June 18, 1968 J. P. MINEAR 3,389,389

MOVING MESSAGE SIGN

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FIG. 1.

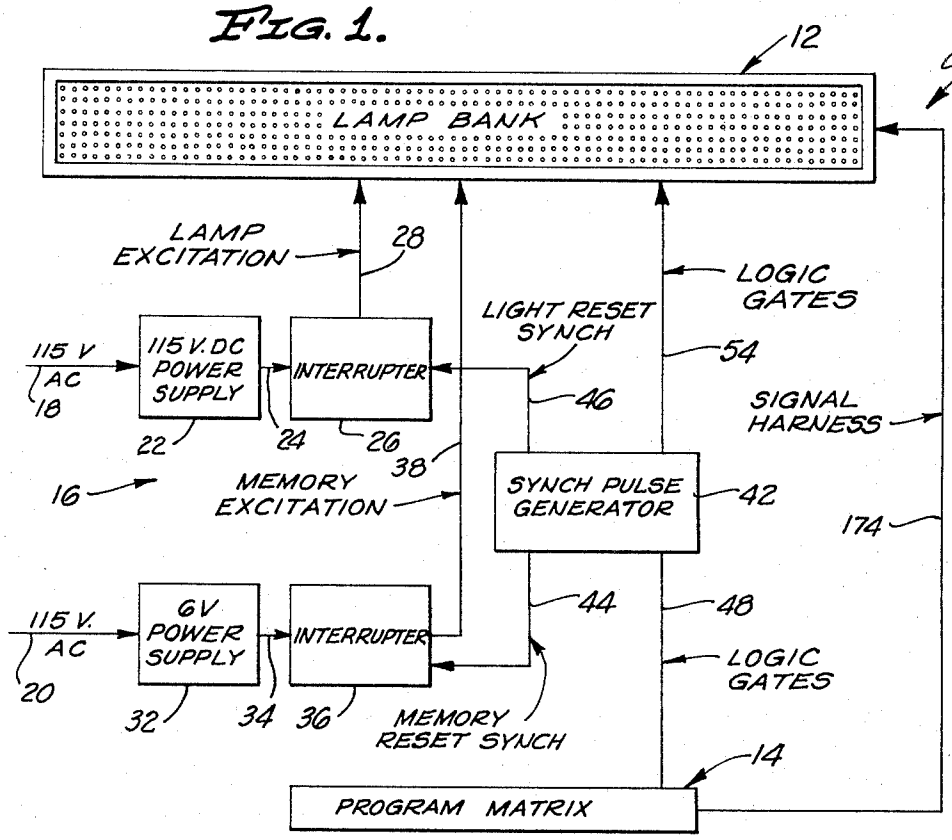


FIG. 5.

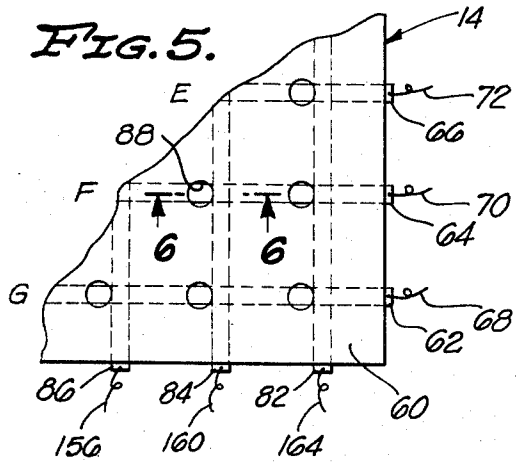
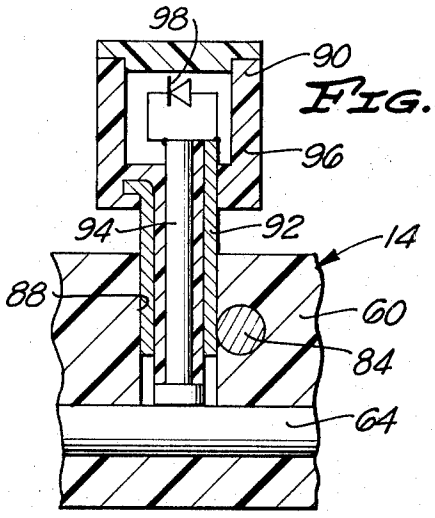


FIG. 6.



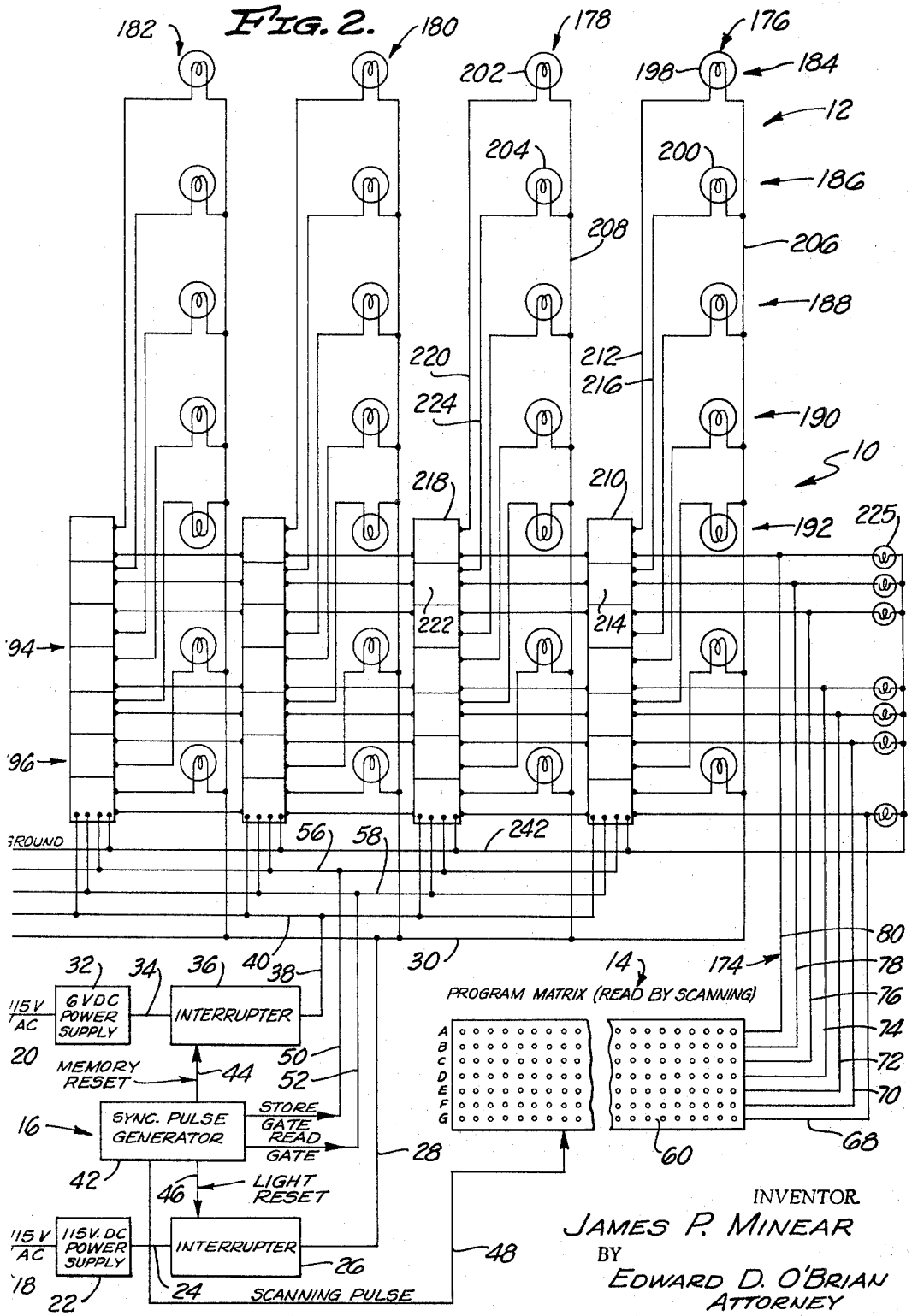
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FIG. 2.



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MOVING MESSAGE SIGN

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FIG. 3.

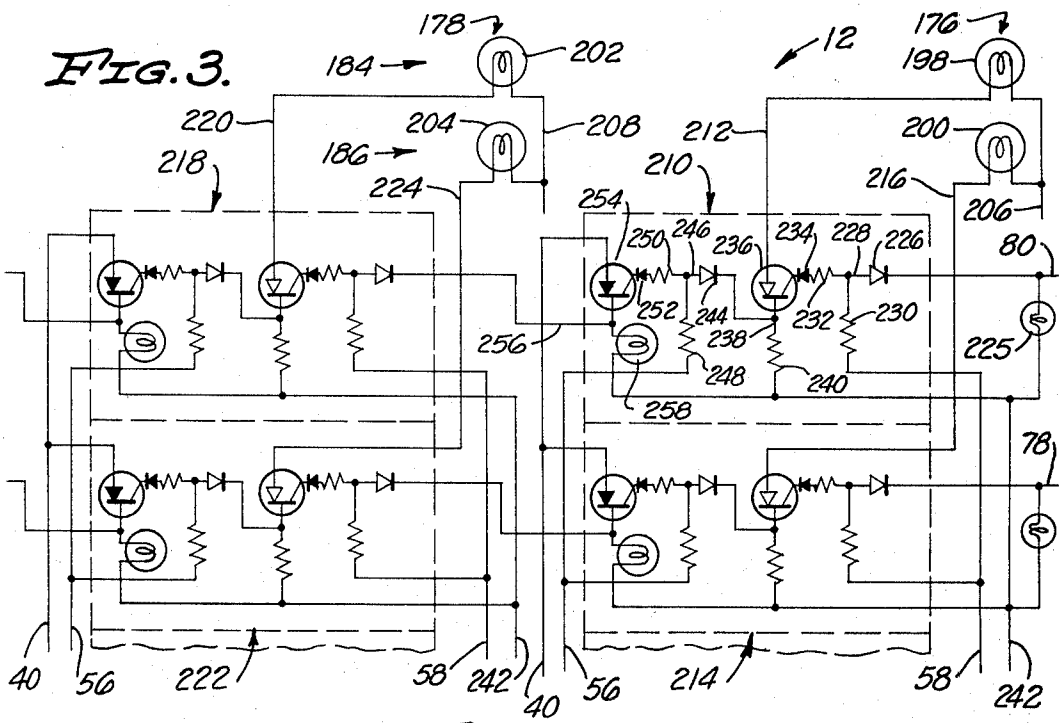
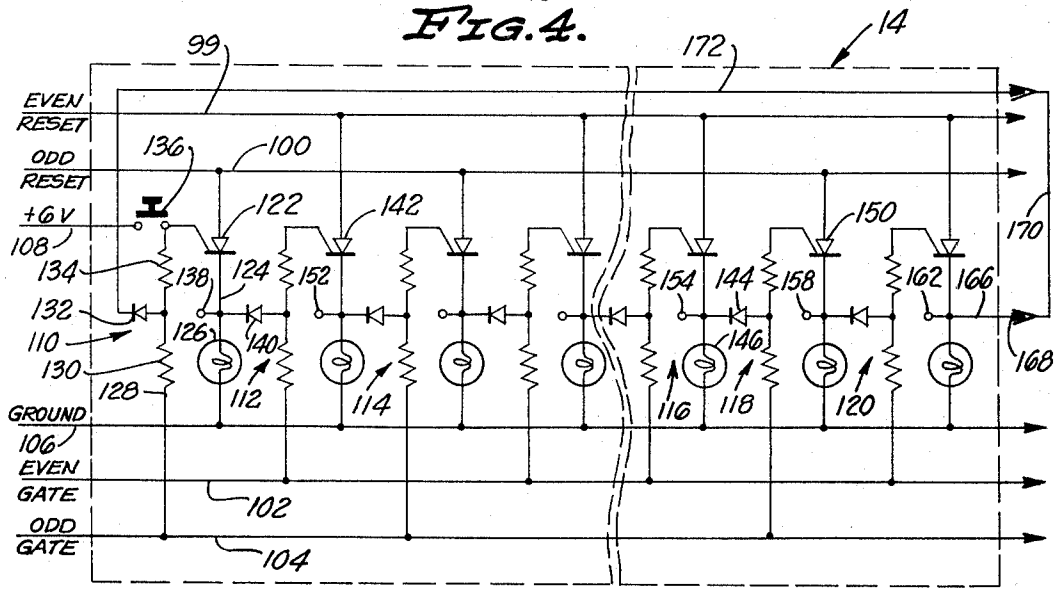


FIG. 4.



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3,389,389

MOVING MESSAGE SIGN

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5 Claims. (Cl. 340—339)

ABSTRACT OF THE DISCLOSURE

A moving message sign having a plurality of lamps arranged in rows and columns is disclosed. The lamps in adjacent columns are electrically connected so that one column signals the next as to its state to provide for progressive signaling from column to column. A program matrix is used to energize lamps in a first one of said columns. Upon pulsing, illumination from the first column is caused to progress along successive columns.

This invention is directed to a moving message sign particularly of the type having a stationary lamp bank comprised of a plurality of columns and rows of individually excitable lamps and signal means therefor to illuminate a message upon the lamp bank and to provide continuous movement of the message along the lamp bank by successive illumination of adjacent lamps in accordance with the message conformation.

Moving message signs are well known in the art and comprise a plurality of columns and rows of individually excitable lamps arranged in such a manner as to be able to represent the desired characters. For the English alphabet the characters can be easily formed from a plurality of lights which are formed in columns seven lamps high and from five adjacent such columns. Each of the lamps is horizontally aligned with the lamps in adjacent columns so as to define seven rows across the lamp bank. In the conventional sign an excitation wire is led from each of these lamps to the central control point wherein a switch contact corresponds to each lamp. The appropriate switch contacts are energized by means of appropriate successive actuation to provide a moving message. It can be clearly seen that a large number of signal wires must lead from the control point to the lamp bank and that a larger number of switches are necessary for control. These switches are subject to considerable contact difficulties such as dirt and contact pressures so that reliability is absent. In some of the prior art devices brass spheres are positioned into the physical form of the message and are moved over the switches to make contact therewith to thus energize selected lamps. In any event, a very complex structure is necessary to provide the proper signaling for the moving message and many connecting wires between the signal unit and the lamp bank are necessary.

Accordingly, it is an object of this invention to provide a moving message sign which is of simple construction and of easy operation as compared to prior equipment so that a trouble free moving message sign can be provided which eliminates much of the previously required extensive wiring from the control unit to the lamp bank.

It is another object of this invention to provide a moving message sign structure which incorporates a program matrix which is readily changeable, which program matrix is an inexpensive and trouble free construction and which feeds signals to the moving message sign so that the moving message sign is energized in an appropriate manner to display the desired signal.

It is another object of this invention to provide a program matrix which is of such structure that it has no moving parts during energization of sequential signals for signaling a moving message into a lamp bank.

It is another object of this invention to provide a program matrix which is simply programmed and reprogrammed by the positioning of elements therein.

It is another object of this invention to provide a lamp bank having a plurality of selectively illuminatable lamps arranged in rows and columns and to electrically connect adjacent columns so that upon proper signaling, one column signals the next as to its state to thus provide for progressive signaling from column to column through the lamp bank.

It is another object of this invention to provide a lamp bank wherein determinative and memory circuitry determines the illumination of the particular lamp in a particular row and column and indicates that upon signal the lamp in the same row in the next column should be illuminated and cause such illumination.

Another object of this invention is to provide suitable signaling pulses to signal sequential outputs from a program matrix into the lamp bank and to signal progressive illumination through the rows in the lamp bank.

Other objects and advantages of this invention will become apparent from a study of the following portion of the specification, the claims and the attached drawings in which:

FIG. 1 is a schematic electrical and physical drawing showing the various parts of the moving message sign and their inter-relationship;

FIG. 2 is an electrical schematic showing a portion of the lamp bank and program matrix together with their interconnection circuitry;

FIG. 3 is still further detailed schematic illustration of the circuitry of a portion of the lamp bank;

FIG. 4 is a schematic electrical diagram showing a portion of the electrical structure of the program matrix;

FIG. 5 is a partial front elevational view showing a portion of the physical structure of the program matrix; and

FIG. 6 is a section taken along the line 6—6 of FIG. 5.

As an aid to understanding this invention it can be stated in essentially summary form that it is directed to a moving message sign which incorporates a physically fixed program matrix board which can be readily programmed by the insertion of physical members therein and electronic structure which sequentially reads the program in a column and column order and transmits signals to a lamp bank having a plurality of rows and columns. The program matrix signals are transmitted to the first column of the lamp bank to energize the lamps therein and electronic circuitry within the lamp bank determines which of the first column lamps are illuminated and cause, upon suitable pulsing, energization of the second column of lamps corresponding to the formerly energized first column lamps. Suitable inter-connecting electronics is provided in the lamp bank so that such energization continues through the length of the lamp bank to provide a true moving message sign.

This invention will be understood in greater detail by reference to the following portion of the specification wherein the drawings are described. Referring now to FIGS. 1 and 2, the moving message sign is generally indicated at **10**. The moving message sign **10** comprises a lamp bank **12** in which a plurality of lamps are arranged so that proper selective illumination thereof can cause depiction of a message, program matrix **14** which sequentially signals proper illumination to the first column in lamp bank **12** so as to signal the content of the desired moving message, and power supply and signaling equipment **16** which supplies the necessary energization for the various electrical components of the remainder of the moving message sign **10** and produces the proper signal pulses to cause successive reading of the program matrix and progressive illumination of columns through the lamp bank.

Continuing to refer to FIGS. 1 and 2, the power supply and signaling equipment comprise incoming power lines 18 and 20 which are conventionally 115 volts, 60 cycle A.C. supplies. Incoming power line 18 is connected to rectifier 22 which supplies 115 volt D.C. power through line 24 to interrupter switch 26. Interrupter 26 is connected through line 28 which extends to the physical area of lamp bank 12 and is connected to line 30 within the lamp bank housing. Similarly, incoming power line 20 is connected to power supply 32 which supplies 6 volt D.C. electric power to line 34. Line 34 is connected to interrupter 36 which in turn is connected through line 38 which extends to the physical location of lamp bank 12 and is connected to line 40 within the lamp bank housing.

Synchronous pulse generator 42 is suitably powered and is suitably adjustable and has output lines connected to various portions of the equipment so that the various portions receive the correct pulses in proper sequence so as to operate the various functions of the moving message sign 10. These various pulses will be described in greater detail hereinafter. It is only necessary at this point to recognize that the synchronous pulse generator 42 is connected by line 44 to actuate power interrupter 36 so as to momentarily deenergize line 38, is connected to interrupter 26 by line 46 so as to cause interrupter 26 to momentarily interrupt the power in line 28, is connected to program matrix 14 by a plurality of lines in harness 48, and is connected by lines 50 and 52 in harness 54 to lines 56 and 58 which are in the proximity of lamp bank 12.

Referring now to the program matrix 14, it is seen in FIGS. 5 and 6 that the program matrix 14 comprises panel 60 which is provided with a plurality of rows of conductors and a plurality of columns of conductors. The number of rows of conductors corresponds to the number of rows of lamps in lamp bank 12, and the number of columns of conductors is of sufficient number for use in setting up a message thereon, and the number of columns need not correspond to the number of columns of lamps in the lamp bank 12. The number of columns of conductors in panel 60 may be greater or less than the number of columns and lamps in the lamp bank. Referring now to FIG. 6, conductors 62, 64 and 66 are arranged longitudinally of panel 60 and correspond to the bottom three rows of lamps therein. Conductors 62, 64 and 66 are, respectively, connected to lines 68, 70 and 72 to the lamp bank 12, and the additional corresponding rows are connected by lines 74, 76, 78 and 80, see FIG. 2. Conductors 82, 84 and 86 are arranged at right angles to conductors 62, 64 and 66 and are electrically isolated therefrom within panel 60. Adjacent each intersection of row and column conductors a hole is positioned in panel 60. One of these holes is illustrated at 88. Hole 88 is positioned to intersect with the axis of conductor 64 and to be tangent to conductor 84, as is indicated in FIG. 6.

Pins are furnished to be positioned in the various holes, of which hole 88 is illustrative, so as to form the pattern therein which is to be shown as a moving message upon the lamp bank. A sufficient plurality of these pins are provided to adequately form the desired pattern. One of these pins is illustrated at 90 and comprises an outer conductor 92 in electrical contact with conductor 84 and an inner conductor 94 in electrical contact with conductor 64. Conductors 92 and 94 are mounted in a suitable housing 96 for the pin 90 so as to maintain them in proper physical relationship and insulate them from each other. Housing 96 contains diode 98 which permits the flow of electric current only from conductor 84 to conductor 64. Diode 98 is provided to prevent reverse current flow which would produce improper signals in lines 68 through 80. Thus, with the positioning of pin 90 in hole 88 the energization of conductor 84 causes energization of conductor 64. Similarly, if a pin is positioned in any of other holes in the column having the hole 88, the energization of conductor 88 will energize those corresponding row conductors, as well.

The circuitry of FIG. 4 is incorporated in the program matrix 14 as an integral part thereof and is arranged to sequentially energize the column conductors from left to right in the matrix. The successive matrix energization circuitry of FIG. 4 comprises even and odd reset lines 99 and 100, and even and odd gate lines 102 and 104, all of which are connected to be sequentially pulsed by the synchronous pulse generator 42 as is hereinafter described. Ground line 106 and power line 108 are also connected to the program matrix 14 for its proper energization and operation.

As is seen in FIG. 4 a plurality of identical pulsing units are arranged in the program matrix 14. Several of these pulsing units are generally indicated at 110, 112, 114, 116, 118 and 120. In view of the fact that these are identical, only pulsing unit 110 will be described in detail, with some description directed to the remaining numerically identified pulsing units. Referring now to pulsing unit 110, the anode of silicon controlled rectifier 122 is connected to odd reset line 100 while its cathode is connected to line 124. Line 124 is connected to incandescent lamp 126 which has its other side connected to ground line 106. Line 128 is connected from odd gate line 104 through resistance 130 and the anode side of diode 132 to resistance 134. Resistance 134 is connected to the gate of silicon controlled rectifier 122. Power line 108 is connected through manually operable pushbutton 136 to the gate of silicon controlled rectifier 122. Terminal 138, connected to line 124, is connected to the left most column conductor in the front of the program matrix.

Both even and odd reset lines 99 and 100 have power, 6 volts D.C. in this example, directed thereto so that they are normally energized. In the initial starting of the pulsing units, pushbutton 136 is closed to connect 6 volts to the gate of silicon controlled rectifier 122. This renders silicon controlled rectifier 122 conductive to permit power to pass from odd reset line 100 through silicon controlled rectifier 122, line 124 and lamp 126 to ground 106. Lamp tively high resistance when energized and, thus substantially 6 volts appears between termnial 138 and ground 106. Conductivity of silicon controlled rectifier 122 is maintained by its normal conductivity after the pushbutton 136 is released. The appearance of 6 volts at terminal 138 energizes the first column conductors in the front of the program matrix and through the pins 90 inserted in contact therewith cause energization of the appropriate row conductors and row lines 68 through 80. It is to be noted that pulsing unit 110 is connceted to odd reset line 100 and gate line 104, while pulsing unit 112 is connected to even reset line 99 and even gate line 102. Further, pulsing units are alternatively connected to these lines and are alternately called odd and even pulsing units.

The next functional occurrence is the energization of even gate line 102 with a positive pulse which supplies a positive 6 volts to the gates of all even silicon controlled rectifiers through the two resistances connected between the gate line and the gate of the silicon controlled rectifiers. Diode 140, connected between these resistances, has subsatntially 6 volts on its cathode side because of the illumination and resultant high resistance of lamp 126, so diode 140 is substantially non-conductive and the voltage is applied to the gate of silicon controlled recitfier 142 to render it conductive. Considering however, pulsing unit 118 which is also connected to even gate 102, the diode 144 is connected to ground through lamp 146 which is not illuminated and, thus, presents a low resistance path to ground line 106. Thus, insufficient voltage is developed to turn on silicon controlled rectifier 150. It is, thus, seen that only pulsing unit 112 is turned on, despite the fact that the even gate line 102 is connected to all even pulsing units. After the pulse in even gate line 102, which turns on hte pulsing unit 112, odd reset line 100 is pulsed off so that silicon controlled rectifier 122 becomes non-conductive. Now only silicon controlled rectifier 142 is conductive and

its terminal 152 applies power to the second column conductor in the front of the matrix.

The next event is the pulsing of odd gate line 104 with the energization of pulsing unit 114, in the manner previously described. The subsequent pulsing off of even reset line 99 renders silicon controlled rectifier 142 nonductive. Thus, properly timed clocking of the reset lines and gate lines provides uniform progressive energization of the terminals connected to the columns in the front of the program matrix board so as to cause sequential energization thereof. Timing is accomplished at the proper rate by rate control of the synchronous pulse generator 42 controlling the pulses. This is preferably adjustable so that the progressive energization of columns can be time controlled. It is clear that clocking is controlled so that only one column conductor is energized for a major portion of the time, and two are energized adjacent each other only long enough to permit reliable progressive energization. Pulsing unit 116 has its terminal 154 connected to line 156 which is connected to column conductor 86. Similarly, terminal 158 in pulsing unit 118 is connected to line 160 which in turn is connected to column conductor 84 and terminal 162 in pulsing unit 120 is connected to line 164 which in turn is connected to column conductor 82.

The right end of program matrix 14 is preferably made for plug in connection of further column conductors, and extensions of the row conductors together with additional pulsing units for the sequential energization thereof. The arrowheads on the right end of FIG. 4 schematically indicate this plug in equipment. By this means the program matrix can be extended to any desired length in accordance with the length of the moving message to be displayed upon the lamp bank 12. In order to permit continuous operation of the pulsing units, the pulsing unit 120 has line 166 connected between its silicon controlled rectifier and its lamp, and connected to terminal 162. Line 166 terminates in plug 168 which is connected externally by plug in line 170 to line 172 within the program matrix circuitry. Line 172 is connected to the cathode of diode 132 so that when pulsing unit 120 is energized, the signal is appropriately transmitted through line 172 back to pulsing unit 110 so that it is the next pulsing unit that is energized. Thus, it is seen that the column conductors in the program matrix are sequentially energized and the row conductors 68 through 80 are appropriately energized in accordance with the energized column conductor and the configuration of pins 99 in contact with both of them. Lines 68 through 80 connected to the row conductors forms signal harness 174 which extends to the locus of lamp bank 12.

Referring now primarily to FIGS. 2 and 3, the lamp bank 12 has a plurality of lamps arranged therein in rows corresponding to the number of rows of indications in signal harness 174. In this case, there are seven rows of lamps, for this number provides good definition of English letters and Arabic numerical characters. A sufficient number of columns of lamps are provided within the lamp bank 12 to provide an adequate length of display of the moving message for proper comprehension of the moving message. The number of columns does not necessarily correspond to the number of columns in the program matrix. All of the rows are indicated in FIG. 2, and the rightmost four columns in the lamp bank 12. These columns are generally indicated at 176, 178, 180 and 182. The rows are generally indicated at 184, 186, 188, 190, 192, 194 and 196. In view of the fact that reading is accomplished on a left to right basis in most languages, the lamps are illuminated with a particular element in a moving message in a right to left arrangement. Thus, the message proceeds sequentially from column 176 through columns 178, 180, 182 to the left end of the lamp bank. Accordingly, the energization of column 176 and the sequential energization of the columns proceeding leftwards therefrom will be discussed. It is clear, however, that the instant sign can be arranged in a vertical manner so that the moving message moves upward or downward, and can be arranged so that the message moves from left to right, should the particular circumstances suggest this direction of motion as being more desirable.

Lamp 198 is in column 176 and row 184, lamp 200 is in column 176 and row 186, lamp 202 is in column 178 and row 184, and lamp 204 is in column 178 and row 186. Lamps 198 and 200, as well as the remaining lamps in column 176, are connected on one side to line 206 which is connected to line 30. Line 30 is energized with 115 volts D.C., or other suitable voltage which is periodically pulsed off by means of interrupter 26 for the hereinafter described purpose. Similarly, lamps 202 and 204, as well as the remaining lamps in column 178, are connected to line 208 which is also connected to line 30. Similarly, all the remaining lamps in the remaining columns in the lamp bank are connected on one side to line 30 for the energization thereof.

A control unit is associated with each one of the lamps in the lamp bank. Thus, lamp 198 is connected to control unit 210 by means of line 212 and lamp 200 is connected to control unit 214 by means of line 216. The control units are also arranged in columns corresponding to the lamp columns and are directly associated with the lamps so that the control unit columns will be identified by the lamp column indicia. Thus, control units 210 and 214 form a column of control units which correspond to the lamps in lamp column 176. Similarly, lamp 202 is connected to control unit 218 by means of line 220 and lamp 204 is connected to control unit 222 by means of line 224. Similar connections are made between each of the lamps in a column with their corresponding control units. Thus, a control unit is provided for each lamp in the lamp bank.

Referring now to the particular circuitry of control unit 210, it is seen that line 80 from the program matrix is connected to lamp 225, which is also connected to ground line 242, and is connected to the cathode of diode 226. Line 228, connected to the anode thereof, is connected through resistance 230 to line 228. Line 228 is connected through resistance 232 and diode 234 to the gate of silicon controlled rectifier 236. The anode of rectifier 236 is connected to line 212 and its cathode is connected through line 238 and resistance 240 to ground line 242. Line 238 is also connected to cathode of diode 244 which has its anode connected through line 246 and resistance 248 to store gate line 56. Line 246 is also connected through resistance 250 and diode 252 to the gate in silicon controlled rectifier 254. Diodes 234 and 252 protect their associated silicon controlled rectifier from reverse current through the gate. Silicon controlled rectifier 254 has its anode connected to 6 volt reset line 40 and has its cathode connected to line 256. Line 256 is connected to one side of 6 volt lamp 258 which is connected on its other side to ground line 242. Each of the remaining control units in column 176 is identical to control unit 210, and each has an input from harness 174. Each of the control units in column 178 is identical to control unit 210, except that the inputs thereto are connected to the cathode of the 6 volt lamp control silicon controlled rectifier, such as line 256 in control unit 210. Thus, the control units in column 178 are each controlled from its corresponding row control unit in column 176, and each control unit in each succeeding column of control units is controlled by its corresponding control unit in the same row in the previous column. Thus, a description of the operation of control unit 210 suffices for each of the control units in lamp bank 12.

In the initial state it is assumed that none of the lamps in the control unit are illuminated. Furthermore, it is assumed that the letter R is signaled from program matrix 14 and, thus, each of the lines in harness 174 is energized corresponding to the upright on the left side of that letter. In the initial state voltage is applied to line 206, but in view of the fact that the silicon controlled rectifiers, particularly silicon controlled rectifier 236 in control unit 210 is non-conductive the lamp 198 remains non-illuminated. Thus, in this initial state line 206 is energized, read gate

line 58 is not energized, store gate line 56 is not energized and 6 volt reset gate line 40 is energized. Diode 226 is back biased with a 6 volt signal in line 80 from the program matrix and thus is non-conductive, and lamp 225 is energized. Synchronous pulse generator 42 generates an appropriate pulse in read gate line 58 with an appropriately large positive pulse to the bottom end of resistance 230 to cause diode 226 to become forward biased and then current will flow to resistance 232 and diode 234 to the control gate of silicon controlled rectifier 236, causing it to become conductive. Power will flow from line 206 through lamp 198, silicon controlled rectifier 236 and resistance 240 to ground 242. This causes line 238 to be slightly positive with respect to ground. It should be noted that if line 80 is not energized, the pulse in read gate line 58 will be dissipated through diode 226 to the relatively low impedance of line 80 provided by the non-energized lamp 225 which is connected to ground 242, and silicon controlled rectifier 236 will not be made conductive.

Since the letter R has been programmed and this first signal represents the left edge of the letter, the entire column of lamps 176 will be illuminated. Referring again to control unit 210, a small voltage is developed at the top of resistance 240 so as to create a back bias on diode 244. 6 volts is applied to reset line 40, and could have been continuously applied since the beginning of the operation cycle discussed. At this point in time a suitable pulse is applied to store gate line 56 and this pulse passes voltage through line 246, resistance 250, diode 252 to the gate of silicon controlled rectifier 254, thereby making it conductive. Current flow from line 40 passes through silicon controlled rectifier 254 to illuminate lamp 258 which has its other side connected to ground line 242. If diode 244 had not been back biased by the voltage in line 238, the application of the pulse to line 56 would be dissipated through diode 244 and the low impedance or resistance 240 to ground line 242, and thus silicon controlled rectifier 254 would not have been made conductive.

By this functional operation each small control lamp in the column corresponding to lamp 258 will be illuminated since its corresponding main lamp in lamp column 176 has been illuminated. The illumination of lamp 258 provides a high impedance path from line 256 to ground line 242, and voltage is maintained in line 256 to back bias the input signal diode in the next control unit. Thus, lamp 258 with its associated circuitry serves as a memory for lamp 198 as to its state, and serves as a signal source to control the subsequent state of lamp 202.

After lamp 258 is illuminated, interrupter 26 interrupts lines 206 and 208 so that the illuminated lamps in columns 176 and 178 are extinguished. Such extinguishment renders the corresponding silicon controlled rectifiers 236 non-conductive and ready for the next operation. Since the last pulsing of read gate line 58 the program matrix has advanced one column so as to provide suitable signals into the harness 174 for the next state of illumination of column 176. In the case of the letter R rows 184 and 190 would have a suitable signal in the harness, while the remaining rows would be non-energized to indicate no illumination.

A pulsing of read gate line 58 would then test for energization in the harness lines and illuminate the corresponding letters, and would also test for energization in the connecting lines between the control unit columns 176 and 178. Thus, since line 256 is connected to ground 242 through a high impedance in each of the rows in control unit column 178, all of the lamps in column 178 will light when the read gate line 58 is pulsed. Thus, it is seen that the external lamps are progressively lit from column to column and a signal put into any row at the right end of the lamp bank will proceed leftward along the sign in accordance with the clocking pulses. During the time of illumination of the main lamps, power is terminated to reset line 40 for a short while so as to cut off the silicon controlled rectifier 254 so that it is ready and store in its memory circuitry including lamp 258 the status of the corresponding column lamp the next time store gate line 56 is pulsed.

It is seen that the lamp 258 serves three important purposes. It provides a sampling resistance from measuring the conductivity state of silicon controlled rectifier 254, it provides visual read out of the memory status for trouble shooting purposes and it provides a low impedance path to ground when the memory circuitry indicates no illumination.

It is clear that while this preferred embodiment of the structure is described in detail, the preferred embodiment provides a single face sign and provides 6 volt memory circuitry, other appropriate voltages can be used in accordance with the particular details of a desired structure. Accordingly, the voltages may be different depending on the available voltages and upon the desired circuitry. It is most important, however, to recognize the fact that the memory lamps, of which lamp 254 is an example, operate upon the same pattern as the main lamp bank lamps, of which lamp 178 is an example. Thus, if a double faced sign is described, the lamps 258 could be arranged for greater illumination, such as being arranged for 115 volt excitation and could be readily displayed on the opposite side of the sign. In such a case, one side of the sign would serve as a memory for the other side and both sets of lamps would be selectively and progressively illuminated in accordance with the programmed moving message.

It is also desirable in some circumstances to illuminate the memory lamp of which lamp 258 is an example with 115 volts, and provide appropriate memory components to operate with this voltage, and place the memory lamps adjacent the main lamps. Thus, lamp 258 would be positioned close to lamp 198. By appropriate plus timing the lamps would be illuminated within a fraction of a second of the same period. This would intensify illumination of the sign face.

It has been previously stated that each of the control units 210, 214, 218 and 222 are identical, and this extends through the lamp bank. The last column, however, need not be identical, for the circuitry from diode 224 to the output 256 is not necessary therein, for no subsequent signal is necessary. However, if identical circuitry is desired for convenience of manufacturing and duplication, the entire circuitry of the control unit, as is illustrated in the control unit 210, could be incorporated therein, but the connecting line 256 furnishing the output signal need not be connected.

It is also clear that the moving message lamp bank 12 and its associated progressive circuitry could readily be programmed from another source than matrix 14. For example, suitable equipment associated with punched tape, or the like, could be used to selectively progressively energize the lines in harness 174 to provide an appropriate moving message input signal. If a moving message of fixed content is desired, no input is necessary. After the message is arranged in the circuitry by other means, the leftmost column is connected to actuate the rightmost column so that the message continuously circulates in the sign.

The preferred embodiment of this invention incorporates the use of silicon controlled rectifiers in the circuitry described in detail. However, it is clear that any electronic structure which is bi-stable is capable of being used to propagate through the rows a signal that a lamp is illuminated. Other bi-stable electronic devices include latching relays, thyratrons, tunnel diodes, magnetic amplifiers, vacuum tubes and transistors. Each requires its own particular nature of circuitry, but each can readily be used in place of the silicon controlled rectifiers 236 and 254 to create the memory propagation through the sign in accordance with this description. Furthermore, any of those devices could be used in suitable circuitry to provide the propagation through the program matrix 14 in accordance with this description.

This invention having been described in its preferred embodiment, it is clear that it is susceptible to numerous modifications and changes without the exercise of the inventive faculty and within the spirit of this invention. Accordingly, the scope of this invention is defined by the scope of the following claims.

I claim:

1. A moving message sign, said moving message sign comprising a plurality of lamps arranged in rows and columns, one of said columns of lamps being a first column of lamps and a column of lamps adjacent said first column of lamps being a second column of lamps, bi-stable energization means connected to each of said lamps in said first and second columns of lamps, individual illumination signal means connected to each of said bi-stable means connected to energize said lamps in said first column of lamps, read signal means connected to each of said bi-stable energization means connected to said lamps in said first column of lamps, pulse means for pulsing said read signal means so that said bi-stable means associated with each of said lamps in said first column of lamps becomes conductive when an illumination signal is impressed upon said bi-stable means associated with each of said lamps in said first column of lamps so that upon pulsing of said read signal means said lamps in said first column of lamps illuminate in accordance with the signals impressed by said ilumination signal means, a memory device associated with each of said bi-stable means, said memory device detecting illumination of said lamp associated with said bi-stable device, said memory device emitting a signal corresponding to illumination of said lamp associated with said bi-stable device, a further bi-stable device associated with each of said lamps in said second column of lamps so as to cause illumination of each of said lamps in said second column of lamps upon condition of said bi-stable device associated with each of said lamps in said second column of lamps, said signal emitted from said memory device associated with said first column of lamps being connected to said further bi-stable means associated with each of said lamps in said second column of lamps and read signal means connected to said further bi-stable device associated with each of said lamps in said second column of lamps so that upon emission of a signal from said memory device and pulsing of said read signal means said lamps in said second column of lamps illuminate when an illumination signal is emitted from the associated memory device.

2. The moving message sign of claim 1 further including means to extinguish each of said lamps in said first column of lamps.

3. The moving message sign of claim 2 wherein each of said further bi-stable means has a further memory device associated therewith.

4. The moving message sign of claim 3 wherein said memory devices have reset means associated therewith, said memory device reset means extinguishing the memory thereof so that each of said memory devices can redetermine and store in its memory the state of illumination of the lamp associated therewith.

5. The moving message sign of claim 4 wherein each of said memory devices includes a lamp therein, each of said memory device lamps being connected so that illumination thereof corresponds to illumination of the lamp bank lamp with which it is associated.

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JOHN W. CALDWELL, *Primary Examiner.*

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,389,389 June 18, 1968

James P. Minear

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

Column 4, line 40, after "lamp", second occurrence, insert -- 126 shows a low resistance when unenergized and a rela- --.
Column 9, line 36, "condition" should read -- conduction --.

Signed and sealed this 18th day of November 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents