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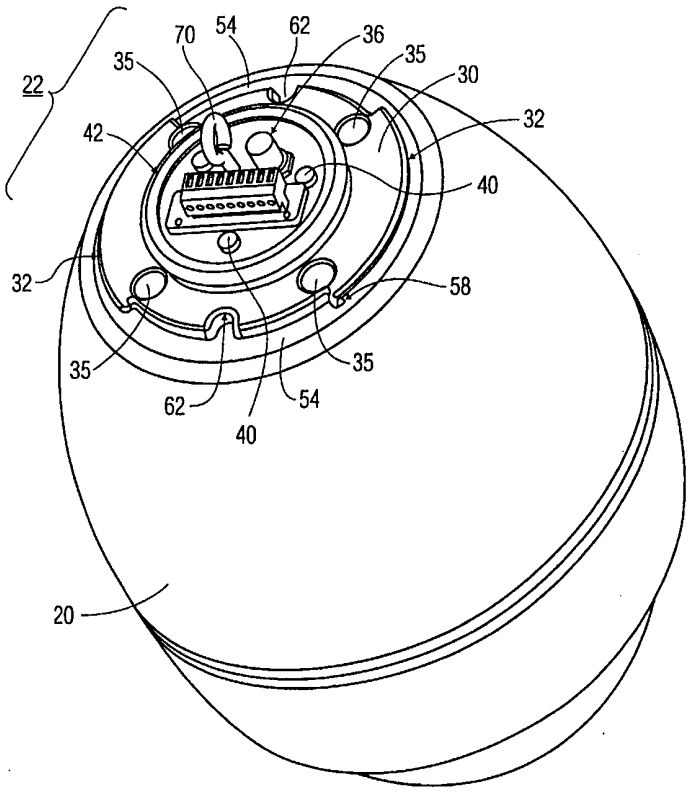
(54) Title: SURVEILLANCE CAMERA HOUSING WITH MOUNTING UNIT

(57) Abstract

A surveillance camera housing (20) contains a crown plate (30) with voids and radially extending flanges (32) which engage corresponding radially extending flanges (28) and voids in a mounting cap (24). A radial gasket (42) is disposed upon the crown plate (30) and electrical connectors (36) are disposed within the radial gasket (42). In operation, the flanges (32) of the crown plate (30) are placed within the voids of the mounting cap (24) and the flanges (28) of the mounting cap (24) are placed in the voids of the crown plate (30). When the housing (20) is further lifted vertically a horizontal plane defined by the crown plate flanges rises above a horizontal plane defined by the mounting cap flanges (28). The housing (20) is then rotated so that the crown plate flanges (32) rest upon the mounting cap flanges (28).



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Surveillance camera housing with mounting unit.

This invention relates to the field of surveillance camera housings and specifically for a housing mounting unit which places the interface for the electrical connections between a mount and a surveillance camera at the mechanical interface between the housing and a mount.

Camera housings like those in U.S. Patent 5,689,304, require the installation of a separate mounting unit. Video, power, and signal wires pass between a surveillance camera installed inside the housing, and a stationary mount, through this mounting unit. The interface between the mounting unit and the housing must be strong, aesthetically pleasing, and watertight. This requires that the housing be connected to the mounting unit in a separate operation generally using fasteners flattening a gasket to produce the necessary seal.

After the mounting unit is connected to a mount and to the housing, the housing subassembly contains unterminated wires extending therein which must be later connected to a surveillance camera by a technically qualified individual. The connection requires access inside the housing necessitating a larger housing to allow ingress of the camera. This arrangement thus requires costly installer time, a larger housing, and a field-actuated mechanical and electrical interface device.

Other prior art attempts like in U.S. Patent 5,718,602, use a large longitudinally extending latch member which is deflected by a cam element and then supported in a recess in that same cam element. This arrangement relies on a biasing force on the latch member to rotate it back into the recess after it is deflected. The engagement is performed automatically relying on this biasing force and so is less reliable and safe than if a user actually causes the engagement. For example, if the latch member does not rotate into the recess and the camera and housing are released, the camera and housing will fall. Furthermore, the latch member necessarily has a length which increases the space required for the arrangement and thus decreases the aesthetic appearance.

Therefore, it is an object of the invention to provide a camera housing which can be easily coupled to a mount without the need for costly field technicians to install the device. So, it is an object of the invention to provide a camera housing with a mounting unit which allows for simple engagement of the housing with a mount. The installation should preferably be user controlled, inexpensive, reliable, structurally sound, and aesthetically pleasing. Preferably a camera housing is combined with a mount in a manner that is simple, aesthetically pleasing, yields reliable engagement, and is structurally sound.

In one aspect of the invention a surveillance camera housing includes a mounting unit having a crown plate. The crown plate has a first radially extending flange for engagement with a corresponding second radially extending flange in a mounting cap. An electrical connector is disposed within the crown plate.

This aspect, like the ones which follow, yields a structurally strong, aesthetically pleasing, easily installed camera housing mount combination.

Another aspect of the invention is a method of connecting a housing including a mounting unit, with a mount including a mounting cap. The method includes providing a mounting cap having a first flange; providing a mounting unit with a second flange; and disposing electrical connectors in the housing. The method further includes inserting the housing with the mounting unit into the mounting cap with the second flange entering the mounting cap in a position where the first flange is not present, and the first flange engaging the housing where the second flange is not present. The method still further includes rotating the housing thereby causing the first flange to be disposed below the second flange.

In yet another aspect of the invention, a surveillance camera housing coupled to a mounting through a mounting unit includes a mounting cap having a first radially extending flange; and a housing having a crown plate. The crown plate has a second radially extending flange resting on the first radially extending flange. An electrical connector is disposed within the crown plate.

These objects, as well as others, will become more apparent from the following description read in conjunction with the accompanying drawings where like reference numerals are intended to designate the same elements.

Fig. 1 is a side elevation view of a housing and cut-away view of a mounting unit according to the invention;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a cut-away side-elevational view taken along line D-D of Fig. 2 detailing a mounting unit of the invention;

Fig. 4 is a cut-away side-elevational view taken along line B-B of Fig. 2 detailing a mounting unit of the invention;

Fig. 5 is a bottom perspective view of a mounting cap used in the invention;

Fig. 6 is plan perspective view of a mounting unit and a housing used in the invention;

Fig. 7 is a side elevational view of a housing and mounting unit used in the invention; and

Figs. 8A-8D are magnified side elevational views showing different embodiments of a radial gasket used in the invention.

Referring briefly to Fig. 1, a housing 20 is connected to a mounting unit shown generally at 22. Fig. 3 details the components of mounting unit 22 with a cut away cross-sectional view of mounting unit 22 taken along the line B-B shown in the plan view of Fig. 2. A generally frustrum shaped sand cast aluminum mounting cap 24, having a tapered opening 26 at a first end, and radially extending interior flanges 28 at a second end, is shown engaged with a sand cast aluminum crown plate 30. Tapered opening 26 can contain internal threads 27 to mate with an externally threaded pipe mount (not shown). Mounting cap 24 further contains inward extensions 46 which extend parallel to a central axis 56 of the frustrum. Crown plate 30 has radially extending exterior flanges 32 for engaging with interior flanges 28. The underside of crown plate 30 is sealed in a watertight manner to the top of housing 20 with a seal 34. Seal 34 can be a flat gasket, a plurality of screws 35 (shown in Fig. 6), or any other conventional sealing unit. Access to components inside the housing, such as address switches, can be realized by removing seal 34.

Referring now also to Fig. 4, there is a cut-away cross-sectional view of mating unit 22 taken along line D-D shown in the plan view of Fig. 2. Electrical connectors 36 are disposed on, and electrically coupled to, an electrical connector plate 38 thereby providing an electrical connection between tapered opening 26 and the interior of housing 20. Electrical connector plate 38 is further coupled to crown plate 30 through screws 40. A hollow radial gasket 42 having a hollow, bulb-shaped, circumferential edge 44, is disposed on top of crown plate 30. Clearly, radial gasket 42 could also be affixed to mounting cap 24.

As can be discerned, when mounting cap 24 is placed on housing 20, inward extensions 46 deflect circumferential edge 44 downward thereby creating a seal pressure for all elements disposed radially external to circumferential edge 44. Conversely, all elements disposed within the hollow portion of radial gasket 42 are left unsealed and accessible through tapered entry 26. The use of a hollow, bulb-shaped circumferential edge 44 allows for significant radial deflection with minimal and equal amounts of both insertion and extraction forces which avoids the need of high cost precision tolerances.

Continuing with reference to Figs. 3 and 4 and making further reference to Fig. 5, interior flanges 28 are disposed on approximately half of the circumferential edge of mounting cap 24. The other half of the circumferential edge of mounting cap 24 contains voids 50 which exist where interior flanges 28 would have been, and further contains screw receiving portions 52. Similarly, as is shown in Fig. 6, exterior flanges 32 cover approximately half of the circumferential edge of crown plate 30. The other half of the circumferential edge of crown plate 30 contains voids 54.

As can be seen most clearly from Fig. 3, exterior flanges 32 extend to the furthest position from central axis 56. By placing exterior flanges 32 at this position, two distinct strength factors are realized. First, the circumference of these flanges is larger thereby creating more bearing area to reduce the stress induced upon the flanges themselves. Second, the large off-axis distance allows for more stress to be transmitted through torque loads at the interface between housing 20 and mounting cap 24.

Referring to Figs. 3-6, in operation, a surveillance camera (not shown) is placed within housing 22 with all electrical connectors 36 which must be accessible to an installer, being disposed near the hollow portion of radial gasket 42 and thus near the center of crown plate 30. If desired, a safety cable eyehook 70 may be disposed near electrical connectors 36. Housing 20, along with mounting unit 22 are engaged with mounting cap 24 by placing exterior flanges 32 in voids 50 and simultaneously placing interior flanges 28 in voids 54. Housing 20 and mounting unit 22 are further lifted so that a horizontal plane defined by exterior flanges 32 is higher than a corresponding horizontal plane defined by interior flanges 28. Housing 20 and mounting unit 22 are then rotated a quarter turn about housing 20's long axis thereby placing exterior flanges 32 above interior flanges 28 and allowing exterior flanges 32 to be supported by interior flanges 28 as is shown most clearly in Fig. 3.

Referring to Fig. 7, rib extensions 58 are disposed at both ends of exterior flanges 32. At a first end of exterior flange 32, rib extension 58 completely inhibits rotation of housing 20 and mounting unit 22. At a second end of exterior flange 32, rib extension allows

rotation of housing 20 and mounting unit 22 only if housing 20 and mounting unit 22 are initially raised vertically. Rib extension 58 thus prevents unintentional disengagement due to applied gravitational forces. Removal of housing 20 requires a user to lift housing 20 vertically and rotate housing 20 about its long axis in a direction opposite that which was used to insert housing 20.

Referring to Figs. 4-6, mechanical engagement of housing 20 and mounting unit 22 with mounting cap 24 is further enhanced with the provision of anti-rotation screws 60. Anti-rotation screws 60 supplement rib extensions 58 by further inhibiting any rotation of housing 20. When exterior flange 32 and interior flange 28 are engaged, anti-rotation screw 60 is threaded through screw receiving portion 52 in mounting cap 24 into a notch 62 disposed in an exterior portion of crown plate 30. As shown most clearly in Fig. 4, anti-rotation screws 60 are mounted generally vertically so as to improve the aesthetics of the apparatus while still maintaining accessibility for an installer. Anti-rotation screws 60 are disposed on crown plate 30 at a position which is radially external to radial gasket 42 so that any water seeping through the screw threads will flow through the gap between mounting cap 24 and housing 20 and will not enter the inside of housing 20. Alternatively, anti-rotation screws could be replaced with spring-loaded detents (not shown) for effecting the same purpose.

Mounting cap 24 can be formed as an extension of any mount. For example, a wall mount arm extension could terminate in a structure like mounting cap 24. In such an embodiment, the external surfaces on the mounting arm could be further structured to blend with housing 20. The mounting cap could further contain a small circumferential step disposed radially upon it to indicate where housing 20 ends and mounting cap 24 begins.

Therefore, by placing the mounting unit and the electrical connector near each other, an installer is provided with the ability to quickly and conveniently access and install a surveillance camera housing to a mount. Additionally, minimal stress is placed on the electrical wires, a high level of mechanical strength and reliability are realized, and aesthetics are maintained. The camera is hard wired in the factory and so no time-consuming or costly connection device is required during installation. Furthermore, the camera and the housing are all in one subassembly and so the camera is protected during handling.

Having described the preferred embodiments it should be made apparent that various changes could be made without departing from the scope of the invention which is defined more clearly in the appended claims.

For example, referring to Fig. 8B, the circumferential edge 44 of radial gasket 42 could include a plurality of radially extending protrusions or fingers 64 (like an open bulb)

instead of a hollow bulb shape as in Fig. 8A. As shown in Fig. 8C, radial gasket 42 could be disposed about crown plate 30 so that circumferential edge 44 is compressed axially instead of radially. Radially gasket 42 and inward extension 46 could be replaced by a first labyrinth portion 66 and a second labyrinth portion 68 designed to interlock with each other. Clearly, this labyrinth interlocking would not provide a true seal but the defined tortuous path would discourage ingress of contamination.

Similarly, internal surface 48 of mounting cap 24 need not be cylindrical. For example, the external surface of crown plate 30 or the internal surface of mounting cap 24 could be tapered to effectuate engagement of the elements.

Interior flange 28 and exterior flange 32 which provide mating engagement between housing 20 and mounting plate 24 need not be flange shaped. They could, for example, embody keying features wherein a series of protrusions and voids mesh and interlock providing mating ingress and egress in one position and providing support of housing 20 in another position. The flanges could also embody a series of protrusions of variable size thereby providing a cam action tightening the mounting cap-housing interface.

In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The wording "comprising" does not exclude the presence of elements or steps other than those listed in a claim. The wording "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. In a device claim enumerating several means, several of these means can be embodied by one and the same item of hardware.

A preferred embodiment of the invention can be summarized as follows. A surveillance camera housing contains a crown plate with voids and radially extending flanges which engage corresponding radially extending flanges and voids in a mounting cap. A radial gasket is disposed upon the crown plate and electrical connectors are disposed within the radial gasket. In operation, the flanges of the crown plate are placed within the voids of the mounting cap and the flanges of the mounting cap are placed in the voids of the crown plate. When the housing is further lifted vertically a horizontal plane defined by the crown plate flanges rises above a horizontal plane defined by the mounting cap flanges. The housing is then rotated so that the crown plate flanges rest upon the mounting cap flanges.

CLAIMS:

1. A surveillance camera housing (20) comprising:

a mounting unit (22) having a crown plate (30), said crown (30) plate having a first radially extending flange (32) for engagement with a corresponding second radially extending flange (28) in a mounting cap (24); and

an electrical connector (36) disposed within said crown plate (30).

2. The surveillance camera housing as claimed in claim 1 further comprising a radial gasket (42) disposed upon said crown plate (30).

3. The surveillance camera housing as claimed in claim 2 where said radial gasket (42) has a circumferential edge (44) that is one of a bulb-shape (44), and a plurality of radially extending fingers (64).

4. The surveillance camera housing as claimed in claim 1 further comprising first labyrinth portions (66) disposed on said crown plate (68) for engaging with second labyrinth portions in said mounting cap, said labyrinth portions discouraging ingress of contaminants into said housing (20).

5. The surveillance camera housing as claimed in claim 1 wherein said first radially extending flange (32) includes at least a first and second rib portion (58) for limiting movement between said first radially extending flange (32) and said second radially extending flange (28).

6. The surveillance camera housing as claimed in claim 1 wherein said crown plate (30) further includes a plurality of notches (62) for receiving a plurality of anti-rotation screws (60), said anti-rotation screws (60) prohibiting movement between said first radially extending flange (32) and said second radially extending flange (28).

7. The surveillance camera housing as claimed in claim 1 wherein said flanges embody one of a keying feature and a series of variable sized protrusions.

8. The surveillance camera housing as claimed in claim 1 wherein said crown plate (30) further includes a plurality of spring loaded detents for inhibiting movement between said first radially extending flange (32) and said second radially extending flange (28).

9. The surveillance camera housing as claimed in claim 1 wherein each of said first and second radially extending flanges comprise a plurality of flanges.

10. A method of connecting a housing (20) including a mounting unit (22), with a mount including a mounting cap (24), said method comprising:

providing a mounting cap (24) having a first flange (28);

providing mounting unit (22), the mounting unit (22) having a second flange (32);

disposing electrical connectors (36) in said housing;

inserting said housing (20) with said mounting unit (22) into said mounting cap (24) with said second flange (32) entering said mounting cap (24) in a position where said first flange is not present (50), and said first flange (28) engaging said housing (20) where said second flange is not present (54); and

rotating said housing (20) thereby causing said first flange (28) to be disposed below said second flange (32).

11. A surveillance camera housing (20) coupled to a mounting through a mounting unit (22), the housing (20) comprising:

a mounting cap (24) having a first radially extending flange (28);

the housing (20) having a crown plate (30), said crown plate (30) having a second radially extending flange (32) resting on said first radially extending flange (28); and

an electrical connector (36) disposed within said crown plate (30).

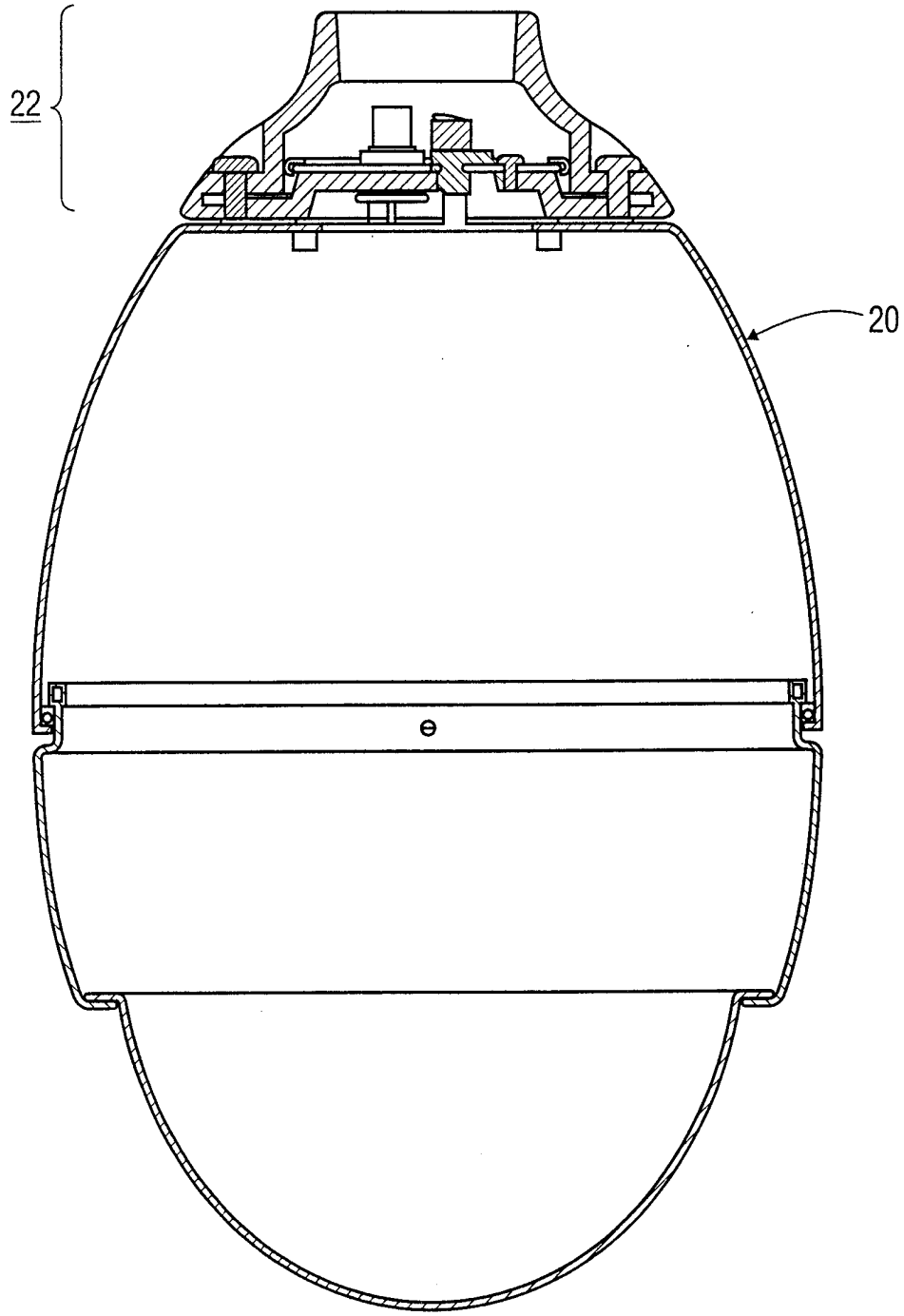

FIG. 1

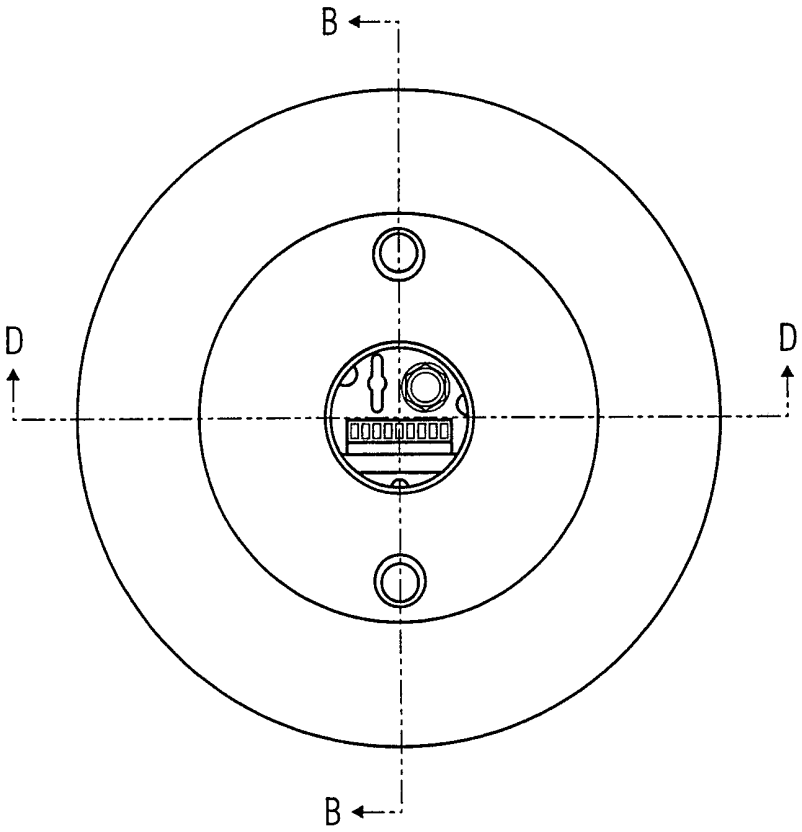

FIG. 2

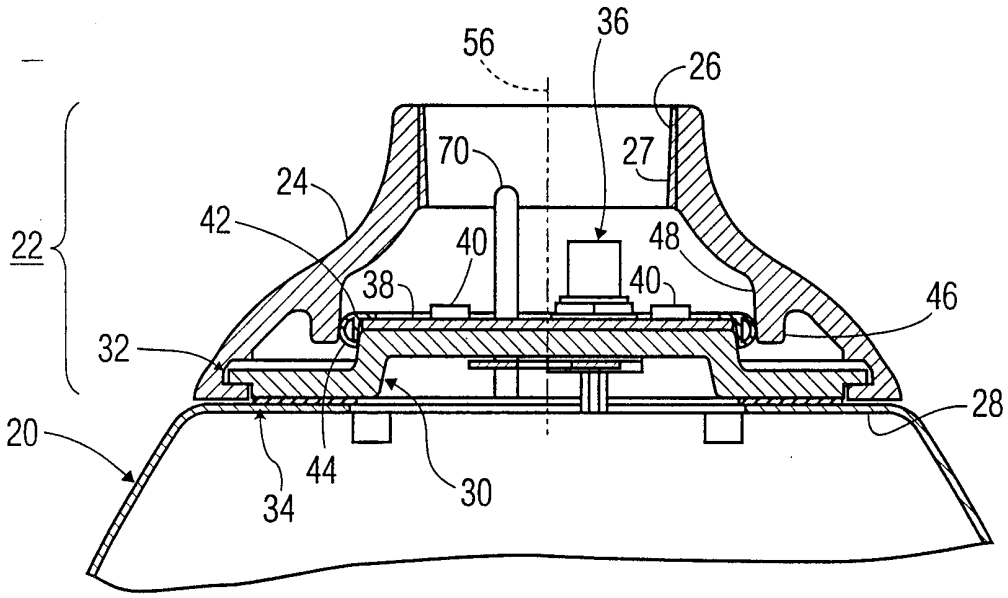
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FIG. 3

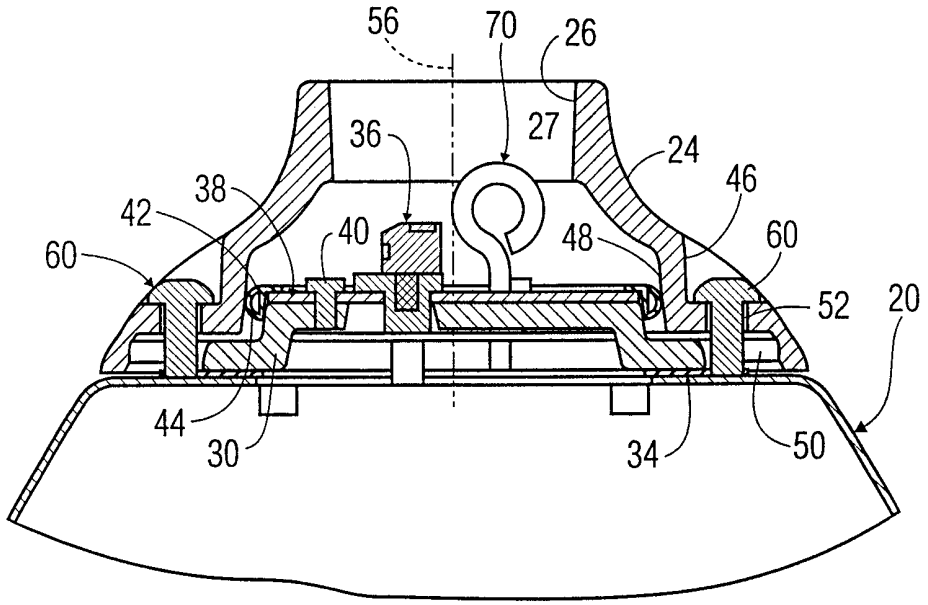
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FIG. 4

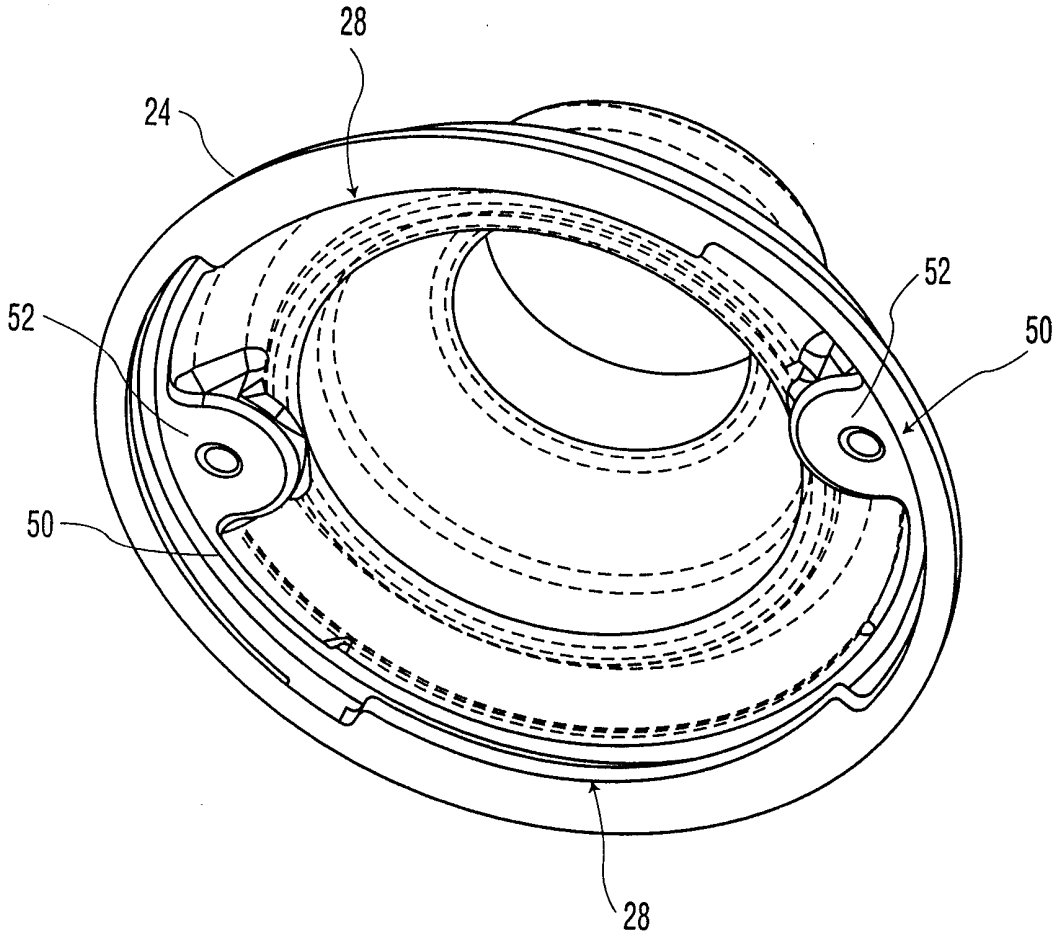

FIG. 5

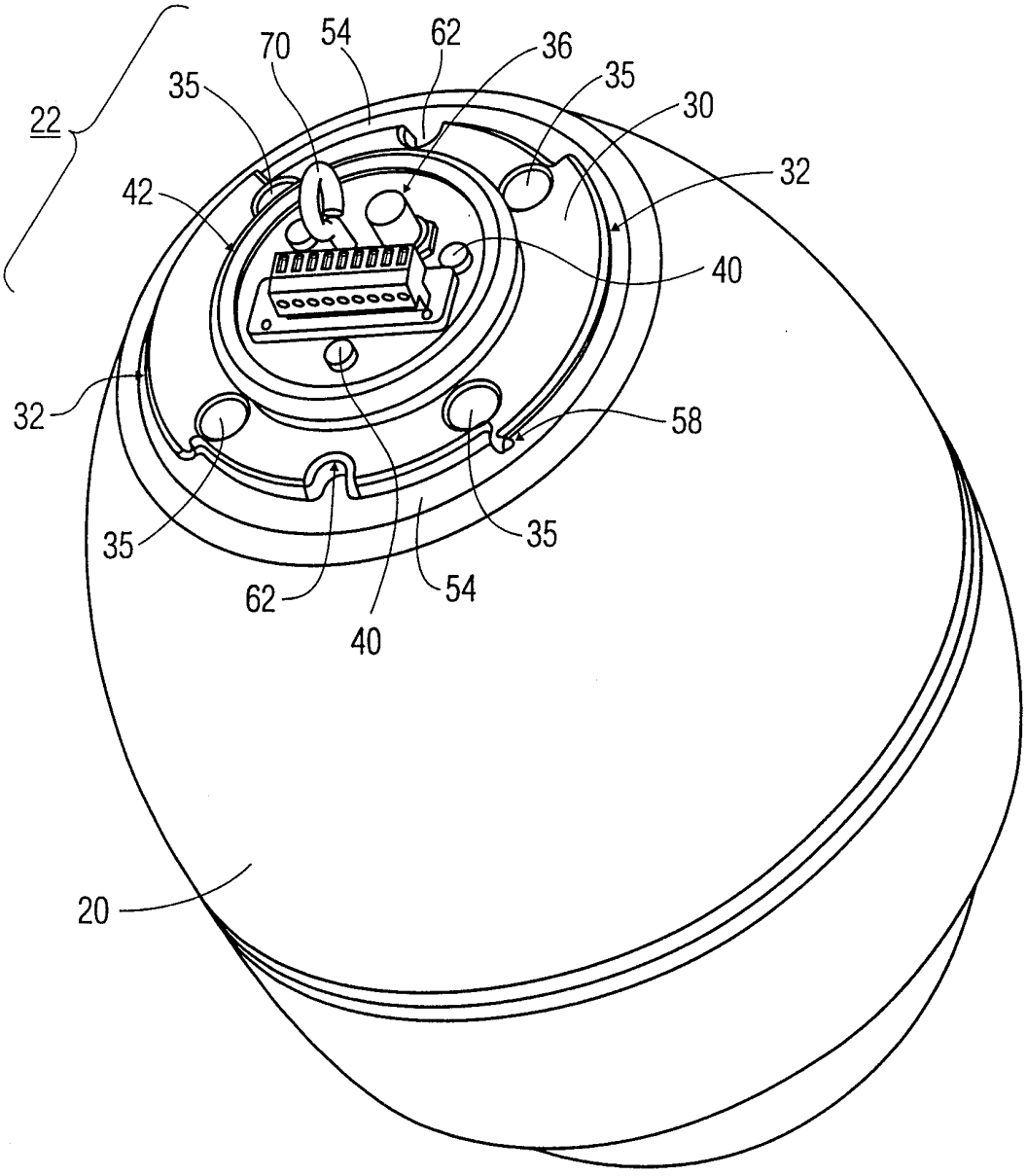

FIG. 6

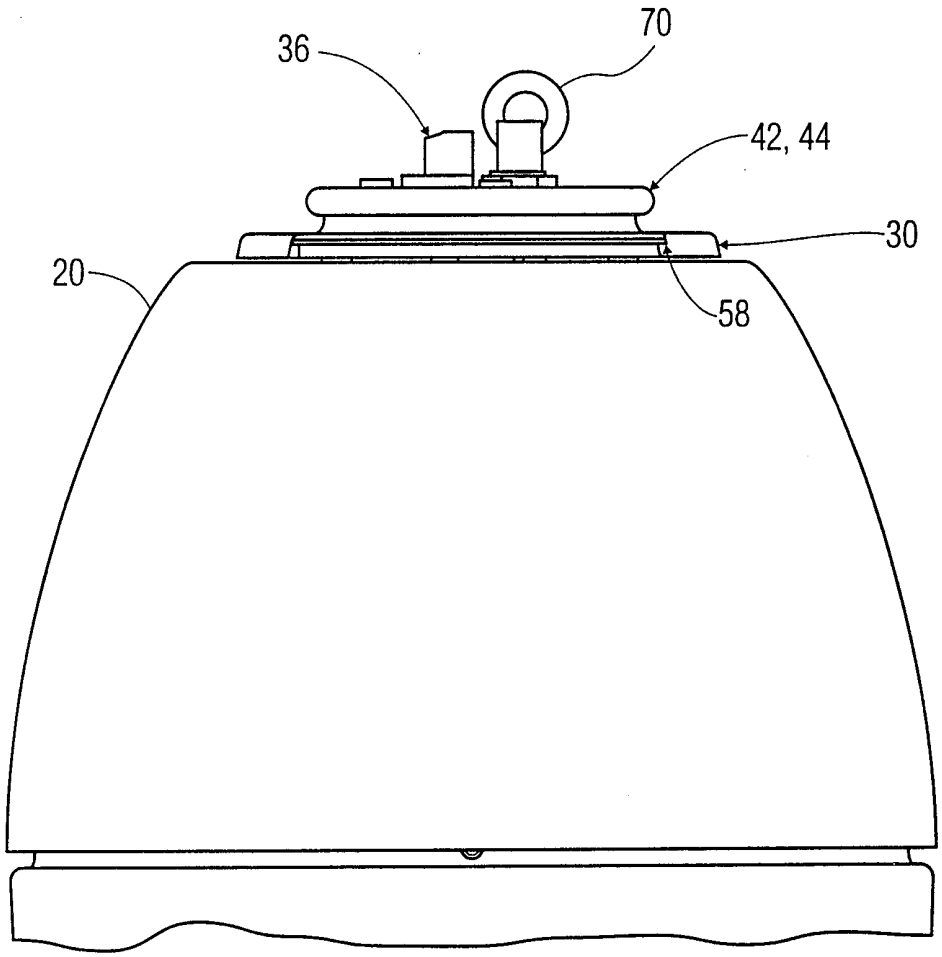

FIG. 7

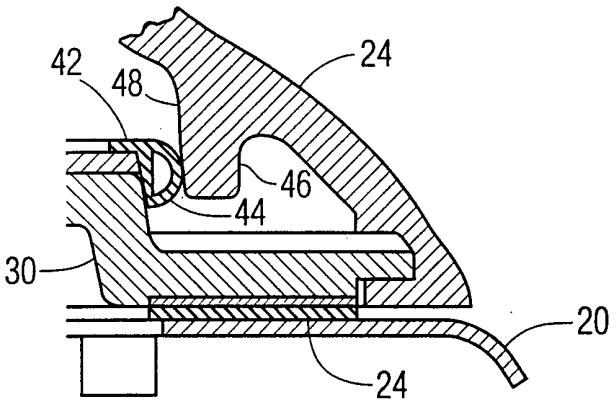

FIG. 8A

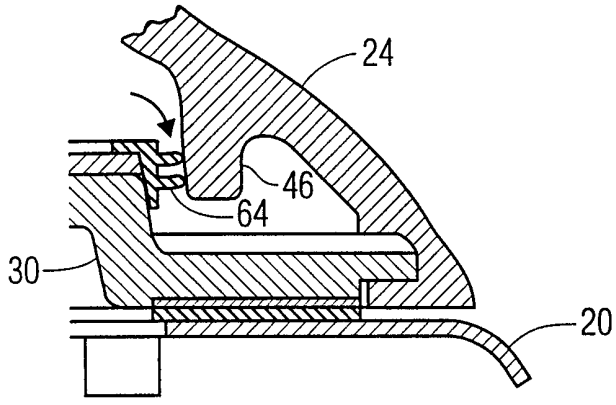

FIG. 8B

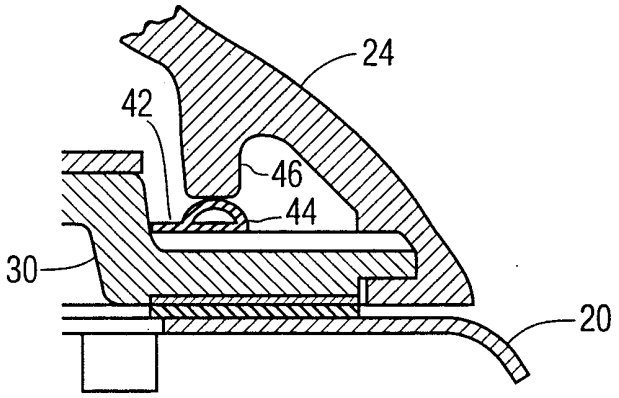

FIG. 8C

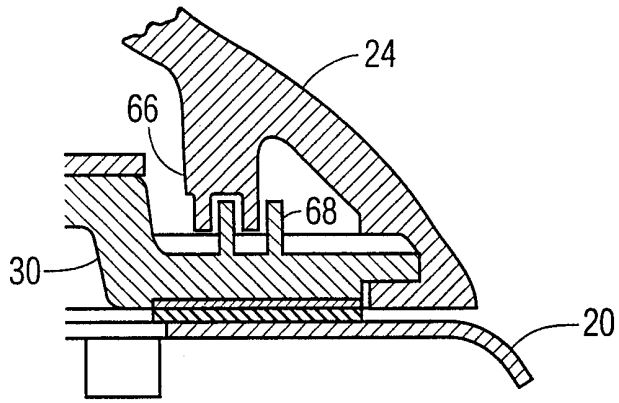

FIG. 8D

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/00234

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G08B15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G08B H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 689 304 A (ARNOLD KATHLEEN ELAINE ET AL) 18 November 1997 (1997-11-18) column 6, line 66 -column 7, line 32 column 11, line 18 - line 26 column 14, line 35 - line 40	1,2,4,10,11 5-9
A	EP 0 544 996 A (SENSORMATIC ELECTRONICS CORP) 9 June 1993 (1993-06-09) column 11, line 23 -column 12, line 1	1-11
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☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
22 May 2000	30/05/2000

Name and mailing address of the ISA	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 00/00234

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