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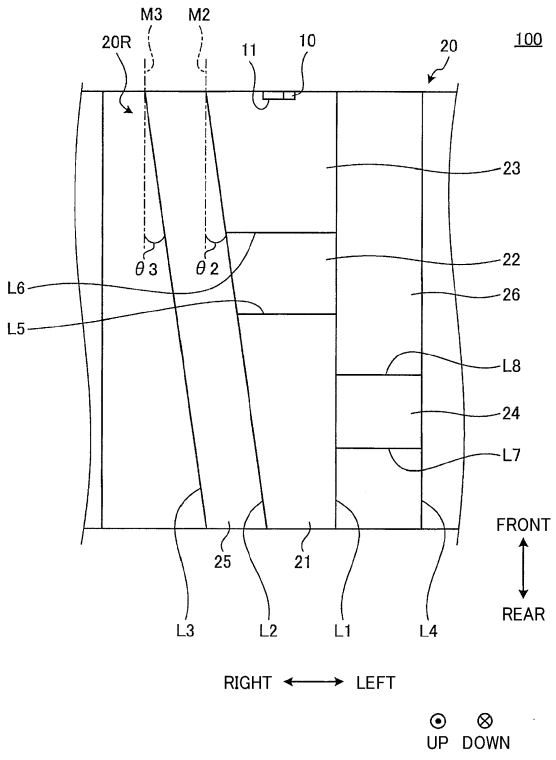
(54) VEHICLE HEADLAMP

(57) A vehicle headlamp includes a light source, a reflector having a reflection surface for reflecting light from the light source. A light emitting surface of the light source has a rectangular shape, a reflection film constituting the reflection surface on a body member formed by a resin material is arranged in the reflector, and the reflection surface includes segments arranged alongside via a division line in a left and right direction in a vehicle mounted state. The light from the light source is reflected from the plurality of segments to form irradiation patterns having mutually different shapes in a front irradiation region in the vehicle mounted state, and a division line at one side of the first segment in the right and left direction to form the irradiation pattern including an oblique cutoff line among the segments is inclined regarding the up and down direction in the vehicle mounted state.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a vehicle headlamp.

BACKGROUND ART

[0002] There has been known a vehicle headlamp which includes a light source, and a reflector of which reflector surface includes a plurality of segments arranged alongside in a left and right direction divided by a division line in a vehicle mounted state and reflects light from the light source for each of the plurality of segments to form irradiation patterns having mutually different shapes in a front irradiation region in the vehicle mounted state.

[0003] A vehicular lamp fitting is known from Japanese Unexamined Patent Publication No. 2015-149173.

[0004] In recent years, the reflector for the vehicle headlamp as described above is manufactured by forming a main body member with a resin material and forming a metal film serving as the reflection surface on the main body member by vapor deposition. In the reflector, there is a possibility that a step is formed at a division line between such segments, and the light reflected by the step is diffused to become glare light.

[0005] The present invention has been made in view of the above, and we have appreciated that it would be desirable to provide a vehicle headlamp capable of suppressing glare light.

SUMMARY OF THE INVENTION

[0006] A vehicle headlamp according to the present invention includes a light source, and a reflector including a reflection surface that reflects light from the light source, a light emitting surface of the light source includes a rectangular shape, the reflector includes a reflection film constituting the reflection surface disposed on a main body member formed using a resin material, the reflection surface comprises a plurality of segments arranged alongside in a left and right direction divided by a division line in a vehicle mounted state, light from the light source is reflected by each of the plurality of segments to form irradiation patterns mutually having different shapes in a front irradiation region in the vehicle mounted state, and the division line at one side of an oblique cutoff segment in the left and right direction which forms an irradiation pattern including an oblique cutoff line among the plurality of segments is inclined with respect to the up and down direction in the vehicle mounted state.

[0007] Further, the light surface may be arranged in a state in which two parallel sides arranged opposite to each other in the front and rear direction in the vehicle mounted state are inclined with respect to the left and right direction in the vehicle mounted state.

[0008] Further, in the reflector, the division line at the other side of the oblique cutoff segment in the left and right direction may be parallel to the up and down direction in the vehicle mounted state.

[0009] Further, in the reflector, the division line at one side of a horizontal cutoff segment in the left and right direction which forms an irradiation pattern comprising a horizontal cutoff line among the plurality of segments may be inclined with respect to the up and down direction.

[0010] Further, the oblique cutoff segment and the horizontal cutoff segment may be arranged in the up and down direction, and the division line inclined with respect to the up and down direction of each of the oblique cutoff segment and the horizontal cutoff segment may be arranged on a line.

[0011] Further, the oblique cutoff segment may be disposed at a position farthest from the light source in the up and down direction, and the horizontal cutoff segment may be disposed at a position closest to the light source in the up and down direction.

[0012] According to the present invention, it is possible to provide a vehicle headlamp capable of suppressing glare light.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a front view showing an example of a vehicle headlamp according to the present embodiment.

FIG. 2 is a cross-sectional view showing the example of the vehicle headlamp according to the present embodiment.

FIG. 3 is a plan view showing the example of the vehicle headlamp according to the present embodiment.

FIG. 4 is a diagram showing an example of a first irradiation pattern formed by a first segment.

FIG. 5 is a diagram showing an example of a second irradiation pattern formed by a second segment.

FIG. 6 is a diagram showing an example of a third irradiation pattern formed by a third segment.

FIG. 7 is a diagram showing an example of a fourth irradiation pattern formed by a fourth segment.

FIG. 8 is a diagram showing an example of a fifth irradiation pattern formed by a fifth segment.

FIG. 9 is a diagram showing an example of a sixth irradiation pattern formed by a sixth segment.

FIG. 10 is a diagram showing an example of a low

beam pattern formed by a reflector.

DETAILED DESCRIPTION

[0014] Hereinafter, an embodiment of a vehicle headlamp according to the present invention will be described with reference to the drawings. Note that the present invention is not limited by the embodiment. Also, the components in the following embodiment include a component that can be easily replaced by those skilled in the art, or substantially the same component. In the following description, each direction of front and rear (forward, backward), up and down (upper and lower), and left and right (left side and right side) is the directions in the state in which a vehicle headlamp is mounted on a vehicle, and indicates the directions when a driver look at the front in the state where the driver sits on the driver's seat. In the present embodiment, it is assumed that the up and down direction is parallel to the vertical direction, and the left and right direction is the horizontal direction.

[0015] FIGS. 1 to 3 are diagrams showing an example of a vehicle headlamp 100 according to the present embodiment. FIG. 1 is a front view, FIG. 2 is a sectional view including a light source 10 in FIG. 1, and FIG. 3 is a plan view. As shown in FIGS. 1 to 3, the vehicle headlamp 100 includes the light source 10 and a reflector 20. In the present embodiment, the vehicle headlamp 100 is a reflector type lamp which is used as a headlamp of a vehicle, and forms a low-beam irradiation pattern in front of the vehicle. The vehicle headlamp 100 is mounted at the left and right front portions of the vehicle, for example. The vehicle headlamp 100 may have the same configuration on the left and right sides, for example, rather than a symmetrical configuration on the left and right sides.

[0016] In the present embodiment, the light source 10 is a semiconductor-type light source such as a light emitting diode (LED), an organic electrode luminescence (OEL), and an organic light-emitting diode (OLED) (organic EL). The light source 10 has a light emitting surface 11 that emits light L (see FIG. 2) to form a Lambertian distribution. When the vehicle headlamp 100 is mounted on a vehicle, the light emitting surface is directed downward, for example, and is arranged parallel to the horizontal plane. The light source 10 is fixed to a mounting member 30, for example.

[0017] As shown in FIG. 3, the light emitting surface 11 of the light source 10 has a rectangular shape. The two parallel sides of the light emitting surface 11 of the light source 10, which are arranged facing each other in the front and rear direction, are arranged to be inclined with respect to a straight line M1 parallel to the left and right direction (see FIG. 3). In this case, the inclination angle $\theta 1$ can be set to, for example, ten (10) degrees or more and twenty (20) degrees or less.

[0018] The reflector 20 reflects the light from the light source 10 toward the front of the vehicle. The reflector 20 is disposed below the light source 10. The reflector 20 has a structure in which a reflection film 20F constituting a reflection surface 20R is disposed on a main body member 20B formed using a resin material, for example. The reflection film 20F is formed by, for example, vapor deposition or the like. The reflector 20 is fixed to the mounting member 30 by a fixing member or the like.

[0019] The reflection surface 20R is formed on the inner surface of the reflector 20. The reflection surface 20R is divided into a plurality of segments. In the present embodiment, the reflection surface 20R has at least six segments. Hereinafter, the six segments are referred to as a first segment 21, a second segment 22, a third segment 23, a fourth segment 24, a fifth segment 25, and a sixth segment 26.

[0020] The six segments 21 to 26 are divided by division lines L1 to L4 parallel to the up and down direction, and division lines L5 to L8 parallel to the left and right direction in the front view. The three segments of the first segment 21, the second segment 22, and the third segment 23 are arranged alongside in the up and down direction. The two segments of the fourth segment 24 and the sixth segment 26 are arranged alongside in the up and down direction. Further, the three segments 21 to 23, the two segments 24 and 26, and the fifth segment 25 are arranged alongside in the left and right direction.

[0021] The division line L1 partitions the three segments 21 to 23 and the two segments 24 and 26. The division line L1 is parallel to the up and down direction. The division line L1 is formed over the three segments 21 to 23. That is, with respect to the first segment 21, the second segment 22, and the third segment 23, the left division line in the left and right direction is arranged on a line. Further, the division line L1 is formed over the two segments 24 and 26. That is, with respect to the fourth segment 24 and the sixth segment 26, the right division line in the left and right direction is arranged on a line.

[0022] The division line L2 partitions the three segments 21 to 23 and the fifth segment 25. The division line L2 is inclined with respect to a straight line M2 which is parallel to the up and down direction. The inclination angle $\theta 2$ of the division line L2 with respect to the straight line M2 may be approximately the half of the angle of the oblique cutoff line of the low beam pattern formed in front of the vehicle. In the present embodiment, the angle of the oblique cutoff line is about fifteen (15) degrees. Therefore, the inclination angle $\theta 2$ may be set to, for example, six (6) degrees or more and eight (8) degrees or less. The angle range of the inclination angle $\theta 2$ is not limited to the above.

[0023] The division line L2 is formed over the three segments 21 to 23. That is, with respect to the first segment 21, the second segment 22, and the third segment 23, the right division line in the left and right direction is arranged on a line.

[0024] The division line L3 is disposed at the right end portion, shown directions in FIG.1 and FIG.3, of the fifth segment 25. That is, the fifth segment 25 is partitioned by the division line L2 and the division line L3. The division line L3 is inclined with respect to a straight line M3 which

is parallel to the up and down direction. The inclination angle θ3 of the division line L3 with respect to the straight line M3 may be approximately the half of the angle of the horizontal cutoff line of the low beam pattern formed in front of the vehicle. The inclination angle θ3 may be set to, for example, six (6) degrees or more and eight (8) degrees or less as described above. The angle range of the inclination angle θ3 is not limited to the above. Also, the inclination angle θ2 and the inclination angle θ3 may be different values.

[0025] The division line L4 is arranged at the left end portion of the two segments 24 and 26. That is, the two segments 24 and 26 are partitioned by the division line L1 and the division line L4 in the left and right direction.

[0026] The division line L5 partitions the first segment 21 and the second segment 22. The division line L6 partitions the second segment 22 and the third segment 23. The division line L7 is disposed at a lower end portion of the fourth segment 24. The division line L8 partitions the fourth segment 24 and the sixth segment 26.

[0027] The six segments from the first segment 21 to the sixth segment 26 partitioned by the above division lines L1 to L8 form irradiation patterns in mutually different irradiation regions. FIGS. 4 to 9 are diagrams showing an example of irradiation patterns formed by the first segment 21 to the sixth segment 26. FIG. 4 is a diagram showing an example of a first irradiation pattern P1 formed by the first segment 21. FIG. 5 is a diagram showing an example of a second irradiation pattern P2 formed by the second segment 22. FIG. 6 is a diagram showing an example of a third irradiation pattern P3 formed by the third segment 23. FIG. 7 is a diagram showing an example of a fourth irradiation pattern P4 formed by the fourth segment 24. FIG. 8 is a diagram showing an example of a fifth irradiation pattern P5 formed by the fifth segment 25. FIG. 9 is a diagram showing an example of a sixth irradiation pattern P6 formed by the sixth segment 26. The H-H line in FIGS. 4 to 9 represents the horizontal plane, and the V-V line represents a line perpendicular to the horizontal plane and indicating the center of the vehicle.

[0028] As shown in FIG. 4, the first segment 21 forms the first irradiation pattern P1 including an oblique cutoff line CL1. The oblique cutoff line CL1 is, for example, in a state of being inclined at an angle θ with respect to the horizontal plane H-H. In the present embodiment, the angle θ may be set to, for example, about fifteen (15) degrees. The oblique cutoff line CL1 is formed, for example, by a portion of the first segment 21 partitioned by the division line L2.

[0029] As shown in FIG. 5, the second segment 22 forms the second irradiation pattern P2. The second irradiation pattern P2 is an overhead pattern, for example, and is formed above the horizontal plane H-H.

[0030] As shown in FIG. 6, the third segment 23 forms the third irradiation pattern P3. The third irradiation pattern P3 includes a horizontal cutoff line CL2. The third irradiation pattern P3 is formed to expand toward the left and right with respect to the center of the vehicle.

[0031] As shown in FIG. 7, the fourth segment 24 forms the fourth irradiation pattern P4. The fourth irradiation pattern P4 is formed on the left side with respect to the first irradiation pattern P1. The fourth irradiation pattern P4 is a pattern that does not include a cutoff line. Note that the fourth segment 24 may form the second irradiation pattern P2, and the second segment 22 may form the fourth irradiation pattern P4.

[0032] As shown in FIG. 8, the fifth segment 25 forms the fifth irradiation pattern P5. The fifth irradiation pattern P5 is a diffusion pattern formed below the horizontal plane H-H. The fifth irradiation pattern P5 is formed to expand toward the left and right direction with respect to the center of the vehicle.

[0033] As shown in FIG. 9, the sixth segment 26 forms the sixth irradiation pattern P6. The sixth irradiation pattern P6 is a diffusion pattern formed below the horizontal plane H-H. The sixth irradiation pattern P6 is formed to expand toward the left and right direction with respect to the center of the vehicle.

[0034] FIG. 10 is a diagram showing an example of the low beam pattern P formed in front of the vehicle by the reflector 20. The low beam pattern P shown in FIG. 10 is an irradiation pattern in which the first irradiation pattern P1 to the sixth irradiation pattern P6 are superimposed. Note that the low beam pattern P may include an irradiation pattern different from the first irradiation pattern P1 to the sixth irradiation pattern P6.

[0035] For example, when the division line L2 is vertically disposed in the up and down direction, the light reflected by the division line L2 becomes diffusion light Da diffused toward the left and right direction. There is a possibility that the diffusion light Da may be diffused outside the low beam pattern P and toward the own vehicle lane and the other vehicle lane. Therefore, there is a possibility that the diffusion light Da may become glare light for the preceding vehicle or the oncoming vehicle.

[0036] On the other hand, in the present embodiment, the division line L2 is inclined with respect to the straight line M2 which is parallel to the up and down direction. In this configuration, the light reflected by the division line L2 becomes diffusion light D1 diffused in an oblique direction with respect to the horizontal plane. The diffusion light D1 is diffused in the oblique direction in the inside of the low beam pattern P, similarly to the oblique cutoff line CL1. Therefore, it is possible to suppress the diffusion light D1 from becoming glare light.

[0037] As described above, the vehicle headlamp 100 according to the present embodiment includes the light source 10 and the reflector 20 provided with the reflection surface 20R for reflecting light from the light source 10. The light emitting surface of the light source 10 has the rectangular shape. In the reflector 20, the reflection film 20F constituting the reflection surface 20R is disposed on the main body member 20B formed using the resin material. The reflection surface 20R has the plurality of segments 21 to 26, which are arranged side by side in

the left and right direction divided by the division lines in the vehicle mounted state. The light from the light source 10 is reflected for each of the plurality of segments 21 to 26, so that the irradiation patterns P1 to P6 having mutually different shapes are formed in the front the irradiation region in the vehicle mounted state. The division line L2 at one side of the first segment 21 in the left and right direction, which forms the irradiation pattern P1 including the oblique cutoff line CL1 among the plurality of segments 21 to 26, is inclined with respect to the up and down direction in the vehicle mounted state.

[0038] Therefore, the light D1 reflected and diffused by the division line L2 is diffused in the oblique direction in the inside of the low beam pattern P, similarly to the oblique cutoff line CL1. As the above, since it is possible to prevent the diffusion light D1 from spreading outside the oblique cutoff line CL1 (the own vehicle lane or the other vehicle lane side), it is possible to suppress generating glare light.

[0039] In the vehicle headlamp 100 described above, the light emitting surface 11 is disposed in a state in which the two parallel sides disposed opposite to each other in the front and rear direction in the vehicle mounted state are inclined with respect to the left and right direction in the vehicle mounted state. Therefore, the irradiation pattern of the light emitted from the light source 10 is formed in a state of being inclined clockwise in front of the vehicle, with respect to the configuration in which the two parallel sides of the light emitting surface 11 arranged opposite to the front and back direction are parallel to the straight line M1 parallel to the left and right direction. Therefore, it is possible to incline the irradiation pattern of light in a state along the direction of the oblique cutoff line CL1.

[0040] In the reflector 20 of the vehicle headlamp 100 described above, the other division line L1 of the first segment 21 in the left and right direction is parallel to the up and down direction in the vehicle mounted state. The light reflected in the vicinity of the division line L1 in the first segment 21 forms a portion on the road shoulder side of the first irradiation pattern P1 (see FIG. 4). Therefore, when the light is diffused in the left and right direction, the light traveling toward the outside of the low beam pattern P is diffused toward the road shoulder side, and the light traveling toward the inside (own vehicle lane side) is irradiated to the inside of the low beam pattern P. Thus, the light reflected in the vicinity of the division line L1 in the first segment 21 is less likely to become glare light than the light reflected by the division line L2. Therefore, it is not necessary to incline with respect to the straight line M1 which is parallel to the up and down direction. Therefore, by arranging the division line L1 parallel to the up and down direction, it is possible to easily form the division line L1.

[0041] In the reflector 20 of the vehicle headlamp 100 described above, the division line L2 at the one side of the third segment 23 in the left and right direction, which forms the irradiation pattern including the horizontal cutoff line CL2 among the plurality of segments 21 to 26, may be inclined with respect to the up and down direction. According to this configuration, the diffusion light D2 (see FIG. 10) reflected and diffused by the division line L2 of the third segment 23 is diffused in the horizontal direction within the low beam pattern P, in the same manner as the horizontal cutoff line CL2. Therefore, since it is possible to prevent the diffusion light D2 from spreading outward (upward) from the horizontal cutoff line CL2, it is possible to suppress generating glare light.

[0042] In the vehicle headlamp 100 described above, the first segment 21 and the third segment 23 are arranged in the up and down direction, and the division line L2 inclined with respect to the up and down direction of each of the segments 21 and 23 is arranged on a straight line. With this configuration, it possible to effectively utilize the region on the reflection surface 20R of the reflector 20, and suppress the generation of glare light.

[0043] In the vehicle headlamp 100 described above, the first segment 21 is disposed at a position farthest from the light source 10 in the up and down direction, and the third segment 23 is disposed at a position closest to the light source in the up and down direction. This makes it easier to form a light image of the third irradiation pattern P3 to be formed in a wider range, which is larger than the first irradiation pattern P1.

[0044] The technical scope of the present invention is not limited to the above embodiments, and can be modified as appropriate without departing from the spirit and scope of the present invention.

REFERENCE NUMBERS

[0045]

CL1	oblique cutoff line
CL2	horizontal cutoff line
DI, D2,	Da diffusion light
L1 to L8	division line
M1, M2, M3	straight line
P	low beam pattern
P1	first irradiation pattern
P2	second irradiation pattern
P3	third irradiation pattern
P4	fourth irradiation pattern
P5	fifth irradiation pattern
P6	sixth irradiation pattern
10	light source
11	light emitting surface
20	reflector
20B	body member
20F	reflection film
20R	reflection surface
21	first segment
22	second segment
23	third segment
24	fourth segment
25	fifth segment
26	sixth segment

30 mounting member
100 vehicle headlamp

Claims

1. A vehicle headlamp (100), comprising:

a light source (10); and
a reflector (20) comprising a reflection surface (20R) that reflects light from the light source,
wherein a light emitting surface (11) of the light source comprises a rectangular shape,
wherein the reflector comprises a reflection film (20F) constituting the reflection surface disposed on a main body member (20B) formed using a resin material,
wherein the reflection surface comprises a plurality of segments (21 to 26) arranged alongside in a left and right direction via a division line in a vehicle mounted state,
wherein light from the light source is reflected by each of the plurality of segments to form irradiation patterns (P1 to P6) mutually having different shapes in a front irradiation region in the vehicle mounted state, and
wherein the division line at one side of an oblique cutoff segment in the left and right direction which forms an irradiation pattern comprising an oblique cutoff line among the plurality of segments is inclined with respect to the up and down direction in the vehicle mounted state.

2. The vehicle headlamp according to claim 1,
wherein the light surface is arranged in a state in which two parallel sides arranged opposite to each other in the front and rear direction in the vehicle mounted state are inclined with respect to the left and right direction in the vehicle mounted state.

3. The vehicle headlamp according to claim 1 or 2,
wherein in the reflector, the division line at the other side of the oblique cutoff segment in the left and right direction is parallel to the up and down direction in the vehicle mounted state.

4. The vehicle headlamp according to any one of claims 1 to 3,
wherein in the reflector, the division line at one side of a horizontal cutoff segment in the left and right direction which forms an irradiation pattern comprising a horizontal cutoff line among the plurality of segments is inclined with respect to the up and down direction.

5. The vehicle headlamp according to claim 4,
wherein the oblique cutoff segment and the horizontal cutoff segment are arranged in the up and down direction, and the division line inclined with respect to the up and down direction of each of the oblique cutoff segment and the horizontal cutoff segment is arranged on a line.

6. The vehicle headlamp according to claim 4 or 5,

wherein the oblique cutoff segment is disposed at a position farthest from the light source in the up and down direction, and
wherein the horizontal cutoff segment is disposed at a position closest to the light source in the up and down direction.

FIG. 1

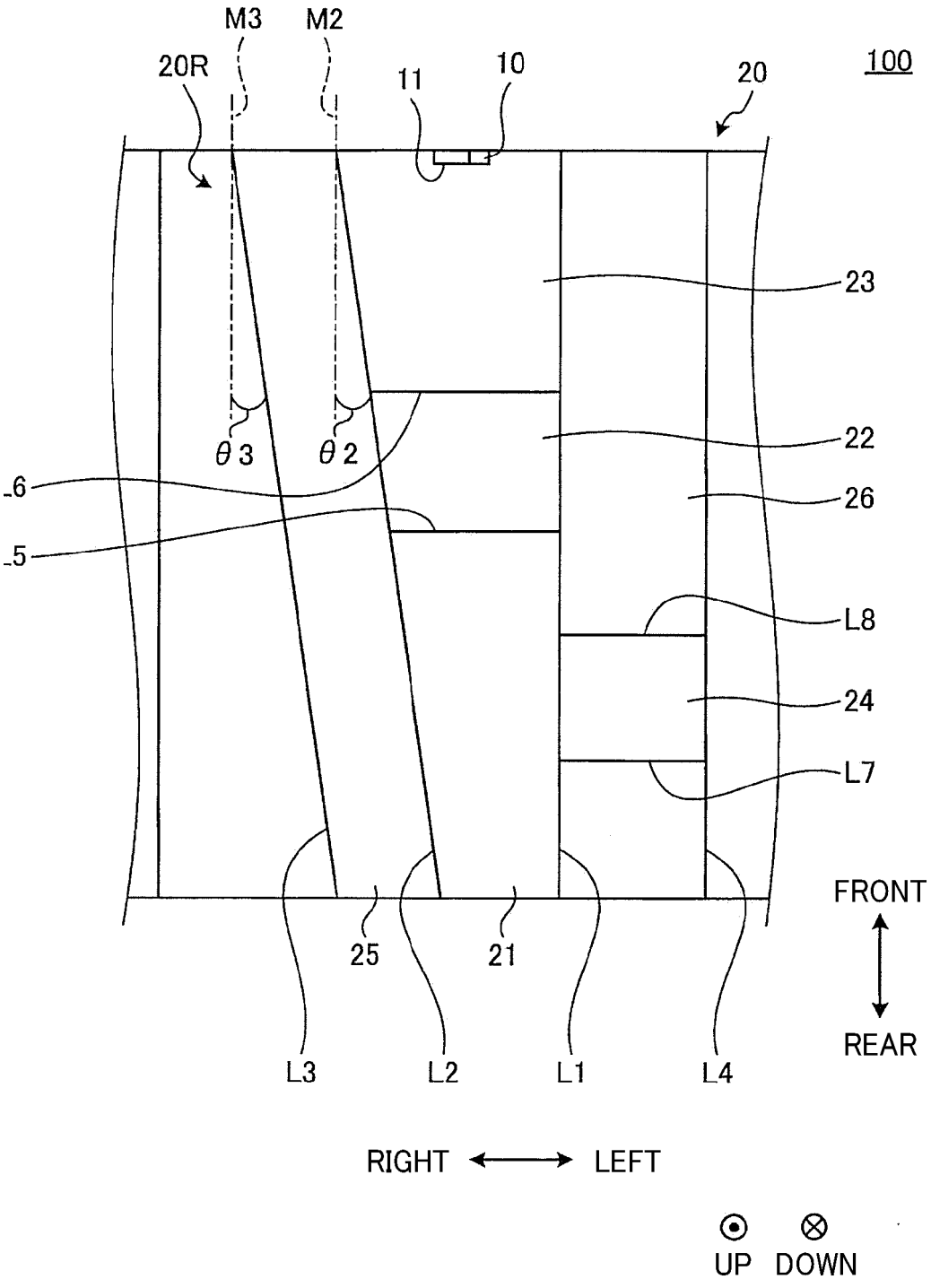

M3
M2
20R
11
10
20
100
23
θ3
θ2
22
6
26
5
L8
24
L7
FRONT
25
21
REAR
L3
L2
L1
L4
RIGHT
LEFT
UP
DOWN

FIG. 2

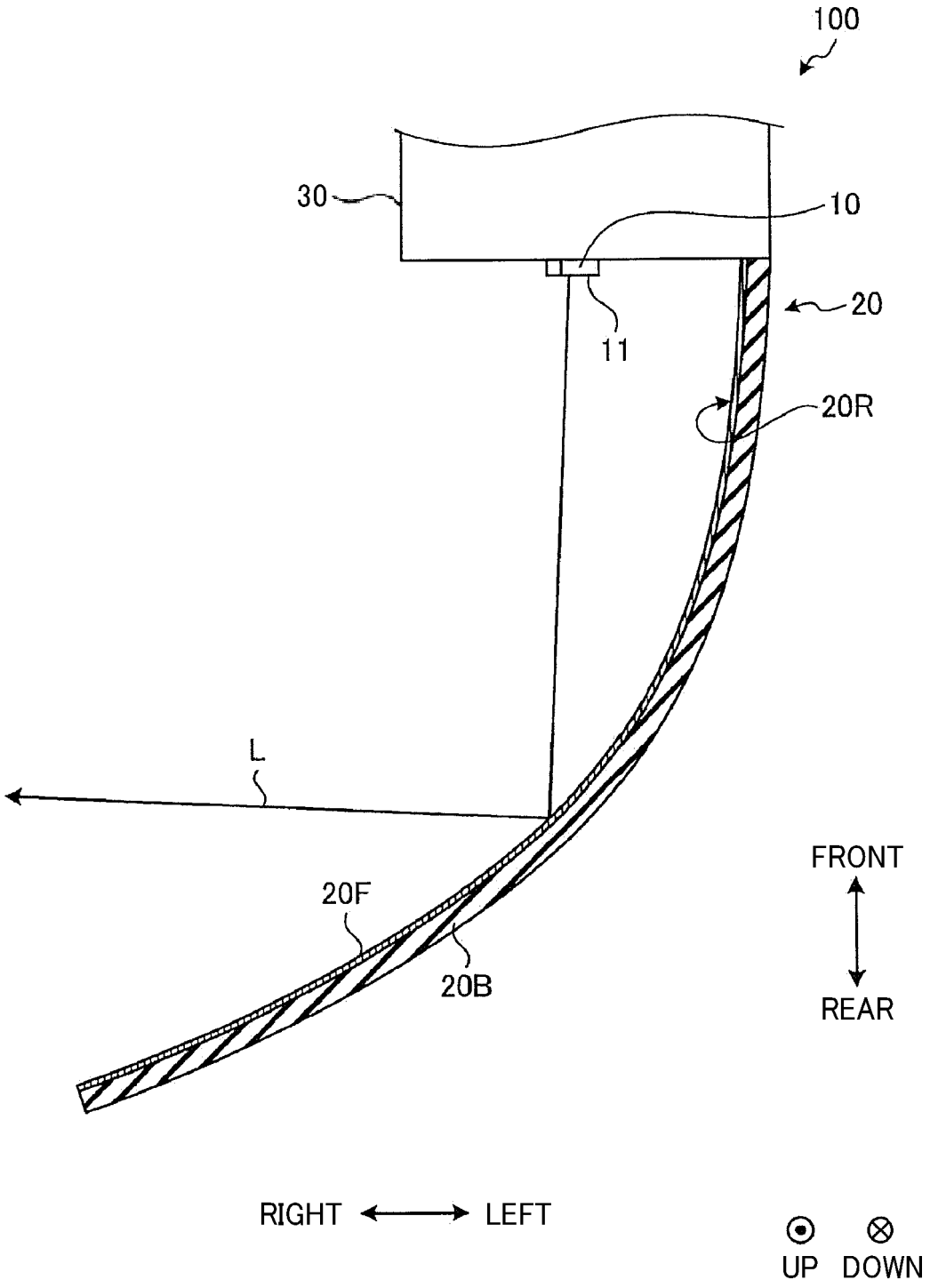


FIG. 3

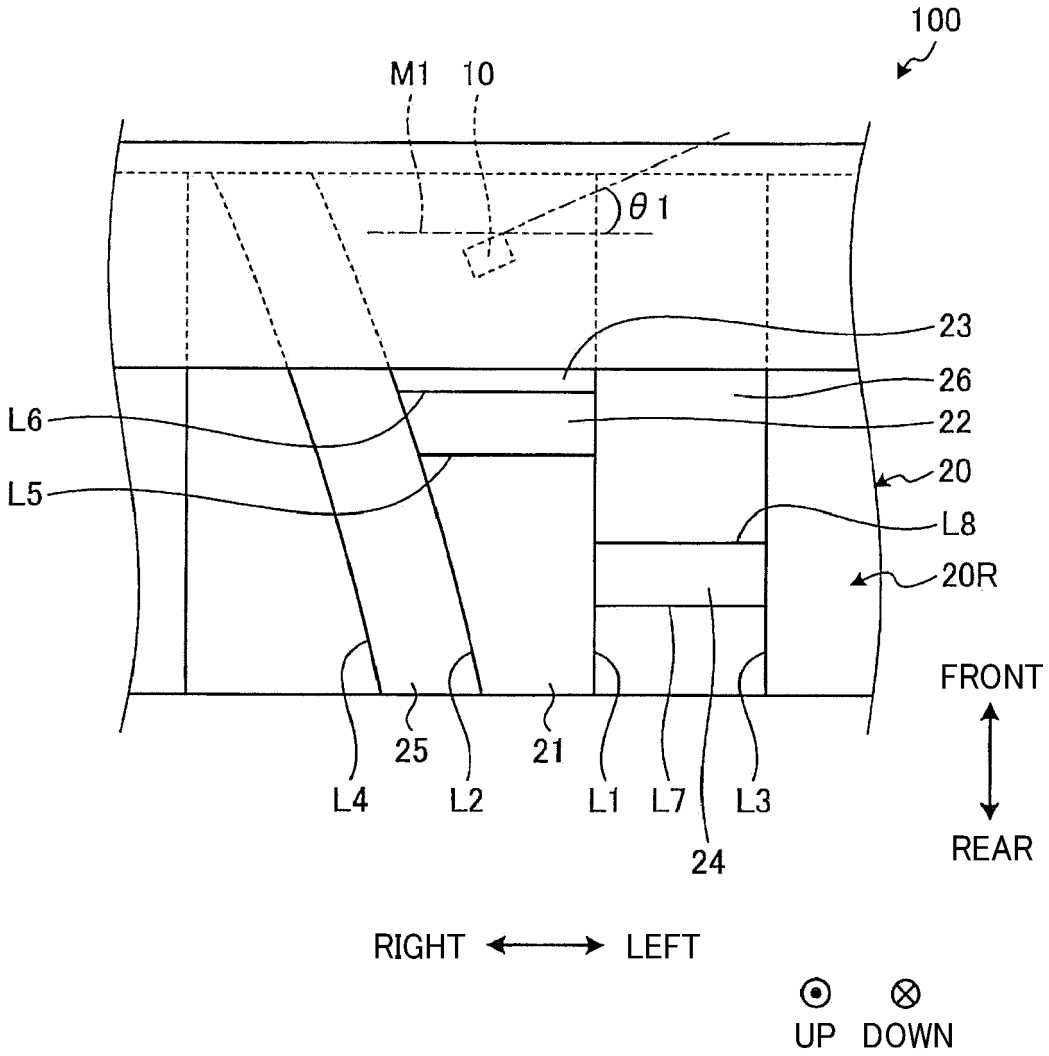

100
M1
10
θ1
23
26
22
20
L8
20R
L6
L5
FRONT
REAR
25
21
L4
L2
L1
L7
L3
24
RIGHT
LEFT
UP
DOWN

FIG. 4

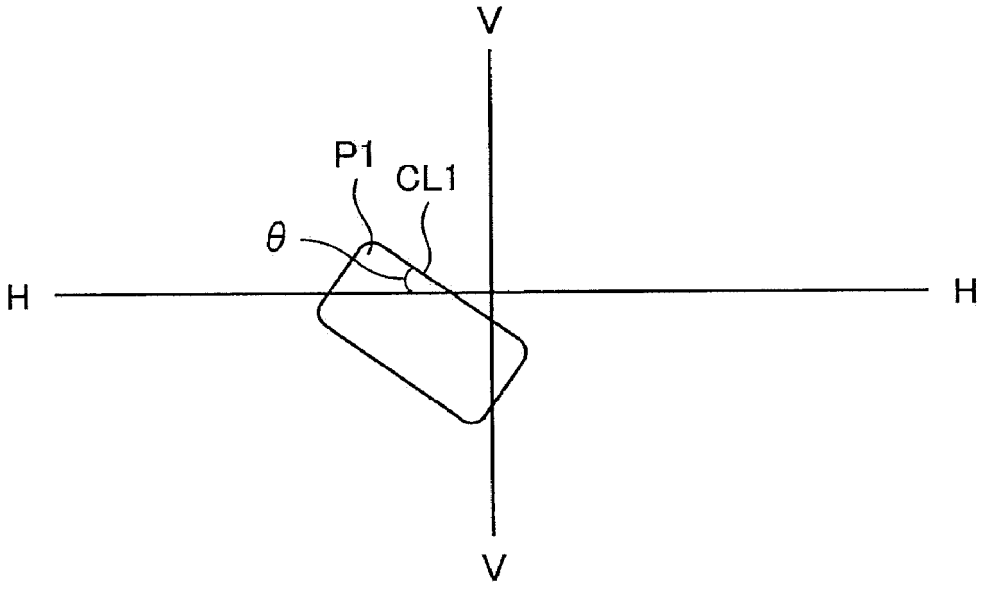


FIG. 5

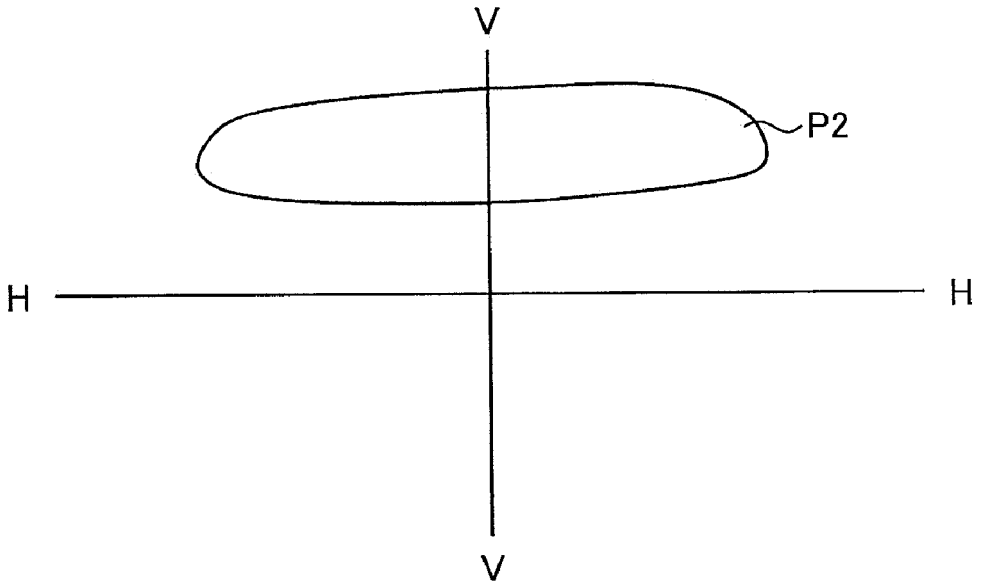


FIG. 6

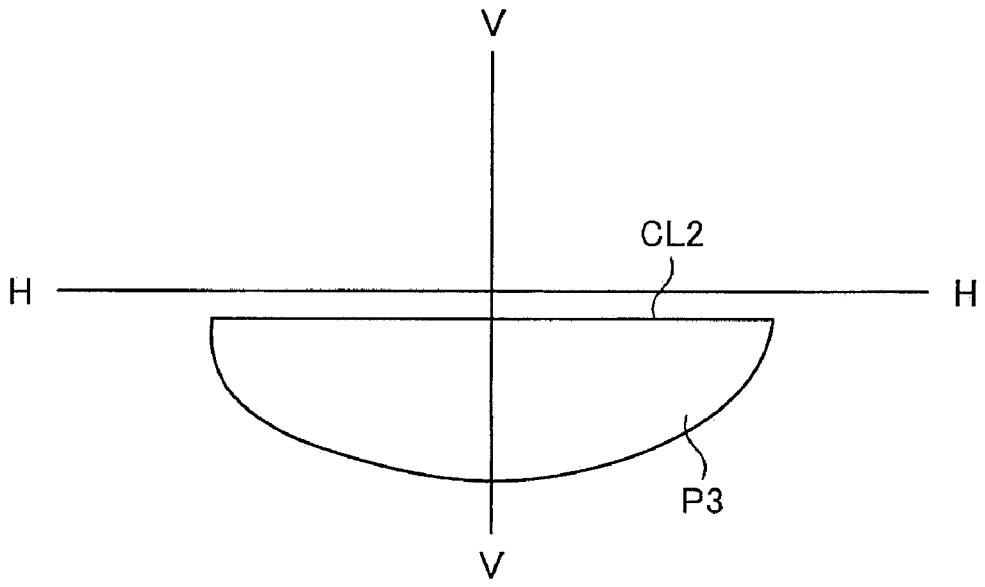


FIG. 7

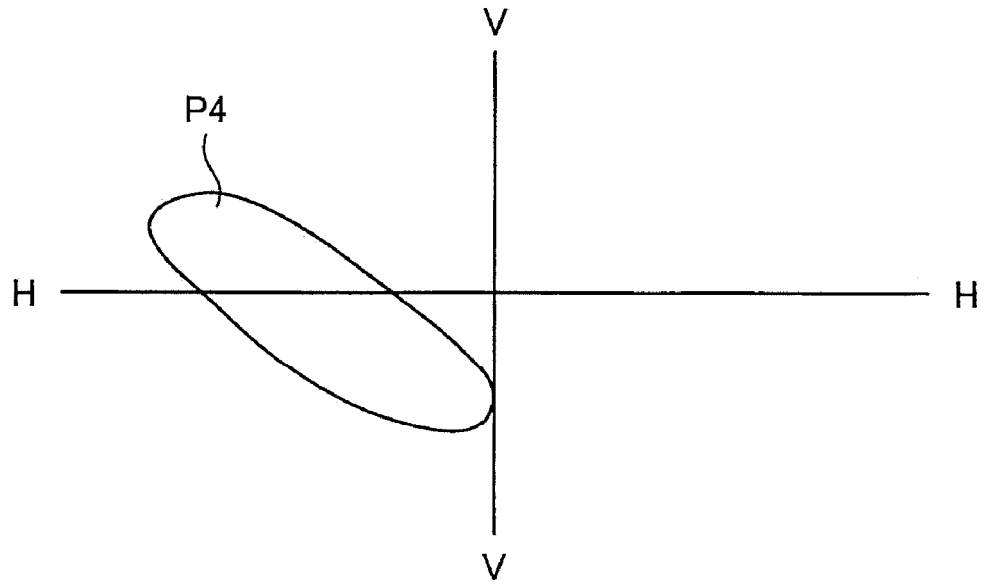


FIG. 8

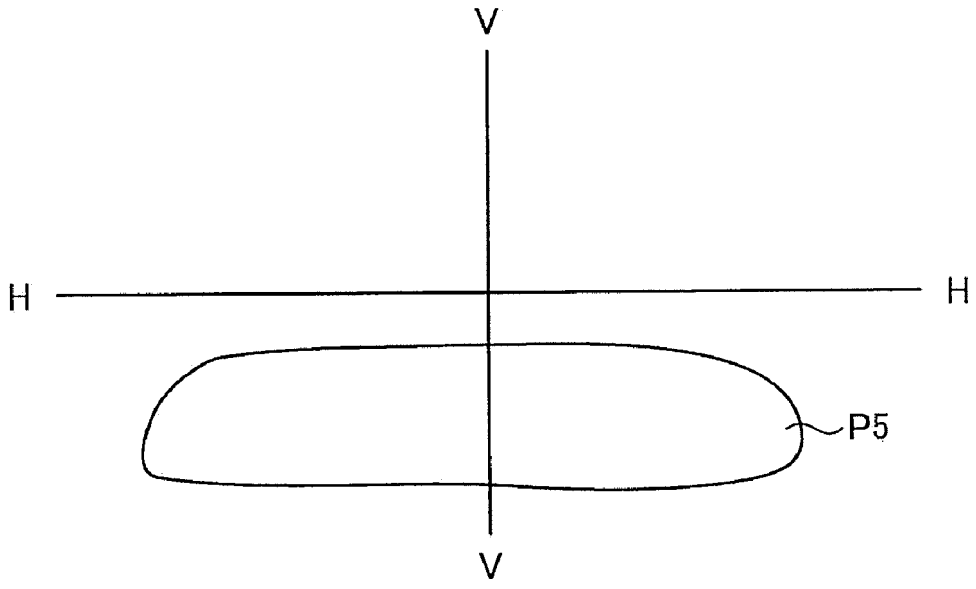


FIG. 9

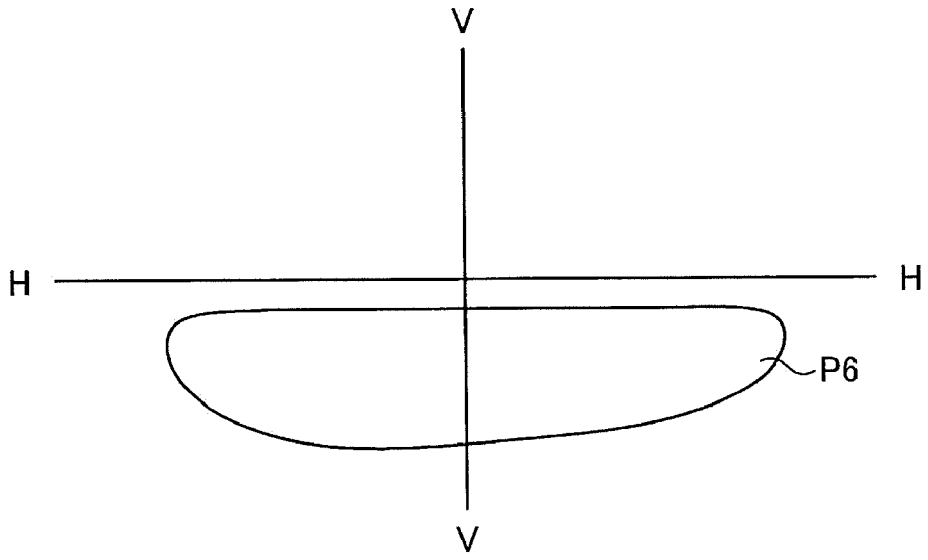
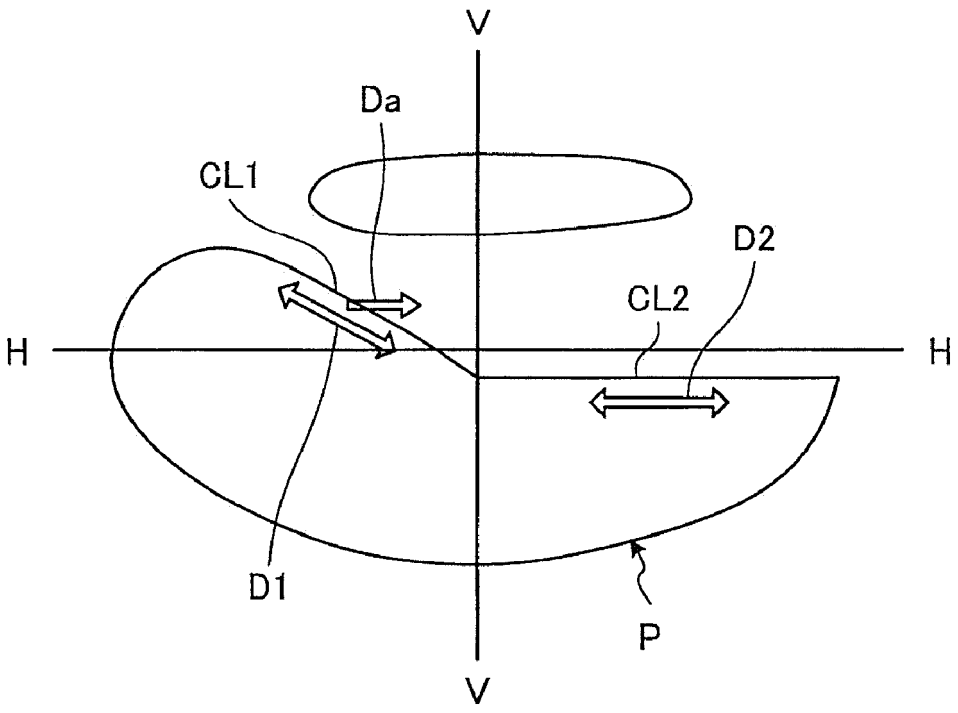


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 6021

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2017/167683 A1 (MAKINO HIROYUKI [JP] ET AL) 15 June 2017 (2017-06-15) * the whole document *	1-6	INV. F21S41/148 F21S41/33
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A	WO 2014/080747 A1 (ICHIKOH INDUSTRIES LTD [JP]) 30 May 2014 (2014-05-30) * abstract; figures *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC) F21S F21W

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 August 2020	Berthommé, Emmanuel

CATEGORY OF CITED DOCUMENTS

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