

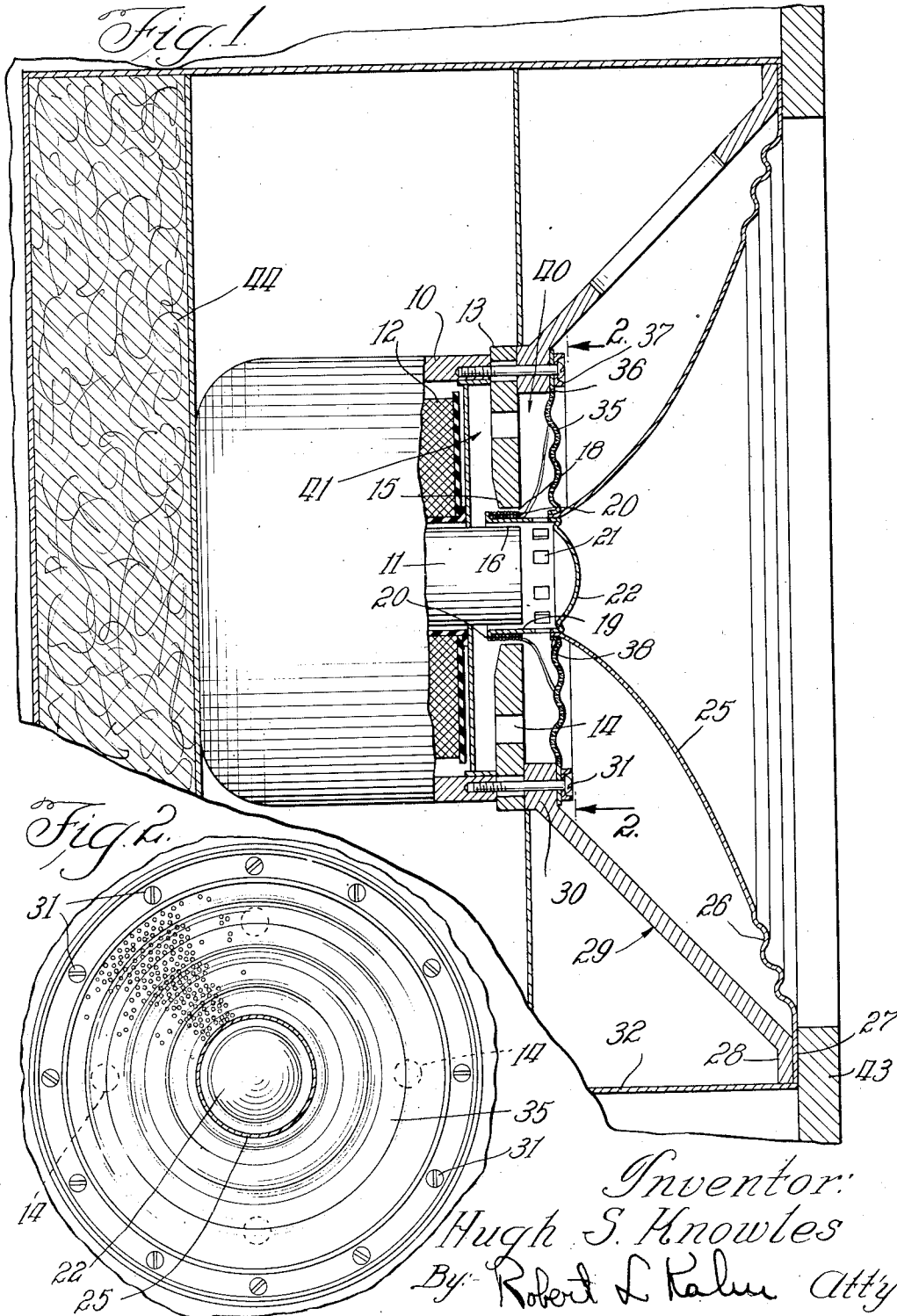
May 10, 1949.

H. S. KNOWLES

2,469,773

LOUD-SPEAKER DIAPHRAGM SUPPORT MEMBER

Original Filed June 4, 1934



UNITED STATES PATENT OFFICE

2,469,773

LOUD-SPEAKER DIAPHRAGM SUPPORT
MEMBERHugh S. Knowles, River Forest, Ill., assignor to
Jensen Manufacturing Company, a corporation
of NevadaOriginal application June 4, 1934, Serial No.
728,993. Divided and this application August
12, 1942, Serial No. 454,527

7 Claims. (Cl. 181—31)

1

This invention relates to a loud speaker and is a division of my application Serial No. 728,993, filed June 4, 1934, now Patent No. 2,295,483, dated September 8, 1942. In particular this invention relates to a combined centering and air filtering member for the bobbin and diaphragm assembly of an electrodynamic type of speaker having a moving voice coil or armature disposed in an annular gap in the magnetic circuit. As is well known, there is a tendency for any para magnetic particles suspended or moving in the fluid in which the unit operates to be drawn into this gap. Inasmuch as this gap is of relatively small area the presence of such particles in the gap disturbs the electrical and mechanical relationship of the movable parts and interferes with the effective operation of the speaker.

An advantage secured by the present improvement is the provision of a centering member for the inner end of a generally conical diaphragm assembly, which centering member is formed to function as a filter or screen excluding dust particles while allowing air to filter through.

Referring now to the drawing, Figure 1 shows a sectional elevation of a unit embodying this invention; Figure 2 is a section on line 2—2 of Figure 1.

The construction comprises a pot 10 provided in the center with a core 11 both of magnetizable material such as soft iron or steel. Surrounding core 11 and disposed inside pot 10 is a magnetizing coil 12. Pot 10 is adapted to be closed by a cover plate 13 having a plurality of apertures 14 and whose inner edge portion 15 cooperates with portion 16 of the core to form pole pieces between which is an annular air gap 18. Cover plate 13 and pot 10 are of magnetizable material such as soft iron or steel so that upon energization of magnetizing coil 12 an intense magnetic field will be created within air gap 18.

Disposed within air gap 18 is a bobbin 19 of any suitable material such as fiber upon which is disposed a voice coil 20, having suitable leads for connection to a source of voice currents. Bobbin 19 is preferably provided with a series of apertures 21 disposed around it of such number and area as to permit movement of substantial quantities of air therethrough. The free end of bobbin 19 is preferably closed by a generally conical dome shaped cap 22 which may be formed of light thin metal such as aluminum or copper or may be formed of thin fiber. The voice coil and bobbin are so proportioned as to move lengthwise within air gap 18 in the manner customary with such type of speakers.

2

Attached to bobbin 19 at the end thereof is a generally conical diaphragm 25 of any suitable material. This diaphragm may have the outer edge provided with annular corrugations 26 if desired. The diaphragm itself is formed of any suitable material such as stiffened paper, metal, phenolic impregnated cloth or any other material and has the outer end 27 thereof rigidly clamped by an annular flanged mounting portion 28 of a diaphragm housing 29. Housing 29 is provided with a mounting flange 30 suitably apertured to accommodate bolts 31 to maintain pot 10, front plate 13 and housing 29 rigidly in predetermined adjusted position. The entire speaker may be mounted by bolting annular flange mounting portion 28 to any suitable baffle 32 in a manner well known in the art. Other methods of support are possible.

In accordance with the present invention, in order to center the small end of diaphragm 25 and bobbin 19 within air gap 18, a flexible centering member 35 is provided. Centering member 35 may have the outer edge portion 36 firmly clamped in position and as shown here is firmly fastened to inner flanged portion 30 of housing 29. In order to securely fasten centering member 35, a rigid ring 37 suitably apertured to accommodate bolts 31 may be disposed outside of the centering member. In this way, centering member 35 may be firmly and tightly clamped in position.

Centering member 35 has inner edge portion 38 securely fastened to the bobbin and diaphragm assembly 19 and 25. The fastening may be effected in any way such as by cementing. The centering member may be physically attached either to the bobbin or to the diaphragm structure near the bobbin, the choice being one of convenience in manufacture. It is a unitary element consisting only of a single thickness sheet. Centering member 35 is porous and may be formed of fibrous material such as paper or cloth which has been impregnated with a stiffening agent, such as lacquer, varnish, phenolic compound or other substance which increases the strength and stiffness to a desired degree. Thereafter it may be perforated if the material itself as fabricated is not sufficiently porous to act as a filter or screen. It is understood of course that the air flow impedance of the porous centering member may be relied upon to function as one of the determinants of the characteristics of the entire speaker.

Between centering member 35 and top plate 13 an annular chamber 40 is created whose volume

3

normally is varied during voice coil travel. In order to reduce the effective or fractional volume variations to a minimum, apertures 14 in top plate 13 are provided so that the effective volume behind centering member 35 consists of chamber 40 and the additional chamber 41 in back of front plate 13. Obviously, the smaller the volume variations due to voice coil movement the less is the quantity of air passing through porous centering member 35, this being the sole air venting means. Hence the requisite porosity of member 35 will be dependent upon volume variations.

In order to increase the axial compliance of member 35, corrugations as shown may be formed in the member, and to prevent any resonance effects such corrugations may be irregular and eccentric.

The entire speaker may be mounted in a suitable cabinet 43 of any suitable material. The back of the cabinet may either be open or closed with any suitable material and as shown here is closed with a sound absorbing material 44. Another mounting for the speaker is shown in Figure 1 of the parent application previously referred to of which this is a division.

What is claimed is:

1. A member for holding the diaphragm assembly of a loud speaker in a centered position consisting of a single sheet of material having a substantially central opening to receive a diaphragm assembly and having distributed perforations therein of such size and number as to permit air to pass through them while preventing the passage of dust particles through them.

2. A member for holding a diaphragm assembly as set forth in claim 1 in which the sheet is of thin inherently porous material.

3. A member for holding a diaphragm assembly as set forth in claim 1, in which the sheet is porous and is impregnated with a stiffening agent.

4. A member for holding a diaphragm assembly as set forth in claim 1 in which the sheet

4

is inherently porous and is of a porous material impregnated with a stiffening agent.

5. A member for holding a diaphragm assembly as set forth in claim 1 in which the sheet is inherently porous and is of porous material impregnated with a phenolic resin compound.

6. A member for holding a diaphragm assembly as set forth in claim 1 in which the sheet is of porous material impregnated with a stiffening agent and thereafter perforated.

7. A combined air filtering and centering member for the bobbin and diaphragm assembly of a loud speaker comprising a single sheet of flexible material having a substantially central opening to receive said assembly at the bobbin end thereof, said sheet having distributed perforations therein to permit air to pass there-through while preventing the passage of dust particles, said sheet being impregnated with a stiffening agent whereby to provide an axially compliant centering support for the diaphragm.

HUGH S. KNOWLES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,284,222	Bliss	Nov. 12, 1918
1,831,235	Barrow	Nov. 10, 1931
1,886,816	Jensen	Nov. 8, 1932
1,877,294	George	Sept. 13, 1932
1,893,049	Baudette	Jan. 3, 1933
1,997,051	Engholm	Apr. 9, 1935
2,002,190	Round	May 21, 1935
2,090,025	Brennan	Aug. 17, 1937
2,261,110	Engholm	Nov. 4, 1941
2,261,111	Engholm	Nov. 4, 1941

FOREIGN PATENTS

Number	Country	Date
351,204	Great Britain	June 25, 1931