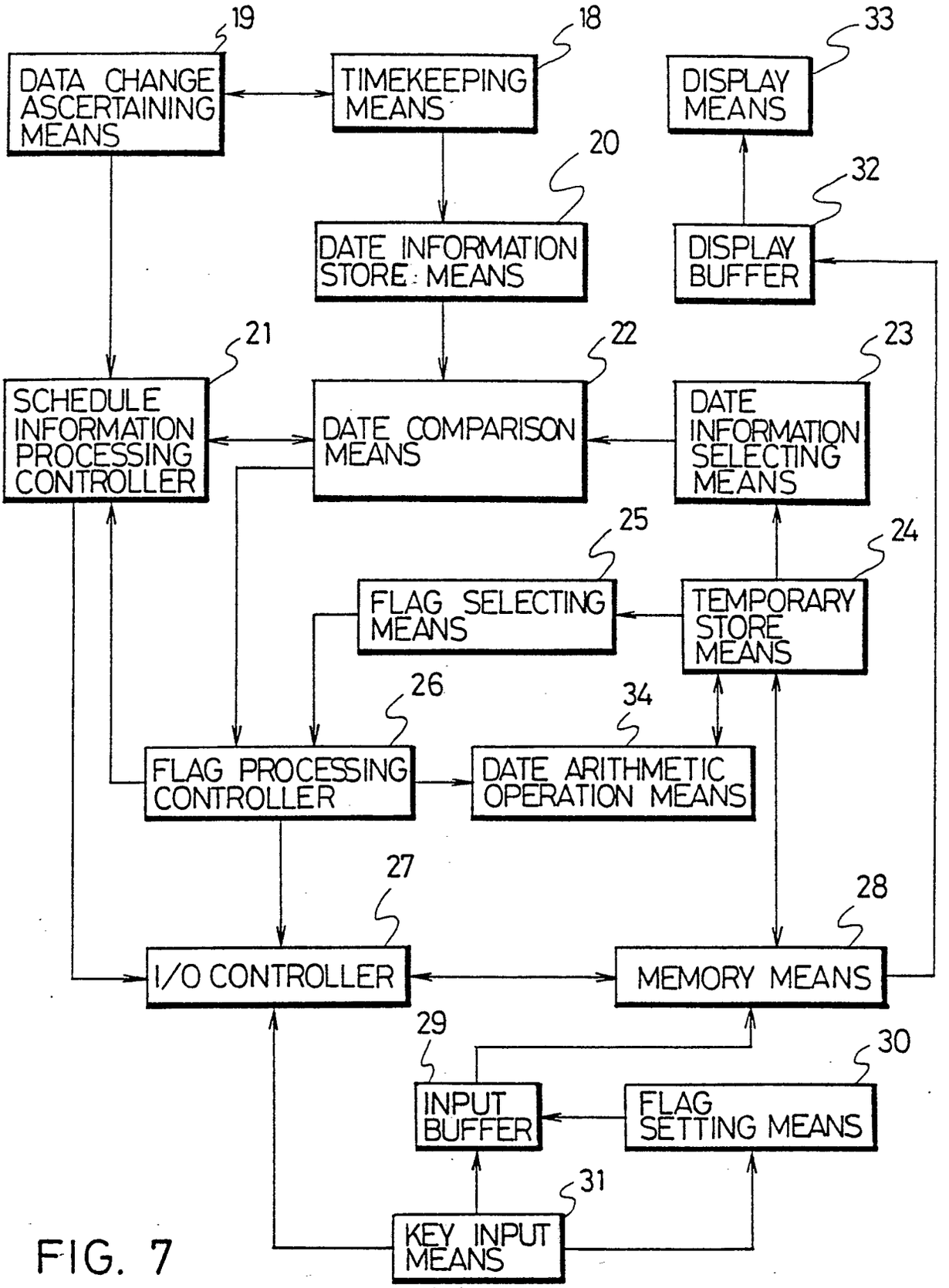

19
DATA CHANGE ASCERTAINING MEANS
18
TIMEKEEPING MEANS
33
DISPLAY MEANS
20
DATE INFORMATION STORE MEANS
32
DISPLAY BUFFER
21
SCHEDULE INFORMATION PROCESSING CONTROLLER
22
DATE COMPARISON MEANS
23
DATE INFORMATION SELECTING MEANS
25
FLAG SELECTING MEANS
24
TEMPORARY STORE MEANS
26
FLAG PROCESSING CONTROLLER
34
DATE ARITHMETIC OPERATION MEANS
27
I/O CONTROLLER
28
MEMORY MEANS
29
INPUT BUFFER
30
FLAG SETTING MEANS
31
KEY INPUT MEANS

FIG. 7