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(54) A splash-proof, modular fuse-holder

(57) A splash-proof fuse-holder has a fuse-holder body (1) which comprises a first rim (12) forming an at least partial housing for a fuse (4) and having a generally cylindrical/prismatic outer surface on which a resilient seal (13) is fitted, and a removable cover (30) for the fuse-holder body (1) which comprises a second generally cylindrical/prismatic rim (31) forming a second housing in which the first rim (12) is fitted, the seal (13) being interposed and compressed between the first and second rims.

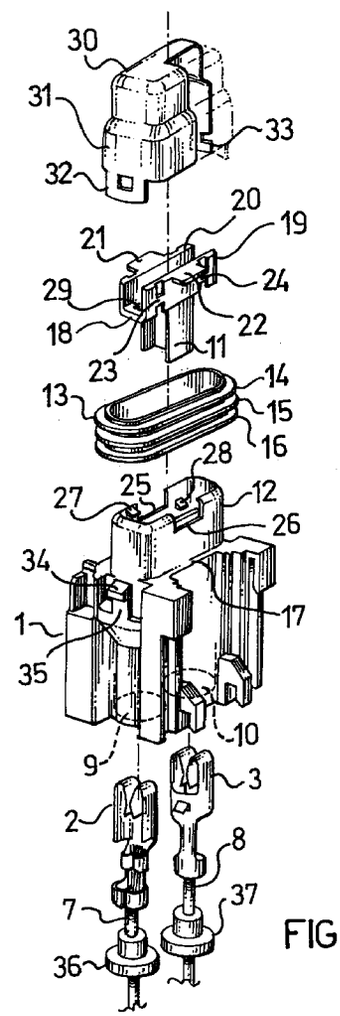

FIG.1

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Description

The present invention relates to a splash-proof and, where necessary, also waterproof, modular fuse-holder for so-called blade-type fuses used in the automotive field.

Once open, the fuse-holder advantageously displays a colour indicating the amperage of the fuse which the fuse-holder is intended to house.

There are known splash-proof fuse-holders for the automotive field in which a modular container for housing the fuse has a cover which is removable along the axis along which the fuse is removed/inserted, this axis being defined below as the axis of the fuse and the fuse-holder, the cover being coupled with the container along a substantially rectangular rim in a plane perpendicular to the axis of the fuse-holder. A housing is formed in the edge of the rim for a resilient seal which is interposed between the cover and the container and, by virtue of its compression between the cover and the container by a suitable pressure exerted in the direction of the axis of the fuse-holder, ensures that the joint is impervious.

To compress the seal it is necessary, upon closure, to push the cover against the container and to provide engagement devices which keep the cover in position without yielding in the direction of the axis of the fuse-holder.

In fuse-holder boxes for housing several fuses, the engagement devices consist of clamping screws with knobs which, in the case of a modular fuse-holder, would be quite bulky and awkward to manipulate owing to the possible presence of two more adjacent fuse-holder modules beside it.

It is desirable to replace the clamping screws with simpler and less bulky engagement systems such as, for example, snap-engagement teeth which release and open the cover as a result of a pull or slight rotation of the cover relative to the container.

Clearly, however, a resilient reaction is exerted on the cover by the compressed seal in the same direction as the force which is exerted to open it and may itself cause the release and opening of the cover or at least partial yielding of the connection and a reduction in the compression of the seal, rendering its sealing unstable.

The instability of the sealing is increased by wear of the engagement teeth as a result of repeated openings and closures of the cover, even if they are infrequent.

The present invention solves this problem and provides a modular, splash-proof fuse-holder which is sealed against spray by a seal interposed between an inner rim of the container which engages in an outer rim of the cover so that the seal is compressed radially relative to the axis of the fuse-holder.

The reaction exerted by the seal on the cover thus acts perpendicularly to the directions of closure and opening and does not stress the engagement devices of the cover, which advantageously are resilient snap teeth, in a direction such as to cause their release.

To prevent the friction exerted between the seal and the outer rim of the cover upon opening from causing axial dislocation of the seal, a pin element with the known function of secondary locking of the contact terminals of the fuse-holder (and for this reason also called the secondary lock) is irremovably snap-engaged inside the container rim.

The secondary lock has a pair of tabs forming a retaining shoulder which prevents the seal from coming off the container rim.

Advantageously, the secondary lock may be made of insulating plastics material of the colour identifying the amperage of the fuse which the fuse-holder is intended to house. In fact, it is known that, for easy identification of their amperage, blade fuses have plastics bodies coloured according to their amperage in accordance with the following list:
Pink: 5A; brown: 7.5A; red: 10A; blue 15A; yellow: 20A; transparent colourless: 25A; green 30A.

The colour identification of the fuse-holder according to the amperage of the fuse which it is intended to house permits safer and error-free replacement of the fuse when necessary.

Since the colour identification of the fuse-holder is visible only when the fuse-holder is open, it does not interfere with the uniformity of the external appearance, for which a dark colour such as black or dark grey is generally required.

The fuse-holder of the present invention may advantageously also be rendered waterproof with the addition of plug seals for closing the access holes to the container for the electrical terminals.

The characteristics and advantages of the invention will become clearer from the following description of a preferred embodiment, given by way of non-limiting example with reference to the appended drawings, in which:

Figure 1 is an exploded, perspective view of a preferred embodiment of a splash-proof modular fuse-holder according to the present invention;

Figure 2 is a perspective view of the fuse-holder of Figure 1 assembled and ready for the insertion of a fuse.

With reference to the drawings, a modular fuse-holder according to the invention is constituted by a generally rectangular, parallelepipedal body of insulating plastics material which acts as a container for a pair of electrical terminals with contact pincers 2, 3 and for a fuse 4 with blade terminals 5, 6 which are inserted removably in the contact pincers 2, 3.

Two housings are formed for the contact pincers 2,3 inside the container 1. The pincer terminals 2, 3 which are fixed to the ends of two electric wires 7, 8 by crimping in conventional manner are inserted in the housings, which are not visible, through two circular holes 9, 10, indicated by broken lines in Figure 1, in the lower wall of the container 1.

The expression "lower" refers to the normal conditions of installation of the fuse-holder, corresponding to the views of Figures 1 and 2.

Once inserted in their respective housings, the pincer terminals 2, 3 are engaged irreversibly, in known manner, by teeth formed on the ends of resilient tongues, not visible, inside the container body 1.

Again in known manner, a secondary lock 11, constituted by a pin of plastics material is inserted in the container 1 and prevents resilient yielding of the tongues supporting the teeth for engaging the terminals 2, 3.

The secondary lock 11 is inserted in the container 1 through the upper face of the container which is open in order to receive both the secondary lock and the blade terminals of the fuse.

The container 1 extends upwardly beyond its upper face to form a rim 12 which is slightly recessed from the side walls of the container.

The rim 12 defines an internal, open-topped, generally prismatic housing.

An annular, resilient seal 13, which is fitted on the generally rectangular and prismatic rim 12 with rounded corners, has several projecting lips 13, 14, 16 and its lower edge bears on the shoulder 17 formed by the portion of the upper face of the container which extends beyond the rim 12.

The secondary lock 11 has, on its top, an open-ended rectangular-sectioned channel 18 with parallel sides 19, 20, the outside dimensions of the channel being equal to the dimensions of the housing formed by the rim 12.

The sides 19, 20 have a pair of tabs 21, 22 extending horizontally outwardly on their upper edges.

Four pairs of vertically aligned recesses are also formed in the sides 19, 20.

Each pair defines an engagement tooth on the side. Two of these teeth 23, 24 are visible in Figure 1.

The channel 18 is inserted in the housing formed by the rim 12 by downward translation from above.

The engagement of teeth such as 23 and 24 with corresponding projecting teeth, of which two 27, 28, are visible in Figure 1, and which are formed on the inner walls of the rim 12 which mate with the sides 19, 20, renders the engagement of the channel irreversible.

The teeth 27 and 28 are disposed at different depths in the rim housing so that, as the teeth 23, 24 of the channel sides pass, owing to resilient yielding of the rim and of the sides of the channel, over the teeth such as 27 of the rim which are closest to the upper edge of the rim, they ensure a first stable positioning and irreversible engagement of the channel inside the rim.

In this first position, the channel 18 and the seal 13 cannot be lost from the fuse-holder body 1.

The outwardly-extending tabs 21, 22 in fact prevent the seal 13 from accidentally coming off the rim 12.

On the other hand, in this first position, the teeth, not visible, for fastening the pincer contact terminals 2, 3 in position cannot be locked in the engagement position by the secondary lock 11, which is not fully inserted in its seat.

When the fuse-holder body has been assembled in the factory and distributed thus to the user, the necessary electrical connections can therefore be made without the risk of components being disassembled and lost during distribution and installation. The body thus assembled is shown in Figure 2.

When the electrical connections have been made, the secondary lock 11 and the channel 18 can be pushed further into the rim 12 so that, by mutual resilient yielding, the channel teeth such as 23, 24 pass over the teeth such as 28 projecting in the lower portion of the internal walls of the rim 12 ensuring a second irreversible positioning of the rim 12 and of the secondary lock 11 inside the rim 12.

To permit this further insertion of the channel 18, the upper edge of the rim 12 has suitable notches for housing the tabs 21, 22.

The channel can be inserted further inside the rim by pressure exerted on the tabs 21, 22 manually, or by the fitting of a cover on the body 1, or even as a result of the insertion of a fuse inside the channel 18 which advantageously has through holes (one of which 29 is partially visible in Figure 1) for the contact blades 5, 6 of a fuse 4.

The container 1 is closed at the top by a removable cover 30 having a lower, generally prismatic rim 31 inside which a housing is defined for the rim 12 and the seal 13.

The rim 31 extends downwardly at opposite ends to form two resilient eyes 32, 33 which engage a pair of teeth, of which one 34 is visible and which are disposed on the ends of two resilient tongues, of which one 35 is visible and which are formed integrally on two sides of the body 1.

When the container 1 is closed by the cover, the eyes 32, 33 engage the corresponding teeth such as 34 of the container 1 by mutual resilient yielding and the rim 31 of the cover is disposed with its inner wall beside and facing the outer wall of the rim 12, forming a space in which the seal 13 is housed and is thus compressed between the rim 12 and the rim 31 in directions perpendicular to the directions in which the cover is opened or closed.

The reaction exerted by the seal 13 on the cover and on the body thus has no effect on the stability of the engagement ensured by the eyes 32, 33 and the sealing of the seal is not affected by dimensional tolerances or by wear of the engagement devices which may be formed so as to ensure stable but reversible coupling between container and cover to enable the cover to be removed.

The modular fuse-holder described is completed by devices for mutual engagement between various modules and/or a support, which are shown in the drawing but are not described in detail since they are of conventional known type.

What is more important is that the fuse-holder

described can easily be converted from a splash-proof embodiment to a waterproof embodiment.

For this purpose it suffices, as shown in Figure 1, to provide the electrical connection wires 7, 8 with resilient sleeves 36, 37 which, by sliding on the wires 7, 8, engage like pressure plugs in the lower holes 9, 10 for access to the container 1, blocking them.

The two sleeves are advantageously of a frustoconical or other functionally equivalent shape so as to ensure a differential seal and to yield in the event of excess pressure developing inside the container, enabling this pressure to be discharged to the exterior whilst infiltration of liquid towards the interior is prevented.

The foregoing description relates solely to a preferred embodiment of the invention but, clearly, many variations may be applied.

For example, the teeth such as 23 and 24 may project instead of being formed from the sides of the channel 18 by partial cutting-out of the sides, and the teeth 27, 28 projecting on the internal surface of the rim 12 may be replaced by recesses.

The secondary lock 11 may have a cross-section other than H-shaped, for example, a rectangular cross-section. The eyes 32, 33 of the cover may be replaced by engagement teeth formed at the ends of resilient tongues and cooperating with corresponding engagement recesses formed in the body 1.

Moreover, for the colour identification of the fuse-holder according to amperage, instead of the channel 18 being made of coloured plastics of various colours, the channel 18 may be made in a single colour and the seals 13 of resilient material of various colours.

Claims

1. A splash-proof fuse-holder of the type in which a fuse-holder body (1) is closed by a removable cover (30), characterized in that the fuse-holder body (1) comprises:

   - a first rim (12) forming an internal housing and a generally cylindrical-prismatic outer surface, and
   - a resilient seal (13) fitted on the outer surface of the rim (12),

   and in that the removable cover (30) comprises a second, generally cylindrical/prismatic rim (31) forming a second housing in which the first rim (12) is engaged axially along the axis of the cylindrical/prismatic rims (12, 31) with the interposition and compression of the seal (13) between the first and second rims (12, 31).

2. A fuse-holder according to Claim 1, comprising a secondary lock (11) engaged irreversibly in the first internal housing and movable along the axis between a first position in which the secondary lock (11) does not perform its locking function and a second irreversible position in which it performs this function, the secondary lock having retaining means (21, 22) extending outside the first internal housing for preventing the seal (13) from coming off the first rim (12) axially.

3. A fuse-holder according to Claim 2, in which the secondary lock (11) and the retaining means are made of insulating plastics material coloured with a colour identifying the amperage of the fuse for which the fuse-holder is intended.

4. A fuse-holder according to Claim 2, in which the seal (13) is coloured with a colour identifying the amperage of the fuse for which the fuse-holder is intended.

5. A fuse-holder according to any one of Claims 2, 3 and 4, in which the secondary lock (11) comprises a channel (18) forming a fuse housing, the channel (18) being housed in the first housing and having tabs (21, 22) extending outside the first rim (12) and forming a shoulder for preventing the seal (13) from coming off.

6. A fuse-holder according to Claim 5, in which the first rim (12) has notches (25, 26) in which the tabs (21, 22) can extend.

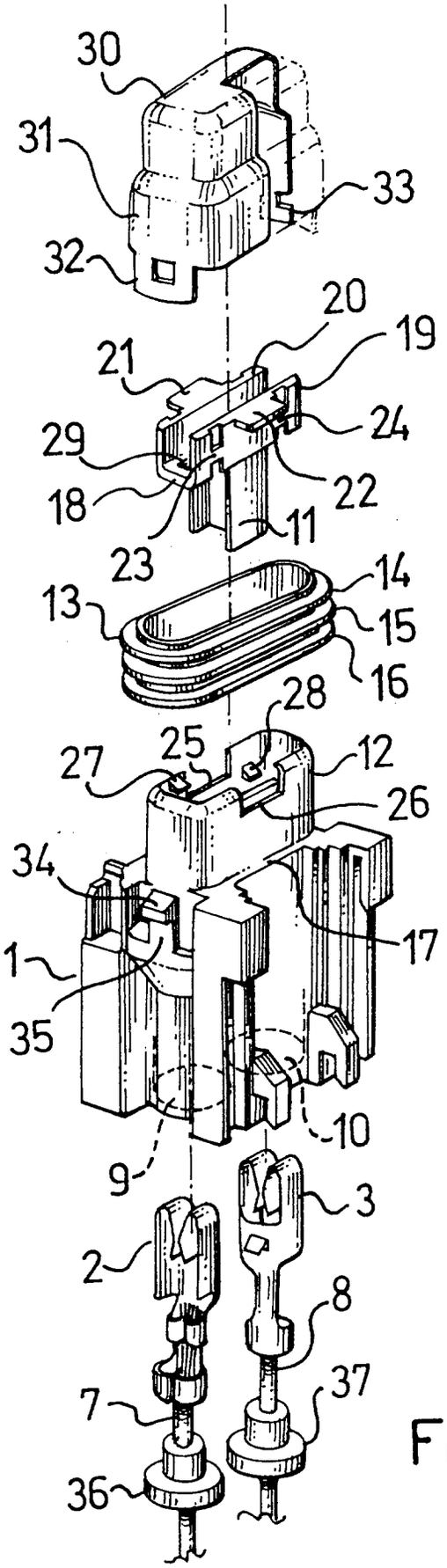
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FIG.1

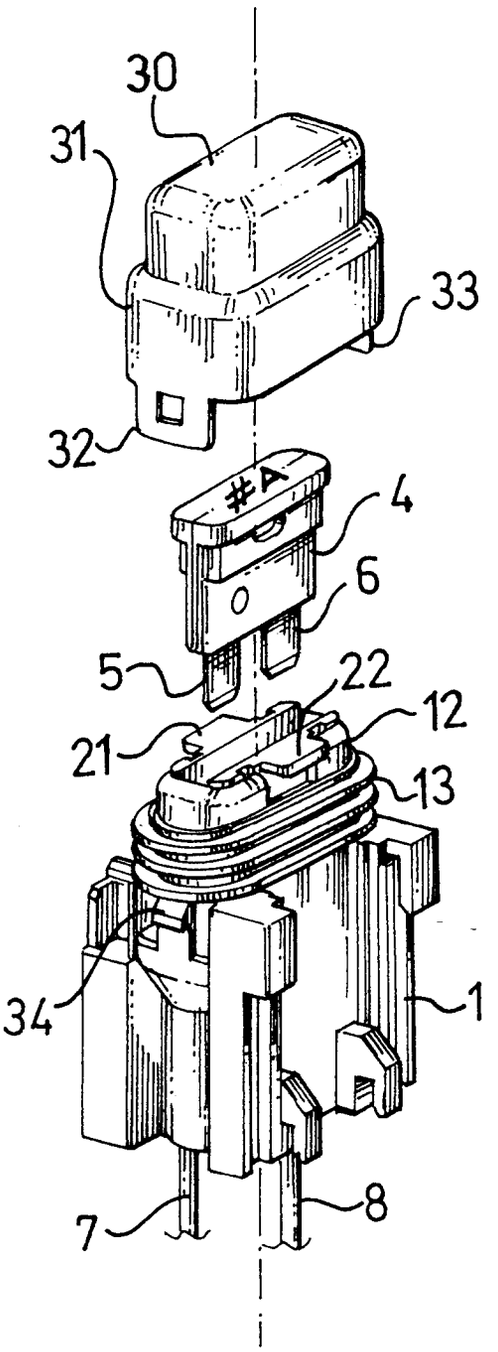
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FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 1680

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE-U-90 06 735 (WICKMANN-WERKE) 23 August 1990 * page 8, line 25 - line 30 * * page 10, line 25 - line 30 * * figures 1,5 *	1,2	H01H85/20
Y A	EP-A-0 306 635 (SUMITOMO WIRING SYSTEMS) 15 March 1989 * the whole document *	1,2 3-6	
A	EP-A-0 633 628 (WHITAKER CORP) 11 January 1995 * the whole document *	1,2	
A	US-A-5 328 382 (PAWLICKI JEFFREY J) 12 July 1994 * abstract *	1,2	
A	DE-A-29 40 607 (PUDENZ KG WILHELM) 16 April 1981 * claims 1,13 *	3,4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01H
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 December 1996	Desmet, W

CATEGORY OF CITED DOCUMENTS

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