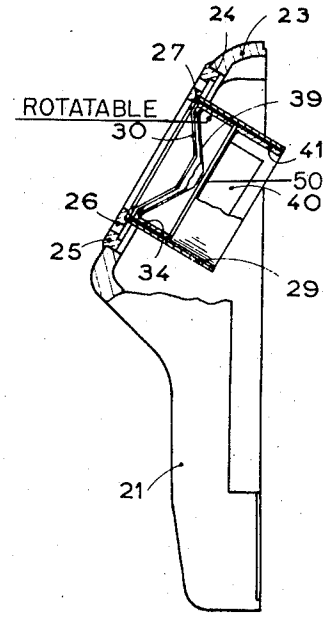
Nov. 25, 1958 M. BONNAFFOUS 2,862,070

MICROPHONE

Filed July 7, 1954

Fig. 1



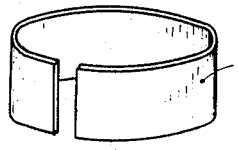


Fig. 7

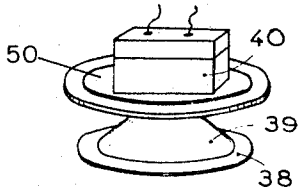


Fig. 6

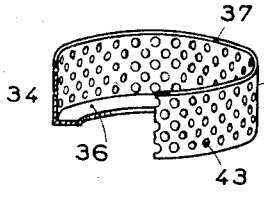


Fig. 5

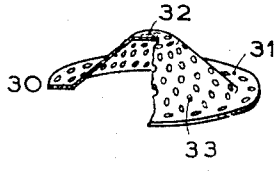


Fig. 4

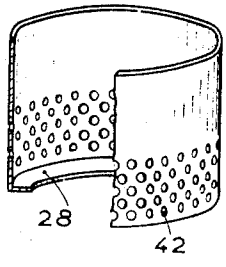


Fig. 3

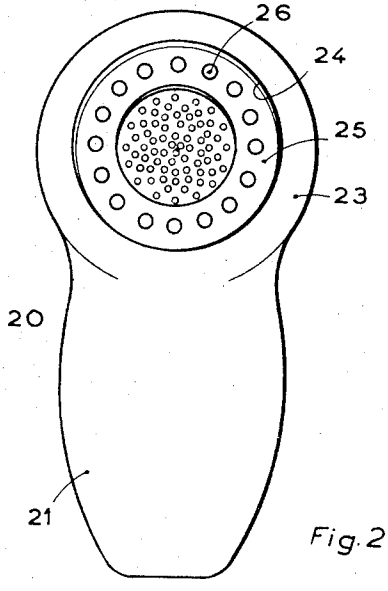


Fig. 2

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2,862,070

MICROPHONE

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Application July 7, 1954, Serial No. 441,891

Claims priority, application France July 10, 1953

5 Claims. (Cl. 179—121)

My invention relates to improvements in microphones and it covers more particularly microphones of the so-called differential type. It should be remembered that, in a differential microphone, the diaphragm is subjected, on either side, to the action of surrounding noise whereby the effects of this latter on both sides of the microphone balance each other and consequently the transmission of actual speech is favored.

Now, my invention has for its object a microphone adapted to operate differentially or otherwise as required by the user.

A further object of my invention consists in producing such a microphone wherein the sensitivity to surrounding noise may be adjusted within a range between zero and a maximum value.

My invention has also for its object the provision of such a microphone which, under conditions otherwise equal, is lighter than any known microphone and which in particular, for a predetermined weight, produces at the output end a very high signal voltage.

My invention has also for its object a microphone of the type referred to which is of an easy and economical execution. According to my invention, the openings formed in the microphone for the admission of the surrounding noises may be covered partly or wholly.

According to my invention, embodiments are provided which include a cylindrical member provided with perforations the operative area of which is controlled by a rotary sleeve cooperating with said cylindrical member and provided with openings which are similar to those of said sleeve.

According to a preferred embodiment, the said cylindrical member is constituted by the cylindrical spacing member generally provided in differential microphones.

According to a further embodiment, the perforations are formed in a flat surface and their cross-sectional area is adjusted in association with a ring-shaped member cooperating with the said surface and provided with similar perforations.

According to a still further embodiment, the cooperating perforations are formed in two frustoconical diaphragms engaging together the vibratory plate of the microphone. I will now describe by way of example various embodiments of my invention, reference being made to accompanying drawings wherein:

Fig. 1 is a sectional view of a microphone according to my invention;

Fig. 2 is a corresponding front view thereof;

Fig. 3 is a perspective view of the perforated cylindrical member, part of which is torn off;

Fig. 4 is a perspective view of a screen a part of which is torn off;

Fig. 5 is a perspective view of a spacing member, a part of which is likewise torn off;

Fig. 6 is a diagrammatic perspective view of the electromagnetic system and vibratory plate of the microphone; and

Fig. 7 is a perspective view of a ring forming part of my improved microphone.

In Figs. 1 and 2, the body **20** of the microphone made, for instance, of plastic material includes a handle **21** at its lower end while its upper end carries the capsule. The front surface **23** of the microphone is provided with a large annular opening **24** inside which is housed a ring **25** provided with regularly distributed perforations **26**. The inner surface of the said ring, which is provided for this purpose with a groove **27**, is engaged by the front surface **28** of a cylindrical member **29** (Fig. 3). The said front surface or inner flange **28** of the member **29** serves as a bearing for a generally frustoconical screen **30** (Figs. 1 and 4) provided with a peripheral outer flange **31** adapted to engage the said flange **28**. The central section **32** at the apex of the said screen may be flat. The screen **30** is provided in the usual manner with numerous perforations **33** and is held in position by a cylindical spacing member or sleeve **34** (Figs. 1 to 5) including a body **35** and an inturned terminal flange **36**. The outer edge **37** of the said spacing member engages the outer flange **38** of a capsule which in the example illustrated includes a diaphragm **39** (Fig. 6); the electromagnetic system associated with the said capsule, supported on a disk **50**, has been illustrated diagrammatically at **40**. A split ring **41** (Fig. 7) is fitted inside the cylindrical member **29** so as to hold the said capsule in position.

According to my invention, the cylindrical member **29** is provided with a plurality of uniformly distributed perforations and is adapted to revolve with reference to the cooperating sleeve **34** also provided with perforations, the distribution of the perforations in the member **29** and in the sleeve **34** being similar. Thus, sleeve **34** acts as a barrier to sound waves wherever its perforations are blocked by the solid portions of cylinder **29**.

It will be assumed for instance that the cylindrical member **29** is provided with circular perforations **42** distributed in horizontal or vertical rows in staggered formation, if required, while the sleeve or spacing member **34** is provided with circular openings **43** the diameter of which is the same as that of the perforations **42**, the perforations **42** and **43** being distributed in an identical manner.

The angular setting of the sleeve or spacing member **34** with reference to the cylinder **29** can be manually varied by suitable means not shown.

The operation of the microphone is as follows: when the relative angular settings of the cylinder **29** and of the sleeve **34** are such that the perforations **43** register exactly with the perforations **42**, the microphone operates in the manner of an ordinary differentially-operating microphone, the background noises reaching, via apertures **26**, the annular round chamber surrounding cylinder **29** and entering the acoustic chamber containing the microphone capsule through the said superposed perforations, thus exerting their action on both sides of the diaphragm **39**.

In contradistinction, if the relative positions of the cylinder **29** and of the sleeve **34** are such that the perforations **42** are no longer in register with the perforations **43**, the microphone acts no longer in a differential manner and the sounds constituted, on one hand, by the speech of the user and, on the other hand, by noise all impinge on only one surface of the diaphragm, to wit its outer surface. For all intermediate positions of the cylinder **29** with reference to the sleeve **34**, the microphone acts in a more or less marked differential manner.

Such a microphone is of particular advantage in arrangements including earphones allowing the user to listen to his own voice. The user may thus adjust at any

moment the differential character of the microphone until optimum audition is obtained, which optimum audition corresponds to optimum transmission at a distance.

A similar effect may be obtained by providing an angularly shiftable perforated ring in register with the ring 25.

According to another embodiment, two frustoconical diaphragms may be used.

What I claim is:

1. A microphone comprising a casing with a front wall having a perforated central portion as well as a perforated peripheral portion, a membrane positioned in said casing back of said central portion and forming the forward boundary of a rear chamber within said casing, a perforated barrier member interposed in the path of sound waves between said rear chamber and said perforated peripheral portion, a blocking member co-operating with said barrier member and adapted selectively to obstruct the perforations thereof, and electro-acoustic transducer means coupled with said membrane for translating vibrations of the latter into electric currents.

2. In a microphone, in combination, a casing, a conical microphonic diaphragm positioned in said casing near the forward end thereof and having its apex directed toward the interior of the casing, said casing comprising a wall portion having an aperture in line with said diaphragm, a perforated cylindrical sleeve substantially coaxial with said conical diaphragm in said casing, means including said sleeve and the rear face of said diaphragm forming an acoustic rear chamber within said casing, a perforated blocking cylinder concentrically positioned in contact with said perforated sleeve and movable with respect thereto for selectively obstructing the perforations of the latter, means including said casing forming around said sleeve an annular sound chamber open toward the atmosphere, said sound chamber communicating with said rear chamber by way of said perforations, and electro-acoustic transducer means coupled with said membrane for translating vibrations of the latter into electric currents.

3. The combination according to claim 2, further including a perforated cone fitting inside the concavity of said conical diaphragm and positioned between the latter and said wall portion.

4. A microphone comprising a casing with a front wall having a perforated central screen portion and a perforated annular rim surrounding said screen portion, a perforated cylindrical sleeve in said casing substantially coaxial with said screen portion and of the same diameter as the latter, a perforated cylindrical blocking member concentrically positioned in contact with said sleeve and displaceable with respect thereto for selectively obstructing the perforations thereof, a conical diaphragm disposed inside said sleeve coaxially with said screen portion and turning its concave side toward same, electro-acoustic transducer means including a disk member back of said diaphragm, said disk member spanning said sleeve and forming therewith an acoustic chamber around the convex side of said diaphragm, and coupling means mechanically linking the apex of said diaphragm with said disk member.

5. A noise-canceling microphone responsive to pressure differentials, comprising a cylindrical sleeve, a pressure-sensitive element mechanically independent from said sleeve and positioned within the latter, said element having a front and a rear face, electro-acoustic transducer means controlled by said pressure-sensitive element for translating vibrations thereof due to impinging sound waves into electric currents, said sleeve being provided with lateral perforations enabling said element to respond to phase differences of said sound waves impinging thereon from opposite sides, and a cylindrical shell concentric with said sleeve and rotatable with respect thereto, said shell being provided with side apertures dimensioned for selectively facilitating or impeding the access of said sound waves to a face of said element.

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