March 24, 1931. J. A. CLIFTON 1,798,118

OPTIPHONE

Filed July 16, 1928

FIG. 1.

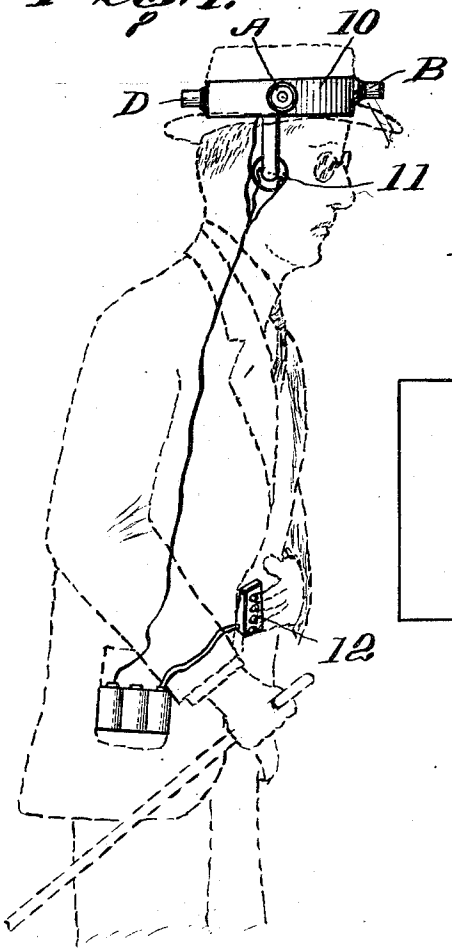


FIG. 2.

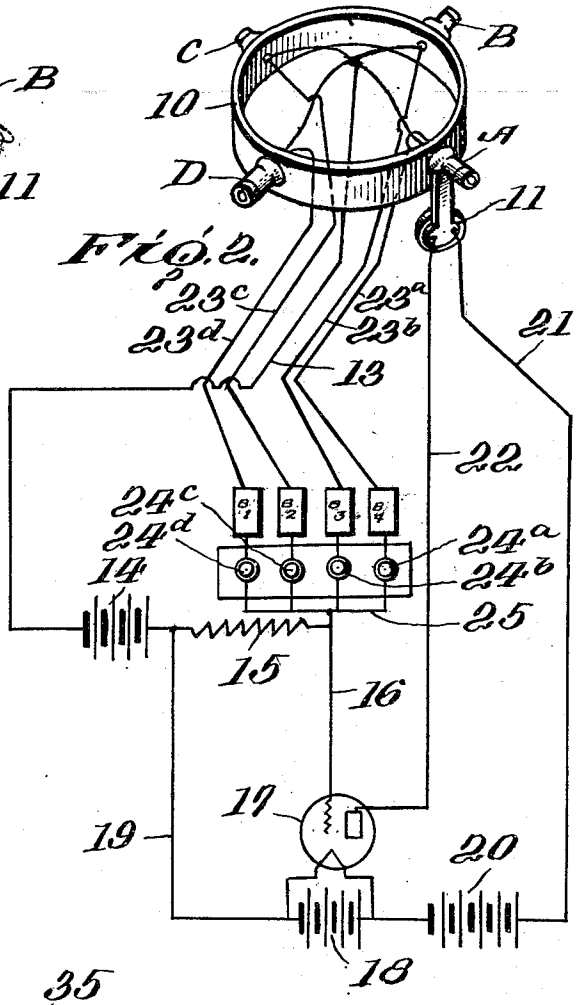
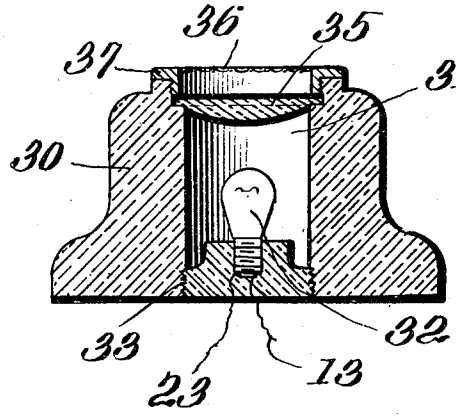


FIG. 3.



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Patented Mar. 24, 1931 1,798,118

UNITED STATES PATENT OFFICE

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OPTIPHONE

Application filed July 16, 1928. Serial No. 293,222.

This invention relates to improvements in photo-sensitive devices having audible indicators more particularly intended for the use of a blind person.

Such a device will hereafter be referred to as an "optiphone", inasmuch as it delivers an audible signal based upon light conditions. According to this invention it is proposed to provide a light sensitive cell having directional characteristics so that it will respond according to the illumination thereon derived from images in its path of quasi-vision. This electrical response is employed by means of a circuit interrupting device to produce a characteristic audible indication of the presence or absence of predetermined images in such a path. In particular, a plurality of such devices, each having its own peculiar characteristic, is provided, the paths of the different devices lying in several directions so that a blind person employing the device is enabled to "hear" the presence or absence of images in the several directions: and further devices are provided whereby such a person may easily determine and locate the direction of maximum or minimum response, thereby locating a given image with great exactness with respect to its own position or movement.

With these and other objects in view as will be apparent in the course of the following specification and claims, an illustrative form of the invention has been shown on the accompanying drawings, in which:

Fig. 1 is a perspective view showing in dotted lines a person bearing the elements constituting the present invention.

Fig. 2 is a conventionalized and diagrammatic view of the parts of the apparatus.

Fig. 3 is a sectional view through one of the light sensitive devices.

In these drawings, in Fig. 1 a blind person is represented as wearing a band 10 having four light sensitive devices thereon located at angular separations of 90 degrees, so that each of these devices has a "path of vision" located with its axis at 90 degrees angular separation from that of each of its neighbors. The person also has a telephone head piece 11 upon his ear. It will be noted that a control casing 12 provided with a plurality of push buttons corresponding in number (four) to the number of light sensitive devices is fastened to the person's belt so that he may readily operate one or more of these push buttons.

In Fig. 2 the head band 10 is shown as provided with light sensitive devices A, B, C, and D, each having a conductor leading to a common return conductor 13 passing to the battery 14 and thence through a resistance to the grid conductor 16 of an amplifying electron discharge tube 17. The filament cathode of this tube is heated by a battery 18, and a grid return conductor 19 is provided between the cathode and a tap intermediate the battery 14 and the resistance 15. The anode battery 20 is connected between the cathode and the telephone receiver 11 by a conductor 21, while a return conductor 22 leads to the anode of the amplifying tube 17.

Each of the individual light sensitive devices A, B, C, and D is also provided with an individual conductor 23*a*, 23*b*, 23*c* and 23*d* leading to a respective buzzer which is diagrammatically shown at B', B^2, B^3, and B^4, and thence to a respective circuit closing device or push button 24*a*, 24*b*, 24*c*, and 24*d*, the other terminal of the respective circuit closures being connected by a common conductor 25 leading to the grid conductor 16.

As shown in Fig. 3, each of the light sensitive devices comprises a solid, opaque housing 30 having a cavity 31 therein in the base of which is mounted a socket 33 to receive a small light sensitive element 32 of the electrically responsive type which reacts to changes in the illumination thereon by opposing a properly varying resistance in the conductor wires 13, 23 leading thereto. The upper end of the cavity 31 is closed by a focusing lens 35 which is protected by a netting 36 carried by the ring 37.

In operation, the blind person carrying the band pushes upon one of the several circuit closures or push buttons 24*a*, 24*b*, 24*c* and 24*d*, using, for example, the button 24*b* corresponding to the light sensitive device located in front of him, so that the lens 35

projects an image of what would be the normal field of vision of a seeing person from the light responsive cell 32, this cell evaluating this illumination and changing in resistance accordingly. The current flows from the battery 14 through the conductor 13, the respective light responsive cell 32, the cell conductor 23*b*, buzzer B^3, push button 24*b*, resistance 15 back to the battery. The buzzer B^3 operates with its characteristic note, say, the second C above middle C or 1024 cycles per second, (using "philosophical" pitch with middle C at 256 cycles). This causes a rapid change of the drop of potential across the resistance 15, so that an amplification of this drop of potential will occur in the amplifying device 17, with a production of sound by the receiver 11, so that the volume of the sound, or its absence, will indicate to the blind person whether or not a light or gray or dark object, or objects of different characters, are located in the direction in which his head is turned, the amplitude of the sound vibrations indicating the relative illumination of the object, while the characteristic tone indicates the general direction with respect to what would be the line of eyesight of a normal person. By moving the head slightly from side to side the field of view is likewise moved, and the audible indications inform him as to the presence and location of various objects.

If another button, say 24*a*, had been pressed, the light sensitive member A would have been energized and a similar field of vision searched out toward the right of the wearer, and the buzzer B^4 would have responded to the tone of second G above middle C, say, at a frequency of 768 cycles, with a similar indication of 768 cycle frequency at the receiver 11. Likewise, the buzzers B^1 and B^2 will operate upon the pressure of the buttons 24*d* and 24*c* and respectively may, for example, correspond to the first C above middle C and the E above it or 512 and 640 cycles, respectively. If more than one push button is operated, the chord produced by the second notes will indicate to the wearer the general condition of his surroundings.

It is obvious that the invention is not limited solely to the illustrative form shown, but that it may be modified in many ways within the scope of the appended claims.

I claim:

1. In an optiphone, a head supported member, a plurality of light sensitive devices mounted on said member and means to project images of objects located in different independent directions from said member upon respective devices so that each device receives an individual image, a plurality of tone generators connected respectively to said devices and controlled thereby to generate tones, and a sound producer connected to said generators, each of said generators having a characteristic tone to indicate the particular device or devices receiving illuminated images and thereby indicating the direction of the objects whose images are being projected.

2. In an optiphone as set forth in claim 1, the arrangement of the several tone generators to operate at chord intervals, so that the sound produced when two or more are in operation will be a harmonic chord.

3. In an optiphone, a support, a plurality of light sensitive devices mounted on said support and spaced apart to have their paths of vision in several directions, a conductor to supply current to each of said light sensitive devices, a respective conductor from each of said light responsive devices, a buzzer connected to each conductor, each of said buzzers having a characteristic note, a respective circuit closing means connected to each of said conductors, a battery connected between said common conductor and the other terminal of each of said circuit closures, a sound-producer, and means for actuating said sound producer according to the operation of said buzzers.

In testimony whereof, I affix my signature.

JESSE ALEX. CLIFTON.