May 22, 1934. H. V. KNAUF, JR 1,960,016

SOUND TRANSLATING DEVICE

Filed April 7, 1933

Fig.1.

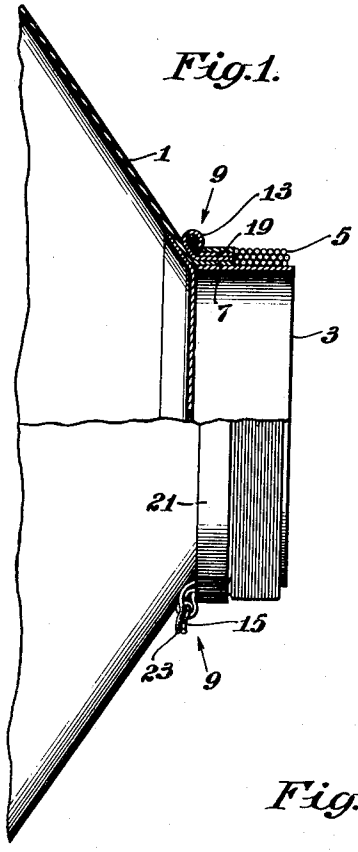


Fig.2.

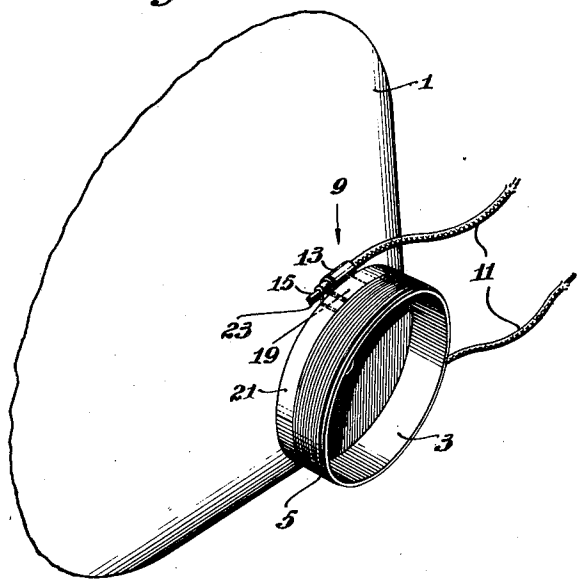


Fig.3.

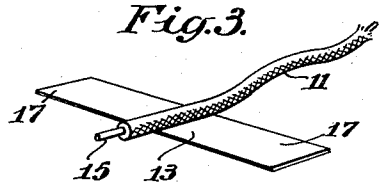


Fig.4.

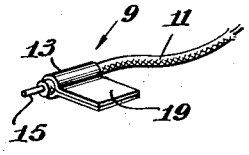


Fig.5.

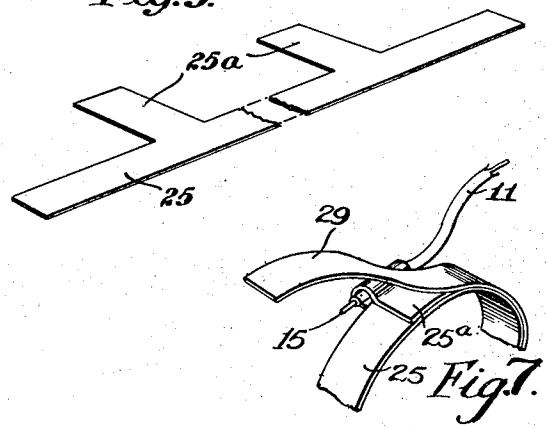
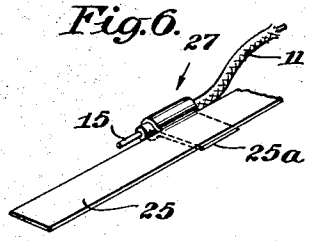


Fig.7.

Fig.6.



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1,960,016

SOUND TRANSLATING DEVICE

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Application April 7, 1933, Serial No. 664,853

9 Claims. (Cl. 179—115.5)

My invention relates to sound translating devices and particularly to dynamic loudspeakers of the type having a frusto-conical diaphragm with a moving voice coil mounted on the smaller end thereof. More specifically stated, my invention relates to improved and novel means for attaching external circuit conductors or leads for the voice coil to the vibratory sound producing structure of the above type of loudspeaker.

In dynamic loudspeaker design, considerable difficulty has been experienced in attaching the external circuit leads for the voice coil to the vibratory structure of the speaker in such a manner that they will be free from contact with the pole pieces of the speaker field and therefore offer minimum interference to the free movement and operation of the vibratory structure.

It is common practice to staple the ends of the external circuit conductors directly to the cone diaphragm and to bring the voice coil conductor out from the coil and along the cone to the stapled ends. In this arrangement the external circuit connections for the voice coil are located away from the field pole pieces, thus permitting the use of a voice coil form of minimum length, which is desirable. However, it is apparent that it is undesirable to puncture the cone as by stapling, and, also, that the attachment of conductors thereto will somewhat unbalance the cone and thus tend to impair its operating characteristics.

In another construction with which I am familiar the external circuit conductors are soldered to eyelet terminals on the voice coil form. Such an arrangement is satisfactory from the point of strength, but it is rather bulky and necessitates undesirable lengthening of the coil form in order that the connections will not come in contact with the field pole pieces.

From the above it will be seen that, although the connections for external circuit conductors to a voice coil may be made in a number of ways, such means as have previously been employed are generally unsatisfactory when viewed from the standpoints of simplicity, rugged construction, and their applicability to modern manufacturing methods.

It is, accordingly, an object of my invention to provide simplified and improved means for mounting external circuit conductors upon the voice coil form of a loudspeaker of the dynamic type.

A further and more specific object of my invention is to provide an improved method of, and means for, mounting external circuit conductors upon the voice coil form of a dynamic loudspeaker having a cone diaphragm, which means are independent of the diaphragm.

Another object of my invention is to provide improved means for mounting external circuit conductors upon the voice coil form of a loudspeaker of the type defined above, which means also serves the purpose of strengthening the union between the voice coil form and the diaphragm.

Still another object of my invention is to provide an improved external circuit conductor sub-assembly, and means for mounting the sub-assembly upon the voice coil form of a dynamic loudspeaker.

A further object of my invention is to provide improved means for mounting external circuit conductors upon the voice coil form of a loudspeaker, which means is free from the disadvantages of those of the prior art and is relatively inexpensive and adaptable to modern production methods.

In accordance with my invention, I provide a relatively narrow strip of parchment or similar material which is first primed with shellac or the like and allowed to dry. The strip is then looped, intermediate its ends, around the insulation of a conductor near an end thereof, and the free ends of the looped strip are cemented together to form a tab. A circumferential space substantially the width of the tab length is provided upon the voice coil form, between the voice coil and the cone diaphragm. The assembly of the strip and conductor is positioned upon the voice coil form with the conductor adjacent the cone diaphragm, and the tab lying within the circumferential space. For securing the assembly in fixed position upon the voice coil form, I provide a securing strip which encircles and is cemented to the voice coil form over the assembly tab ends.

In a modified form of my invention, the aforesaid strips, which are adapted to be looped around the conductors, are made integral with the securing strip which encircles and is cemented to the voice coil form.

The novel features which I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a

specific embodiment when read in connection with the accompanying drawing in which

Figure 1 is an enlarged, fragmentary view in side elevatiton, with a portion in section, of a dynamic type loudspeaker cone and a voice coil therefor, illustrating a preferred embodiment of my invention;

Fig. 2 is a fragmentary perspective view of the loudspeaker cone and voice coil illustrated in Fig. 1 with my invention applied thereto;

Fig. 3 is a perspective view illustrating a step in the preparation of a conductor prior to its attachment to the voice coil form of the loudspeaker cone;

Fig. 4 is a perspective view of a conductor sub-assembly prepared in accordance with my invention, for attachment to the voice coil form of a dynamic loudspeaker cone;

Fig. 5 is a perspective view of a modified form of my invention;

Fig. 6 is a fragmentary perspective view further illustrating the modified form of my invention shown in Fig. 5; and

Fig. 7 is a fragmentary perspective view illustrating another embodiment of my invention.

Referring now to the drawing, in which like numerals refer to like parts throughout, there is shown in Figs. 1 and 2, a frusto-conical diaphragm 1 of a dynamic type loudspeaker. Upon the smaller end of the diaphragm is mounted a cylindrical voice coil form 3 which extends a sufficient distance to the rear of the diaphragm to accommodate a voice coil 5 and to leave a narrow space thereon adjacent the cone.

Means for attaching the voice coil form 3 to the diaphragm 1 is provided in the form of a cylindrical extension 7 integral with and extending rearwardly of the diaphragm. The cylindrical extension encircles the end of the voice coil form which is not occupied by the voice coil and is cemented firmly thereto as clearly shown in Fig. 1.

After being attached thereto in the above described manner, the cylindrical extension 7 of the diaphragm may, for all purposes, be considered a part of the voice coil form 3.

Mounted upon the voice coil form are the external circuit conductor sub-assemblies designated generally by the reference numerals 9 and more fully hereinafter described.

Referring now to Figs. 3 and 4, the steps in the preparation of an external circuit conductor sub-assembly constructed in accordance with my invention will be described.

In Fig. 3 there is shown an insulated conductor 11 and a relatively narrow strip 13 of parchment or the like. Prior to the operations about to be described, the strip is primed preferably with shellac and allowed to dry.

An end of the conductor 11 is placed across the strip intermediate its ends, with the insulation of the conductor end projecting slightly over an edge of the strip. A bared end 15 of the conductor is provided for connection to the voice coil 15, as will be described later. When the conductor is thus placed, the strip is looped tightly around the conductor and the strip ends 17 are cemented together to form a tab 19, as clearly shown in Fig. 4.

To facilitate the above operations, I propose to have the strip 13 over-long. After the strip ends are cemented to form the tap 19, I propose to cut the tab to the desired length. This eliminates the necessity of placing the conductor exactly mid way of the ends of the strip in order that the tab formed from the strip ends will be of the proper length, which is substantially that of the width of the space on the coil form 3 between the voice coil 5 and the diaphragm 1.

In the above manner, I have provided the external circuit conductor sub-assembly 9, which is attached to the voice coil form and diaphragm assembly, in the manner about to be described.

The sub-assembly is positioned upon the voice coil form and diaphragm assembly with the tab occupying and cemented to the space between the voice coil and the cone, and the conductor adjacent the cone, as clearly shown in Figs. 1 and 2. In a like manner a second sub-assembly of the same construction is positioned substantially diametrically opposite the first assembly.

Means for retaining the sub-assemblies 9 in place, and also for strengthening the union between the diaphragm and the voice coil form is provided in the form of a securing strip 21 of parchment or the like. The strip 21 encircles and is cemented to the voice coil form over the cylindrical extension 7 of the diaphragm and the tabs 19 of the sub-assemblies. In this manner the sub-assemblies 9 are held firmly in place and the diaphragm is more securely fixed to the coil form. Also, the added thickness of the securing strip over the union between the diaphragm and the voice coil form provides additional strength at a point in the structure where breakage is likely to occur.

The ends of the voice coil conductor are brought out in any suitable manner, and soldered to the bared external circuit conductor ends 15. In Figs. 1 and 2 of the drawing I have shown one end 23 of the voice coil conductor 5 passing under the securing strip 21. Obviously, in this arrangement it is necessary to bring out and attach the voice coil conductor ends to the external circuit conductors prior to cementing the securing strip in place.

After the external circuit conductors are secured to the coil form in the manner described, and the connections made to the voice coil, I have found it desirable to shellac the exposed portions of the sub-assemblies and the edges of the securing strip at the points where they pass over the sub-assembly tabs. This has been found to satisfactorily prevent the access of air and moisture.

Reference is now had to Figs. 5 and 6 in which is shown a modified form of my invention.

In this form of my invention a securing strip 25, also of parchment, is provided with integral, laterally extending supplemental strips 25*a*. After the strip 25 is primed with shellac and allowed to dry, the supplemental strips 25*a* are looped around the external circuit conductors 11, respectively, and their free ends cemented to the underside of the securing strip, as shown clearly in Fig. 6. In this manner a sub-assembly 27 carrying external circuit conductors for the voice coil 5 is provided.

The sub-assembly 27 is then positioned and cemented upon the voice coil and cone assembly, with the supplemental strip ends 25*a* under the securing strip 25, and with the conductors and securing strip in substantially the same location as the conductors 11 and the strip 21 of the previously described form of my invention.

In this modified form of my invention it will be seen that there is but one thickness of material, i. e., the ends of the supplemental strips 25*a*, between the voice coil form and the securing strip 25. This is desirable in that it

allows the securing strip to more snugly encircle the voice coil form throughout its entire circumference, thus further eliminating the possibility of moisture, etc. from penetrating under the strip.

It is also within the scope of my invention to mount the securing strip 25 of the foregoing modified form of my invention with the ends of the supplemental strips 25*a* on the outer side of the securing strip as illustrated in Fig. 7. This arrangement will allow the securing strip to be in direct contact with the voice coil form throughout its entire circumference.

In the above described arrangement, a second securing strip 29 similar to the strip shown in Fig. 1 will encircle the first securing strip 25 and pass over the supplemental strip ends 25*a*, thus securing them in place and further strengthening the union between the voice coil form and the cone diaphragm.

Although, as described, I have found parchment or the like to be a suitable material for the construction of the strips 13, 21 and 25, it is to be understood that I am not to be restricted to the use of parchment in the practice of my invention, since it is obvious that many other materials may be utilized, such for example, as cloth or the like.

From the foregoing it will be seen that I have provided simple, durable, and light weight means which occupies a minimum of space, for making connection between external circuit conductors and the voice coil of a dynamic loudspeaker. Also, it will be seen that in providing the above means, the union between the voice coil form and the diaphragm of the loudspeaker has been materially strengthened.

Although I have shown and described certain embodiments of my invention, I am aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the appended claims.

I claim as my invention:

1. In a loudspeaker including a voice coil form, means for securing a conductor to said form, said means comprising a strip looped around said conductor and having a free end extending laterally therefrom, and means for securing said free end to said form.

2. The invention as set forth in claim 1 characterized in that said means for securing said free end to said form comprises a securing strip encircling said form and binding said free end to said form.

3. In a loudspeaker including a voice coil form, means for securing a conductor to said form, said means comprising a strip looped intermediate its ends around said conductor, and a securing strip encircling said form and binding said strip ends to said form.

4. In a loudspeaker including a voice coil form, means for securing a conductor to said form, said means including a parchment strip looped intermediate its ends around said conductor, said ends being adhesively secured together to form a tab extending laterally of said conductor, and a securing strip encircling said form and binding said tab to said form.

5. In a loudspeaker including a diaphragm provided with a cylindrical extension and a voice coil form extending within said extension, means for securing a conductor to said extension, said means including a strip looped intermediate its ends around said conductor, and unitary means for securing said strip ends and also said voice coil form to said cylindrical extension.

6. The invention as set forth in claim 5 characterized in that said unitary means for securing both said strip ends and said voice coil form to said cylindrical extension comprises a retaining strip encircling said cylindrical extension and binding said strip ends thereto.

7. In a loudspeaker including a voice coil form, means for securing a conductor to said form, said means comprising a securing strip having integral supplemental strip portions passing laterally around said conductors, respectively, and under said securing strip, said securing strip encircling and cemented to said form over the ends of said supplemental strip portions.

8. In a loudspeaker including a voice coil form, means for securing conductors to said form, said means comprising a securing strip having integral supplemental strip portions passing laterally around said conductors, respectively, and over said securing strip, said securing strip encircling said form, and a second securing strip encircling said first securing strip over the ends of said supplemental strips.

9. In a loudspeaker including a diaphragm having a cylindrical extension and a voice coil form having an end threof extending within said cylindrical extension, unitary means for securing conductors and said voice coil form to said extension, said means comprising a securing strip having integral supplemental strips passing around said conductors, respectively, and under said securing strip, said securing strip encircling said cylindrical extension over the ends of said supplemental strips.

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