

Description

The present invention relates to a waterproof display unit of a large-sized display equipment for providing a large number of people with visual information. Figure 2 shows a sectional view of a conventional waterproofing arrangement for use with such a display unit. Shown in Figure 2 are a display element 1 which is generally cylindrical and includes a spherical tip, a seal pusher 2, a seal 3, a shade 4, a printed circuit board 5 and a socket 6. The seal 3 is pinched between the seal pusher 2 and the shade 4 so that the seal is compressed in its axial direction and thus expanded perpendicularly to that direction. The display element 1 and the seal 3 are thus in tight engagement. The shade 4 prevents rain water from rushing in between the display element 1 and the seal 3. The seal 3 functions so that the rain water whose rushing motion is stopped by the shade 4 is prevented from entering the displaying unit.

Since the display element 1 is generally cylindrical, the conventional waterproofing can perform a proper waterproofing function. However, for a display element whose cross section is angular and whose tip is thicker than the base thereof, a good seal cannot be attained by using the conventional waterproofing device, and so the device cannot perform a sufficient waterproofing function. This is a problem.

German Patent 2752049 describes an apparatus in which two parts of a display device are sealed together using an 'O' ring. The 'O' ring engages a cylindrical surface and is compressed in its radial direction by the two parts of the device. A large compression force is required to produce an adequate seal in such an arrangement. French Patent 2244126 shows a similar apparatus but in which the seal is compressed in its axial direction. Again, a large compression force is required to produce an adequate seal and an external, complex, spring clip arrangement is required to provide and maintain the necessary axial loading.

The present invention was made in order to solve the above-mentioned problems.

Accordingly, it is an object of the present invention to provide a waterproof display unit, which performs a sufficient waterproofing function and has a simple construction.

According to the present invention, there is provided a waterproof display unit comprising a display element, a plug electrically and mechanically connected to the display element, a case having a display element insertion hole formed therein, and a socket for receiving the plug, and characterized by a finned annular end face seal fitted around the insertion hole such that on inser-

tion of the plug into the socket, the end face seal is compressed and the fins of the end face seal form a watertight seal with the plug.

Preferably, the plug and socket are fitted together in a manner such that they are not easily separated from each other.

Figure 1 shows a sectional view of a waterproofing device, which is an embodiment of the present invention, for the display unit of a large-sized outdoor display equipment.

Figure 2 shows a sectional view of a conventional waterproofing device for a display unit.

Figure 1 shows a waterproof display unit. The device comprises a display element 10 whose cross section is angular, a plug 11 electrically connected to an electrode of the display element, and fitted with an engaging pin 12, a socket 13 receiving the plug 11, an end face seal 14 whose inner diameter is smaller than the outer diameter of a display element insertion hole 16 provided in a unit case 15 into which the display element 10 is inserted, two fins 17 provided on the end face seal, the unit case 15 having a groove 18 formed around the insertion hole 16, the end face seal 14 being fitted into the groove, a printed circuit board 19, a high-voltage socket 20, and a cover 21.

The operation of the arrangement is now described. Since the inner diameter of the end face seal 14 is smaller than the outer diameter of the display element insertion hole 16 of the unit case 15, the end face seal is in tight contact with the unit case. When the plug 11 is fitted into the socket 13, the plug and the end face seal 14 engage tightly with each other. The end face seal 14 exerts a force in a direction to push the plug 11 out of the socket 13, but the end face seal and the plug 11 are kept in tight engagement with each other by pin 12 of the plug 11 engaging in the socket 13. Raindrops falling on the side surface of the display element 10 are prevented from entering the display unit by the two fins 17. Raindrops falling on the unit case 15 are stopped by the fin 17 located in contact with the unit case 15.

As described above a waterproofing arrangement is provided utilizing an end face seal around a display element insertion hole, thus permitting the easy production of a highly-reliable waterproof assembly.

Claims

1. A waterproof display unit comprising a display element (10), a plug (11) electrically and mechanically connected to the display element (10), a case (15) having a display element insertion hole (16) formed therein and a socket (13) for receiving the plug (11), and characterized by a finned annular end face seal (14)



Description

The present invention relates to a waterproof display unit of a large-sized display equipment for providing a large number of people with visual information. Figure 2 shows a sectional view of a conventional waterproofing arrangement for use with such a display unit. Shown in Figure 2 are a display element 1 which is generally cylindrical and includes a spherical tip, a seal pusher 2, a seal 3, a shade 4, a printed circuit board 5 and a socket 6. The seal 3 is pinched between the seal pusher 2 and the shade 4 so that the seal is compressed in its axial direction and thus expanded perpendicularly to that direction. The display element 1 and the seal 3 are thus in tight engagement. The shade 4 prevents rain water from rushing in between the display element 1 and the seal 3. The seal 3 functions so that the rain water whose rushing motion is stopped by the shade 4 is prevented from entering the displaying unit.

Since the display element 1 is generally cylindrical, the conventional waterproofing can perform a proper waterproofing function. However, for a display element whose cross section is angular and whose tip is thicker than the base thereof, a good seal cannot be attained by using the conventional waterproofing device, and so the device cannot perform a sufficient waterproofing function. This is a problem.

German Patent 2752049 describes an apparatus in which two parts of a display device are sealed together using an 'O' ring. The 'O' ring engages a cylindrical surface and is compressed in its radial direction by the two parts of the device. A large compression force is required to produce an adequate seal in such an arrangement. French Patent 2244126 shows a similar apparatus but in which the seal is compressed in its axial direction. Again, a large compression force is required to produce an adequate seal and an external, complex, spring clip arrangement is required to provide and maintain the necessary axial loading.

The present invention was made in order to solve the above-mentioned problems.

Accordingly, it is an object of the present invention to provide a waterproof display unit, which performs a sufficient waterproofing function and has a simple construction.

According to the present invention, there is provided a waterproof display unit comprising a display element, a plug electrically and mechanically connected to the display element, a case having a display element insertion hole formed therein, and a socket for receiving the plug, and characterized by a finned annular end face seal fitted around the insertion hole such that on inser-

tion of the plug into the socket, the end face seal is compressed and the fins of the end face seal form a watertight seal with the plug.

Preferably, the plug and socket are fitted together in a manner such that they are not easily separated from each other.

Figure 1 shows a sectional view of a waterproofing device, which is an embodiment of the present invention, for the display unit of a large-sized outdoor display equipment.

Figure 2 shows a sectional view of a conventional waterproofing device for a display unit.

Figure 1 shows a waterproof display unit. The device comprises a display element 10 whose cross section is angular, a plug 11 electrically connected to an electrode of the display element, and fitted with an engaging pin 12, a socket 13 receiving the plug 11, an end face seal 14 whose inner diameter is smaller than the outer diameter of a display element insertion hole 16 provided in a unit case 15 into which the display element 10 is inserted, two fins 17 provided on the end face seal, the unit case 15 having a groove 18 formed around the insertion hole 16, the end face seal 14 being fitted into the groove, a printed circuit board 19, a high-voltage socket 20, and a cover 21.

The operation of the arrangement is now described. Since the inner diameter of the end face seal 14 is smaller than the outer diameter of the display element insertion hole 16 of the unit case 15, the end face seal is in tight contact with the unit case. When the plug 11 is fitted into the socket 13, the plug and the end face seal 14 engage tightly with each other. The end face seal 14 exerts a force in a direction to push the plug 11 out of the socket 13, but the end face seal and the plug 11 are kept in tight engagement with each other by pin 12 of the plug 11 engaging in the socket 13. Raindrops falling on the side surface of the display element 10 are prevented from entering the display unit by the two fins 17. Raindrops falling on the unit case 15 are stopped by the fin 17 located in contact with the unit case 15.

As described above a waterproofing arrangement is provided utilizing an end face seal around a display element insertion hole, thus permitting the easy production of a highly-reliable waterproof assembly.

Claims

1. A waterproof display unit comprising a display element (10), a plug (11) electrically and mechanically connected to the display element (10), a case (15) having a display element insertion hole (16) formed therein and a socket (13) for receiving the plug (11), and characterized by a finned annular end face seal (14)



fitted around the insertion hole (16) such that on insertion of the plug (11) into the socket (13), the end face seal (14) is axially compressed and the fins (17) of the end face seal (14) form a watertight seal with the plug (11).

2. A unit as claimed in Claim 1 characterized in that the face of the seal (14) presented to the case (15) has a fin engaging the case.
3. A unit as claimed in Claim 1 or Claim 2 characterized in that the plug (11) includes a pin (12) which extends into the socket (13) in use to retain the socket and the plug interengaged against the resilience of the seal (14).

Revendications

1. Unité d'affichage étanche à l'eau, comprenant un élément d'affichage (10), une prise mâle (11) connectée électriquement et mécaniquement à l'élément d'affichage (10), un revêtement (15) présentant un trou d'insertion d'élément d'affichage (16) formé en son sein et une fiche femelle (13) pour loger la prise mâle (11), et caractérisé par un joint d'étanchéité de surface d'extrémité (14) annulaire et nervuré, installé autour du trou d'insertion (16), de sorte que lors de l'insertion de la prise mâle (11) dans la fiche femelle (13), le joint d'étanchéité de surface d'extrémité (14) est axialement comprimé et les nervures (17) du joint d'étanchéité de surface d'extrémité (14) produisent une étanchéité à l'eau de la prise mâle (11).
2. Unité selon la revendication 1, caractérisée en ce que la surface du joint d'étanchéité (14) tournée vers le revêtement (15) présente une nervure en contact avec le revêtement.
3. Unité selon la revendication 1 ou 2, caractérisée en ce que la prise mâle (11) comprend une broche (12) qui s'étend dans la fiche femelle (13) en utilisation, pour maintenir la fiche femelle et la prise mâle introduites l'une dans l'autre, contre l'élasticité du joint d'étanchéité (14).

Patentansprüche

1. Wassergeschützte Anzeigeneinheit mit einem Anzeigeelement (10) einem elektrisch und mechanisch mit dem Anzeigeelement (10) verbundenen Stecker (11), einem Gehäuse (15) mit einem darin gebildeten Anzeigeelementeinführloch (16) und einer Fassung (13) zum Aufnehmen des Steckers (11), gekennzeichnet durch eine gerippte ringförmige Endflächenabdich-

tung (14) die um das Einführloch (16) derart eingebaut ist, daß auf das Einführen des Steckers (11) in die Fassung (13) die Endflächenabdichtung (14) axial zusammengepreßt ist und die Rippen (17) der Endflächenabdichtung (14) eine wasserdichte Abdichtung mit dem Stecker (11) bilden.

2. Einheit nach Anspruch 1, dadurch gekennzeichnet, daß die Fläche der dem Gehäuse (15) zugewandten Abdichtung (14) eine in das Gehäuse eingreifende Rippe aufweist.
3. Einheit nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Stecker (11) einen Stift (12) aufweist, der sich bei der Benutzung in die Fassung (13) zum Halten der Fassung und des Steckers ineinandergreifend gegen die Federung der Abdichtung (14) erstreckt.