July 12, 1938. F. MASSA 2,123,633

SIGNAL TRANSLATING APPARATUS

Filed Dec. 31, 1936

FIG. 1.

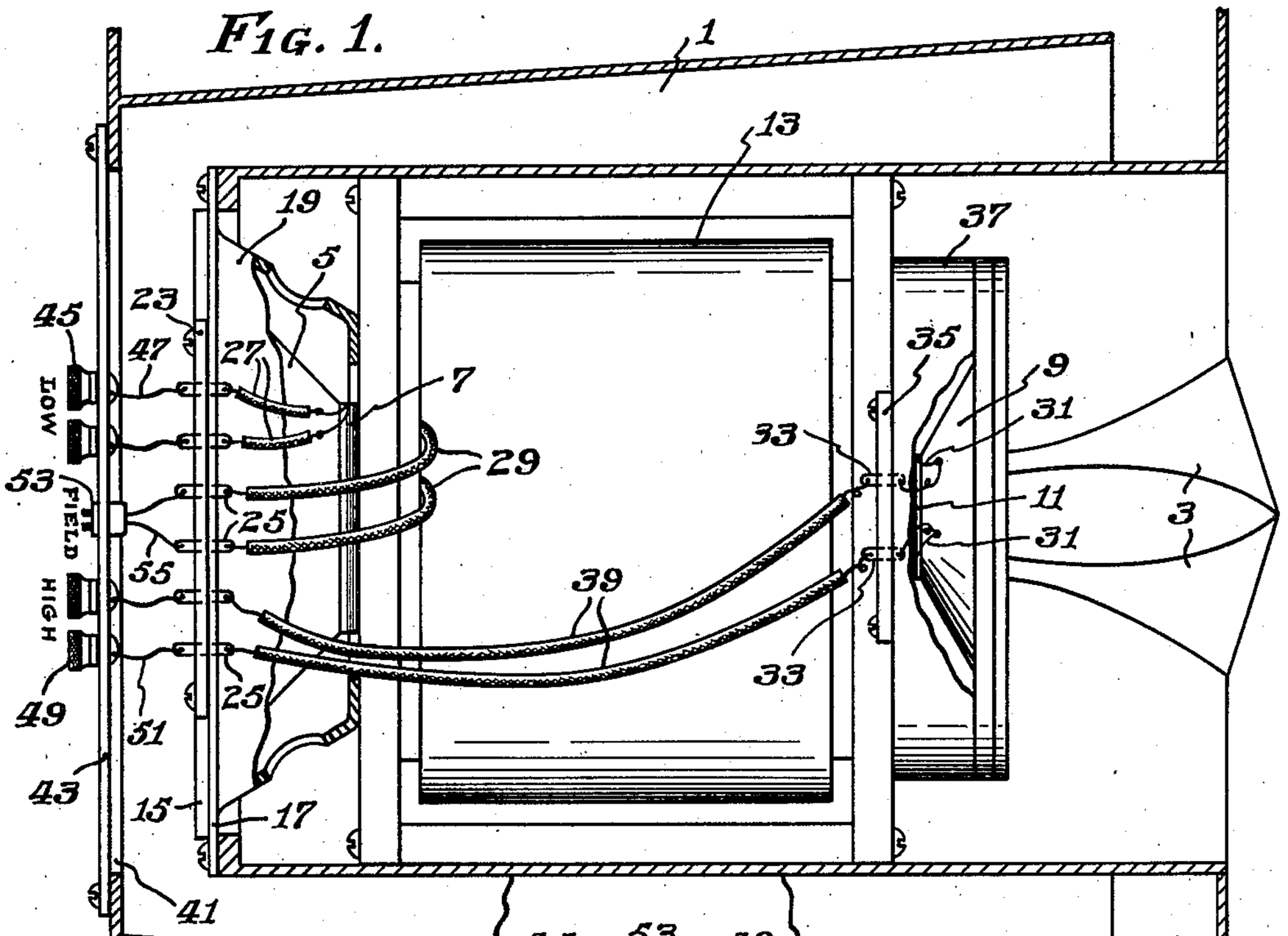
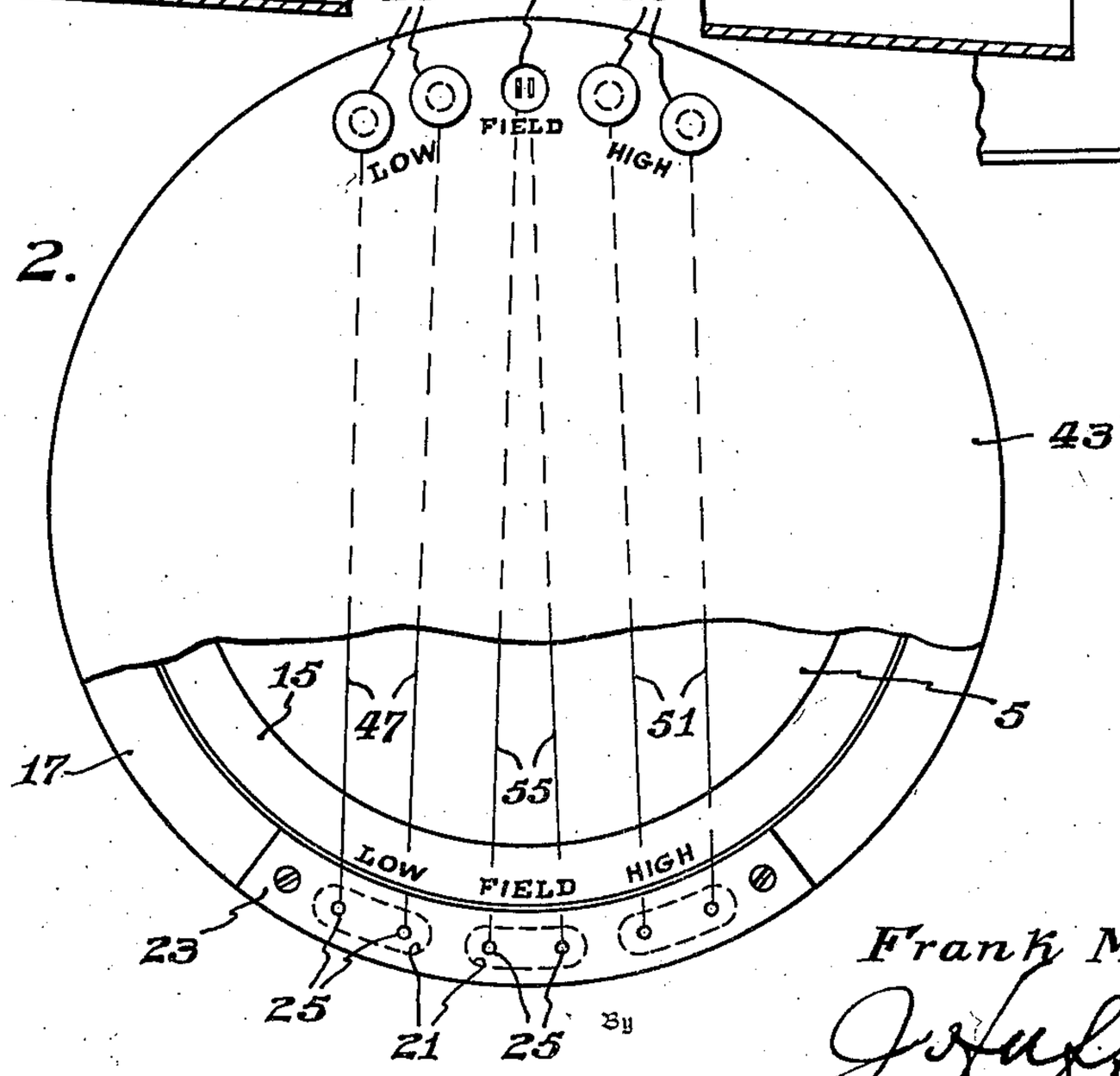


FIG. 2.



Inventor
Frank Massa

By

Attorneu

Patented July 12, 1938

2,123,633

UNITED STATES PATENT OFFICE

2,123,633

SIGNAL TRANSLATING APPARATUS

Frank Massa, West Collingswood, N. J., assignor to Radio Corporation of America, a corporation of Delaware

Application December 31, 1936, Serial No. 118,634

10 Claims. (Cl. 179—115.5)

This invention relates to signal translating apparatus, and especially to loudspeakers of the electrodynamic type, the present invention being particularly applicable to horn loudspeakers of the type shown and described in my copending application, Serial No. 113,475.

In said copending application, I have disclosed a compound horn loudspeaker driven by two electrodynamic drivers having a common field structure, one of the drivers being particularly suited for low frequencies and feeding into a folded, low frequency horn, and the other driver being particularly suited for high frequencies and feeding into a straight-axis, high frequency horn. Both driving units, including their separate voice coils and their common field coil, are housed entirely within the horn structure, and the leads from the several coils must, obviously, be brought out in some way to permit making connection thereto.

The primary object of my present invention is to provide an improved means whereby connection may be conveniently made to the several coils of a horn loudspeaker system of the type described.

More specifically, it is an object of my invention to so arrange the leads of the field and voice coils of horn loudspeakers generally that external connection thereto may be readily made.

Another object of my invention is to provide an improved arrangement of the type set forth which will in no way impair the efficiency of the loudspeaker system.

It is also an object of my invention to provide an improved arrangement as aforesaid which is simple and durable in construction, which can readily be installed by even an unskilled worker, and which is efficient in use.

In accordance with my present invention, I connect the leads of both voice coils and the field coil to terminal elements on an insulated block or strip mounted on the outer periphery of the frame member of one of the diaphragms, preferably the large, low frequency diaphragm. Flexible leads connect the terminal elements on the insulated strip with suitable plugs or binding posts on the back of the large horn, and the several coils may be connected to external circuits by means of these plugs or binding posts.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, together with additional objects and advantages thereof, will best be understood from the following description of one embodiment thereof, when read in connection with the accompanying drawing, in which

Figure 1 is a view partly in plan and partly in section showing the arrangement of the driving units within a compound horn loudspeaker of the type previously described, and illustrating, also, one way of bringing out the several coil leads according to my present invention, and

Figure 2 is a fragmentary rear elevation of the loudspeaker assembly showing the input connections therefor and the coupling leads between said input connections and the terminal elements on the insulated block.

Referring more specifically to the drawing, wherein similar reference characters indicate corresponding parts throughout, there is shown a compound horn loudspeaker of the type disclosed in my aforementioned copending application and comprising a folded, low frequency horn 1 and one or more straight-axis high frequency horns 3. The horn 1 is fed by a relatively large frusto-conical diaphragm or other suitable vibratile member 5 on the voice coil form of which is wound a voice coil 7, while the small horns 3 are fed by a small frusto-conical diaphragm 9 carrying a voice coil 11 thereon, the magnetic field in which the voice coils 7 and 11 operate being supplied by a single field coil 13, as more fully disclosed in my said copending application. Preferably, the driving unit for the horn 1 is designed to particularly reproduce the lower frequencies within the audio frequency range, while the driving unit for the horns 3 is designed to particularly reproduce the higher frequencies within this range, whereby the entire loudspeaker system is adapted to efficiently reproduce sounds over a wide range.

As will be clearly seen from Fig. 1, the two electrodynamic driving units described are housed entirely within the large horn 1, and in order to connect the voice coils 7 and 11 and the field coil 13 to suitable external circuits, it is necessary to bring out the leads from the several coils to points which are easily accessible from outside the horn structure. For this purpose, use may advantageously be made of the frame or supporting structure which supports either of the diaphragms 5 or 9, and by way of illustration, I have selected the supporting frame for the large diaphragm 5.

The diaphragm 5 is clamped at its periphery between a ring 15 and the flange 17 of a suitable metallic supporting frame 19, such as the conventional "dish-pan", the flange 17 being of larger diameter than the diaphragm 5 so that

it extends beyond the peripheral edge of the diaphragm 5. At some convenient location thereon, the flange 17 is provided with a plurality of circumferentially spaced openings 21 over which is mounted an insulated terminal block or strip 23 which may be fixed to the flange 17 in any suitable manner, the strip 23 being preferably mounted on the front surface of the flange 17 and the coils 7, 9 and 13 being located to the rear of the flange 17, as viewed in Fig. 2. The terminal strip 23 is provided with several sets of terminal elements 25, such as metallic pins, which extend therethrough and which are, of course, electrically insulated from each other, since they are mounted on the insulated strip 23 in spaced relation, the pins 25 serving as terminal elements for the several coil leads. Thus, the leads 27 from the voice coil 7 may be directly connected to one set of pins 25 and the leads 29 from the field coil 13 may be directly connected to another set of pins 25, as clearly shown in Fig. 1, and the leads 31 from the voice coil 11 may also be directly connected to the third set of pins 25, if desired. In some cases, however, it may not be convenient to connect the leads 31 directly to a set of pins 25, and in such cases, the leads 31 may be connected to one end of a set of pins 33 or the like on an insulated strip 35 which is carried by the supporting structure 37 for the diaphragm 9, and the opposite ends of the pins 33 connected to the third set of terminal pins 25 by a pair of leads 39.

The horn 1 is provided with an opening 41 in its rear wall through which the electrodynamic driving units heretofore described may be inserted prior to being mounted therein, and a cover plate 43 is secured to the horn 1 over the opening 41. Mounted on the cover plate 43 are three sets of suitable input terminals by means of which suitable external circuits may be connected to the several coils of the loudspeaker. These input terminals may, for example, comprise a pair of binding posts 45 marked "Low" which are connected by a pair of leads 47 to the pins 25 having connection with the voice coil 7, a second pair of binding posts 49 marked "High" and connected by a pair of leads 51 to the pins 25 having connection with the voice coil 11, and a plug 53 marked "Field", which is connected by a pair of leads 55 to the pins 25 having connection with the field coil 13. The binding posts 45 and 49 and the plug 53 thus constitute convenient means for easily making connection to the voice coils 7 and 11 and the field coil 13.

Although I have shown and described but one embodiment of my invention, it will be readily apparent to those skilled in the art that many other modifications thereof are possible. For example, the supporting frame 19 may itself be formed of insulating material, in which case the insulated strip 23 may be dispensed with. Also, if desired, the leads from the several coils may all be connected to terminal elements on the insulated strip 35 instead of the strip 23, and the input terminals 45, 49 and 53 may be mounted on the side, bottom or top of the horn 1 instead of on the back wall thereof, or in any other suitable location thereon. Many other changes will, no doubt, also readily suggest themselves and I therefore desire that my invention shall not be limited except insofar as is made necessary by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In an electrodynamic loudspeaker, the combination of a diaphragm, a frame supporting said diaphragm at its periphery, said frame being of greater diameter than said diaphragm whereby to provide an annular flange beyond the peripheral edge of said diaphragm, an insulated terminal strip mounted on said flange, electrically conductive terminal elements fixed to said strip in electrically insulated relation, a voice coil carried by said diaphragm, and a field coil associated with said voice coil, said voice coil and said field coil each having leads connected to said terminal elements.

2. In an electrodynamic loudspeaker, the combination of a diaphragm, a metallic frame supporting said diaphragm at its periphery, said frame being of greater diameter than said diaphragm whereby to provide an annular flange beyond the peripheral edge of said diaphragm, said flange having a plurality of openings therein, an insulated terminal strip mounted on said flange over said openings, electrically conductive terminal elements fixed to said strip in electrically insulated relation, said elements passing through said openings, a voice coil carried by said diaphragm, and a field coil associated with said voice coil, said voice coil and said field coil each having leads connected to said terminal elements.

3. The invention set forth in claim 2 characterized in that said coils are located on one side of said flange and said terminal strip is located on the opposite side of said flange, and characterized further in that said terminal elements extend through said strip whereby connection may be made thereto on either side of said flange.

4. The invention set forth in claim 2 characterized in that said coils are located at the rear of said flange and said terminal strip is mounted on the front of said flange, characterized further in that said terminal elements extend through said strip, and characterized still further in that said leads are connected to the rear ends of said terminal elements.

5. The invention set forth in claim 2 characterized by the addition of a housing in which the structure set forth in claim 2 is housed, and a plurality of input terminals on said housing, said terminal elements being connected to said input terminals.

6. The invention set forth in claim 2 characterized by the addition of a housing in which the structure set forth in claim 2 is housed, and a plurality of input terminals on said housing, characterized further in that said coils are located on one side of said flange and said terminal strip is located on the opposite side of said flange, and characterized still further in that said terminal elements extend through said strip, said coil leads being connected to the adjacent ends of said terminal elements, and the opposite ends of said terminal elements being connected to said input terminals.

7. In a loudspeaker system, a plurality of electrodynamic units each having a diaphragm and each diaphragm being provided with a voice coil, a single field coil common to all of said units, separate supporting devices for independently supporting each of said diaphragms, and a terminal strip on one of said supporting devices, each of said voice coils and said field coil having leads connected to said terminal strip.

8. In a compound horn loudspeaker, a pair of horns, a pair of driving units each including a

diaphragm and an associated voice coil, one of said units being arranged to feed into one of said horns and the other of said units being arranged to feed into the other of said horns, a single field coil common to both of said units, separate supporting devices for independently supporting each of said diaphragms, an insulated terminal strip on only one of said supporting devices, and terminal elements carried by said strip in electrically insulated relation, said voice coils and said field coil all having leads connected to said terminal elements.

9. The invention set forth in claim 8 characterized in that one of said units is relatively large and particularly adapted to reproduce low frequencies, while the other of said units is relatively small and particularly adapted to reproduce high frequencies, and characterized further in that said insulated strip is mounted on the diaphragm supporting device of said large unit.

10. The invention set forth in claim 8 characterized in that said units are housed entirely within one of said horns, and characterized further by the addition of a plurality of input terminals on said horn, said terminal elements being connected to said input terminals.

FRANK MASSA.