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ELECTRICAL CONTACT SPRING

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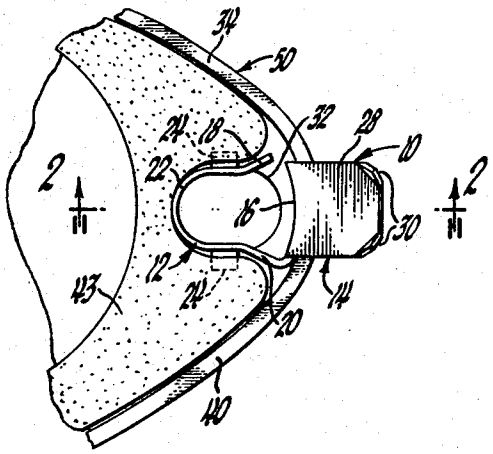


Fig. 1

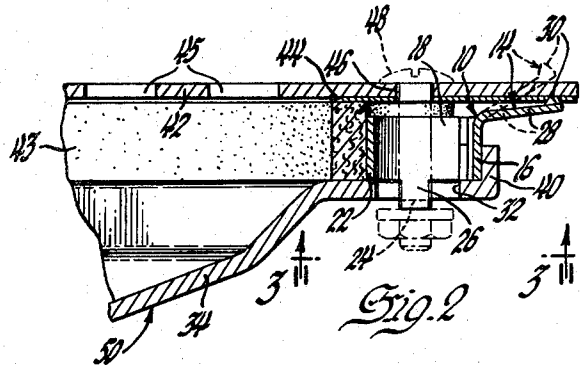


Fig. 2

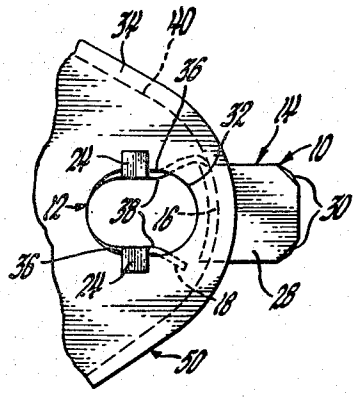


Fig. 3

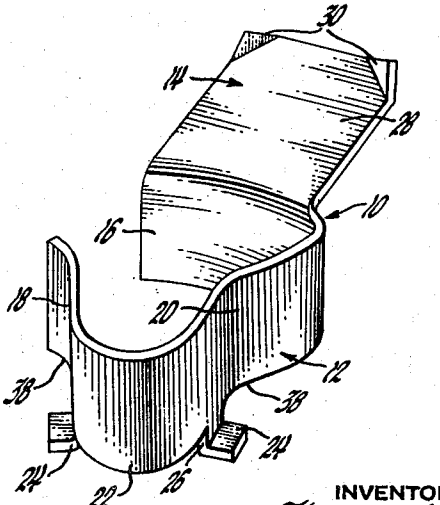


Fig. 4

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ELECTRICAL CONTACT SPRING

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2 Claims. (Cl. 339—14)

This invention is directed to a resilient electrical connection and more particularly to an electrical contact element of an improved design for providing an efficient vibration-isolating resilient electrical connection between associated but relatively spaced and otherwise insulated members and to the method of installing said element between the members.

The presence of electrical systems; i.e., automobile ignition systems, which are capable of generating electromagnetic waves of relatively high frequencies in the vicinity of electronic devices such as radio frequency receivers and transmitters, often impairs the quality of operation of such devices and the life of the various components. This is particularly true with respect to television and frequency modulation receivers, automobile radios, and other highly sensitive electronic instruments. To suppress such undesirable electrical impulses, it is necessary to suitably ground the necessary components of such electronic and electrical devices. It is also desirable from the standpoint of operation and life of the various components to isolate the various components from excessive vibration.

As indicated above, the invention contemplates the use of an improved resilient contact element in the form of a spring metal contact clip which is mounted between adjacent but relatively spaced parts to provide electrical contact therebetween. While contact elements constructed in accordance with the invention are particularly adapted to provide suitable ground return paths for the various components of electronic devices, their use is not limited to connections of this particular type and they are considered adaptable to electrical connections generally.

Among the principal objects of the invention are to provide such a spring metal contact clip which may be used to accommodate various degrees of spacing between the parts; which is extremely simple in design; and which may be assembled to one of the parts prior to installation or assembly of the associated parts so that the installer will need to handle fewer parts, thereby lessening the time of installation and insuring that a positive connection will always be provided.

The invention features a spring metal clip adapted to provide a vibration-isolating resilient connection between two members and comprising a sheet metal clip portion having laterally extending means formed thereon adapted to engage the upper and lower surfaces of a sheet metal mounting member having an aperture therein through which said means is insertable prior to such engagement, and having a barbed resilient grounding portion extending upwardly and outwardly from the clip portion to resiliently engage the surface of the other member.

The foregoing and other objects and features of the invention will be better understood from the following description of one embodiment of a contact spring metal contact clip constructed in accordance with the invention, which, for the purpose of illustration, is shown and described in the mounting and grounding of a radio speaker basket mounted in the metal package shelf to the rear of the back seat of an automobile, reference being had to the accompanying drawing, in which:

Figure 1 is a fragmentary top view of a speaker basket having a clip constructed in accordance with the invention secured thereto;

Figure 2 is a fragmentary sectional view taken substantially on the line 2—2 of Figure 1 showing the speaker basket in its mounted position;

Figure 3 is a fragmentary view taken in the direction of the arrows 3—3 of Figure 2 and showing the speaker basket with the spring contact clip attached; and

Figure 4 is a perspective view of the spring contact clip.

Referring more particular to the drawings, the metal contact spring clip illustrated in the various figures is formed of sheet metal stock of the desired thickness and the blank is suitably deformed to impart the desired yielding and locking features. As best seen in Figure 4, the metal contact spring clip which is designated generally by the numeral **10** comprises a hollow expansible clip portion **12** including an end portion **16** and a pair of resilient arms **18** and **20**; the arm **20** being connected at one end to the end portion **16** and connected at its opposite end to the arm **18** by a bight **22**. A laterally extending tab **24** is connected to each of the arms **18** and **20** by a portion **26** extending axially of the clip portion **12**. It will be noted that the ends of the arms **18** and **20** adjacent the end portion **16** are deflected outwardly for a purpose to be described in greater detail below.

A resilient contact portion **14** formed integrally with the end portion **16** comprises a resilient portion **28** extending laterally and upwardly from the end portion. The corners **30** of the resilient portion **28** are bent upwardly to form surface-engaging barbs or points **30** which are adaptable to bite into any surface with which they are forced into contact to provide an efficient electrical connection.

As stated above, Figures 1–3 show the spring clip **10** utilized to provide a resilient vibration-isolating ground connection between a radio speaker **50** and a metal package shelf **42** located between the rear seat and rear window of an automobile. The spring clip **10** is assembled to the speaker basket **34** prior to mounting the speaker to the package shelf. This may be accomplished by laterally compressing the resilient arms **18** and **20** of the hollow expansible portion **12** to permit the tabs **24** to be inserted through a suitable aperture **32** provided in the speaker basket but is preferably accomplished in the embodiment shown by first inserting the tabs **24** through the length of an elliptical aperture **32** provided in the speaker basket and then rotating the spring clip **10** through an angle of ninety degrees, thus bringing the connecting portions **26** of the tabs **24** into camming engagement with the edges **36** defining the narrow portion of the aperture **32** and laterally compressing the resilient arms **18** and **20** of the expansible clip portion **12**. When thus assembled, the connecting portions **26** are resiliently biased into engagement with the edges **36** of the aperture **32** and the speaker basket **34** is engaged on its lower surfaces by the tabs **24** and on its upper surface by the lower edge **38** of the end portion **16**, the outwardly deflected ends of the arms **18** and **20**, and their interconnecting bight **22**. It will be noted that the end portion **16** is arcuately formed to fit a curved upstanding flange **40** formed on the speaker basket. The resilient action of the arms **18** and **20** urges the end portion **16** into engagement with the mating surface of the flange **40** thereby serving to locate and maintain the clip **10** in its desired assembled position. Where the clip **10** is mounted in an elliptical aperture, as shown, by rotation of the clip, the end portion **16** may be provided with a slight

outward deflection requiring the speaker flange 40 to cam the end portion 16 as the clip 10 is rotated towards its assembled position. This increases the compressive loading of the expansible portion tending to maintain the clip in its assembled position.

After the clip has been assembled to the speaker basket, the speaker basket is spaced below the sheet metal package shelf 42 with a vibration-dampening gasket 44 interposed therebetween and in alignment with one or more openings 45 provided in the shelf for the transmission or escape of the reproduced sound emitting from the speaker. The apertures 32 are also aligned with holes 46 provided in the shelf for suitable basket mounting means such as the nut and bolt indicated in broken line in Figure 2 at 48. By tightening the nut and bolt 48 to secure the speaker basket to the shelf, the resilient portion 28 is deflected from its broken line position shown in Figure 2, causing its corner barbs 30 to cut through paint, sound-dampening material, and other insulating matter as indicated at 43 on the under surface of the shelf 42 and into the metal of the shelf, thereby establishing a resilient vibration-isolating electrical connection providing a ground return path for the speaker 50.

It is contemplated that the tabs 24 may be crimped or barbed upwardly to bitingly engage the metal of the under surface of the speaker basket. However, the contact provided by the tabs and the edge 38 will normally be sufficient for most applications unless the member to which the clip is secured is surface-insulated. Biting engagement with the basket may also be provided by inclining the bend of the outwardly deflecting ends of the arms 18 and 20 from the vertical towards the end portion 16.

While only one specific embodiment of the invention has been shown and described for the purpose of illustration, it will be appreciated that various minor modifications may be made without departing from the spirit and scope of the invention as defined in the following claims.

We claim:

1. A mounting for a radio speaker adapted to provide a vibration-isolating resilient ground connection between the radio speaker and a sheet metal mounting member, comprising, in combination, a speaker basket, a sheet metal mounting member spaced from said basket, an audible-vibration-isolating gasket interposed between said basket and said member, said basket and said member having a plurality of aligned apertures, a hollow expansible contact spring aligned with each of said apertures and interposed between said basket and said member, said spring comprising an expansible clip portion including an end portion, a resilient arm connected to said end portion, a second resilient arm connected to said first-mentioned resilient arm by a bight opposite said end portion, at least one tab extending laterally from each of said arms and connected thereto by an axially extending portion, said tabs and the edges of said arms engaging the bottom and top surfaces of the speaker basket adjacent the aperture therein through which the tabs are insertable when said arms are deflected under compressive loading, and a resilient contact portion formed integrally of the end portion and extending laterally and upwardly from said end portion, said contact portion having upwardly directed barbs formed thereon adapted to bite into the surface of the mounting member with which they come into contact during the mounting operation to provide a good grounding contact, and means insertable through said apertures for drawing and securing said basket, said mounting member, and said interposed gasket together.

2. A mounting for a radio speaker adapted to provide a resilient ground connection between a sheet metal mounting member and the radio speaker spacedly mounted therefrom, said mounting comprising, in combination, a speaker basket, a sheet metal mounting member spaced from said basket, said basket and said member having a plurality of aligned apertures, a vibration-isolating gasket interposed between said basket and said member, a contact spring interposed between said basket and said member, said contact spring comprising a hollow expansible clip portion aligned with said apertures having laterally extending means formed thereon engaging the bottom and top surfaces of the speaker basket adjacent the aperture therein through which the laterally extending means are insertable when said clip portion is contracted under compressive loading, and a resilient contact portion extending laterally outwardly and upwardly from said clip portion and having barbs formed thereon biting into the surface of the mounting member with which they come into contact during the mounting operation to provide a good grounding contact, and means insertable through said apertures for drawing and securing said basket, said mounting member, and said interposed gasket together.

References Cited in the file of this patent

UNITED STATES PATENTS

807,051	Strong	Dec. 12, 1905
2,146,628	Jackson	Feb. 7, 1939
2,229,989	Roby	Jan. 28, 1941
2,290,172	Eby	July 21, 1942
2,523,083	Wilkowski	Sept. 19, 1950
2,745,080	Offerman	May 8, 1956
2,749,434	Falge	June 5, 1956

FOREIGN PATENTS

372,140	Great Britain	May 5, 1932