July 9, 1935. J. BERTSCHI 2,007,703

ELECTROMAGNETIC VIBRATORY DEVICE AND METHOD OF MAKING SAME

Filed May 17, 1933

Fig. 1.

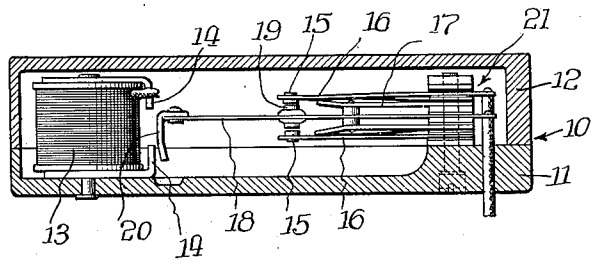


Fig. 2.

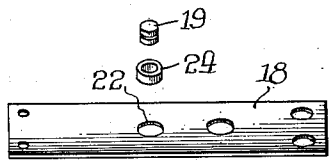


Fig. 3.

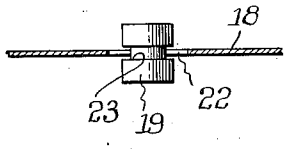


Fig. 4.

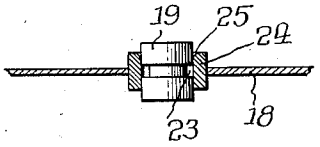
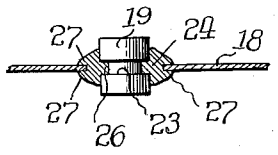


Fig. 5.



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2,007,703

ELECTROMAGNETIC VIBRATORY DEVICE AND METHOD OF MAKING SAME

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5 Claims. (Cl. 200—166)

The invention relates generally to electromagnetic vibratory devices and in particular to the vibrating or oscillating element of said devices and to the method of making such elements.

Devices of this character commonly include a movable element or "reed" which is usually fashioned of spring steel or like material and is caused to oscillate or vibrate by the force of an intermittently energized electromagnet. Frequently said element carries one or more contact points for making and breaking a like number of circuits in the movement of the element. Heretofore serious difficulty has been encountered in satisfactorily mounting these contact points on said element.

For example, if the element becomes permanently distorted in the assembly of said points thereon as may occur in an upsetting or riveting operation, the normal operating action thereof will be changed and it becomes impossible consistently to produce in quantity assemblies which are uniform in all respects. Hence each device may require considerable adjustment after assembly particularly where the device is to be employed in connection with such electrical equipment as radio "B" battery eliminators or current rectifiers. Likewise, if the points are assembled by any of the methods involving heat, the temper of the element may be so destroyed or altered that uniformity in quantity manufacture is impossible.

A general object of the invention is to produce an improved device of this character by a novel and simple method whereby such devices may be produced in quantity and uniformity of operation in all devices so produced consistently obtained.

Another object is to produce an improved device embodying a movable resilient element having contact points mounted thereon by means of an interposed member which may be distorted readily to unite the parts.

A further object is to provide a novel method of assembling a contact point on a resilient reed which includes the step of distorting a connecting member so that parts of said member are forced into rigid engagement with the parts to be connected.

Other objects and advantages will become apparent in the following description and from the accompanying drawing, in which:

Figure 1 is a longitudinal vertical section through the casing of a device embodying the features of the invention.

Fig. 2 is a view showing the several parts of the reed assembly in perspective.

Figs. 3, 4 and 5 are sections through the reed on an enlarged scale showing successive steps in the method of assembling the contact points on the reed.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawing and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The invention will be described, merely for illustrative purposes, as being embodied in one form of an electromagnetic vibratory device. It should be understood, however, that the present invention may be used in connection with many types of devices other than that shown. With reference to Fig. 1, 10 designates a casing comprising a base 11 and a cover element 12 adapted normally to be secured together in any suitable manner (not shown). Within the casing and at one end of the base is an electromagnet 13 having pole pieces 14 facing toward the opposite end of the base.

In the present embodiment, the vibratory structure by which the circuits to be controlled are made and broken, includes what may be termed a double contact point arranged to cooperate with and move between two fixed contact points. The two fixed contact points are designated 15 and are supported in opposed, inwardly facing relation by stiff spring fingers 16. Spacing means 17 adjustably determines the proper distance between the two fixed contact points. The vibratory structure comprises a reed 18, which is supported intermediate the two fixed contact points 15, a double contact point 19, interposed between the two fixed contact points for cooperation therewith, and an armature 20.

The reed 18 is preferably of some resilient current conducting material, such as spring steel, and in this instance is in the form of an elongated plate (see Fig. 2).

Suitable supporting means, indicated at 21, including the usual strips of insulation for electrically isolating the several parts, secures the finger 16, spacer 17 and reed 18 through corresponding ends thereof to the end of the base opposite the electromagnet. When the parts are so supported, the armature 20 is located within

the effective range of the magnetic force exerted by the electromagnet. In this instance, the armature is normally offset at one side of the center of such magnetic force so that energization of the electromagnet causes the armature to swing, thereby establishing a circuit through one or the other of the fixed contact points and the intermediate double contact point. Intermittent energization of the electromagnet in any suitable manner causes the reed to vibrate or oscillate and thereby reciprocates the double contact point 19 between the two fixed contact points 15.

A description of the mounting of the double contact point 19 on the reed 18 will be given as an example of one form of the invention. Referring to Fig. 2, 22 designates an aperture formed in the reed 18 at a point which will be alined with the fixed contact points 15 when the parts are assembled, which aperture is somewhat larger than the double contact point 19 (as may be seen in Fig. 3). Intermediate its ends, the contact point 19 has a depression formed therein which, in this instance, is in the form of an annular peripheral groove 23. When the contact point is positioned in proper relation to the reed 18 in the assembly of the parts, the groove 23 is opposed to the margin of the aperture 22.

Interposed between the contact point and the margin of the aperture is a sleeve-like connecter 24 (see Fig. 4) which fits snugly about the contact point and within the margin of the aperture. The connecter 24 is preferably formed of a current-conducting material which may be readily deformed or distorted under normal shop temperatures. Silver has been found to be a suitable material. If desired, an internal edge at one end of the connecter may be beveled, as at 25, to facilitate insertion of the contact point. After the parts have been assembled as shown in Fig. 4, the outer edges of the connecter 24 are struck inwardly at an angle to the plane of the reed and to the axis of the contact point by means of a suitable tool. By this operation the connecter is deformed so that a portion 26 thereof enters and fills the depression or groove 23 while other portions 27 are forced into a firm gripping engagement with the reed about the margin of the aperture 22. This relationship of parts is shown in Fig. 5.

It will be evident that a novel method of attaching contact points to resilient reeds has been produced whereby the parts are rigidly secured together without the use of a heat treatment and without distortion or machining of the contact points. Consequently, there is no distortion of the flexible reed which would produce a variation in the movements thereof, and the reed assemblies may be manufactured in quantity and with substantial uniformity. Moreover, an excellent electrical connection between the parts of the assembly is attained.

I claim as my invention:

1. The method of securing a contact point to a thin spring tempered vibratory member while maintaining substantially the original flexibility and resiliency of said member which consists in forming an aperture in the thin member without distortion thereof, locating a contact point of substantially less diameter than said aperture and having an annular groove therein within said aperture with said groove opposing the margin of said aperture, interposing a bushing of an easily distortable soft and current conducting material between said margin and said contact point, and distorting said bushing to turn the ends thereof over said margin and to force an intermediate part of the bushing into said groove to secure the parts firmly together, the bushing distorting force being so applied that no distortion of the vibratory member occurs.

2. A vibratory reed for a device of the character described which is adapted to vibrate accurately due to the absence of reed distortion and comprises the combination of a thin flat member formed of a spring tension material of determined vibration frequency and having an aperture therein defined by a substantially undistorted margin of the member, a contact point of substantially less diameter than said aperture and extending therethrough, and a bushing in said aperture and about said point formed of a soft material which is a good electrical conductor and is capable of being easily deformed into gripping engagement with said point and margin by the application of a force which will not distort said member so as to preserve said vibration frequency.

3. In a vibratory device, a thin, flat reed member having an aperture therein defined by a substantially undistorted margin of the member, a cylindrical contact point extending through said aperture and being of a diameter substantially less than said aperture, and a deformable connecter fashioned as a cylindrical bushing fitting snugly about said point and substantially occupying the space between said point and said margin, said connecter having an internal surface beveled toward one edge to facilitate reception of said point in assembling the device.

4. A vibratory reed for a device of the character described which is adapted to vibrate accurately due to the absence of substantial reed distortion comprising, in combination, a thin flat resilient member having a determined vibration frequency, said member having an aperture therein defined by a substantially undistorted margin of said member, a contact point of substantially less diameter than said aperture and extending therethrough, said point having an annular groove therein adapted to be located in opposition to the margin of said member defining said aperture, and a bushing in said aperture and about said point formed of a soft material which is a good electrical conductor and is capable of being easily deformed into gripping engagement with the side faces of said member about said margin and into the groove in said point by the application of a force which will not distort said member.

5. The method of securing a contact point to a thin vibratory member of spring tempered material while maintaining substantially the original flexibility and resiliency of said member which comprises the steps of forming an aperture in said member without distortion thereof, locating a contact point of substantially less diameter than said aperture within said aperture and extending therethrough, interposing a bushing of an easily distortable soft and current conducting material in said aperture and about said point and deforming said bushing into gripping engagement with said point and margin by the application of a force which will not distort said member whereby to preserve said vibration frequency.

JACOB BERTSCHI.