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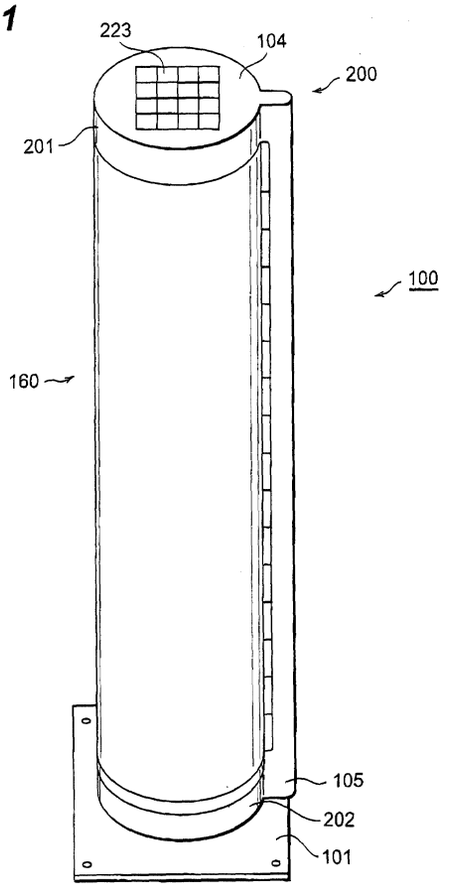
(54) Road display apparatus

(57) A road display apparatus comprises a base secured to a road, a display section having an outer peripheral surface of a body of revolution, with a display area for providing information, a wipe unit, secured to the base, having a wipe member in contact with and along the outer peripheral surface; and a driving unit for driving the display section to rotate, so as to clean said outer peripheral surface with the wipe member.

Fig.1



EP 1 156 466 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an improvement in a road display apparatus, installed at a roadside, in the middle of the road, and so forth, for providing by means of its display section a predetermined display for passers of the road such as pedestrians and drivers.

Related Background Art

[0002] Various kinds of display apparatus such as road signs are installed in roads. These kinds of display apparatus are installed at roadsides such as shoulder and at a center part of the road such as median strip so as to be easily seen by passers of the road. As a consequence, display sections of display apparatus are gradually soiled due to various reasons such as exposure to winds and rains, splashes of mud from vehicles passing by, and oily substances and the like attaching thereto from within exhaust gases from the vehicles, whereby their visibility to passers of the road gradually decreases.

[0003] Such a state can be prevented from occurring if the display sections are cleaned periodically. However, the number of road display apparatus is enormous, and many of them are disposed at higher places. Therefore, it takes a very large amount of labor and cost for such road display apparatus to be cleaned periodically.

[0004] For eliminating such circumstances, a system in which a wipe member rotates or moves on the surface of a display section may be employed. In this case, however, the moving wipe member may draw the interest of passers of the road more than necessary, so that there is a fear of causing various problems, e.g., distracting drivers from concentrating on driving, motivating children to play with it and break the wipe member, an so forth. Further, the wipe member will be hard to move if it is tangled with its surrounding plants or litter such as vinyl, whereby its visibility to passers of the road cannot be maintained anymore.

[0005] Hence, as means for overcoming such a problem, a cleaning apparatus utilizing a wind has been considered. Such an apparatus has a structure utilizing a windmill technique so as to transform a wind power into a continuous rotary motion, whose force is used for rotating a wipe unit for wiping the display section together with the windmill. Therefore, the windmill necessitates a plurality of blades. If the wind is strong, the blades of windmill may rotate too fast. Also, a large stress will act on a blade if it receives alternate winds directed opposite to each other. As a consequence, the apparatus of this kind has to be made larger in order to attain a structure which can endure strong winds such as those of typhoons.

[0006] Further, if the display section for providing information is made larger in such a road display apparatus, then the windmill and wipe unit increase their sizes, so that they are more likely to draw the interest of people. As people tend to touch the apparatus out of their interest and insert their fingers into the gap between the wipe unit and display section and the like, they are likely to be injured, or the wipe unit is likely to be broken.

[0007] Furthermore, vinyl, litter, and so forth are likely to tangle with driving parts of the windmill and the like, the gap between wipe unit and display section, and so forth, whereby the wipe unit may fail to move or may break.

[0008] On the other hand, moving parts such as the windmill and wipe unit are visible to passers of the road and draw their attention extraordinarily, so that a sufficient information providing function cannot be achieved.

[0009] Further, since the wipe unit is driven at the outside of the outer periphery of the display section, the ratio of the display section itself being hidden by the wipe unit becomes greater, which makes it difficult for passers of the road to acquire the displayed information.

[0010] Even when an electric motor or the like is utilized as a power source instead of the windmill, there is a possibility that the movement of the wipe unit draws the interest of people, thereby causing problems such as those mentioned above.

SUMMARY OF THE INVENTION

[0011] In view of the foregoing circumstances, it is an object of the present invention to provide a safe road display apparatus which can maintain favorable visibility without drawing the interest of people more than necessary.

[0012] One of the objects of the present invention is to provide, in a road display apparatus for providing information, a road display apparatus comprising a base adapted to be secured to a road, a display section having a outer peripheral surface with a display area for providing information, said peripheral surface being substantially a outer surface of a body of revolution, a wipe unit secured to said base, with a wipe member in contact with the outer peripheral surface, and a driving unit for driving said display section to rotate, so as to clean said outer peripheral surface with said wipe member.

[0013] In the above arrangement, since the display section is rotated around a predetermined axis and the wipe unit is fixed to a base, it is possible to automatically clean the display section without drawing the undesired attention and realize the provision of proper and clear information.

[0014] As the display section, not only those carrying out a display through an indicator such as letter and picture, but also those carrying out a display simply by means of a reflecting mirror and those improving the nighttime visibility by incorporating an illuminating device inside the columnar display section may be em-

ployed. In the case of those carrying out a display through an indicator as in the former in particular, though a part formed with the indicator may be directly rotated as the display section as a matter of course, a fixed part formed with the indicator may be provided with a surface layer portion such as a transparent cover so as to construct the display section. If the surface layer portion is rotated alone, then the position of indicator will not change with respect to passers of the road, whereby the visibility can further be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a view showing the appearance of a road display apparatus which is an embodiment in accordance with the present invention;
Fig. 2 is a partly cutaway perspective view showing the configuration of the road display apparatus shown in Fig. 1;
Fig. 3 is a longitudinal sectional view showing the configuration of the road display apparatus shown in Fig. 1;
Fig. 4 is a transverse sectional view showing the configuration of the road display apparatus shown in Fig. 1;
Fig. 5 is a view showing the configuration of the control unit of the road display apparatus shown in Fig. 1; and
Fig. 6 is a view showing the configuration of another example of the control unit of the road display apparatus shown in Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] In the following, the present invention will be explained with reference to drawings which illustrate embodiments.

[0017] Figs. 1 to 5 show a first embodiment of the display apparatus in accordance with the present invention.

[0018] Fig. 1 is a view showing the outer configuration of a road display apparatus 100 which is an embodiment in accordance with the present invention.

[0019] As depicted, the display apparatus 100 is to be installed at a roadside such as shoulder or a center part of a road such as median strip; and comprises an attachment plate 101 for securing the road display apparatus 100 onto the road or the like by means of anchor bolts or the like, a wipe unit 200 secured to the attachment plate 101, and a display section 160 whose outer peripheral surface is slidable with respect to the wipe unit 200. Disposed at the upper part of the wipe unit 200 is a solar cell 210 which receives light from the sun and generates electric power.

[0020] The wipe unit 200 has holders 201, 202 for covering the upper and lower parts of the display section 160, respectively, and is configured so as to keep a predetermined positional relationship with the display section 160.

[0021] Fig. 2 is a perspective view showing a mechanical inner structure of the road display apparatus shown in Fig. 1, whereas Fig. 3 is a longitudinal sectional view showing a further detailed mechanical structure of the road display apparatus shown in Fig. 1.

[0022] The structure of the road display apparatus of the above-mentioned embodiment will be explained with reference to the above-mentioned drawings. As shown in Figs. 2 and 3, a pillar 103 is secured to the upper face of the attachment plate 101 substantially at the center thereof so as to extend vertically upward. The pillar 103 has a substantially cylindrical form. A reinforcement board 202 for reinforcing the connection between the pillar 103 and attachment plate 101, i.e., fixation and perpendicularity, is secured onto the attachment plate 101.

[0023] An auxiliary pillar 110 for mounting individual brackets is attached to the pillar 103 so as to cover the latter.

[0024] On the other hand, the display section 160 is constituted by a cylindrical display region having an information display area, and lower and upper brackets 130, 131 covering the lower and upper parts of the display region, respectively. The lower and upper brackets 130, 131 are rotatably held with respect to the auxiliary pillar 110 by way of bearings 132, 133, respectively. Secured to the lower and upper brackets 130, 131 are respective passive gears 134, 135 for rotating the display section 160.

[0025] Inside the display section 160, a display section rotating motor 220 for rotating the display section 160 is secured to the auxiliary pillar 110 by way of a motor bracket 108.

[0026] Secured to the driving shaft of the display section rotating motor 220 is a motor-side gear 141 for rotating the display section. On the other hand, a rotation transmission shaft 143 for the display section vertically extends inside the display section 160. Secured to this shaft 143 is a gear 142 on the rotary shaft side of the display section. Fixed at the lower and upper parts of the rotation transmission shaft 143 are display section driving gears 144, 145 in mesh with the rotary passive gears 134, 135 secured to the lower and upper brackets 130, 131, respectively. The rotation transmission shaft 143 is held rotatable with respect to the brackets 106, 107 by way of rotary bearings 146, 147. A display section rotating shaft brackets 106, 107 for holding the rotation transmission shaft 143 is rotatably held with respect to the pillar 103. The display section rotating shaft brackets 106, 107 are secured to the auxiliary pillar 110.

[0027] As a consequence of such a configuration, the rotary driving force of the display section rotating motor 220 is transmitted to the rotation transmission shaft 143 by way of the motor-side gear 141 secured to the driving

shaft of the motor 220 and the gear 142 on the shaft for rotating the display section, and further to the passive gears 134, 135 for rotating the display section. Here, since the passive gears 134, 135 are secured to the lower and upper brackets 130, 131, and the lower and upper brackets 130, 131 are secured to the display section 160. Since the passive gears 134, 135 are meshed with the display section driving gears 144, 145, the rotation of the rotation transmission shaft 143 causes the rotation of the passive gears 134, 135 around the pillar 103. Therefore, the display section 160 secured to the upper and lower brackets 130, 131 is moved with respect to the wipe section 200.

[0028] In the road display apparatus of this embodiment, the wipe unit 200 is provided with a longitudinally extending container groove 300a at a part opposing the surface of display section 160 as shown in Fig. 4. The container groove 300a is a single recess extending along the axial center of rotation of the display section 160, and contains and holds a plurality of wiper blades 140 arranged in series therein. Each of wiper members 150 is molded with a soft, elastic resin material such as rubber, and has a transverse cross section with one end part exhibiting a pointed form. With each pointed end part opposing the surface of the display section 160, the wiper members 150 retractably engage the container groove 300a.

[0029] A plurality of pairs of permanent magnets 151, 152 are inserted between the container groove 300a and the individual wiper members 150. The paired permanent magnets 151, 152 are attached to the inner wall of the container groove 300a and the base end face of wiper members 150 such that the same kinds of poles oppose each other, whereby repulsive forces of magnetism acting on each other press the individual pointed parts of wiper members 150 against the outer peripheral surface of the display section 160. Hence, as the display section 160 rotates, the wiper members 150 clean the outer peripheral surface of display section 160.

[0030] Further, a display section internal illumination lamp 250 is disposed inside the display section 160, and illuminates the information display area of the display section 160 from inside, so that the information display area can be projected outside even in the nighttime. The internal illumination lamp 250 is securely held with the auxiliary pillar 110 by way of a bracket 271 or the like. One or a plurality of such illumination lights may be provided.

[0031] Though not clearly depicted, the display section 160 shows an indicator corresponding to the information to be given to passers of the road, and has an information display area displaying one composed of a letter, a mark, and/or a characteristic color. In view of the visibility in dark places and in the nighttime, the display section 160 may employ a reflecting member so as to actively reflect external light such as that of headlights or employ a transparent or semitransparent member such as glass or resin so that an internal light source such as fluorescent light and introduced external light is transmitted therethrough. In any case, it is preferred that the surface of display section 160 be configured so as to yield a smooth surface.

[0032] Though the display section rotating motor 220, which is a driving means, is accommodated within the display section 160, the motor 220 may be disposed in any or both of the upper and lower portions of the display section 160.

[0033] Fig. 5 is a view showing a control circuit 400 for the above-mentioned display section rotating motor 220.

[0034] A voltage comparator 241 in Fig. 5 is a part determining whether the electric energy of the solar cell 210 has reached a value necessary for driving the electric motor 220 or not and supplying the result of determination to a control board 242.

[0035] The control board 242 is used for supplying various kinds of control signals to a motor driver board 247 according to contents of setting of a timer volume switch 243 and three setting switches 244, 245, 246 and the above-mentioned result of determination of the voltage comparator 241. The timer volume switch 243 is used for setting the driving time of the electric motor 220 by changing a variable resistance value as appropriate. The setting switches 244, 245, 246 are switches for selecting a preset operation pattern of the electric motor 220. For example, if the setting switch 244 is turned ON, then operation pattern A is selected. As a consequence, if the electric energy of the solar cell 210 is sufficient for driving the electric motor 220 within the driving time set by the timer volume switch 243, then a control signal is supplied to the motor driver board 247 so as to cause the display section 160 to carry out one rightward rotation and then two leftward rotations. Similarly, operation pattern B is selected if the setting switch 245 is turned ON, so that a control signal for rotating the cylindrical member 110 in a mode different from that of the above-mentioned operation pattern A is supplied to the motor driver board 247; and operation pattern C is selected if the setting switch 246 is turned ON, so that a control signal for rotating the cylindrical member 110 in a mode different from those of the above-mentioned operation patterns A and B is supplied to the motor driver board 247.

[0036] Super capacitors 248, 249 are backup power sources for supplying electric power to the control board 242 in the nighttime, rainy/cloudy days, and the like under no solar irradiation.

[0037] If a sufficient electric energy is given by solar irradiation in the display apparatus 200 mentioned above, then the cylindrical member 110 rotates relative to the connecting member 105 according to the contents of setting of the timer volume switch 243 and setting switches 244, 245, 246, whereby the wiper blades 140 slidably come into contact with the surface of display section 160 by their pointed end parts.

[0038] As a result, even if the display section 160 is

soiled due to winds, rain, splashes, adhesion of oily substances contained in exhaust gases, and the like, these foreign matters are removed by the wiper blades 140, whereby its visibility can be restored.

[0039] Also, the operation mentioned above is carried out continuously and automatically as long as the apparatus is irradiated with the sun. As a consequence, without requiring any labor or cost, the display apparatus 200 can keep a desirable visibility of the display section 160.

[0040] Also, since the solar cell 210 converts the radiation energy of the sun into an electric energy, and the electric motor 220 is driven by this electric energy, there is no necessity for securing a power source and so forth, whereby this embodiment is excellent in terms of installation. However, it is not always necessary for the present invention to employ the solar cell 210, and the present invention may be configured so as to use a commercial power source, for example, for driving the electric motor to rotate the display section.

[0041] Fig. 6 shows a modified example of the road display apparatus configured so as to use a commercial power source.

[0042] This drawing exemplifies acontrol circuit for a display section rotating motor 220'. Since the other part of configuration is the same as that of the above-mentioned first embodiment, no detailed explanations will be provided. In this example, two light sources 250, 251 are disposed inside the display section 160 and are configured such that one of them is lit so as to transmit the light thereof through the display section 160 to the outside.

[0043] Three setting switches 244', 245', 246', and the like in Fig. 6 are similar to those in the above-mentioned first embodiment. A rain sensor 252 is used for detecting whether there is a rainfall or not, whereas a solar light sensor 253 is used for detecting whether there is a solar irradiation or not, each being disposed at the top part of a display apparatus 200'. The two internal light sensors 254, 255 are disposed inside the display section 160 and are used for respectively detecting whether the light sources 250, 251 disposed inside the display section 160 are lit or not.

[0044] A control board 260 is a part for carrying out ON/OFF control of relays R1, R2, R3, R4 according to the contents of setting of the above-mentioned three setting switches 244', 245', 246', and detection signals from the rain sensor 252, solar light sensor 253, and internal light sensors 254, 255.

[0045] Specifically, the relays R1 and R2 are turned ON when appropriate according to the contents of setting of the setting switches 244', 245', and 246', whereby the display section 160 is rotated relatively. Consequently, as in the above-mentioned display apparatus 200 of the first embodiment, the wiper members 150 contained and held in the connecting member 105 slidably come into contact with the outer peripheral surface of the display section 160 by their pointed end parts, whereby the visibility of the display section 160 can be maintained.

[0046] If the rain sensor 252 detects a rainfall, on the other hand, then the relays R1 and R2 are immediately turned ON regardless of the contents of setting of the above-mentioned setting switches 244', 245', 246', and the like, and this state is held for a longer period of time than usual.

[0047] As a result, during a rainfall, the cylindrical member 110 immediately starts rotating, and its state continues longer than usual, whereby the display section 160 can reliably be prevented from being soiled with the rainfall.

[0048] Both of the relays R3, R4 are turned OFF during the time when solar irradiation is detected by the solar light sensor 253, whereas one of the relays R3, R4, e.g., relay R3, is turned ON during the time when no solar irradiation is detected. As a result, the light of light source 250 is transmitted through the display section 160 in dark places where the display of the display apparatus 200' is hard to see or in the nighttime, whereby the visibility of the display section 160 can be secured. In bright places or in the daytime, both of the light sources 250, 251 are turned OFF, so as to contribute to saving energy, and the life of light sources 250, 251 can be elongated.

[0049] In the ON state of the relay R3, if its corresponding internal light sensor 254 does not detect the lighting of light source 250, then the relay R3 is immediately turned OFF, and the other relay R4 is turned ON, so as to light the other light source 251. As a result, no maintenance is necessary until both of the two light sources 250, 251 fail or are dead, whereby the labor and cost for maintenance can further be reduced.

[0050] The scope of the present invention is not restricted to the above-mentioned embodiments, and various modified examples are possible.

[0051] In the above embodiments, the outer peripheral surface has a cylindrical shape. But the outer peripheral surface of the display section 160 is formed to be an outer surface of a body of revolution and the wipe member may be formed to have a shape along the outer peripheral surface of the display section 160.

[0052] Since the outer peripheral surface of the display section is automatically cleaned while being rotated in a state where wipe members of the fixed wipe unit are pressed thereagainst, the road display apparatus in accordance with the present invention can safely and appropriately provide information without drawing the attention of people more than necessary, and can reduce an enormous amount of human resources and the like required for cleaning since it carries out automatic cleaning.

Claims

1. A road display apparatus comprising:

a base secured to a road;
a display section having an outer peripheral surface of a body of revolution, with a display area for providing information;
a wipe unit, secured to said base, having a wipe member in contact with and along said outer peripheral surface; and
a driving unit for driving said display section to rotate, so as to clean said outer peripheral surface with said wipe member.

2. A road display apparatus according to claim 1, wherein said display section has a first cylindrical portion provided with said display area, and a second cylindrical portion surrounding said first cylindrical portion in a radial direction thereof and having said outer peripheral surface.

3. A road display apparatus according to claim 1 or 2, wherein said driving unit is accommodated within said display section.

4. A road display apparatus according to claim 1, 2, or 3, wherein illumination means for illuminating said display area to outside is disposed within said display section.

5. A road display apparatus according to claim 1, 2, 3, or 4, wherein said driving unit is provided with a control mechanism for controlling a rotation of said display section.

6. A road display apparatus according to claim 4 or 5, wherein said control mechanism comprises at least one of means for detecting illuminance and means for detecting moisture, at least a part of said illumination means in said display section being controlled according to a detection effected by said detecting means.

Fig.1

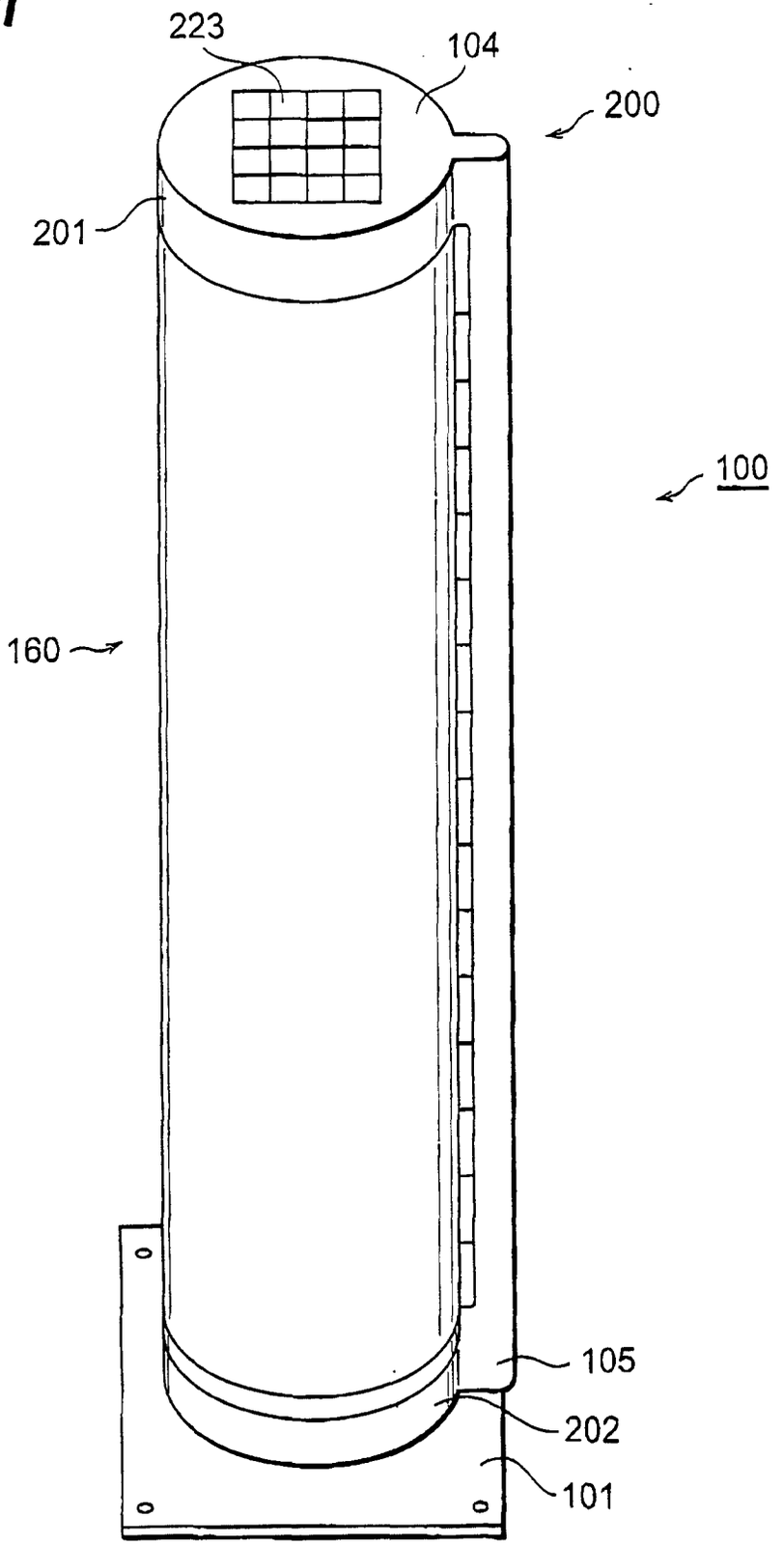


Fig.2

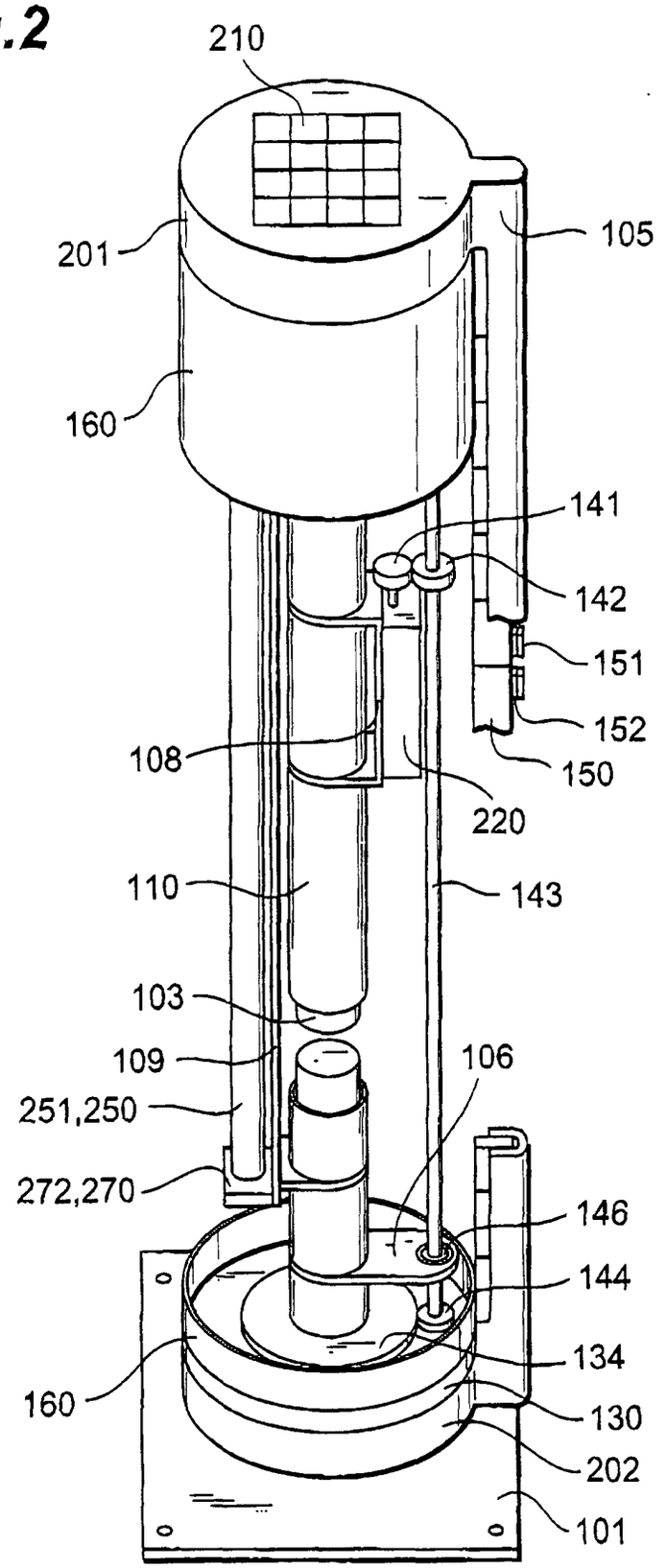

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Fig.3

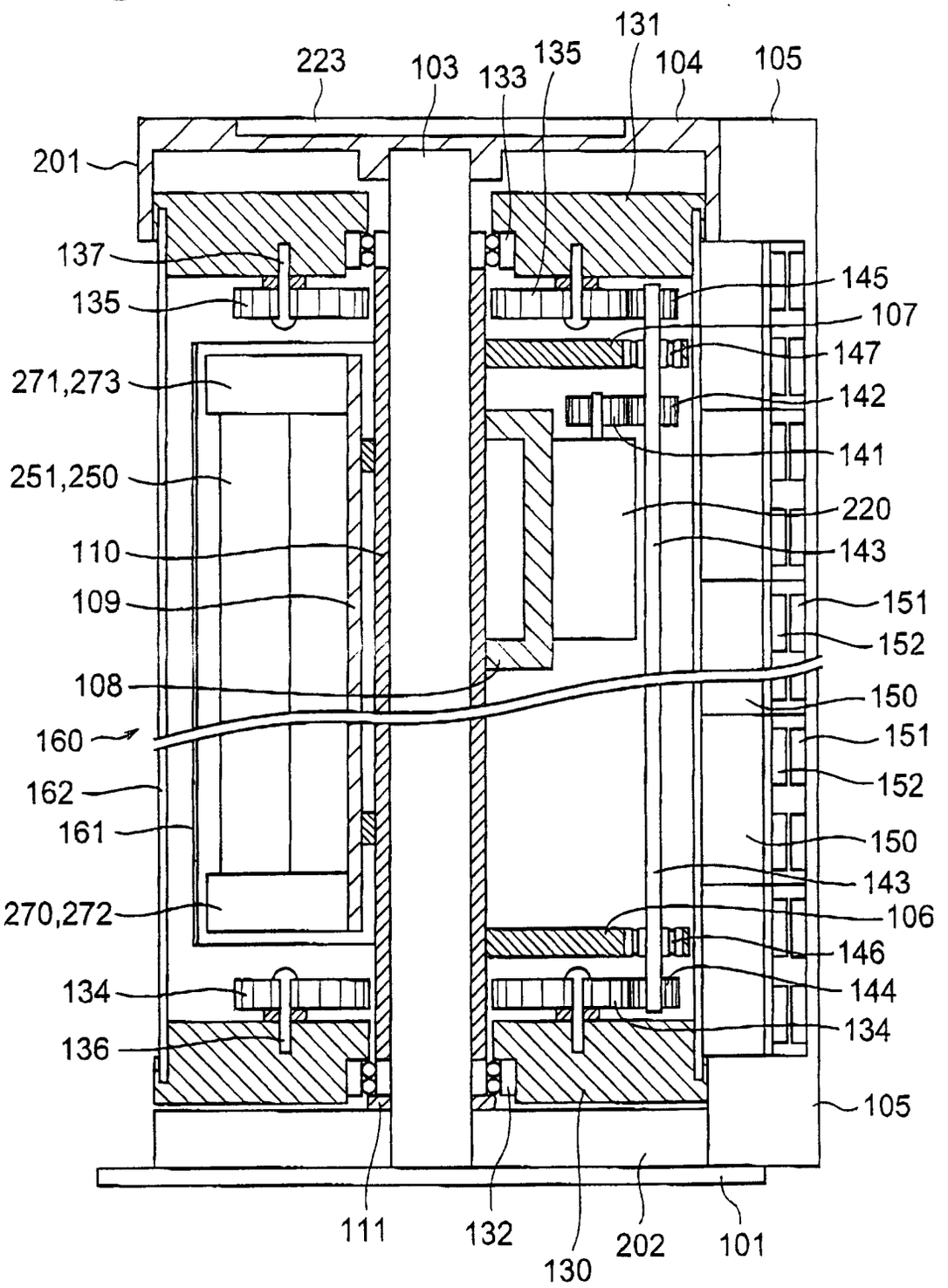
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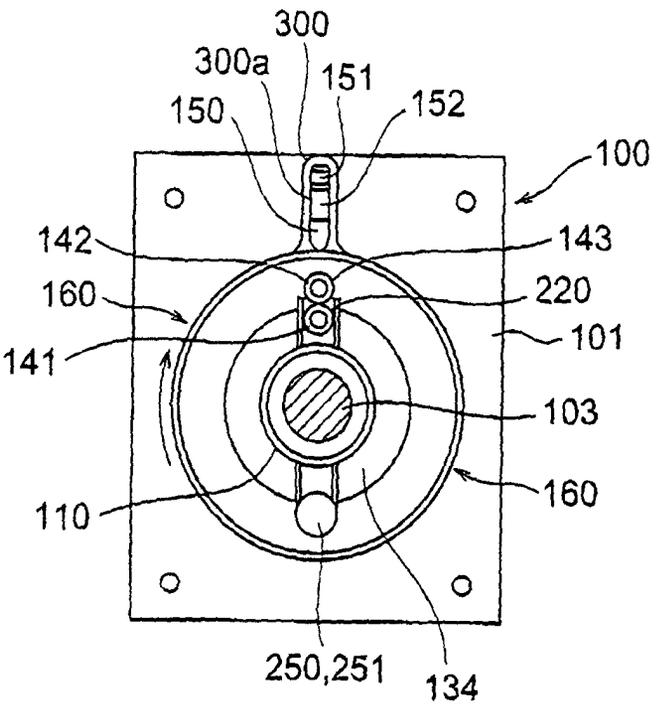
Fig.4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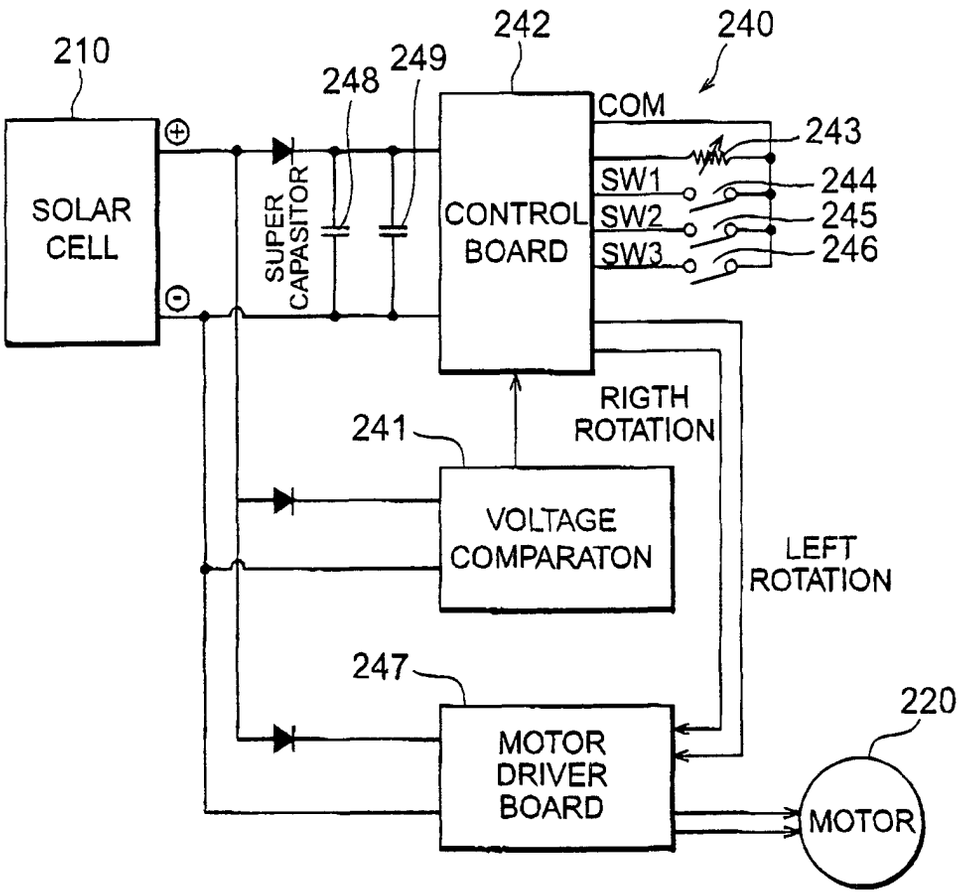
250,251
134

Fig.5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SW2
SW3
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245
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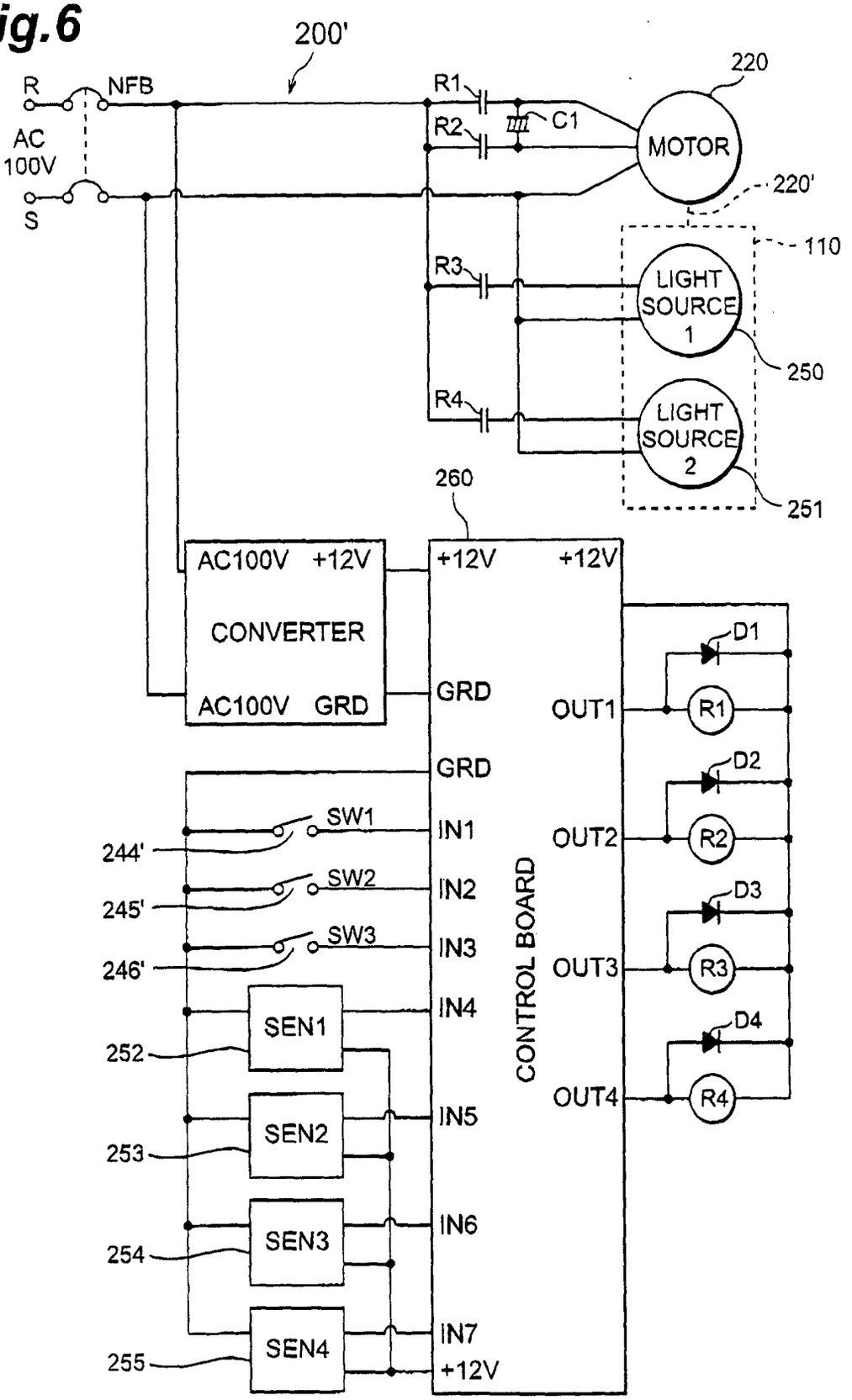
RIGTH ROTATION
241
VOLTAGE COMPARATON
LEFT ROTATION
247
MOTOR DRIVER BOARD
220
MOTOR

Fig.6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EUROPEAN SEARCH REPORT

Application Number
EP 00 12 5810

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 08, 29 August 1997 (1997-08-29) & JP 09 095913 A (SEKISUI JUSHI CO LTD), 8 April 1997 (1997-04-08) * abstract *	1	G09F15/00
A	DE 299 04 308 U (STOEVER) 15 July 1999 (1999-07-15) * the whole document *	1-5	
A	US 3 917 382 A (AMANN MARIO) 4 November 1975 (1975-11-04) * abstract; figure 2 *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 05, 31 May 1996 (1996-05-31) & JP 08 016116 A (TOSHIBA LIGHTING & TECHNOL CORP), 19 January 1996 (1996-01-19) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 August 2001	Puhl, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 12 5810

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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23-08-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 09095913 A	08-04-1997	NONE	
DE 29904308 U	15-07-1999	NONE	
US 3917382 A	04-11-1975	DE 2225307 A	13-12-1973
		AT 434273 A	15-07-1976
		BE 799950 A	17-09-1973
		CA 978917 A	02-12-1975
		CH 559286 A	28-02-1975
		DK 137902 B	29-05-1978
		FR 2185724 A	04-01-1974
		GB 1416747 A	03-12-1975
		IT 987823 B	20-03-1975
		JP 49050898 A	17-05-1974
		NL 7307261 A	27-11-1973
		SE 418339 B	18-05-1981
JP 08016116 A	19-01-1996	NONE	

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