

March 30, 1954

C. M. WILLIAMS ET AL
DISPLAY SIGN

2,673,976

Filed Dec. 19, 1952

3 Sheets-Sheet 1

Fig. 1.

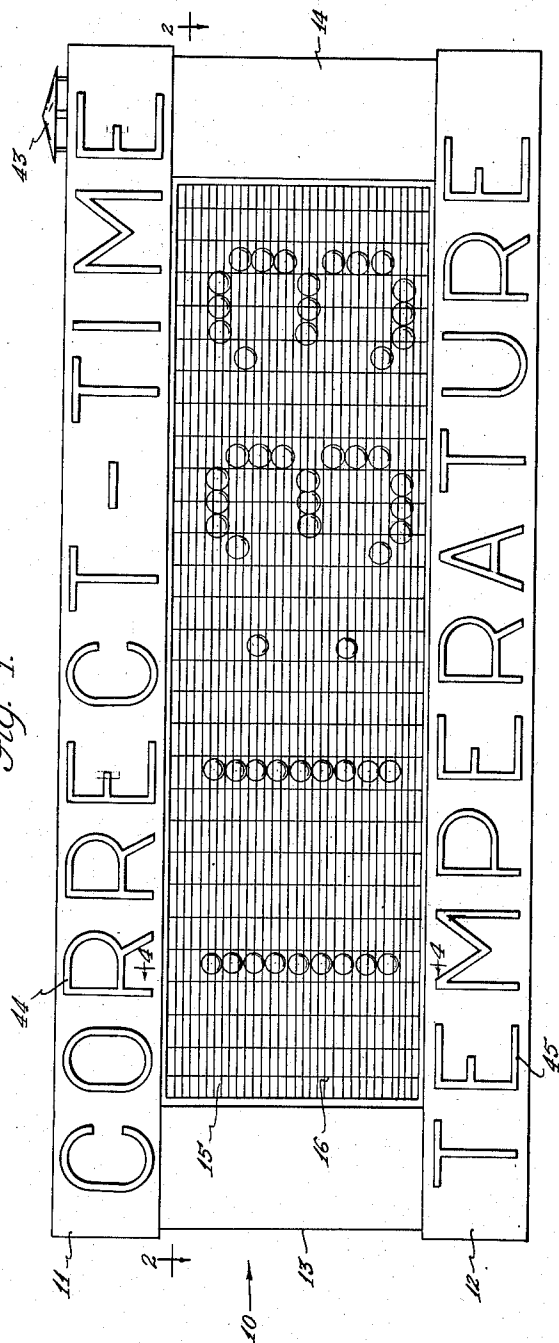
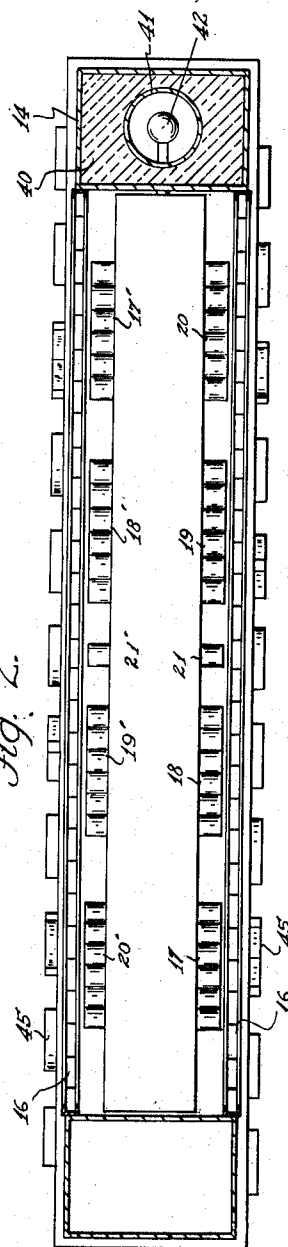


Fig. 2.



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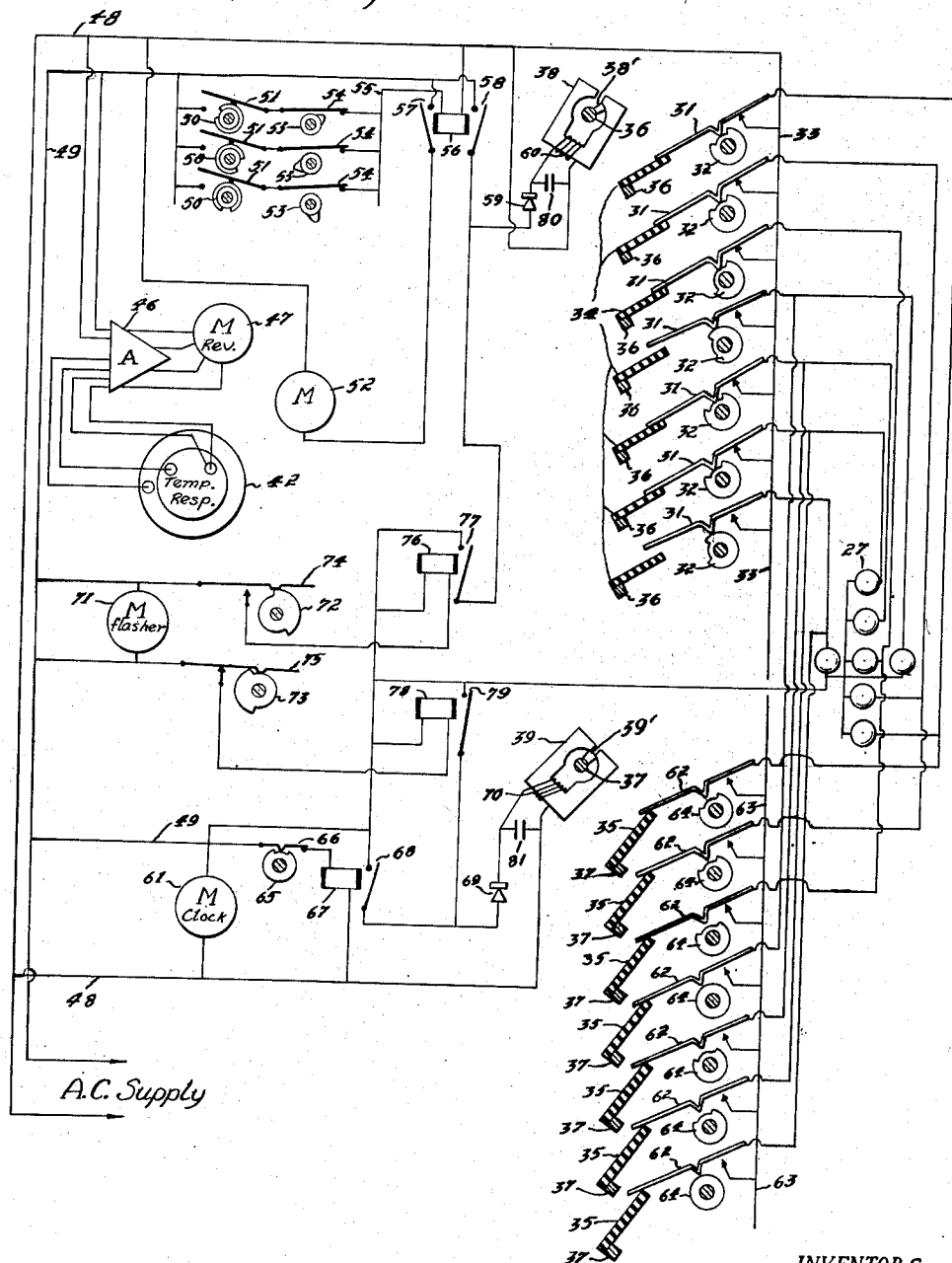
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Filed Dec. 19, 1952

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Fig. 3.



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Fig. 6.

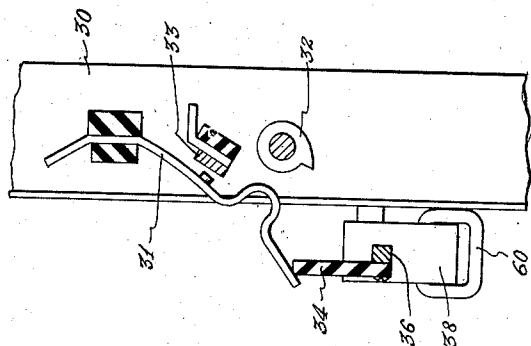


Fig. 5.

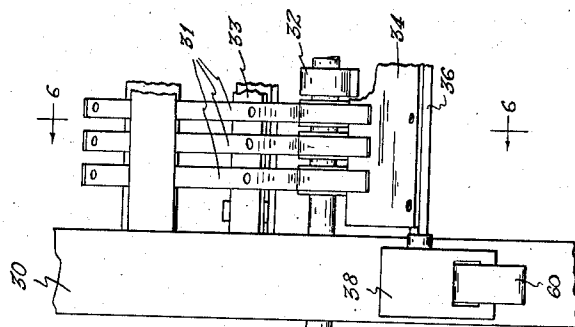
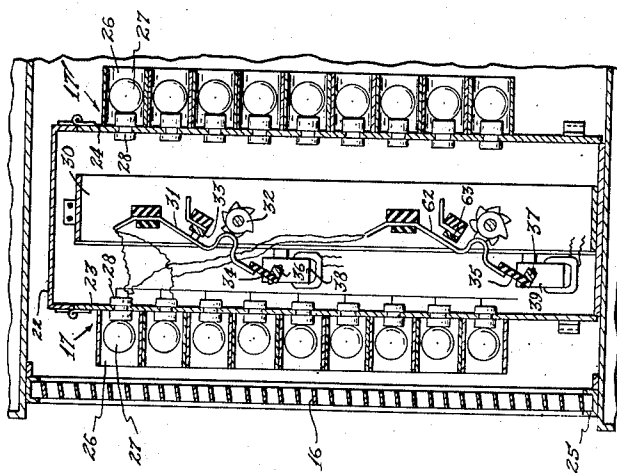


Fig. 4.



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2,673,976

DISPLAY SIGN

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Application December 19, 1952, Serial No. 326,842

4 Claims. (Cl. 340—338)

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The present invention relates to display signs and is particularly directed to a display sign wherein the correct time and temperature are alternately given at frequent intervals. It is the principal purpose of the invention to provide a display sign of this character utilizing the same banks of display lamps for both forms of information, in which two circuit controlling devices are utilized for connecting and disconnecting current supply to the lamps, one control device being time operated to energize at frequent intervals, appropriate lamps in the lamp bank to spell out the time display, the other control device being temperature operated to energize at frequent intervals appropriate lamps in the bank, including lamps that are energized by the first control device, to spell out the temperature display, the control devices each comprising spring closed contacts for the lamps used in spelling out the respective displays, a continuously effective function controlled means to lift the individual contacts necessary to leave the desired combination of lamps in circuit, together with a selecting means operable alternately to lift all of the spring closed contacts of the time controlled device and all of the spring contacts of the temperature controlled device, whereby to show the correct time and the correct temperature free of interference or intermediate flashing of the lamps.

The invention is illustrated in combination with a display structure involving sufficient lamps to show the four numerals necessary for spelling out the time and the three numerals necessary for spelling out the temperature. The detailed mechanisms by which the several numbers are properly spelled out, are not illustrated since they are well known in the art and do not form any part of our invention. However, the particular mechanisms which cooperate to effect direct control by the time clock and by the temperature change respectively, are illustrated in combination with a single simplified unit for spelling out one of the numbers.

The detailed nature and objects of the invention will be explained more fully hereinafter in connection with the accompanying drawings illustrating a preferred form of the invention. It should be understood, however, that the drawings and description are illustrative only and are not intended to limit the invention except insofar as it is limited by the claims.

In the drawings:

Figure 1 is a side view of a display sign embodying our invention;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a diagrammatic view illustrating the essential electrical elements and connections necessary to carry out the invention;

Figure 4 is an enlarged fragmentary sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a detailed view on an enlarged scale illustrating the spring contact lifting mechanism; and

Figure 6 is a sectional view taken on the line 6—6 of Figure 5.

Referring now to the drawings, the invention is shown as embodied in a display sign that is housed in a casing 10 which comprises an upper display panel 11, a lower display panel 12 and tubular end sections 13 and 14. These panels and sections provide a lamp bank enclosure 15 which is provided with grills 16 on opposite sides through which the lamp banks direct the light rays. The construction is such that the information is displayed in both directions as will be readily apparent in the showing of Figure 2 of the drawings. However since the lamp bank construction and the electrical connections are merely duplicated for both sides of the sign, a description of one side only will be given in detail. Figures 2 and 4 of the drawings illustrate the presence of lamp bank units 17, 18, 19 and 20 along one side of the sign and corresponding units 17', 18' 19' and 20' along the other side. Small individual lamp units 21 and 21' are provided to indicate the break between the hour and minute banks of the displays.

The several lamp banks are mounted on opposite side walls 23, and 24 of a housing 22 for the electrical and mechanical equipment. The housing 22 is mounted in the enclosure 15 and the side walls 23 and 24 are hinged so they can be swung upwardly and outwardly upon removal of the grills 16 to provide access to the equipment within the housing 22. The grills 16 are provided with channel frameworks 25 which set into the enclosure 15 at both sides and are secured in any suitable fashion. Each lamp bank, such as the bank 17, is made up of a multiplicity of cylindrical shields 26 that are secured to the side walls 23 and 24, lamps 27, and lamp sockets 28 that extend through the side walls 23 and 24 and provide for current connections to the lamps 27.

Within the housing 22 a framework 30 carries the operating equipment, including contacts 31, cams 32, bus bars 33, etc. for controlling the current supply to the lamps 27. The temperature responsive means, the time clock, the motors, and certain other parts are not shown in Figures 4, 5 and 6, but they are illustrated diagrammatically in Figure 3 where the essential electrical components and connections are shown in combination.

One essential device in the system comprises the means for lifting the lamp bank connecting contacts 31 from the corresponding bus bar 33 whenever the display is changed from time to temperature and whenever a change in time or temperature occurs in the illuminated period of the display of that particular information. This

mechanism comprises lift bars 34 and 35 of insulating material which are operated by rock shafts 36 and 37. The rock shafts 36 and 37 are controlled by electro-magnets 38 and 39 respectively. In actual construction, the length of a rock shaft 36 or 37 is often so great that in order to obtain accuracy and avoid twisting of the shaft, it is provided with an electro-magnet at each end, the two electro-magnets being connected in series so that both of them will be energized at once to turn the rock shaft and lift the bar 34 or 35.

It will be noted from Figure 2 of the drawings that the tubular section 14 of the casing 19 is provided with an insulating lining 40 and an inner tube 41. The purpose of this construction is to provide an insulated passage for a temperature responsive device 42 which will be open to the atmosphere and substantially protected from the heat generated by the lamp banks and electrical apparatus within the casing 19. The temperature responsive device 42 is protected from rain, snow, etc., by a hood 43 shown in Figure 1.

Figure 1 shows gaseous conduction tube displays 44 and 45 on the panels 11 and 12. It is obvious that various other displays of an informative nature may be used in connection with the lamp bank display provided in the enclosure 15.

Referring now in particular to Figures 3, 5 and 6 of the drawings, the detailed connections necessary for operation of the display sign to alternately display the correct time and temperature will be described. The temperature responsive device 42 is shown in Figure 3 as electrically connected to an amplifier 45 which in turn is connected to a reversible motor 47 and to the main current supply leads 48 and 49. The amplifier amplifies the electrical responses from the temperature responsive device 42 so as to operate the motor 47 in one direction or another upon temperature change taking place. The motor 47 drives a series of cams 50 which control switches 51 in such a fashion that only one of the switches 51 will be closed at a time. There are enough of the cams 50 driven by the motor 47, for each lamp bank used in displaying the temperature, to cause it to display the proper numeral. For the purpose of illustrating the present invention, however, we have shown only a part of the cams 50 and their corresponding switches 51. The temperature indication may go up or down, hence it is necessary to have a reversible motor 47 to record both the direction and the change in the temperature. A second motor 52 is used with the reversible motor 47 to control the transmission of a change in temperature to the lamp banks. This motor is directly under the control of the reversible motor 47. It operates the cams 32 that control the contacts 31 to the lamp banks for indicating temperature. The manner of controlling the motor 52 from the motor 47 consists in providing an additional set of cams 53 operably connected to the motor 52, and switches 54 associated with the cams 53. The arrangement is such that only one of the switches 54 will be opened by the cams 53 at any time. Only one of the switches 51 will be closed by the cams 50 at any time. Each of the switches 54 is connected to one of the switches 51 so that in order to get current from the line 49 through switches 51 and 54, both switches 51 and 54 have to be closed. When this occurs, current will pass from the line 49 over a conductor 55 to a relay 56. This will energize the relay and close its nor-

mally open contacts 57 and 58. When the normally open contact 57 is closed, the motor 52 is connected across the lines 48 and 49 and will operate until it brings the corresponding cam 53 into the right position to open the contact 54 that is in series with the closed contact 51. The motor 52 will then stop again and remain stopped until there is a change in the position of the cams 53, due to rotations of the motor 47 by a temperature change.

When the motor 52 operates, it also turns the cams 32 and if, for example, the temperature drops when it previously has been rising, the cams 32 would have to be rotated through several positions to bring up the next lower number in the lamp bank controlled thereby. This would cause the several intermediate numbers to flash on and off unless the circuit to the lamps were open. The lamps, however, must also serve the time indication at intervals between display of the temperature indication. In order to avoid flashing of the several lamps, the system provides a means for lifting all of the contacts 31 of the temperature indicating connection to the lamp banks while the motor 52 is operating. This is accomplished by energizing the electro-magnet 38 at the same time the motor 52 is energized. The normally open contact 58 of the relay 56 will, when closed, connect the line 49 through a rectifier 59 to the coil 60 of the electro-magnet 38. This will energize the electro-magnet 38 and cause it to attract the armature 38' so as to rock the bar 34 and lift all of the contacts 31 away from their cams 32 and away from the bus bar 33. As soon as the motor 52 breaks its circuit by moving its switch 54 that is in series with the closed switch 51 to open position, the relay 56 is de-energized and the contact 58 returns to open position, breaking a point in the supply circuit of the electro-magnet 38 to allow the armature 38' to return to open position. The bar 34 drops so that the contacts 31 may again ride on their cams 32 and make the proper contacts with the bus bar 33.

A clock motor 61 is utilized to provide the time control by which spring contacts 62 are connected to and disconnected from a bus bar 63 which is also connected to the power line 48. The time clock 61 runs continuously in the same direction and is suitably connected to cams 64 for opening and closing the contacts 62. The clock 61 is also connected to the cams 64 so that it will move them quickly at the end of each minute from one position indicating a certain numeral on the lamp banks to a second position indicating the next numeral in the passage of time. During the interval in which the time indication is changing, the bar 35 is lifted by all of the electro-magnet 39 to break engagement of all of the contacts 62 with their bus bar 63. The mechanism by which this action is accomplished comprises a cam 65, also driven by the clock 61, and a switch 66 which is closed once each minute to energize a relay 67. The relay 67, when energized, connects the power line 49 through contacts 68 and a rectifier 69 to the coil 70 of the electro-magnet 39. The other side of the coil 70 is permanently connected to the power line 48. Thus, each time the clock 61 moves its cams 64 ahead to indicate a new time reading on the lamp banks, the electro-magnet 39 is energized to attract its armature 39' and lift the bar 35 so that during the travels of the cam 64 to the next position, the contacts 62 will not be in engage-

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ment with the bus bar 63. This is only a momentary action and as soon as the cam 65 opens the switch 66, the relay 67 is de-energized and the contact point 68 opens to thus open a point in the circuit of the electro-magnet 39.

Alternate displays of the time and temperature indications on the lamp banks is brought about by utilizing the electro-magnets 38 and 39 to prevent both the time indicating contacts 62 and the temperature indicating contacts 31 from being closed at the same time. This control is carried on in conjunction with the operations previously described by which the electro-magnets 38 and 39 operate to open the lamp bank connections during the change over from one time indication to another and from one temperature indication to another. A motor 71 drives two cams 72 and 73 which control switches 74 and 75. The switch 74 and the switch 75 are both closed temporarily twice during each rotation of the cams 72 and 73 as will be evident by an inspection of the position of the cams in Figure 3. When the switch 74 is closed, it energizes a relay 76 to close a normally open contact point 77 and supply current to the coil 63 on the electro-magnet 38. Likewise when the switch 75 is closed, it energizes a relay 78 to close a contact point 79 and supply current to the coil 70 of the electro-magnet 39. Thus when both switches 74 and 75 are closed at the same time, the reading of both time and temperature will be broken since all of the lamp banks 31 and 62 will be lifted. As soon as one of the switches 74 or 75 opens, the corresponding electro-magnet will be deenergized and allow its bar 34 or 36 to drop back so that the contacts lifted by the bar will again ride on their cams and display the correct time or temperature under the control of the clock 61 and the temperature responsive device 42.

It is necessary to make doubly sure that the bars 34 and 35 will drop into released position whenever the electro-magnets are de-energized. To accomplish this purpose, the mounting is such that the spring contacts 31 and 32 tend to return the bars 34 and 35 to the proper released position. In addition the residual magnetism of the electro-magnets 38 and 39 which would tend to hold the arms 38' and 39' attracted is overcome by utilizing condensers 80 and 81 in parallel with the coils 60 and 70. Thus when the electro-magnet is energized, the condenser in parallel with it is charged and as soon as the supply circuit is broken, the condenser discharges through the electro-magnet coil to thereby offset the residual magnetism. This permits the armature of the electro-magnet to drop back freely.

It is believed that the nature and advantages of this invention will be apparent from the foregoing description. Having thus described our invention, we claim:

1. A display sign comprising a bank of lamps, a source of current supply, two circuit controlling devices for connecting and disconnecting current supply to said lamps, one control device being time controlled to energize at intervals, appropriate lamps in the bank to display the time, the other control device being temperature controlled to energize at intervals, appropriate lamps in the bank, including lamps that are energized by the first named control device, to display the temperature, each of said control devices comprising spring closed contacts for the lamps used in spelling out its respective display, continuously operable cams positioned to lift the individual contacts to leave the correct combination of contacts closed, and rocker bars beneath each group of spring closed contacts operable alternately to lift all of one group together, then all of the other group together.

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2. A display sign comprising a bank of lamps, a source of current supply, two circuit controlling devices for connecting and disconnecting current supply to said lamps, one control device being time controlled to energize at intervals, appropriate lamps in the bank to display the time, the other control device being temperature controlled to energize at intervals, appropriate lamps in the bank, including lamps that are energized by the first named control device, to display the temperature, each of said control devices comprising spring closed contacts for the lamps used in spelling out its respective display, continuously operable cams positioned to lift the individual contacts to leave the correct combination of contacts closed, rocker bars beneath each group of spring contacts, means responsive to time change to lift the rocker bar beneath the time indication control contacts, means responsive to temperature change to lift the rocker bar beneath the temperature indication control contacts and a separate energizing means for said responsive means operable alternately to lift all of one group together, then all of the other group together.

3. A display sign comprising a bank of lamps, a source of current supply, two circuit controlling devices each operable to selectively energize groups of lamps in said bank to display a changing function at intervals, each of said devices comprising groups of spring closed contacts for the lamps used in spelling out its respective display, continuously operable cams positioned to lift the individual contacts to leave closed the correct combination of contacts necessary to energize lamps to display the function, rocker bars beneath each group of spring closed contacts operable to lift the group together, an activator for each rocker bar, operable in response to a change in the function requiring a changed combination of closed contacts in the group to lift the rocker bar while the cams change the combination, and a third control device operable alternately to energize the activators in the first two control devices.

4. A display sign comprising a casing having upper and lower display panels and upright sections joining the ends of said panels, and forming therewith an enclosure area, grills closing the sides of the enclosure area, a housing seated in said enclosure between the grills, banks of lamps on said housing operable to display information through the grills when illuminated, one of said upright sections having a passage therein, heat insulated from the casing, a temperature change responsive device in said passage and means in said housing connected to said device for effecting changes in the lamp display in response to temperature changes.

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