

June 25, 1946.

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2,402,736

BRUSH AND INDEXING ASSEMBLY

Filed July 26, 1944

2 Sheets-Sheet 1

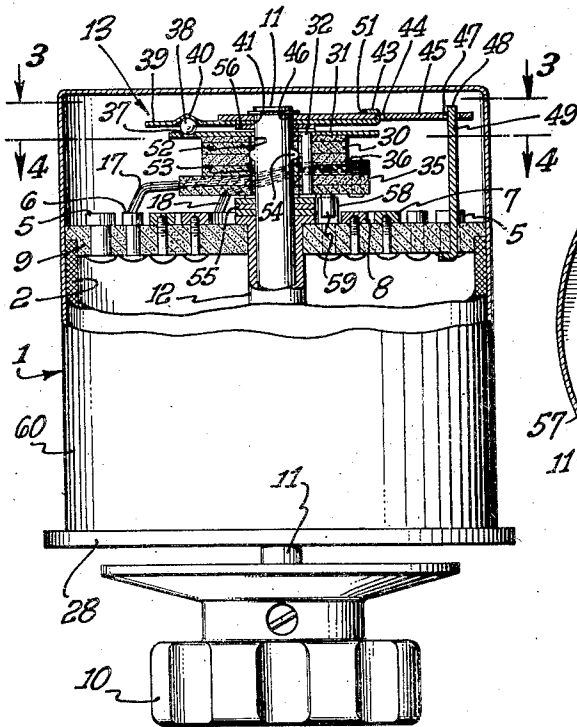


Fig. 1.

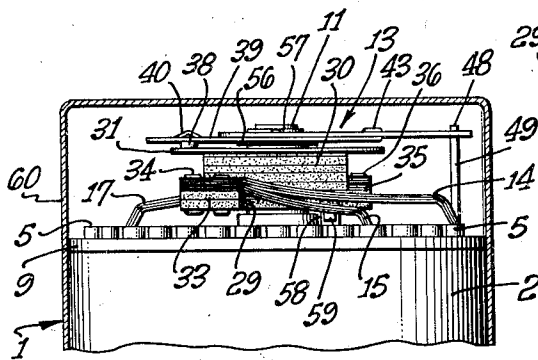


Fig. 2.

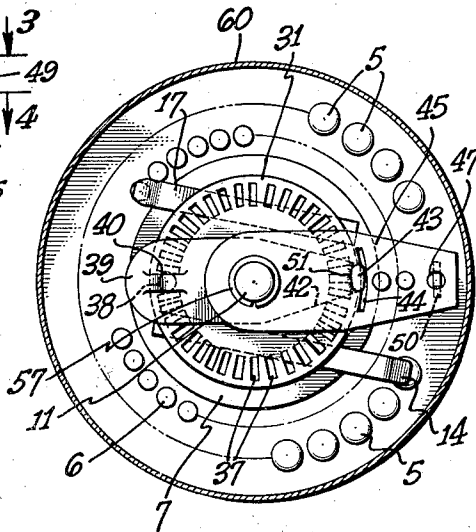


Fig. 3.

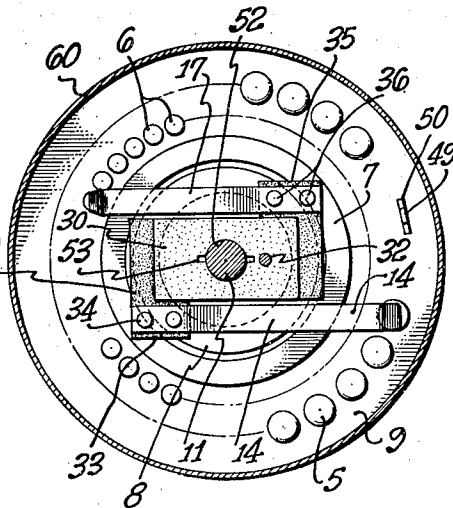


Fig. 4.

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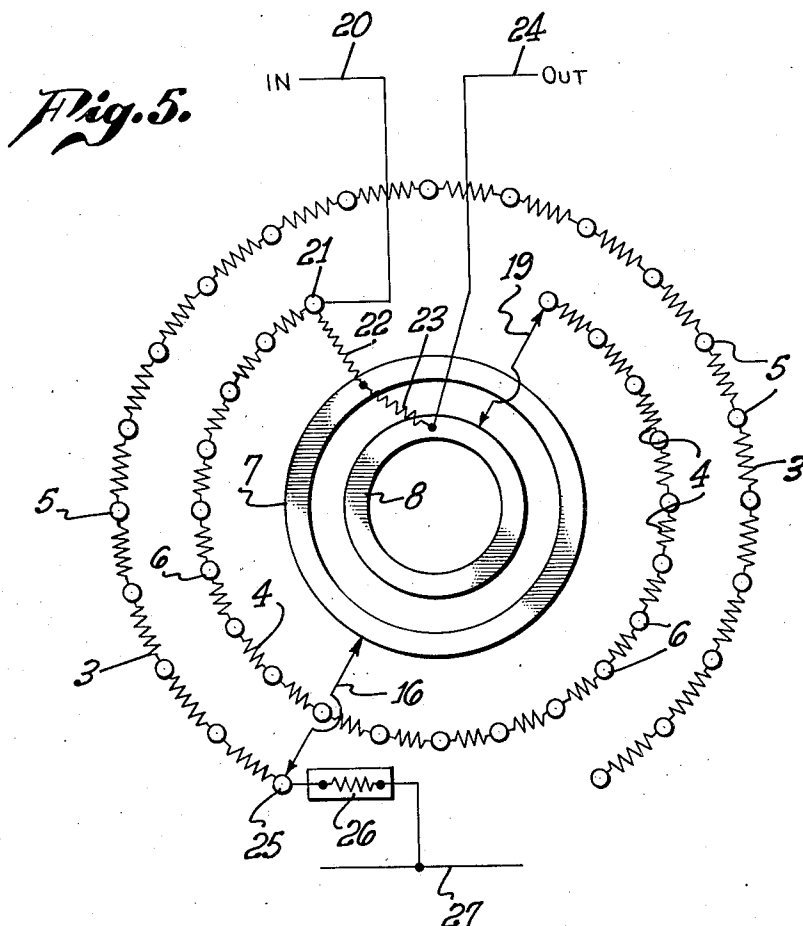
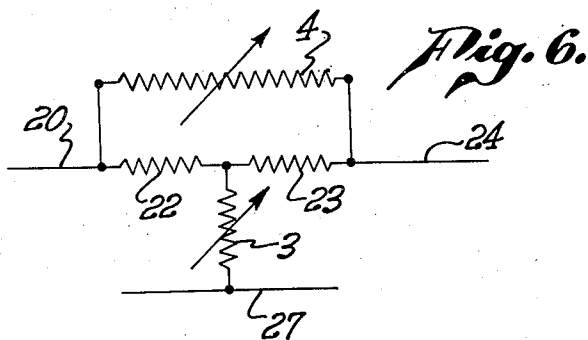
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2,402,736

BRUSH AND INDEXING ASSEMBLY

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Application July 26, 1944, Serial No. 546,697

7 Claims. (Cl. 200—11)

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The invention relates to a brush and indexing assembly for an attenuator, whereby the attenuation of an electrical circuit may be varied step by step.

The attenuator with which the invention is concerned, as is well-known, involves the use of impedance elements connected between an array of contacts. The invention deals with the brush assembly whereby electrical connection can be made to the various contacts, and with an indexing arrangement for impositively holding the brush assembly in any one of its adjusted positions with the brush or brushes in circuit with the selected contact or contacts.

An object of the invention is to improve the construction of the brush and indexing assembly, to simplify the manner in which the brush and indexing assembly may be mounted on or removed from the rotatable shaft of the attenuator, to locate the brush and indexing assembly where it is readily accessible, and preferably to provide a construction whereby the principal parts of the brush and indexing assembly may be constructed of both metal and insulating material in sheet or strip form which may be formed into desired shapes on a punch press.

Another object of the invention is to provide an assembly of the type described wherein means are provided for firmly holding the brush assembly in each of its selected positions.

Another object of the invention is to provide means for adjusting the angular position of a detent with respect to its index disc to adjust the parts so that the brush positions will coincide with the contacts.

For further details of the invention, reference may be made to the drawings, wherein

Fig. 1 is a sectional view in elevation, with parts broken away, of a brush and indexing assembly according to the invention.

Fig. 2 is a front view in elevation with parts broken away, of the device of Fig. 1.

Figs. 3 and 4 are sectional views on lines 3—3 and 4—4 respectively of Fig. 1.

Fig. 5 is a schematic wiring diagram of one type of attenuator circuit which may be employed with the brush and indexing assembly of Figs. 1 to 4.

Fig. 6 is a schematic wiring diagram showing substantially the circuit of Fig. 5 in simplified form.

Referring in detail to the drawings, the attenuator 1 comprises an inner casing 2 containing various impedance elements shown at 3 and 4 in Fig. 5, connected between an outer row of contacts 5 and an inner row of contacts 6 respectively, and in circuit with an outer ring 7 and an inner ring 8. The contacts 5 are arranged in an outer circle, the contacts 6 in an inner circle, and these contacts, as well as the rings 7 and 8,

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are mounted on an end wall 9 of insulating material.

The handle 10 is mounted on a shaft 11 which is rotatably mounted in a sleeve 12 and the shaft 11 at its upper end as shown in Fig. 1, although the attenuator 1 is here shown as upside down, carries and supports the brush and indexing assembly 13, whereby the brush assembly may be moved to complete the circuit through selected contacts at the various contact stations.

The assembly 13 comprises a double brush on each side thereof, Fig. 2 showing a double brush of which the brush 14 bears on the outer row of contacts 5 and a shorter brush 15 which bears on the outer ring 7. The brushes 14 and 15 are schematically indicated by the slider 16 in Fig. 5. As shown in Fig. 1, the other side of the assembly 13 has a similar double brush of which the longer brush 17 bears on the inner row of contacts 6 and the shorter brush 18 bears on the inner ring 8. The brushes 17 and 18 are schematically indicated by the slider 19 in Fig. 5.

The attenuator circuit shown in Figs. 5 and 6 is to be taken as merely illustrative of one type of impedance-controlled circuit which may be used, as various other types of such circuits may be employed instead. In the example shown in Fig. 5, the "in" lead 20 on one side of the line is connected to the end contact 21 in the inner row 6. A fixed resistance 22 is connected between contact 21 and outer ring 7. A fixed resistance 23 is connected between outer ring 7 and inner ring 8 and the latter is connected to the "out" line 24 of the same side of the line. The end contact 25 of the outer row 5 may be connected directly or through a fixed resistance 26 to the other side of the line 27.

As is well-known, the various impedance elements 3, 4, etc., are so selected as to vary the attenuation in the line 20—24, 27 while keeping the impedance looking in opposite directions, the same.

The various positions or stations of the contacts 5 and 6 are indicated by calibrations not shown, on the end wall 28 and the handle 10 is provided with a cooperating pointer or index not shown.

The brush and indexing assembly 13 preferably comprises a stack of strips of insulating material such as phenolic, the stack including one or more brush supporting strips, two being shown at 29, and a plurality of strips of the same material, four being shown at 30, serving as spacer strips, with an indexing plate 31, all held together as a unit by rivets such as 32.

The strips 29, as indicated at 33 in Fig. 2, have a lateral extension and the double brush 14 and 15 are riveted together on this extension as indicated at 34. At the opposite side thereof the strips 29 have a similar lateral extension 35 shown

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in Figs. 1 and 2, to which the double brush 17, 18 is riveted as indicated at 36.

The detent disc or index plate as shown at 31 in Fig. 3 has an annular array of punched out portions 37 angularly separated the same as the contacts 5 and 6, and a ball detent 38 is held in the selected one of the recesses 37 by a metal spring arm 39 having a punched out recess 40 which retains the ball 38 when the plate 31 is rotated. As shown in Fig. 3, the arm 39 extends on opposite sides of shaft 11 and it is journaled on shaft 11, in that it has a recess 41 which fits around the shaft 11. The ball 38 is retained at one end of arm 39 and the other end thereof is reduced in width as shown at 42 and terminates in a lug 43 which is bent up through a slot 44 which is concentric with the center of shaft 11. The slot 44 is arranged at an intermediate portion of an overlying spring metal arm 45 which at one end has an aperture 46 fitting around shaft 11 and at its other end is provided with an aperture 47 which fits over the end 48 of a post 49 which arises from and is secured to the end wall 9. The post 49 has a shoulder 50 which supports the outer end of arm 45 and urges it upwardly to firmly hold the ball 38 in one of the recesses 37, through the spring tension of the metal arms 39 and 45.

In the course of assembling the device, the arm 39 is angularly adjusted on shaft 11 so that the ball 38 will come to rest in one of the recesses 37 at a time when the brushes such as 14 and 17 are squarely on their contacts. The lug 43 is then soldered to the plate or arm 45 as indicated at 51.

The brush block comprises the strips 29, the spacer strips 30, and the plate 31 all have a bore 52 and a key-way 53 in which tightly fit the shaft 11 and the struck-out portions 54 on shaft 11 which serve as a key. This brush block unit is assembled in position by sliding it over the end of shaft 11 after first using one or more washers 55 if desired, then an additional washer 56 may be added and on that is placed the spring arm 39-45 and all of these parts are retained in position on shaft 11 by means of a lock-ring 57.

The rotation of the assembly 13 may be limited in opposite direction by means of a stop lug 58 on the wall 9 and against the opposite sides of which the stop pin 59 is adapted to strike. The pin 59 is carried by the insulating strips 29.

A cover 60 is provided with a slot not shown to pass over a terminal block not shown on the outside of casing 2.

It will be apparent that various modifications may be made in the invention. For example, various types of attenuator circuits may be employed and to reduce the outside diameter, the attenuator may be divided in two parts arranged in two decks with only one set of contacts and one ring on an end wall such as 9, with the rest of the attenuator circuit and the other set of contacts and its ring spaced from the unit 1 along the shaft 11.

I claim:

1. A brush and indexing assembly comprising a base having a circular array of contacts thereon, a rotatable shaft in said base, an insulating block carried by said shaft, a brush on said block for said contacts, and means for impositively holding said brush in various rotatable positions in contact with one of said contacts, said means comprising a detent disc having an array of de-

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tent recesses corresponding to said array of contacts, means securing said disc to said brush assembly, a post arising from said base, a spring arm supported by said post and having an aperture rotatably receiving said shaft, a lock ring retaining said spring arm on said shaft and a detent on said arm for said recesses.

2. A brush and indexing assembly comprising a stack of strips of insulating material, certain of said strips having a laterally projecting portion with a brush riveted thereto, a detent disc, and rivets extending through said stack and said disk and securing the same together as a unit, said unit having a shaft receiving bore.

3. An assembly comprising a rotatable shaft having insulating means secured thereto, a brush secured to said insulating means, an indexing disc on said shaft and rotatable therewith and with said brush assembly, said disc having a plurality of recesses corresponding to the brush positions, a post at one side of said shaft, a detent member comprising a pair of superposed spring arms, one of said arms being supported by said post and having an aperture rotatably receiving said shaft, the other of said arms having a detent for said disc, an aperture rotatably receiving said shaft and an extension secured to said one arm.

4. An assembly comprising a rotatable shaft, a brush assembly secured thereto, a detent disc secured to said brush assembly, a post at one side of said shaft, said post having a shoulder, a plate having an aperture fitting over said post and resting on said shoulder, said plate having an aperture rotatably receiving said shaft and having an intermediate slot, a detent arm having at one side of said shaft a detent for said disc, and at the other side of said shaft having a lug extending through said slot and secured thereto.

5. An assembly comprising a base having a plurality of contacts, a rotatable shaft in said base, a unitary brush assembly and detent disc carried by said shaft, a brush on said assembly for said contacts, a post at one side of said shaft, a detent spring arm rotatably receiving said shaft and supported by said post, and a detent on said arm for said disc.

6. An assembly comprising a rotatable shaft having a laterally projecting portion forming a key, a plurality of superposed strips of insulating material having opposed laterally projecting portions with brushes secured thereto, a plurality of spacer strips of insulating material on said brush strips, a detent disc on said spacer strips, a plurality of contacts for said brushes, said disc having a corresponding plurality of detent recesses, rivets securing said brush strips, spacer strips and disc together as a unit, said unit having a bore receiving said shaft and a key-way receiving said key, a post at one side of said shaft, a detent arm supported by said post and journaled on said shaft, a ball detent on said arm for said disc, and a lock ring on said shaft for said arm.

7. A brush and indexing assembly comprising a base, a plurality of contacts on said base, a shaft journaled in said base, a brush for said contacts on said shaft, a detent disc on said shaft, a post on said base at one side of said shaft, a detent arm supported by said post and journaled on said shaft, a ball detent on said arm for said disc, and a lock ring on said shaft for said arm.

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