

Title of the Invention

Control Switch

Background of the Invention

5 1. Field of the Invention

The present invention relates to a control switch, and more particularly to a control switch having an operating mechanism comprising an operating lever arranged such that, by swinging or turning the
10 operating mechanism, there are provided different states of electric conduction. Such a control switch can be used as a control switch in a navigation system.

A navigation system mounted on a motor vehicle
15 is required to have not only a function of moving a point indicated by the cursor on a monitor in the X-axis direction and the Y-axis direction at a right angle thereto, but also a function of moving such a point in oblique directions between the X- and Y-axis
20 directions. The navigation system is also required to have a function of setting the point position to which the cursor has been moved.

The control switch of the present invention satisfies the requirements above-mentioned.

25

2. Description of the prior art

Japanese Utility Model Publication No. 59-25075 discloses a control switch in which the operating lever can be swung and turned so that any of different states of electric conduction is provided dependent on a position to which the operating lever is set. This control switch may be used, for example, for setting any of states of electric conduction where motors are to be reversely and forwardly rotated. Further, this control switch provides four different states of electric conduction and can therefore be used as a switch for controlling any of the positions of fender mirrors of a motor vehicle.

It may be considered to apply the control switch discussed in the publication above-mentioned, to a switch for controlling the moving direction of a point indicated by the cursor on the monitor in a navigation system. However, this control switch can provide only four different states of conduction. Accordingly, when such four different states of conduction are respectively used for setting a point in X- and Y-axis directions at the positive and nevative sides, it is not possible to provide four different states of conduction for setting a point in diagonal directions at the positive and negative sides. Further, this control

switch is not provided with a function of setting the point position to which the cursor has been moved on the monitor.

5 Summary of the Invention

In view of the foregoing, the present invention is proposed with the object of providing a control switch capable of providing a number of states of electric conduction which could never be obtained
10 merely by following the technology of the control switch disclosed in Japanese Utility Model Publication No. 59-25075.

It is another object of the present invention to provide a control switch arranged such that, by swing-
15 ing and turning the operating lever, there can provide not only four different states of electric conduction in the X- and Y-axis directions, but also four different states of electric conduction in diagonal directions.

20 It is a further object of the present invention to provide a control switch having a very simple structure.

It is still another object of the present invention to provide a control switch in which a switching
25 operation can be carried out.

It is a still further object of the present invention to provide a thin control switch.

To achieve the objects above-mentioned, the present invention provides a control switch comprising: a
5 base; a movable body disposed on the base slidably in all directions and normally biased toward a neutral position of the base; an operating mechanism for sliding the movable body in all directions; a first terminal member disposed on the surface of the base
10 and having a terminal pattern which presents (i) an electric insulating portion at the center portion of the first terminal member, (ii) a plurality of electric insulating portions around the center portion above-mentioned at regular angular intervals and (iii)
15 a plurality of terminals as divided by the electric insulating portions; a second terminal member disposed on the surface of the base and having a terminal pattern which presents (i) an electric insulating portion at the center portion of the second terminal member,
20 (ii) a plurality of electric insulating portions around the center portion above-mentioned at regular angular intervals and (iii) a plurality of terminals as divided by the electric insulating portions, the terminal pattern being different in phase from the
25 terminal pattern of the first terminal member; a first

common terminal disposed on the surface of the base,
the first common terminal corresponding to the first
terminal member; a second common terminal disposed on
the surface of the base, the second common terminal
5 corresponding to the second terminal member; a first
movable contact-piece member adapted to be set at (i)
a position where the first movable contact-piece mem-
ber extends over the electric insulating portion of
the first terminal member at the center portion there-
10 of and the first common terminal when the movable body
is set to the neutral position, and (ii) a position
where the first movable contact-piece member extends
over one of the terminals of the first terminal member
and the first common terminal when the movable body is
15 slid in a direction away from the neutral position;
and a second movable contact-piece member adapted to
be set at (i) a position where the second movable con-
tact-piece member extends over the electric insulating
portion of the second terminal member at the center
20 portion thereof and the second common terminal when
the movable body is set to the neutral position, and
(ii) a position where the second movable contact-piece
member extends over one of the terminals of the second
terminal member and the second common terminal when
25 the movable body is slid in a direction away from

the neutral position.

According to the present invention, the first and second terminal members may be formed such that each of the terminal patterns thereof presents four
5 terminals and five electric insulating portions, and that the terminal patterns may be different in phase by 45° from each other. Further, the movable body may be set to the neutral position on the base by the biasing forces of resilient members each comprising a
10 compression coiled spring.

According to the control switch having the arrangement above-mentioned, when the movable body is set to the neutral position, (i) the first movable contact-piece member is set at a position where the
15 first movable contact-piece member extends over the electric insulating portion of the first terminal member at the center portion thereof and the first common terminal, so that the first common terminal and the first terminal member are maintained in a state of
20 non-conduction, and (ii) the second movable contact-piece member is set at a position where the second movable contact-piece member extends over the electric insulating portion of the second terminal member at the center portion thereof and the second common ter-
25 minal, so that the second common terminal and the sec-

ond terminal member are maintained in a state of non-conduction.

The terminal patterns of the first and second terminal members are different in phase from each other. Accordingly, when the movable body is slid on the base by the operating mechanism, the first and second movable contact-piece members are moved according to a direction in which the movable body is slid. When the first movable contact-piece member is set at a position where the first movable contact-piece member extends over one of the terminals of the first terminal member and the first common terminal, the second movable contact-piece member is set at a position where the second movable contact-piece member extends over one of the electric insulating portions of the second terminal member and the second common terminal. When the first movable contact-piece member is set at a position where the first movable contact-piece member extends over one of the electric insulating portions of the first terminal member and the first common terminal, the second movable contact-piece member is set at a position where the second movable contact-piece member extends over one of the terminals of the second terminal member and the second common terminal. Accordingly, each of the states of

electric conduction as obtained by connecting the first common terminal to each of the terminals of the first terminal member, can be used for moving the cursor in each of the X- and Y-axis directions at the positive and negative sides on the monitor, and each
5 of the states of electric conduction as obtained by connecting the second common terminal to each of the terminals of the second terminal member, can be used for moving the cursor in diagonal (upward-rightward
10 and downward-rightward) directions at the positive and negative sides on the monitor. Thus, there can be provided eight different states of electric conduction.

Thus, the control switch according to the present invention can advantageously provide a number of
15 different states of electric conduction readily and securely. Further, in the present invention, ingenuity is exercised only on the terminal patterns of the first and second terminal members. Further, only two (first and second) movable contact-piece members are
20 used. Accordingly, the present invention is advantageous in that the structure is very simple and the number of required component elements such as the movable contact-piece members is not excessively increased.

According to the present invention, the operating
25 ing mechanism may be formed by a spherical body and an

operating lever projecting from the spherical body. Further, the spherical body may be held by a case-like holding body disposed at the center portion of the base such that the spherical body is rotatable and
5 slidable in the axial direction of the holding body. Further, the holding body may have a switch having an actuator adapted to be operated by the spherical body when the spherical body is displaced in the axial direction of the holding body.

10 According to the control switch having the arrangement above-mentioned, by moving the operating lever in the axial direction of the holding body, the spherical body can operate the actuator of the switch and the switch can be switched regardless of the position to which the movable body is slid on the base.
15 Accordingly, when the control switch of the present invention is used in a navigation system, there can be rapidly and securely carried out with good maneuverability, (i) an operation of optionally moving a point
20 indicated by the cursor in any of the X-axis, Y-axis and diagonal directions on the monitor, and (ii) an operation of immediately setting the point position to which the cursor has been moved.

When the spherical body of the operating mechanism is fitted in the holding body such that the sphere
25

rical body cannot be rotatable on its own axis, the operating lever is not rotatable on its own axis regardless of the position to which the operating lever has been moved. Accordingly, a variety of states
5 of conduction in the X-axis, Y-axis and diagonal directions can be displayed on the operating lever. This improves the maneuverability.

Brief Description of the Drawings

10 Figure 1 is a plan view of a control switch according to an embodiment of the present invention with an upper cover removed;

 Figure 2 is a section view taken along the line II-II in Figure 1;

15 Figure 3 is a plan view of a box-shape body having a base having two common terminals and two terminal members;

 Figure 4 is a section view taken along the line IV-IV in Figure 1;

20 Figure 5 is a side view of the control switch shown in Figure 1;

 Figure 6 is a view illustrating portions of the control switch in Figure 1 when a movable body is set to a neutral position;

25 Figure 7 is a view illustrating portions of the

control switch in Figure 1 when the movable body is
slided in the upward direction on the drawing plane of
Figure 1; and

Figure 8 is a view illustrating portions of the
control switch in Figure 1 when the movable body is
slided in a diagonal direction on the drawing plane of
Figure 1.

Detailed Description of the Preferred Embodiment

As shown in Figs. 1 to 5, a control switch according to an embodiment of the present invention has a box-shape body 1, of which bottom wall also serves as a base 2 which is square in plan elevation. Four lateral walls 11 of the box-shape body 1 integrally stand from the four sides of the base 2.

A holding body 3 integrally stands from the base 2 at the center portion thereof. The holding body 3 may be rectangular or circular in plan elevation as far as the holding body 3 is made in the form of a casing. In this embodiment, the holding body 3 is a rectangular casing. As shown in Fig. 2, the holding body 3 is provided at the upper part of the inside thereof with an expanding portion 32 which projects toward the inside of the holding body 3 from the outer peripheral side thereof. In the expanding portion 32,

the inner peripheral surface of the upper part thereof is made in the form of a conical surface 33 which flares in the upward direction, and the inner peripheral surface of the lower part is made in the form of a spherical surface 34 which smoothly communicates with the cylindrical wall surface of a through-hole 31 in the holding body 3.

An operating mechanism 4 has a spherical body 41 and an operating lever 42. The spherical body 41 is held in the through-hole 31 in the holding body 3 so as to be slidable and displaceable in a predetermined limited range in the axial direction of the holding body 3. The operating lever 42 projects from the spherical body 41 in the upward direction of the holding body 3. The diameter of the spherical body 41 is greater than the smallest inner diameter of the expanding portion 32. The spherical body 41 has a downwardly projecting portion 43 and a concaved spring seat 44 therearound. The spherical body 41 has a transversely projecting portion 45. The transversely projecting portion 45 is fitted in a slit-like engagement hole 35 which is formed in the holding body 3 and which extends in the axial direction thereof. The transversely projecting portion 45 is slidable in the hole 35 only in the axial direction of the holding

body 3. According to the arrangement above-mentioned, the spherical body 41 is slidable in the axial direction of the holding body 3 but is not rotatable on its own axis in the holding body 3.

5 The base 2 is provided in the center portion thereof with a concave 21. A switch 5 is fitted in and held by the concave 21. As the switch 5, there is used a key switch which uses an inverting plate also serving as a contact. A pushbutton 51 serving as an actuator projects inside of the through-hole 31 in the holding body 3. The pushbutton 51 is normally biased in the projecting direction by the spring force of the inverting plate. A compression coiled spring 6 is disposed between the spring seat 44 of the spherical body 41 and the housing of the switch 5. The biasing force of the compression coiled spring 6 slidably pushes the surface of the spherical body 41 to the spherical surface 34 of the expanding portion 32. Accordingly, the spherical body 41 is engaged with the expanding portion 32. The compression coiled spring 6 may not be used. Instead, provision may be made such that the surface of the spherical body 41 is slidably pushed to the spherical surface 34 of the expanding portion 32 by the spring force of the inverting plate of the switch 5, this spring force being exerted to the push-

button 51 coming in contact with the projecting portion 43 of the spherical body 41. When the pushbutton 51 is pushed, the switch 5 is turned on. When the pushbutton pushing force is released, the pushbutton 5 51 is reset so that the switch 5 is turned off. The switch 5 has terminals 52.

A movable body 7 has a square top plate 71 and lateral plates 72 downwardly extending from the four sides of the top plate 71, thus causing the movable 10 body 7 to be made in the form of a box. The top plate 71 is provided in the center thereof with a through-hole 73 having a wall surface 74 which is downwardly outwardly inclined. The lateral plates 72 have projections 75 at the lower end surfaces at the corner portions thereof. Such a movable body 7 is disposed on 15 the base 2 with the operating lever 42 axially slidably fitted in the through-hole 73. When the movable body 7 is slid on the base 2, the projections 75 are also slid on the surface of the base 2, enabling the 20 movable body 7 to be smoothly slid.

As shown in Figs. 1 and 2, the top plate 71 of the movable body 7 is provided in the center of each of the four sides thereof with a concave 77 having a spring seat 76. A spring receiving piece 78 is housed 25 in each concave 77. A compression coiled spring 79 is

disposed between each spring receiving piece 78 and each spring seat 76. The biasing forces of the compression coiled springs 79 cause the spring receiving pieces 78 to slidably come in contact with the lateral
5 walls 11 of the box-shape body 1. Accordingly, the movable body 7 is normally biased toward the center (neutral) position of the base 2 by the cooperation of the four compression coiled springs 79.

As shown in Fig. 3, the base 2 is provided on
10 the surface at one side thereof with a first terminal member 8 and a first common terminal 8A, and is also provided on the surface at the other side thereof with a second terminal member 9 and a second common terminal 9A. These terminal members 8, 9 and terminals
15 8A, 9A are embedded in the base 2 and flush with the surface of the base 2. The first terminal member 8 has an electric insulating portion 81 at the center portion thereof, and four electric insulating portions 82, 83, 84, 85 around the center portion thereof at
20 regular angular intervals of 90° . Thus, the first terminal member 8 has a terminal pattern presenting four flat terminals 86, 87, 88, 89 as divided by these electric insulating portions 81 to 85. On the other hand, the first common terminal 8A has one electric
25 insulating portion 80. The second terminal member 9

has an electric insulating portion 91 at the center portion thereof, and four electric insulating portions 92, 93, 94, 95 around the center portion thereof at regular angular intervals of 90° . Thus, the second
5 terminal member 9 has a terminal pattern presenting four flat terminals 96, 97, 98, 99 as divided by these electric insulating portions 91 to 95. On the other hand, the first common terminal 9A has one electric insulating portion 90. The terminal pattern of the
10 first terminal member 8 is identical in arrangement with that of the second terminal member 9. However, the terminal pattern of the first terminal member 8 is different in phase by 45° from that of the second terminal member 9. In this embodiment, the electric insulating portions 81 to 85 of the first terminal member 8, the electric insulating portion 80 of the first common terminal 8A, the electric insulating portions
15 91 to 95 of the second terminal member 9 and the electric insulating portion 90 of the second common terminal 9A, are formed by the base 2 molded with the use of a synthetic resin excellent in electric insulating properties. There are also disposed lead terminals 86a, 87a, 88a, 89a, 96a, 97a, 98a, 99a, 80a, 90a.

A first movable contact-piece member 100 and a
25 second movable contact-piece member 200 (See Fig. 4

and Figs. 6 to 8) are respectively disposed at the undersides of two opposite lateral plates 72 of the movable body 7. As shown in Fig. 4, the first movable contact-piece member 100 has an attachment plate portion 110, a pair of contact pieces 120, 130 extending to both sides of the attachment plate portion 110, and contacts 121, 131 respectively disposed at the ends of the contact pieces 120, 130. The attachment plate portion 110 is attached to a concave portion 101 formed in the center of the lateral plate 72 of the movable body 7. As shown in Figs. 6 to 8, the pair of contact pieces 120, 130 are so disposed as to extend over the first terminal member 8 and the first common terminal 8A. The second movable contact-piece member 200 is not shown in Fig. 4, but has the same arrangement as that of the first movable contact-piece member 100 and is so disposed as to extend over the second terminal member 9 and the second common terminal 9A.

In Figs. 2, 4 and 5, a box-shape cover 10 has in the top thereof a circular opening 10a. The operating lever 42 passes through this opening 10a. The cover 10 has lateral plate portions 10b in which engagement holes 10c are respectively formed. The lateral plate portions 10b are put, from above, on the box-shape body 1 and the engagement holes 10c are respectively

engaged with engagement projections 12 of the box-shape body 1. In this embodiment, the cover 10 is made of a metallic plate subjected to bending or punching. Accordingly, when the cover 10 is fitted onto the
5 box-shape body 1, the cover 10 does not become bulky. This advantageously makes the control switch in a thin and compact design.

According to the control switch having the arrangement above-mentioned, when the movable body 7 is
10 set at the neutral position on the base 2 as shown in Figs. 1, 2 and 4, one contact 121 of the first movable contact-piece member 100 comes in contact with the electric insulating portion 81 of the first terminal member 8 at the center portion thereof, and the other
15 contact 131 comes in contact with the electric insulating portion 80 of the first common terminal 8A, as shown in Fig. 6. Also as shown in Fig. 6, one contact 221 of the second movable contact-piece member 200 comes in contact with the electric insulating portion
20 91 of the second terminal member 9 at the center portion thereof, and the other contact 231 comes in contact with the electric insulating portion 90 of the second common terminal 9A. Accordingly, when the movable body 7 is set at the neutral position, the first
25 common terminal 8A and the second common terminal 9A

are maintained as electrically non-conductive with respect to the terminals of the first and second terminal members 8, 9. Such a state of non-conduction is maintained by the fact that the contact 121 comes in
5 contact with the electric insulating portion 81 of the first terminal member 8 and that the contact 221 comes in contact with the electric insulating portion 91 of the second terminal member 9. Accordingly, the electric insulating portions 80, 90 of the first and sec-
10 ond common terminals 8A, 9A may not be disposed. However, when the first and second common terminals 8A, 9A have such electric insulating portions 80, 90, respectively, this improves the reliability of maintaining the state of non-conduction.

15 When the operating lever 42 is swung to slide the movable body 7 in a direction away from the neutral position, for example, in the upward direction on the drawing plane of Fig. 1, the one contact 121 and the other contact 131 of the first movable contact-
20 piece member 100 get on and come in contact with the terminal 89 of the first terminal member 8 and the first common terminal 8A, respectively, as shown in Fig. 7. Accordingly, the first common terminal 8A and the terminal 89 of the first terminal member 8 are
25 electrically conducted with each other by the first

movable contact-piece member 100. However, the one contact 221 of the second movable contact-piece member 200 comes in contact with the electric insulating portion 95 of the second terminal member 9. Accordingly, 5 the second common terminal 9A is maintained as non-conductive with respect to the terminals 86 to 89 of the second terminal member 9. Accordingly, when the movable body 7 is slided vertically or transversely on the drawing plane of Fig. 1, the one contact 121 of 10 the first movable contact-piece member 100 comes in contact with one of the four terminals 86 to 89 of the first terminal member 8, the other contact 131 comes in contact with the first common terminal 8A, and the one contact 221 of the second movable contact-piece 15 member 200 comes in contact with one of the four electric insulating portions 92 to 95 of the second terminal member 9.

When the movable body 7 is slided in an diagonal direction, e.g., in an upward-rightward direction on 20 the drawing plane of Fig. 1, the one contact 221 and the other contact 231 of the second movable contact-piece member 200 get on and come in contact with the terminal 98 of the second terminal member 9 and the second common terminal 9A, respectively, as shown in 25 Fig. 8. Accordingly, the second common terminal 9A and

the terminal 98 of the second terminal member 9 are electrically conducted with each other by the second movable contact-piece member 200. However, the one contact 121 of the first movable contact-piece member 5 100 comes in contact with the electric insulating portion 85 of the first terminal member 8. Accordingly, the first common terminal 8A is maintained as non-conductive with respect to the terminals 86 to 89 of the first terminal member 8. Accordingly, when the movable 10 body 7 is slided in a diagonal direction on the drawing plane of Fig. 1, the one contact 221 of the second movable contact-piece member 200 comes in contact with one of the four terminals 96 to 99 of the second terminal member 9, the other contact 231 comes in contact 15 with the second common terminal 9A, and the one contact 121 of the first movable contact-piece member 100 comes in contact with one of the four electric insulating portions 82 to 85 of the first terminal member 8.

20 Accordingly, (i) the pair of terminals 86, 88 of the first terminal member 8 which are opposite to each other in the transverse direction, may be used for providing states of conduction in the X-axis direction at the positive and negative sides, (ii) the pair of 25 terminals 87, 89 opposite to each other in the verti-

cal direction may be used for providing states of con-
duction in the Y-axis direction at the positive and
negative sides, (iii) the pair of lower left terminal
96 and upper right terminal 98 of the second terminal
5 member 9 may be used for providing states of conduc-
tion in the upward-rightward diagonal direction at the
the positive and negative sides, and (iv) the pair of
the upper left terminal 99 and the lower right termi-
nal 97 may be used for providing states of conduction
10 in the downward-rightward diagonal direction at the
positive and negative sides. Thus, there can be ob-
tained eight different states of conduction.

When the operating lever 42 is turned along the
periphery of the circular opening 10a in the cover 10,
15 the one contact 121 of the first movable contact-piece
member 100 and the one contact 221 of the second mo-
vable contact-piece member 200 are turned along cir-
cular passages of rotation 100a, 200a, respectively,
shown in Figs. 7 and 8, and successively come in con-
20 tact with the terminals 86 to 89 and the terminals 96
to 99, respectively. At this time, the other contact
131 of the first movable contact-piece member 100 and
the other contact 231 of the second movable contact-
piece member 200 are turned along circular passages of
25 rotation 100A, 200A, respectively, shown in Figs. 7

and 8, while the other contacts 131 and 231 remain in contact with the first common terminal 8A and the second common terminal 9A, respectively. Accordingly, the eight different states of conduction above-mentioned
5 can be successively switched. Since the opening 10a in the cover 10 is circular, the operating lever 42 can be smoothly turned. Further, the transversely projecting portion 45 of the spherical body 41 in the operating mechanism 4 is engaged with the engagement hole
10 portion 35 in the holding body 3. This prevents each of the operating lever 42 and the spherical body 41 from being rotated on its own axis in the the holding body 3. Accordingly, a variety of states of conduction in the X-axis, Y-axis and diagonal directions can be
15 displayed on the operating lever 42.

When the operating lever 42 is pushed down to push down the spherical body 41 inside of the holding body 3, the pushbutton 51 of the switch 5 is pushed by the projecting portion 43 of the spherical body 41.
20 This causes the switch 5 to be turned on. When the operating lever pushing forcing is released, the switch 5 is turned off.

The control switch having the arrangement above-mentioned may be used as a controller in a navigation system for a motor vehicle. In such a case,
25

when the operating lever 42 is swung or turned, a point indicated by the cursor on the monitor is moved vertically, transversely or diagonally. At the time when the point is moved to a desired position, the operating lever 42 can be pushed down. This causes the switch 5 to be turned on, so that the point position can be set.

In this embodiment, each of the first terminal member 8 and the second terminal member 9 has four terminals. Within the scope of the present invention, the number of the terminals in each of the first and second terminal members 8, 9 may be three, two or greater than four. Further, the operating mechanism 4 which is of the lever type in the embodiment, may be so arranged as to be of the type using a slide knob.

30 10 11

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What is Claimed is:

1. A control switch comprising:

a base;

5 a movable body disposed on said base slidably thereon in all directions and normally biased toward a neutral position of said base;

an operating mechanism for sliding said movable body in all directions;

10 a first terminal member disposed on the surface of said base and having a terminal pattern which presents (i) an electric insulating portion at the center portion of said first terminal member, (ii) a plurality of electric insulating portions around said center
15 portion at regular angular intervals and (iii) a plurality of terminals as divided by said electric insulating portions;

a second terminal member disposed on said surface of said base and having a terminal pattern which
20 presents (i) an electric insulating portion at the center portion of said second terminal member, (ii) a plurality of electric insulating portions around said center portion at regular angular intervals and (iii)
a plurality of terminals as divided by said electric
25 insulating portions, said terminal pattern being dif-



ferent in phase from said terminal pattern of said first terminal member;

a first common terminal disposed on said surface of said base, said first common terminal corresponding
5 to said first terminal member;

a second common terminal disposed on said surface of said base, said second common terminal corresponding to said second terminal member;

a first movable contact-piece member adapted to
10 be set at (i) a position where said first movable contact-piece member extends over said electric insulating portion of said first terminal member at said center portion thereof and said first common terminal when said movable body is set to said neutral position,
15 tion, and (ii) a position where said first movable contact-piece member extends over one of said terminals of said first terminal member and said first common terminal when said movable body is slid in a direction away from said neutral position; and

20 a second movable contact-piece member adapted to be set at (i) a position where said second movable contact-piece member extends over said electric insulating portion of said second terminal member at said center portion thereof and said second common
25 terminal when said movable body is set to said neutral

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position, and (ii) a position where said second movable contact-piece member extends over one of said terminals of said second terminal member and said second common terminal when said movable body is slid in a
5 direction away from said neutral position.

2. A control switch according to Claim 1, wherein the movable body is normally biased to the neutral position of the base by the biasing forces of resilient members.
10

3. A control switch according to Claim 2, wherein
the base is formed by the bottom wall of a box-
15 shape body and is square in plan elevation,
the movable body is square in plan elevation,
and

the resilient members and spring receiving pieces are disposed between (i) the four sides of said
20 movable body disposed on said base inside of said box-shape body and (ii) the four lateral walls of said box-shape body which respectively stand from the four sides of said base, said resilient members comprising compression coiled springs, said spring receiving
25 pieces slidably coming in contact with said lateral

walls of said box-shape body.



4. A control switch according to Claim 1, where-
in the first and second movable contact-piece members
5 are disposed at the movable body.

5. A control switch according to Claim 1, where-
in the neutral position of the movable body on the
base refers to the center position of said base.

10

6. A control switch according to Claim 1, where-
in

the terminal pattern of the first terminal mem-
ber presents (i) an electric insulating portion dis-
15 posed at the center portion of said first terminal
member, (ii) four electric insulating portions dis-
posed around said center portion at regular angular
intervals of 90° and (iii) four terminals as divided
by said electric insulating portions, and

20

the terminal pattern of the second terminal mem-
ber presents (i) an electric insulating portion dis-
posed at the center portion of said second terminal
member, (ii) four electric insulating portions dis-
posed around said center portion at regular angular
25 intervals of 90° and (iii) four terminals as divided



by said electric insulating portions.

7. A control switch according to Claim 1, where-
in the terminal pattern of the first terminal member
5 is different in phase by 45° from the terminal pattern
of the second terminal member.

8. A control switch according to Claim 7, where-
in each of the first and second common terminals is
10 provided at one portion thereof with an electric in-
sulating portion.

9. A control switch according to Claim 1, where-
in
15 the operating mechanism has a spherical body and
an operating lever projecting from said spherical
body,

said spherical body is held by a case-like hold-
ing body disposed at the center portion of the base
20 such that said spherical body is rotatable and displa-
ceable in the axial direction of said holding body,
and

said holding member has a switch having an
actuator adapted to be operated by said spherical body
25 when said spherical body is displaced in the axial



direction of said holding body.

10. A control switch according to Claim 9,
wherein the spherical body of the operating mechanism
5 is fitted in the holding body such that said spherical
body is not rotatable on its own axis.

11. A control switch according to Claim 9,
wherein

10 the spherical body of the operating mechanism
has a transversely projecting portion, and

said transversely projecting portion is fitted
in a slit-like engagement hole formed in the holding
body,

15 said slit-like engagement hole extending in the
axial direction of said holding body,

said transversely projecting portion being
slidable only in said axial direction of said holding
body.

20

12. A control switch according to Claim 9,
wherein

a cover is put on the box-shape body,

said cover being formed by subjecting a metallic
25 plate to machining,



said cover having a circular opening through which the operating lever of the operating mechanism passes.

13. A control switch substantially as herein described with reference to and as illustrated in the accompanying drawings.

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Fig.2

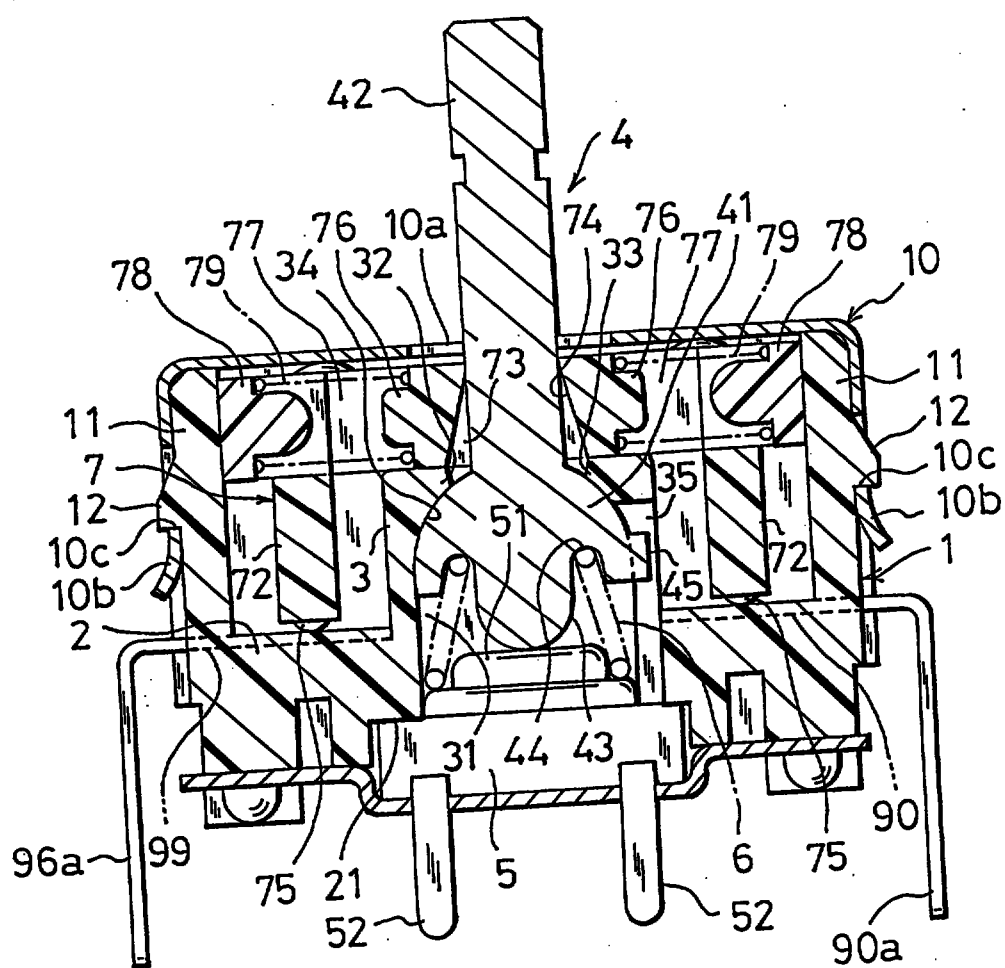


Fig.3

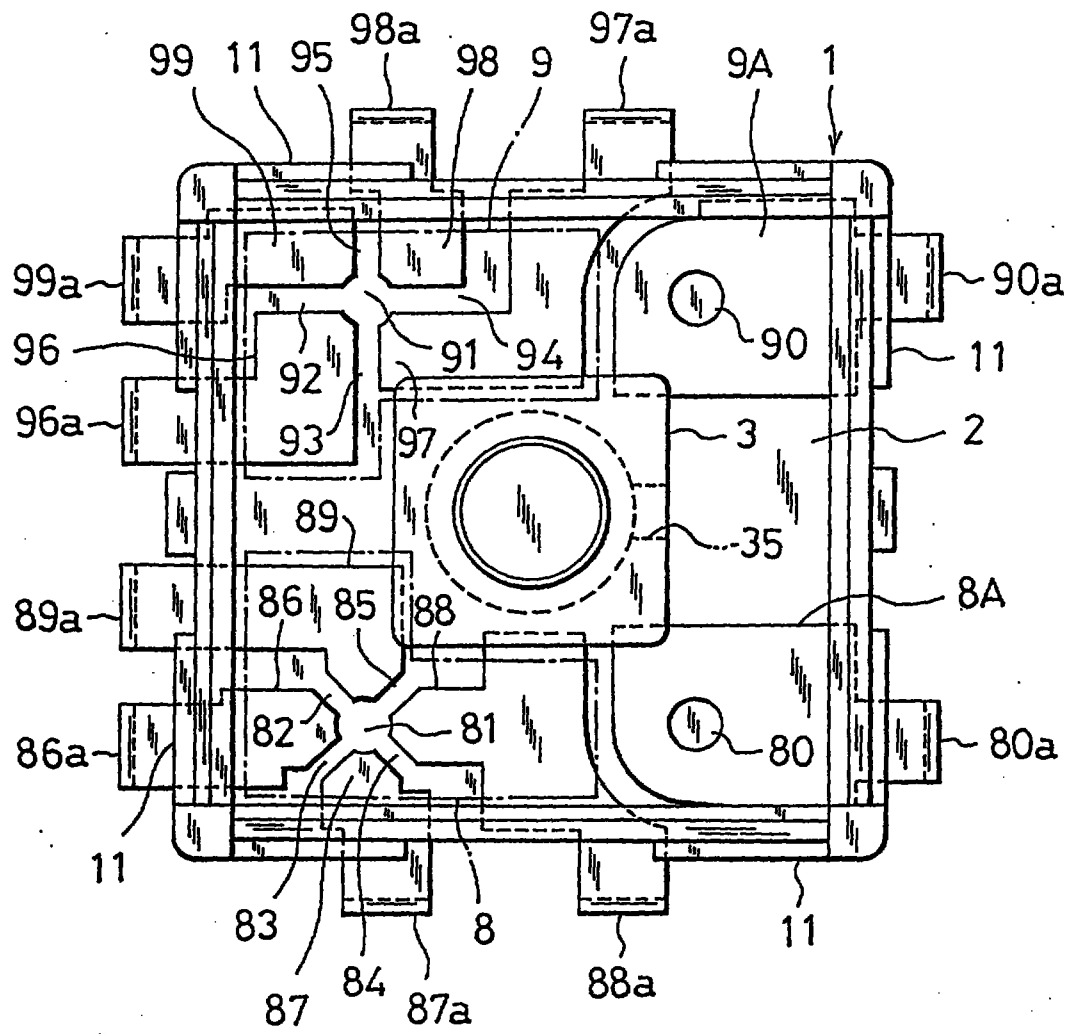


Fig.4

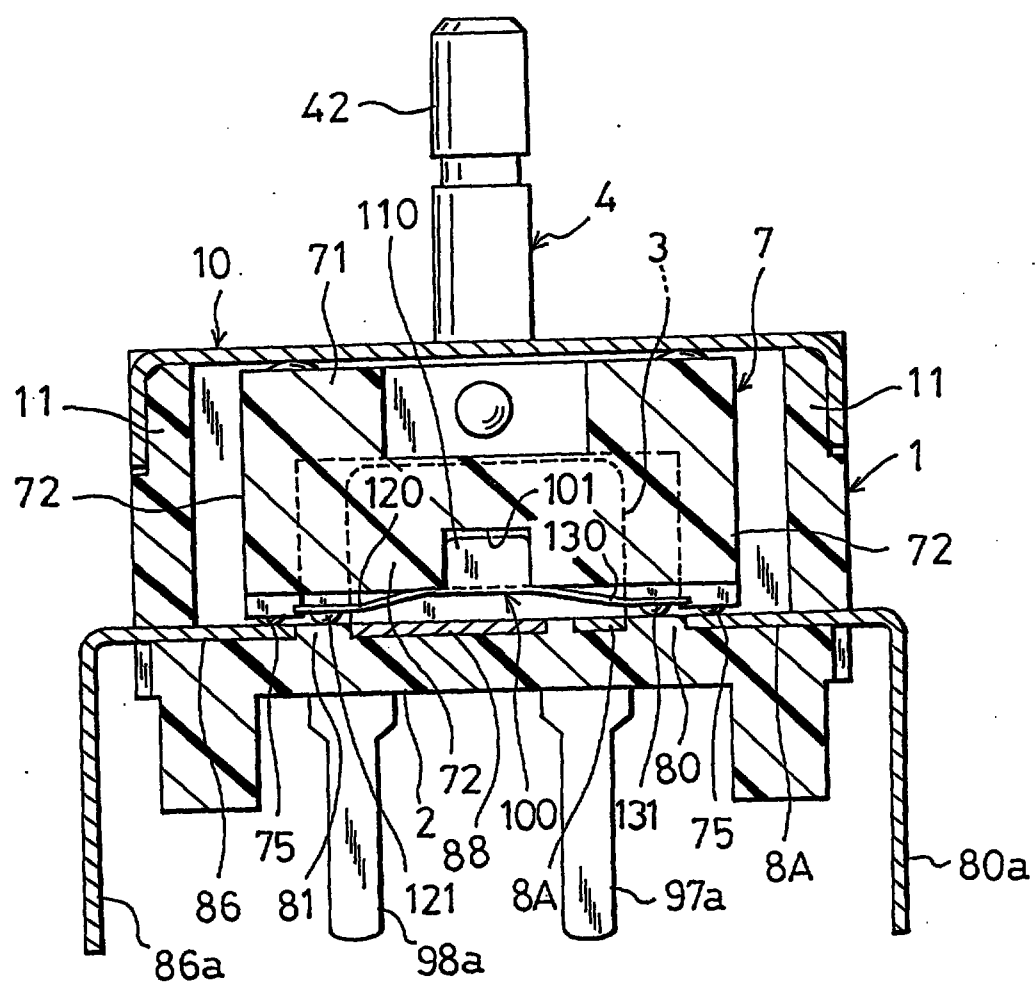


Fig.5

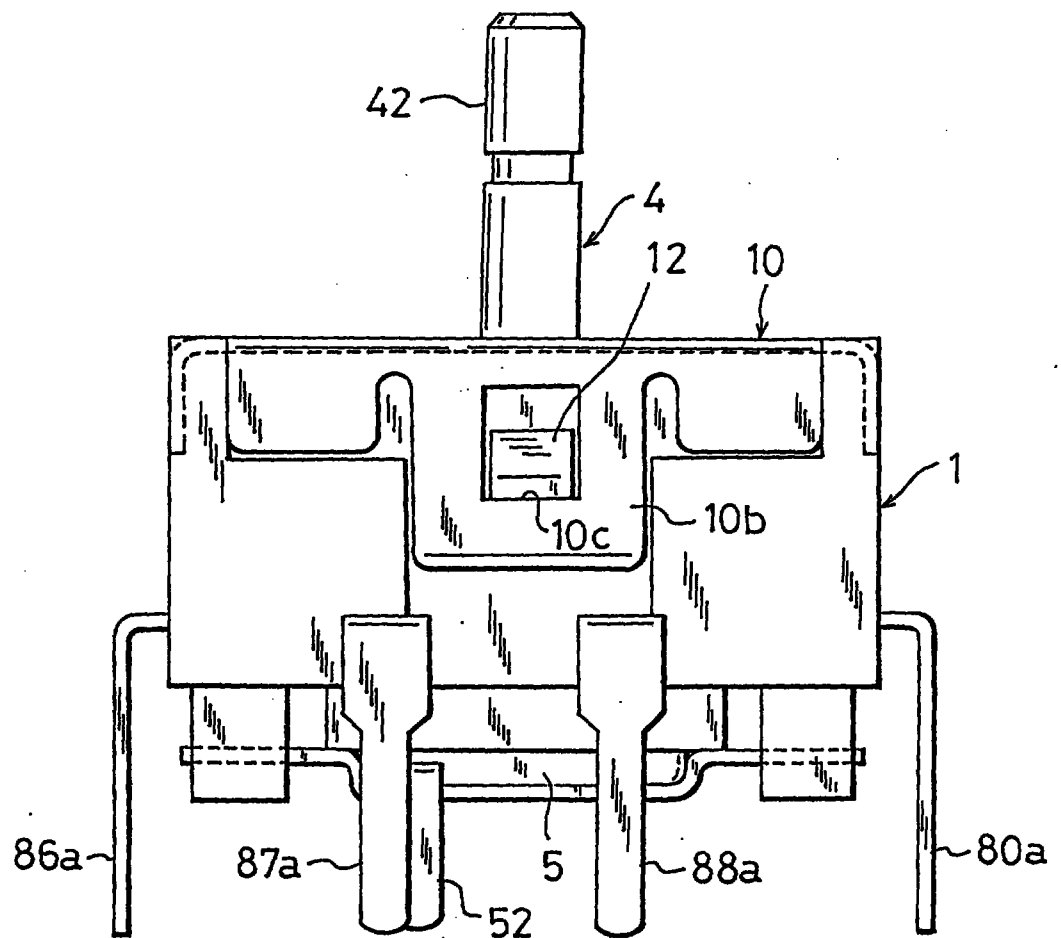


Fig.6

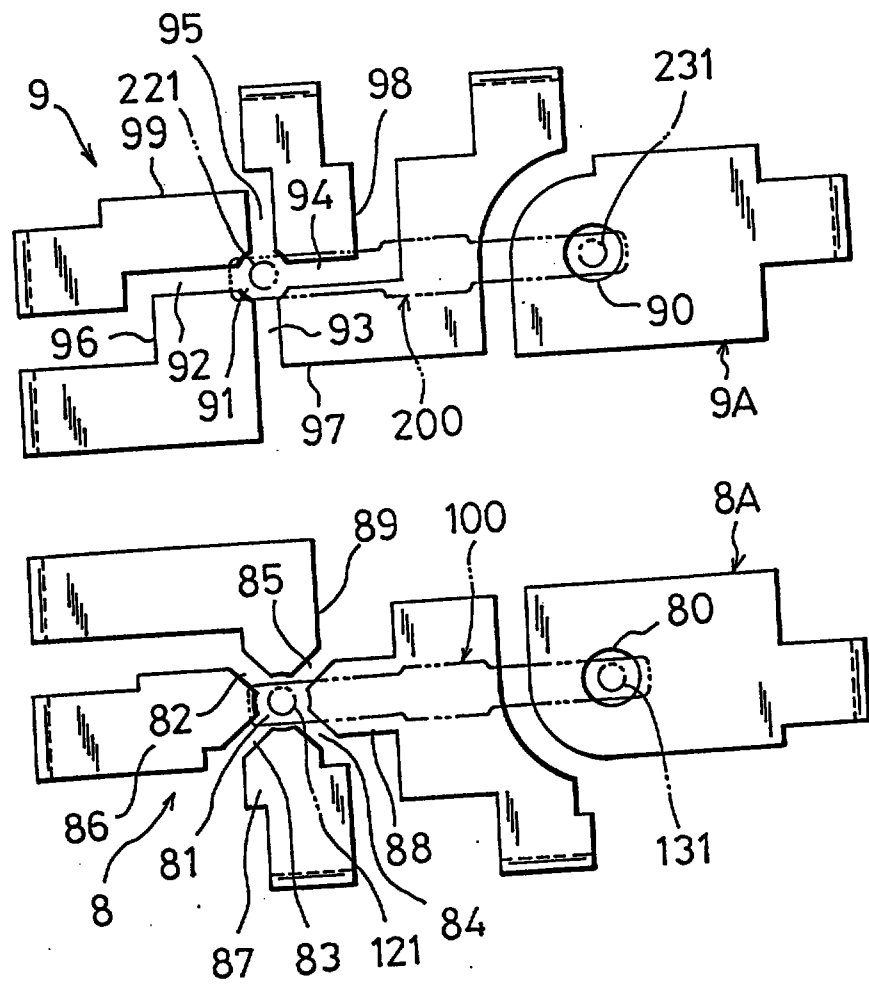


Fig.7

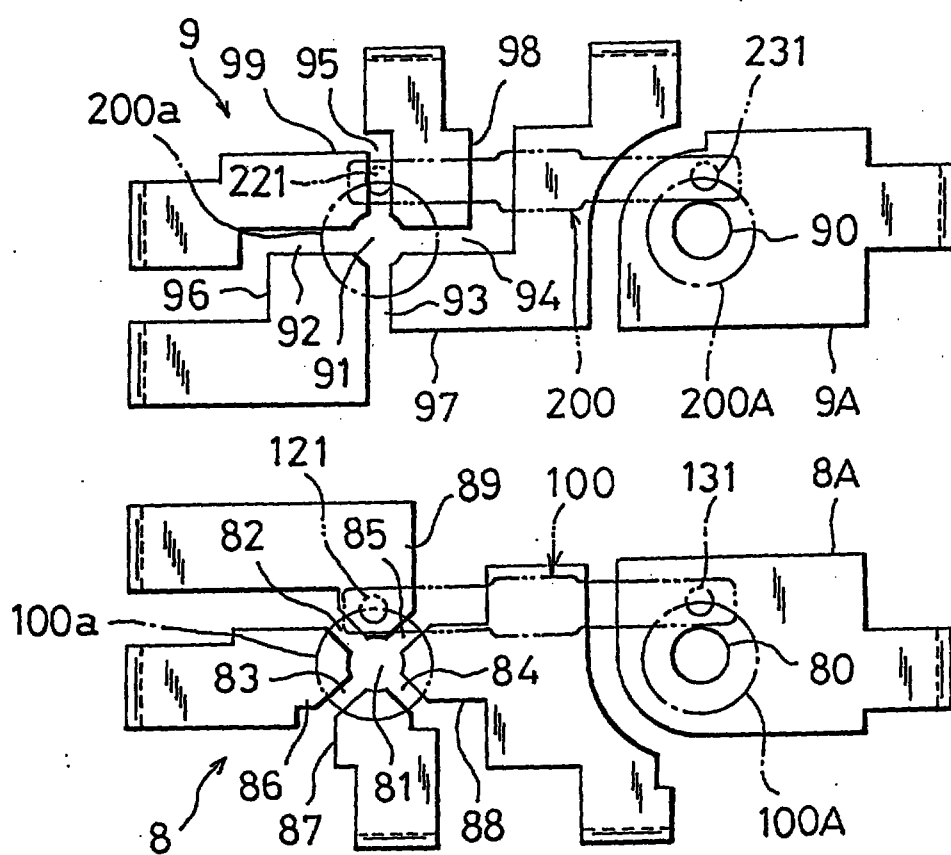
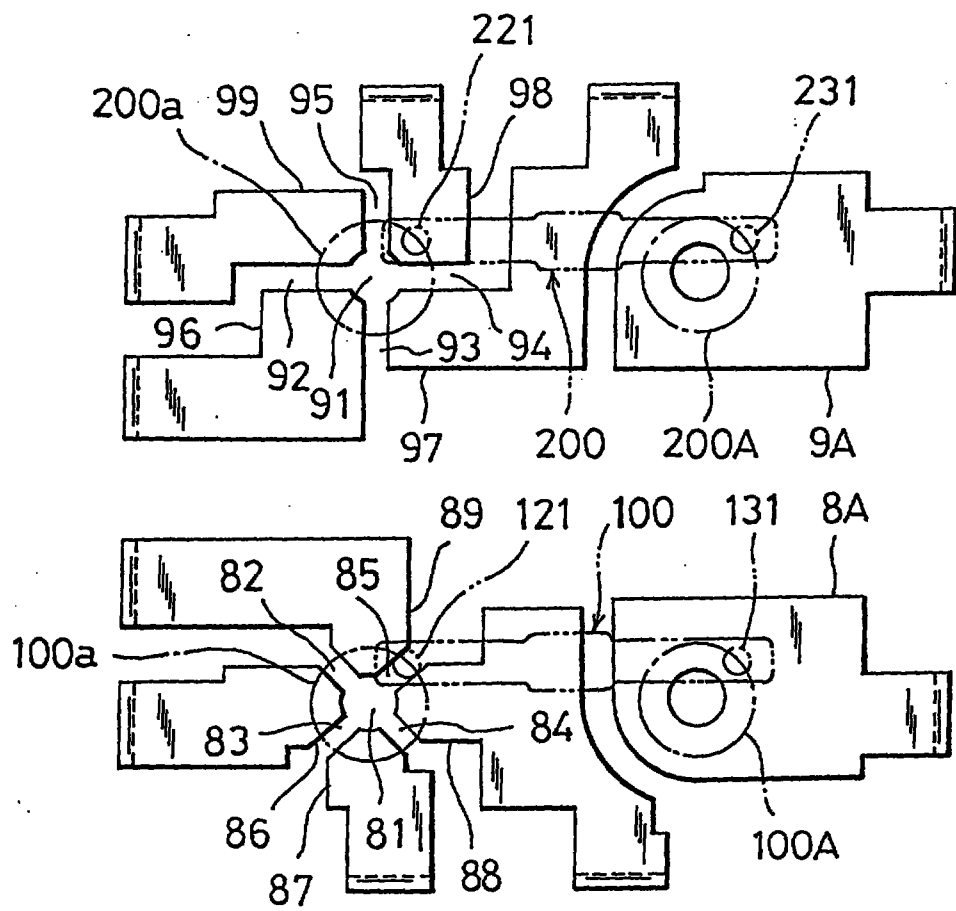


Fig.8



Abstract of the Disclosure

Title of the Invention

Control Switch

The control switch according to the present invention provides different states of electric conduction and may be used for setting a point indicated by the cursor on a monitor in a navigation system. The control switch comprises (i) two terminal members 8, 9 each having four terminals 86 to 89, 96 to 99, and (ii) common terminals 8A, 9A respectively corresponding to the terminal members 8, 9. The terminal member 8 is different in phase from the terminal member 9. When the common terminal 8A and the terminal member 8 are short-circuited by a movable contact-piece member 100, the common terminal 9A and the terminal member 9 are in a state of non-conduction. When the common terminal 9A and the terminal member 9 are short-circuited by a movable contact-piece member 200, the common terminal 8A and the terminal member 8 are in a state of non-conduction.

This Sheet Has Been Replaced



8-4501028

29/2/96

Abstract of the Disclosure

Title of the Invention

Control Switch

The control switch according to the present invention provides different states of electric conduction and may be used for setting a point indicated by the cursor on a monitor in a navigation system. The control switch comprises (i) two terminal members 8, 9 each having four terminals 86 to 89, 96 to 99, and (ii) common terminals 8A, 9A respectively corresponding to the terminal members 8, 9. The terminal member 8 is different in phase from the terminal member 9. When the common terminal 8A and the terminal member 8 are short-circuited by a movable contact-piece member 100, the common terminal 9A and the terminal member 9 are in a state of non-conduction. When the common terminal 9A and the terminal member 9 are short-circuited by a movable contact-piece member 200, the common terminal 8A and the terminal member 8 are in a state of non-conduction.

Please note that Fig. 3 should accompany the abstract when published.

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ferent in phase from said terminal pattern of said first terminal member;

a first common terminal disposed on said surface of said base, said first common terminal corresponding to said first terminal member;

a second common terminal disposed on said surface of said base, said second common
5 terminal corresponding to said second terminal member;

a first movable contact-piece member adapted to be set at (i) a position where said first
movable contact-piece member extends over said electric insulating portion of said first
terminal member at said center portion thereof and an electrically insulating or an electrically
non-insulating portion of said first common terminal when said movable body is set to said
10 neutral position, and (ii) a position where said first movable contact-piece member extends
over one of said terminals of said first terminal member and said first common terminal when
said movable body is slid in a direction away from said neutral position; and

a second movable contact-piece member adapted to be set at (i) a position where said
second movable contact-piece member extends over said electric insulating portion of said
15 second terminal member at said center portion thereof and an electrically insulating or an
electrically non-insulating portion of said second common terminal when said movable body
is set to said neutral

said cover having a circular opening through which the operating lever of the operating mechanism passes.