

panying drawings by the reference number 10. The drowsiness warning device 10 comprises, generally, a neck band 12 which is securable about a wearer's neck 14, and an alarm device 16 which is positioned by the band below the wearer's chin 18. The alarm device is capable of producing both a tactile and an aural warning as the chin 18 contacts the alarm device 16 when the wearer's head 20 droops. (See FIGS. 1 and 2).

In accordance with the present invention, and as illustrated with respect to a first embodiment in FIGS. 3-6, the alarm device 16 comprises a hollow elastomeric ball 22 and a mechanical noisemaker disposed adjacent to an air inlet/outlet aperture 24 for the ball. The mechanical noisemaker comprises a bugle-shaped pipe 26 having a first portion 28 that extends into the air inlet/outlet aperture 24, and a second enlarged portion 30 which extends downwardly from the aperture 24. An air flute 32 is disposed within the first portion 28 of the bugle-shaped pipe 26 for producing an aural warning as air passes through the aperture 24. In this regard, the hollow ball 22 includes an upper rounded dome 34 which extends above an upper edge of the neck band 12 and which is positioned immediately below the chin 18. Extending downwardly from the dome 34 is an elongated lower body 36 which is securely held within a central section 38 of the neck band 12.

The central section 38 of the neck band 12 comprises a vertical wall having a pair of parallel, generally horizontally extending slots 40 which are cut therein to define an upper front support segment 42, an intermediate rear support segment 44 and a lower front support segment 46 between which the lower body 36 of the alarm device 16 is positioned. Further, a lower support tab 48 is disposed below the slots 40 to engage a bottom end of the lower body 36 of the alarm device 16, to limit downward movement thereof relative to the vertical wall of the central section 38. A shown, the lower support tab 48 engages the bottom end of the bugle-shaped pipe 26.

A pair of straps 50 define opposite ends of the neck band 12. The straps include hook tape 52 and loop tape 54 fasteners which engage each other in a known manner to secure the straps 50 to one another. The straps 50 are connected, utilizing strap anchors 56, to intermediate sections 58 of the neck band 12 which extend between the central section 38 and the straps 50. The intermediate sections 58 include a vertically stiff, exteriorly facing support member 60, a fibrous interiorly facing lining 62 adjacent to the support member 60, and upper and lower edge guards 64 and 66 extending over, respectively, upper and lower edges of the support member 60 and adjacent lining 62 (see FIG. 4).

As noted above, the drowsiness warning device 10 is constructed to position the dome 34 of the alarm device 16 immediately below the chin 18 of the wearer. As the wearer becomes drowsy, the head 20 naturally droops thus causing the chin 18 to engage the dome 34. Such engagement provides a tactile warning that the person is becoming drowsy. Upon depression of the dome 34, air is forced from the hollow ball 22 through the air inlet/outlet aperture 24. Such air movement causes the air flute 32 to issue an aural warning to the wearer that he or she is falling asleep.

FIGS. 7 and 8 illustrate an alternative embodiment of the alarm device 16' which utilizes an electrically actuated speaker 68 disposed within the dome 34'. In this embodiment, the upper rounded dome 34' has embedded therein the speaker 68 and a printed circuit board 70 which controls the audio signal to the speaker. A plurality of speaker apertures

72 are provided through the dome 34 adjacent to the speaker 68. Extending downwardly from the upper dome 34' is a square shaft 74 that extends through a square through-hole 76 provided in a main body 78 of the alarm device 16'. Surrounding an upper end of the square shaft 74 is an upper spring well 80 into which an upper end of a spring 82 extends. A lower surface of the dome 34' supports a pair of upper contact plates 84 and 86, the function of which will be explained below.

The main body 78 includes a lower spring well 88 in which a lower portion of the spring 82 is situated. An upper surface of the main body 78 supports a pair of lower contact plates 90 and 92 disposed opposite the upper contact plates 84 and 86. A battery chamber 94 is provided in the main body 78 into which a battery 96 is inserted and enclosed therein by a battery access screw 98. A first conductive lead connector 100 extends from the first lower contact plate 90 to an end of the battery 96. A conductive contact ring 102 extends from a side of the battery 96 to a second conductive lead connector 104 which extends to the second lower contact plate 92. The contact ring 102 is placed within a recess 106 within the main body 78 and held in place by an insert 108. The lower end of the square shaft 74 extends to a lower end of the insert 108, and an end plug 110 is fastened to a lower end of the square shaft 74 to prevent it from being withdrawn from the main body 78. The end plug 110 is secured to the square shaft 74, and the insert 108 is secured to the main body 78 within the recess 106, by means of an ultrasonic weld or the like.

A pair of conductive leads 112 extend between respective ones of the upper contact plates 84 and 86 and the printed circuit board 70. This arrangement causes an aural warning to issue from the speaker 68 when the electrical circuit is completed by bringing the upper contact plates 84 and 86 into contact with the lower contact plates 90 and 92. The spring 82, however, normally biases the dome portion 34' away from the main body 78, thereby opening the circuit and preventing operation of the speaker 68 in the absence of a depressing force supplied to the dome portion 34' by the chin 18 of the wearer of the drowsiness warning device 10.

From the foregoing it is to be appreciated that the drowsiness warning device 10 provides a novel apparatus for alerting a wearer when his or her head 20 begins to droop due to drowsiness. In addition to drivers, the device 10 may be advantageously utilized by others who are subject to becoming drowsy, such as night watchmen. The device 10 is manufactured of relatively simple components and is quite easy to use. Besides issuing an aural warning, contact between the chin 18 and the upper dome 34 provides tactile indicia that the wearer is becoming drowsy. Moreover, the provision of the fibrous lining 62 in the neck band 12 provides for a separation between the neck 14 and the plastic support member 60 which prevents sweating and ensures that the neck band 12 will remain comfortable to the wearer. The provision of hook and loop tape fasteners 52 and 54 ensures that the neck band 12 is adjustable for different neck sizes.

Although two particular embodiments of the invention have been described in detail for purposes of illustration, various modifications of each may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

I claim:

1. A drowsiness warning device, comprising: a band securable about a wearer's neck; and