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(71) Applicant: **YAZAKI CORPORATION**
4-28, Mita 1-chome
Minato-ku Tokyo 108(JP)

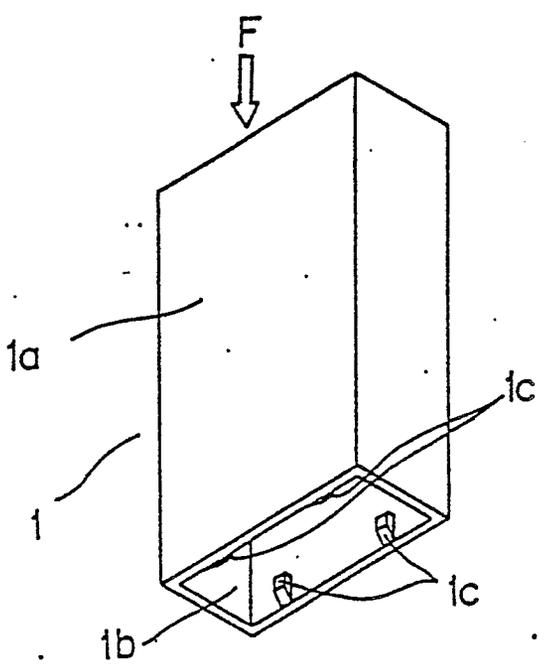
(72) Inventor: **Yamagata, Akio**
c/o Yazaki Parts Co., Ltd. No. 252,
Kawashimada
Gotenba-shi Shizuoka(JP)

(74) Representative: **Patentanwälte Grünecker,**
Kinkeldey, Stockmair & Partner
Maximilianstrasse 58
D-8000 München 22(DE)

(54) Fuse puller.

(57) A fuse puller for pulling a compact blade-type fuse from a female terminal. The fuse puller has a box-like shape with two pen ends. One end, the fuse insertion end, has projections with inclined surfaces facing the opening to ease insertion of the fuse. The puller is made of a flexible resin so that it flex as the puller is pushed onto the head of the compact fuse. The projections grab a shoulder of the head of the fuse, pulling the fuse from the female terminal as the fuse puller is pulled by hand. The fuse is then discharged from the opposite open end of the fuse puller.

FIG. 1



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FUSE PULLER

BACKGROUND OF THE INVENTION

The invention relates to a fuse puller for pulling a blade-type fuse.

As shown in Fig. 7, a blade-type fuse 3 comprises sheet-like blades 3b and 3b serving as male terminals and connected together by a fuse wire (not shown), and an electrically insulative resin covering the upper portions of the blades 3b and 3b. the upper end portion of the resin defines a head portion 3a whose opposite sides project away from each other.

The blade-type fuse 3 is adapted to fit in a female terminal provided within a fuse box (not shown). The female terminal holds the blades 3b and 3b by a strong resilient force to positively keep the contact between them. Consequently, it is not easy to pull the blade-type fuse 3 out of the female terminal. For this reason, a fuse puller 4, as shown in Fig. 8, is used.

The manner of use of fuse puller 4 will now be described with reference to Figs. 9(a) to 9(c). The blade-type fuse 3 has stepped portions 3c provided as a result of the formation of the enlarged head portion 3a. The fuse puller 4 has a pair of legs 4b formed integrally with opposite sides of a spring portion 4a, and each leg 4b has an engaging pawl 4c formed at its lower end. As shown in Figs. 9(b) and 9(c), the engaging pawls 4c are engaged with the stepped portions 3c of the fuse 3 to hold the fuse under the resilient force of the spring portion 4a. Then, the fuse puller 4 is pulled in the direction of an arrow P to pull the fuse 3 out of the female terminal.

In addition to the blade-type fuse as shown in Fig. 7, another blade type fuse of a smaller size, as shown in Fig. 3, has recently been used. Such a compact-size blade-type fuse has no enlarged head portion, and therefore cannot be pulled out of the female terminal with the conventional fuse puller, and difficulty is encountered in pulling such from a terminal fuse.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above problems, and an object of this invention is to provide a fuse puller for pulling from a terminal a compact-size fuse of the blade-type.

The above object is achieved by providing a fuse puller comprising a hollow flexible body of a rectangular parallelepipedic shape, having a fuse insertion opening slightly greater in size than a head portion of a blade-type fuse; and at least one projection formed on an inner surface of said rectangular parallelepipedic body in the vicinity of the insertion opening and being engageable in a groove formed in the fuse.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a fuse puller provided in accordance with the present invention;

Fig. 2(a) is a front-elevational view of the fuse puller;

Fig. 2(b) is a cross-sectional view taken along the line A-A of Fig. 2(a);

Fig. 2(c) is a cross-sectional view taken along the line B-B of Fig. 2(a);

Fig. 3 is a perspective view of a compact-size blade-type fuse;

Fig. 4(a) is a cross-sectional view taken along the line C-C of Fig. 3;

Fig. 4(b) is a view as viewed in a direction of an arrow D of Fig. 3;

Fig. 5(a) is a longitudinal cross-sectional view of the compact-size blade-type fuse;

Fig. 5(b) is a longitudinal cross-sectional view, showing the engagement between the compact-size blade-type fuse and the fuse puller;

Fig. 6(a) is a partial cross-sectional view, showing the engagement between the compact-size blade-type fuse and the fuse puller;

Fig. 6(b) is a cross-sectional view, showing the condition in which the compact-size blade-type fuse is about to be discharged out of the fuse puller;

Fig. 7 is a perspective view of a conventional blade-type fuse;

Fig. 8 is a perspective view, showing the manner in which a conventional fuse puller is used with respect to the fuse; and

Figs. 9(a) to 9(c) show the manner of use of the conventional fuse puller: Fig. 9(a) is a view of the fuse; Fig. 9(b) is a side-elevational view of the fuse and the fuse puller engaged with each other; and Fig. 9(c) is a front-elevational view of the fuse and the fuse puller engaged with each other.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

A preferred embodiment of the invention will now be described with reference to the drawings.

Figs. 3 and 4 show the compact-size fuse 2 of the blade-type (hereinafter referred to as "compact fuse") , with respect to which a fuse puller of the present invention can be used. As shown in these figures, the compact fuse 2 comprises sheet-like blades 2c and 2c serving as male terminals and connected together by a fuse wire 2d, and an electrically-insulative resin covering the upper portions of the blades. A head portion 2a is not enlarged, and instead two grooves 2b are formed in each of the opposite sides or faces of the resin portion. The compact fuse 2 is adapted to be fitted in a female terminal, for example, of a fuse box of an automobile.

Fig. 1 shows the appearance of the fuse puller 1 provided according to the present invention. The fuse puller 1 includes a hollow body 1a of a rectangular parallelepiped shape and made of a flexible material such as a resin. The hollow body 1a has a square cross-section and has opposite open ends. One open end 1b of the rectangular parallelepiped body 1a serves as a fuse insertion opening. The longitudinal dimension W′ of the fuse insertion opening 1b is slightly greater than the longitudinal dimension W of the head portion of the fuse, and the transverse dimension H′ of the fuse insertion opening 1b is generally equal to or slightly greater than the transverse dimension H of the head portion of the fuse. The body 1a has projections 1c formed on the inner surface thereof adjacent to the insertion opening 1b, the projections 1c being adapted to be received respectively in the grooves 2b formed in the compact fuse 2. With the above configuration of the fuse puller 1, it can be molded of a resin by a single molding operation, such as injection molding.

Figs. 2(a) to 2(c) are corss-sectional views, of the fuse puller 1 of Fig. 1. The fuse puller 1 can be deformed as indicated in dots-and-dash line in Fig. 2(a) due to its own flexible nature.

The manner of use of the fuse puller 1 will now be described. The compact fuse 2 fits in a female terminal (not shown) in such a condition as shown in Fig. 5(a). The fuse puller 1 is engaged with the compact fuse 2, and a force F is applied to the fuse puller 1 as indicated in Fig. 1 to press-fit the fuse puller 1 on the compact fuse 2. Each of the projections 1c formed in the vicinity of the insertion opening 1b has an inclined front surface to facilitate entry of the compact fuse 2 into the fuse puller 1. Since the insertion opening 1b of the fuse puller 1 is slightly greater than the head portion of the compact fuse 2, the fuse puller 1 is expanded as shown in Fig. 2(a), and the compact fuse 2 is forced into the insertion opening 1b of the thus expanded fuse puller 1. When the projections 1c slide over the head portion 2a of the compact fuse and reach the respective grooves 2b, the projections 1c are received respectively in the grooves 2b as shown in Fig. 5(b) whereupon the fuse puller 1 is returned to its original shape. When the fuse puller 1 is pulled in a direction of an arrow P (Fig. 5(b)), each projection 1c is held against a shoulder 2e provided at the head portion and defined by the upper end of the groove 2b, so that the compact fuse 2 can be pulled out of the female terminal. In this embodiment, although the number of the projections 1c is equal to the number of the grooves 2b, that is to say, four, the number of the projections 1c may be less than the number of the groove 2b if there is no problem from the standpoint of the strength. For example, the provision of at least one pair of opposed projections 1c or at least one projection 1c may be sufficient.

The manner of removing the compact fuse 2 from the fuse puller 1 after the compact fuse 2 is pulled out of the female terminal will now be described. The open end 1d of the fuse puller 1 of the present invention opposite to the insertion opening 1b is also open, as shown in Fig. 6. When the fuse puller 1 is inclined as shown in Fig. 6(b) after the compact fuse 2 is pulled out of the female terminal as shown in Fig. 6(a), the compact fuse 2 is discharged from the open end 1d by itself.

As described above, according to the present invention, the fuse puller of a simple construction for pulling the compact fuse can be provided, and the pulling of the fuse out of the female terminal, which has conventionally been carried out with the fingers, etc., with much difficulty, can be easily done. Further, the fuse puller of the present invention is of such a construction that it can be easily molded of a resin, for example, by injection molding.

Claims

1. A fuse puller for pulling from a female terminal a blade-type fuse of the type having grooves formed therein defining a shoulder in the head portion of the fuse, said fuse puller comprising:
a hollow flexible body of a rectangular parallelepiped shape having a fuse insertion opening slightly greater in size than said head portion of said blade-type fuse; and
at least one projection formed on an inner surface of said hollow flexible body in the vicinity of said insertion opening and being engageable in said groove formed in the fuse.

2. A fuse puller according to Claim 1, in which the end of said hollow body opposite to said fuse insertion opening is also open.

3. A fuse puller according to Claim 1, in which the longitudinal dimension of said fuse insertion opening is slightly greater than the longitudinal

dimension of said head portion of said fuse.

4. A fuse puller according to Claim 1, in which the transverse dimension of said fuse insertion opening is lightly greater than the transverse dimension of said head portion of said fuse.

5. A fuse puller according to Claim 1, in which said projection has a surface inclining toward said opening.

6. A fuse puller according to Claim 1, in which there is provided at least a pair of said projections disposed in opposed relation to each other.

FIG. 1

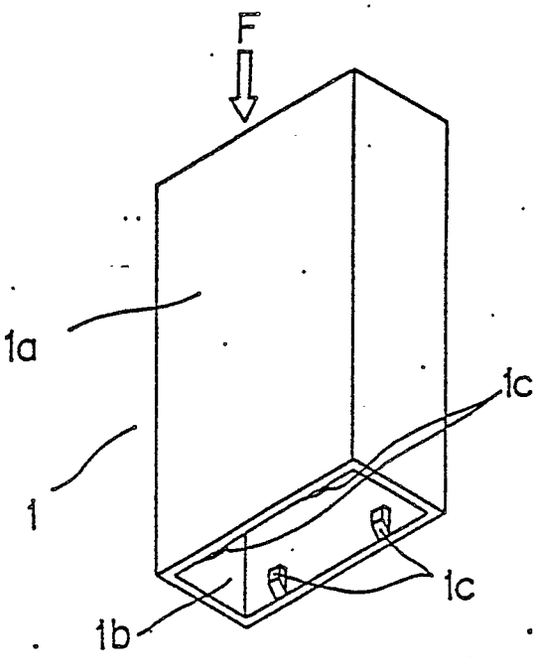

FIG. 2(a)

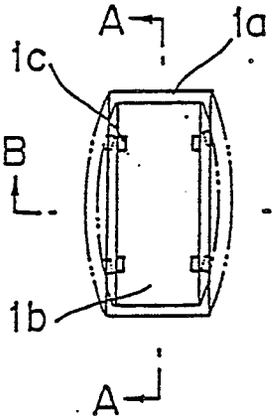

FIG. 2(b)

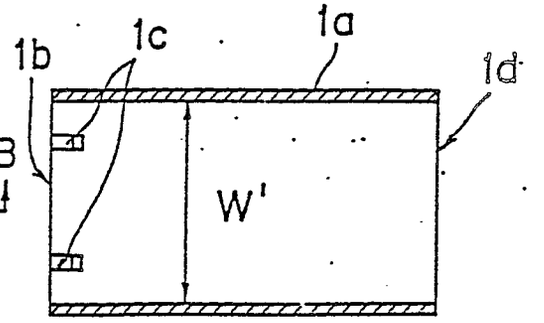

FIG. 2(c)

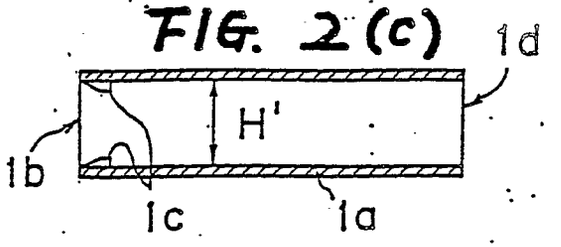

FIG. 3

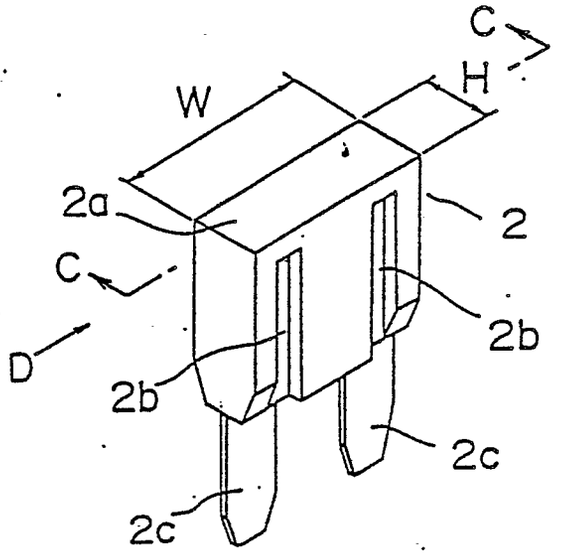

FIG. 4(a) FIG. 4(b)

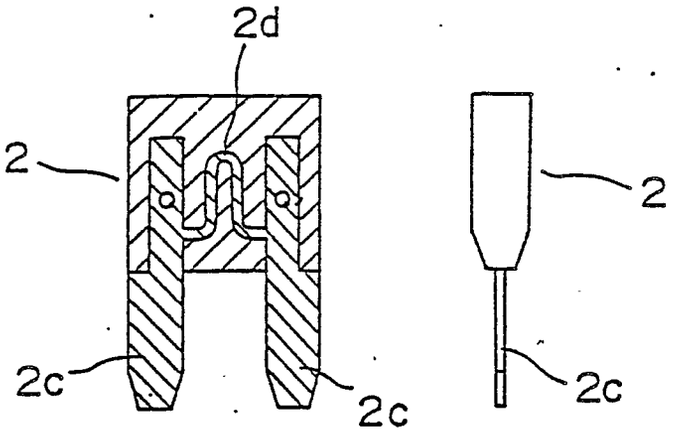

FIG. 6(a)

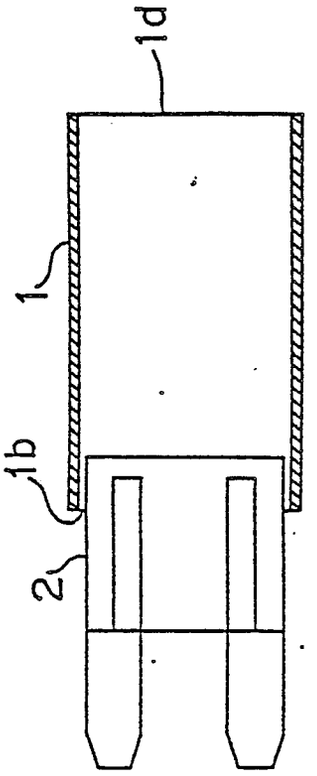

FIG. 6(b)

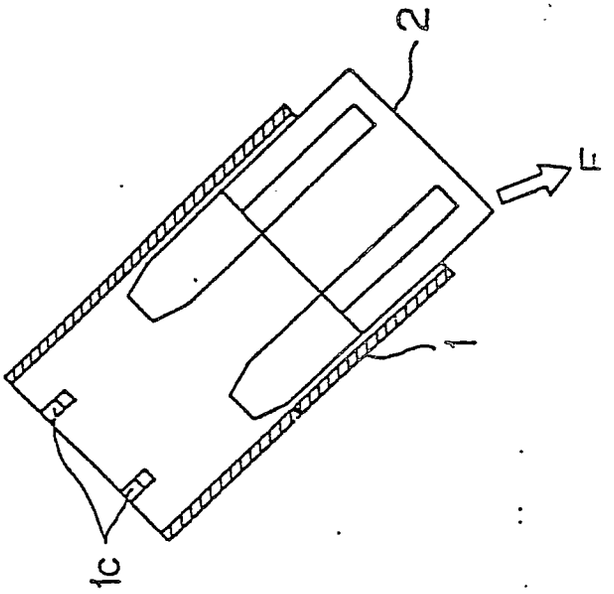

FIG. 5(a) FIG. 5(b)

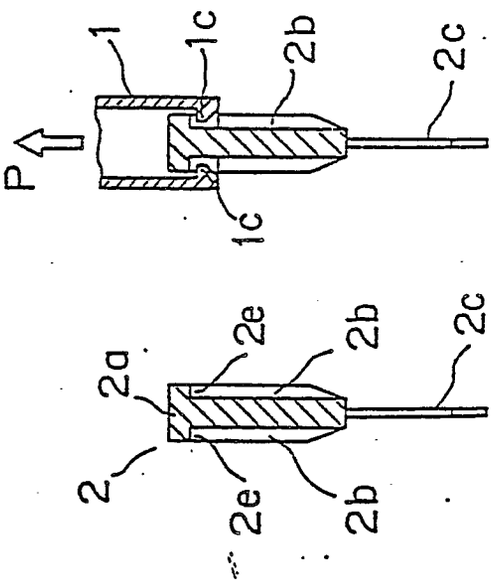

FIG. 7

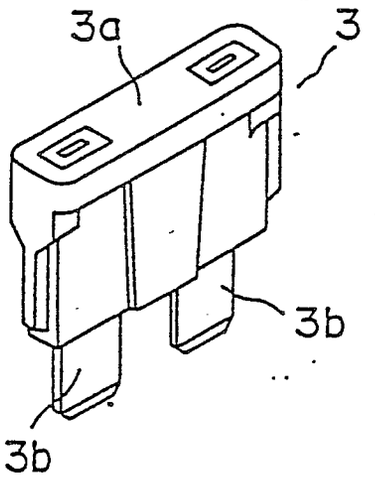

FIG. 8

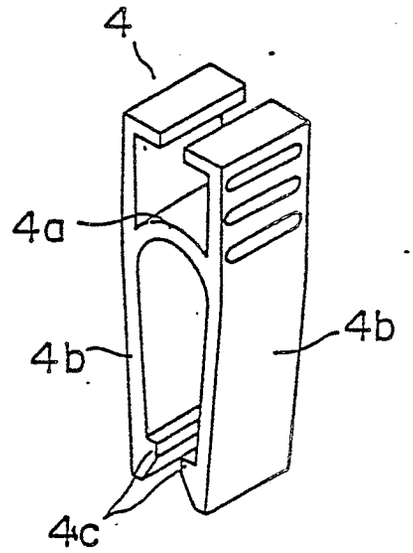

FIG. 9(b)

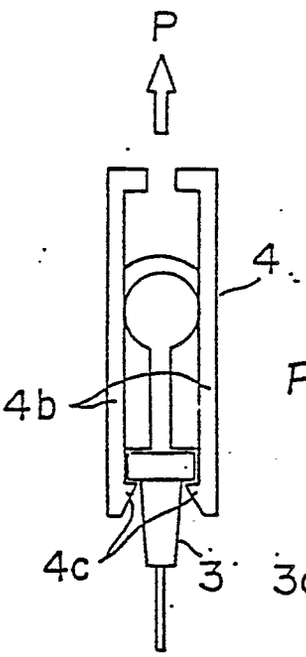

FIG. 9(a)

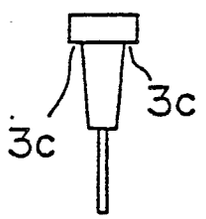

FIG. 9(c)