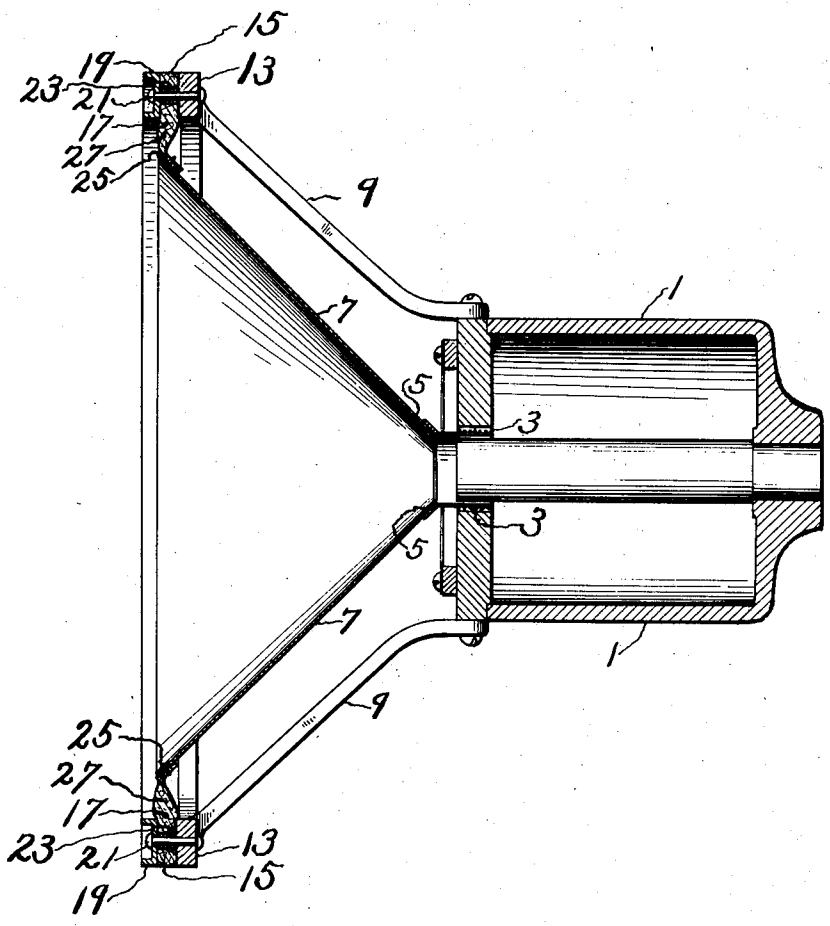
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LOUD SPEAKER CONE SUSPENSION

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LOUD SPEAKER CONE SUSPENSION

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12 Claims. (Cl. 181—31)

The object of this invention is to provide an improved form of damping for large size direct acting sound radiators. A more specific object is to provide such damping and suspension for the body of the paper cone in the conventional cone type of loud speaker, whereby the moving parts including the cone may be rendered comparatively dead beat, particularly at low frequencies.

Other objects may be found in the following detail description of a preferred embodiment of the invention and may be pointed out in the claims.

Specifically, one object of my invention is to provide a damping for the edge of a sound radiator composed of material in an extremely expanded state, extremely flexible, having high internal friction when bent and extremely small elasticity. Extremely soft felt is a good example of such material. Ordinary felt or flannel or sponge rubber on the other hand have too high a ratio of mass and elasticity to internal friction to be valuably effective.

Referring to the accompanying drawing:—

The figure is a diagrammatic vertical cross-section of one embodiment of my invention, showing a cone type loud speaker having my improved loud speaker cone suspension.

The numeral 1 indicates a conventional "dynamic" motor or driver provided with a conventional movable voice coil 3 conventionally mounted at the apex 5 of a paper cone 7 and suspended by a conventional centering spider. A conventional frame 9 is mounted on member 1 and terminates in a ring portion 13 at its left end where it supports the outer edge 15 of my improved suspension 17 which in this instance consists of a strip of soft felt bent in the form of a circle.

Member 17 is clamped between member 13 and a conventional washer 19 by means of rivets 21—21 passing through the several members 13, 15 and 19. Spacers 23—23 fix the amount of compression applied to member 15 between members 13 and 19 and thus facilitate uniformity of manufacture.

Member 17 tapers toward its inner edge 25 which is sewed and cemented securely to the base of the cone 7. The taper of the member 17 is preferably so proportioned that its inner edge 25 at the base of the cone 7 is as thin, flexible and light as practicable, so as to avoid interfering with high frequency vibrations of the cone 7.

By high frequency I mean those frequencies at or above, for instance, 512 cycles per second. By low frequency I mean those frequencies below 512 cycles per second.

The body portion 27 of member 17 may be designed so as to bring into action the internal friction quality of the felt to the best advantage so as to damp the motion of the cone 7 and the voice coil 3 at low frequencies.

Among important factors in the design of member 17, it may be noted that when the cone is in the indicated neutral position the fibres of the felt in the body portion designed for radial flexure 27 should be free from tension. Thus the effect of the improved suspension will be to impose damping friction between the fibres of the felt to control the low frequencies.

In most of the current loud speakers of conventional type a thin soft leather member under tension is used in place of my member 17. Such leather raises the natural period of the cone and voice coil assembly and thus places the fundamental resonant peak higher in the musical scale which makes it more tolerable. With my improved suspension I seek to smooth out the peak.

While I have described my improved suspension as being made of felt, other materials having similar physical properties may also be used.

Other positions on a paper cone than that described above may also be chosen for my felt member.

My improved felt or equivalent may be added to any ready to play loud speaker radiator to damp its response at peak frequencies in accordance with the progress of the art.

I claim:—

1. A suspension for the large end of a cone sound radiator including a stationary frame, a ring of thick, soft, substantially untensioned material supported at its outer edge in the frame, extending inwardly, decreasing in stiffness toward and connected to the edge at the cone.

2. A loud speaker including a frame, a cone sound radiator, a driver in the frame and attached to the apex of the cone, and a yielding support for the base of the cone consisting of thick, soft material having a high degree of internal friction, mounted on the frame, extending unsupported and decreasing in stiffness toward the cone and attached thereto at the more flexible edge.

3. A loud speaker including a frame, a direct acting sound radiator provided with a substantially continuous fibrous damping means at the edge thereof; said damping means extending unsupported from the frame toward the center

of the radiator and being capable of radial flexure whereby damping may be effected.

4. A loud speaker including a frame, a direct acting sound radiator provided with a substantially continuous damping means of material inherently diffused and porous in both its natural and finished states at the edge thereof; said edge being continuous, said damping means extending toward the center of the radiator, and being capable of radial flexure whereby damping may be effected.

5. A vibratory loud speaker radiator of direct acting size including an outer edge said edge being continuous, and front and rear surfaces, a member of extremely soft damping material, in an expanded and porous state, at a surface, near the edge, coupled to the radiator and substantially free from initial tension to avoid radial compression of the edge thereof and a stationary frame substantially surrounding the radiator and member.

6. A vibratory loud speaker radiator of direct acting size including an outer edge, said edge being continuous, and front and rear surfaces, a member of extremely soft fibrous damping material, in an expanded and porous state at a surface, near the edge, coupled to the radiator to avoid radial compression of the edge thereof and a stationary frame substantially surrounding the radiator and member.

7. A vibratory loud speaker radiator of direct acting size including an outer edge said edge being continuous, and front and rear surfaces, a member of extremely soft damping material, in an expanded and porous state, tapered in stiffness toward the centre of the radiator and substantially free from initial tension, coupled to the radiator and a stationary frame substantially surrounding the radiator and member.

8. A loud speaker including a frame and a direct acting sound radiator provided with a substantially continuous fibrous damping means at the edge thereof; said damping means extending unsupported except by the radiator and frame, from the frame toward the center of the radiator and being capable of radial flexure whereby damping may be effected.

9. A loud speaker including a frame and a direct acting sound radiator provided with a substantially continuous fibrous damping means in an extremely diffused state and containing a large percentage of voids, at the edge thereof; said damping means extending unsupported except by the radiator and frame, from the frame toward the center of the radiator and being capable of radial flexure whereby damping may be effected.

10. A loud speaker including a frame and a direct acting sound radiator provided with a substantially endless fibrous damping means at the edge thereof; said damping means extending unsupported from the frame toward the center of the radiator and being arranged to flex in accordance with movement thereof, said flexing being predominantly radial as axial movement of the radiator takes place.

11. A loud speaker including a frame and a direct acting sound radiator provided with a substantially continuous fibrous damping means in an extremely diffused state and containing a large percentage of voids, at the edge thereof; said damping means extending unsupported and in free air from the frame toward the center of the radiator and being capable of radial flexure whereby damping may be effected.

12. A loud speaker including a frame and a direct acting substantially conical sound radiator provided with driving means at the centre and an edge damping means of sufficient continuity to damp substantially the entire edge; said damping means consisting of thick loose textured porous material tapering in thickness and designed for radial flexure.

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