United States Patent

Sasaki et al.

[15] **3,671,915**

[45] **June 20, 1972**

[54] SLIDING TYPE VARIABLE RESISTOR

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[21] Appl. No.: **109,924**

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Jan. 30, 1970	Japan	45/9926
Jan. 30, 1970	Japan	45/9927

[52] **U.S. Cl.** **338/183,** 338/176

[51] **Int. Cl.** **H01c 9/02**

[58] **Field of Search** 338/176, 183

[56] **References Cited**

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Primary Examiner—Lewis H. Myers
Assistant Examiner—D. A. Tone
Attorney—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

A sliding type variable resistor having a resistance element and a conductive element mounted in parallel with each other on a dielectric base, a slider having a conductor on its lower surface, a guide rail for guiding the sliding movement of the slider, a housing covering the dielectric base for accommodating thereinside the slider and the guide rail, and an operating means fixed to the slider and projecting to the exterior through a slot in the upper wall of the housing. In the variable resistor, supporting pedestals are provided at longitudinal opposite end portions of the dielectric base for supporting the opposite ends of the guide rail thereby to ensure smooth and stable sliding movement of the slider.

6 Claims, 15 Drawing Figures

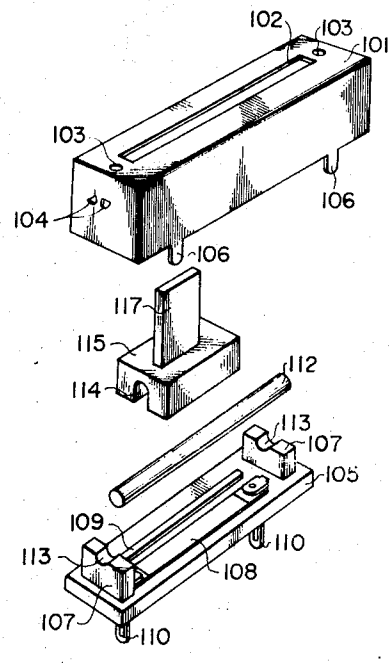


FIG. 1

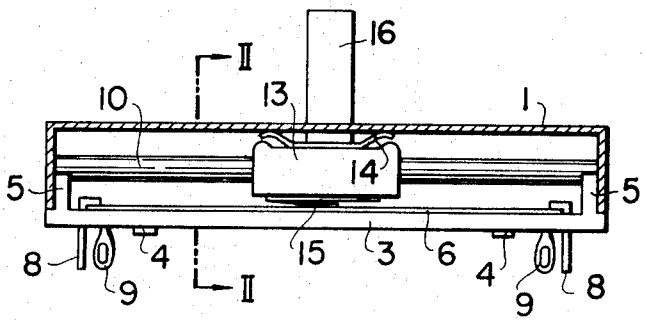

16
II
10
13
1
14
5
5
8
4
15
3
6
4
8
9
9
II

FIG. 2

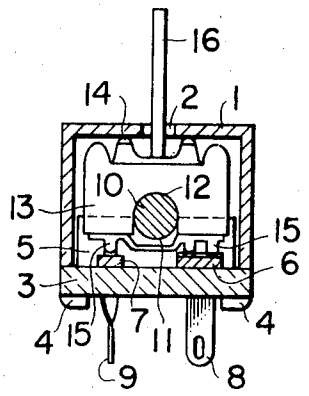

16
14
2
1
10
12
13
15
5
6
3
4
15
7
11
4
9
8

FIG. 3

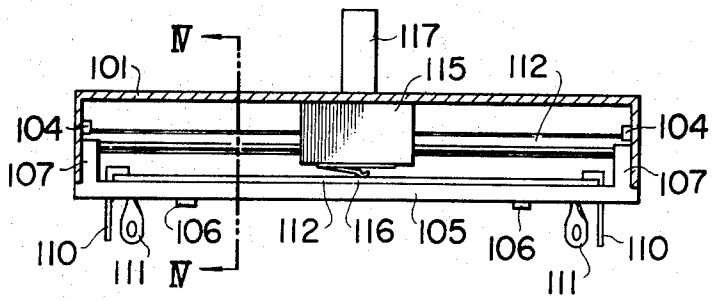

IV
117
101
115
112
104
104
107
107
110
106
112
116
105
106
110
111
IV
111

FIG. 4

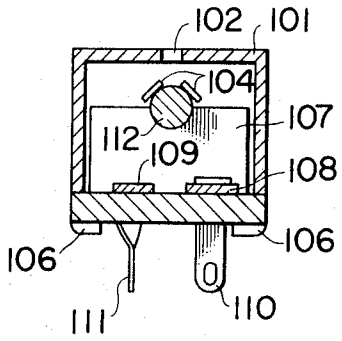

102
101
104
107
112
109
108
106
106
111
110

FIG. 5

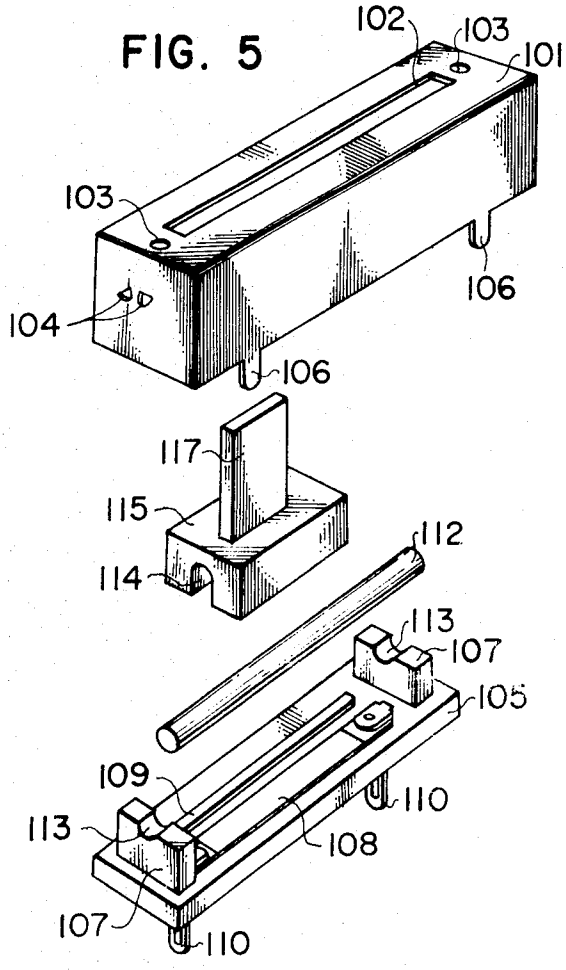

102
103
101
103
106
104
106
117
115
112
114
113
107
105
109
110
113
108
107
110

FIG. 6

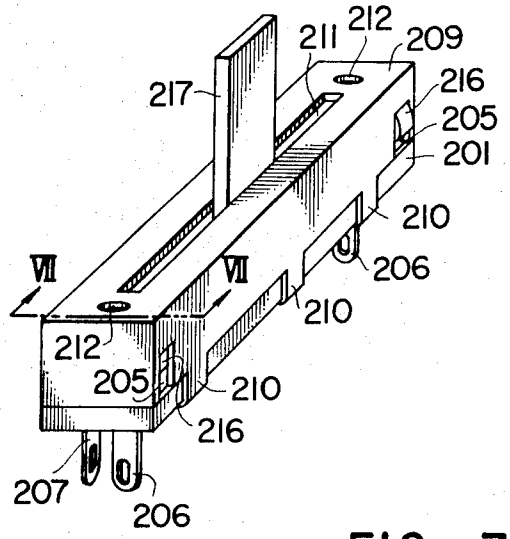

211
212
209
217
216
205
201
210
206
VII
VII
210
212
205
210
216
207
206

FIG. 7

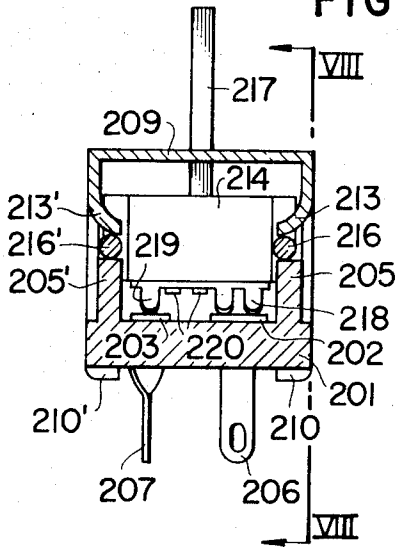

VIII
217
209
214
213'
213
216'
219
216
205'
205
218
203
220
202
201
210'
210
207
206
VIII

FIG. 8

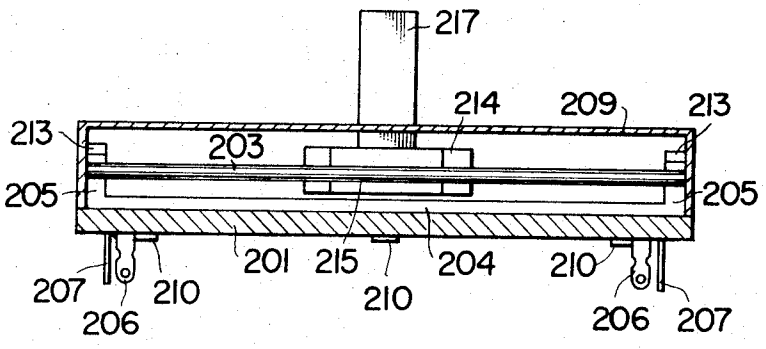

217
214
209
213
213
203
205
205
201
215
204
210
207
210
210
206
206
207

FIG. 9

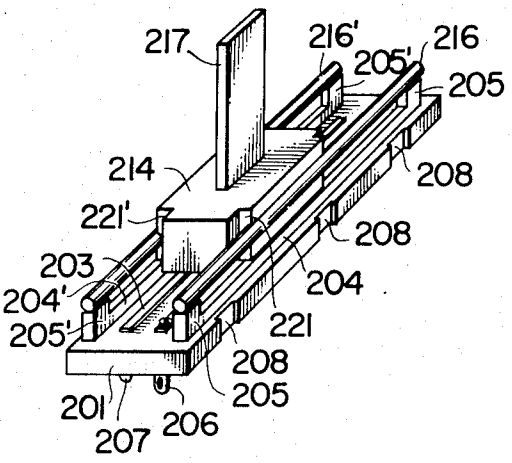

217
216'
216
205'
205
214
208
221'
208
203
204
204'
221
205'
208
205
201
207
206

FIG. 10

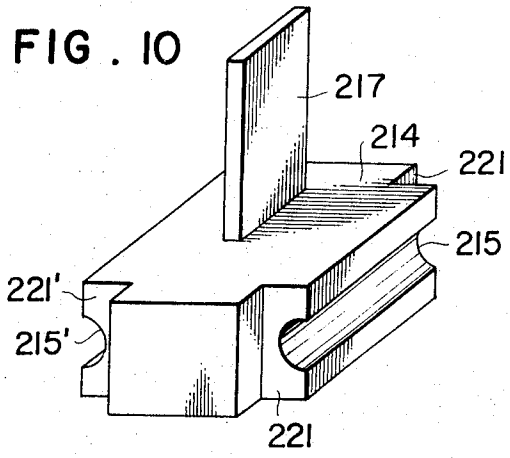

217
214
221
215
221'
215'
221

FIG. 13

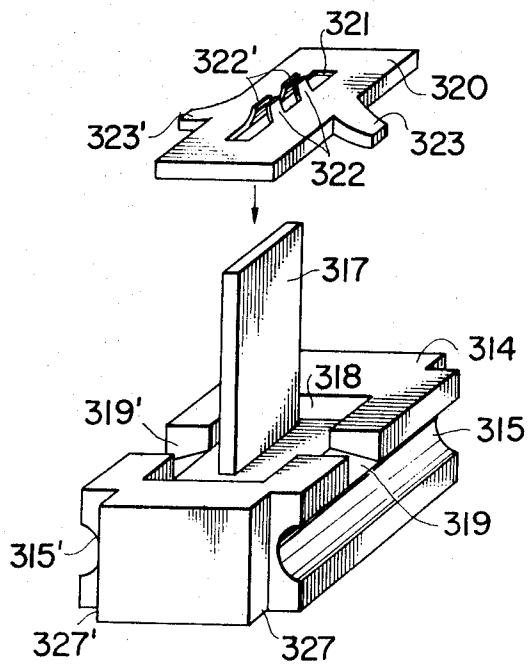

321
322'
320
323'
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322
317
314
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319'
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319
315'
327'
327

FIG. 11

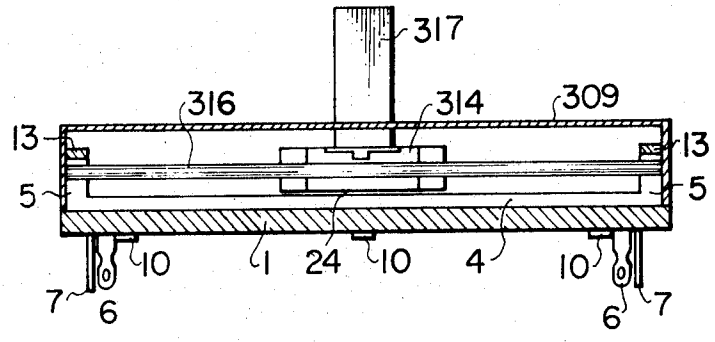

317
316
314
309
13
13
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24
10
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10
7
6
6
7

FIG. 12

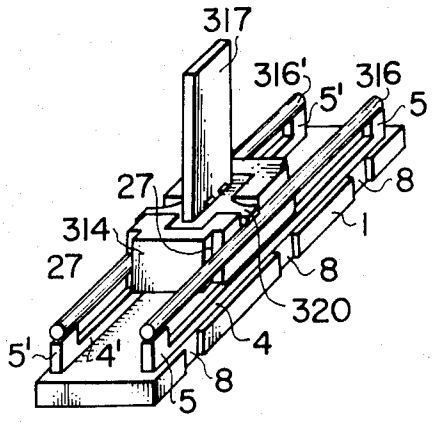

317
316'
316
5'
5
27
8
314
1
27
8
320
5'
4'
4
8
5

FIG. 14

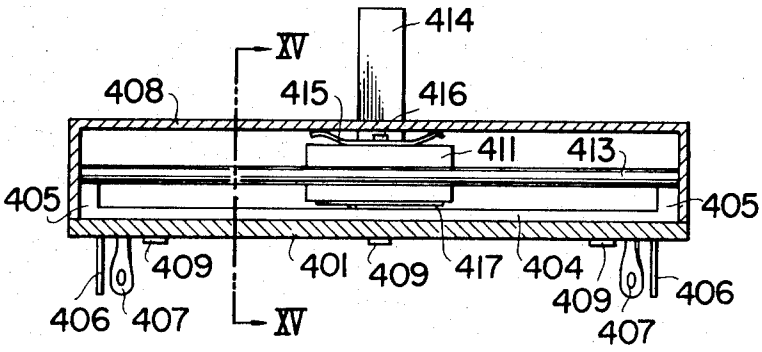
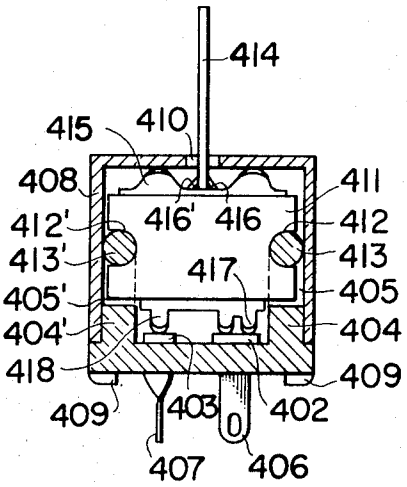

414
XV
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406
407
407
XV

FIG. 15


414
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412'
416'
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413'
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405'
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404'
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402
407
406

SLIDING TYPE VARIABLE RESISTOR

This invention relates to a sliding type variable resistor having improved means for supporting a guide rail and a slider for ensuring smooth and stable sliding movement of the slider within the resistor casing.

In prior art sliding type variable resistors of this kind, guide rails for guiding the sliding movement of a slider within the resistor casing have been supported in such a manner that the opposite end portions of the guide rails extend through holes bored in the opposite end walls of an outer housing and are fixed to the housing by locking means such as washers or springs or by caulking and like means. The prior art sliding type variable resistors having such supporting means have been defective in that a complex process is required for assembling same and a greater total length of the resistance element than the housing is disadvantageous for application of the resistor in a set where there is little space.

Prior art sliding type variable resistors of the kind in which a single guide rail for guiding the sliding movement of a slider is disposed substantially centrally of the resistor casing have also been defective in that the slider tends to oscillate in the lateral direction.

It is therefore a primary object of the present invention to provide a novel and an improved sliding type variable resistor which is free from prior defects as above described.

The present invention provides a sliding type variable resistor, which is featured by the provision of a dielectric base having a resistance element and a conductive element mounted in parallel with each other on its upper surface, and supporting pedestals disposed at opposite end portions of the upper surface of the dielectric base for supporting the opposite ends of one or a plurality of guide rails for guiding a slider which has a conductor fixed to its lower surface so that the slider can slide over the dielectric base with its conductor in sliding contact with the resistance element and the conductive element while being ensured in its smooth and stable sliding movement by the guide rail or rails.

The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of preferred embodiments thereof taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a partly sectional, side elevational view of a first embodiment of the present invention;

FIG. 2 is a sectional view taken on the line II — II in FIG. 1;

FIG. 3 is a partly sectional, side elevational view of a second embodiment of the present invention;

FIG. 4 is a sectional view taken on the line IV — IV in FIG. 3;

FIG. 5 is an exploded view of the sliding type variable resistor shown in FIG. 3;

FIG. 6 is a perspective view of a third embodiment of the present invention;

FIG. 7 is an enlarged sectional view taken on the line VII — VII in FIG. 6;

FIG. 8 is a sectional view taken on the line VIII — VIII in FIG. 7;

FIG. 9 is a perspective view similar to FIG. 6, but showing the sliding type variable resistor, in a state in which its housing is removed;

FIG. 10 is an enlarged perspective view of a slider forming a part of the sliding type variable resistor shown in FIG. 6;

FIG. 11 is a sectional, side elevational view of a fourth embodiment of the present invention;

FIG. 12 is a perspective view of the sliding type variable resistor, shown in FIG. 11 in a state in which its housing is removed;

FIG. 13 is an enlarged perspective view of a slider and a sliding spring forming parts of the sliding type variable resistor, shown in FIG. 11;

FIG. 14 is a sectional, side elevational view of a fifth embodiment of the present invention; and

FIG. 15 is an enlarged sectional view taken on the line XV — XV in FIG. 14.

Referring to FIGS. 1 and 2, a first embodiment of the present invention includes a generally box-like housing 1 having a bottom opening and a plurality of dependant mounting legs 4. A longitudinal slot 2 is formed in the upper wall of the housing 1 so that an operating means fixed to a slider described later can extend through the slot 2. Mounting holes (not shown) are provided in the upper wall of the housing 1 adjacent to the opposite ends of the slot 2. The bottom opening of the housing 1 is closed by a dielectric base 3 of a moldable material which is fixed to the housing 1 by the mounting legs 4. Supporting pedestals 5 for supporting a guide rail, described later, extend upwardly from the longitudinal end portions of the dielectric base 3. A resistance element 6 and a conductive element 7 are mounted in parallel with each other on the upper surface of the dielectric base 3 between the supporting pedestals 5. The opposite ends of the resistance element 6 are securely fixed to the dielectric base 3 by external terminals 8. The opposite ends of the conductive element 7 are integral with terminal portions 9 and these terminal portions 9 are twisted to fix the conductive element 7 to the dielectric base 3. A semicircular recess 11 is formed at the top of each of the supporting pedestals 5 extending from the opposite end portions of the dielectric base 3, and a guide rail 10 is received at opposite ends in these semicircular recesses 11. A slider 13 of electrically insulating material is slidably mounted on the guide rail 10 with a channel 12 formed at the center of the lower surface thereof engaging the guide rail 10. A sliding spring 14 is fixed to the upper surface of the slider 13 and engages the inside surface of the upper wall of the housing 1 so as to prevent upward floating of the guide rail 10 off the supporting pedestals 5. A conductor 15 of electrically conductive resilient material is fixed to the lower surface of the slider 13 slidably engaging the guide rail 10 within the space between the housing 1 and the dielectric base 3. The conductor 15 is provided with fingers at one end. One of the fingers makes a positive engagement with the surface of the resistance element 6 by its resiliency, while the other finger makes a positive engagement with the surface of the conductive element 7 by its resiliency also. Thus, the conductor 15 is moved in integral relation with the slider 13 while engaging at its fingers with the resistance element 6 and the conductive element 7. An operating means 16 is fixed to the upper surface of the slider 13 and extends upwardly through the slot 2 formed in the upper wall of the housing 1 so that, when the operating means 16 is manipulated by hand, the slider 13 makes a sliding movement by being guided by the guide rail 10.

In assembling the sliding type variable resistor, the guide rail 10 is placed to span between the supporting pedestals 5 provided at the opposite end portions of the dielectric base 3, and then the slider 13 is mounted on the guide rail 10 in such a manner that the channel 12 formed at the lower surface of the slider 13 to engage with the guide rail 10. After fixing the sliding spring 14 to the upper surface of the slider 13, the housing 1 is fitted on the dielectric base 3 in such a manner that the operating means 16 protrudes from the slot 2, and the dielectric base 3 is fixed in the bottom opening of the housing 1 by bending inwardly the mounting legs 4 extending from the end edges of the bottom opening of the housing 1. When the housing 1 and the dielectric base 3 are fixed together in this manner, the guide rail 10 is securely supported between the slider 13 and the supporting pedestals 5 by the action of the sliding spring 14 disposed between the inside surface of the upper wall of the housing 1 and the upper surface of the slider 13. Although only one guide rail 10 is shown herein, two or more guide rails may be provided as required. In this case, the number of supporting pedestals 5 may be correspondingly increased to meet the number of the guide rails 10.

The sliding type variable resistor having a structure as above described has various advantages over prior art variable resistors of this type. Parts to be incorporated in a miniature set or a set having a narrow space therein have a limited size and any extra length, even if it is very slight, is objectionable. In contrast with the prior art variable resistor of this type in

which the guide rail is fixed at the outside of the housing, the present invention is advantageous in that the size of the variable resistor can be considerably reduced compared with the prior art variable resistor, since the guide rail is fixed within the resistor casing. Another advantage of the present invention resides in the fact that the variable resistor can be very easily assembled because the sliding spring disposed between the upper surface of the slider and the inside surface of the upper wall of the housing is utilized to fixedly support the guide rail between the lower surface of the slider and the supporting pedestals which are integral with the dielectric base. Thus, the variable resistor according to the present invention has a simple structure and can be manufactured at low cost.

Referring to FIGS. **3**, **4** and **5**, a second embodiment of the present invention includes a generally box-like housing **101** having a bottom opening and a plurality of dependant mounting legs **106**. A longitudinal slot **102** is formed in the upper wall of the housing **101** so that an operating means described later can protrude from the slot **102**. A pair of mounting holes **103** are provided in the upper wall of the housing **101** adjacent to the opposite ends of the slot **102**. Portions of the opposite end walls of the housing **101** are cut open and bent inwardly to form a plurality of inwardly extending lugs **104**. The bottom opening of the housing **101** is closed by a dielectric base **105** of moldable material which is fixed to the housing **101** by bending inwardly the mounting legs **106**. Supporting pedestals **107** for supporting a guide rail described later extend upwardly from the longitudinal end portions of the dielectric base **105**. A resistance element **108** and a conductive element **109** are mounted in parallel with each other on the upper surface of the dielectric base **105** between the supporting pedestals **107**. The opposite ends of the resistance element **108** are securely fixed to the dielectric base **105** by external terminals **110**. The opposite ends of the conductive element **109** are integral with terminal portions **111** and these terminal portions **111** are twisted to fix the conductive element **109** to the dielectric base **105**. A semicircular recess **113** is formed at the top of each of the supporting pedestals **107** extending from the opposite end portions of the dielectric base **105**, and a guide rail **112** is received at opposite ends in these semicircular recesses **113**. A slider **115** of electrically insulating material is slidably mounted on the guide rail **112** with a channel **114** formed at the center of the lower surface thereof engaging the guide rail **112**. The lugs **104** extending inwardly from the opposite end walls of the housing **101** engage the upper surface of the opposite end portions of the guide rail **112** so as to prevent upward floating of the guide rail **112** off the supporting pedestals **107**. A conductor **116** of electrically conductive resilient material is fixed to the lower surface of the slider **115** slidably engaging the guide rail **112** within the space between the housing **101** and the dielectric base **105**. The conductor **116** is provided with fingers at one end. One of the fingers makes positive engagement with the surface of the resistance element **108** by its resiliency, while the other finger makes positive engagement with the surface of the conductive element **109** also by its resiliency. Thus, the conductor **116** is moved in integral relation with the slider **115** while engaging at its fingers with the resistance element **108** and the conductive element **109**. An operating means **117** is fixed to the upper surface of the slider **115** and extends upwardly through the slot **102** formed in the upper wall of the housing **101** so that, when the operating means **117** is manipulated by hand, the slider **115** makes a sliding movement by being guided by the guide rail **112**.

According to the present embodiment, the guide rail **112** is securely supported in place by being held between the supporting pedestals **107** and the inwardly extending lugs **104** which are formed by cutting open portions of the opposite end walls of the housing **101** and bending these portions inwardly. A guide member of any suitable shape may be employed in lieu of the guide rail **112** described hereinbefore. Although only one guide rail **112** is shown herein, two or more guide rails may be provided as required. In this case, the number of the supporting pedestals **107** and the lugs **104** may be correspondingly increased to meet the number of the guide rails **112**.

Referring to FIGS. **6** through **10**, a third embodiment of the present invention includes a dielectric base **201** of electrically insulating material. On the upper surface of the dielectric base **201**, resistance element **202** and a conductive element **203** are mounted in parallel with each other in the longitudinal direction of the dielectric base **201**. A pair of parallel ridges **204** and **204'** extend upwardly from the upper surface portions adjacent to the longitudinal side edges of the dielectric base **201** as an integral part thereof, and the opposite end portions of these ridges **204** and **204'** are raised to form two pairs of spaced guide rail supporting pedestals **205** and **205'** respectively. The opposite ends of the resistance element **202** are securely fixed to the dielectric base **201** by external terminals **206**. The opposite ends of the conductive element **203** are integral with terminal portions **207** and these terminal portions **207** are twisted to fix the conductive element **203** to the dielectric base **201**. A plurality of cutouts **208** and **208'** (**208'** not shown) are formed on the longitudinal side surfaces of the dielectric base **201**. A generally box-like housing **209** has a bottom opening, and a plurality of mounting legs **210** and **210'** extend from the lower end of the longitudinal side walls thereof. The mounting legs **210** and **210'** are fitted in the cutouts **208** and **208'** of the dielectric base **201** and are then bent inwardly to firmly engage the bottom surface of the dielectric base **201** so as to securely fix the dielectric base **201** in the bottom opening of the housing **209**. A longitudinal slot **211** is formed in the upper wall of the housing **209**, and a pair of mounting holes **212** are provided in the upper wall of the housing **209** adjacent to the opposite ends of the slot **211** so as to mount the resistor in a set (not shown). Portions adjacent to the ends of the longitudinal side walls of the housing **209** are cut open and bent inwardly to form two pairs of inwardly extending lugs **213** and **213'** which are slightly spaced from the guide rail supporting pedestals **205** and **205'** integrally formed on the dielectric base **201**. A slider **214** of plastic material is slidably disposed within the space between the housing **209** and the dielectric base **201** and is formed with a pair of semicircular channels **215** and **215'** on its opposite side surfaces. The slider **214** is slidably engaged by two guide rails **216** and **216'** at its semicircular channels **215** and **215'** respectively. The guide rails **216** and **216'** are supported at opposite ends, on the respective pairs of the guide rail supporting pedestals **205** and **205'** and are engaged at their upper surface portions by the respective pairs of the inwardly extending lugs **213** and **213'** formed adjacent to the four corners of the housing **209**. That is, the opposite ends of the two guide rails **216** and **216'** are fixed in place by being held between the respective pairs of the guide rail supporting pedestals **205** and **205'** integral with the dielectric base **201** and the respective pairs of the inwardly extending lugs **213** and **213'** formed adjacent to the four corners of the housing **209**. An operating means **217** of metal material is fixed to the upper surface of the slider **214** and protrudes from the slot **211** formed in the upper wall of the housing **209** so that, when the operating means **217** is manipulated by hand, the slider **217** makes a sliding movement by being guided by the guide rails **216** and **216'**. A plurality of dowels **220** are provided on the bottom surface of the slider **217**, and a conductor **218** and a contactor **219** in the form of a resilient metal strip are fixed to the bottom surface of the slider **217** by crushing the heads of the dowels **220**. The conductor **218** and the contactor **219** make positive engagement with the resistance element **202** and the conductive element **203** are respectively mounted on the dielectric base **201** due to their own resiliency. Manipulation of the operating means **217** causes sliding movement of the slider **214** along the guide rails **216** and **216'** so that the conductor **218** and the contactor **219** carried by the slider **214** make a sliding movement while contacting the resistance element **202** and the condutive element **203** respectively. The four corners of the slider **214** are cut out as at **221** and **221'** so that the sliding move-

ment of the slider **214** may not be obstructed by the supporting pedestals **205** and **205'**.

In assembling the sliding type variable resistor, the guide rails **216** and **216'** are mounted in the respective semicircular channels **215** and **215'** formed on the opposite side surfaces of the slider **214**, and then the slider **214** carrying these elements is put into the housing **209** in such a manner that the operating means **217** fixed to the upper surface thereof protrudes from the slot **211** of the housing **209**, and the opposite ends of the guide rails **216** and **216'** engage the respective pairs of the inwardly extending lugs **213** and **213'** formed adjacent to the four corners of the housing **209**. Then, the dielectric base **201** is positioned in the bottom opening of the housing **209**, and after fitting the mounting legs **210** and **210'** in the respective cutouts **208** and **208'** of the dielectric base **201**, the mounting legs **210** and **210'** are bent inwardly to firmly engage the bottom surface of the dielectric base **201** so as to fix the dielectric base **201** in the bottom opening of the housing **209**. When the dielectric base **201** is thus fixed to the housing **209**, the guide rails **216** and **216'** are fixed in place by being held between the respective pairs of the guide rail supporting pedestals **205** and **205'** integral with the dielectric base **201** and the respective pairs of the inwardly extending lugs **213** and **213'** formed adjacent to the four corners of the housing **209**.

In the sliding type variable resistor assembled in this manner, lateral oscillatory movement of the operating means **217** and the slider **214** due to lateral force imparted to the operating means **217** can be reduced to a minimum by virtue of the fact that the slider **214** is held between the two guide rails **216** and **216'** which are fixed in place by the inwardly extending lugs **213** and **213'** and the guide rail supporting pedestals **205** and **205'** as above described. Further, the ridges **204** and **204'** standing up from the upper surface portions adjacent to the opposite side edges of the dielectric base **209** are sufficiently spaced from the slider **214** so that they may not be in contact with the slider **214** during the sliding movement of the slider **214**, but only when an unusual force is imparted to the slider **214** from above, as when a knob (not shown) is press-fitted on the driving lever **217**, the ridges **204** and **204'** bear against the slider **214** so as to prevent undesirable deformation of the guide rails **216** and **216'**.

The sliding type variable resistor having a structure as above described is advantageous in many points. In the first place, the structure in which the slider is firmly but slidably held between the two stationary guide rails provides the advantage that undesirable lateral oscillatory movement of the slider can be very easily prevented and the required dimensional precision can be very easily obtained compared with the prior art structure in which the prevention of lateral oscillating movements of the slider is dependent upon the dimensions of the housing and dielectric base. In the second place, the use of the two guide rails for slidably holding the slider therebetween is advantageous in that lateral and vertical oscillating movement of the slider can be reduced to a minimum so that the slider can make a very smooth and stable sliding movement without oscillating in its direction of travel.

A fourth embodiment of the present invention which will now be described is substantially similar in structure to the third embodiment described above and only differs from the latter in minor details. Referring to FIGS. **11**, **12** and **13**, a slider **314** is provided with a generally rectangular recess **318** on its upper surface and an operating means **317** is fixed to the center of the recess **318**. The slider **314** is provided on its opposite side surfaces with a pair of semicircular channels **315** and **315'** which communicate with the recess **318** through respective cutouts **319** and **319'**. A sliding spring **320** of metal material having a shape as best shown in FIG. **13** is fitted in the recess **318** on the upper surface of the slider **314** and has a central opening **321** through which the operating means **317** can extend upwardly. Spring portions **322** and **322'** extending obliquely upwardly from the opposite edges of the central opening **321** of the sliding spring **320** are in pressure contact with the operating means **317**. A pair of tongues **323** and **323'** extend obliquely downwardly from the opposite side surfaces of the sliding spring **320** for sliding contact at their ends with respective guide rails **316** and **316'**. The operating means **317** is electrically connected to a housing **309** through the sliding spring **320** and the guide rails **316** and **316'**. The pressure encountered by the slider **314** during its sliding movement due to the manipulation of the operating means **317** can be set at any suitable value by suitably adjusting the pressure with which the tongues **323** and **323'** of the sliding spring **320** engage the respective guide rails **316** and **316'**.

The sliding type variable resistor of the above structure in which the operating means is electrically connected to the housing through the sliding spring and guide rails is especially used to advantage in an amplifier of high sensitivity in that generation of undesirable noises such as an induced hum can be effectively avoided, even when the operating means is touched by a part of the human body, because the operating means is electrically connected to the housing which is grounded. A further advantage of this sliding type variable resistor, in which the pressure encountered by the slider during its sliding movement is controlled by the pressure with which the tongues of the sliding spring engage the guide rails, resides in the fact that the different sense of resistance against the same sliding movement of the slider due to a variation in the ambient temperature can be substantially eliminated unlike the prior manner of controlling such pressure by a layer of grease.

Referring to FIGS. **14** and **15**, a fifth embodiment of the present invention includes a dielectric base **401** of electrically insulating material. A resistance element **402** and a conductive element **403** are mounted in parallel with each other on the upper surface of the dielectric base **401** in the longitudinal direction thereof. A pair of parallel ridges **404** and **404'** extend upwardly from the upper surface portions adjacent to the longitudinal side edges of the dielectric base **401** as an integral part thereof, and the opposite end portions of these ridges **404** and **404'** are raised to form two pairs of spaced guide rail supporting pedestals **405** and **405'** respectively. The opposite ends of the resistance element **402** are securely fixed to the dielectric base **401** by external terminals **406**. The opposite ends of the conductive element **403** are integral with terminal portions **407** and these terminal portions **407** are twisted to fix the conductive element **403** to the dielectric base **401**. A plurality of cutouts (not shown) are formed on the longitudinal side surfaces of the dielectric base **401**. A generally box-like housing **408** has a bottom opening, and a plurality of mounting legs **409** and **409'** extend from the lower end of the longitudinal side walls thereof. The mounting legs **409** and **409'** are fitted in the cutouts of the dielectric base **401** and are then bent inwardly to firmly engage the bottom surface of the dielectric base **401** so as to securely fix the dielectric base **401** in the bottom opening of the housing **408**. A longitudinal slot **410** is formed in the upper wall of the housing **408**, and a pair of mounting holes (not shown) are provided in the upper wall of the housing **408** adjacent to the opposite ends of the slot **410** so as to mount the resistor in a set (not shown). A slider **411** of plastic material is slidably disposed within the space between the housing **408** and the dielectric base **401** and is formed with a pair of semicircular channels **412** and **412'** on its opposite side surfaces. The slider **411** is slidably engaged by two guide rails **413** and **413'** at its semicircular channels **412** and **412'** respectively. The guide rails **413** and **413'** are supported at opposite ends on the respective pairs of the guide rail supporting pedestals **405** and **405'**. An operating means **414** is fixed to the upper surface of the slider **411** and extends upwardly through the slot **410** formed in the upper wall of the housing **408**. A sliding spring **415** is disposed between the upper surface of the slider **411** and the inside surface of the upper wall of the housing **408**. The sliding spring **415** has a central opening and a pair of tabs **416** and **416'** extending towards each other from the opposite edges of the central opening. After the sliding spring **415** is fitted on the operating means **414**, the tabs **416** and **416'** are pressed against the

operating means **414** to securely fix the sliding spring **415** to the upper surface of the slider **411**. Due to the provision of the sliding spring **415**, the slider **411** is forced downwards by the resiliency of the spring **415** so that the guide rails **413** and **413'** can be fixedly positioned on the guide rail supporting pedestals **405** and **405'** without floating upwardly away from the supporting pedestals **405** and **405'**. Thus, when the operating means **414** protruding from the slot **410** formed in the upper wall of the housing **408** is manipulated by hand, the slider **411** makes a sliding movement by being guided by the guide rails **413** and **413'**. A conductor **417** and a contactor **418** in the form of a resilient metal strip are fixed to the bottom surface of the slider **411**. The conductor **417** and the contactor **418** make positive engagement with the resistance element **402** and the contact plate **403** respectively mounted on the dielectric base **401** due to their own resiliency. Manipulation of the operating means **414** causes sliding movement of the slider **411** along the guide rails **413** and **413'** so that the conductor **417** and the contactor **418** carried by the slider **411** make a sliding movement while contacting the resistance element **402** and the contact plate **403** respectively.

In assembling, the sliding spring **415** is fixed to the upper surface of the slider **411**, and the conductor **417** and the contactor **418** are fixed to the lower surface of the slider **411**. The guide rails **413** and **413'** are mounted in the respective semicircular channels **412** and **412'** formed on the opposite side surfaces of the slider **411**, and then the slider **411** carrying these elements is put into the housing **408** in such a manner that the operating means **414**, fixed to the upper surface thereof, protrudes from the slot **410** of the housing **408**. Then, the dielectric base **401** is positioned in the bottom opening of the housing **408**, and after fitting the mounting legs **409** and **409'** in the cutouts of the dielectric base **401**, the mounting legs **409** and **409'** are bent inwardly to firmly engage the bottom surface of the dielectric base **401** so as to fix the dielectric base **401** in the bottom opening of the housing **408**. When the dielectric base **401** is thus fixed to the housing **408**, the guide rails **413** and **413'** received in the semicircular channels **412** and **412'** formed on the opposite side surfaces of the slider **411** are fixed at their opposite ends on the respective pairs of the guide rail supporting pedestals **405** and **405'** provided on the dielectric base **401** by the action of the sliding spring **415**.

The sliding type variable resistor having a structure as above described is advantageous in that lateral and vertical oscillating movement of the slider can be reduced to a minimum so that the slider can make very smooth and stable sliding movement without oscillating in its direction of travel because the slider is firmly but slidably held between the two guide rails.

What is claimed is:

1. A sliding type variable resistor comprising a dielectric base mounting a resistance element and a conductive element thereon and provided with guide rail supporting means adjacent to the longitudinal opposite ends thereof, a slider, a conductor of electrically conductive resilient material fixed to the lower surface of said slider for sliding contact with the surface of said resistance element and said conductive element, an operating means fixed to the upper surface of said slider, at least one guide rail fixedly supported at its opposite ends by said guide rail supporting means for guiding the sliding movement of said slider, a housing of metal material fixed to said dielectric base to cover the upper surface of said dielectric base for accommodating there inside said slider, said guide rail supporting means and said guide rail, and means provided inside of said housing for holding said guide rail in place with respect to said guide rail supporting means, said housing having an elongated slot in its upper wall so that said operating means fixed to said slider can protrude to the exterior from said slot.

2. A sliding type variable resistor comprising a dielectric base mounting a resistance element and a conductive element thereon and provided with guide rail supporting means adjacent to the longitudinal opposite ends thereof, a slider, a conductor of electrically conductive resilient material fixed to the lower surface of said slider for sliding contact with the surface of said resistance element and said conductive element an operating means fixed to the upper surface of said slider, at least one guide rail fixedly supported at its opposite ends by said guide rail supporting means for guiding the sliding movement of said slider, a housing of metal material fixed to said dielectric base to cover the upper surface of said dielectric base for accommodating there inside said slider, said guide rail supporting means and said guide rail, and a sliding spring disposed between the upper surface of said slider and the inside surface of the upper wall of said housing so as to slidably hold said slider between the upper wall of said housing and said guide rail, said housing having an elongated slot in its upper wall so that said operating means fixed to said slider can protrude to the exterior from said slot.

3. A sliding type variable resistor comprising a dielectric base mounting a resistance element and a conductive element thereon and provided with guide rail supporting means adjacent to the longitudinal opposite ends thereof, a slider, a conductor of electrically conductive resilient material fixed to the lower surface of said slider for sliding contact with the surface of said resistance element and said conductive element, an operating means fixed to the upper surface of said slider, at least one guide rail fixedly supported at its opposite ends by said guide rail supporting means for guiding the sliding movement of said slider, a housing of metal material fixed to said dielectric base to cover the upper surface of said dielectric base for accommodating there inside said slider, said guide rail supporting means and said guide rail, said housing being provided with lugs extending inwardly from the side walls adjacent to said guide rail supporting means for engaging the opposite ends of said guide rail from above thereby to press said guide rail against said guide rail supporting means to firmly fix said guide rail in place, said housing having an elongated slot in its upper wall so that said operating means fixed to said slider can protrude to the exterior from said slot.

4. A sliding type variable resistor as claimed in claim **3**, in which said guide rail is provided along each side surface of said slider, and said housing is provided with lugs extending inwardly from the side walls adjacent to said guide rail supporting means for engaging the opposite ends of these two guide rails from above, thereby to press said guide rails against said guide rail supporting means to firmly fix said guide rails in place.

5. A sliding type variable resistor as claimed in claim **3**, in which a sliding spring having outwardly extending tongues engaging said guide rails is fitted on the lower end portion of said operating means so as to establish pressure engagement between said guide rails and said slider for ensuring smooth and stable sliding movement of said slider along said guide rails.

6. A sliding type variable resistor as claimed in claim **2**, in which said guide rail is provided along each side surface of said slider, and a sliding spring is fixed to the upper surface of said slider so that it makes pressure engagement with the inside surface of the upper wall of said housing.

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