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K. M. TURNER & N. W. JOHNSTON.

ACOUSTICON.

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Fig. 1.

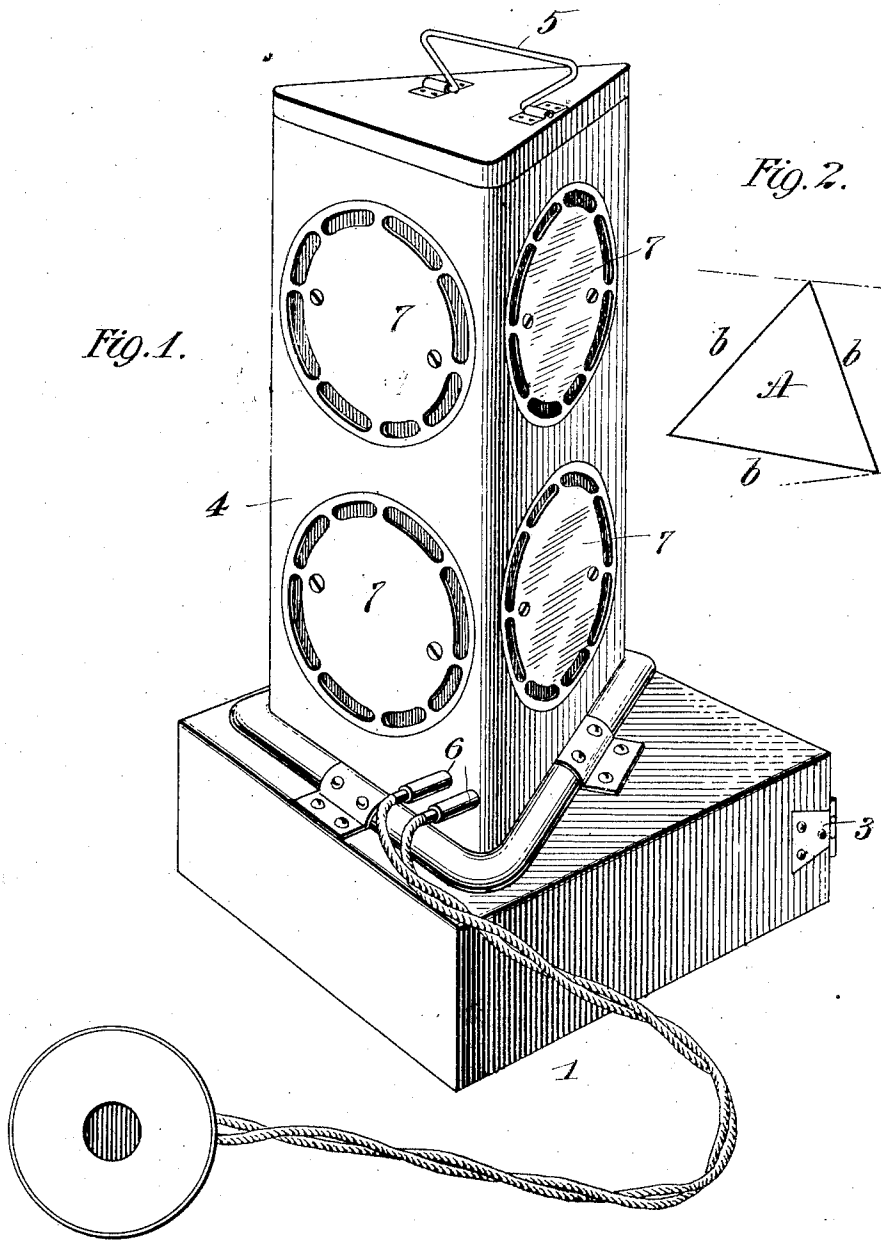

Fig. 2.

Witnesses

Inventors

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By their Attorneys

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UNITED STATES PATENT OFFICE.

KELLEY M. TURNER, OF NEW YORK, AND NORTON W. JOHNSTON, OF CHAPPAQUA, NEW YORK, ASSIGNORS, BY MESNE ASSIGNMENTS, TO GENERAL ACOUSTIC COMPANY, A CORPORATION OF NEW YORK.

ACOUSTICON.

No. 846,088. Specification of Letters Patent. Patented March 5, 1907.

Application filed August 25, 1905. Serial No. 275,762.

To all whom it may concern:

Be it known that we, KELLEY M. TURNER, of the city, county, and State of New York, and NORTON W. JOHNSTON, of Chappaqua, Westchester county, New York, have invented certain new and useful Improvements in Acousticons, of which the following is a full, clear, and exact description.

Our invention relates to telephonic transmitting appliances.

In a patent to M. R. Hutchison, No. 737,242, there is described an apparatus by which any number of deaf persons within an assembly or gathering may hear all that is going on and take part in the conversation. The apparatus comprises, essentially, a transmitting device, known as an "acousticon," which is placed at a central position in the room and connected to circuits including telephone-receivers for the various deaf persons.

The object of the present invention is to improve and perfect the above-described transmitting apparatus or acousticon and to render it at once more simple of construction, more efficient in operation, and more pleasing in appearance.

With these and other objects in view our invention consists in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally particularly pointed out in the appended claim.

In the drawings, Figure 1 is a perspective view of an acousticon embodying the principles of our invention, and Fig. 2 is a diagram showing the manner in which sound-waves are received by the acousticon.

It is evident that an instrument of this character must be adapted to receive the sounds in a substantially equal way from every direction that they are likely to come. In practice the sounds of conversation from a group of persons emanate from points around a circle or circumference, but generally lie in the same horizontal plane, so that the sound may be considered as coming uniformly from all points in the periphery of a horizontal circular plane surface ordinarily about four or five feet above the floor. The acousticon which we have provided is adapted to receive the sounds in the most efficient and uniform way.

Referring now to the drawing, and to the various views and reference-signs appearing thereon, in which like parts are designated by the same reference-sign wherever they occur, 1 denotes a base or casing for a battery, which constitutes the supporting-frame of the instrument and is preferably in the form of a square prismatic box, which may have a drawer therein provided with any suitable clasps 3, by which it may be held in position. Upon the base or block 1 we erect a prismatic structure 4, having a certain fixed and definite arrangement of faces, in which are inset the acousticon-transmitters proper.

5 denotes a handle upon the top piece of the prismatic structure, by which the instrument may be carried about, and 6 indicates terminal blocks at a convenient point, by which the connection may be made to the various telephonic receivers.

We have discovered that the efficiency of the acousticon varies widely according to the shape of the prismatic structure 4. A simple consideration will show that no two sound-waves are likely to strike the instrument in exactly the same way, one, for example, striking a face squarely and another striking it at a greater or less angle. It is of course intolerable in practice to have the sound from one section received much more clearly than from another, since under such circumstances it would be impossible to adjust the receivers for any one person without putting them out of adjustment for another. An acousticon should therefore be made in such a way as to receive the sounds uniformly from every direction. This may be accomplished by making it with a very large number of faces, in which case it would have a substantially equal effect in all directions; but we have discovered a shape by which the acousticon attains remarkable efficiency and in the simplest and most convenient manner.

We have discovered that by making the prismatic structure in the form of a three-sided equilateral triangular prism that a remarkable efficiency is attained, and in Fig. 2 of the drawing we have indicated the shape of the prism used in order to show the reason for the high efficiency attained. Each of the sides *b* of the equilateral triangle A may be considered to be a face of the prism. It is evident that a sound-wave, such as S, strikes

an area of the acousticon-surface which is never greater than the side *b* and varies between this amount and a value proportional to the altitude of the triangle A, or, in other words, $b \times \frac{\sqrt{3}}{2}$, which equals .866*b*. Accordingly the ratio of the effect of a person situated at maximum efficiency to that of a person situated at minimum efficiency of transmission is as 1 is to .866. Thus it may be stated that the difference between maximum and minimum efficiency is not much over ten per cent. Now considering, for example, a square prismatic acousticon having faces *b*. It is evident that the area of the sound-receiving surface is *b* when the wave strikes squarely thereagainst, but is $b \times \sqrt{2}$, or 1.514, when the sound strikes the acousticon at one of its corners. Accordingly the difference between maximum and minimum efficiency for a square and for a triangular acousticon is substantially four times as great in the case of the square as in the case of the triangular instrument. As a matter of fact, it is greater than this in practice on account of the fact that the transmitters employed in the acousticon are circular and have a diameter determined by the width of the face. The real efficiency is therefore proportional to the area of the circular transmitters and to the squares of the figures above given.

7 denotes the transmitters within the faces of the acousticon, and in practice we prefer to secure two transmitters within each face. These transmitters are connected together into one or more electrical circuits including the receivers above mentioned in a manner which will be readily understood without a detail description.

By the use of our invention an acousticon of maximum efficiency is produced, and in addition it is evident that by the use of three faces a much simpler construction is provided than would be true of a greater number. Moreover, the triangular form employed gives individual faces which are wider than would be possible of any other polygonal shape, so that larger transmitters may be used in the faces and a greater area and efficiency secured than in another form. It is also evident that the completed structure is much more pleasing in appearance by virtue of its triangular form than would be true of a rectangular structure, which looks like a mere box and has nothing about it which is pleasing in appearance or which would attract the eye.

What we claim is—

In a telephonic transmitting apparatus, a base or box adapted to contain an electric battery, a prismatic structure erected upon and supported by said base or box, said structure having an equilateral triangular form with three symmetrical faces, a transmitter inset into each of said faces, and electrical connections including said battery and said transmitters adapted to be connected to a suitable receiver.

In witness whereof we subscribe our signatures in the presence of two witnesses.

KELLEY M. TURNER.
NORTON W. JOHNSTON.

Witnesses:
FRANK S. OBER,
ALFRED W. PROCTOR.