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CURRENT CONTROLLING DEVICE

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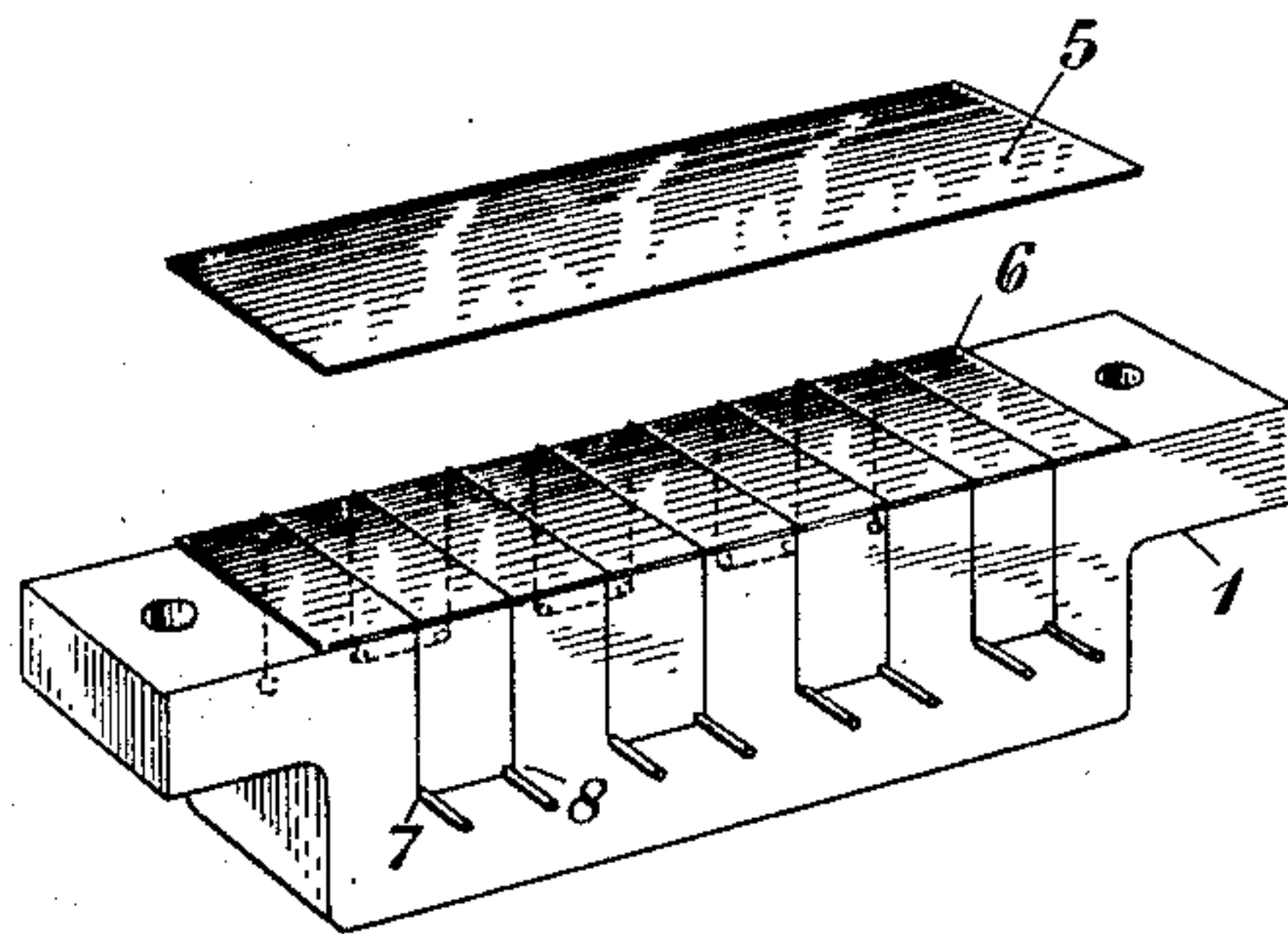


Fig. 2

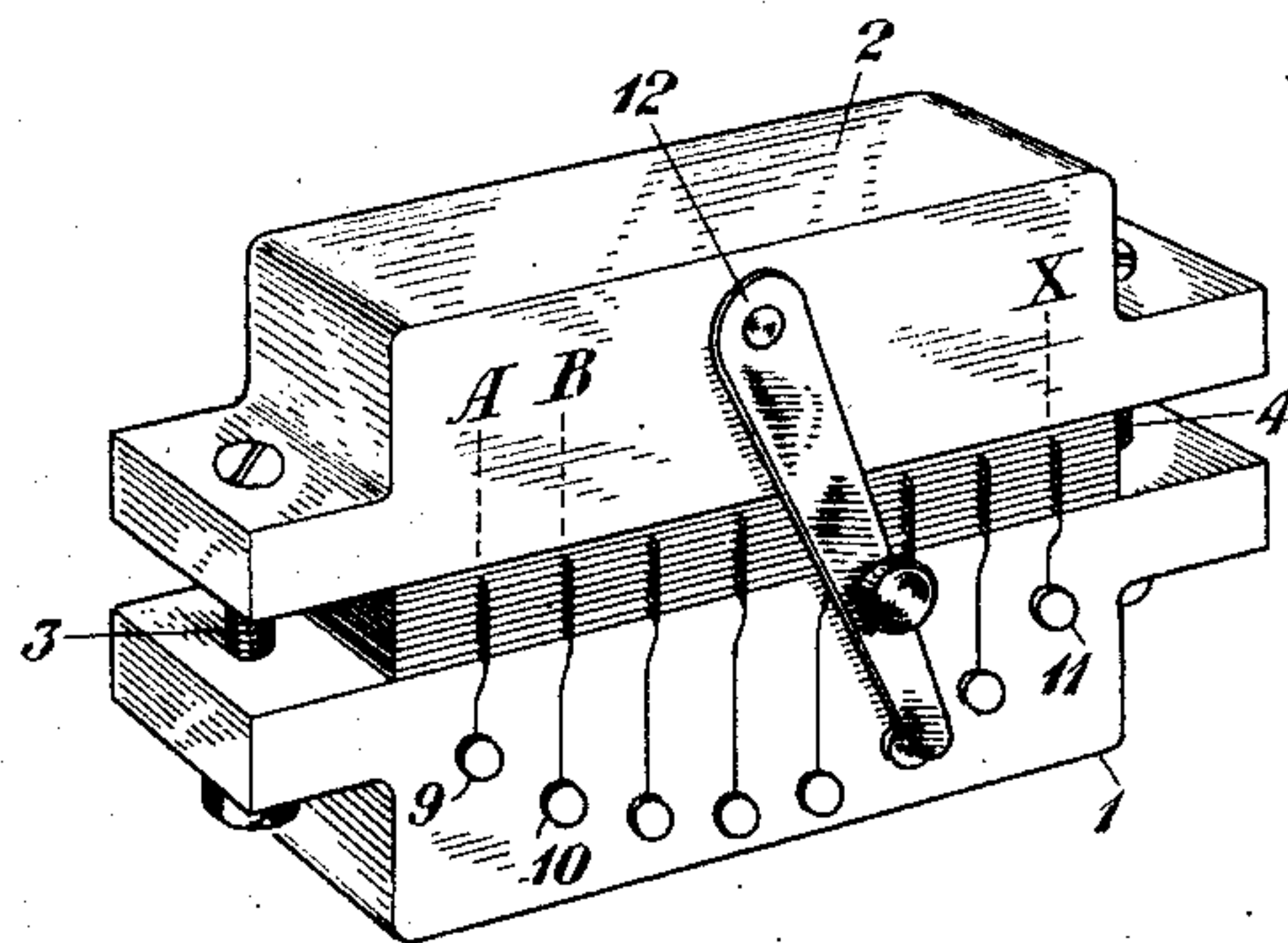


Fig. 1

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CURRENT-CONTROLLING DEVICE.

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This invention relates to current controlling devices, and particularly to a resistance element having no inductance, substantially no capacity, and which is nonmicrophonic.

5 In the design and construction of radio receiving apparatus, and other types of electrical apparatus, it is frequently desirable to employ a stable resistance element of the order of twenty thousand ohms, variable by
10 steps, and preferably free, or substantially free, from inductance or capacity.

This invention provides such an element having no inductance, substantially no capacity, and which is also nonmicrophonic and
15 simple and inexpensive in construction.

The invention will be clear from the following description when read in connection with the attached drawing of which Figure 1
20 shows a simple form of embodiment of the invention; and Fig. 2 shows some of the details employed in the arrangement shown in Fig. 1 illustrating the method of construction.

In Fig. 1 the members 1 and 2, of insulating
25 material, together with the bolts 3 and 4, serve to clamp tightly a plurality of sheets of high resistance material which constitutes the resistance element of the device. These sheets are represented by 5 and 6 of Fig. 2.
30 A simple method for producing these resistance elements consists in dipping a sheet of cardboard or other suitable material in black India ink which, as is well known, consists principally of ground carbon. After being
35 coated, preferably on both sides, the sheet should be thoroughly dried so as to avoid any substantial conductance through the material upon which the carbon has been deposited. Other material than the carbon-coated sheets
40 may, of course, be employed for resistance material; as, for example, thin sheets of pure carbon or equivalent material.

In building up the resistance unit, a sheet
45 of high resistance material such as 6 is placed upon one of the clamping members 1 and a fine, bare copper wire is wound back and forth across the face of the sheet in the manner shown in Fig. 2, the wire being held by
50 pins, such as 7 and 8, which may be inserted either in each face of the clamping block as shown, or upon a mounting block which may be employed in the assembling of this apparatus. To produce a resistance unit having
55 equal steps of resistance, the distance between the successive crossings of the wire over the

face of the sheet 6 should be substantially the same throughout the length of the sheet. A second coated sheet is then placed over the first sheet, across which the wire has been wound, and then another length of bare copper wire is wound back and forth over the
60 second sheet in the same way in which the wire was wound over the first sheet. The number of sheets employed will, of course, depend upon the magnitude of the resistance
65 desired. After the required number of sheets of resistance material have been placed in position they should be bound tightly together between the clamping members 1 and 2 by means of the bolts 3 and 4. The loops
70 under the pins should then be cut and all of the wires extending across the adjacent sheets at the same relative position should be twisted together and fastened beneath a switch-contact point as shown in Fig. 1. Thus, the wires
75 extending transversely between the sheets at the position A, are bound together under the contact point 9; those at position B are connected with contact point 10, and similarly
80 the other groups of wires are connected. The portions of the wires which were looped around the pins on the side of the clamping member opposite to that in which the contact points are placed, may be cut off close to
85 the edges of the sheets through which they pass.

After completion, the unit should preferably be sealed against moisture by coating with shellac or other suitable material.

The last group of wires which is connected
90 with the contact point 11 may constitute one terminal of a potentiometer, and the movable arm 12 of the switch the other terminal. The resistance will therefore depend upon the setting of the arm 12. Thus, when the arm 12
95 rests upon the contact point 9 the magnitude of the resistance between the arm 12 and the contact point 11 is the resultant of the resistance of all the sheets in parallel between the position A, and position X. Other settings
100 of the arm 12 will decrease the resistance between the contact point 11 and the arm 12.

From the foregoing description, it will be apparent that the product is in effect, a block
105 of carbon or similar high resistance material having a plurality of substantially parallel conductors set therein, each conductor extending transversely through the block. The important point to be considered in carrying
110

out the invention is to provide a relatively large surface of contact between the low resistance element, viz, the terminating conductors and the high resistance element, viz, the carbon or equivalent material in either block or laminated form.

This invention is not limited to the particular form of embodiment shown and described herein, but obviously may be made in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a resistance device, the combination with a plurality of sheets of resistance material of a plurality of separate, spaced conductors lying transversely between adjacent sheets, the conductors between any two sheets being substantially directly above and below the conductors between the adjacent sheets, means to clamp together all of the said sheets, and a plurality of terminals each of which serves to terminate all of the conductors similarly located between the adjacent sheets.

2. In a resistance device, the combination with a plurality of sheets of resistance material, of a plurality of separate, spaced conductors between the said sheets, the spacing being such that all similarly positioned con-

ductors will lie substantially in the same vertical transverse plane, means to clamp the said sheets, and a plurality of terminating means, each individual to and connected with all of the wires lying in the same vertical plane.

3. In a resistance device, the combination with two sheets coated with high resistance material, of a plurality of separate, spaced wires lying transversely between the said sheets and separating the said sheets into a plurality of resistance units, and means for clamping the said sheets.

4. In a resistance device, the combination with a plurality of sheets coated with high resistance material, of a plurality of wires lying transversely between adjacent sheets to separate each of said sheets into a plurality of resistance units, the wires between any two of said sheets being in substantially the same vertical transverse plane as the similar wires between the other adjacent sheets, and means for clamping the said sheets.

In testimony whereof, I have signed my name to this specification this 1st day of December, 1924.

WILLIAM R. BALLARD.