

18 JAN 2000

SWITCHING DEVICEBACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a switching device, and more particularly to shutter opening/closing mechanisms for shielding fixed board-side terminal plates of a switching device comprising a movable board and a fixed board.

2. Description of the Related Art

Figs. 15 and 16 are side views illustrating the arrangement of a conventional switching device, in which Fig. 15 shows an open state, and Fig. 16 shows a closed state. In Figs. 15 and 16, reference numeral 1 denotes a fixed board; 2, a movable board provided movably on the fixed board 1; 3, a terminal plate provided on the fixed board 1; and 4, a terminal provided on the movable board 2, the terminal plates 3 and the terminals 4 constituting electrical connecting portions. Numeral 5 denotes a guide attached to the fixed board 1; numerals 6a and 6b denote an upper shutter and a lower shutter provided movably on the guide 5; numeral 7 denotes a linking plate for linking the upper shutter 6a and the lower shutter 6b; numeral 8 denotes a driving plate provided on the movable board 2 and having a horizontal portion 8a and an inclined portion 8b. Numeral 9 denotes an operating link having one end attached movably to the lower shutter 6b and the other end attached rotatably to a supporting shaft 10.

Numeral 11 denotes a roller which is attached rotatably to the operating link 9 and rolls along the driving plate 8. Numeral 12 denotes a spring having one end retained at the guide 5 and the other end retained at the operating link 9.

Next, a description will be given of the operation. In a case where the movable board 2 is electrically connected to the fixed board 1, as the movable board 2 is pushed toward the fixed board 1, the roller 11 is pushed by the inclined portion 8b of the driving plate 8, and is rotated clockwise about the supporting shaft 10 serving as a fulcrum. As the movable board 2 is further pushed toward the fixed board 1, the roller 11 rolls on the lower side of the horizontal portion 8a, thereby moving the operating link 9. At this time, the lower shutter 6b is moved downward along the guide 5 against the tensile force of the spring 12. For this reason, the upper shutter 6a, together with the linking plate 7 linked to the lower shutter 6b, is moved downward along the guide 5, and the terminal plates 3 are exposed. If the movable board 2 is further pushed in in this state, the terminals 4 of the movable board 2 are fitted and inserted in the terminal plates 3 of the fixed board 1, and are electrically connected thereto.

It should be noted that in a case where the circuit is electrically disconnected, the operation is opposite to the above-described one.

Since the conventional switching device is arranged as

described above, in the case where the circuit is electrically connected (closed) or disconnected (opened), since both shutters 6a and 6b move vertically, an interval between the movable board 2 and both shutters 6a and 6b is required, so that there has been a problem in that the movable board 2 cannot be pushed toward the fixed board 1 by exceeding the interval D1 (shown in Fig. 16) between the fixed board 1 and the movable board 2. For this reason, even if an attempt is made to make the switching device compact in view of reducing the installation space, its realization has been difficult.

SUMMARY OF THE INVENTION

The present invention has been devised to overcome the above-described problems, and its object is to obtain a switching device which is capable of reducing the interval between the fixed board and the movable board.

The switching device in accordance with the present invention is characterized by being arranged such that a first connecting portion and a second connecting portion are electrically connected or disconnected by pushing in or drawing out a movable board with respect to a fixed plate, and when a first shutter for opening or shielding the first connecting portion and a second shutter for opening or shielding the second connecting portion are moved in mutually opposite directions, and when each of the first shutter and the second has opened each of the

connecting portions, the first shutter is disposed in a space on an upper side of the first connecting portion, and the second shutter is disposed in a space on a lower side of the second connecting portion.

Further, the switching device comprises: a fixed board; a movable board provided movably on the fixed board; a first connecting portion and a second connecting portion which are electrically connected or disconnected as the movable board is pushed in or drawn out with respect to the fixed board; a first shutter which is linked to a first supporting arm attached rotatably to the fixed board between the fixed board and the movable board, the first shutter being adapted to open or shield the first connecting portion, the first shutter being disposed in a space on a lower side of the first connecting portion when the first connecting portion is opened; a first driving member provided on the movable board and having a first horizontal portion and a first inclined portion; a first operating link having one end linked to a first linking member attached rotatably to the first supporting arm and another end attached rotatably to the fixed board; a first roller attached rotatably to the first operating link and adapted to roll along the first driving member; a second shutter which is linked to a second supporting arm attached rotatably to the fixed board between the fixed board and the movable board, the second shutter being adapted to open or shield the second connecting portion, the second shutter being

disposed in a space on an upper side of the second connecting portion when the second connecting portion is opened; a second driving member having a second horizontal portion which is disposed in face-to-face relation to the first horizontal portion of the first driving member with the movable board placed therebetween and a second inclined portion which is disposed so as to be symmetrical with a direction of the inclination of the first inclined portion of the first driving member; a second operating link having one end linked to a second linking member attached rotatably to the second supporting arm and another end attached rotatably to the fixed board; and a second roller attached rotatably to the second operating link and adapted to roll along the second driving member.

Still further, a first shutter supporting member is linked between the first supporting arm and the first shutter, and a second shutter supporting member is linked between the second supporting arm and the second shutter.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view illustrating the arrangement of a switching device in accordance with a first embodiment of the present invention, and shows a disconnected state prior to the pushing of a movable board into a fixed board;

Fig. 2 is a right side view of Fig. 1, and illustrates an opening/closing mechanism of a lower shutter;

Fig. 3 is a left side view of Fig. 1, and illustrates an opening/closing mechanism of an upper shutter;

Fig. 4 is a front view illustrating the arrangement of the switching device in accordance with the first embodiment of the present invention, and shows an electrically connected state after the movable board is pushed into the fixed board;

Fig. 5 is a right side view of Fig. 4, and illustrates the opening/closing mechanism of the lower shutter;

Fig. 6 is a left side view of Fig. 4, and illustrates the opening/closing mechanism of the upper shutter;

Fig. 7 is a front view illustrating the arrangement of a switching device in accordance with a second embodiment of the present invention, and shows a disconnected state prior to the pushing of the movable board into the fixed board;

Fig. 8 is a right side view of Fig. 7, and illustrates the opening/closing mechanism of the lower shutter;

Fig. 9 is a left side view of Fig. 7, and illustrates the opening/closing mechanism of the upper shutter;

Fig. 10 is a front view illustrating the arrangement of the switching device in accordance with the second embodiment of the present invention, and shows an electrically connected state after the movable board is pushed into the fixed board;

Fig. 11 is a right side view of Fig. 10, and illustrates the opening/closing mechanism of the lower shutter;

Fig. 12 is a left side view of Fig. 10, and illustrates

the opening/closing mechanism of the upper shutter;

Fig. 13 is a perspective view of an essential portion of Fig. 7;

Fig. 14 is an explanatory diagram of the essential portion of Fig. 7;

Fig. 15 is a side view illustrating the arrangement of a conventional switching device, and shows an open state; and

Fig. 16 is a side view illustrating the arrangement of the conventional switching device, and shows a closed state.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, a description will be given in detail of preferred embodiments of the invention with reference to the accompanying drawings.

First Embodiment

Fig. 1 is a front view illustrating the arrangement of a switching device in accordance with a first embodiment of the present invention, and shows a disconnected state prior to the pushing of the movable board into the fixed board. Fig. 2 is a right side view of Fig. 1, and illustrates an opening/closing mechanism of a lower shutter, and Fig. 3 is a left side view of Fig. 1, and illustrates an opening/closing mechanism of an upper shutter. Fig. 4 is a front view illustrating the arrangement of the switching device in accordance with the first embodiment of the present invention, and shows an electrically connected state

after the movable board is pushed into the fixed board. Fig. 5 is a right side view of Fig. 4, and illustrates the opening/closing mechanism of the lower shutter. Fig. 6 is a left side view of Fig. 4, and illustrates the opening/closing mechanism of the upper shutter. The upper shutter and the lower shutter, each comprising one shutter, are disposed, and the opening/closing mechanism of the upper shutter is provided independently on the left side surface of the device, while the opening/closing mechanism of the lower shutter is provided independently on the right side surface of the device.

In Figs. 1 to 6, reference numeral 21 denotes a fixed board; 22, a movable board provided movably on the fixed board 21; 23, a terminal plate provided on the fixed board 21; and 24, a terminal provided on the movable board 22, the terminal plates 23 and the terminals 24 constituting electrical connecting portions. Numeral 25b denotes a lower shutter which is linked to one supporting arm 27b on the left side of the device and two supporting arms 27b on the right side thereof, the supporting arms 27 being attached movably to the fixed board 21 by means of supporting shafts 26. Numeral 28 denotes a spring having one end retained at the fixed board 21 and the other end retained at the upper supporting arm 27b on the right side of the device.

Numeral 29 denotes a driving plate provided on the movable board 22 and having a horizontal portion 29a and an inclined portion 29b which is inclined upward. Numeral 30 denotes an

operating link having one end attached to a linking plate 32, which will be described later, and the other end attached rotatably to the fixed board 21 by means of a supporting shaft 31. The linking plate 32 is for the lower shutter 25b, and has one end linked to the lower supporting arm 27b and the other end linked to the operating link 30 on the right side of the device. Numeral 33 denotes a roller which is attached rotatably to the operating link 30 and rolls along the driving plate 29.

It should be noted that the members 25b, 26, 27b, 28, 29, 30, 31, 32, and 33 constitute the opening/closing mechanism of the lower shutter.

Numeral 25a denotes an upper shutter which is linked to one supporting arm 27a on the right side of the device and two supporting arms 27a on the left side thereof, the supporting arms 27a being attached movably to the fixed board 21 by means of supporting shafts 26. Numeral 34 denotes a driving plate provided on the movable board 22 in face-to-face relation to the driving plate 29 with the movable board 22 placed therebetween, and the driving plate 34 has a horizontal portion 34a disposed in such a way as to oppose the horizontal portion 29a and an inclined portion 34b which is inclined downward so as to be symmetrical with the direction of the inclination of the inclined portion 29b.

Numeral 35 denotes an operating link having one end attached to a linking plate 36 for the upper shutter 25a, which will be described later, and the other end attached rotatably to the fixed

board 21 by means of a supporting shaft 31. The linking plate 36 is for the upper shutter 25a, and has one end linked to the lower supporting arm 27a and the other end linked to the operating link 35 on the lower side of the device. Numeral 37 denotes a roller attached rotatably to the operating link 35 and rolls along the driving plate 34.

It should be noted that the members 25a, 26, 27a, 31, 34, 35, 36, and 37 constitute the opening/closing mechanism of the upper shutter.

Next, a description will be given of the operation of the lower shutter 25b. In a case where the movable board 22 is electrically connected to the fixed board 21, as the movable board 22 is pushed toward the fixed board 21, the roller 33 abuts against the inclined portion 29b of the driving plate 29. As the movable board 22 is further pushed, the roller 33 is pushed downward along the inclined portion 29b of the driving plate 29, and the operating link 30 is rotated clockwise about the supporting shaft 31 serving as a fulcrum. For this reason, since the supporting arms 27b rotate counterclockwise about the supporting shafts 26 by means of the linking plate 32, the shutter 25b retracts toward the fixed board 21 while being pulled downward.

As the movable board 22 is further pushed toward the fixed board 21, the roller 33 rolls on the lower side of the horizontal portion 29a of the driving plate 29, and the supporting arms 27b are further rotated counterclockwise, thereby making it possible

to bring the lower shutter 25b closer toward the fixed board 21 in a direction in which the movable board 22 is pushed. In addition, since the lower shutter 25b is pulled downward, the lower terminal plates 23 are opened (shielded when the movable board 22 and the fixed board 21 are electrically disconnected). As the movable board 22 is further pushed in in this state, as shown in Fig. 5, the lower terminals 24 of the movable board 22 are fitted and inserted in the lower terminal plates 23 of the fixed board 21 and are electrically connected thereto, and the lower shutter 25b is disposed in the space on the lower side of these connecting portions.

Next, a description will be given of the operation of the upper shutter 25a in a case where the movable board 22 is electrically connected to the fixed board 21. As the movable board 22 is pushed toward the fixed board 21, the roller 37 abuts against the inclined portion 34b of the driving plate 34. As the movable board 22 is further pushed, the roller 37 is pushed upward along the inclined portion 34b of the driving plate 34, and the operating link 35 is rotated clockwise about the supporting shaft 31 serving as the fulcrum. For this reason, since the supporting arms 27a rotate counterclockwise about the supporting shafts 26 by means of the linking plate 36, the shutter 25a retracts toward the fixed board 21 while being pulled upward.

As the movable board 22 is further pushed toward the fixed board 21, the roller 37 rolls on the upper side of the horizontal

portion 34a of the driving plate 34, and the supporting arms 27a are further rotated counterclockwise, thereby making it possible to bring the upper shutter 25a closer toward the fixed board 21 in the direction in which the movable board 22 is pushed. In addition, since the upper shutter 25a is pulled upward, the upper terminal plates 23 are opened (shielded when the movable board 22 and the fixed board 21 are electrically disconnected). As the movable board 22 is further pushed in in this state, as shown in Fig. 6, the upper terminals 24 of the movable board 22 are fitted and inserted in the upper terminal plates 23 of the fixed board 21 and are electrically connected thereto, and the upper shutter 25a is disposed in the space on the upper side of these connecting portions.

It should be noted that in a case where the movable board 22 and the fixed board 21 are electrically disconnected, the operation is opposite to the above-described one.

In accordance with the switching device of the first embodiment arranged as described above, since the arrangement provided is such that the upper shutter 25a and the lower shutter 25b move in the mutually opposite directions, and when the shutters 25a and 25b have opened their connecting portions, the shutters 25a and 25b are disposed in the space on the upper or lower side of the connecting portions which are electrically connected, the movable board 22 can be pushed toward the fixed board 1 more than in the case of the conventional device. For this reason, the

interval between the fixed board 21 and the movable board 22 can be reduced, and it is possible to reduce the space for installing the switching device, making it possible to make effective use of the space inside a building.

Since the interval L1 (see Fig. 16) between the movable board 2 and the terminal 4, which is determined from the minimum interval D1 (see Fig. 16) between the conventional fixed board 1 and movable board 2, can be reduced to the interval L2 (see Fig. 5) between the movable board 22 and the terminal 4, which is determined from the minimum interval D2 (see Fig. 5) between the fixed board 21 and the movable board 22 in accordance with the first embodiment of the present invention, materials of related parts making up the opening/closing mechanisms of the upper and lower shutters can be saved. For this reason, a low-cost switching device is made possible.

Second Embodiment

Fig. 7 is a front view illustrating the arrangement of a switching device in accordance with a second embodiment of the present invention, and shows a disconnected state prior to the pushing of the movable board into the fixed board. Fig. 8 is a right side view of Fig. 7, and illustrates the opening/closing mechanism of the lower shutter, and Fig. 9 is a left side view of Fig. 7, and illustrates the opening/closing mechanism of the upper shutter. Fig. 10 is a front view illustrating the arrangement of the switching device in accordance with the second

embodiment of the present invention, and shows an electrically connected state after the movable board is pushed into the fixed board. Fig. 11 is a right side view of Fig. 10, and illustrates the opening/closing mechanism of the lower shutter. Fig. 12 is a left side view of Fig. 10, and illustrates the opening/closing mechanism of the upper shutter. The upper shutter and the lower shutter, each comprising one shutter, are disposed, and the opening/closing mechanisms of the respective shutters are provided independently on the left and right side surfaces of the device, respectively. In addition, Fig. 13 is a perspective view of an essential portion of Fig. 7.

It should be noted that, of the reference numerals shown in Figs. 7 to 13, those reference numerals that are identical to those shown in Figs. 1 to 6 show identical or corresponding parts, and a description thereof will be omitted.

The arrangement of the second embodiment differs from that of the first embodiment in that although, in the first embodiment, the shutters 25a and 25b are respectively directly linked to the supporting arms 27a and 27b, shutter supporting brackets 42a and 42b are respectively provided between the shutter 25a and a supporting arm(s) 41a and between the shutter 25b and a supporting arm(s) 41b, as will be described later.

In Figs. 7 to 11, reference numeral 41a denotes the supporting arm for the upper shutter 25a, and two supporting arms 41a are provided on the left side of the device, while one

supporting arm 41a is provided on the right side thereof. The supporting arm 41a has one end attached rotatably to the fixed board 21 by means of the supporting shaft 26 and the other end linked to the shutter supporting bracket 42a which will be described below. The shutter supporting bracket 42a has one end linked to the supporting arm(s) 41a and the other end fixed to the upper shutter 25a.

It should be noted that the members 25a, 26, 31, 34, 35, 36, 37, 41a, and 42a constitute the opening/closing mechanism of the upper shutter.

Reference numeral 41b denotes the supporting arm for the lower shutter 25b, and two supporting arms 41b are provided on the right side of the device, while one supporting arm 41b is provided on the left side thereof. The supporting arm 41b has one end attached rotatably to the fixed board 21 by means of the supporting shaft 26 and the other end linked to the shutter supporting bracket 42b which will be described below. The shutter supporting bracket 42b has one end linked to the supporting arm(s) 41b and the other end fixed to the lower shutter 25b.

It should be noted that the members 25b, 26, 28, 29, 30, 31, 32, 33, 41b, and 42b constitute the opening/closing mechanism of the lower shutter.

Next, a description will be given of the operation of the lower shutter 25b. In a case where the movable board 22 is electrically connected to the fixed board 21, as the movable board

22 is pushed toward the fixed board 21, the roller 33 abuts against the inclined portion 29b of the driving plate 29. As the movable board 22 is further pushed, the roller 33 is pushed downward along the inclined portion 29b of the driving plate 29, and the operating link 30 is rotated clockwise about the supporting shaft 31 serving as a fulcrum. For this reason, since the supporting arms 41b rotate counterclockwise about the supporting shafts 26 by means of the linking plate 32, the shutter 25b together with the shutter supporting brackets 42b retracts toward the fixed board 21 while being pulled downward.

As the movable board 22 is further pushed toward the fixed board 21, the roller 33 rolls on the lower side of the horizontal portion 29a of the driving plate 29, and the supporting arms 41b are further rotated counterclockwise, thereby making it possible to bring the lower shutter 25b together with the shutter supporting brackets 42b closer toward the fixed board 21 in a direction in which the movable board 22 is pushed. In addition, since the lower shutter 25b is pulled downward, the lower terminal plates 23 are opened (shielded when the movable board 22 and the fixed board 21 are electrically disconnected). As the movable board 22 is further pushed in in this state, as shown in Fig. 11, the lower terminals 24 of the movable board 22 are fitted and inserted in the lower terminal plates 23 of the fixed board 21 and are electrically connected thereto, and the lower shutter 25b is disposed in the space on the lower side of these connecting

portions.

Next, a description will be given of the operation of the upper shutter 25a in a case where the movable board 22 is electrically connected to the fixed board 21. As the movable board 22 is pushed toward the fixed board 21, the roller 33 abuts against the inclined portion 34b of the driving plate 34. As the movable board 22 is further pushed, the roller 33 is pushed upward along the inclined portion 34b of the driving plate 34, and the operating link 35 is rotated clockwise about the supporting shaft 31 serving as the fulcrum. For this reason, since the supporting arms 41a rotate counterclockwise about the supporting shafts 26 by means of the linking plate 36, the shutter 25a together with the shutter supporting brackets 42a retracts toward the fixed board 21 while being pulled upward.

As the movable board 22 is further pushed toward the fixed board 21, the roller 33 rolls on the upper side of the horizontal portion 34a of the driving plate 34, and the supporting arms 41a are further rotated counterclockwise, thereby making it possible to bring the upper shutter 25a together with the shutter supporting brackets 42a closer toward the fixed board 21 in the direction in which the movable board 22 is pushed. In addition, since the upper shutter 25a is pulled upward, the upper terminal plates 23 are opened (shielded when the movable board 22 and the fixed board 21 are electrically disconnected). As the movable board 22 is further pushed in in this state, as shown in Fig. 12, the upper

terminals 24 of the movable board 22 are fitted and inserted in the upper terminal plates 23 of the fixed board 21 and are electrically connected thereto, and the upper shutter 25a is disposed in the space on the upper side of these connecting portions.

Meanwhile, in a case where the movable board 22 and the fixed board 21 are electrically disconnected, the operation is opposite to the above-described one.

Next, referring to Fig. 14, a description will be given of the operation in the case where the shutter supporting brackets 42b are used. In Fig. 14, the broken lines show the loci of movement of the shutter supporting bracket 42b and the lower shutter 25b, the angle *a* shows an angle of operation of the supporting arm 41b at this time. Meanwhile, the dotted chain lines show the locus of movement of the lower shutter 25b in a case where, as in the first embodiment, the supporting arms 27b are directly attached to the lower shutter 25b without using the shutter supporting brackets 42b and the shutter 25b is opened or closed. In addition, the angle *b* shows an angle of operation of the supporting arm 27b at this time.

In addition, reference character *c* indicates the center of rotation of the supporting arm 41b, and its position is determined on the basis of the conditions that it is closest to a rear plate 43 of the fixed board 21 in a range in which the supporting arm 41b does not interfere with the rear plate 43, and

that the position is highest (lowest in the case of the upper shutter 25a) in a range in which the corner of the lower shutter 25b, indicated by a point A in Fig. 14, and the corner of an insulating material 44 of the fixed board 21, indicated by a point B, do not interfere with each other during the opening or closing of the lower shutter 25b.

As described above, although a description has been given on the basis of the lower shutter, the operation in the case of the upper shutter is similar to the above description except that the operation is upward.

As shown in Fig. 14, the angle of operation of the supporting arm 41b can be reduced by the use of the shutter supporting brackets 42b. For this reason, the angle of operation of the operating link 30 becomes small, and since the operating link 30 is operated, it becomes possible to reduce the distance in which the movable board 22 moves.

In addition, the radius of rotation of the supporting arm 41b becomes large by the use of the shutter supporting brackets 42b. Consequently, since it is possible to suppress the movement of the lower shutter 25b toward the movable board 22 by the portion of the distance D in Fig. 14, the position of starting the opening/closing operation of the lower shutter 25b can be moved in the direction in which the movable board 22 is pushed toward the fixed board 21.

It should be noted that since the position of the center

of rotation c of the supporting arm 41b is positioned as at an upper a position as possible in accordance with the above-described conditions, the distance D of movement of the lower shutter 25b toward the movable board 22 can be made small.

In addition, in the open position of the lower shutter 25b, the supporting arms 27b are located virtually vertically in a case where the shutter supporting brackets 42b are not used.

On the other hand, in the case where the shutter supporting brackets 42b are used, since the distal ends of the supporting arms 41b move toward the movable board 22, the area where the link 32 for driving the supporting arms 41b can be disposed below the supporting arm 41b increases, so that mounting is facilitated.

As a result, the dimension of the fixed board 21 in the direction in which the movable board 22 is pushed can be made still smaller, and a compact switching device can be obtained.

For this reason, the material cost of the fixed board constituting a breaker can be reduced, and as the breaker is made compact, its installation area can be decreased, and if the switching device is installed in a building or the like, it is possible to expand the space which can be effectively utilized.

Since the present invention is arranged as described above, the following advantages are offered.

The arrangement provided is such that a first connecting portion and a second connecting portion are electrically connected or disconnected by pushing in or drawing out a movable

board with respect to a fixed plate, and when a first shutter for opening or shielding the first connecting portion and a second shutter for opening or shielding the second connecting portion are moved in mutually opposite directions, and when each of the first shutter and the second has opened each of the connecting portions, the first shutter is disposed in a space on an upper side of the first connecting portion, and the second shutter is disposed in a space on a lower side of the second connecting portion.

Accordingly, the movable board can be pushed in further toward the fixed board side, so that the interval between the fixed board and the movable board can be reduced, and the space for installing the switching device can be reduced.

Further, the switching device comprises: a fixed board; a movable board provided movably on the fixed board; a first connecting portion and a second connecting portion which are electrically connected or disconnected as the movable board is pushed in or drawn out with respect to the fixed board; a first shutter which is linked to a first supporting arm attached rotatably to the fixed board between the fixed board and the movable board, the first shutter being adapted to open or shield the first connecting portion, the first shutter being disposed in a space on a lower side of the first connecting portion when the first connecting portion is opened; a first driving member provided on the movable board and having a first horizontal portion and a first inclined portion; a first operating link having one

end linked to a first linking member attached rotatably to the first supporting arm and another end attached rotatably to the fixed board; a first roller attached rotatably to the first operating link and adapted to roll along the first driving member; a second shutter which is linked to a second supporting arm attached rotatably to the fixed board between the fixed board and the movable board, the first shutter being adapted to open or shield the second connecting portion, the second shutter being disposed in a space on an upper side of the second connecting portion when the second connecting portion is opened; a second driving member having a second horizontal portion which is disposed in face-to-face relation to the first horizontal portion of the first driving member with the movable board placed therebetween and a second inclined portion which is disposed so as to be symmetrical with a direction of the inclination of the first inclined portion of the first driving member; a second operating link having one end linked to a second linking member attached rotatably to the second supporting arm and another end attached rotatably to the fixed board; and a second roller attached rotatably to the second operating link and adapted to roll along the second driving member. Accordingly, the movable board can be pushed in further toward the fixed board side, so that the interval between the fixed board and the movable board can be reduced.

Still further, a first shutter supporting member is

linked between the first supporting arm and the first shutter, and a second shutter supporting member is linked between the second supporting arm and the second shutter, whereby the first shutter and the second shutter can be moved in mutually opposite directions at a reduced angle of operation of each supporting arm. Hence, the movable board can be pushed in further toward the fixed board side, so that the interval between the fixed board and the movable board can be reduced.

WHAT IS CLAIMED IS:

1. A switching device characterized by being arranged such that a first connecting portion and a second connecting portion are electrically connected or disconnected by pushing in or drawing out a movable board with respect to a fixed plate, and when a first shutter for opening or shielding said first connecting portion and a second shutter for opening or shielding said second connecting portion are moved in mutually opposite directions, and when each of said first shutter and said second has opened each of said connecting portions, said first shutter is disposed in a space on an upper side of said first connecting portion, and said second shutter is disposed in a space on a lower side of said second connecting portion.

2. A switching device comprising:
a fixed board;
a movable board provided movably on said fixed board;
a first connecting portion and a second connecting portion which are electrically connected or disconnected as said movable board is pushed in or drawn out with respect to said fixed board;

a first shutter which is linked to a first supporting arm attached rotatably to said fixed board between said fixed board and said movable board, said first shutter being adapted to open or shield said first connecting portion, said first shutter being disposed in a space on a lower side of said first connecting portion



when said first connecting portion is opened;

a first driving member provided on said movable board and having a first horizontal portion and a first inclined portion;

a first operating link having one end linked to a first linking member attached rotatably to said first supporting arm and another end attached rotatably to said fixed board;

a first roller attached rotatably to said first operating link and adapted to roll along said first driving member;

a second shutter which is linked to a second supporting arm attached rotatably to said fixed board between said fixed board and said movable board, said first shutter being adapted to open or shield said second connecting portion, said second shutter being disposed in a space on an upper side of said second connecting portion when said second connecting portion is opened;

a second driving member having a second horizontal portion which is disposed in face-to-face relation to the first horizontal portion of said first driving member with said movable board placed therebetween and a second inclined portion which is disposed so as to be symmetrical with a direction of the inclination of the first inclined portion of said first driving member;

a second operating link having one end linked to a second linking member attached rotatably to said second supporting arm and another end attached rotatably to said fixed board; and

a second roller attached rotatably to said second



operating link and adapted to roll along said second driving member.

3. The switching device according to claim 2, wherein a first shutter supporting member is linked between said first supporting arm and said first shutter, and a second shutter supporting member is linked between said second supporting arm and said second shutter.

