

Oct. 15, 1935.

O. B. HANSON

2,017,122

DOUBLE REFLECTOR TYPE MICROPHONE

Filed March 11, 1932

Fig. 1

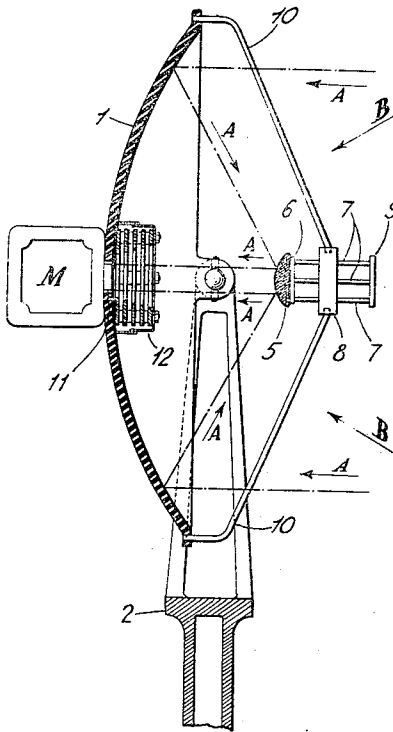


Fig. 2

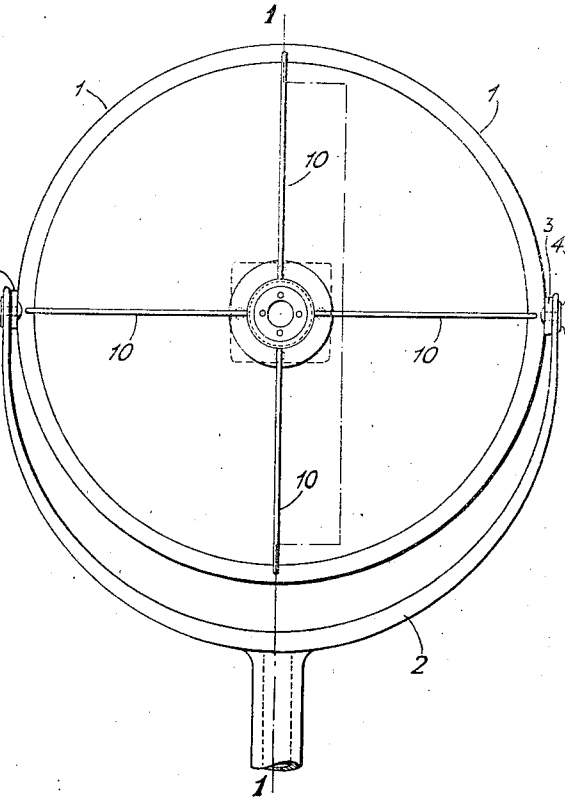


Fig. 3

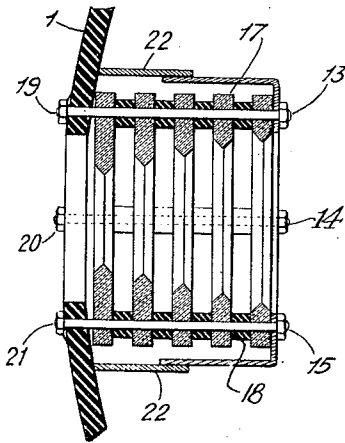
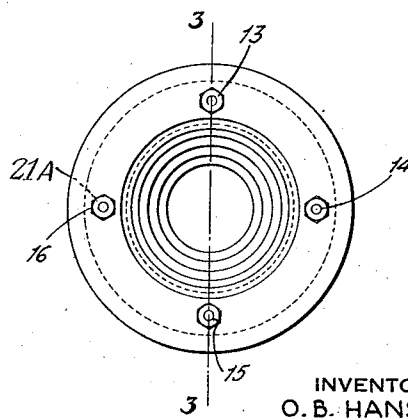


Fig. 4



INVENTOR
O. B. HANSON
BY *H. E. Grover*
ATTORNEY

UNITED STATES PATENT OFFICE

2,017,122

DOUBLE REFLECTOR TYPE MICROPHONE

Oscar B. Hanson, Westport, Conn., assignor to
Radio Corporation of America, a corporation of
Delaware

Application March 11, 1932, Serial No. 598,104

7 Claims. (Cl. 179—1)

This invention relates to a sound reflecting microphone, and more particularly the type employing double reflecting surfaces such as are used in radio broadcasting.

5 An object of this invention is to simplify and improve sound reflecting microphones utilizing double reflecting surfaces.

10 Another object of this invention is to provide a double sound reflecting microphone which is mounted on a portable stand and may be used in or out of doors, such as in a theater, studio, baseball park, or the like.

15 Another object of this invention is to collect and doubly reflect sound waves in a manner that improves and increases the efficiency of the microphone.

20 A feature of this invention is the novel means of adjustment provided for one of the reflectors to move in or out of focus, thus obtaining sharp focus and a narrow beam of pick-up, or soft focus with a wide beam of pick-up.

25 Another feature of this invention resides in the new and novel absorbing and shield elements which are placed directly in front of the microphone to absorb or attenuate any undesirable sounds entering from the sides of the microphone or those from an unreflected source.

30 Heretofore, in microphones having reflectors of the single type, the sound waves picked up by the microphone were only those received or collected by the single reflector whereas with the double reflector of my invention there is, in addition to the reflected sound, such other desirable sounds as will arrive at the microphone directly. 35 These other desirable sounds are mixed and blended with the reflected sounds, and result in more pleasing and increased efficiency of sounds entering or energizing the microphone. These reflected sounds arrive at the microphone at a small angle. Therefore, there is little discrimination between the higher frequencies due to the angular characteristics of the microphone. The new advantage being a superior response to the higher audio frequencies over that obtainable with practical single reflector type. Likewise, 45 previous reflectors of the single reflector type were also dependent to some extent on the size or diameter of the reflector for adequate low frequency response in the order of 50 to 100 cycles. Whereas, in my invention of the double reflector type microphone, the reduction in diameter of the large reflector will not discriminate so appreciably against the low frequencies. The low frequency response of the microphone is enhanced and increased by the action of the large 50 reflector as a baffle. This effect is well known to persons skilled in the art.

55 The characteristics of the reflecting surfaces in general indicate that the low frequencies are obtained largely by sound waves directly affect-

ing the microphone diaphragm, whereas the high frequencies are obtained and reproduced by the two reflecting surfaces. Should it be desirable to change the characteristics of the double reflector or to eliminate any undesirable sounds 5 such as those of the low frequencies, I have devised new and novel adjustable absorbing and attenuating shield elements. The double sound reflector microphone consists essentially of a relatively large reflector, in the center of which is 10 mounted a microphone facing a smaller reflector located coaxially with the microphone and removed from it by the proper distance. The large reflector is so shaped that sounds, from the proper direction, impinging on its surface, are di- 15 rected toward the small reflector which reflects them to the microphone. In addition to this reflected sound, the microphone also collects sounds reaching it directly, thus resulting in an increase in efficiency of the microphone. 20

In the drawing, like references refer to similar parts throughout the several views in which,

Fig. 1 is a vertical cross section, the section being taken on lines 1—1 of Fig. 2;

Fig. 2 is a front elevation of the improved re- 25 flector;

Fig. 3 is a vertical cross section of the absorbing and attenuating shield elements;

Fig. 4 is a front elevation of the absorbing and attenuating shield elements. 30

The invention is best shown and illustrated in Figs. 1 and 2 wherein the large reflector 1, which is approximately three feet in diameter and is composed of Racon impregnated fabric, or any other suitable sound reflecting material, is shown 35 mounted upon a suitable pivoted and portable supporting member 2 which is pivoted at the center of the large reflector 1 by means of bolts 3, and wing nuts 4. The small or second reflector 5 is approximately 4" in diameter and is composed of polished walnut wood, or may be of any other good sound reflecting material. This reflecting surface 5 is supported by a metallic ring 6 which has four round rods 7 mounted thereon. These rods 7 are supported on and pass through a 45 larger metallic ring 8 with sufficient clearance between the rods 7 and the holes in the metallic ring 8 to permit movement of the second reflector to and from the large reflector, and terminate at a binding ring 9. The smaller adjustable reflector 5 together with its associated parts are supported to the large reflecting surface 1 by four rigid metallic rods 10. The microphone M is a standard condenser type microphone 50 mounted in a suitable aperture 11 in the large reflector 1 in any convenient manner not shown. As the microphone alone forms no part of my invention, no further description is believed to be necessary.

Referring now to Figs. 3 and 4, the adjustable 60

shield and absorbing elements are shown in more detail. The shield 12 which is of fibre, is shown containing four metallic rods 13, 14, 15 and 16, on which the absorbent rings 17, for attenuating the transmission of sound from undesired directions, are mounted. Spacers 18 keep the rings spaced in proper relation. It is to be noted that the inside of these rings progressively decrease in diameter as they approach the front of the microphone forming a funnel-like opening for sound waves entering the microphone. To more completely absorb and prevent transmission of undesirable sounds, an adjustable telescoping shield 22 is provided. This complete assembly of absorbent rings and shields is then mounted on and secured to the large reflector 1 by means of four nuts 19, 20, 21, and 21A.

In the operation of this improved microphone and reflector, also by referring to the drawings mentioned above, it will be seen that sound waves impinging on the large reflector 1 in a direction parallel to its axis will be reflected to the smaller reflector 5 and then reflected to the microphone. It will also be seen that sounds arriving at comparatively small angles with respect to the reflector axis, will reach the microphone diaphragm directly. When this double reflector is used in the studio, auditorium, or out doors, an operator sets the microphone together with its associated reflecting surfaces at any convenient location, and directs the center of the reflector toward the spot from which it is desired to collect the most desirable sound waves. To further improve the sound qualities, the operator properly focusses the sounds energizing the microphone by moving in or out the small reflecting surface 5 by adjusting the ring 9 until the proper reflected sound is obtained, and to properly absorb undesirable sounds from entering at an angle with respect to the reflector axis, a varying number of absorbing rings 17 are inserted and the resulting telescoping shield is thus correspondingly increased or decreased in length.

It will be seen by the dot and dash lines indicated by the arrows at A, Fig. 1, that the sound waves follow a direction parallel to the axis of the smaller reflector 5, and is then reflected to the microphone M. It will also be seen that sounds arriving at an angle in respect to the axis of the reflector as indicated by the arrows B, will reach the microphone directly. Any other sounds reaching the inside of the large reflector 1 from the sides will be either substantially eliminated or properly attenuated before reaching the microphone by selecting the proper amount of absorbing rings and correct length of shield as mentioned above.

Although this invention has been described and illustrated, it is apparent that the size, shape and separation of the two reflectors and materials of construction may be varied in order to obtain the desired result and yet retain the fundamental principles of this device within the spirit and scope of the appended claims.

I claim:—

1. In combination, a directive sound receptive microphone, a large parabolic reflecting surface mounted upon a stand, a small reflecting surface adjustably mounted upon a support fastened to said large reflecting parabolic surface, and an adjustable funnel-shaped sound absorbing means for changing the characteristics of the reflected

sounds, said microphone being mounted on said large reflector.

2. In combination, a directive sound responsive system comprising a condenser type microphone mounted upon a first reflector with a concave parabolic reflecting surface, an adjustable sound absorbing means interposed between the microphone and a second reflector with a convex reflecting surface, the said second reflector being mounted to slide upon a support fastened to the first reflector to adjust the focus of sounds entering or energizing the said microphone, the sound absorbing means comprising a plurality of fibre rings which are arranged to permit properly reflected sound from the second reflector to energize or enter the said microphone.

3. A sound responsive device comprising a microphone mounted upon the rear of a concave sound reflecting surface, a convex sound reflecting surface, said convex sound reflecting surface being adjustable with respect to said microphone, and sound absorbing means comprising a plurality of rings interposed between the said convex sound reflecting surface and said microphone.

4. A sound responsive device comprising a microphone mounted upon the rear of a concave sound reflecting surface, a convex sound reflecting surface, said convex sound reflecting surface being adjustable with respect to said microphone, and sound absorbing means comprising a plurality of adjustable sound absorbing ring elements forming a funnel-like opening interposed between the said convex sound reflecting surface and said microphone.

5. A directive sound receptive microphone comprising a condenser type microphone mounted upon the rear of a concave sound reflecting surface, a convex sound reflecting surface, said convex sound reflecting surface being adjustable with respect to said microphone by means of a plurality of rods passing through a support ring which is secured to the concave sound reflecting surface, and sound absorbing means comprising a plurality of rings forming a funnel-like opening interposed between the said convex sound reflecting surface and the microphone.

6. In combination, a directive sound responsive system comprising a microphone mounted upon a first reflector with a concave parabolic reflecting surface, an adjustable sound-absorbing means interposed between the microphone and a second reflector with a convex reflecting surface, the said second reflector being adjustably mounted with respect to said first reflector to adjust the focus of sounds entering or energizing the microphone, the sound-absorbing means comprising a plurality of rings arranged to permit properly reflected sound from the second reflector to energize or enter the said microphone.

7. A directive sound receptive microphone comprising a microphone mounted upon the rear of a concave sound reflecting surface, a convex sound reflecting surface, said convex sound reflecting surface being adjustable with respect to said microphone by means of a plurality of rods passing through a support ring which is secured to the concave sound reflecting surface, and sound absorbing means comprising a plurality of rings forming a funnel-like opening interposed between the said convex sound reflecting surface and the microphone.

OSCAR B. HANSON.