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JP-U- 5 941 385 JP-U-54 158 586
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73 Proprietor: **JAPAN TRAFFIC MANAGEMENT
TECHNOLOGY ASSOCIATION**
No. 6, Ichigaya-Tamachi 2-chome, Shinjuku-
ku
Tokyo 162(JP)

Proprietor: **KOITO INDUSTRIES, LTD.**
100, Maeda-cho Totsuka-ku

Yokohama-shi Kanagawa 244(JP)

Proprietor: **Stanley Electric Co., Ltd.**
9-13, Nakameguro 2-chome
Meguro-ku Tokyo 153(JP)

72 Inventor: **TSUZAWA, Masami**
14-15, Minamitsukushino 4-chome
Machida-shi Tokyo 194(JP)
Inventor: **TOMINAGA, Muneharu**
2-47-102, Shiohama 4-chome
Ichikawa-shi Chiba 272-01(JP)
Inventor: **KATO, Hiroshi**
3447, Fukaya
Ayase-shi Kanagawa 252(JP)
Inventor: **MORIKAWA, Tadahiro**
1184-2, Daigiri
Fujisawa-shi Kanagawa 251(JP)

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Inventor: **UCHIYAMA, Yoshinori**
16-22, Tsurukawa 3-chome
Machida-shi Tokyo 194-01(JP)

Inventor: **WAKI, Osamu**
1-18, Kitano 1-chome
Mitaka-shi Tokyo 181(JP)

⑦ Representative: **Dreiss, Hosenthien, Fuhlen-**
dorf & Partner
Gerokstrasse 6
D-70188 Stuttgart (DE)

Description

FIELD OF THE INVENTION

This invention relates to an information display apparatus which uses a large number of multi-colored light emitting devices as display elements to enhance visibility, visual attractivity, and attention evocativeness.

BACKGROUND OF THE INVENTION

So far information display boards have been proposed that are constructed to show specific display patterns by lighting many groups of light emitting devices, such as electric bulbs or light emitting diodes (LEDs), which are arranged in the checkerboard pattern to form specific display patterns.

Although the light emitting devices which are used for conventional information display boards only light electric bulbs or LEDs, and control their brightness or flicker them, they cannot emphasize the display detail visually beyond the above-mentioned level of their functions. Therefore, if various information boards of lighting type flood in display area, their visibility, visual attractivity, and attention evocativeness will be relatively reduced. Under such a condition, in order to attract special attention to the display of a specific information board, it is necessary not only to light specific display patterns and control their brightness or flicker them, but to change their lighting color properly. To satisfy such requirements, this invention uses "multicolored light emitting devices", which were devised previously by the same inventors as those of this invention, and applied to Japan Patent Office as Japan Utility Model Application No. 55-117524. The "multicolored light emitting device" represents a light emitting device in combination of one or more LEDs of different colors, such as red, yellow and blue, arranged on a substrate, connected with wires and fixed to a base shell having pins or a metal base to form a single device that can emit one color, or more colors simultaneously as required, and change the color to be emitted.

In FR-A-2 574 206 a display apparatus with light emitting devices (1) is disclosed which are arrayed in a checkered pattern layout merely by providing three fluorescent lamps in one case and covering the front face of said case with a dispersion plate.

According to BE-A-432 729 a display apparatus is provided with light emitting devices which are made up by a plurality of bulbs stored in cases and arrayed in a matrix pattern. However, the bulbs are set in the cases so that the same type of bulbs are arranged at a position to entirely display a specific

display pattern and are only enabled to form a plurality of display patterns with one light emitting device by turning on and off the bulbs. Therefore, this known apparatus has an extremely complicated construction for which a plurality of bulbs corresponding to required display patterns should be designed and used in each light emitting device and the positions of bulbs in each light emitting device differ with from other light emitting devices to display different display patterns with the same light emitting device.

DE-C-33 13 353 also discloses a display apparatus which is constructed so that bulbs are accommodated in frames partitioned in a matrix pattern. However, this reference does also not disclose the multicolored light emitting devices in accordance with the present invention and comparison with such a light emitting device rather clarifies that the multicolored light emitting devices are based on an extremely unique construction.

Further, this invention improves the above-mentioned device so that many devices can be arranged in a checkerboard pattern as a display unit of information board. That is, if plural LEDs of different colors are merely arrayed in groups and fixed on substrates in such structure that the LED groups are only fixed with base shell after wiring connection of them, the LED groups heat up during use and, the temperature rise lowers brightness of the LEDs and particularly shortens the life of LEDs, thus causing a breakdown of multicolored light emitting devices and also of the information display board. Furthermore, these multicolored light emitting devices require dust- and water-proof properties for outdoor use.

The purpose of this invention is, in view of the above-mentioned disadvantages of the prior art, to provide an information display apparatus that maintains a high level of visibility, visual attractivity and attention evocativeness by lighting specific display patterns, as needed, in a display unit in which many light emitting devices as display elements are arrayed in a checkerboard pattern, while changing the brightness of the patterns and flickering them, and also by changing the lighting colors of the patterns.

Another purpose of this invention is to provide an information display apparatus having a display unit in which multicolored light emitting devices, composed of many light emitting diodes contained in lamp cases in the structure that can dissipate heat from leads of devices whose temperature is liable to excessively rise, are arrayed in a checkerboard pattern, thus enabling effective dissipation of hot air in the lamp cases. Further another purpose of this invention is to provide an information display apparatus that can serve efficiently for out door use by making the exposed part on the front of mul-

multicolored light emitting devices dust- and water-proof.

DISCLOSURE OF THE INVENTION

An information display apparatus in accordance with the present invention is provided with a display unit that comprises many multicolored light emitting devices arrayed in a checkerboard pattern over the whole area of the opening of the front flame constructing the main body of the information display apparatus. Multicolored light emitting devices have such structure that when they are arrayed in a checkerboard pattern in a display unit, heat dissipation holes formed in the side plates of the lamp cases along leads of LEDs whose temperature is liable to rise are aligned in vertical and horizontal directions and provide air paths that can circulate air in the display.

Further, a transparent cover is mounted on the front of each lamp case, that is, on the light emitting side of LEDs, to provide the dust- and water-proof properties to the lamp case to prevent dust and water intrusion from the outside of the apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevation of information display apparatus embodying the present invention;
 Fig. 2 is a plan view;
 Fig. 3 is a side view, showing the inside structure of a lamp case with the shading hood partly cut off;
 Fig. 4 is an enlarged view of section A shown in Fig. 3;
 Fig. 5 is an enlarged perspective illustration which shows an example of display unit comprising arraying many multicolored light emitting devices in a checkerboard pattern;
 Fig. 6 is a plan view showing an embodiment of multicolored light emitting device;
 Fig. 7 is a plan view thereof;
 Fig. 8 is a bottom plan view thereof;
 Fig. 9 is a side view thereof;
 Fig. 10 is a cross-sectional view of B-B line in Fig. 9;
 Fig. 11 is a cross-sectional view of C-C line in Fig. 9;
 Figs. 12(a) and (b) are side views of a side plate of lamp case;
 Fig. 13 is a front elevation showing other embodiment of the multicolored light emitting device;
 Fig. 14 is a front view thereof;
 Fig. 15 is a cross-sectional view of D-D line in Fig. 13;

Fig. 16 is a partial sectional view showing modified embodiment other than mentioned above; and

Fig. 17 is a reference drawing showing examples of display patterns.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An information display apparatus according to the present invention will be hereinafter described with reference to the accompanying drawings.

In Figs. 1 to 12, the main body of an information display apparatus 1 according to the present invention is composed of an enclosure 2 and a front frame 5 which is fitted to the bottom edge of enclosure 2 by means of hinge 3 so as to turn freely but usually fixed with clamps 4 to the top edge of the front opening of enclosure 2.

The front frame 5 of main body 1 is fitted with a display board 6, and a hood 7 which interrupts rays of light from incidence on a display board 6 beyond the circumference of the board, especially from the upper side and both the right and left sides of the enclosure. The display board 6 is provided with many shading windows 8 which are arrayed in a checkerboard pattern over the whole face of the displayboard 6, and behind the shading windows 8 in main body 1, sockets or a base board 9 is arranged and many multicolored light emitting devices 10 are installed on this socket or base board 9 so that light emitting parts of multicolored light emitting devices 10 come to the same positions with shading windows 8.

If desired, a transparent plate 11 for dust- and water-proofing can be arranged between the back face of display board 6 and the light emitting part of multicolored light emitting devices 10, which are energized to flicker by a printed circuit board 12 for the energization.

Meanwhile, multicolored light emitting devices 10 have respectively such structure that LEDs 14, two or more for each of different colors, are arrayed and fixed on the surface of a substrate 15 and wired on the back face of substrate 15, which is provided with a specific number of electrodes 16 projecting out of the substrate.

In illustrated embodiment, diodes 14 of two different colors are used and arranged alternatively by color in groups of the square form in which two or more LEDs of each color are arrayed in every line. The number of LEDs 14, kinds of lighting color, combination of colors, etc. can be arbitrarily selected and changed in response to the purpose of using the information display board composed of the multicolored light emitting devices 10 but not limited to the above. Around the periphery of each group of LEDs 14 formed as above, a lamp case

17 is fitted to construct a multicolored light emitting device 10. The lamp case 17 is provided with heat dissipation holes 18 in the side plates of the lead section 13 of lamp case in which leads of the LEDs 14 are contained, so that when many multicolored light emitting devices 10 are arrayed in a checker-board pattern to construct a display unit of the information display apparatus, the heat dissipation holes 18 of the light emitting devices 10 arrayed in a line can communicate with the adjacent hole.

The high-temperature air generated in the section of leads 13 of LEDs 14 passes the heat dissipation holes 18 upward, preventing the temperature rise in the display unit of the information display apparatus. The lamp case 17 is composed of two side plates 17a and 17b that form a cross section in the shape of " ", and these side plates 17a and 17b are combined to form a square lamp case. Namely, side plates 17a and 17b are respectively provided with the above-mentioned heat dissipation hole 18 in the side plate which is not divided and with a groove 19 at the bottom of the side plate so that an edge of a substrate 15 can be fitted to the groove 19. Furthermore, of the two divided side plate, which form a single side plate for the lamp case 17 in close contact with each other, one divided part 17a has a hooking tongue 20 at the edge of its divided face and another divided part 17b a hooking edge 21, which catches the hooking tongue 20.

When the lamp case 17 is formed of divided side-plate parts 17a and 17b, the above-mentioned hooking tongue 20 is fitted to hooking edge 21 while making both divided faces come to close contact from the right and left, and a hook 20 provided at the edge of hooking tongue 20 is engaged with the end part of hooking edge 21.

When the lamp case 17 is divided, hook 22 is separated from the end part of hooking edge 21 by pushing hooking tongue 20 to the outside of side plate 17a, and thus side plates 17a and 17b can be parted.

For such assembly and separation, a guide piece 23 is fixed to either of divided side-plate parts 17a and 17b and a guide groove 24 is cut on other side of the divided side-plate parts 17a and 17b and fitted to the above-mentioned guide piece 23. The lamp case 17 may be constructed in a shape of cylinder. In this case, a group of plural LEDs 14 is inserted into a lamp case 17 from the rear end of the case, and the edge of the substrate 15 is fitted to the groove 19 of the lamp case 17, while widening the rear edge of lamp case. Heat dissipation holes 18 may be formed in all the side plates of the lamp case 17 so that the high-temperature air generated by leads 13 of LEDs 14 can flow in the horizontal direction as well.

Further, if desired, an opaque plate or filter for adjusting the lighting color of each LED group, or a lens (not illustrated) for enlarging the visible area of the LED group may be installed in the front opening of the lamp case.

In this invention, the lamp case 17 has a function as hood at the same time.

When the LEDs which constitute a multicolored light emitting device 10 receive irradiation of external light, it is liable to halation, depending on the irradiating direction, and if they are energized in such condition, the external light reduces the visibility of them remarkably. Generally, although the external light is shaded by the shading windows 8 of the display board 9, it can be also prevented also by making the edges of lamp case 17 project forward from the LED group 14. The length of the projection of the edge of lampcase 17 should be decided definitely according to the condition to use multicolored light emitting devices 10. However, generally the projection in the direction of irradiating external light is enough in the length of 10 to 15 mm.

Using the multicolored light emitting device 10 of such structure permits change of the shading windows 8 of display board 9 to a single display window.

Such information as characters, figures and marks which should be displayed on the display board 6, for example, such information as "warning declared" as shown in Fig. 17 is displayed by selecting one or more display patterns from several display patterns stored previously in semiconductor storage devices of control unit (not illustrated), sending out the control, signal according to the selected display pattern(s) to the display unit, lighting the multicolored light emitting devices corresponding to the display pattern(s) from all the multicolored light emitting devices 10, and controlling or flickering the light of the devices.

The above-mentioned control unit can be contained in enclosure 2 of the main body 1 together with other electrical devices, and if desired, the control unit can be arranged outside the enclosure 2.

Figs. 13 to 15 show another embodiment concerning multicolored light emitting devices in which transparent cover 25 covers the front opening of lampcase 17 in order to provide dust- and water-proof properties to the lampcase 17 and enhance the adaptability of the lamp case to outdoor installation.

As the cover 25, an opaque plate, colored filter, lens or the like can be used for various applications. In this example of the embodiment, lamp case 17 is constructed in the cylindrical form and six heat dissipation holes 18 are provided along the circumference of the lampcase, but the numbers of

the holes are not limited to six.

Further, in the given position on the circumference of the lampcase 17, usually in front of the heat dissipation holes 18, threads 26 is machined and at the end, a flange 27 is fitted, and a nut 28 is a set to the threads 26. The flange 27 and nut 28 are used for holding, in the mounting plate 29, multicolored light emitting devices 10 arrayed and fitted in the display unit, and each multicolored light emitting device 10 can be removed freely from the mounting plate 29 by loosening the nut 28. The structure for holding the light emitting devices in the mounting plate 29 is not limited to the combination of screw 26 and nut 28 as mentioned above.

Fig. 16 shows a modified example of above-mentioned embodiment related to the front opening of lampcase 17, and the edge of the opening is projected a little forward from cover 20 can prevent the lighting face of cover 25 from exposure to direct sunlight or other external light that reduces contrast between the light from the lighting face and external light and therefore also lowers the visibility of the information display of information display apparatus. Such purpose can be usually achieved enough by 10-15 mm forward projection of cover 25.

According to the present invention as disclosed above, the visibility, visual attractiveness and attention evocativeness of the information display apparatus can be enhanced by displaying in the desired brightness the specific display patterns selected from predetermined display patterns in response to the road information in the area where the information display apparatus of the present invention is installed.

Moreover, the high-temperature air generated in the lamp case is vented out through heat dissipation holes, temperature rise in the lamp case is controlled, and thus reduction of brightness of LEDs by high temperature can be prevented. In addition adaptability of the information display apparatus to outdoor installation can be improved by selecting the multicolored light emitting devices which excels in dust- and water-proof properties.

INDUSTRIAL APPLICABILITY OF THE INVENTION

The information display apparatus according to the present invention is suitable for application as road traffic information display apparatus installed outdoors and for other information display purposes.

Claims

1. An information display apparatus which is adapted to light up or flicker those groups of

multicolored light emitting devices (10) corresponding to specified display patterns stored in advance in semiconductor storage devices of a control unit which are selected from a large number of multicolored light emitting devices arrayed in a matrix pattern to form a display unit by a switching unit in order to display the specified information with drawings, symbols, character groups, etc., **characterized in that** said multicolored light emitting devices (10) which form said display unit are constructed so that a substrate (15) is provided with a plural number of types of one or plurality of light emitting diodes (14) for different light emitting colors which have a specified length of lead (13) on its or their upper surfaces and an electrode (16) on its or their rear surfaces and a lamp case (17) which holds said substrate (15) to be freely remountable and stores light emitting diodes (14), that the side plate of the lamp case (17) is provided with heat dissipation holes (18), which communicate horizontally and vertically, at a position said leads (13) of light emitting diodes (14) are located and in that the opening edge of the lamp case (17) at the incident direction side of light emitting diodes (14) projects forward from the front of the light emitting diodes (14), said control unit is adapted to form a desired display pattern by selecting one ore more desired display pattern from display patterns stored in advance in semiconductor storage devices and send out control signals related to this selected and formed display pattern to said display unit, and said switching unit is adapted to light up, flicker or brightness-adjust the groups of multicolored light emitting devices corresponding to the display pattern selected and formed by said control unit and switch over, as required, the colors of emitted lights from said groups of multicolored light emitting devices.

2. An information display apparatus in accordance with claim 1, characterized in that a cover (25) is fitted to the front side opening of said lamp case (17).
3. An information display apparatus in accordance with claim 2, characterized in that said cover (25) is a transparent plate, an opaque plate or a colored filter.
4. An information display apparatus in accordance with claim 2, characterized in that said cover (25) provides a lens function.

Patentansprüche

1. Informationsanzeigevorrichtung, die geeignet ist, diejenigen Gruppen von vielfarbigen lichtemittierenden Einrichtungen (10) zu erleuchten oder flackern zu lassen, die spezifizierten Anzeigemustern entsprechend, die vorher in einer Halbleiterspeichereinrichtung einer Kontrolleinheit gespeichert sind, und die aus einer großen Zahl von vielfarbigen lichtemittierenden Einrichtungen, die in einer Matrixform angeordnet sind, um eine Anzeigeeinheit durch eine Schalteinheit zu bilden, um spezielle Informationen mit Zeichnungen, Symbolen, Buchstaben, Gruppen, etc., darzustellen, **dadurch gekennzeichnet**, daß die vielfarbigen lichtemittierenden Einrichtungen (10), die die Anzeigeeinheit bilden, derart ausgebildet sind, daß ein Substrat (15) mit einer mehrfachen Anzahl von Arten von einer oder einer Vielzahl von lichtemittierenden Dioden (14) für verschiedene lichtemittierende Farben ausgestattet ist, die eine spezifizierte Länge von Leitungen (13) an ihrer oder ihren oberen Oberflächen und eine Elektrode (16) an ihrer oder ihren hinteren Oberflächen und ein Lampengehäuse (17), welches das Substrat (15) hält, um frei wieder aufsetzbar zu sein, und das die lichtemittierenden Dioden (14) aufnimmt, daß eine Seitenplatte des Lampengehäuses (17) mit Hitzeabzugslöchern (18) versehen ist, welche horizontal und vertikal miteinander in Verbindung stehen, in einer Position, in der die Leitungen (13) der lichtemittierenden Dioden (14) angeordnet sind und in der eine Öffnungskante des Lampengehäuses (17) auf der Seite der Einfallsrichtung der lichtemittierenden Dioden (14) über die Front der lichtemittierenden Dioden (14) vorsteht, wobei die Kontrolleinheit geeignet ist, ein gewünschtes Anzeigemuster zu bilden, in dem ein oder mehrere gewünschte Anzeigemuster aus Anzeigemustern, die vorher in der Halbleiterspeichereinrichtung gespeichert wurden, auswählt, und Kontrollsignale aus zur Anzeigeeinheit aussendet, die das ausgewählte und gebildete Anzeigemuster betreffen, und das die Schalteinheit geeignet ist, um die Gruppen von vielfarbigen lichtemittierenden Einrichtungen zu erleuchten, flackern zu lassen oder in ihrer Helligkeit zu adjustieren, welche zu einem Muster, das von der Kontrolleinheit ausgewählt und gebildet wird, gehören, und die Farben des Lichts, das von diesen Gruppen von vielfarbigen lichtemittierenden Einrichtungen emittiert wird, wie gewünscht zu schalten.
2. Informationsanzeigevorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß eine Abdek-

kung (25) für eine vorderseitige Öffnung des Lampengehäuses (17) angepaßt ist.

3. Informationsanzeigevorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Abdeckung (25) eine transparente Platte, eine opake Platte oder ein gefärbter Filter ist.
4. Informationsanzeigevorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Abdeckung (25) eine Linsenfunktion bereitstellt.

Revendications

1. Appareil d'affichage d'information prévu pour allumer ou faire clignoter les groupes de dispositifs émetteurs de lumière multicolores (10) selon des schémas d'affichage spécifiés stockés à l'avance dans des dispositifs de stockage à semi-conducteur d'une unité de commande, les dits émetteurs de lumière multicolores (10) étant choisis parmi un grand nombre de dispositifs émetteurs de lumière multicolores, agencés sous la forme d'une matrice afin de former une unité d'affichage au moyen d'une unité de commutation de façon à afficher l'information spécifiée avec des dessins, symboles, groupes de caractères, etc., caractérisé en ce que lesdits dispositifs émetteurs de lumière multicolores (10) formant ladite unité d'affichage sont construits de telle sorte qu'un substrat (15) est pourvu sur sa surface supérieure de plusieurs types d'une ou plusieurs diodes électro-luminescentes (14) pour des couleurs de lumière émise différentes ayant une longueur spécifiée de fil (13), sur sa surface arrière d'une électrode (16), et d'un boîtier de lampe (17) maintenant ledit substrat (15) et étant remontable librement, et renfermant des diodes électro-luminescentes (14), en ce que la plaque latérale du boîtier de lampe (17) est pourvue de trous de dissipation de chaleur (18), communiquant horizontalement et verticalement, situés en regard desdits fils (13) des diodes électro-luminescentes (14) et en ce que le bord ouvert du boîtier de lampe (17) du côté de la direction d'incidence des diodes électro-luminescentes (14) dépasse vers l'avant au-delà des diodes électro-luminescentes (14), ladite unité de commande étant prévue pour former un schéma d'affichage souhaité en choisissant un ou plusieurs schémas d'affichage souhaités parmi des schémas d'affichage stockés à l'avance dans des dispositifs de stockage à semiconducteur et pour envoyer à ladite unité d'affichage des signaux de commande liés à ce schéma d'affichage formé et choisi, et ladite unité de commutation étant

prévue pour allumer, faire clignoter ou ajuster la luminosité des groupes de dispositifs émetteurs de lumière multicolores correspondant au schéma d'affichage choisi et formé par ladite unité de commande et pour commuter, lorsque cela est souhaité, les couleurs des lumières émises par lesdits groupes de dispositifs émetteurs de lumière multicolores. 5

2. Appareil d'affichage d'information selon la revendication 1, caractérisé en ce que un capot (25) est monté sur le bord avant ouvert dudit boîtier de lampe (17). 10
3. Appareil d'affichage d'information selon la revendication 2, caractérisé en ce que ledit capot (25) est une plaque transparente, une plaque opaque ou un filtre coloré. 15
4. Appareil d'affichage d'information selon la revendication 2, caractérisé en ce que ledit capot (25) remplit une fonction de lentille. 20

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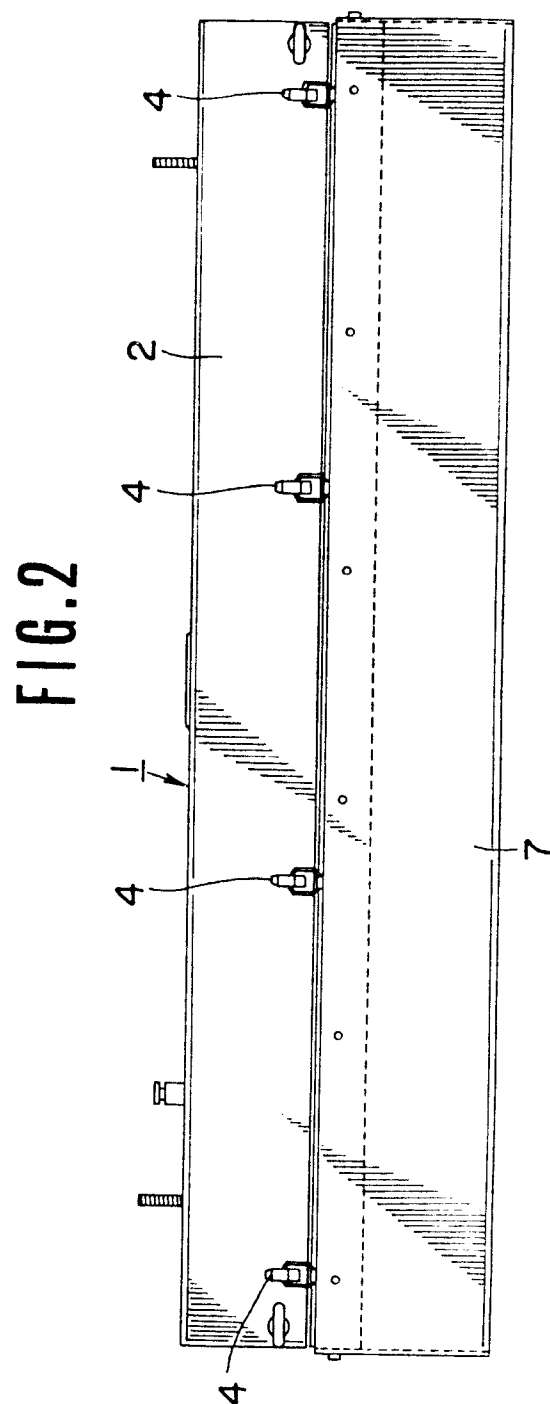
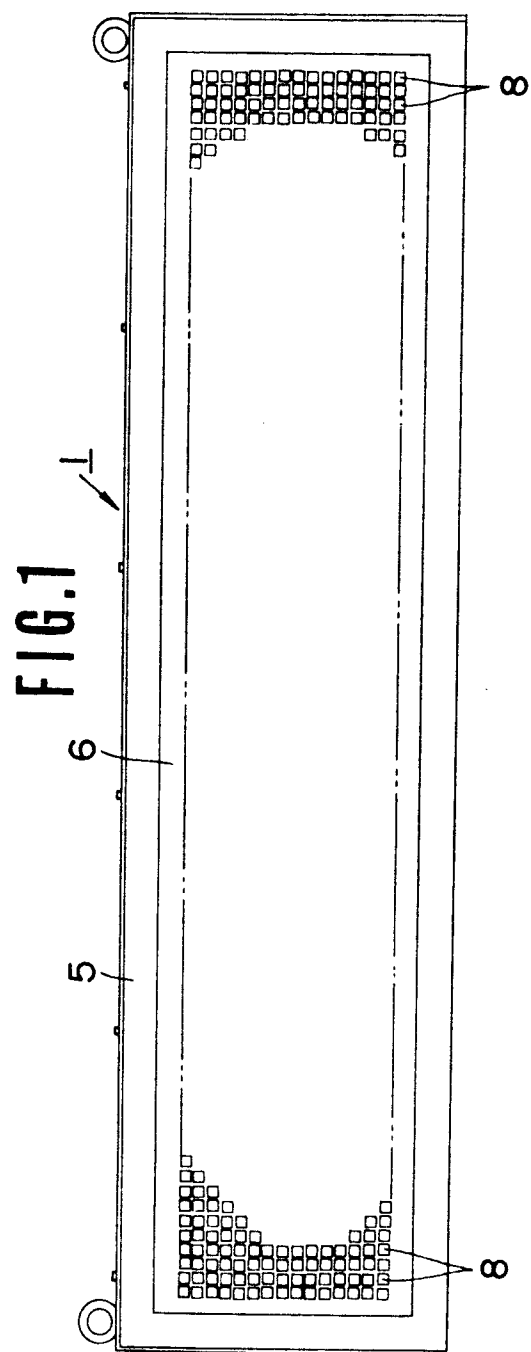


FIG.3

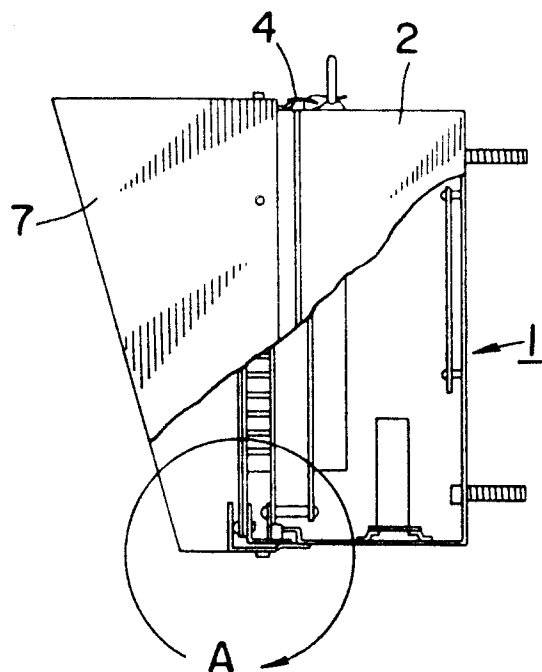


FIG.4

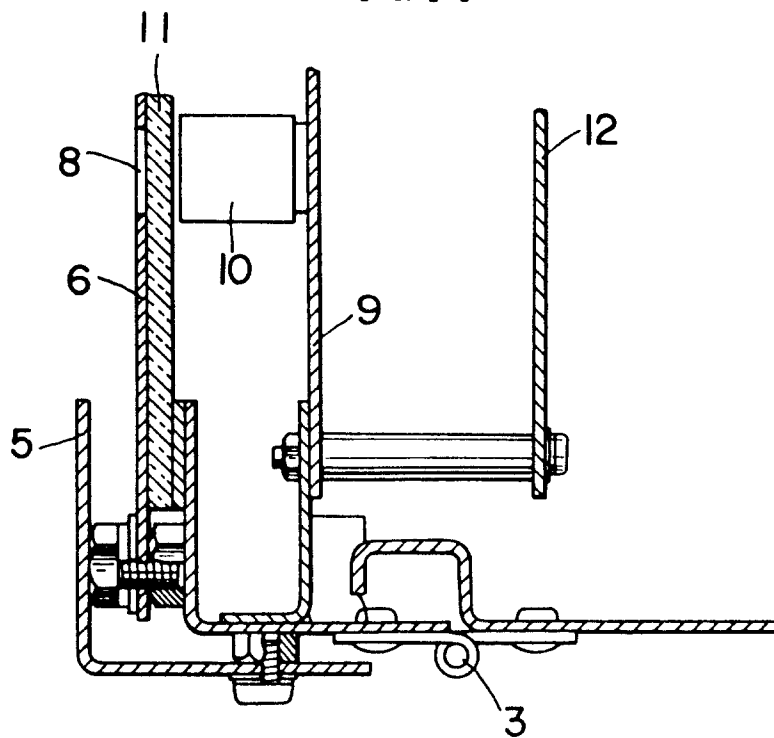


FIG.5

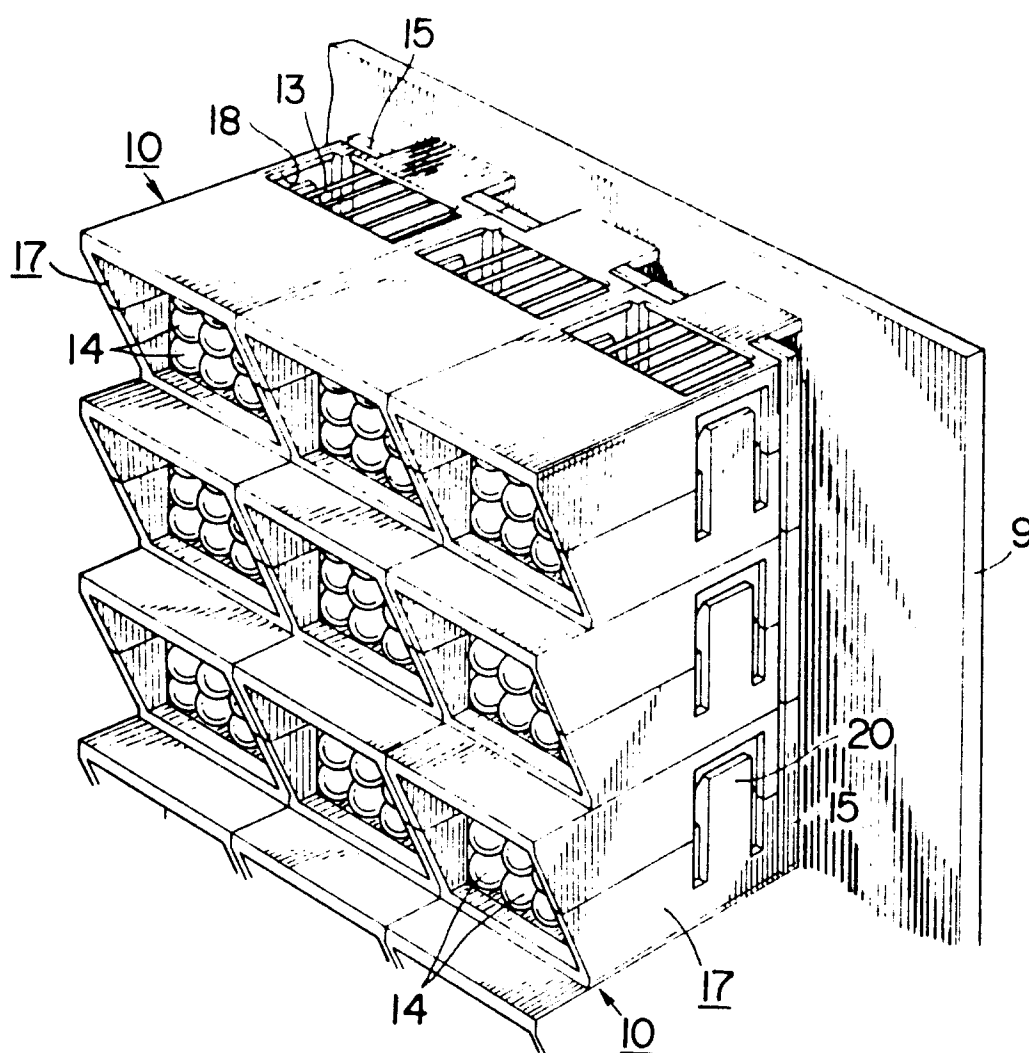


FIG.6

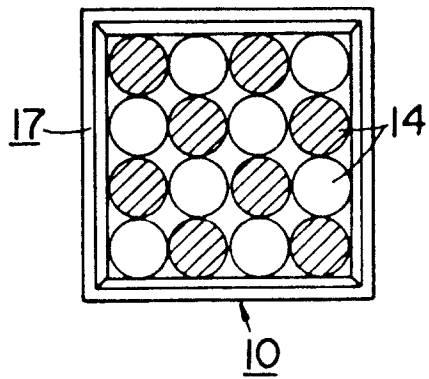


FIG.8

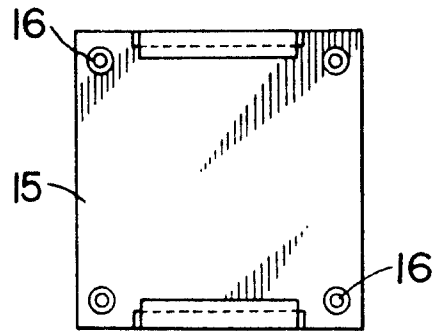


FIG.7

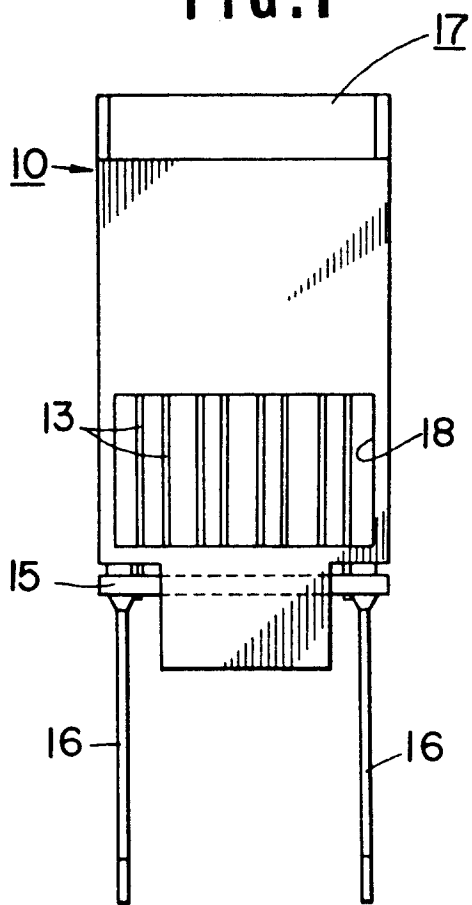


FIG.9

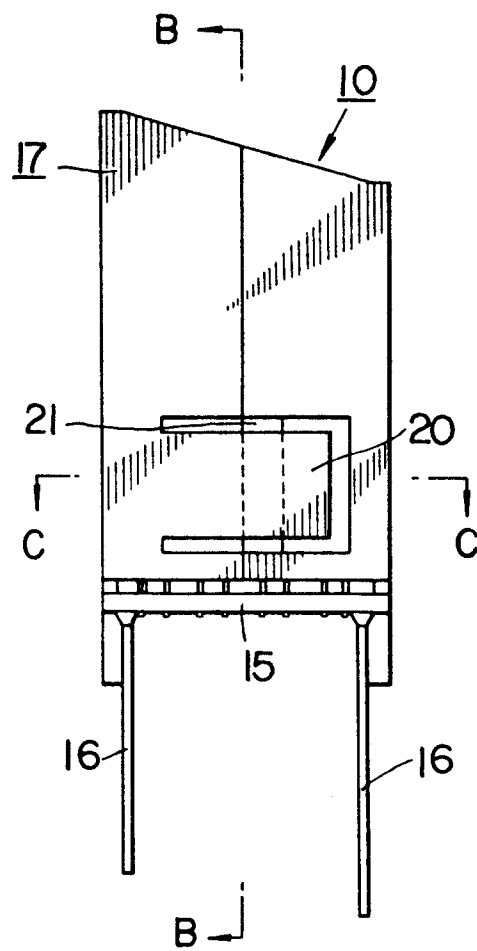


FIG.10

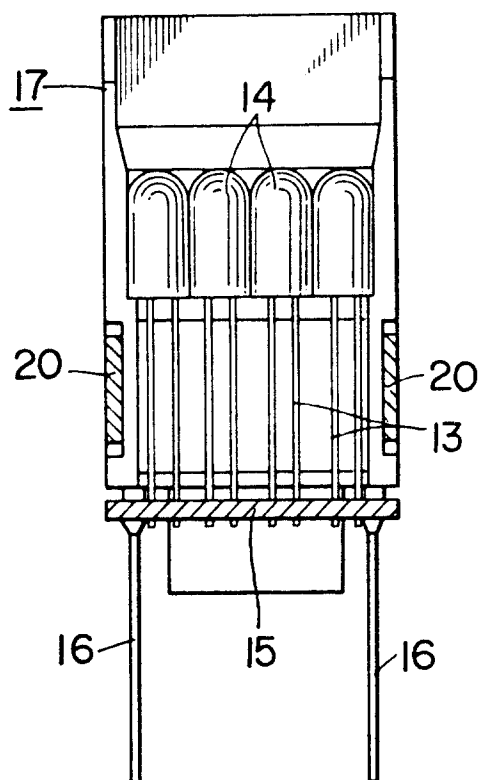


FIG.11

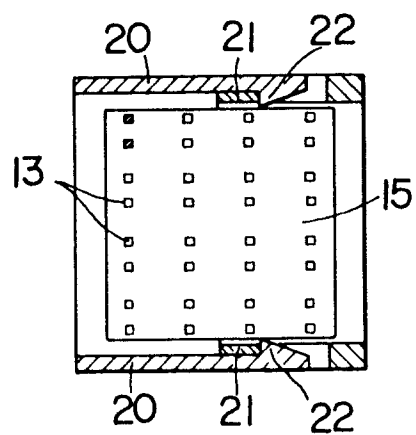


FIG.12

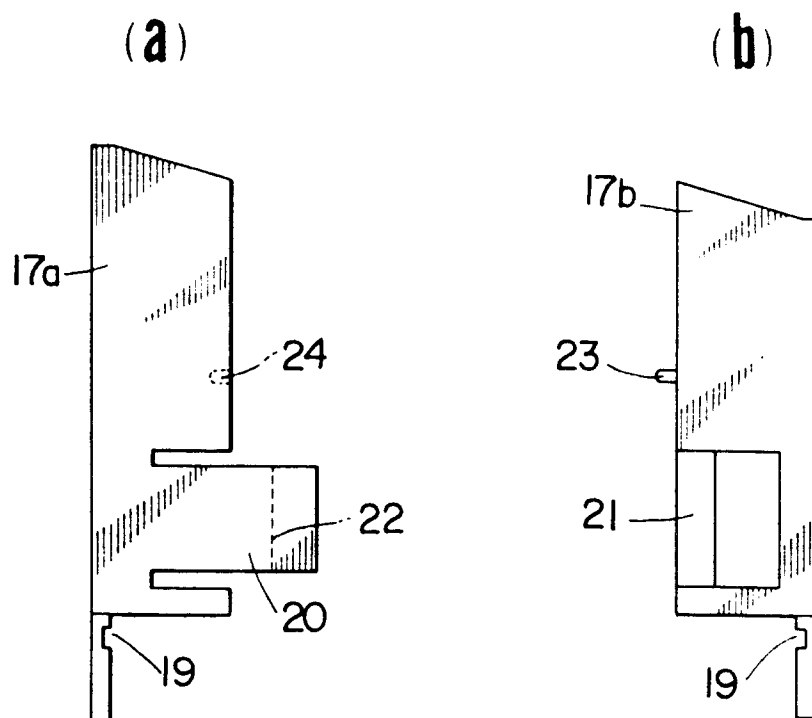


FIG. 13

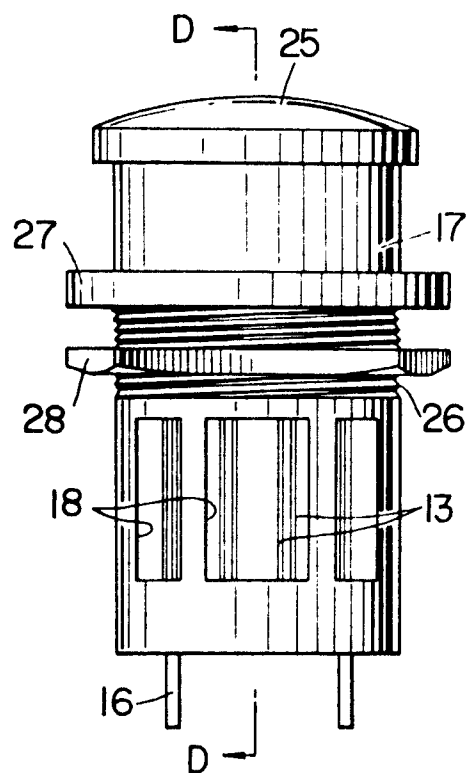


FIG. 15

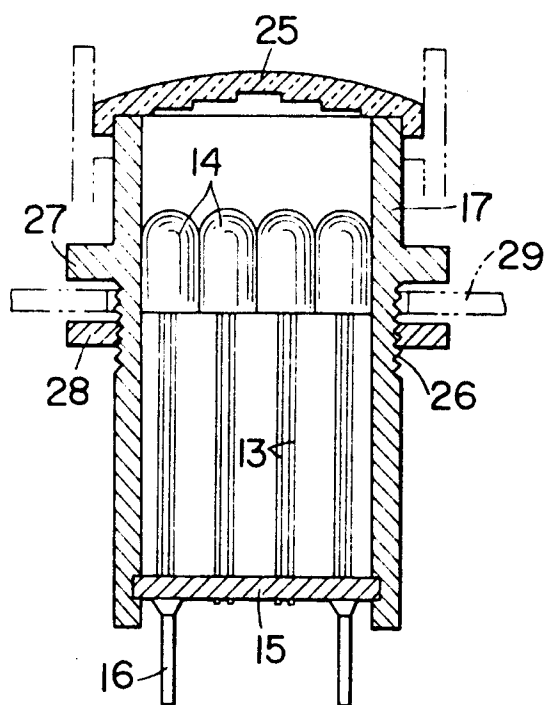


FIG. 14

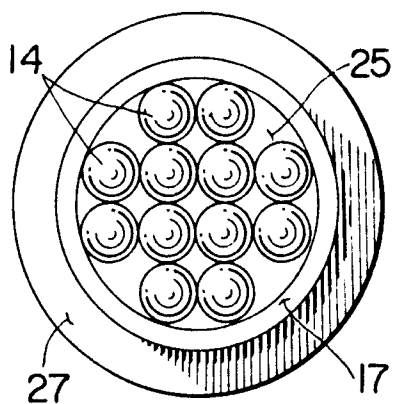


FIG. 16

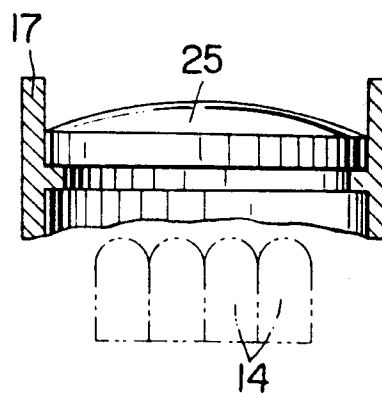


FIG.17

(A) 銀座四丁目

(B) 警戒宣言先令

(C) 火災通行止

(D) 事故渋滞中

(E) 渋滞 3 Km