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A. B. STROUSE

1,988,880

SOUND DEADENER

Filed Oct. 29, 1932

Fig. 1

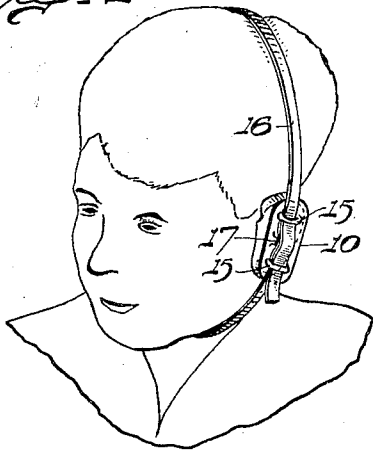


Fig. 2

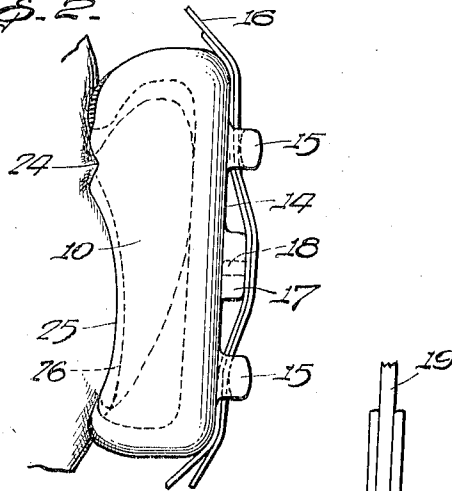


Fig. 3

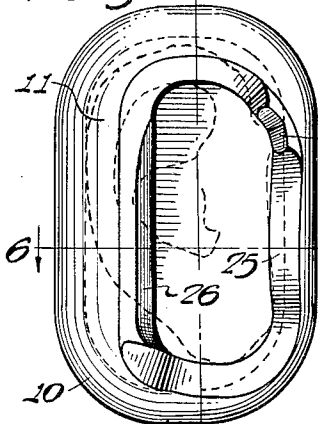


Fig. 4

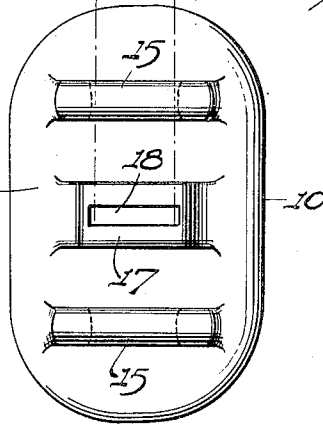


Fig. 5

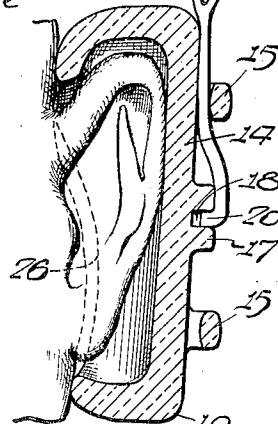


Fig. 7

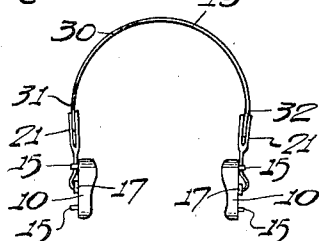


Fig. 6



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## UNITED STATES PATENT OFFICE

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## SOUND DEADENER

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12 Claims. (Cl. 128—152)

This invention relates to a sound deadener for protecting the ears and has for its principal object the provision of a device for excluding noise from the ear, and deadening those sound vibrations which interfere with sleep, reading or study, such as those due to the radio, talking, the telephone bell, building operations, playing children, trains, trolley cars, automobiles, etc.

Another object is to provide means for covering the ears in such a manner as to exclude every vibration possible and which fits the contour of the temporal bones particularly the zygomatic in front of the ear, the space between the mastoid and mandible under the lobule and the slight depression at the suture between the temporal and the mastoid.

Another object is to provide an ear covering of a material that is non-responsive to sound waves and of such thickness as to be immune to all sound waves within the auditory range.

Still another object is to provide a device that is sanitary and easily cleaned and one which can be repeatedly sterilized without injury.

It is well known that the cause of nervous disorders with many people is the fact that they are continuously subjected to irritating noises and it is one of the objects of this invention to provide means whereby such persons may enjoy absolute quiet without quitting their noisy environment. Numerous devices have been invented to give relief from these noises but thru extensive research I have found that none of these accomplish the purpose for which they were invented. The chief difficulty with all of these previous devices is that the inventor has ignored two important factors, one that the ear covering itself should not transmit sound vibrations and the other that when a non-transmitting material is used for covering the ear it should not rest too firmly on any of the various temporal bones since the usually thin layer of flesh at these points will be compressed to such an extent that it fails to perform its sound deadening function and because of this sound waves impinging on the ear cup are transmitted directly to the ear even though the person is not aware of any disturbance. After experimenting with a great many materials I have discovered that the one giving the maximum satisfaction is glass which, when made sufficiently thick, will respond to no ordinary sound wave. The sound deadening effect is increased by constructing this cup to fit the contour of the several temporal bones and incidentally but not necessarily to fit the contour of the flesh about the ear. That is, it is not so important to shape the

cup to conform to the contour of the flesh as it is to shape the rim of the cup to the contour of the temporal bones containing the organs of hearing. This is especially important where the ear cups are made of glass or similar substance which when sufficiently thick is non-responsive to sound waves.

I have discovered that many people suffering from certain nervous disorders are apparently immune to sounds which distract the ordinary person but the nervous condition of these people is greatly aggravated by a continual noise or din which trouble the ordinary person but little, for example, that experienced in cities, particularly in large offices and mills, and at busy street intersections. One of the primary objects of my invention is to completely shut out all din even though some of the sharper sounds may not be excluded.

It is well known that the function of the helix is to direct sound waves into the auditory canal and nature has evolved a highly efficient device for this purpose. I have discovered that by distorting the helix the longer sound waves are further deadened and for this reason the ear cups are made relatively narrow so as to bend the helix, however not to such an extent as to cause discomfort. This expedient serves the further function of preventing any vibration of the bottom wall of the ear cup.

In the drawing:—

Figure 1 is a view showing the invention in use.

Figure 2 is a front elevation.

Figure 3 is a view looking into the ear cup.

Figure 4 is a side elevation.

Figure 5 is a section on line 5—5 of Figure 3.

Figure 6 is a horizontal section on line 6—6 of Figure 3.

Figure 7 is a view showing my improved head band for supporting the ear pieces.

The ear cup or covering 10 is elongated and shaped to receive the auricle but the cavity is made sufficiently small so as to bring the inner walls against the auricle especially at the helix 11 whereby any vibration which may be set up in the cup walls is muted and arrested by the engagement. On the rear wall 14 are provided two loops 15 for receiving the supporting strap 16 which is preferably of fabric. Between the two loops is positioned the boss 17 having in its center a groove 18. This boss causes a gripping engagement with the strap and in case the strap is not used permits the use of a fastener, preferably of wood, having at its lower end an inwardly directed projection 20 which engages the

groove 18 of the boss 17, and having at its upper end a fork 21 to receive the free end of a U-shaped band or strap 19 also preferably of wood, the fork operating in much the same manner as a clothes pin for securely connecting the lower part with the band and for providing means for adjusting the height of the ear cup in order that the device may fit different sized heads. As the band 19 is made of wood it will be seen that no metal whatsoever is used in the structure.

As is best seen in Figure 3 it is important that the forward wall of each ear cup be provided with contours 24 and 25, the former being shaped to fit the zygomatic bone at the temporal-maxillary joint and the latter contour being shaped to correspond to the contour of the flesh directly in front of the lobule. The lower wall of the structure is curved and slightly extended at the rim to fit the suture between the temporal and the mastoid. As shown in Figures 5 and 6, the rear wall follows the curve of the mastoid and is given a slant at 26 to correspond to that of this bone. It is important that the curvature of the cup should follow as near as possible the curvature of the mastoid since the cavities in this bone are connected directly to the tympanum and any vibration that may be set up in the cup will be transmitted thru this bone to the ear drum.

When the cup is made of glass as I prefer it shall be, it is important that the thickness be sufficient to exclude the many annoying sounds that are to be prevented from reaching the ear. On the other hand it is equally obvious that if the walls are too thick the weight of the device makes the wearing of it quite uncomfortable. My experiments indicate that a thickness of about a quarter of an inch produces the results desired without sacrifice of comfort.

In Figure 7 is shown the preferred shape of the supporting band 19 which gives best results when made of hickory. Being generally U-shaped the band is provided with a curved portion 30 and two straight portions 31 and 32. The latter portions are made straight in order to have adjustable engagement with the forks 21 and to conform to the sides of the head so that the ear cups 10 will be held snugly against the ear.

What I claim is:

1. In a sound deadener, an auriform glass cup for covering the ear, said cup having walls of sufficient thickness as not to vibrate in harmony with the usual sound waves which would normally interfere with sleep or concentration, characterized by the rim of the cup being curved to fit the contour of the temporal and the mastoid bones, whereby the flesh about the ear acts as the sole cushioning means between the rigid cup and said bones.

2. The device of claim 1 in which the thickness of the cup is about a quarter of an inch.

3. In a sound deadener, an auriform glass cup for covering the ear, said cup having walls of sufficient thickness as not to vibrate in harmony with the usual sound waves which would normally interfere with sleep or concentration, characterized by the rim of the cup being curved to fit the contour of those bones of the skull which surround the ear orifice whereby the flesh about the ear acts as the sole cushioning means between the rigid cup and said bones.

4. The cup of claim 3 further characterized by the cavity of the cup being sufficiently shallow in depth as to contact with the auricle when applied to a wearer.

5. In a sound deadener, an elongated glass cup for covering the ear, said cup having walls of such thickness as to be non-responsive to sound waves, the rims of said cup being curved to fit the contour of the temporal and mastoid bones, an integral loop on the exterior bottom wall for receiving a supporting strap, and a boss spaced from said loop, said boss having a groove therein normal to the opening in said loop.

6. In a sound deadener, an elongated glass cup for covering the ear, said cup having walls of such thickness as to be non-responsive to sound waves, the rims of said cup being curved to fit the contour of the temporal and mastoid bones, two spaced loops on the exterior bottom wall and a boss between the loops, said boss having a recess for receiving a lug on a cup supporting band.

7. In a sound deadener, an elongated glass cup for covering the ear, said cup having walls of such thickness as to be non-responsive to sound waves, the rims of said cup being curved to fit the contour of the temporal and mastoid bones, two spaced loops on the exterior bottom wall and a boss between the loops rising above the level of the top of the opening in one of said loops.

8. In an ear protector, a cup for covering the ear, a loop on the outer bottom wall of the cup, a boss on said wall spaced from said loop, said boss having a central transverse groove therein, a wood strip in the loop, said strip having a lug at the bottom for engaging in said groove, a U-shaped band for looping over the head for engaging said strip and supporting said cup.

9. The device of claim 8 in which the upper part of said strip is forked for frictional engagement with the end of said band.

10. In an ear protector, a cup having a rim shaped approximately to fit the contour of the bones around the ear, a loop on the outer wall of the cup, a recessed boss on said wall spaced from and substantially parallel to said loop, means for supporting said cup comprising a resilient U-shaped band, a member extending thru said loop for connecting the cup to said band, said member having a lug at one end for engaging in said recess and being bifurcated at the other end for frictionally engaging an end of said band.

11. The device of claim 10 in which said bifurcated end is resilient whereby the member may be moved to fork more or less of the band end to adjust the height of the cup as desired.

12. In an ear protector, a glass cup for covering the ear, a loop on the outer bottom wall of the cup, a boss on said wall spaced from said loop, said boss having a central transverse groove therein, a wood strip in the loop, said strip having a lug at the bottom for engaging in said groove, a U-shaped band for looping over the head for engaging said strip and supporting said cup, and a second loop provided in spaced relation from said first loop, said loops being elongated and flat whereby to provide legs for holding said cup upright when detached from the strip and placed on a supporting surface.

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