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(54) Sounding device.

(57) A sounder (29) is mounted substantially within a housing (22) and directs its sound outwardly into a resonant volume defined between the housing (22) and a spaced sounder plate (24). The plate (24) may serve also for mounting other components (20) such as a sensor or a light. There may be a terminal block (26) in the housing for connecting the sounder (29) and any other components (20)

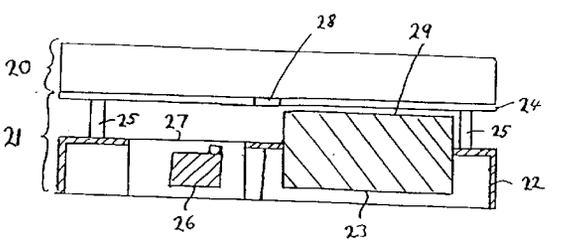

Fig 3

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The present invention relates to a sounding device, e.g. for a fire alarm, and in particular to a compact sounding device for inclusion in an alarm unit including a light and/or a sensor and/or a switch.

A large number of varieties of sounding devices, and in particular electrically operated sounders and other alarm devices, are known. It is also known to connect a plurality of these devices together, so as to form an alarm system. This may also include one or more further components such as power sources, monitors, and detectors. These are all separate units. For example, it is common for sensors (e.g. fire detectors) and sounders to be separately mounted side by side.

In one aspect the present invention provides a sounder assembly which comprises a body having an outer surface, sounder means located generally within the body, an opening in said surface to allow passage of sound from the sounder means, and a sounder plate mounted to said body so as to confront said opening and be spaced from said surface so that sound can emerge laterally of said plate. Desirably the sounding plate is spaced from the adjacent surface of the sounder housing, so that the volume of air between the sounding plate and the adjacent surface of the sounder housing acts as a resonating volume.

The sounder plate may have a device, e.g. a sensor and/or a warning light, fixed or removably mounted to it. Thus in another aspect the invention may provide an alarm assembly which comprises a sounder assembly as defined in the first aspect above, and a device, e.g. a sensor coupled to the sounder for actuation thereof and/or an alarm light, that may be arranged to be actuated simultaneously with the sounder; said device being mounted on the sounder plate.

In this way, a more compact arrangement is achievable. So far it is known, there have not been previous proposals to stack sounder units and detector units.

Once the inventor of the present application had settled on the idea of stacking the sounder unit and the detector unit (or light unit), it was found that it was desirable to depart from the standard constructions of sounder units. It can be noted that, in a stacked arrangement according to the present invention, the sounder unit is normally between the detector unit (or light unit) and the surface on which the sounder assembly is to be mounted, since it is important that the detector is exposed to the ambient air, and that the light is visible. Therefore, more consideration was given to the design of the sounder unit.

Previously, all sounder units have had the sounder itself mounted substantially centrally, i.e. the centre of the (normally circular) sounder coincided with the centre of the (normally circular) housing of the sounder unit, which housing supports the sounder itself. One development of the present invention proposes that the centre of the sounder be displaced from the centre of the sounder housing. For example, the sounder may be displaced so that its periphery is proximate the centre of the sounder housing, and indeed it is possible for the sounder to be displaced so that the centre of the sounder housing is (in plan) outside the circumference of the sounder.

In a preferred type of embodiment the sounder is mounted such that at least a part projects through an opening in the sounder housing towards the sounder plate, so that a surface of the sounder is close to the sounding plate itself. A slight adjustment of the spacing of the sounding plate and the sounder housing must then be made, in order to ensure that the volume therebetween (excluding the projecting part of the sounder) is suitable to achieve a satisfactory resonance, but in practice the level of adjustment is small. However, this development of the present invention has the advantage that the overall height of the sounder unit may be reduced, since the height of the sounder housing may be less than the total height of the sounder itself. Previously, sounder housings have been at least as high, if not higher, than the height of the sounder.

In an arrangement in which a detector unit or light unit is stacked on a sounder unit, it is necessary that the electrical connections to the detector unit or light unit pass through the sounder unit. Therefore, a further development of the present invention proposes that a terminal block be provided within the sounder housing, providing for electrical connection both to the sounder and to the detector/light unit. There may then be an opening in the housing in the surface of the housing closest to the detector/light unit, to permit suitable electrical connection. Again, this permits a compact construction to be achieved.

It can be noted that although the present invention has primarily been developed for a ceiling mounted sounder assembly, it is not restricted thereto and the sounder assembly may be mounted on any suitable surface.

Some embodiments of the invention will now be described in further detail, with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of a first embodiment of a sounder assembly, which comprises a sounder body and a sounder plate;

Fig. 2 shows a bottom view of the sounder body of Fig. 1;

Fig. 3 shows a schematic sectional view through a sounder assembly according to a second embodiment;

Fig. 4 shows a detailed sectional view through the sounder housing of the sounder assembly of Fig. 3;

Fig. 5 shows a plan view of the sounder unit of the sounder assembly of Fig. 3, Fig. 3 being taken along the line A to A in Fig. 5 and Fig. 4 being taken along the line B to B in Fig. 5;

Fig. 6 is a side elevation of a third embodiment of a sounder assembly showing a sounder plate and a sounder body separated; and

Fig. 7 is a top plan view of the sounder plate of the third embodiment.

Fig. 1 shows a generally cylindrical sounder body 2, generally inside which is an electrical sounder 4 – (best seen in Fig. 2). The sound from the sounder is emitted through an opening 6 in the top face 5 of the sounder body.

A sounder plate 8 is shaped and dimensioned to overlie the top face 5 of the sounder body 2, to which it is mounted. Spacer means 12, which may be integral with the plate 8, maintain the plate at a distance from the face 5, and generally parallel to it. A number of fixing holes 10 may pass through the plate 8 and the spacers 12.

Fig. 2 shows the bottom of the sounder body 2, generally inside which is the sounding device 4. Said sounding device has a number of electrical connectors, 14. The sounder body may have a rim 16 bridged by strengthening walls 18, and contain an encapsulating resin in which the sounder 4 is embedded.

In use, sound from the sounding device 4 is emitted through the opening 6 and emerges radially from the space between the body 2 and the plate 8. An associated component, e.g. a fire detector or a flashing xenon light may be mounted on the plate, thus providing a compact alarm unit.

For the volume of sound to be satisfactory, the dimensions of the components are important, particularly the diameter of the opening 6, the diameter of the plate 8 and its spacing from the body 2. For example, if the spacing is increased, the plate diameter should be decreased.

Fig. 3 shows a second embodiment of the present invention in which a detector unit 20 and a sounder unit 21 are stacked one on the other. In this embodiment of the present invention, the detector unit 20 may be wholly conventional and therefore its detailed structure will not be discussed.

The sounder unit 21 comprises a housing 22 which supports a sounder 23, a sounding plate 24 connected to the housing via supports 25 and a terminal block 26. The sounder unit 21 may also contain suitable electronics, as will be discussed later.

It can readily be seen that the sounder 23 in Fig. 3 is laterally displaced from the centre of the housing 22, so that the terminal block 26 may be mounted alongside the sounder 23. This permits a compact construction to be achieved. The terminal block 26 is mounted in the housing 22 so that it is (in plan) within the boundaries of an aperture 27 (shown more clearly in Fig. 5) so that electrical connections arriving at the sounder assembly from the bottom in Fig. 3 may pass through the housing 22 via the terminal block 26 to the detector 20. An opening 28 may be provided in the sounding plate 24 to facilitate this.

As can also be seen from Fig. 3 the sounder 23 projects from the housing 22 into the space defined between the housing 22 and the sounding plate 24. The upper surface 29 of the sounder (from an opening in which surface 29 the sound is emitted), is very close to the sounding plate 24. In practice, the spacing is preferably at least as small as 3 mm, more preferably 1 mm. The volume of air between the sounding plate 24 and the adjacent surface of the housing 22 acts as a resonating volume for the sounder 23, and, since the sounder 23 projects into that space, the spacing of the sounding plate 24 and the housing 22 must be suitably selected in order to achieve the necessary resonant volume. However, it has been found that by bringing the surface 29 of the sounder 23 close to the sounder plate 24, two advantages are achieved. Firstly, it is found that better sound generation occurs. Secondly, the height of the housing 22 may be reduced, as compared with existing arrangements, because the sounder 23 need not wholly be contained within the housing 22.

Fig. 4 shows the structure of the housing 22 in more detail; Fig. 4 being taken along the line B to B in Fig. 5. In particular, Fig. 4 shows that the housing 22 has a boss 40 projecting from its upper surface, which boss may coincide with an opening in the sounding plate 24 to enable connection thereto of a suitable interconnection to the detector unit 20. In this way, the detector unit 20 is fixed above the sounder unit 21. Fig. 4 also shows a mounting recess 41 in the housing 22 to enable the housing 22 and hence the sounder assembly, to be fixed to a suitable surface. Fig. 5 shows that a second mounting recess 42 similar to the mounting recess 41 may be provided.

Finally Fig. 5 shows the upper surface of the sounder unit 21 in plan view. The mounting of the terminal block 26 below the aperture 27 can clearly be seen. Furthermore, Fig. 5 shows that there is a suitable space, e..g area 50 to enable electronic components to be mounted in the housing 22 to control the sounder and/or detector. The electronics mounted in the space 50 may be conventional, and will not be discussed in detail. Also shown in Fig. 5 is a user controllable adjustment device 51 connected via the electronics in e.g. space 50 to the sounder 23 for controlling the volume of the sounder 23. The mounting of this in line with the aperture 27 makes access for adjustment easy.

A further feature that is evident from Fig. 5 is that the aperture 27 is larger than the terminal block 26, to allow the passage of a suitable number of cables to or from the detector unit 20.

Thus, it can be seen that a compact sounder assembly is achievable. The sounder assembly has the minimum lateral extent, and also the minimum vertical extent compatible with the size of the components. This is particularly desirably in a ceiling mounted assembly, since then the assembly is not obtrusive. It

should be noted that, when the assembly of Fig. 3 is mounted on the ceiling, it will be inverted and the words "above" and "below" in the description of the embodiment are concerned only with the orientation shown in Fig. 3. It may also be noted that the sounder assembly according to that embodiment may be mounted on any suitable surface at any orientation.

Furthermore, it is possible to replace the detector unit 20 with a light unit, with the sounder unit then being connected to a remote detector. Again, such a light unit may be conventional.

Figs. 6 and 7 show a third embodiment which is a sounder unit 50 substantially the same as the sounder unit 21 of the second embodiment. Thus there is a housing 51 in which a sounder, a terminal block 52, and other components are mounted; and there is a sounding plate 54 which, in use, is connected to the housing via supports 56. The main top surface 58 of the housing is a circular plate. Adjacent the periphery there is a circular rib 60. The terminal block 52 is mounted in an aperture delimited by a wall 62 that rises from the surface to the same height as the supports 56. Also projecting above the surface 58 to the same height are a pair of hollow bosses 64, similar to the bosses 40 of the second embodiment. The sounder projects slightly above the surface 58 within a sounder cover 66. The top of this cover is an annular plate 68 with a central opening, centered over the sounder. The plate 68 is spaced slightly below the level of the tops of the terminal block wall 62, the supports 56 and the bosses 64. However adjacent to the edge of the housing there is a pillar 69 that also extends to the higher level.

The sounding plate 54 has the form of a shallow cup. The base 70 is a flat disc penetrated by screw apertures 72 corresponding to the supports 56; by connection apertures 74 corresponding to the hollow interiors of the bosses 64; an adjustment aperture 76 for permitting access to a user controllable device associated with the sounder; and a large terminal block aperture 78 corresponding to the aperture delimited by the wall 62. The cylinder wall 80 has the form of a multiplicity of teeth 82 between which are defined openings. Over about two thirds of the circumference these penetrate the wall 80 to provide sound outlets. Over the remaining third they are closed. The plate is dimensioned so that it can sit on the housing 51, engaging over the rib 60. The base 70 is then in contact with the tops of the terminal block wall 62, the supports 56, the bases 64, and the pillar 69, and is spaced by a small, carefully controlled, distance from the plate 68 of the sounder cover 66, thus providing a predetermined resonance volume. With the various openings in register, the plate 54 is oriented so that the closed third of the openings are centred on, and adjacent, the sounder cover 66.

Claims

1. A sounder assembly comprising: a housing(22); a sounder plate(24); mounting means(25) whereby the sounder plate is mounted to the housing in overlying relationship and spaced therefrom; and a sounder mounted(23) generally within the housing and arranged to direct sound towards the sounder plate(24) so that, in use, sound emerges laterally of the sounder plate.

2. An assembly according to claim 1 including a wall portion(29) interposed between the sounder and the sounder plate, said wall portion having an opening through which sound is directed; said wall portion being spaced from the sounder plate, the spacing being selected so that the volume of air between the sounding plate and the adjacent surface of the sounder housing acts as a resonating volume.

3. An assembly according to claim 1 or 2 wherein the centre of the sounder(23) is displaced from the centre of the sounder housing(22).

4. An assembly according to any preceding claim wherein the sounder(23) is mounted such that at least a part projects through an opening in the sounder housing towards the sounder plate(24).

5. An assembly according to any preceding claim further including at least one further electrical device(20) which is mounted to the sounder plate.

6. An assembly according to claim 5 wherein at least one further electrical device comprises a sensor and connection means are provided whereby the sensor is coupled to the sounder for triggering actuation thereof.

7. An assembly according to claim 5 wherein the at least one further electrical device comprises a light.

8. An assembly according to claim 5, 6 or 7 further including a terminal block(26) provided within the housing and arranged to provide electrical connection to the sounder and to the or each further electrical device.

9. An assembly according to claim 8 wherein the housing has a cavity(27) which opens towards the sounder plate(24) in which the terminal block(26) is located; and the sounder plate has an aperture in register with the cavity opening for the passage of electrical connecting means.

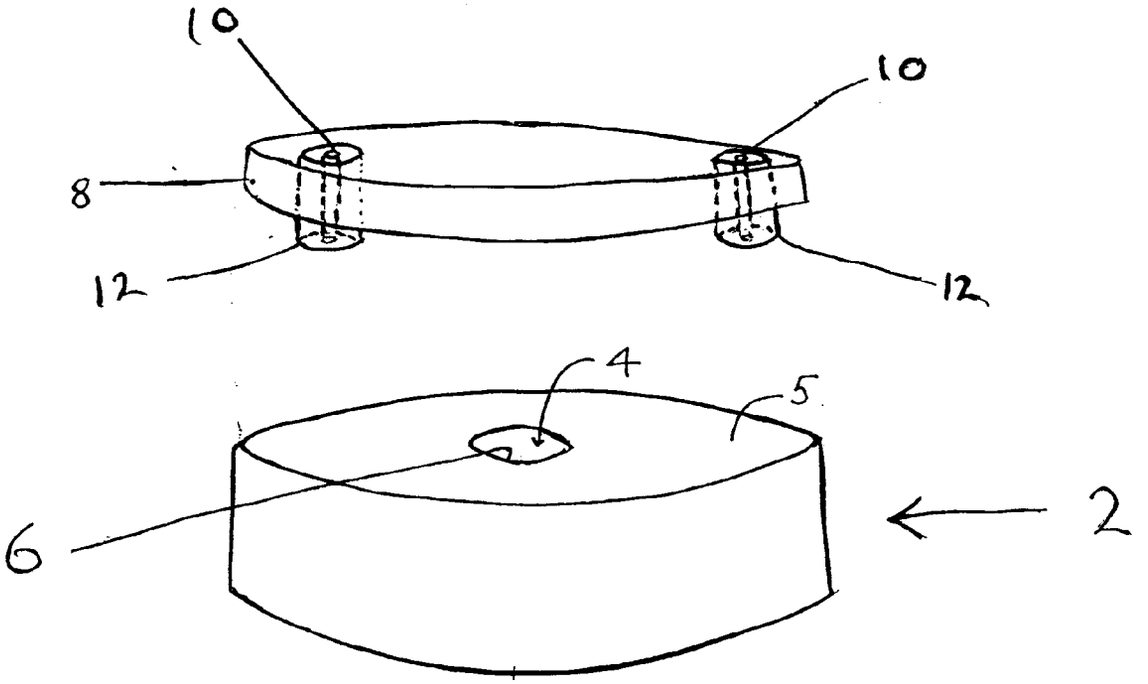


Fig 1

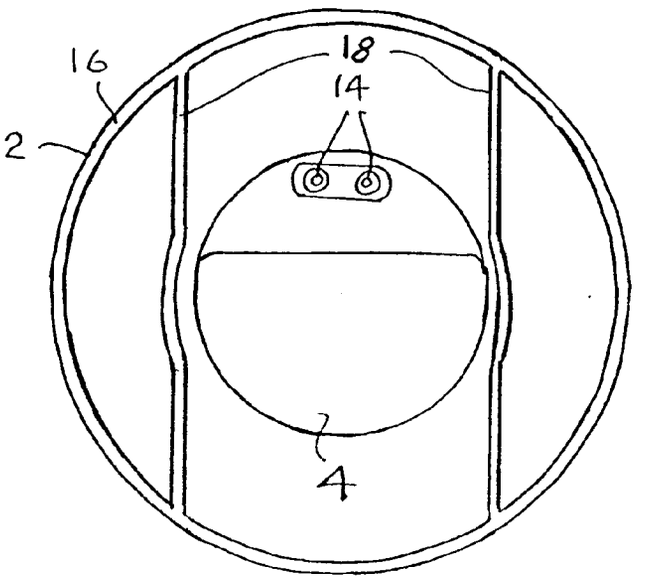


Fig 2

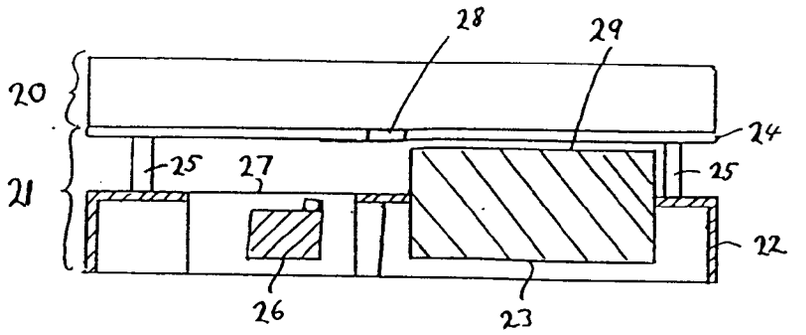


Fig 3

Fig 4

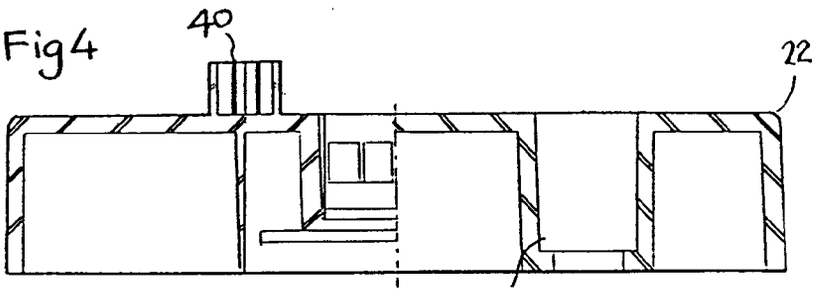
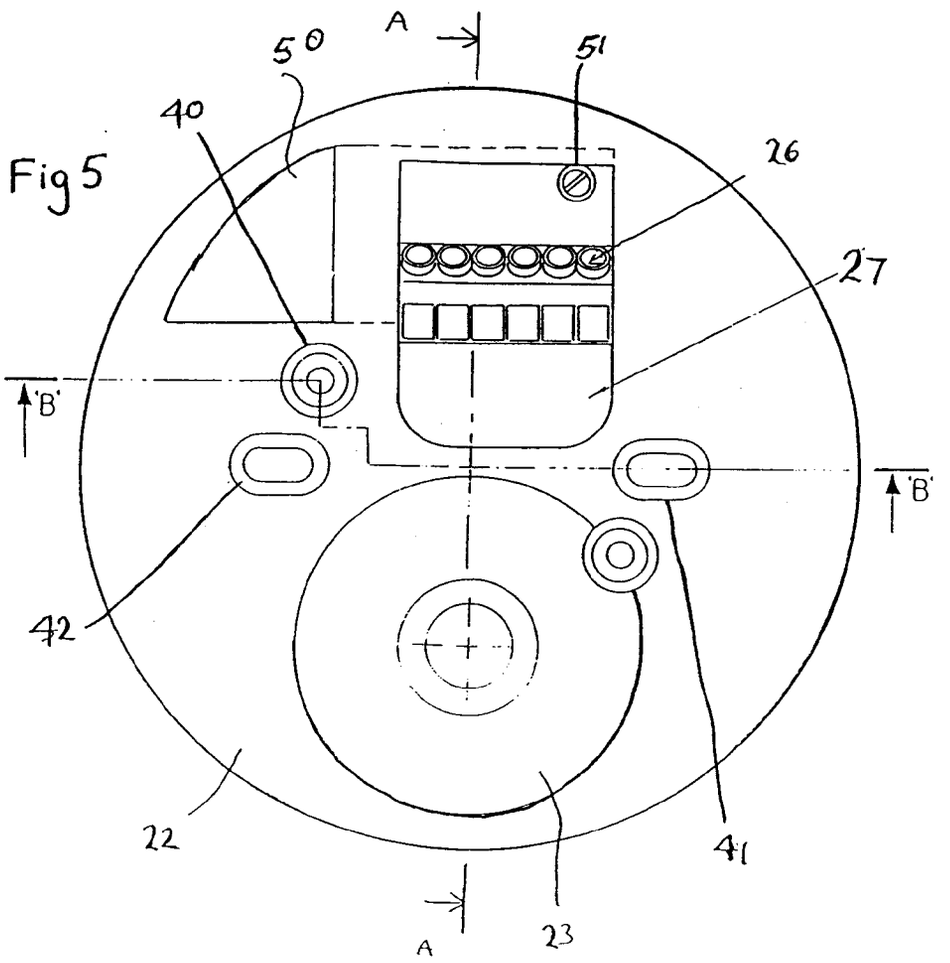


Fig 5



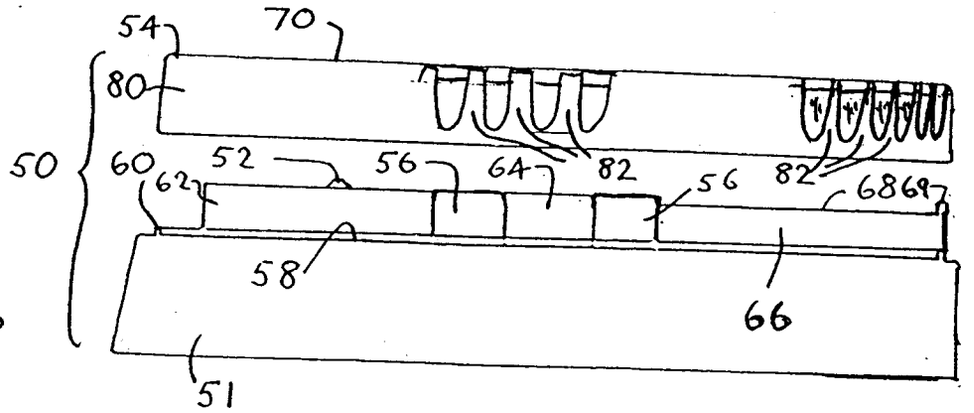

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Fig6

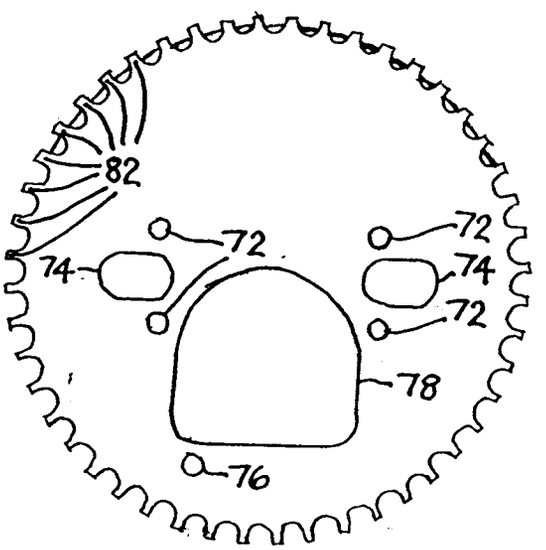
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Fig7