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(54) **Indicator system for public means of transport**

(57) In an indicator system for buses etc., liquid crystal matrix display panels serve as indicator boards outside and inside the vehicle. The display may be controlled via a microprocessor by non-volatile programmable memory or by keyboard for non-standard messages. The display may be made up of a series of sub-panels, each e.g. a 5x7

matrix displaying one character as in Fig. 3, plugged into a printed circuit board. In dim light the panels may be illuminated. Boards outside the bus may display route number and destination, those inside additionally showing the next stop and other passenger information; advance of such display can be brought about by movement of the bus after the door has closed after each stop. The driver may also have a small display panel to copy the information displayed on the other panels.

Fig. 3

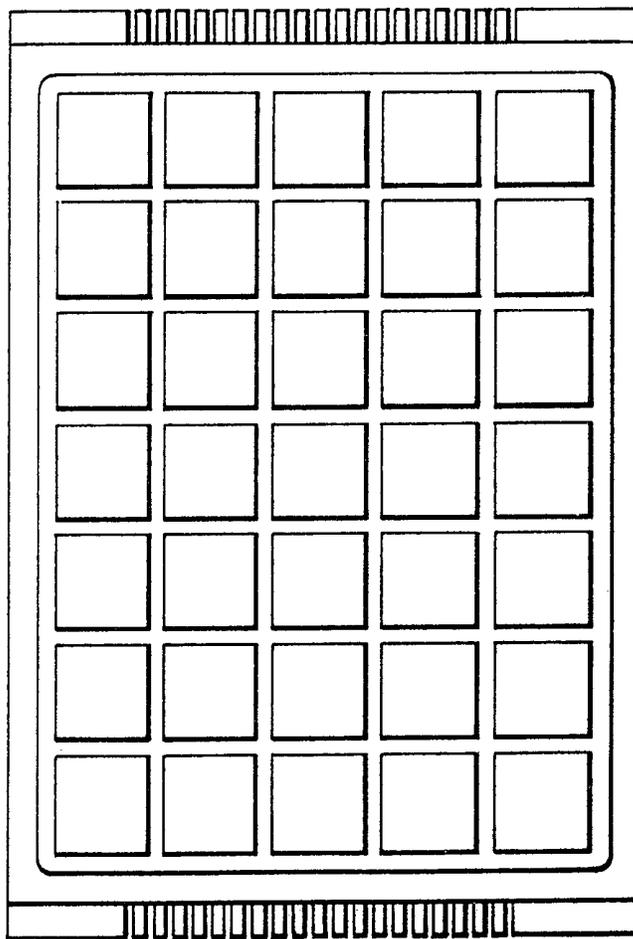


Fig. 1

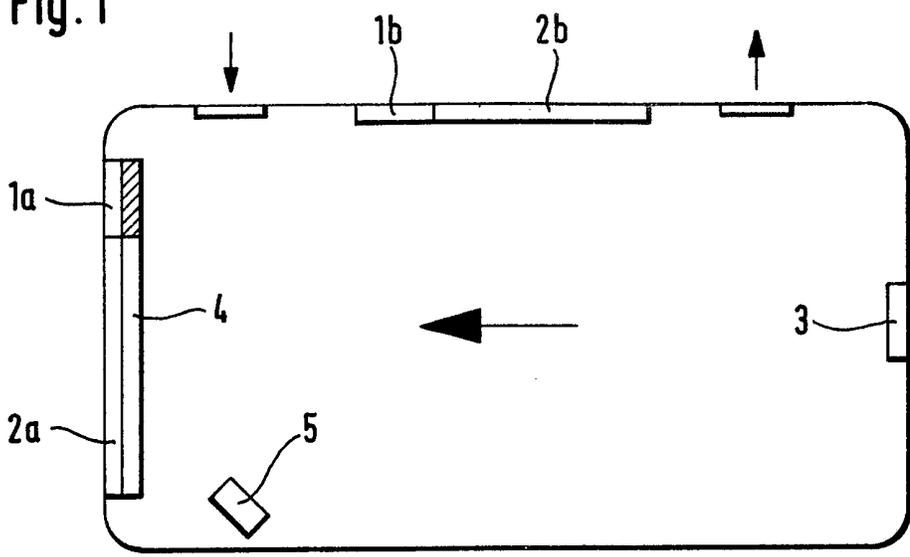


Fig. 3

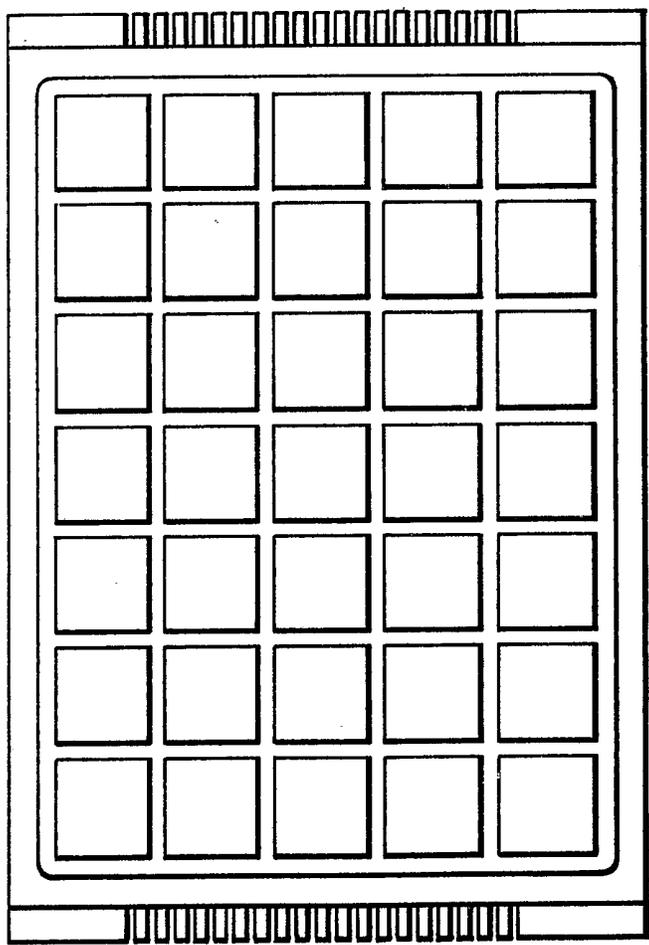
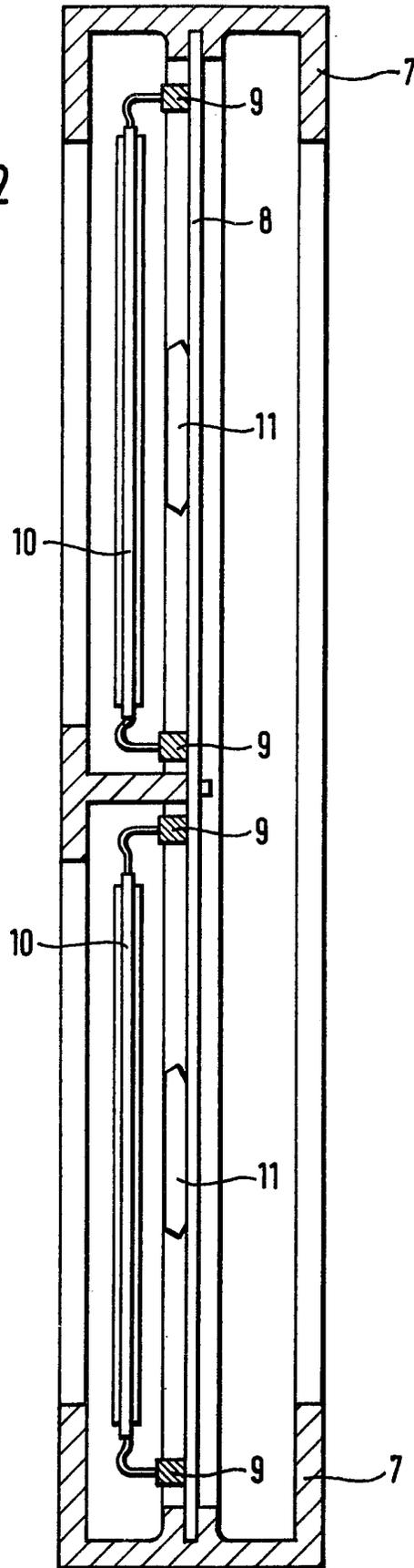


Fig. 2



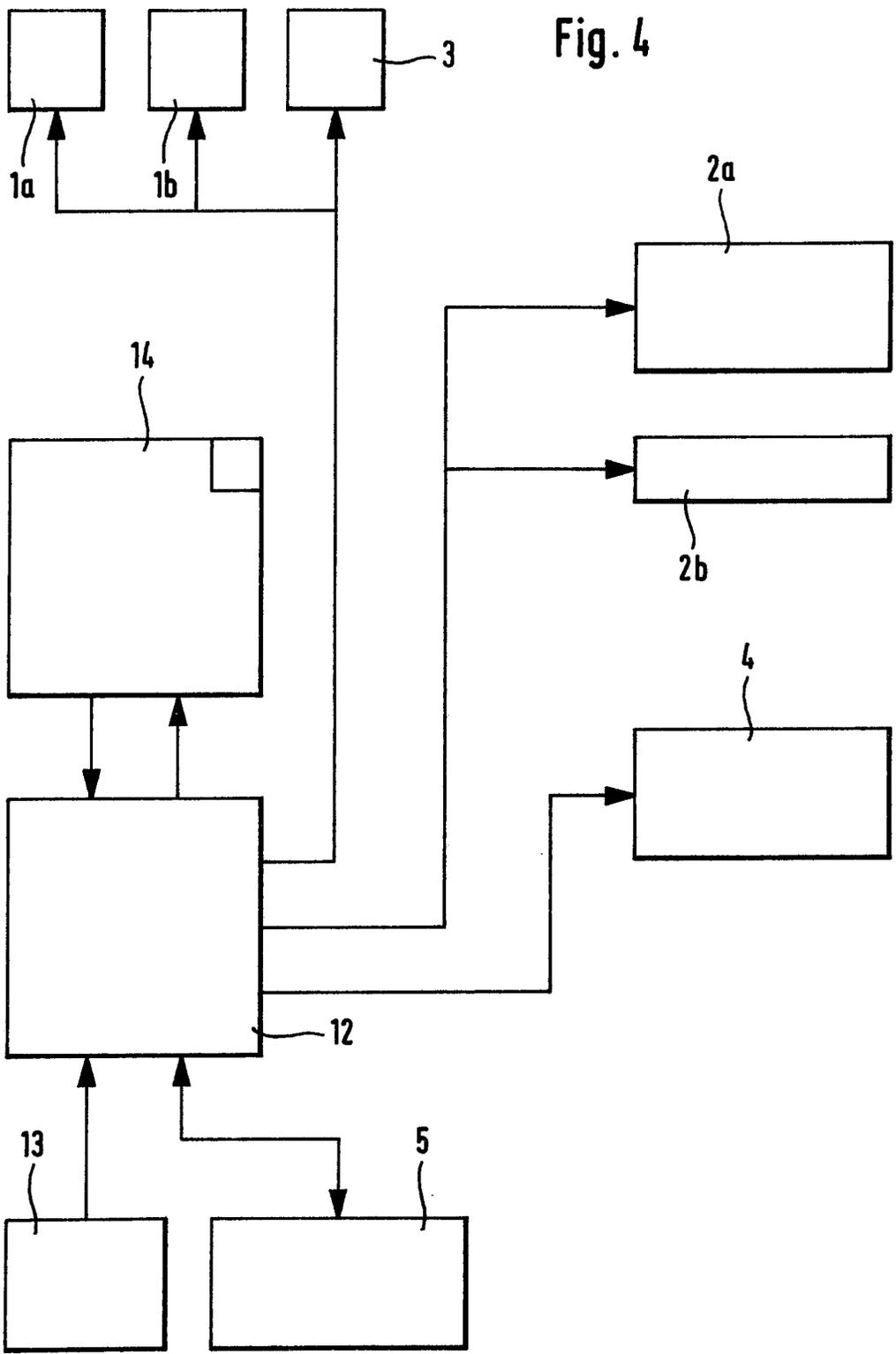


Fig. 4

SPECIFICATION

Indicator system for public means of transport

This invention relates to an indicator system for public means of transport. On trains and public transport vehicles an indicator board which indicates the route number, and the journey destination for example the terminus, is as a rule attached to the front of the vehicle. An identical indicator board is as a rule also located at the rear of the vehicle, whereas there are usually no indicator boards on the sides thereof, namely to face passengers waiting to board the vehicle. Particularly with older vehicles, the indicator boards are usually boards which are inserted by the driver or conductor into pockets provided for this purpose, and this work has to be carried out whenever the direction of travel is changed of otherwise whenever there is a change in the journey destination. The exchange of several such boards is time-consuming, and this factor encourages the number of indicator boards being kept as small as possible.

In another known indicator system, the announcements are printed on a wide web of material which is unwound from a first roller by means of a crank mechanism and wound onto a second roller. Even here, the changeover is time-consuming and laborious. Both known systems have the disadvantage that there is no guarantee that the various indicator boards on the same vehicle or train will agree with one another. At railway stations, indicator boards which are controlled electronically and are turned over like the pages of a book are frequently used, but here again a considerable time is required before the new setting is found, and even here incorrect displays can occur as a result of defects in the mechanism.

The invention achieves the object of producing quickly and without difficulty the particular display desired and of guaranteeing that, even in the case of a relatively large number of indicator boards, their displays agree exactly with one another.

This object is achieved, according to the invention, due to the fact that the indicator boards used are boards with a liquid-crystal display in a matrix arrangement. Liquid-crystal display in a matrix arrangement is already used in clocks and watches or other indicator instruments of small dimensions. Investigations have shown that it is possible to have displays with digits or letters of a size of approximately 150 millimeters high by applying the same system. To ensure that all the digits and letters can be represented so as to be easily legible, a 5x7-point matrix is sufficient, the individual matrix point having a size of approximately 20x20 millimetres.

According to the invention, the liquid-crystal display is controlled by a programmable memory, the storage capacity of which is sufficient for storing in it all the lines and destination data which occur.

Under these conditions, the read-out of

selected data from the memory to produce a specific indication on the liquid-crystal display can be carried out by means of a microprocessor of generally known design. This guarantees that by simply pressing a button the particular data called up from the program appear simultaneously on all the indicator boards, so that it is no longer necessary for the driver to change over several boards in succession. The subject of the invention also provides the possibility of likewise arranging inside the vehicle an indicator board controlled by the same memory unit, so that the passengers in the vehicle can ascertain that they have boarded the correct vehicle. In addition, however, the indicator board located inside the vehicle can also serve to indicate visibly the next station in question, whereas hitherto the next station has, as a rule, been announced in such vehicles only by calling out and, apart from the fact that the announcements are often very difficult to understand, foreigners who have no command or only a poor command of the language often do not know when the station which they want has been reached. However, such foreigners can read the caption on the indicator board, since, as a rule, they have made a note of the station which they want to reach.

This display of the next station can likewise be stored, so that pressure on a button is sufficient to cause the display to be changed. However, the change can also take place automatically, appropriately after the doors have closed and after a further distance has been covered, and this can amount to approximately 100 metres but can also be fixed as a period of time, for example 10 seconds. This ensures that the display of the next stop is not forgotten and is always shown shortly after a stop has been left.

Furthermore, to prevent any error, according to a further feature of the invention a smaller additional indicator board, which is controlled at the same time as the other indicator boards, can be located at the driver's position, so that the driver can always ascertain that the correct display, that is to say the display which he wants, has appeared on the indicator boards outside and inside the vehicle. The invention also provides the possibility of arranging a small printer keyboard at the driver's position, so that, even in the case of those indications which are not contained in the memory, for example with regard to special journeys or breakdowns necessitating detours, it is possible for the driver to display this on the indicator boards.

An exemplary embodiment of the indicator system according to the invention is illustrated in the Figures.

Figure 1 shows diagrammatically a section through a bus with an indicator system;

Figure 2 shows a vertical section through a two-part indicator board;

Figure 3 shows an individual 5x7 matrix;

Figure 4 shows, in a block diagram, the indicator system together with the control device.

In the vehicle shown diagrammatically in

Figure 1, for example a bus, it is envisaged that there is on the front face a board on which the number of the bus line is indicated at 1a and the journey destination, that is to say, for example, the terminus, is indicated at 2a. A corresponding board is located on the right-hand side of the vehicle. On this, the number of the bus line is indicated at 1b and the journey destination at 2b.

On the rear face of the vehicle, a smaller board 3, on which only the number of the bus line is indicated, is sufficient as a rule. Inside the vehicle there is an additional board 4 on which the next stop in question is displayed. However, this board can also serve to give other information to the passengers. The information on the boards 1a and 2a or 1b and 2b respectively can also be visible on the inside to the passengers present inside the vehicle. At the position of the vehicle driver there is a control and monitoring unit 5 which contains, on the one hand, the keys, by means of which the driver calls up from the memory the particular data desired, and, on the other hand, a smaller indicator board on which the same text appears as on the large indicator boards 1a—2a and 1b—2b respectively. As is evident from Figure 2, the twopart board illustrated there consists of a frame 7 into which a printed circuit board 8 is inserted in the middle. The actual indicator board 10 is attached to this printed circuit board by means of plug-in sockets. This indicator board contains for each letter unit a matrix appropriately with 5×7 matrix points, as illustrated in Figure 3. Since the liquid-crystal display is not luminous, but rests on the dark colouring of the individual matrix points, the display is clearly discernible under bright lighting, that is to say in daylight. Under poorer lighting, that is to say at dawn and dusk and in darkness, it is necessary to illuminate the indicator board by means of lamps 11.

Figure 4 illustrates the entire indicator system in a block diagram.

Overall control is carried out via a microprocessor of generally known design, for example in the form of a μ P card 8085. Any known programmable non-transient memory can serve as the memory. Thus, for example, an EPROM 2716 contains 128 words at 16 letters each. $24 \times 128 = 3072$ words, each of 16 characters can be programmed permanently on one storage card. This number would seem to be sufficient, even in the case of the largest urban transport networks, to store the numbers of the bus lines, the journey destinations and the

individual stops and to call them up manually by means of the driver's control and monitoring unit. As shown in Figure 4, the desired display is fed in from the driver's monitoring unit 5 by pressing a button, whereupon the appropriate data are read out from the memory 14 by the microprocessor 12, and the corresponding control signals are transmitted to the individual indicator boards 1a, 1b, 2a, 2b, 3, 4 which have already been described above.

Furthermore, it is possible to connect to the microprocessor 12 a further control device 13 which is linked to the door contact of the vehicle and which can initiate a change in the display either after the door has closed or, counting from the closing of the door, after a specific time has expired or a specific distance has been covered.

Claims

1. An indicator system for vehicular public means of transport including one or more indicator boards, characterised in that the indicator boards used are boards (10) having a liquid-crystal display in a matrix arrangement.
2. An indicator system according to Claim 1, wherein the said liquid-crystal display is controlled by a programmable memory.
3. An indicator system according to Claim 2 wherein selection from the said programmable memory and the supply of data to the indicator boards are carried out by a microprocessor.
4. An indicator system according to Claim 2 or Claim 3, wherein indicator boards controlled by the same said memory are located on the outside and inside of the vehicle.
5. An indicator system according to any of Claims 2 to 5, wherein inside the vehicle an indicator board (4) on which the next vehicle stop can be displayed, is provided.
6. An indicator system according to Claim 5, wherein the change in the display of the said next stop is effected automatically each time after the doors of the vehicle have closed and a short distance has been covered.
7. An indicator system according to any of Claims 2 to 6, wherein an additional indicator board (5) is located at the driver's position.
8. An indicator system according to Claim 1, substantially as hereinbefore described and illustrated in any of the accompanying drawings.
9. A public service vehicle incorporating an indicator system as claimed in any of Claims 1 to 8.