United States Patent

Lince

[15] **3,656,113**

[45] **Apr. 11, 1972**

[54] CONTROL SYSTEM FOR ROOM RESERVATION

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[73] Assignee: **UMC Electronics Company,** North Haven, Conn.

[22] Filed: **Nov. 1, 1968**

[21] Appl. No.: **772,673**

[52] **U.S. Cl.** **340/153,** 340/151, 340/334, 340/339

[51] **Int. Cl.** **H04g 3/00**

[58] **Field of Search** 340/153, 151, 334, 339

[56] **References Cited**

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Primary Examiner—Harold I. Pitts

Attorney—Delio & Montgomery

[57] **ABSTRACT**

This disclosure relates to a system which displays the availability of categories of items over a predetermined number of units of time. Provision is made to constantly update the display by incrementing or decrementing the appropriate item categories between initial and final dates of use of any item. The units of time may be classified into groups to allow an expired group of units of time to be annexed to the last group of units of time to continuously utilize the system over a predetermined future time period.

18 Claims, 13 Drawing Figures

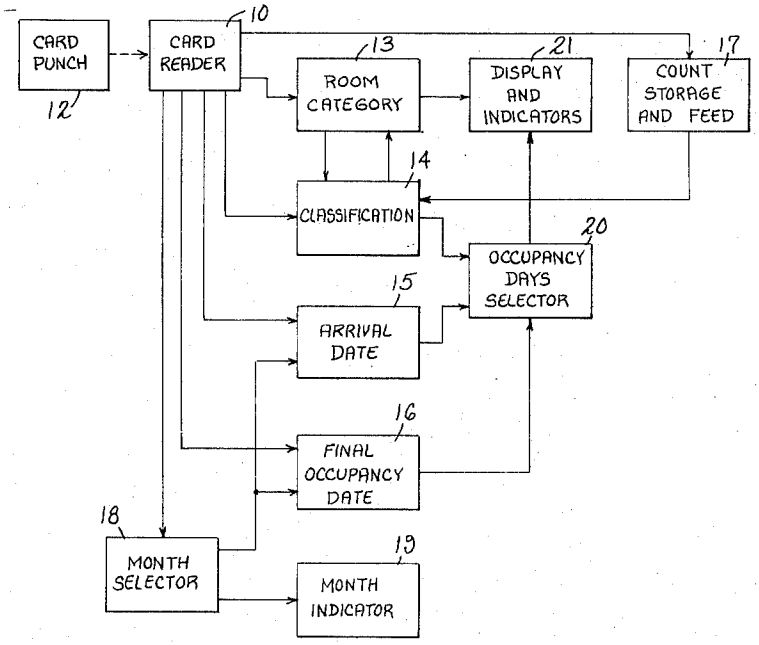

Fig. 2.

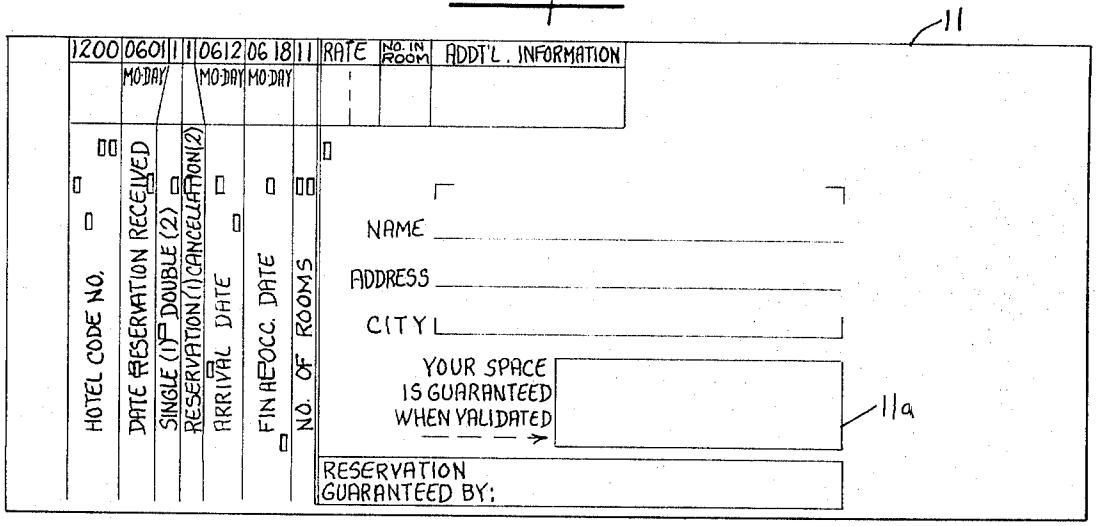

Fig. 1.

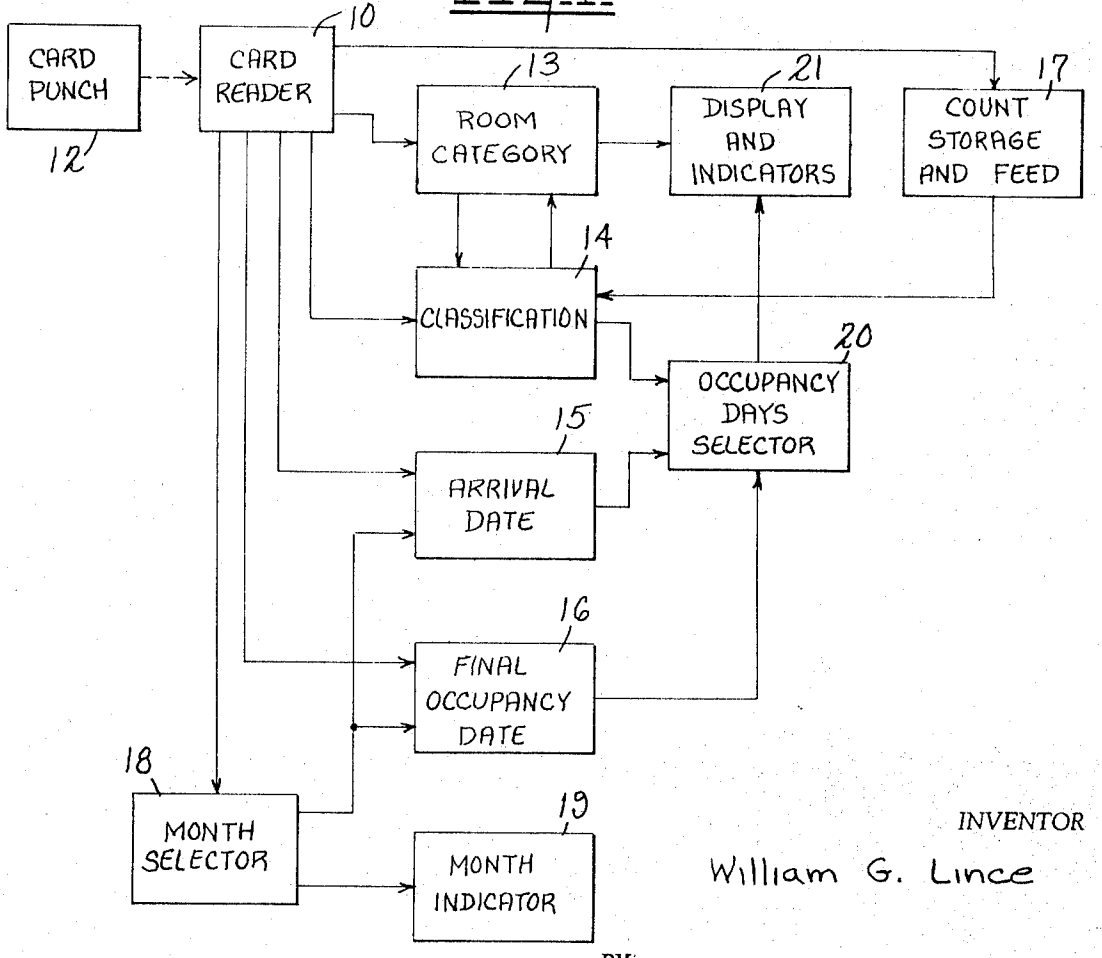

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Fig. 3

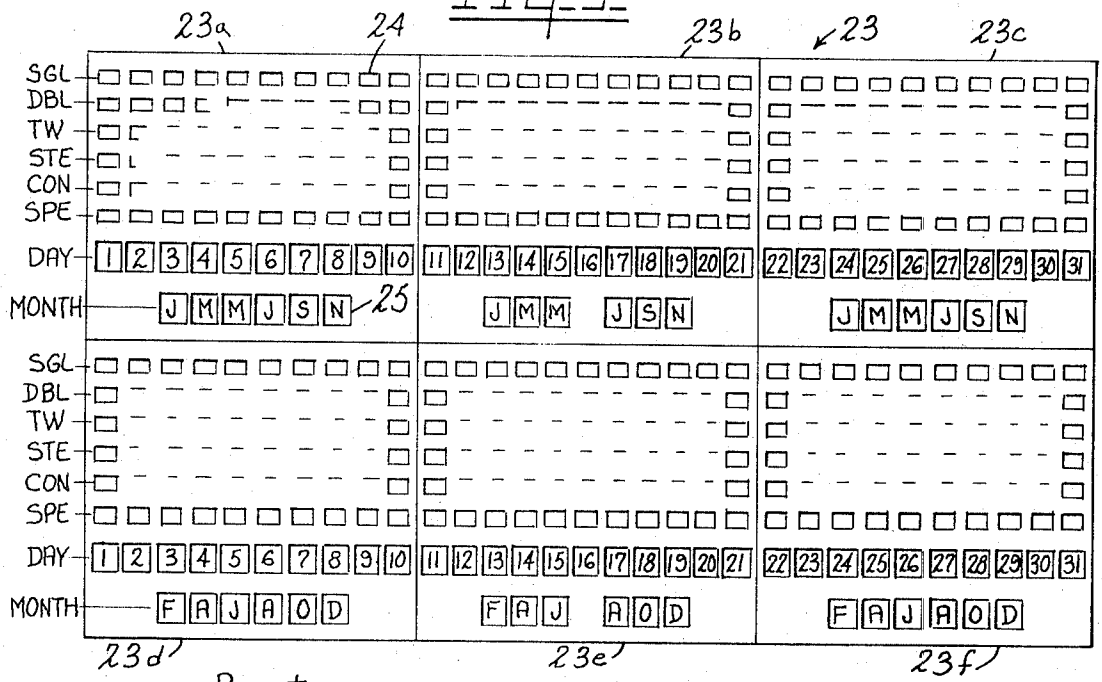

Fig. 5

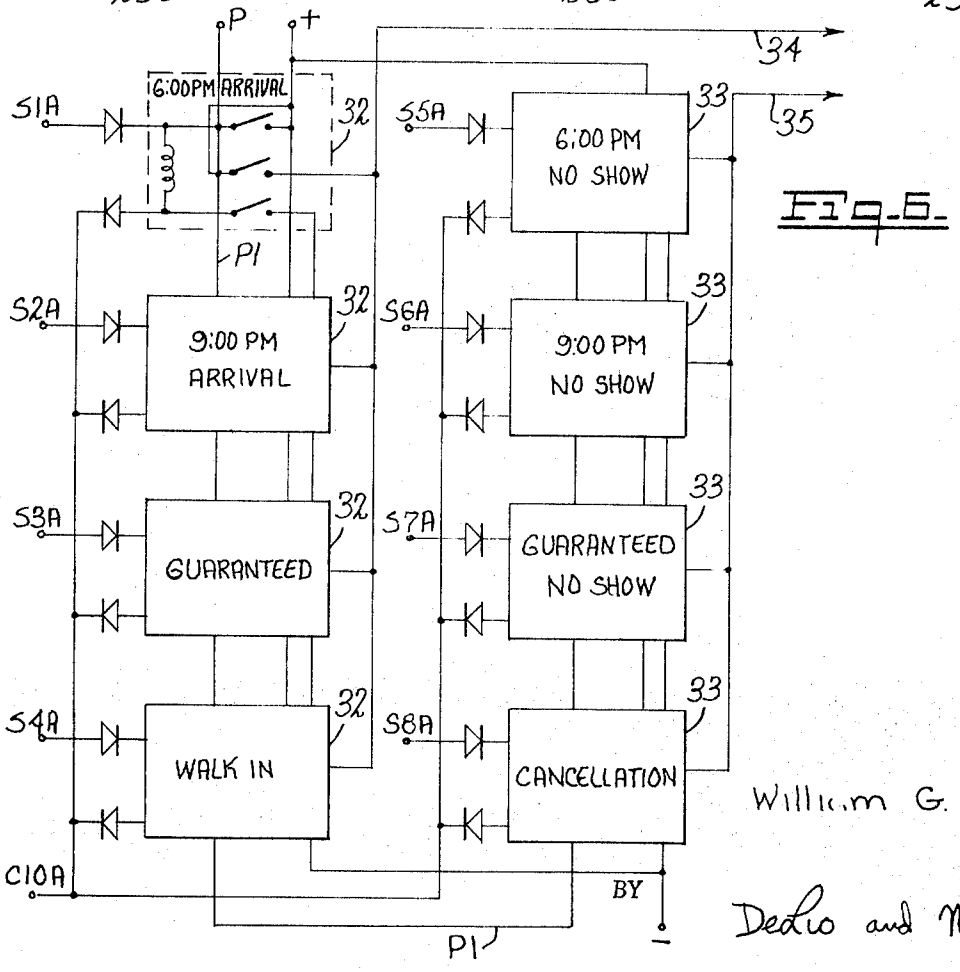

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Fig. 4

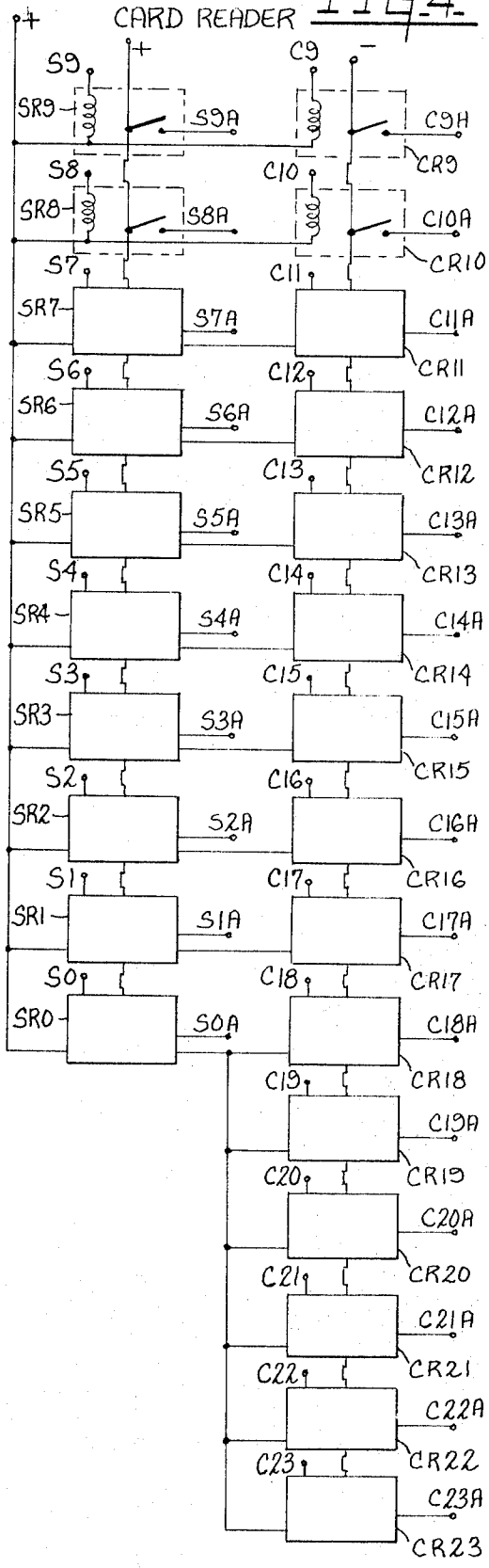
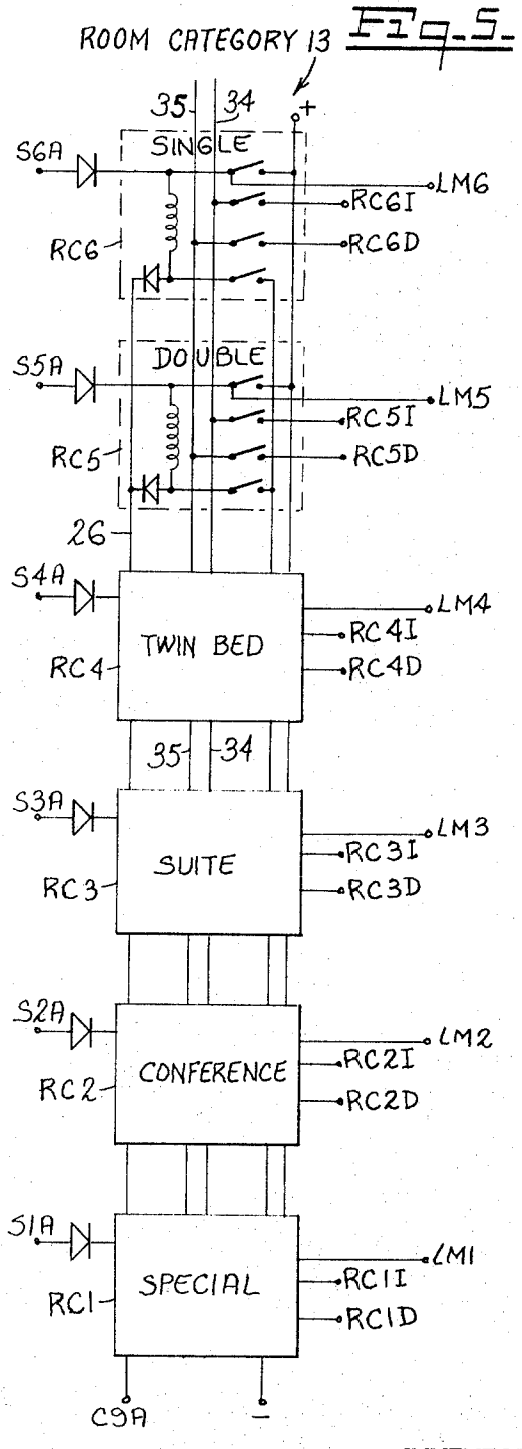


Fig. 5



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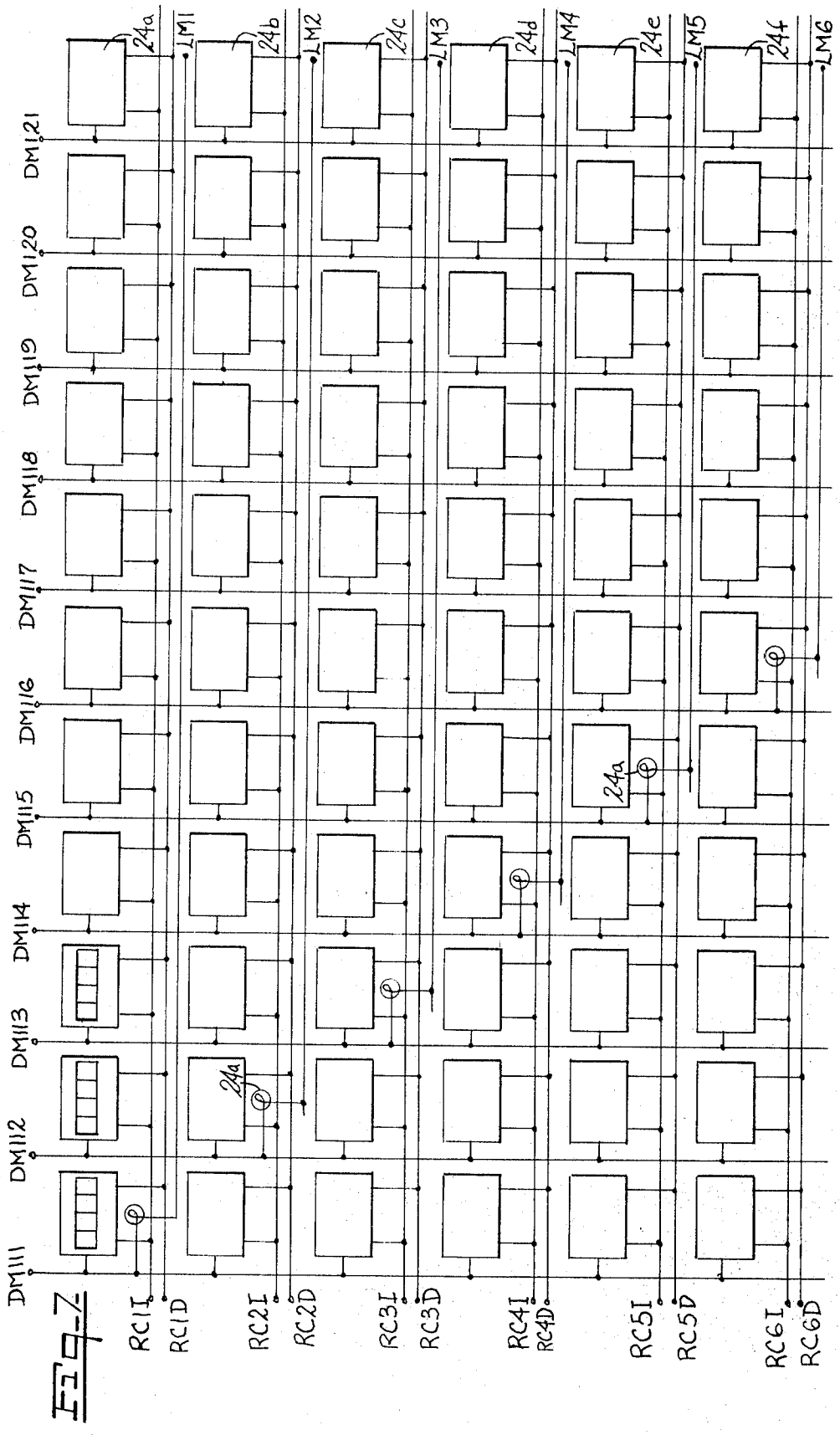
DM111
DM112
DM113
DM114
DM115
DM116
DM117
DM118
DM119
DM120
DM121
LM1
LM2
LM3
LM4
LM5
LM6
24a
24b
24c
24d
24e
24f
RC1I
RC1D
RC2I
RC2D
RC3I
RC3D
RC4I
RC4D
RC5I
RC5D
RC6I
RC6D

Fig. 2

Fig. 8.

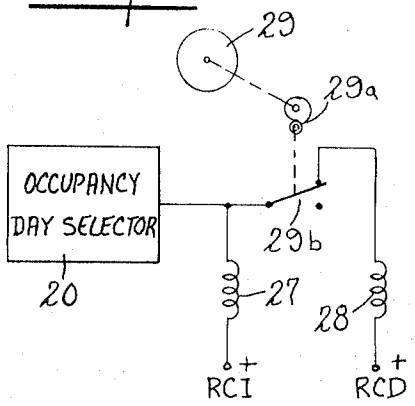

Fig. 10.

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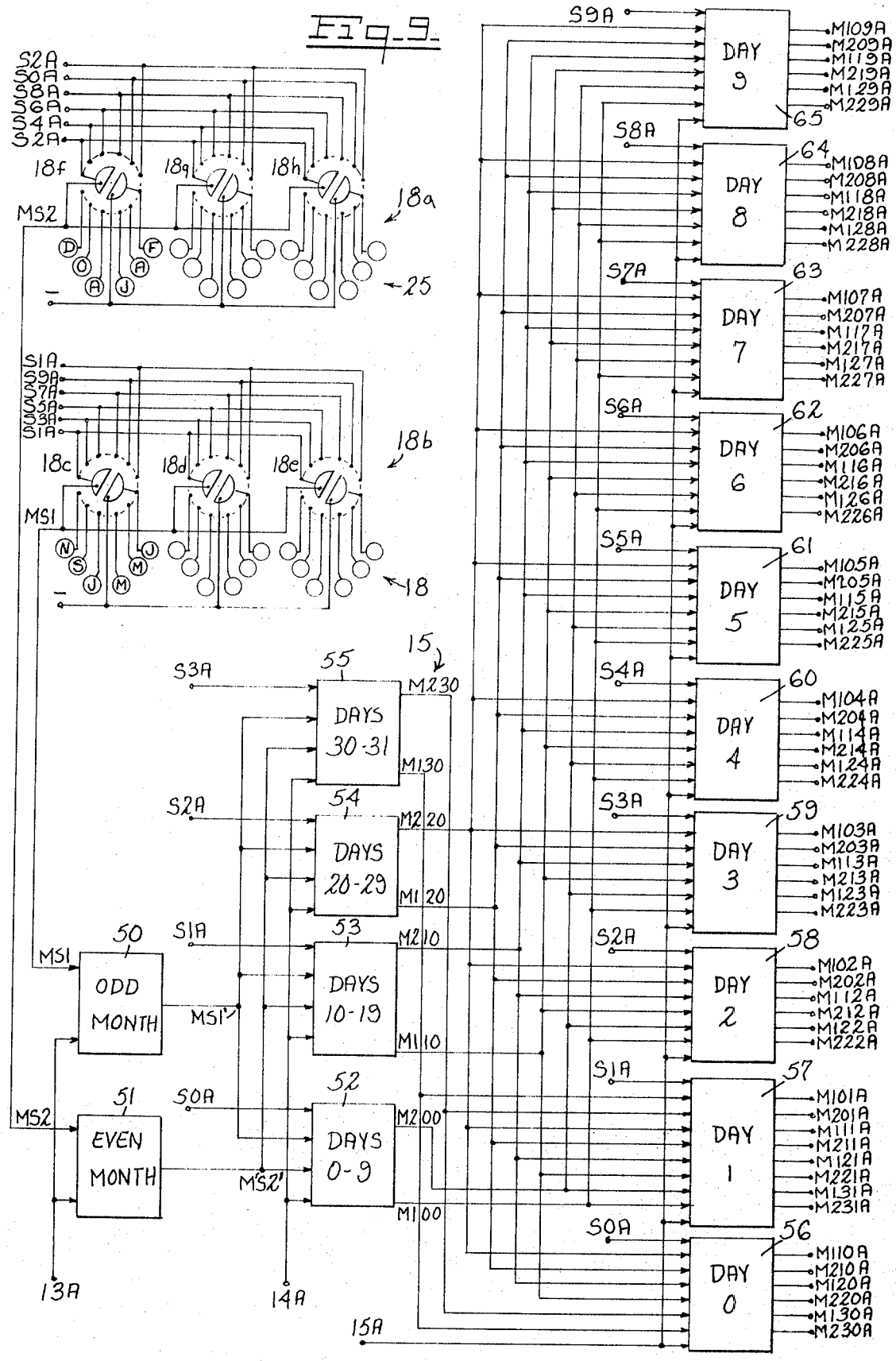
Fig. 9.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S0A
S8A
S6A
S4A
S2A
18f
18g
18h
18a
MS2
25
S1A
S9A
S7A
S5A
S3A
S1A
18c
18d
18e
18b
MS1
18
15
S3A
55
DAYS 30-31
M230
M130
S2A
54
DAYS 20-29
M220
M120
50
ODD MONTH
MS1
S1A
53
DAYS 10-19
M210
M110
MS1'
51
EVEN MONTH
MS2
S0A
52
DAYS 0-9
M200
M100
MS2'
13A
14A
15A
S9A
DAY 9
65
M109A
M209A
M119A
M219A
M129A
M229A
S8A
DAY 8
64
M108A
M208A
M118A
M218A
M128A
M228A
S7A
DAY 7
63
M107A
M207A
M117A
M217A
M127A
M227A
S6A
DAY 6
62
M106A
M206A
M116A
M216A
M126A
M226A
S5A
DAY 5
61
M105A
M205A
M115A
M215A
M125A
M225A
S4A
DAY 4
60
M104A
M204A
M114A
M214A
M124A
M224A
S3A
DAY 3
59
M103A
M203A
M113A
M213A
M123A
M223A
S2A
DAY 2
58
M102A
M202A
M112A
M212A
M122A
M222A
S1A
DAY 1
57
M101A
M201A
M111A
M211A
M121A
M221A
M131A
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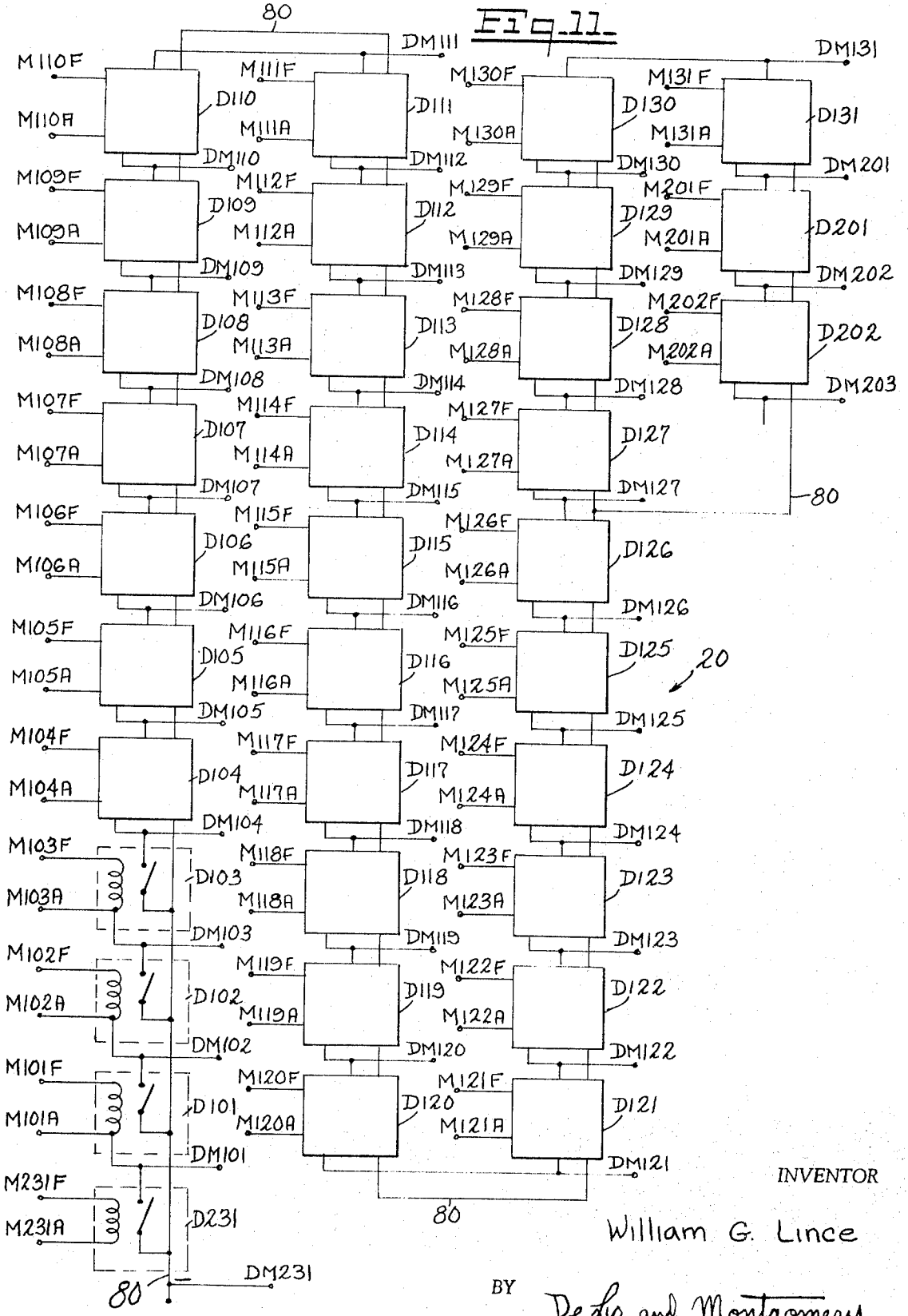
S0A
DAY 0
56
M110A
M210A
M120A
M220A
M130A
M230A

Fig. 11



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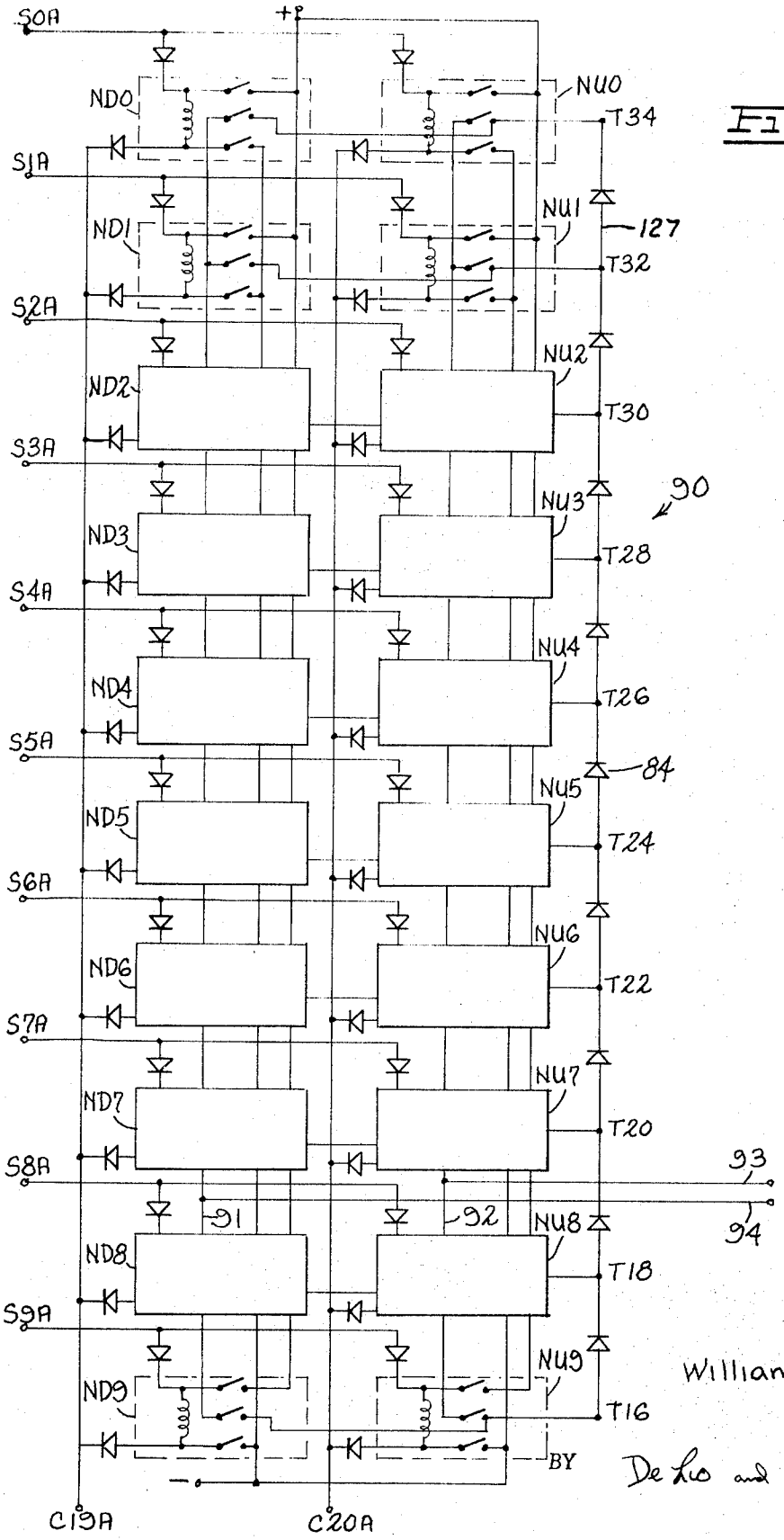

Fig. 12.

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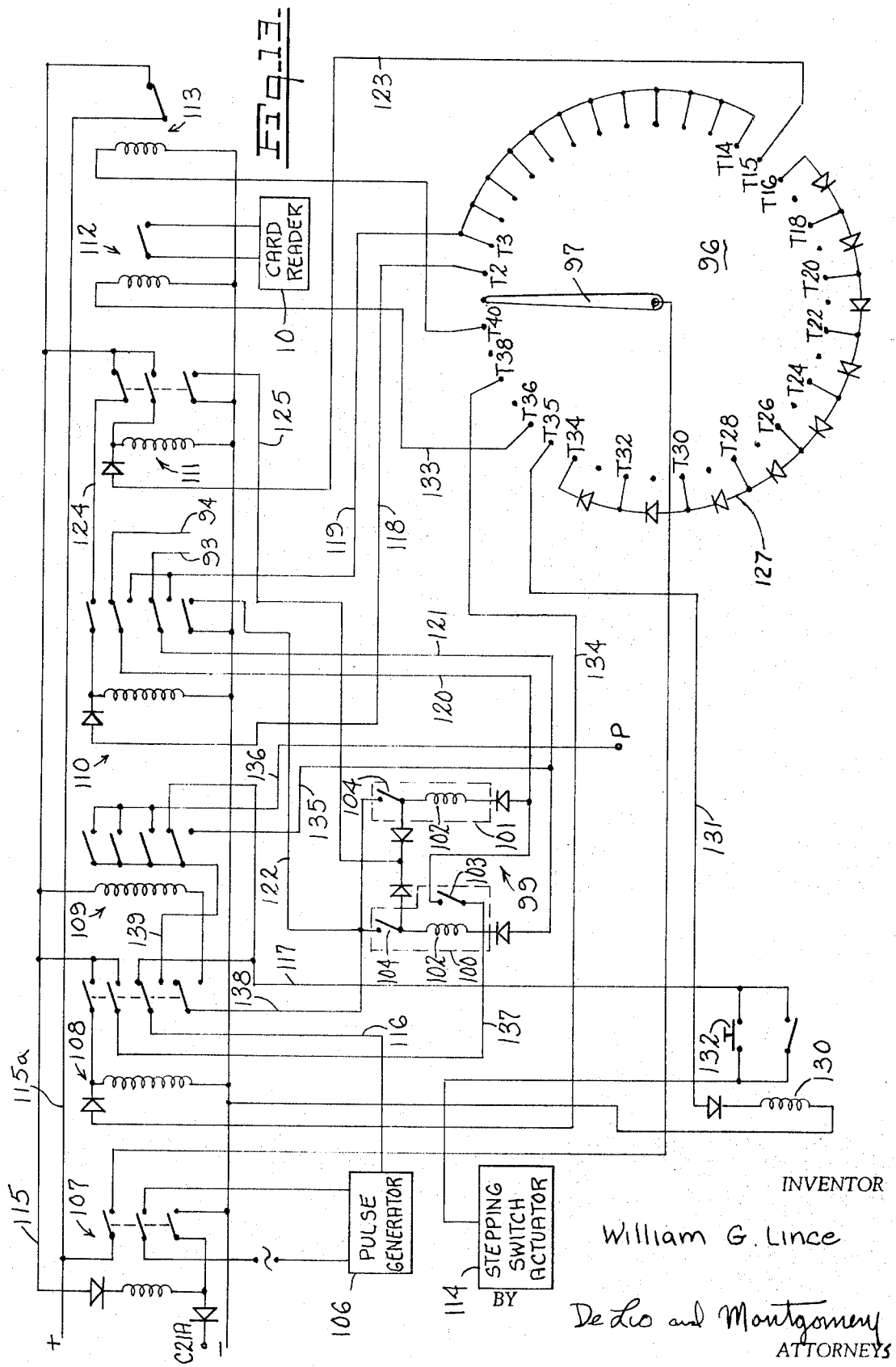
Fig. 13



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CONTROL SYSTEM FOR ROOM RESERVATION

This invention relates to information storage and display systems, and more particularly relates to systems for storing and displaying an inventory of different items taking into consideration the total availability of items, category of items, units of time over which the items are utilized and continuous monitoring of items placed in and removed from availability over the time period.

A system embodying the present invention may find many applications where a large number of items are continuously taken from and returned to an inventory over predetermined units of time. It is particularly adaptable for use in hotels, motels, hospitals, and where information regarding the use and availability of units over successive units of time is critical to the efficient operation. Accordingly, the invention will be disclosed in such environment.

At the present time, most large hotels, motels, hospitals, and the like, rely on a paper marking inventory system which is continuously maintained and updated by a reservation clerk. In such bookkeeping or inventory systems, mistakes and overbookings for units are frequent. The result may be that a reserve customer is turned away or referred to another establishment resulting in a loss of good will. Alternatively, the establishment, to maintain good will, may give the customer a higher priced unit at the lower reserve rate to maintain its reputation in good will. In either event, or analogous situation, the establishment suffers a loss of good will and/or income. Additionally, much clerical time is required at all presently known reservation systems.

The present invention as applied to a hotel reservation system presents a continuous display of all categories of rooms available for a predetermined number of days, months or other periods of time. The invention further provides a means for almost instantaneously validating reservations and recording cancellations or reservations for any number of units within the predetermined time. The present invention further provides a means for gathering statistical data regarding reserved arrival time, no-shows, walk-ins, peak periods, etc. A system embodying the present invention further saves much clerical, bookkeeping and reservation time and allows the reservation and reception personnel an ever present, positive indication of all available units for a given number of units.

An object of this invention is to provide a new and improved inventory information storage and display system.

Another object of this invention is to provide a new and improved system for maintaining and displaying a continuous inventory of available units over a predetermined period of time, and further allowing immediate updating of such inventory upon any change in reserved unit, cancellations, etc.

Another object of this invention is to provide a new and improved system which will continuously display categories of available items over a predetermined number of units of time and which may be immediately updated when items are added to or subtracted from availability.

Another object of this invention is to provide a new and improved system of the type described in which the units of time are divided into groups and each group may be utilized to indicate a new period of time upon passage of a first period of time.

Another object of this invention is to provide a new and improved system of the type described in which the date of first use and date of final use of a category of items are selected and all units of time therebetween are incremented or decremented by the number of items removed from or added to availability.

A further object of this invention is to provide a new and improved arrangement for providing a plurality of pulse counts corresponding in number to a number held in a storage register indicating a number of items to be placed in or removed from availability.

The features of the invention which are believed to be novel are particularly pointed out and definitely claimed in the concluding portion of the specification. The invention, however,

both as to its organization and operation, together with further objects and advantages thereof, may best be appreciated by reference to the following detailed description taken in conjunction with the drawings, wherein:

FIG. 1 is a block diagram of a system embodying the invention;

FIG. 2 is an illustration of a record medium in the form of a punch card for reading information into the system of FIG. 1;

FIG. 3 illustrates a display console;

FIG. 4 is a drawing partly in schematic and partly in block form of a circuit for reading the information on the cards of FIG. 2;

FIG. 5 is a diagram partly schematic and partly in block form of the room category register of FIG. 1;

FIG. 6 is a diagram partly schematic and partly in block form of the classification register of FIG. 1;

FIG. 7 is a diagram partly schematic and partly in block form of a portion of the display console of FIG. 3;

FIG. 8 is a drawing partly schematic and partly in block form of the actuating mechanism of each display register;

FIG. 9 is a diagram partly schematic and partly in block form of the arrival date register of FIG. 1 and further showing the month selector and indicator of FIG. 1;

FIG. 10 is a diagram in block form of the final occupancy day register of FIG. 1;

FIG. 11 is a diagram partly schematic and partly in block form of the occupancy days selector of FIG. 1;

FIG. 12 is a diagram partly schematic and partly in block form of a register for storing a number of units to be utilized; and

FIG. 13 is a schematic diagram of the count control and feed register of FIG. 1.

Referring now to the drawings and, specifically, to FIGS. 1 and 2. A system embodying the invention includes an information or data input in the form of a card reader 10. Card reader 10 is adapted to read information which is stored in a record medium which is preferably a card 11.

With specific reference to a hotel or motel, when a reservation is received, the necessary data is punched in the appropriate places on the card 11 utilizing a card punch unit 12. The card 11 is a standard punch card having a given number of columns (vertical) and rows (horizontal). The card is inserted into card reader 10 which in a conventional manner senses the perforations in each column of the card and forwards this sensed information to appropriate storage or information handling devices. Considering both the system of FIG. 1 and the card of FIG. 2, the first classification on the card may be marked with the identifying code number of the hotel for later reference in statistical analysis. The next classification on the card is the date a reservation (or cancellation) is received. The next classification on the card will show the type or category of room selected. This information will appear in column nine of the card and will be conveyed to a room category storage unit 13. As will hereinafter be more specifically set forth, any number of room categories up to ten may be encoded in one column to show rooms such as singles, doubles, twin bed units, suites, conference rooms, and any other category of rooms in a particular hotel. The next classification on the card will show the type of reservation, that is, whether it is a new reservation or cancellation of an existing reservation. As will hereinafter be explained more specifically, classification may be divided into such classifications as 6:00 PM arrival, 9:00 PM arrival, guaranteed reservation, and walk-in, and further may be classified as 6:00 PM no-show, 9:00 PM no-show, guaranteed no-show, and announced cancellation. Such information is read from column 10 of the card and applied to a classification storage register 14. The next classifications on the card which occupy four columns each show the arrival date and the final occupancy date. Such information is read from columns 12 –14, 16 –18, and applied to storage registers 15 and 16, respectively.

The final punched classification on this particular card will indicate the number of rooms in a given reservation or cancel-

lation, and such information is read from the card reader to a count control and feed register **17**. The month during which the occupancy will occur or during which a previously made reservation is to be cancelled is applied to a month selector unit **18** which further channels this information to the arrival date and final occupancy date storage registers **15** and **16**, respectively.

The month selector further provides a signal to a month display indicator **19** which will display the months being utilized in a system. As will hereinafter be more fully explained, the particular unit disclosed is a 62-day or 2-month system.

The information stored in the arrival date register and the final occupancy date register is applied in an occupancy days selector **20** together with information in the classification register to provide an ultimate indication of whether room units are to be subtracted from inventory as by additional reservations or added to inventory by reasons of cancellation. This information is applied to a visual register and indicating portion of the system identified at **21**.

The inventory of available rooms of each category is preferably displayed on a console or display register board **23** as shown in FIG. 3. This display board is made in six sections, **23***a* –**23***f*, and will show for each of 62 days the number of available rooms in each category. For example, the number of available single SGL rooms is shown in the top row, the number of double DBL rooms, twin TW bedroom rooms, suites STE, conference CON rooms and other special SPE rooms is shown in succeeding rows. For each category of rooms for each of the 62 days there is a numerical display register **24** which is preferably in the form of a numerical counter as hereinafter more fully explained. The display board is shown as physically arranged in six sections of 10 or 11 days each. This is merely for purposes of symmetry of appearance and to facilitate disclosure as will hereinafter be made apparent.

Below each column of room categories is a day of the month numbered 1–31 and on each section of the console are indicator lights **25** for six different months. The odd-numbered months, January, March, May, July, September and November are available to be shown on the upper display sections **23***a*, **23***b*, **23***c*, and the even-numbered months, February, April, June, August, October and December are available to be shown on the lower console sections. It will be understood that at any given time, only one of the month indicators on each console section will be illuminated.

Briefly, by way of preliminary explanation, assume that the console of FIG. 3 is to be programmed for January 1 through February 28. All of the January indicators on the upper sections **23***a*, **23***b* and **23***c* would be illuminated and all of the February indicators on the lower sections **23***d*, **23***e* and **23***f* would be illuminated. Initially, each display register or counter **24** is set to the maximum number of rooms of each category for each day. Then the cards **11** are fed into the card reader and the information thereon would be utilized to decrement the counts in the registers **24** in accordance with the reservations. In some instances, the counters might later be incremented upon cancellations or no-shows.

As has previously been stated, the disclosed system is arranged for a maximum of 62 days or 2 months. Therefore, on January 11 all registers in the upper left section **23***a* would be reset to the maximum number of rooms available in each category, and the month of March would be selected for display thereon. Similarly, on January 22, all registers in the upper middle console section would be reset to the maximum number of rooms in each category so that these sections could then accept further reservations, cancellations and other information, and the month of March would be selected for display thereon. In this way, the console sections are preferably divided into 10- or 11-day sections to obtain maximum utilization of the equipment. However, other divisions of a month or number of days may be utilized. In the illustrated system, the upper console sections have only the odd-numbered months, and the lower console sections have only the even-numbered months. This is feasible in a 2-month system inasmuch as by the symmetry thereof only the odd months will appear on the top sections and only the even months will appear on the bottom sections. If a 3-month system were involved, each display section would then only have to show every 4th month.

A console of the type disclosed in FIG. **3** allows an immediate visual inspection of the number of units or rooms in each category available during any day of a 2-month period. Assume that the reservation clerk receives a telephone call or a letter requesting reservations for a given period of time during the next month. The reservation clerk merely inspects the availability of room categories for the period of time desired, determines that such are available, then punches the necessary information on a card **11** and places the card in the card reader. This will cause a decrementing of the registers for the reserved days in the proper room category. Alternatively, in smaller systems the information may be manually read in to the system by setting preselected switches, as will hereinafter be made apparent.

A series of indicator lamps, not shown in FIG. **3**, below the selected rooms on the reserved dates will be illuminated to allow the reservation clerk a visual check against the requested reservation to determine that no error has been made during the card punching and reading operation. When this check has been made such indicator lamps may be extinguished, as hereinafter described.

Reference is now made to the information read-in logic or card reader **10**. The card reader generally comprises a Standard Register Company Card Reader Type 1711, which may be further modified as disclosed in FIG. **4** to handle the necessary control power. The punch cards **11** are inserted into card reader **10** and the perforations in each column thereon read by a conventional star wheel contact (not shown) which sequentially reads the perforations within each column on the card and a commutator switch (not shown) which reads the column on the card. When a perforation occurs in one of the columns, a source of power (not shown) is connected to a contact SO –**S9**. This will read a number in a given column. At the same time the card is being advanced column-by-column to the card reader and a commutator switch contact **C9** –**C23** will have a source of power connected thereto as each column is read. The contacts **C9** –**C23** when made indicate a particular column which is being read. In FIG. **4** the pertinent portions of the card reader **10** are shown and comprise a plurality of contacts which are made when a perforation in a column occurs. When one of contacts SO –**S9** is connected to a source of power an associated relay SRO –**SR9** is energized which picks up its controlled contacts to connect a positive voltage to associated terminals SOA –**S9A**.

At the same time, as the columns are read by the card reader, contacts **C9** –**C23** may be connected to a source of negative potential to selectively energize relays **CR9** –**CR23** which will cause the selected relays to pick up their controlled contacts **C9A** –**C23A** to a source of negative potential or ground.

In the various drawings, electrically common contacts, terminals, and lines bear the same reference characters. In describing the various logic elements of a system embodying the invention, relays which operate between energized and de-energized states are set forth to facilitate disclosure. However, it is to be understood that the various circuits and networks may be composed of relays, vacuum tubes, semi-conductor devices or any other elements operable between two states or conditions.

As will be hereinafter more fully explained, the combination of an energized S contact and a C contact will identify the location of a perforation on the card **11** and will convey the intelligence on the card to a predetermined portion of the system.

The manner in which a particular room category is read will be apparent from reference to FIGS. **4** and **5**. FIG. **5** illustrates a plurality of memory devices, namely, six in number, which are selected and set to an indicative state through information

read from the card 11. Reference to FIG. will show that the room category is shown on column nine of the card. As illustrated in FIG. 5 there are six room categories and a memory device in the form of a relay RC1 – 6 for each room category. Each memory device RC includes a relay coil having self-latching contacts and a pair of signal contacts. When one of the relays is energized it will pick up all of its contacts. The relay will be latched in and the signal contacts are all connected to line 33 or 34 having positive voltage thereon. The contacts or terminals which read the room category are identified – S1A –S6A and the individual memory relays are connected between one of these terminals and a common line 26 which is connected at its other end to terminal C9A of FIG. 4. Thus, when column nine of card 11 is read and a perforation appears in any of positions S1 – S6 a particular category of room is called for. One of relays RC1 – RC6 corresponding to such room category is energized and its corresponding signal contacts RC1I – RC6I, RC1D – RC6D closes to indicate that a particular category of room has been called for by the card 11.

In FIGS. 4 and 5 it will be understood that each of the relays and memories are identical in construction and those represented in block diagram are the same as those shown in schematic. In FIG. 5 the relays are self-latching and serve as memory units while those shown in FIG. 4 are not self-latching and intended only to give an instantaneous signal to one of terminals S1A – S6A and C9A – C23A.

The classification register 14 is exemplified in FIG. 6. Such classification register comprises a plurality of memory devices which again may be in the form of relays 32 and 33 which are energized through contacts S1A – S8A by the card reader sensing perforations in column 10 of card 11. The coils of the relays 32 and 33 are adapted to be energized by completion of a circuit through one of contacts S1A – S8A and contact C10A indicating information in column 10 of the card. In FIG. 6 only one memory unit is indicated in schematic form and the remainder are indicated in block form. Each memory unit has a particular significance and is so labeled. For example, the first column of memory units 32 indicates reservations for 6:00 PM arrival, 9:00 PM arrival, guaranteed reservation, or walk-in customer. The memory units 33 in the second column each indicate a no-show or a cancellation. Hence, the memory units 32 in the first column, when energized, are utilized to decrement the available rooms, while the memory units 33 in the second column, when energized, are utilized to increment the number of available rooms.

The signal terminal of each of the decrementing memories 32 are applied to a common line 34 and the signal terminals of each of the incrementing memories 33 are connected to a common line 35.

Accordingly, a decrementing count in any classification in memories 32 will apply a signal to line 34. If any of memories 33 are energized indicating a no-show or a cancellation, an incrementing signal is applied to line 35. The incrementing or decrementing signals, as is hereinafter explained, are applied to terminal P and signal line P1. The incrementing or decrementing signal is then passed through the signal contact of the energized memory to line 35 or 34. Line 35 is connected to the lower signal terminals of each of relays RC1 – RC6 and the line 34 is applied to the upper signal terminal of each of memory units Thus, the output terminals RC1I – RC6I and RC1D – RC6D upon reading columns nine and 10 of card 11 will indicate a particular room category that has been read from the card and whether a decrementing or incrementing count is to be utilized for that room category.

Briefly stated, when the circuits of FIGS. 5 and 6 are set up, a number of pulses may be applied to terminal P indicative of a given room count which is read from columns 19 and 20 on card 11 and which is applied to the network of FIGS. 5 and 6 to the selected ones of the signal terminals of the RC relays.

It may be seen that the memories exemplified in the form of relays act as coincident networks, that is, such memories are set or energized upon the simultaneous occurrence of given conditions.

The outputs appearing on the signal terminals RC1I–RC6I, RC1D–RC6D, of the room category register are applied to visual display counting registers, as shown in FIGS. 3 and 7. The array of display counters 24 shown in FIG. 7 represent the display on section 23*b* of display 23. More specifically, they show the displays for an 11-day period and for six room categories. The displays are in the form of a counter such as Veeder-Root Company, Hartford, Conn., counter Model No. KJ1659 which is either incremented or decremented by a single pulse and is so arranged that it will not count below zero. Each of the counters 24 will have a number of digits selected in accordance with the number of available rooms of a given type. The counters 24 a which indicate the number of available single rooms receive inputs over line CR1I and CR1D from the room category register of FIG. 5. The counters 24*b* which represent the number of available double rooms receive inputs over lines CR2I and CR2D from the room category register of FIG. 5. Similarly, the rows of counters 24*c*, 24*d*, 24*e*, and 24*f* receive inputs from lines CR3I, CR3D; CR4I, CR4D; CR5I, CR5D; and CR6I, CR6D, respectively, from the room category register. The counters 24 will not be operated unless a circuit is established therethrough from a CRI or CRD line to the occupancy days selector register, which circuits indicate the days in which reservations or cancellations are made.

Each of the display counters 24 have an indicator light 24*g* associated therewith to indicate the days and room categories which have been selected and thus provide a visual check to the operator. Such lamps are arranged to be illuminated by the coincident application of a signal on a category signal line L1 – L6 and occupancy day signal line DM. Each of relays RC1 – RC6 will connect a line L1 – L6, respectively, to positive voltage when energized. Each of lines L1 – L6 is connected to a series of lamps 24*g* (FIG. 7) for a corresponding category of rooms for each day (only one day shown for each category. Each lamp is further connected to an associated day line DM.

FIG. 8 illustrates in simple schematic form the operating mechanism of one of the counters 24. Each counter comprises an add-actuating coil 27 and a subtract-actuating coil 28 which receive inputs from a RCI or RCD terminal, each of which when energized is adapted to advance or reverse counting wheels 29 having numbers serially displayed thereon adapted to be viewed through a window port as exemplified in FIG. 7. The unit counting wheel is arranged to operate a detent or other means 29*a* when the absolute sum in the counter decrements to zero, which will open a switch 29*b* and prevent further decrementing of the counter. A circuit is completed through one of the coils 27 or 28 when a negative signal appears at the occupancy day selector, as will hereinafter be more fully described.

The function of the arrival date register 15 together with the month selector 18 and month indicator 19, are shown in FIG. 9. The register 15 comprises a plurality of logic elements adapted to be set in a given one of two stable conditions upon the occurrence of coincident signals, and upon such coincident signals transmit a signal therethrough. It will be recalled that the system under description is a 2-month or 62-day system. Accordingly, 2 month memories 50 and 51 are provided, four decade day memories 52 – 55 are provided, and 10-unit day memories for day zero through day nine, 56 –65 are provided. With reference to FIGS. 2 and 4, the information on the card 11 under the classification "arrival date" is read into the arrival date register 15 of FIG. 9 as follows: The arrival date classification on card 11 comprises four columns. As shown in FIG. 2, these columns bear the number 0612 which indicates a 6-month, 18th day arrival date. The 06 indicates the month of June which is an even month and, accordingly, a signal is applied to terminal MS2 even month memory from month selector 18*a*. At the same time the C13 contacts indicate that this information is in column 13 and a signal is applied to terminal C13*a*.

This will, in turn, set memory 51 which applies signals from terminal MS2' to decade day selectors 52, 53, 54 and 55. One of these memories will be set upon the reading of column 14 on card 11. Referring to the example on the card, it will be

seen that the arrival date falls between the 10th and 19th. Therefore, when card column **14** is read a signal will be applied to terminal **C14A** and simultaneously to terminal **S1A** which will set memory **53**. Each of memories **52 – 55** is adapted to yield two output signals. One of the output signals is indicative of an odd month and a day within its range, while the other signal is indicative of an even month and the day within its range. The outputs of each of memories **52 – 55** is marked to indicate its possible output. For example, the output of memory **53**, **M110**, indicates that the arrival date is in an odd- or even-numbered month and is within the 10th to 19th day span. Similarly, the output marked **M210** indicates that the arrival date is in an even-numbered month and the date falls within the 10th to 19th day span. The outputs of the memories **52 – 55** are indicated on the common bus lines running vertically in the drawing.

At this point, after reading the first three columns in the classification arrival date on card **11**, the selected ones of the month and decade days memories have been set. In the example given, this signal will appear on line **M210**. When the fourth column in the room arrival classification of card **11** is read, terminal **C15A** will be energized and terminal **S2A** representative of the second day will also be energized. These coincident signals to memory **58** will set memory **58** and enable it to provide a signal on its output line **M212A**. In effect, memory **58** when set passes the signal on line **M210** to its output terminal **M212A**. This now signifies that the arrival date June **12** has been read from card **11** and the arrival date register **15** has read such information from the card and energized an appropriate line.

It may be readily seen that in a similar manner any day of an odd or even month may be read from the card.

Reference is now made to the month selector **18** and the even and odd month selectors **18*a*** and **18*b***, respectively.

The month selectors have a two-fold function. One function is to indicate on each section of the display of FIG. **3** the month indicated by that console.

A selector switch is associated with each section of the console. The odd month selector **18*b*** which comprises selector switches **18*c***, **18*d*** and **18*e*** illuminate the month indicator lights **24** on the upper three sections **23*a***, **23*b***, and **23*c*** of the display, while the even month selector **18*a*** through selector switches **18*f***, **18*g***, and **18*h*** will illuminate the month indicators **24** on the lower three sections of the display of FIG. **3**. As shown, the selector switches **18*c***, **18*d*** and **18*e*** will illuminate the January illuminers on the upper three sections of the console and the selectors **18*f***, **18*g*** and **18*h*** will illuminate the month February on the lower three sections of the console. The selectors, as shown, comprise six position rotary switches with two sets of six terminals. The first set of six terminals of each of selectors **18*c***, **18*d*** and **18*e*** are connected to terminals **S1A**, **S9A**, **S7A**, **S5A**, **S3A** and **S1A** of the card reader. Connected to the movable contact of each of the selectors is the line **MS1** which is, in turn, connected to memory **50**. Thus, when any of the odd months are read from the card, line **MS1** will be energized and will apply a signal to memory **50**. When such signal coincides with the reading of column 13 on the card, memory **50** will be set or energized.

Selector **18*a*** operates in a similar manner on contacts **SOA**, **S8A**, **S6A**, **S2A** and **SOA** and when the circuits are properly selected will apply a signal at terminal **MS2** to memory **51**.

Assume that the system initially displays the month of January across the upper sections thereof and the month of February across the lower sections thereof, and that the first 10 days of January have passed. Selector **18*c*** will be set to March and arranged to read an input from terminal **S3A**. This will then change the month indicator on the upper lefthand section **23*a*** of the display to illuminate the indicator for the month of March. Similarly, when the 21st day of January has passed, selector **18*d*** will be turned to contact **S3A** which will allow reservations to be read in for the March 11th – 21st period and will illuminate the March month indicator on the middle upper section **23*b***. Subsequently, after each **10**- or **11**-day period the overall register will be updated in a left-to-right sequence as viewed in FIG. **3**. Each time a section of the display is updated the appropriate month indicator is illuminated.

The outputs of the memories **56 – 65** are each indicative of 1 day in a 2-month or 62-day period. Such outputs are indicated by the prefix M followed by the numeral one to indicate the odd month and the numeral two to indicate the even month. The last two digits of a reference character indicate the day of the month and the suffix A indicates that this is an arrival date.

Each of the memories **50 – 65** may comprise self-latching relays with a plurality of signal contacts as previously described. For example, the memories **56 – 65** will provide a total of 62 signal contacts or terminals. Where relays are utilized as the memories the signal contacts thereof are normally open when the relay is de-energized.

The final occupancy day register **16** is identical in construction to the arrival day register **15** with the exception that the signal contacts thereof are normally closed when the relay is de-energized. Thus, when a given final occupancy day is read from the card **11**, one of the terminals indicative of that day has no voltage thereon.

The final occupancy day register, shown in block form in FIG. **10**, comprises odd and even month memories **70**, **71** which receive inputs over lines **MS1** and **MS2** and an input from terminal **C16A**. The decade day memories **72**, **73**, **74** and **75** receive inputs from contacts **SOA**, **S1A**, **S2A**, and **S3A**, respectively, and from terminal **17a** when column **17** of the card is read. The unit day memories **76 – 85** receive individual inputs from terminals **SOA – S9A**, respectively, when column **18** on the card through terminal **C18A** is read. The memories **76 – 85** have a total of 62 outputs each indicative of one day in a 62 -day period and identify in the same manner as the signal outputs of the arrival day register except that the signal output terminals in the final day occupancy register **15** bear the suffix F.

The final occupancy date register **16** is identical in construction to the arrival date register **15** except for slight differences in operation. The relay signal contacts provide a positive potential signal when energized, while the relay contacts in memories **56 – 65** provide a negative polarity signal when energized. The relay contacts in the arrival date register are normally open when their associated relays are de-energized. In the final occupancy date register the relay contacts are normally closed when the associated memory relays are de-energized.

The occupancy date selector **20** is set forth in FIG. **11**, partly in schematic and partly in block form and comprises 62 memory units of which 34 are shown.

The relays shown are **D231 – D202**, each memory relay being representative of an odd or even month and the day in that month. Accordingly, it will be apparent that the relay **D131** represents the odd month and the 31st day thereof.

The coil of each of the relays receives at either end thereof signals from the arrival date register **15** and the final occupancy date register **16** corresponding to the date of the month represented by the energized signal terminal of that register. For example, the coil of relay **D101** receives at its upper terminal a signal from terminal **M101F** (FIG. **10**) at its lower terminal a signal at terminal **M101A** of the arrival date register **15** (FIG. **8**).

Assume that a registration or cancellation is to be made commencing on the 31st day of an even month through the third day of the next month, relay **D231** would receive a negative signal at terminal **M231A**. At this point it will be recalled that on the unit day memories of the final occupancy register the signal contacts are normally closed and a positive potential applied thereto. Therefore, the coil of relay **D231** will become energized and close its controlled contact. This will connect the lower terminal of the coil of relay **D101** to negative bus line **80**. Relay **D101** will become energized and close its control contact to connect the lower terminal of the coil of relay **D102** to line **80**. The coil of relay **D012** will then become

energized and close its controlled contact to connect the lower terminal of the coil of relay D103 to line 80. However, in the final occupancy date register the contact to terminal M103F has been opened when relay memory 79 is energized. Accordingly, the coil of relay D103 is not energized.

At this time, the lines DM231, DM101, DM102 and DM103 will be connected through the closed relay contacts to the negative bus line 80. This will supply a negative control potential to the display and indicator registers 24 shown in FIGS. 7 and 8. Accordingly, the selected counting registers 24 are now set up for incrementing or decrementing by a predetermined number of rooms as will be read from columns 19 and 20 of card 11.

In FIG. 11 only 34 of the 62 days are represented by the memories D231 –D202. It will be understood, however, that in the system described there will be 29 additional memories serially arranged in a loop. The arrival date information and final occupancy date information may be applied to any position as desired on the day selector register. This register will automatically operate to produce a circuit for each day which occupancy is reserved or, alternatively, cancelled. FIG. 11 further indicates the importance of the final occupancy date signal. If only an arrival date was read into the system without a final occupancy date, it will be apparent that the whole serial register would be set up inasmuch as no signal would be removed from the upper terminals of any of the day relays. This feature of construction, however, is utilized when initially setting the system for the total occupancy period.

When the appropriate display counters, as exemplified in FIG. 8, have been selected by energizing one or more of the DM lines and the appropriate CRI or CRD line, the display counters are then enabled to receive either incrementing or decrementing pulse counts where each pulse count is indicative of a room to be reserved or a previous reservation cancelled.

The count control and feed register 17 of FIG. 1 is more specifically set forth in FIGS. 12 and 13. The number of units to be reserved or cancelled are read into and stored in number register 90, FIG 12. Such number in tens is read into relay memories NDO–9 and in units in relay memories NUO–9. The number in tens is read in when column 19 of card 11 is read through contact C19A by the individual inputs SOA – S9A. Similarly, the unit numbers are read in from card column 20 at terminal C20A and through individual inputs SOA –S9A. It will be apparent that if the number of rooms to be reserved is, say, 11, relay memories ND1 and NU1 will be energized and latched in. The signal contacts of these relays will be connected to common bus lines 91 and 92 which are, in turn, connected to lines 93 and 94, respectively, for purposes hereinafter set forth. The signal contacts of each pair of associated relays is further connected to contacts T16, T18, T20, T22, T24, T26, T28, T30, T32 and T34 in inverse order to the storage number represented by the memory relays. Between each set of these contacts is a uni-directional conducting device 84.

As will hereinafter be more fully explained, positive-going pulses are sequentially applied to each of contacts T16 – T34 to read the complement of the number stored in number register 90. Reference is now made to the count control network shown in FIG. 13.

The network of FIG. 13 includes a sequence and time base generator in the form of a stepping switch 96 having a contact arm 97 which sequentially steps along contacts T1 – T40 which also provide timing markers. It will be understood that the number of contacts that are utilized is a function of the marker times desired. The contact arm 97 in making contact with the terminals T1 – T40 as the arm 97 is stepped provides a series of marker or timing pulse signals. It is to be understood that such marker or timing signals may be derived from other equipment such as an electronic marker or time base generator.

The network of FIG. 13 further includes a buffer or temporary storage counting register 99. In the embodiment of the invention illustrated, this counting register may comprise a unit counter 100 and a decade counter 101 which are of the type CM1OR/ZT/V of the Presin Company, Inc. of Bridgeport, Conn. These counters are down counters arranged to count in one direction. The individual counters are of the type having a counting wheel (not shown) which is actuated one-tenth of a revolution upon energization of a coil 102. These counters further include a switch 103 (only shown on the units counter) which closes as the counting wheel moves from zero to nine to simulate a carry, and a switch 104 which opens when the count is zero. When switch 103 closes indicating a borrow, a line 105 is connected directly to counter 101 to effect such borrowing action.

To summarize, the temporary storage register 99 is utilized to temporarily store the number of rooms read from number register 90 and thereafter to monitor the pulses derived from a pulse generator 106 and applied to selected ones of display register 24.

The network of FIG. 13 utilizes seven bi-stable devices in the form of relays 107–113. Relay 107 is energized when all previous data has been read into the system, and the system is ready to increment or decrement the counting registers 24 by the number in card columns nineteen and twenty. Relay 107 is enabled from terminal C21A and is energized through time T40.

Relay 108 controls the application of pulses from pulse generator 106 to a stepping switch actuator 114 which operates the arm 97 of timing switch 96, and also controls the application of pulse counts to classification register 14, FIG. 6. Relay 108 is energized at time T38.

Relay 109 also acts to control the application of pulses from pulse generator 106 to classification register 14, FIG. 6, and to decrement to zero the number of units read into storage register 99 from number register 90. Relay 109 is also energized at time T38.

Relay 110 acts to clear storage register 99 during times T2 – T14. It is energized at these times. When energized it completes a circuit through storage register 99 to the negative voltage line, and thus acts as a power control during the clearing time.

Relay 111 functions as a power control for storage register 99 commencing at time T15 when a new number is read in from number register 90. When energized it unlatches relay 110.

Relay 112 at time T36 provides a signal to the card reader 10 to signify that a cycle of operation is complete and print a validating legend on card 11 in block 11*a*.

Relay 113 at time T37 opens the positive voltage supply to relay 107 to shut down the counting network.

When card column 21 is read, terminal C21A is energized and an enabling signal is applied to a relay 107.

When an energizing signal is applied to relay 107 it applies positive voltage over line 115 from positive bus line 115*a* to the movable contact arm 97 on the time sequence generator 96. Simultaneously, it enables pulse generator 106 which commences to generate positive-going pulses. Such pulses are applied through the contacts of relay 108 and lines 116 and 117 to stepping switch actuator 114 which commences to index arm 97 in timed steps about the contacts T1 – T40. When contact or time T2 is reached, an energizing signal is applied to relay 110 over line 118 and relay 110 is set or latched in. As arm 97 moves to contact T3 and subsequently moves through T14, each movement of the contact on one of the terminals T3 – T14 produces a positive-going pulse which is applied over line 119 through relay 110 and lines 120 and 121 to counters 100 and 101, respectively, in parallel. At this time coils of both of counters 100 and 101 are returned to negative voltage over line 122 through relay 110. Accordingly, as arm 97 indexes from – –T14 it will generate a total of 11 positive-going pulses which are utilized to decrement the counters to zero. These pulses are applied to the counters in parallel. At any time during the sequence when the counters reach zero, the switches 104 open.

The counters **100** and **101** are inherently designed not to decrement past zero in a positive direction. That is, they will move from zero to nine, but not from zero to one.

When arm **97** makes contact with terminal T**15** an energizing signal is applied over line **123** to relay **111**. When energized memory **110** latches in and accomplishes two functions. It opens line **124** to de-energize memory **109** and it further connects line **125** to negative voltage.

At this time, the temporary storage register has been decremented to zero, relays **107** and **111** are energized or set and relays **108, 109, 110, 112** and **113** are de-energized. Relay **110** is energized only from time T2 through T**14** at which time any number in register **99** is decremented to zero. At this time, arm **97** will sequentially make contact with terminals T**16** – T**34** which correspond to the terminals **T16** – **T34** in the number register of FIG. **12**. As arm **97** moves past each of terminals T**14** T**34** a pulse is generated which is sequentially applied to the terminals T**16** – T**34**. Such pulses may be applied to lines **93** and **94** through the signal contact of the energized ones of the ND and NU relays, FIG. **12**. In the example previously given, assume that relays ND1 and NU1 are energized, as arm **97** steps from T**16** to T**32**.

As arm **97** sweeps through contact T**16** – T**32**, nine pulses will be produced which are applied to line **127**. Line **127** includes the uni-directional conducting devices as well as the T**16** – T**34** terminals. The pulses applied to the terminals T**16** – T**34** pass along line **127** to seek the signal terminals of the relays which are closed and, hence, to lines **91** and/or **92** and then lines **93** and **94**. Lines **93** and **94** are connected to lines **120** and **121** through relay **110**, hence, nine decrementing pulses are applied simultaneously to each of counters **100** and **101**. This will decrement the counters to show a total of eleven therein. After the arm **97** moves past contact T**32**, the diode **84** between terminals T**32** and T**34** prevents any further application of pulse counts to lines **93** and **94**.

The temporary storage register **99** is now set with the number stored in the room number register of FIG. **12**.

When terminal T**35** is reached, an optional checking feature may be employed. At this time the system is prepared to increment or decrement the selected registers **24**. Provision is made for the operator to delay this action until the indicator lamps **24***a* under the selected registers **24** are checked. At T**35**, a relay **130** is energized over line **131** and opens its contact in line **117** to interrupt pulses to actuator **114** and halt advance of arm **97**. If the lamps **24***a* indicate that the day selection is accurate, the operator closes switch **132** to reapply pulses to actuator **114**. At time T**36** an enabling or energizing signal is applied over line **133** to relay **112**. When this occurs, relay **112** closes its contact and signals card reader **12** which prints a validating legend in box **11***a* on card **11**. Copies of the validated card may then be utilized as hereinafter described.

At time T**38**, arm **97** energizes line **134**, and relay **108**. The lower contact of relay **108** connects the coil of relay **109** to lines **122** and **125** and, hence, negative voltage to complete a circuit therethrough. When relay **108** is energized it opens the circuit between lines **116** and **117** and inhibits actuator **114**, thus halting arm **97**. Line **116** now connects pulses from generator **106** to the closed contacts of relay **109**, and such pulses are simultaneously applied to lines **135** and **136**. Line **136** leads to terminal P in the classification register (FIG **6**). Line **135** is connected to line **121** which applies the pulses to unit counter **99**. Assuming the number in storage is 11, at the application of the second pulse, switch **103** closes and positive voltage is applied to counter **101** over line **137**. This decrements the decade counter to zero and switch **104** in counter **101** opens. After nine more pulses, counter **100** is decremented to zero and its switch **104** opens. This opens the circuit through the coil of relay **1009** by disconnecting line **138** from lines **122** and **125**. The contacts of relay **109** return to their normal position, the circuit to line **136** is broken, and application of pulses to lines **135** and **136** is interrupted. Simultaneously, a circuit from line **116** through lines **139** and **140** is established to line **117** and actuator **114** is again rendered operative.

As arm **97** advances to T**40**, relay **113** is energized to open its contact and remove voltage from line **115** and de-energize relay **107**. The network of FIG. **13** is now disabled and awaits a new cycle of operation when another card is read.

In the described operation 11 pulses were transmitted to terminal P in classification register **14**, FIG. **6**, which are in turn applied to one of lines **34** or **35**. Lines **34** or **35** will convey the pulses to the selected RCI or RCD lines in room category register **13**, FIG. **5**, and hence to the selected RC lines in FIG. **7**. The pulses will be applied to the selected day counter registers **24** having energized DM lines, and the counter registers will be appropriately indexed.

The invention has been disclosed within a system in which information is read in from a prepared record medium. It will be apparent that the read-in of information to the system could be accomplished manually by appropriately substituting push-button or other type switches to set information in the various registers. For example, the classification register could be reduced to two relays for reservation and cancellation where no permanent record is desired and each of such relays could be actuated by a manually operated switch. In all registers and controls, the bi-stable devices may easily be operated by manually operated switches rather than from the card reader **12**.

However, the use of the cards **11** provide an added benefit in that they may be stored and then utilized in a data processing system to derive a statistical analysis of the establishments of business over a period of time. The cards **11** may be in duplicate or in triplicate. The cards bearing the reservation validation may be mailed to the customer to verify the reservation, a second card may be held for checkout purposes and a third card utilized for a permanent record.

When the illustrated system is initially set up for operation for a period including a predetermined number of units of time, all of the counters **24** will be at zero or may be set to zero. Then a card is prepared for each room category for each unit of time and fed into the system as incrementing counts. This will set all of the counters **24** to the total units in inventory or available. Thereafter, the cards which have the reservation data thereon are fed into the system and the appropriate counters **24** are decremented to show the remaining available units during any unit of time.

The invention has been disclosed in a hotel or motel reservation system. However, it will be apparent that it will have many other utilizations to account for items of inventory which are used over units of time. Such uses, for example, might be in the leasing of equipment, such as automobiles, use of hospital rooms, or any other system which requires accounting of categories of items, number of it items and times of use of such items or stores of materials.

It may thus be seen that the objects of the invention set forth as well as those made apparent from the preceding description are efficiently attained. While a preferred embodiment of the invention has been set forth for purposes of disclosures other embodiments and modifications to the disclosed embodiment of the invention which do not depart from the spirit and scope of the invention may occur to those skilled in the art. Accordingly, the appended claims are intended to cover all embodiments of the invention as well as modifications to the disclosed embodiment which do not depart from the spirit and scope thereof.

What is claimed is:

1. A system for continuously visually displaying the status of an inventory of items over a period of time defined by a plurality of units of time, comprising a plurality of numerical display devices each corresponding to a unit of time, said devices being arranged to display the availability of a number of items for a unit of time, said devices being arranged in sequential order of units of time to display the availability of the items over the defined time period, means for selecting a number of items and the units of time said selected number of items are to be utilized, and means responsive to said selection means for decrementing the numerical information in the display devices corresponding to the selected units of time by the selected number of items.

2. The system of claim 1 wherein said display devices corresponding to units of time are divided into groups of units of time, and means for resetting the display devices of each group to indicate an additional group of units of time.

3. The system of claim 2 wherein said units of time are days and said groups comprise a plurality of successive days.

4. The system of claim 3 wherein each succeeding three groups of days total 31 and no group is greater than 11 days.

5. The system of claim 1 further including means for displaying a plurality of categories of items for said predetermined units of time, and said means for selecting includes category selection means.

6. The system of claim 1 wherein the items are rooms and the units of time are days.

7. A system for displaying the availability of a plurality of rooms for a predetermined number of days, comprising a plurality of counting registers sequentially displaying the available number of rooms for each day, means for selecting the days a number of rooms are to be reserved, and means responsive to said selection means for decrementing the registers corresponding to the selected days by the selected number of rooms.

8. The system of claim 7 wherein said day registers are classified into groups, a plurality of month indicators for each group, means for selecting a month of operation for each group, and means for energizing the indicator of the month selected.

9. The system of claim 7 wherein the number of days displayed are selected to display N months, said day registers being classified into groups where a given plurality of groups add to at least 1 month, each of said groups having 12/N month indicators associated therewith where said month indicators are adapted to display each 12/Nth month.

10. The system of claim 9 further including a month selector for each group of days, and means responsive to said month selector for energizing the indicator on each group for the selected month.

11. The system of claim 9 further including means for selecting a particular 12/Nth month for operation, and means responsive to selection means to enable said group to accept information only in the month selected.

12. A system for visually displaying a number of stores in inventory for each of a predetermined number of serial units of time, comprising a plurality of counter means each corresponding to a unit of time, said counter means being arranged to visually display the number of available stores for each unit of time, means for selecting a predetermined number of stores for use between two units of time, and means responsive to selection of said two units of time for changing the number displayed by said counters between said two units of time by the selected predetermined number.

13. The system of claim 12 wherein said counter means are responsive to pulses to change the number displayed therein, and further comprising a number register arranged to receive and store the number of selected stores, a temporary number storage register, means providing a sequence of timing signals, means responsive to a first number of said timing signals for clearing said temporary storage register, means responsive to a succeeding second number of said timing signals for setting the number in said number register in said temporary storage register, means for generating a series of pulses, means responsive to setting of said temporary storage register for applying pulses of the series to selected counter means and utilizing the pulses to decrement the number in said temporary storage register, and means for interrupting application of the pulses to said counter means when the number in said temporary storage register reaches zero.

14. The system of claim 12 wherein said counter means are responsive to pulses to change the number displayed therein and further comprising a number register for statically storing the selected number of stores, a buffer register, means for setting the number in said number register in said buffer register, means providing a train of pulses, means for applying the pulses of said train to one or more counter means and to said buffer register to decrement the number in said buffer register, and means for interrupting application of the pulses to said one or more counter means when the number in said buffer register reaches zero.

15. A system for continuously displaying a number of items available for use in each of one or more categories for a predetermined number of units of time comprising record means for visually showing the number of items, category of items, initial unit time of use, and final unit time of use, storage means for storing the number of items, category of items, initial unit time of use and final unit time of use, means for reading said record means and storing the information thereon in said storage means, numerical display means for displaying the number of each item available for use in each category for each unit of time, and means responsive to said storage means, for changing the number in each of said numerical display means in a category between said initial unit time of use and said final unit time of use by the number of items on said record means.

16. The system of claim 15 further including a buffer register, means for setting the number of items in said storage means in said buffer register, means providing a train of pulses, means for applying the pulses of said train to said numerical display means between said initial unit time and said final unit time and to said buffer register to decrement the number in said buffer register, and means for interrupting application of the pulses to said numerical display means when the number in said buffer register reaches zero.

17. The system of claim 15 where the units of time are days, said numerical display means being arranged in groups of days where a plurality of groups of days total at least 31 days, 12/N month indicators associated with each group of days, where N is the number of months displayed by said system, and means for energizing a month indicator for each group of days in accordance with the month in which said each group of days resides.

18. A system for continuously visually displaying a number of items available for use in each of one or more categories for each of a predetermined number of units of time comprising a plurality of counter means each adapted to display the number of items available for a unit of time, means for selecting and storing the number of items, category of items, initial unit time of use and final unit time of use, and means responsive to said storage means for changing the number in each counter in a category between said initial unit time of use and said final unit time of use by the number of items selected and stored.

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PO-1050
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,656,113 Dated April 11, 1972

Inventor(s) William G. Lince

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 1, after "FIG." insert -- 2 --. Column 5, line 11, after "identified" insert -- as --. Column 10, line 71, after "from" insert -- T3 --. Column 11, line 17, after "T14" insert a dash. Column 11, line 69, delete "1009" and substitute therefor -- 109 --.

Signed and sealed this 26th day of December 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents