

April 9, 1940.

J. A. BRIGGS
SOUND REPRODUCING DEVICE

2,196,352

Filed Dec. 14, 1937

Fig. 1.

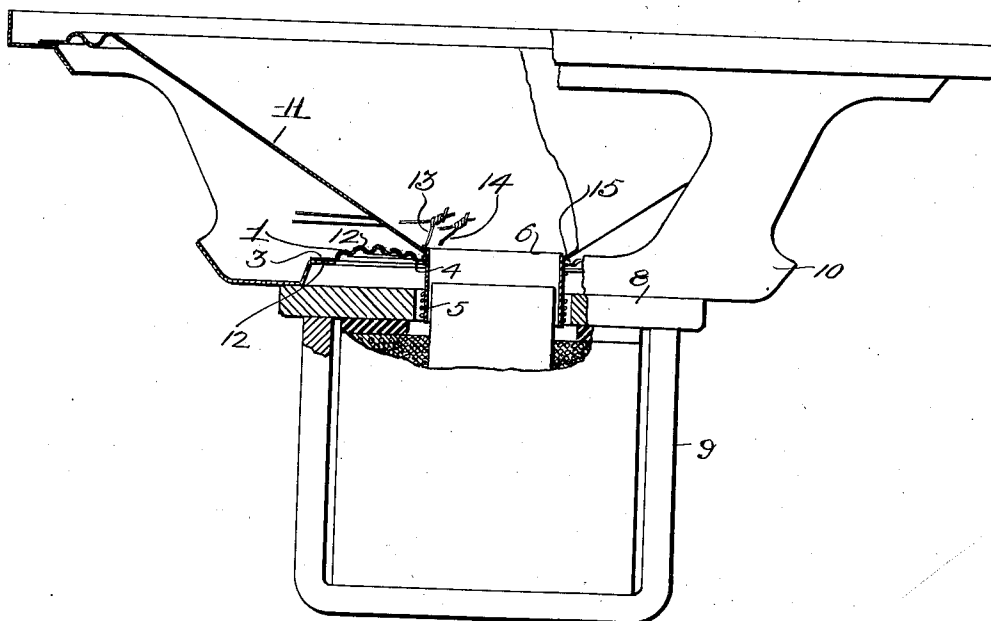


Fig. 2.

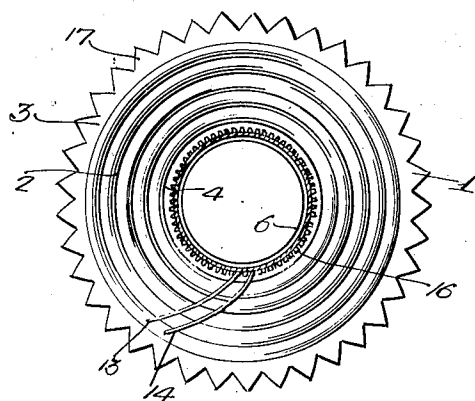
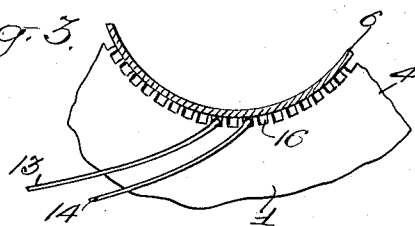


Fig. 3.



Inventor
Joseph A. Briggs
By *Howson & Howson*

UNITED STATES PATENT OFFICE

2,196,352

SOUND REPRODUCING DEVICE

Joseph A. Briggs, Erlton, N. J., assignor to Philco
Radio & Television Corporation, Philadelphia,
Pa., a corporation of Delaware

Application December 14, 1937, Serial No. 179,763

6 Claims. (Cl. 179—115.5)

This invention relates to new and useful improvements in sound reproducers and more particularly to a novel voice coil supporting and centering spider or diaphragm for sound reproducers or loud speaking devices of the electro-dynamic type.

In loudspeakers of the electro-dynamic type, the voice coil and the cylinder or former upon which it is wound are supported in the annular air gap of the electro-magnet structure for free and unrestricted longitudinal or axial movement in said gap and constitute an actuator for the speaker cone or diaphragm which is connected thereto. The voice coil and its cylinder are usually supported and centered within the air gap of the magnetic system by means of a diaphragm or spider of generally annular form through which the voice coil cylinder projects and to which it is secured by cement or glue. The opposite ends of the winding forming the voice coil are usually led upwardly along the exterior of the voice coil cylinder between the surface of the latter and the inner edge of the centering spider and speaker cone where they are connected respectively to lead wires which are led through the cone to energize the voice coil.

As above mentioned, the centering spider is secured at its inner edge to the outer surface of the voice coil cylinder by means of cement, glue or the like. This inner edge of the centering spider is generally truly circular and smooth, and the lead wires of the voice coil windings which pass between said edge and the outer surface of the said coil cylinder in more or less spaced relation cause a substantial gap or space to occur between that edge and the cylinder surface between and adjacent said wires with the result that when the cement or glue is deposited at the juncture of the cylinder and spider from above the latter, the adhesive material passes or flows through this gap or space downwardly along the exterior of the said cylinder and into the air gap between the core and pole of the magnetic system and prevents or interferes with free longitudinal or axial movement of the voice coil therein.

The outer periphery of the centering spider is usually secured by means of cement, glue or the like to a portion of the usual speaker cone supporting frame, and, as in the case of the inner edge of the spider, the outer peripheral edge thereof is usually truly circular and smooth with the result that the permanence of its connection to the frame is not as efficient as desired and

when a portion of the peripheral edge portion of the spider does break loose or become torn or unsecured from said speaker cone frame, there is a tendency for such break or disconnection to progress further around the periphery of the spider until it is of sufficient length to vibrate or buzz when the speaker is operated, and hence destroy the usefulness of the loudspeaker as a sound reproducing instrument.

With the foregoing observations in mind, the principal object of the invention is to provide an outside centering spider for electro-dynamic loudspeakers which is constructed and arranged at its inner edge to provide recesses for the reception of the voice current coil lead wires and at the same time provide a more secure, permanent connection between such spider and the voice coil cylinder while insuring against flow or passage of the cement or glue therebetween and along the surface of said cylinder into the air gap of the magnetic system.

Another object of the invention is to provide a centering spider of the character set forth which is constructed and arranged at its outer peripheral edge so as to provide a more secure, permanent connection thereof to the speaker cone frame and at the same time function to confine any detachment or loosening thereof from said speaker cone frame to relatively small portions or sections of its periphery or circumference.

These and other objects of the invention as well as the features and details of its construction and arrangement are hereinafter fully set forth and shown in the accompanying drawing in which:

Figure 1 is a longitudinal section axially through a radio loudspeaker provided with a voice coil centering spider made according to this invention.

Figure 2 is a view in plan of such a centering spider; and

Figure 3 is an enlarged fragmentary plan view of a portion of said spider illustrating certain details of the invention.

Referring now to the drawing, reference numeral 1 designates a voice coil centering spider of the usual annular or washer form composed of thin flexible material, such for example, as paper, Bakelite, cloth or other fibrous structure, and provided with concentric corrugations 2 between the peripheral portion 3 and the inner edge portion 4 thereof; the corrugated portion preferably having a radial cross-section of concavo-convex form in the direction of the speaker cone as more particularly described and claimed

in the copending application of Ingo L. Stephan, filed Dec. 14, 1937, Serial No. 179,748. As is customary, the voice coil 5 is wound upon a supporting cylinder 6 and supported by the centering spider 1 for free movement axially in the air gap provided between the core 7 and pole piece 8 of the electro-magnet 9. A frame or supporting structure 10 for the speaker cone or diaphragm 11 is secured to the magnet and its lower portion forms an annular support 12 for the outer peripheral portion 3 of the centering spider 1.

The cylinder 6 together with the lead wire portions 13 and 14 of the voice coil 5 projects through the central opening in the spider 1 as shown, and said cylinder 6 is secured to the inner edge of said spider by means of cement or glue deposited along the juncture thereof at the upper side of the spider as indicated at 15. In accordance with the invention, the inner edge of the spider is provided with a continuous series of relatively small serrations or recesses 16 as best illustrated in Figure 3 of the drawing. These serrations or recesses 16 are of such size and spacing relative to one another that when the spider 1 is passed over the cylinder 6 and lead wires 13 and 14, the latter will each naturally pass into or engage one of the said serrations or recesses 16 in the manner shown in said Figure 3. Also, the small projections afforded by the serrations 16 between adjacent recesses are sufficiently lacking in stiffness and body to permit the spider 1 to be passed over the coil cylinder 6 without distorting either said spider or said cylinder since the said projections are to some extent compressible or flexible and tend to adjust themselves to the surface configuration of said cylinder.

Moreover, I have found that whereas the glue or cement employed in affixing the spider to the voice coil cylinder would formerly leak past the spider at the point where the voice coil leads come through, by providing the serrations or small spaces at the inner edge of the spider and between it and the voice coil of sufficient size to accommodate said lead wires, the leakage of glue therethrough is prevented. Furthermore, the extended edge length thus provided by the serrations 16 affords an increased edge length for contact with the cement or glue with the result that a more secure, permanent connection is obtained between said spider and coil cylinder 6.

In addition to providing serrations or recesses 16 at the inner edge of the annular spider 1, a continuous series of pointed or saw-tooth-like serrations or projections of comparatively larger size is formed or provided in the outer peripheral portion 3 of said spider as indicated at 17 in Figure 2 of the drawing for the purpose of insuring a more secure connection of said peripheral portion 3 of the spider to the annular supporting portion 12 of the cone frame 10. The outer peripheral portion 3 of the spider 1 is secured to the upper surface of this annular supporting portion 12 of the cone frame 10 by means of cement or glue, a continuous layer or coating of which is first applied to such surface after which said peripheral portion 3 of the spider is pressed into contact therewith by means of a hot die or other implement.

By forming the peripheral portion 3 of the spider in this manner, the saw tooth-like projections 17 in said peripheral portion are pressed into or penetrate the layer of cement or glue causing the latter to be displaced upwardly be-

tween said projections and over the edge portions thereof with the result that the projections are interlocked or imbedded in the adhesive and thus provide a more permanent secure connection of the periphery of the spider to the supporting structure or portion 12. In addition to providing a more secure connection of the spider to the supporting portion 12 of the frame 10, the saw tooth-like projections 17 function to minimize the possibility of the entire spider or a substantial portion thereof becoming detached or loosened from said supporting structure 12. Should one or two of the projections be detached or torn loose from the supporting structure 12, the space or notch between adjacent projections 17 will confine such loosening of the periphery of the spider to those particular projections and prevent said spider from becoming detached or working loose progressively about its peripheral circumference.

The invention, of course, is not limited to the particular shape or relative size of the projections and serrations illustrated. Furthermore, said projections and serrations may be eliminated from one or the other edge portion of the spider as desired or as may be practicable for a particular speaker construction, and while these features have been herein illustrated and described with particularity and in detail, changes and modifications may, from time to time, be embodied or incorporated within the scope of the annexed claims.

I claim:

1. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a device for supporting and centering said current coil in said air gap comprising a thin flexible element of substantially annular form having its inner edge serrated to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively compressible and sufficiently lacking in stiffness so that said voice coil centering device and the voice coil will adjust themselves to the surface configuration of each other without the distortion of either.

2. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a voice coil supporting and centering device comprising a thin flexible element of substantially annular form having a serrated inner edge to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively compressible and sufficiently lacking in stiffness so that said voice coil centering device and the voice coil will adjust themselves to the surface configuration of each other without the distortion of either, and adhesive deposited continuously about the junction of the serrated inner edge of said element and voice coil cylinder at the upper side of the former to permanently secure the element and voice coil cylinder together.

3. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a voice coil supporting and centering device comprising a thin flexible element of substantially annular form having a serrated inner edge to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively com-

pressible and sufficiently compressible and sufficiently lacking in stiffness so that said voice coil centering device and the voice coil will adjust themselves to the surface configuration of each other without the distortion of either, a voice current coil wound on said cylinder and having its lead end portions extending between the cylinder and the inner edge of the element and disposed in predetermined recessed portions of said serrated edge, and adhesive deposited continuously about the junction of the serrated inner edge of said element and voice coil cylinder at the upper side of the former to permanently secure the element and voice coil cylinder together.

4. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a voice coil supporting and centering device comprising a thin flexible element of substantially annular form having a serrated inner edge to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively compressible and sufficiently lacking in stiffness so that said voice coil centering device and the voice coil will adjust themselves to the surface configuration of each other without the distortion of either, a voice current coil wound on said cylinder, and a support for the periphery of said element cemented to the under side thereof, said periphery of the element being also serrated so that the projections thus produced may be imbedded into the cement which will be displaced upwardly through the spaces therebetween and over the edges of said projections to interlockingly secure the periphery of the element to said supporting structure.

5. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a voice coil supporting and centering device comprising a thin flexible element of substantially annular form having a serrated inner edge to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively compressible and sufficiently lacking in stiffness so that said voice coil centering device and the

voice coil will adjust themselves to the surface configuration of each other without the distortion of either, a voice current coil wound on said cylinder and having its lead end portions extending between the cylinder and the inner edge of the element and disposed in predetermined recessed portions of said serrated edge, and a support for the periphery of said element cement to the under side thereof, said periphery of the element being also serrated so that the projections thus produced may be imbedded into the cement which will be displaced upwardly through the spaces therebetween and over the edges of said projections to interlockingly secure the periphery of the element to said supporting structure.

6. In a sound reproducing device having a voice current coil disposed in the air gap of a magnetic system, a voice coil supporting and centering device comprising a thin flexible element of substantially annular form having a serrated inner edge to provide a plurality of laterally extending projections which engage the voice current coil substantially perpendicular to its surface, said projections being relatively compressible and sufficiently compressible and sufficiently lacking in stiffness so that said voice coil centering device and the voice coil will adjust themselves to the surface configuration of each other without the distortion of either, a voice current coil wound on said cylinder and having its lead end portions extending between the cylinder and the inner edge of the element and disposed in predetermined recessed portions of said serrated edge, adhesive deposited continuously about the junction of the serrated inner edge of said element and voice coil cylinder at the upper side of the former to permanently secure the element and voice coil cylinder together, and a support for the periphery of said element cemented to the under side thereof, said periphery of the element being also serrated so that the projections thus produced may be imbedded into the cement which will be displaced upwardly through the spaces therebetween and over the edges of said projections to interlockingly secure the periphery of the element to said supporting structure.

JOSEPH A. BRIGGS.