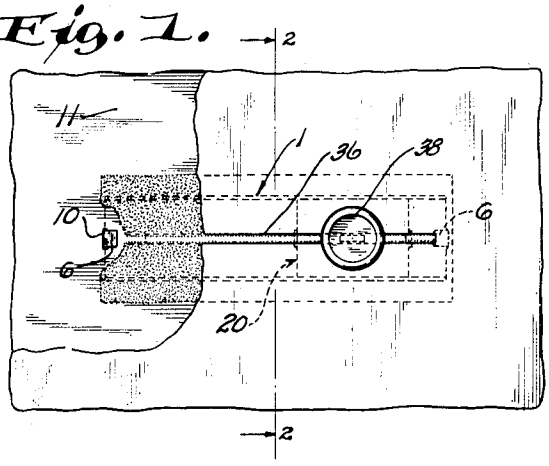
May 20, 1941. H. W. RUBINSTEIN 2,242,327

VARIABLE RESISTANCE

Filed April 13, 1938 2 Sheets-Sheet 1

Fig. 1.



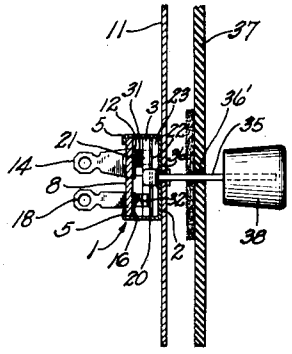


Fig. 2

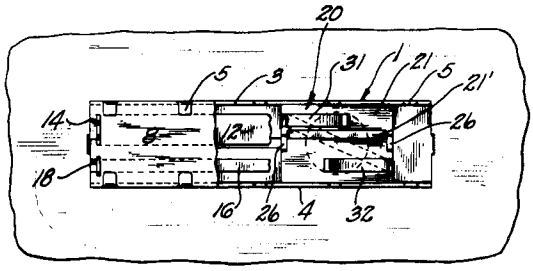


Fig. 3.

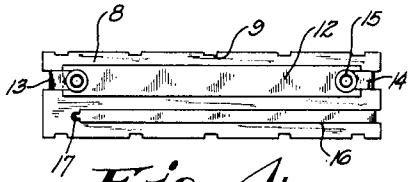


Fig. 4.

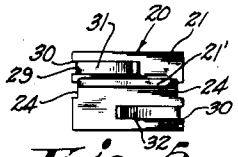


Fig. 5.

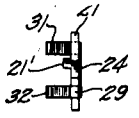


Fig. 6.

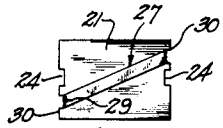


Fig. 7.

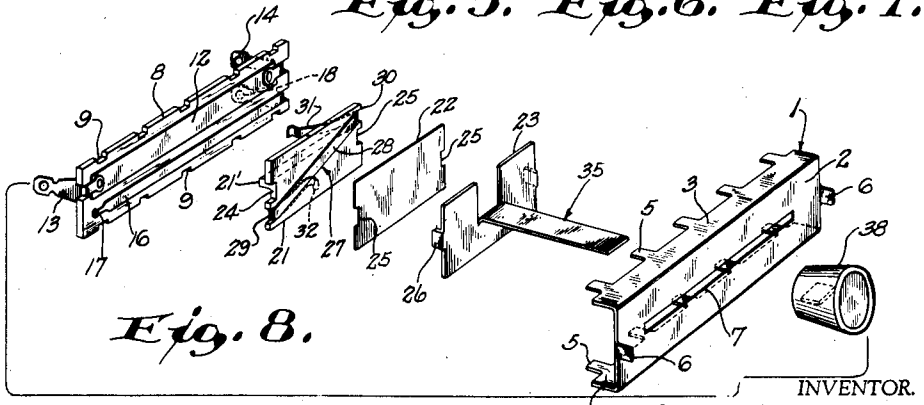


Fig. 8.

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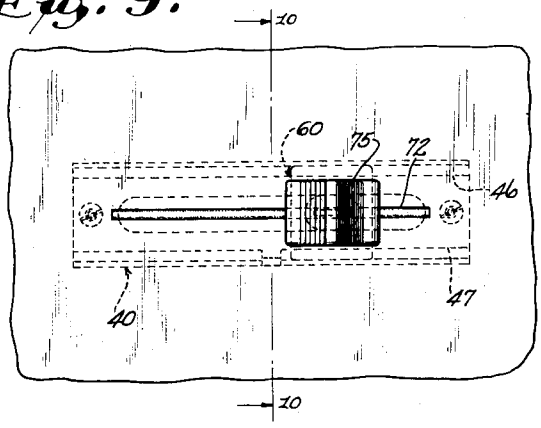
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May 20, 1941. H. W. RUBINSTEIN 2,242,327

VARIABLE RESISTANCE

Filed April 13, 1938 2 Sheets-Sheet 2

Fig. 9.



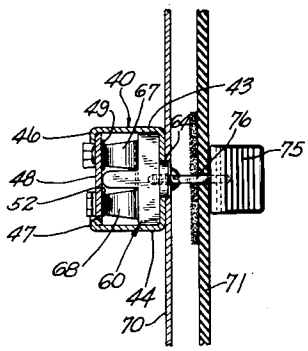


Fig. 10.

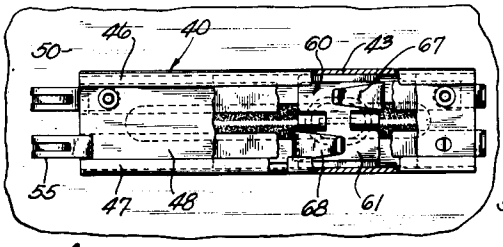


Fig. 11.

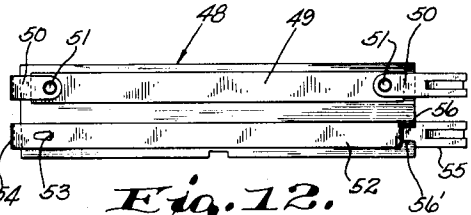


Fig. 12.

Fig. 13.



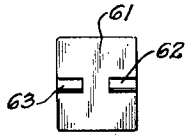


Fig. 14.

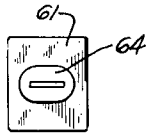


Fig. 15.

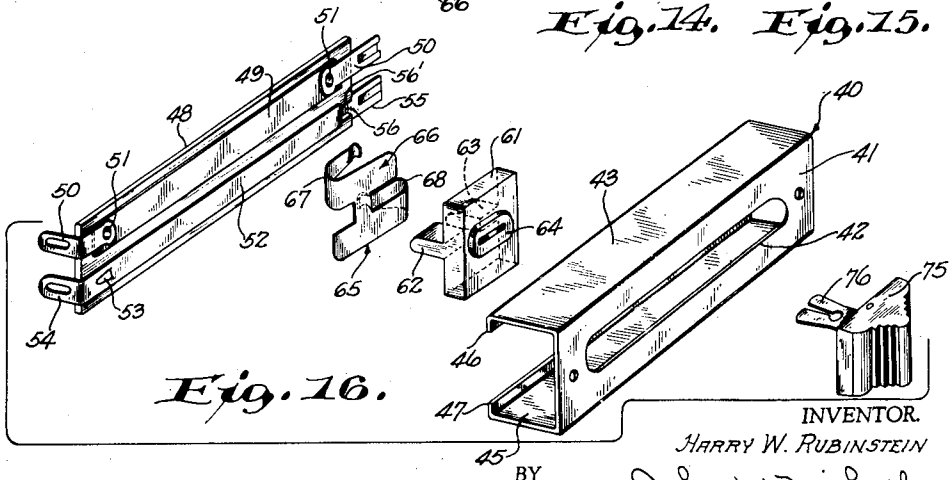


Fig. 16.

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Patented May 20, 1941

2,242,327

UNITED STATES PATENT OFFICE

2,242,327

VARIABLE RESISTANCE

Harry William Rubinstein, Milwaukee, Wis., assignor to Globe-Union Inc., Milwaukee, Wis., a corporation of Delaware

Application April 13, 1938, Serial No. 201,684

8 Claims. (Cl. 201—62)

This invention relates to an improvement in adjustable resistances of the type having a rectilinear slide, that is, a contact member movable in a straight line along the resistor to vary the value of the resistance interposed in the conductive path of the circuit.

One of the objects of the invention is to simplify and compact the structure of the resistance, the number of parts required being reduced to a minimum thereby rendering the device susceptible of economical manufacture.

Another object of the invention is to provide an adjustable resistance having the advantages and capacities mentioned and which may be conveniently combined with a radio receiver or other instrumentality in a variety of ways and when installed is capable of ready and smooth as well as fine adjustment and yet is reliable and efficient in operation.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a fragmentary view in front elevation showing one embodiment of the present invention applied to a radio receiver, a fragment only of the receiver cabinet being shown and part of that being broken away for the sake of illustration;

Figure 2 is a fragmentary view in vertical cross section taken on line 2—2 of Figure 1;

Figure 3 is a view in rear elevation of the structure shown in Figure 1, the insulating panel enclosing the rear of the metal casing of the resistance being broken away for the sake of illustration;

Figure 4 is a view in elevation showing the insulating panel, and the resistance element and contact strip carried thereby;

Figure 5 is a detail view in rear elevation of the adjustable slide of the resistance;

Figure 6 is a detail view in end elevation of one of the insulating plates of the slide and the movable bridging contact associated therewith;

Figure 7 is a detail view in elevation looking toward the right hand side of Figure 6;

Figure 8 is a group view in perspective showing the insulating panel and parts carried thereby, the elements of the adjustable slide, the metal housing and knob prior to assembly;

Figure 9 is a fragmentary view in front elevation showing another embodiment of the invention applied to a radio receiver, only a fragment of which is shown;

Figure 10 is a fragmentary view in vertical cross section taken on line 10—10 of Figure 9;

Figure 11 is a view in rear elevation of the adjustable resistance illustrated in Figures 9 and 10, portions of the insulating panel and of the metal housing being broken away for the sake of illustration;

Figure 12 is a view in elevation of the insulating panel, resistance element and contact strip employed in the adjustable resistance illustrated in Figures 9 to 11;

Figure 13 is a detail view in elevation of the bridging contact employed in this form of the invention;

Figures 14 and 15 are views in elevation showing the opposite sides of the slide block employed in this embodiment of the invention; and

Figure 16 is a group view in perspective showing the insulating panel and parts carried thereby, the bridging contact, the slide block, the metal housing and the knob prior to assembly.

Referring to the drawings and more particularly to Figures 1 to 8 inclusive, it will be seen that in the embodiment of the invention there illustrated the adjustable resistance embodying the present invention comprises a metal housing designated generally at 1 and constituted of a single piece of metal stamped or otherwise shaped to provide a front wall 2 and top and bottom walls 3 and 4 integral with the front wall and projecting rearwardly therefrom. The rear edges of the top and bottom walls 3 and 4 are provided with integral tangs 5. Similar tangs 6 are formed at the ends of the front wall 2. This metal portion of the housing is of elongated rectangular form. In the front wall 2 a longitudinal slot 7 is provided and extends for almost the full length of the housing, its ends terminating adjacent to the ends of the housing.

The enclosure of the housing is completed by means of a back panel 8 of insulating material which has its top and bottom edges notched as at 9 to receive portions of the tangs 5. The end portions of the tangs 5 project beyond the panel 8 and in the assembly are bent flatly against the rear face of the back panel 8 to fasten it in position in the manner illustrated in Figures 2 and 3.

The tangs 6 are employed to mount the housing in position on its support. As shown in Figures 1, 2 and 3 the tangs 6 are extended through slots 10 provided in the front wall 11 of the chassis of a radio receiver and then

clinched over to secure the resistance in position on the chassis.

A resistance element 12, preferably in the form of an elongated strip of flexible material such as paper with a carbonaceous or equivalent conductive coating applied to its outer face, is supported on the back panel 8. While the resistance element may be in the form of a separate element, it may also be in the form of a strip-like film or coating directly painted or otherwise applied to the insulating panel. The panel 8 thus affords an insulating base or support for the resistance element as well as a wall of the housing. The resistance element 12 extends for substantially the full length of the panel and hence also for the full length of the housing. Terminals 13 and 14 are connected to the ends of the resistance element preferably by means of eyelets 15 which serve the double function of fastening the terminals to the ends of the resistance element and of securing both the terminals and the resistance element in position on the insulating panel. Preferably these eyelets are hollow and are integral with the terminals. The eyelets of course penetrate both the resistance strip and the back panel and are peened over outwardly by the fastening blow.

Paralleling the resistance element is an elongated contact strip 16 of copper or other conductive material. The contact strip 16 is also supported on the insulating panel 8 and extends for the full length of the resistance element 12. One end of the contact strip may be reduced as at 17, extended through an opening in the insulating panel and clinched over. The other end extends through a notch in the end of the insulating panel and may be provided with an integral terminal 18.

A slide designated generally at 20 is supported in the housing for movement lengthwise thereof. In this embodiment of the invention the slide is made up of an insulating carrier plate 21, an intermediate insulating plate 22, and a metal actuating plate 23. The end edges of the insulating plates 21 and 22 have notches 24 and 25 which register in the assembly and receive tabs 26 formed integral with the end edges of the metal plate 23 and function in the assembly to hold the parts in alinement and transmit positively the drive of the metal carrier plate to the other elements of the slide.

A bridging contact designated generally at 27 is combined with the slide and is formed of a metal ribbon having an intermediate body portion 28 extending diagonally across one face of the insulating plate 21. Bends or bight portions 29 are integral with the body portion of the ribbon 28 and are seated in notches 30 provided adjacent the corners of the plate 21. Beyond the bights 29 the ribbon making up the bridging contact is formed into spring contact fingers 31 and 32 designed to have wiping contact engagement with the resistance element 12 and contact strip 16 respectively.

The metal carrier plate 23 of the slide has a shank 35 struck therefrom and in the assembly this shank extends through the slot 7 of the housing and through similar alined slots 36 and 36' provided in the wall 11 and in the front wall of the instrument panel 37 of the radio receiver. An operating knob 38 is interconnected with the outer end of this shank 35 and provides a means whereby the shank and incidentally the slide may be adjusted longitudinally along the resistance element and contact strip 16.

The slide 20 is in the form of a substantial rectangular block whose front face and upper and lower edges have sliding engagement with the adjacent walls of the housing. The insulating plate 21 of the slide has a guide rib 21' which rides on the insulating panel 8 in between the resistance element 12 and contact strip 16. The guiding engagement between the slide and the walls of the housing is such as to insure free sliding movement and yet prevent any appreciable canting or tipping. Binding of the slide or jerky motion thereof are precluded.

In the embodiment of the invention shown in Figures 9 to 16 inclusive the adjustable resistance comprises a metal housing designated generally at 40 and constituted of a sheet metal stamping having a front wall 41 provided with a longitudinal slot 42, integral top and bottom walls 43 and 44 extending rearwardly from the front wall and formed with confronting marginal flanges 46 and 47. As in the other embodiment of the invention, the enclosure provided by the housing is completed by an insulating back panel 48 which in this construction is interfitted with and suitably secured to the flanges 46 and 47. An elongated resistance element 49, preferably of the type having a flexible backing strip with a conductive coating applied to its outer surface, extends lengthwise of the insulating panel 48 and at its ends is connected to terminals 50 by means of eyelets 51 which as described, may be integral with the terminals and serve the double purpose of fastening the terminals to the resistance element and supporting both terminals and resistance element on the insulating back panel. An elongated metal contact strip 52 parallels the resistance element 49 and is suitably supported on the panel. As shown, a tang 53 may be struck from an end portion of the contact strip and extended through an opening in the panel and be clinched about the rear face thereof. Terminals 54 and 55 are provided at the ends of the contact strip and the terminal 55 preferably has a reduced portion 56 interfitted with a notch 56' in the back panel in such a manner as to aid in securing the contact strip in position.

An adjustable slide designated generally at 60 is mounted in the housing for adjustment lengthwise thereof. In this form of the invention the slide 60 comprises a rectangular block 61 of molded insulating material having lugs 62 and 63 formed integral therewith and projecting laterally from the inner face of the block, the lugs being disposed at the middle of the block and being symmetrically disposed thereon. A slotted boss 64 projects a slight distance from the other face of the block. In the assembly the slotted boss has a sliding fit in the slot 42. A bridging contact designated generally at 65 is provided and is constructed of resilient material. It has an H-shaped body portion 66 which is interfitted with the lugs 62. One end of each leg of the H-shaped body portion has a reversely bent spring contact finger, the fingers being designated at 67 and 68 and bearing on the resistance element 49 and contact strip 52 respectively.

The housing of the resistor may be fastened in any suitable way to a vertical wall 70 of the chassis of a radio receiver. The instrument panel 71 of a receiver is provided with a slot 72 alined with the slot 42 of the housing and a corresponding slot in the vertical wall 70 of the chassis.

An operating knob 75 is provided and has a

bifurcated shank **76** projecting therefrom and designed to extend through the slots **72** and **42** and to be interfitted with the slot of the boss **64** so as to provide means for adjusting the slide lengthwise of the resistance element and contact strip to vary the resistance.

Here again the resistance is smooth and free in its adjustments and tilting or binding of the adjustable slide is precluded.

In both forms of the invention the bridging contact has an effective yet smooth wiping engagement with both the adjustable resistance and contact strip and while effectively connecting them electrically is completely insulated from the housing and knob.

It will be obvious to those skilled in the art that the invention, particularly the form shown in Figures 1 to 8 inclusive, may be advantageously embodied in the grounded type of resistor, simply by omitting the contact strip **16** and insulating plate **22**. In such a construction the current flows from the resistance through the bridging contact and metal parts of the slide to the grounded metal housing.

While I have shown and described two constructions in which the invention may be advantageously embodied, it is to be understood that the constructions shown have been selected merely for the purpose of illustration or example and that various changes in the size, shape and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

The invention claimed is:

1. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, an elongated contact strip carried by said panel and provided with a terminal, a slide mounted in said housing and guided by said front and side walls, a bridging contact carried by said slide and insulated from said housing, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and connected with said slide through said slot.

2. An adjustable resistance comprising an elongated channel shaped metal housing having only front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals having integral eyelets formed thereon connecting said terminal to said element and said panel, an elongated contact strip carried by said panel, one end of said contact strip forming another terminal, a slide mounted in said housing and guided by said front and side walls, a bridging contact carried by said slide and insulated from said housing, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and connected with said slide through said slot.

3. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, an elongated contact strip carried by said panel and provided with a terminal, a slide in the form of a block of insulating material mounted in said housing and guided by said front and side walls, said block having spaced rearwardly extending lugs, a bridging contact having an H-shaped body portion interfitted with said lugs whereby it is carried by said slide, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and having a shank extending through said slot and interfitting with said slide.

4. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, an elongated contact strip carried by said panel and provided with a terminal, a slide including a metal plate and two plates of insulating material interconnected therewith mounted in said housing and guided by said front and side walls, a bridging contact having a portion interposed between said insulating plates whereby it is carried by said slide, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and connected with said slide through said slot.

5. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, an elongated contact strip carried by said panel and provided with a terminal, a slide including a metal plate and two plates of insulating material interconnected therewith mounted in said housing and guided by said front and side walls, a bridging contact having a portion interposed between said insulating plates whereby it is carried by said slide, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element comprising a shank struck from said metal plate and extending through said slot and a knob on the outer end of said shank.

6. An adjustable resistance comprising an elongated channel shaped metal housing having

front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, an elongated contact strip carried by said panel and provided with a terminal, a slide in the form of a block of insulating material mounted in said housing and guided by said front and side walls, said block having spaced rearwardly extending lugs and a slotted boss extending into and guided by said slot, a bridging contact having an H-shaped body portion interfitted with said lugs whereby it is carried by said slide, said contact having spring fingers in wiping engagement with said resistance element and said contact strip, there being sufficient resilience in said fingers to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and having a shank extending through said slot and interfitting with said slotted boss.

7. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, a slide including a metal plate and a plate of insulating material interconnected therewith mounted in said housing and guided by said front and side walls, a contact having a portion interposed between said plates whereby it is carried by said slide, said contact having a spring finger in wiping engagement with said resistance element, there being sufficient resilience in said finger to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element disposed exteriorly of said housing and connected with said slide through said slot.

8. An adjustable resistance comprising an elongated channel shaped metal housing having front and side walls, a longitudinal slot in said front wall, a panel of insulating material closing the back of said housing, an elongated continuous strip type resistance element secured to the inside of said panel, terminals connected to said element and said panel, a slide including a metal plate and two plates of insulating material interconnected therewith mounted in said housing and guided by said front and side walls, a contact having a portion interposed between said insulating plates whereby it is carried by said slide, said contact having a spring finger in wiping engagement with said resistance element, there being sufficient resilience in said finger to urge said slide toward said front wall and maintain it in proper position in said housing, and an operating element comprising a shank struck from said metal plate and extending through said slot and a knob on the outer end of said shank.

HARRY WILLIAM RUBINSTEIN.