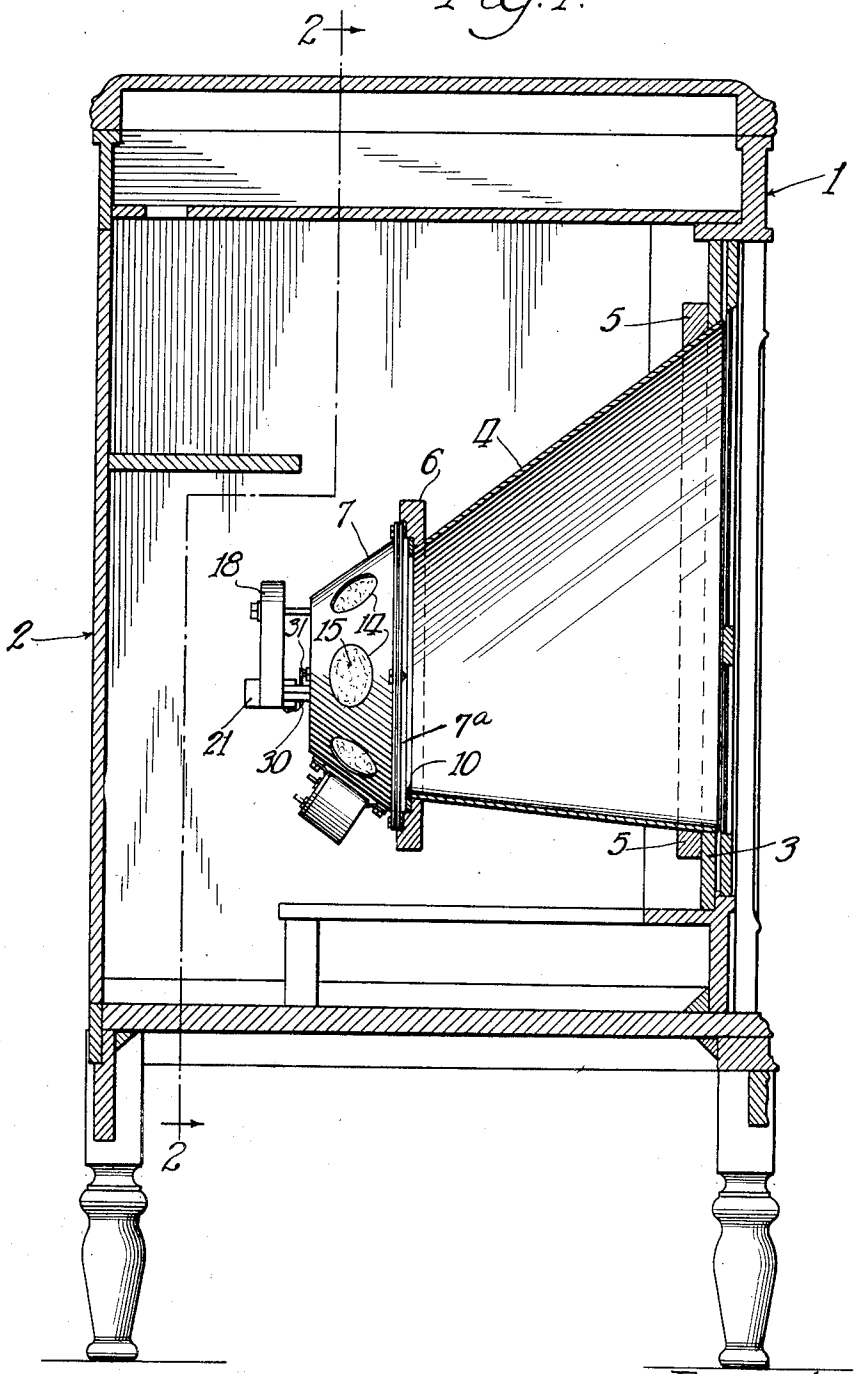
Sept. 12, 1933. K. R. SMITH 1,926,820

SOUND REPRODUCING DEVICE

Filed Nov. 28, 1927 3 Sheets-Sheet 1

Fig. 1.



Inventor
Robert R. Smith.
by James P. Shea Atty.

Sept. 12, 1933. K. R. SMITH 1,926,820

SOUND REPRODUCING DEVICE

Filed Nov. 28, 1927 3 Sheets-Sheet 2

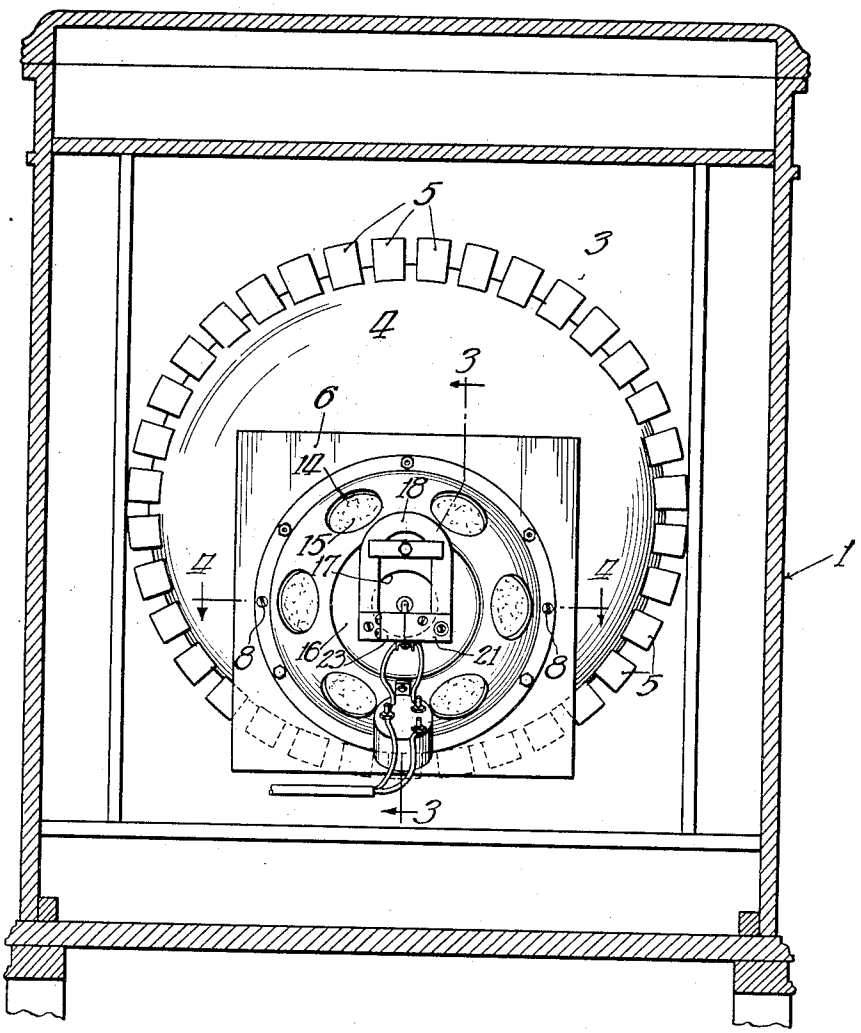


Fig. 2.

Inventor
Robert R. Smith
by James P. Shea
Atty

Sept. 12, 1933. K. R. SMITH 1,926,820

SOUND REPRODUCING DEVICE

Filed Nov. 28, 1927 3 Sheets-Sheet 3

Fig. 3.

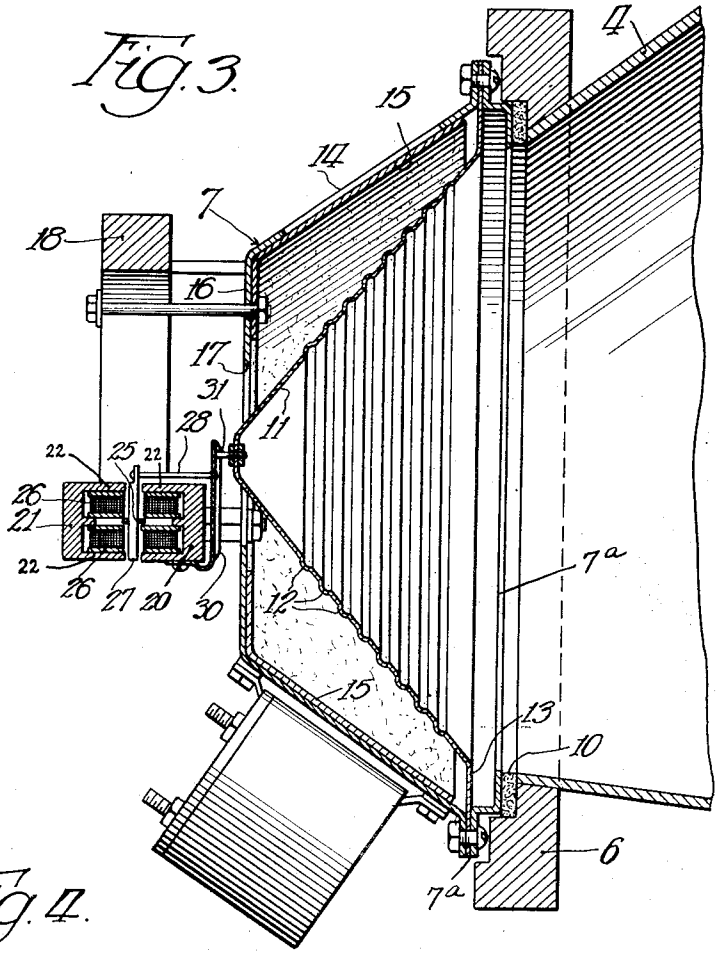
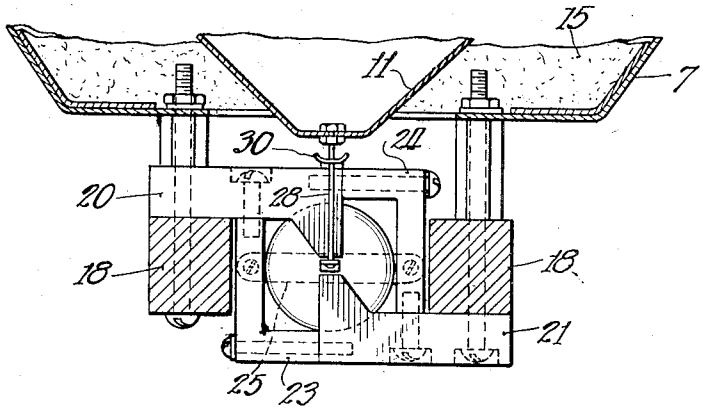


Fig. 4.



Inventor
Robert R. Smith
by James A. Shea
Atty.

Patented Sept. 12, 1933 1,926,820

UNITED STATES PATENT OFFICE

1,926,820

SOUND REPRODUCING DEVICE

Kobert R. Smith, Chicago, Ill., assignor, by mesne assignments, to United Research Corporation, Long Island City, N. Y., a corporation of Delaware

Application November 28, 1927
Serial No. 236,286

10 Claims. (Cl. 181—31)

My invention relates to sound reproducing devices, and more particularly to those known in the radio art as loud speakers.

One object of my invention is to couple a conical diaphragm of the type used heretofore for acting directly on the air independently of a horn, with an acoustic horn for perfecting the reproduction by said diaphragm.

Another object of my invention is to provide a device of the type described, with a baffle for preventing vibrations at the mouth of the horn from traveling to the rear face of the diaphragm and impairing the reproduction.

Other objects and advantages will appear as the description proceeds.

Referring now to the drawings, forming a part of this specification:

Fig. 1 represents a vertical sectional view of a phonograph cabinet in which my device is mounted, certain parts being shown in elevation;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2, and

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2.

In the illustrated embodiment of the invention, a cabinet 1 has sides, a rear wall 2, and a front wall or baffle board 3 provided with an opening. A horn 4 within the cabinet is secured to the front wall by means of a series of blocks 5 glued to the horn and the front wall, and has its mouth in registry with the opening therein.

A frame 6 is secured to the small end of the horn, and a casing 7 is secured to the frame 6 by means of bolts 8, a ring 10 of damping material such as felt being interposed between the casing and the frame.

A conical diaphragm 11 having corrugations 12 therein, and a flexible base 13 is secured at its periphery to the casing by suitable means such as an annular clamping ring 7*a* shown in elevation in Figure 1 and in section in Figure 3. The casing has conical side walls in which openings 14 are provided and is lined by a layer 15 of damping material such as felt, for damping undesirable vibrations. The casing is also provided with a flat end 16 having an opening 17 therein to permit the diaphragm to be coupled to a driving unit.

The driving unit comprises a permanent magnet, including a U shaped member 18 and a pair of terminal members 20 and 21 which are secured thereto, the entire magnet being supported on the casing.

Each of the terminal members is divided at its ends to provide a pair of spaced parallel fingers 22, the fingers of one terminal member being adjacent to, and opposite those of the other terminal member. A pair of L shaped retaining pieces 23 and 24 of non-magnetic material are secured to the terminal members and have mounted thereon a spring 25 which is interposed between a pair of coils 26. An armature 27 is supported by the spring 25 with its ends between the oppositely disposed ends of the fingers 22, and is connected by a rod 28 to a spring damper 30. The damper is bent at one end and secured to the terminal member 20, and at its other end, is secured to the diaphragm by means of a stud 31.

The driving unit operates on electro-magnetic principles well known in the art, but it will be noted particularly that the damper tends somewhat to eliminate resonances within the diaphragm, as it offers a slight resistance to the movement thereof.

In an actual model which was constructed embodying the invention, a combined conical diaphragm and driving unit were used, of a type that has heretofore been used for acting directly on the air independently of a horn. The base of the conical portion of the diaphragm was approximately 7″ in diameter and the horn had a diameter at its small end of approximately 7″, which was approximately half the diameter at the large end and approximately half the length of the horn.

When the diaphragm and driving unit were used independently of the horn, the reproduction of lower notes was imperfect, but when coupled to the horn, the low notes were brought out with greatly enhanced distinctness and in fact, the reproduction generally was greatly improved. The combined cone and horn were tested together outside of the cabinet and within the cabinet as described, and it was established that the cabinet greatly improved the reproduction. This was due to the operation of the walls of the cabinet as baffles tending to prevent the vibrations emitted at the mouth of the horn from traveling to the rear face of the diaphragm where they would be out of phase with the movement of the diaphragm.

The invention is not limited to the specific details of construction illustrated and described, but diverse modifications are contemplated within the spirit of the invention. For instance, the horn may be altered as to shape and dimensions and the proportions of the conical diaphragm may be altered. A substantial range of equivalents is

contemplated within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. The combination of a conical diaphragm of the type for acting directly on the air independently of a horn, a horn coupled to said diaphragm, and a cabinet enclosing said horn and diaphragm, and having an opening in the front wall thereof, said horn being supported with its mouth in registry with said opening, the walls of said cabinet operating to prevent vibrations at the mouth of said horn from being transmitted to the rear face of said diaphragm.

2. A loud speaker comprising, a direct radiating diaphragm member, means for actuating said member, an acoustic horn having an inlet and a mouth, means for supporting said member at said inlet and a baffle member cooperating with the mouth of said horn.

3. In combination, a loud speaker cabinet having a front member adapted to act as a baffle, and having an opening therein, an acoustic horn cooperating with said baffle and mounted on said baffle, a direct radiating diaphragm member cooperating with said horn, and a driving unit for said diaphragm member.

4. In combination, a substantially closed cabinet having a front member adapted to act as a baffle and having an opening therein, an acoustic horn within said cabinet the mouth thereof cooperating with the opening in said front member, and substantially closing it, and a direct radiating diaphragm member cooperating with said horn.

5. In combination, a loud speaker device having a sound radiator adapted to the direct radiation of sound therefrom, a sound conduit cooperating therewith having an inlet of a diameter size substantially that of said radiator and a larger mouth, and a baffle member cooperating with said conduit.

6. In combination, a loud speaker device having a sound radiator adapted to the direct radiation of sound therefrom, a sound conduit cooperating therewith having an inlet of a diameter size substantially that of said radiator and a larger mouth, a baffle member cooperating with said conduit, and a cabinet therearound, said baffle forming a part of said cabinet.

7. In combination, a loud speaker comprising a direct radiating diaphragm, a frame therefor, a driving means therefor, an acoustic horn cooperating with said diaphragm and means for attaching said frame to said horn comprising vibration damping means therebetween.

8. In combination, a loud speaker comprising a direct radiating diaphragm, a frame therefor, a driving means therefor, an acoustic horn cooperating with said diaphragm and means for attaching said frame to said horn comprising vibration damping means therebetween, and a baffle member carrying said horn, and rigidly attached thereto.

9. A loud speaker comprising a cabinet, a horn therein, a diaphragm for the small end of said horn, a driving unit for said diaphragm, means for securing said driving unit to said horn and means for securing said horn to said cabinet.

10. The combination of a baffle having an opening, a horn, means for securing the large end of said horn in the opening in said baffle, a diaphragm for the small end of said horn, a driving unit for said diaphragm and means for securing said driving unit to the small end of said horn.

KOBERT R. SMITH.