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C. HUETTEN

2,334,769

VIBRATOR

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Fig. 1

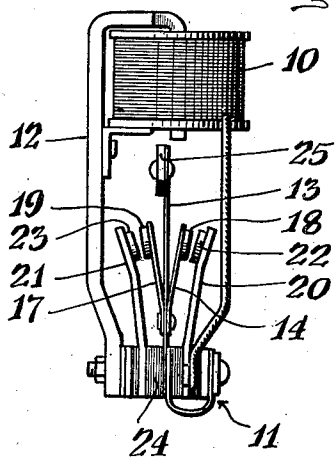


Fig. 2

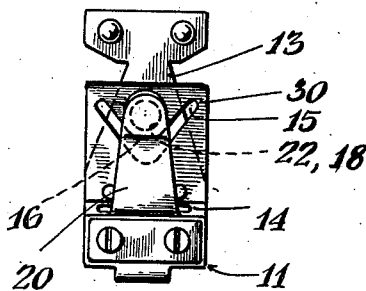


Fig. 3

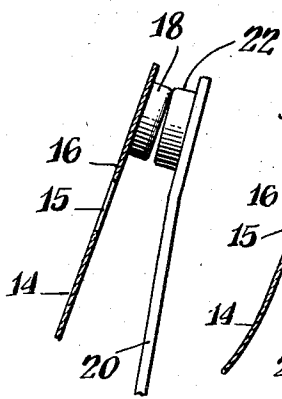


Fig. 4

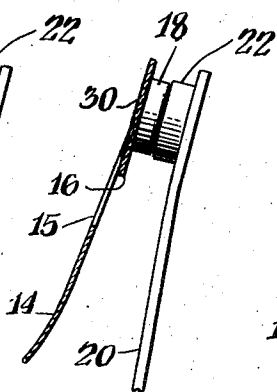


Fig. 5

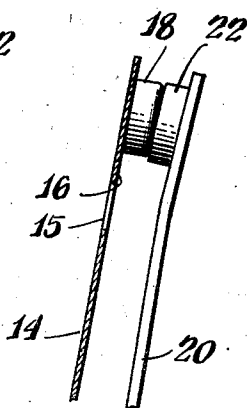
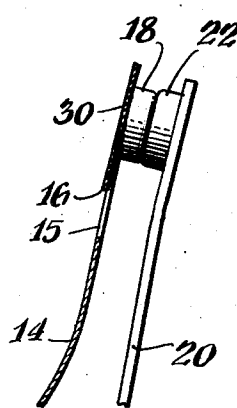


Fig. 6



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VIBRATOR

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2 Claims. (Cl. 200—165)

This invention relates to electromagnetic vibratory interrupter devices and to the co-operating electric contacts thereof.

An object of the invention is to improve vibratory interrupter devices.

Another object is to improve the mountings for co-operating electric contacts.

Other objects of the invention will be apparent from the following description and accompanying drawing taken in connection with the appended claims.

The invention comprises the features of construction, combination of elements, arrangement of parts, and methods of manufacture and operation referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustrations in the drawing.

In the drawing:

Figure 1 is a side view of an electromagnetically controlled vibratory contact mechanism embodying features of the present invention;

Figure 2 is a face view of the reed and contact arm assembly; and

Figures 3, 4, 5 and 6 show details of the vibratory contact operation under certain conditions.

This invention finds its principal application in electromagnetic vibratory interrupter devices or vibrators of the type shown and described in I. M. Slater Patent #2,190,685 and H. J. Brown Patent #2,197,607. Such vibrators are used for example, for periodically interrupting current from a battery or other low voltage source to produce a pulsating current. They are frequently used in co-operation with transformers and rectifiers to obtain a high voltage D. C. output current from a low voltage D. C. source.

The present invention contemplates an improvement in the contact mounting thereof whereby the co-operating contact faces will align themselves more accurately during operation. In its preferred embodiment this is accomplished by forming at least one of the contact mounting arms with a pivoted or flexible mounting portion upon which the contact is mounted.

While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the construction of parts without departing from the spirit of the invention. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the drawing, the vibrator mechanism of Figure 1 comprises an iron frame 12 bent into a hook shape and having an electromagnet winding 10 around the hook end. The vibrator

reed 13 and side contact arms 20 and 21 are clamped at their lower ends in a "stack" assembly 11 with interposed layers 24 of sheet insulation, the entire assembly being clamped or bolted to the end of frame 12.

The reed carries an armature 25 at its free end and has riveted to its opposite faces near its base a pair of diverging contact arms 14 and 17 carrying flat contact discs 18 and 19, respectively, at their outer ends. Side arms 20 and 21 carry contact discs 22 and 23, respectively, at their ends in mating relation to contacts 18 and 19.

The structure so far described is generally similar to that shown in the above-mentioned Slater and Brown patents. In manufacturing and assembling such vibrators it has been the practice to adjust the contact arms to bring the mating contacts, as nearly as possible, into alignment when they are brought together during vibration of the reed by the electromagnet. However, even with the most careful adjustment there are often instances where imperfect alignment is obtained, resulting in a lower contact efficiency, although the misalignment is so slight as to be difficult or impossible of detection at the time of assembly.

A more important factor in reducing contact efficiency, however, is the tendency of one contact to rock upon the other due to the flexing of the contact support arms during the closed contact interval while the reed travels to the end of its swing and returns.

According to the present invention both contact misalignment and contact rock are corrected by making reed contact arms 14 and 17 of the shape shown most clearly in Figure 2. As is clearly shown in the drawing, the reed contact arm 14 is punched with a V-shaped aperture 15, which aperture extends below and to the two sides of the contact disc 18. Disc 18 is thereby supported upon a table portion 16 which is joined to the main part of arm 14 only by the narrow and readily flexible connecting portions 30 at opposite edges of the contact arm. Portions 30, being of much smaller cross-section than the main arm, are readily flexible and hence provide hinges or pivots about which the table portion 16 can rock under influence of comparatively small forces.

The effect of this construction upon contact operation is shown in Figures 3, 4, 5 and 6.

Figures 3 and 4 illustrate one condition in which contact 18 first engages contact 22 at their upper or outer edges. In Figure 3 the contacts are shown at the instant when contact 18 first touches contact 22. As the swing of the reed continues, thereby building up the contact pressure the forces produced will rotate contact 18 and its supporting table 16 about the hinge or pivot regions 30 to bring the mating contacts 18 and 22 into alignment as shown in Figure 4. The

contacts then remain in flat face-to-face contact throughout the closed contact interval. It will be noted in Figure 4 that arm 14 has bent slightly under the force of the swinging reed. Without the present construction this would cause the contacts to rock upon each other.

Figures 5 and 6 show the operation when the original misalignment is such as to bring the contacts into engagement first at their inner or lower edges. Here likewise the forces produced cause rotation about regions 30 to bring the contacts into alignment as shown in Figure 6.

In vibrators of the prior art there was usually present a continual rocking action throughout the closed contact intervals due to the flexing of the contact arms so that the point of engagement between mating contacts was continually changing during a closed contact interval. This condition has resulted in more rapid wear and electrical aging of the contacts than is necessary and has raised the average contact resistance. The present invention, by eliminating the rocking action, maintains a steady contact engagement during the entire closed-contact interval. It also corrects any original contact misalignment.

It will be noted that the hinge regions 30 provide an axis of rotation for the contact which extends across the middle of the contact. This is the preferred location of the pivotal axis. It is contemplated, however, that the axis may be moved up or down, by changing the shape of the arm or aperture, and that contact alignment may still be obtained. However, it is preferred that the axis shall be within the contact boundaries so as to be between the two points of possible application of force tending to rotate the contact about the axis.

Tests on vibrators embodying the present invention reveal lower contact resistance and cooler vibrator operation with the improved vibrators than has been obtained heretofore.

While the self-aligning contacts are shown and described as applied to the vibrator reed contact arms, it is apparent that similar improvements can be made in the independently mounted side contact arms 20 and 21 either alternatively or in addition to the reed arm improvements.

While the present invention, as to its objects

and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims.

What is claimed is:

1. A contact arm assembly for a vibrator of the type wherein a pair of support arms are clamped at one end in substantially parallel relation and carry respectively opposed plane contacts at their free ends, said contacts being brought into direct face-to-face contact by vibration of one of said arms, said assembly comprising a sheet metal arm, a sheet metal table support in substantially the same plane therewith, a substantially plane contact secured to the face of said table support, said arm being cut out to provide a pair of spaced parallel portions and a pair of integral flexible connecting portions between said parallel portions and opposite edges of said table support holding said support substantially parallel to said arm in the absence of external forces but permitting limited rotation of said support about a line through the body of said contact when said contact engages the opposed contact and said opposed contact is not already in alignment therewith.

2. A contact arm assembly for a vibrator of the type wherein a pair of support arms are clamped at one end in substantially parallel relation and carry respectively opposed plane contacts at their free ends, said contacts being brought into direct face-to-face contact by vibration of one of said arms, said assembly comprising a sheet metal support arm and a substantially plane-faced contact secured to a face thereof adjacent the free end of said arm, said support arm having an aperture therein between the clamped end thereof and said contact, said aperture extending around the sides of said contact and terminating at points on opposite sides of said contact and near the edges of said arm, said points defining a line passing through said contact body about which said contact is hinged by the remaining material of said contact arm in the region of said line.

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