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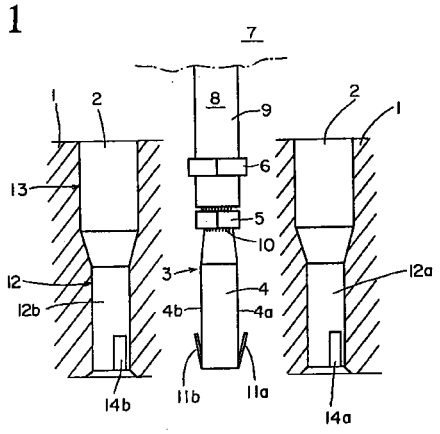
(54) Cable connector

(57) Disclosed is a cable connector comprising an insulating housing having two or more parallel-piled, lateral arrangements of terminal cavities, each terminal cavity containing a terminal, which is connected to the core conductor of a selected insulated wire in a wire cable. The terminal has a crimping barrel formed on ist root side for pinching the end of the selected insulated wire, and a hollow socket formed on ist tip end for receiving a selected pin terminal in a counter cable connector. The hollow socket has lances projecting from the opposite side walls and diverging toward the root of the terminal. Each terminal cavity has catch recesses formed on the opposite side walls confronting the opposite lanced-side walls of the terminal when inserted in a selected terminal cavity. The terminals each having the core conductor crimped thereto by the crimping barrel are inserted in the terminal cavities until the lances have been caught by the catch recesses, thereby preventing the pulling-off of the wire cable from the cable connector.

FIG. 1



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Description

Field of the Invention:

[0001] The present invention relates to a cable connector having terminals contained in its terminal cavities, each terminal connected to a selected core conductor in a wire cable.

Prior Art:

[0002] This type of cable connector includes an insulating housing having two or more parallel-rows of laterally arranged terminal cavities, each terminal cavity containing a selected terminal. Each terminal has knife-edged beams formed on its base side, and a selected core conductor in a wire cable may be connected to the terminal by pushing the selected insulated core conductor of the wire cable between the knife-edged beams of the terminal until the beam edges have cut into the insulation of the insulated core conductor. A plurality of core conductors may be connected to a corresponding plurality of terminals simultaneously. To insert and fixedly hold the terminals in the terminal cavities of the insulating housing, the terminals have lances formed in the vicinity of the knife-edged beams, and the terminal cavities have recesses or U-shaped spaces formed therein permitting the lances of the terminals to be engaged by the recesses in the terminal cavities.

[0003] Such a cable connector needs to be designed such that the knife-edged beams may have an inter-space wide enough for the core conductor to be tightly pinched between the opposite sharp edges of the beams. Therefore, terminals of different sizes need to be prepared for connecting core conductors of different sizes. The inter-space of the crimping beams, however, is prone to be too wide to hold fixedly a selected core conductor, thus making no reliable electric connection.

Summary of the Invention:

[0004] In view of the above, one object of the present invention is to provide a cable connector which can assure reliable connection to the core conductors of a wire cable regardless of the core size of the conductors.

[0005] To attain this object a cable connector according to the present invention uses terminals having crimping barrels formed in their rear portions, thereby permitting connection of terminals to the core conductors of a wire cable no matter what size the core conductors may have.

[0006] Specifically a cable connector having an insulating housing and two or more parallel-rows, a laterally arranged terminal cavity and each terminal cavity containing a selected terminal which is connected to a selected core conductor in a wire cable, is improved according to the present invention in that: the terminal has a crimping barrel formed in its rear portion for pinching the end of a selected insulated wire from the wire cable, and a hollow socket formed on its front end for receiving a selected pin terminal in a mating cable connector, the hollow socket having lances projecting from the opposite side walls and diverging toward the back of the terminal. Each terminal cavity having catch recesses formed on the opposite side walls confronting the opposite lanced-side walls of the terminal when the terminal is inserted in a selected terminal cavity, whereby the terminals each having the core conductor of a selected insulated wire connected thereto by the crimping barrel are inserted in the terminal cavities until the lances have been engaged by the recesses, thereby preventing the pulling-off of the wire cable from the cable connector.

[0007] The crimping of the end of each core conductor to a selected terminal may be effected regardless of what size the core conductor may have, and therefore, single type of terminal may be commonly used for core conductors of different sizes while still assuring reliable terminal-to- cable connection.

[0008] The terminal is, in cross-section, larger in its rear portion than on its front portion. Each terminal cavity is made to be in conformity with the tapering contour of the terminal, and accordingly the rear end-to-rear end distance in the lateral arrangement of terminals in the insulating housing is shorter than the front-to-front distance. With this geometrical interval difference each recess may be made deep enough to assure that a selected lance is caught fixedly to prevent the pulling-out of the terminal from the insulating housing because adjacent recesses are made in the relatively thick area between adjacent terminal cavities.

[0009] One of the lances may be integrally connected to one of the opposite side walls at a higher level whereas the other lance may be integrally connected to the other side wall at a lower level; and one of the recesses may be formed on one of the opposite side walls at a corresponding higher level whereas the other recess may be formed on the other side wall at a corresponding lower level. The staggering of lance-and-engagement recess arrangement effectively permits reduction of terminal-to-terminal intervals, and effectively causes a resistance to the rotary moment, which may occur when a pulling force is applied to a terminal.

[0010] Other objects and advantages of the present invention will be understood from the following description of a cable connector according to one preferred embodiment of the present invention, which is shown in accompanying drawings.

Brief Description of the Drawings:

[0011]

Fig.1 illustrates a terminal and a terminal cavity, showing the terminal cavity as being longitudinally

cut into two halves the halves located on opposite sides of the terminal;

Fig. 2 illustrates the terminal and the terminal cavity viewed from an angle 90 degrees apart from which the terminal and the terminal cavity are viewed in Fig. 1, similarly showing the terminal cavity being longitudinally cut and separated into two halves, the halves positioned on opposite sides of the terminal;

Fig. 3 is a front view of an insulating housing of the cable connector;

Fig. 4 is a side view of the insulating housing;

Fig. 5 is a plane view of the insulating housing;

Fig. 6 is a bottom view of the insulating housing;

Fig. 7 is a longitudinal section of the insulating housing;

Fig. 8 is another longitudinal section of the insulating housing;

Fig. 9 is a plane view of a terminal;

Fig. 10 is a side view of the terminal;

Fig. 11 is another side view of the terminal;

Fig. 12 is an enlarged longitudinal section of the terminal;

Fig. 13 is a front view of a cover of the cable connector;

Fig.. 14 is a side view of the cover;

Fig. 15 is a plane view of the cover; and

Fig. 16 is a longitudinal section of the cover.

Detailed Description of the Preferred Embodiments:

[0012] Referring to Figs. 1 and 2, a terminal 3 comprises a square hollow socket 4 formed on its front side for receiving a selected pin terminal of a mating connector (not shown), a crimping barrel 5 formed on its back side for pinching the core conductor 10 of a selected insulated wire 8 of a wire cable 7 and a strain-relief strip 6 formed adjacent to the crimping barrel 5. One end of the insulated wire 8 is stripped by removing its insulation 9 to expose the core conductor 10. The exposed core conductor 10 is crimped by the crimping barrel 5, and the insulated wire 8 is crimped by the strain-relief strip 6. Thus, the insulated wire 8 of the wire cable 7 is connected to the terminal 3.

[0013] The square hollow socket 4 has lances 11a and 11b projecting from the opposite sides walls 4a and 4b of the socket and diverging toward the back of the terminal. The first lance 11a is formed at a level higher than the center line of the right side wall 4a as viewed from the side of the square hollow socket 4, on which side the insulating housing 1 receives the pin-terminals of the mating connector, whereas the second lance 11b is formed at a level lower than the center line of the left side wall 4b as viewed from the pin-terminal receiving side of the insulating housing 1 (see Fig. 2).

[0014] The insulating housing 1 has a plurality of terminal cavities 2. Each terminal cavity 2 is composed of a socket receptacle section 12 for receiving the square hollow socket 4 of the terminal 3 and a barrel receptacle section 13 for receiving the crimping barrel 5 of the terminal 3. The terminal cavity 2 has U-shaped spaces or recesses 14a and 14b formed on the opposite side walls 12a and 12b confronting the opposite lanced-side walls 4a and 4b of the terminal 3 when the terminal is inserted in the terminal cavity 2. In compliance with the upper-and-lower staggered arrangement of opposite lances 11a and 11b the catch recesses 14a and 14b are formed on the opposite sidewalls 12a and 12b such that the first recess 14a is at a level higher than the center line of the right side wall 12a, and that the second catch recess 14b is at a level lower than the center line of the left side all 12b as viewed from the pin-terminal receiving side of the insulating housing 1 (see Fig. 2).

[0015] In connecting a wire cable 7 to a cable connector to provide a harness assembly, first the end of each insulated wire 8 is stripped by removing its insulation 9 to expose the core conductor 10 and the stripped insulated wire 8 is then connected to a selected terminal 3 by the crimping barrel 5 and by the strain-relief strip 6, as described above. Terminal 3 is then inserted from the rear side of the insulating housing 1 into a selected terminal cavity 2 until the square hollow socket 4 is located in the socket receptacle section 12 of the terminal cavity 2 with the lances 11a and 11b engaged by the recesses 14a and 14b. Engagement by the lances 11a and 11b effectively prevents the cable 7 from being pulled out of the housing 1.

[0016] The wire-to-terminal connection is effected by the crimping barrel 5, and therefore, reliable connection can be assured no matter what size the wire may be present.

[0017] As seen from Fig.1, the barrel receptacle section 13 of the terminal cavity 2 is, in section, larger than the socket receptacle section 12. Accordingly the distance T between adjacent socket receptacle sections is greater than the distance T between adjacent barrel receptacle sections 13. The opposite lances 11a and 11b and catch recesses 14a and 14b are arranged in the relatively large portion of the insulating housing 1, separating the socket receptacle sections 13 thus making it possible to make each recess 14a or 14b deep enough to assure that each lance is engaged by housing 1.

[0018] Two or more lances may be advantageously used to distribute the pulling force which may be applied to the terminal 3 thereby reducing the force to be applied to each lance. Additionally, advantageously the rotary moment to the terminal, which rotary moment may occur when a pulling force is applied to the terminal, may be reduced.

[0019] The upper-and-lower staggered arrangement of lances and engagement recesses permits the cavity-to-cavity interval T to be at a minimum. Specifically, the distance between adjacent terminal cavities in the insulating housing 1 may be reduced to the extent that the upper and lower recesses 14a and 14b may be

made deep enough to assure positive gripping of the lance 11a or 11b. Accordingly, the terminals 3 may be mounted in the insulating housing 1 at an increased density and the overall size of the cable connector may be reduced.

[0020] Referring to Figs.3 to 8, the insulating housing 1 is molded from an insulating plastic material with molding dies. In these drawings, the insulating housing 1 has five parallel-tiers of terminal cavities, five cavities per each tier. The recesses 14a and 14b extend to the open end of the terminal cavity 2 on the pin-terminal receiving side of insulating housing 1. As shown, openings 15 are made in the cavity-to-cavity spaces.

[0021] The insulating housing 1 has engagement projections 16 formed on its top and bottom surfaces 1a and 1b on rear side for catching and holding a cover, which will be described later.

[0022] Also, the housing has guide projections 17 formed on its top and bottom surfaces 1a and 1b, extending from the center to the pin-terminal receiving end for guiding a mating cable connector.

[0023] As seen from Figs.9 to 12, the terminal 3 may be stamped from a sheet of metal. As seen from Fig.12, the square, hollow socket 4 has a spring contact piece 18 extending from the ceiling wall 4c of the socket 4 for pinching a selected pin-terminal between the cantilever-like contact piece 18 and the raised portion of the floor wall 4d. Referring to Figs.13 to 16, the cover 19 to be applied to the rear side of the insulating housing 1 is a box-like molded piece of insulating plastic material having engagement slots 20 formed on its top and bottom surfaces 19a and 19b for engaging the latching projections 16 of insulating housing 1. The cover also has a circular hole 21 formed in its rear wall 19c for permitting a wire cable 7 to pass therethrough, and a cable support 22 formed along a quarter are of the circular circumference 21 to project backward. In connecting the insulated wires 8 to the terminals 3, the wire cable 7 is inserted in the circular hole 21 to connect each wire 8 to a selected terminal as described earlier. After connecting all wires 8 to the terminals 3 the cover 19 is applied to the insulating housing 1, and then, the cable 7 is bound to the cantilever-like cable support 22 with straps (not shown).

[0024] The cover 19 is large enough to contain a single insulating housing. It may be designed to be large enough to contain two or more insulating housings arranged in layers, and then, the numbers of circular holes 21 and cable supports 22 are determined depending on how many insulating housings 1 are to be contained.

[0025] Fig.3 and other drawings show the terminals arranged to form a grid array. The terminals, however, may be arranged laterally to form a single layer.

Claims

1. A cable connector comprising an insulating housing 1 having two or more parallel-rows of laterally arranged terminal cavities 2, each terminal cavity 2 containing a terminal 3, which is connected to the core conductor 10 of a selected insulated wire 8 in a wire cable 7, characterized in that: the terminal 3 has a crimping barrel 5 formed on the base side of the terminal for pinching the end of the selected insulated wire 8, and a hollow socket 4 formed on its tip end for receiving a selected pin terminal in a mating counter cable connector, the hollow rectangular socket 4 having lances 11a and 11b projecting from the opposite side walls 4a and 4b and diverging toward the base of the terminal 3, and each terminal cavity 2 having engagement recesses 14a and 14b formed on the opposite side walls 12a and 12b for engaging the lances on side walls 4a and 4b of the terminal 3 when inserted in a selected terminal cavity 2, whereby the terminals 3 each having the core conductor 10 crimped thereto by the crimping barrel 5 are inserted in the terminal cavities 2 until the lances 11a and 11b have been engaged by the recesses 14a and 14b respectively, thereby preventing the pulling-off of the wire cable 7 from the cable connector.

2. A cable connector according to claim 1 wherein one of the lances 11a and 11b is integrally connected to one of the side walls 4a and 4b at a higher level whereas the other lance is integrally connected to the other side wall at a lower level; and one of the catch recesses 14a and 14b is formed on one of the opposite lanced-side walls and 12b at a corresponding higher level whereas the other catch recess is formed on the other lanced-side wall at a corresponding lower level.

FIG. 1

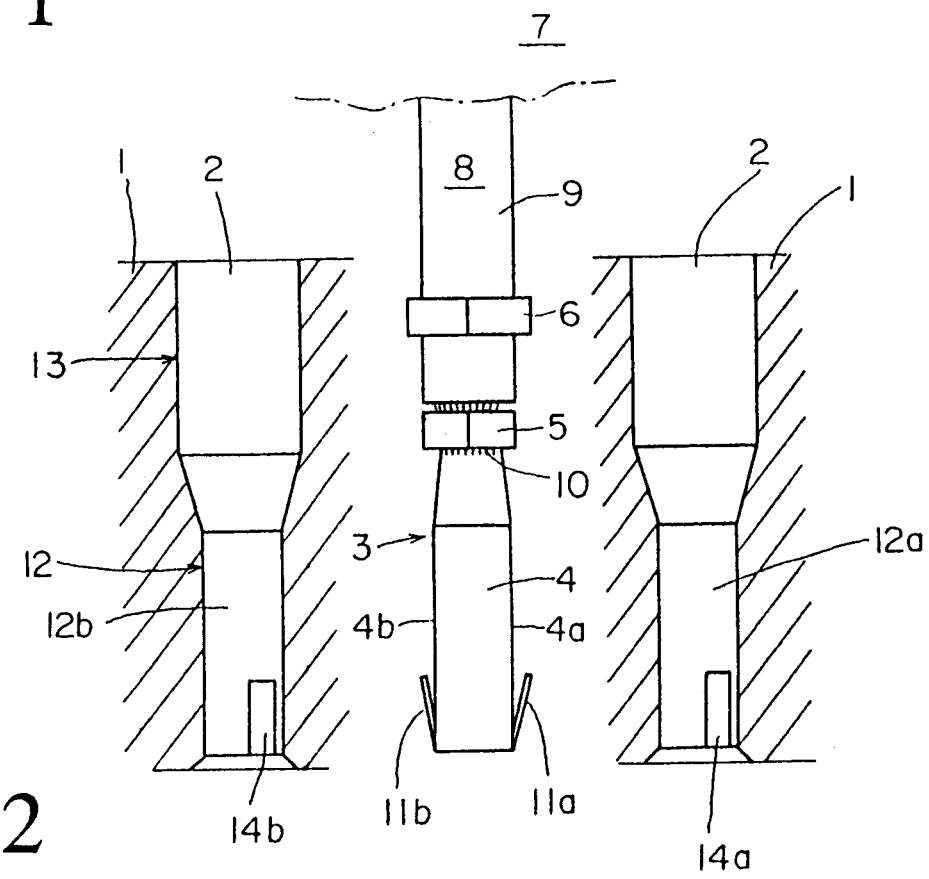
7
8
9
6
5
10
1
2
13
12
12b
3
4
4b
4a
11b
11a
14b
2
1
12a
14a

FIG. 2

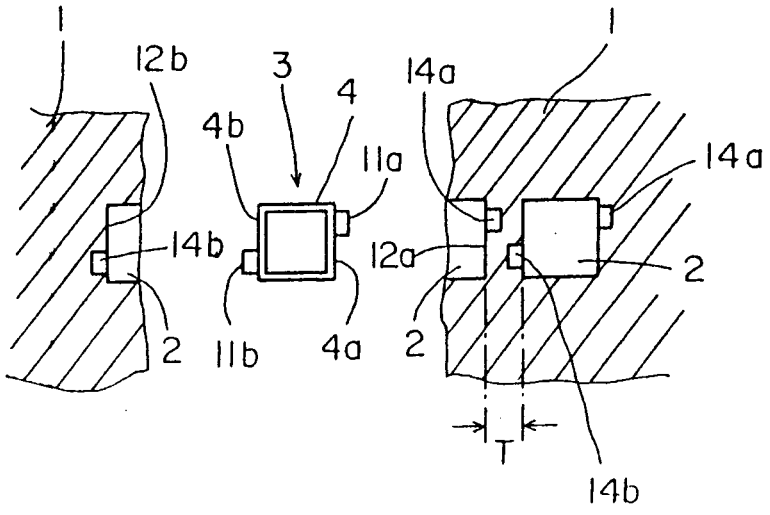
1
12b
3
4
4b
11a
14b
2
11b
4a
14a
1
14a
12a
2
2
T
14b

FIG. 3

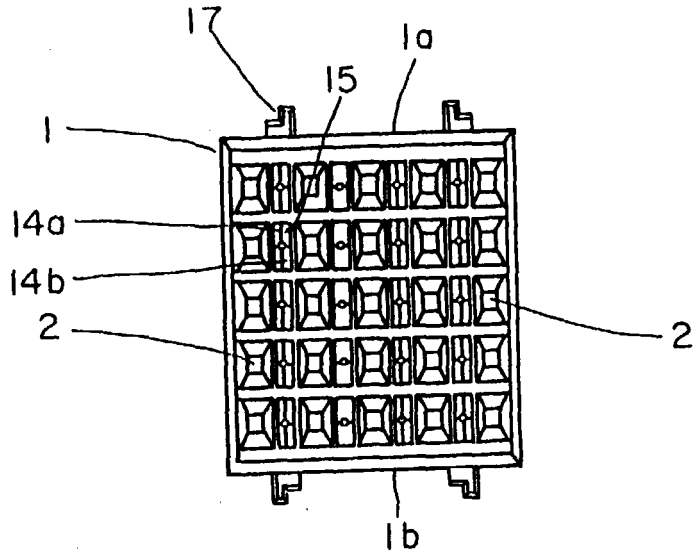

FIG. 4

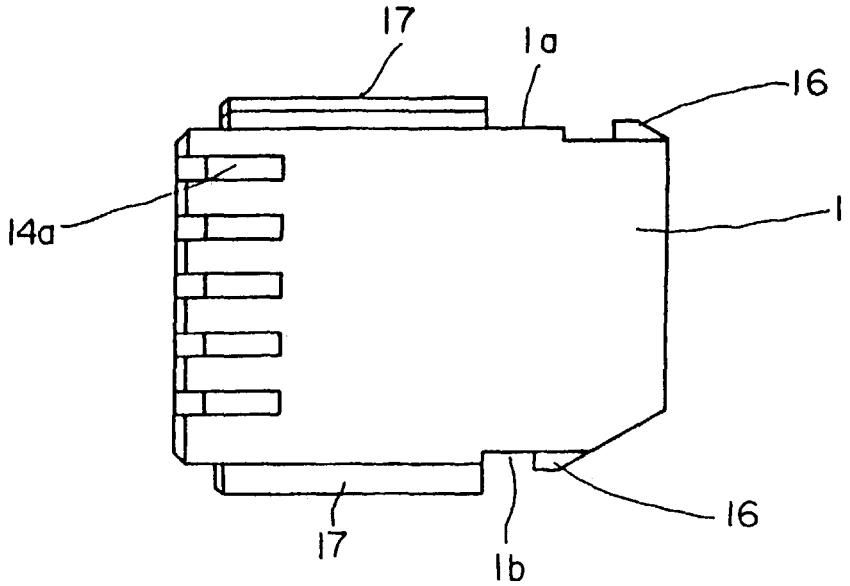

FIG. 5

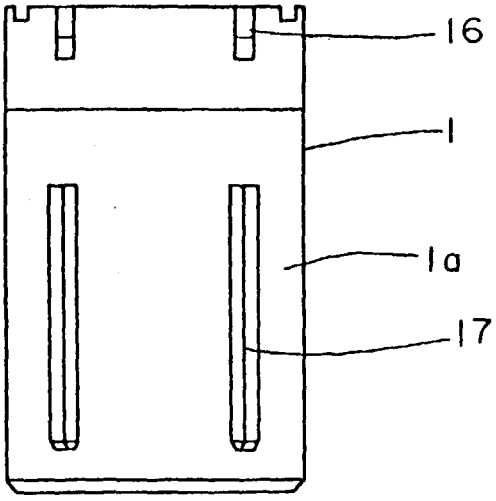

FIG. 6

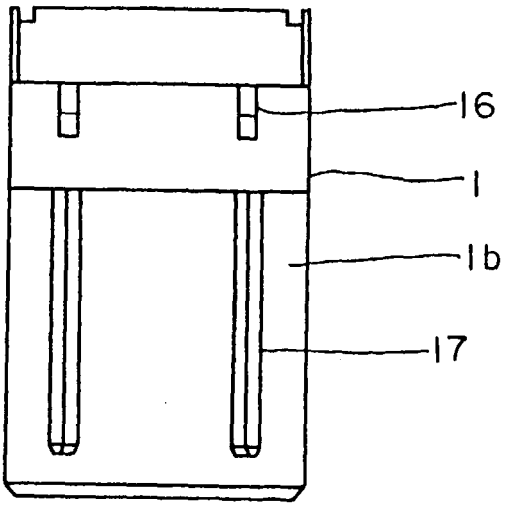

FIG. 7

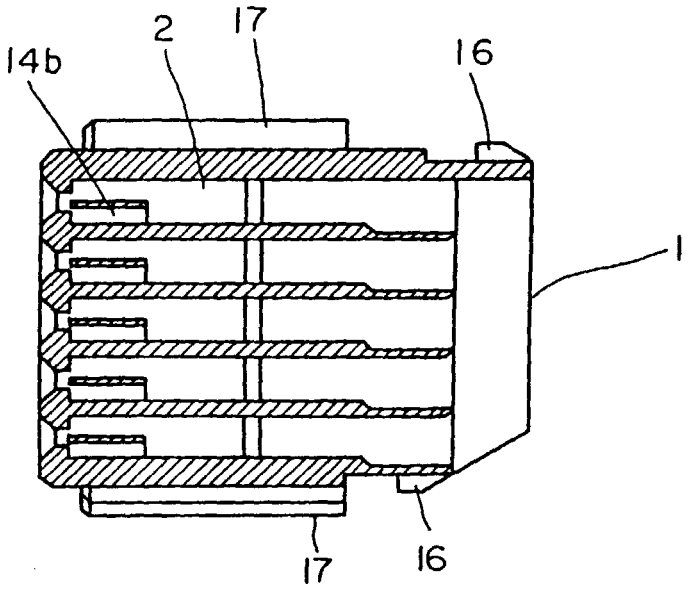

FIG. 8

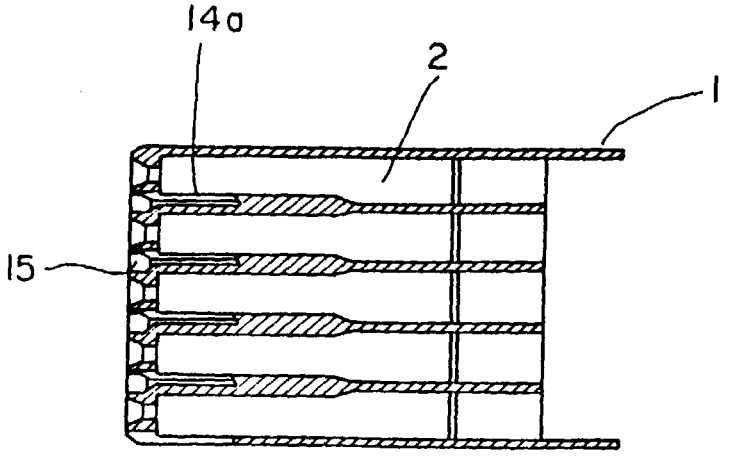

FIG. 9

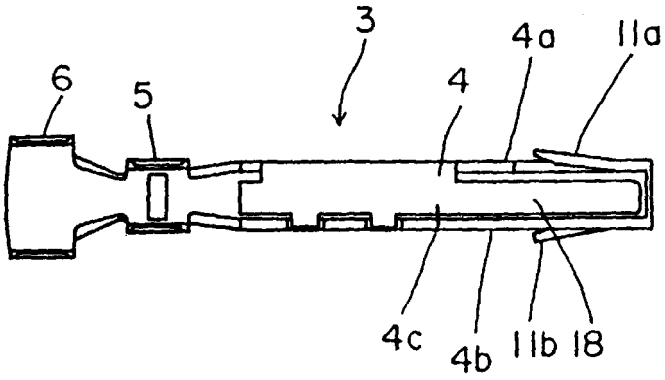

FIG. 10

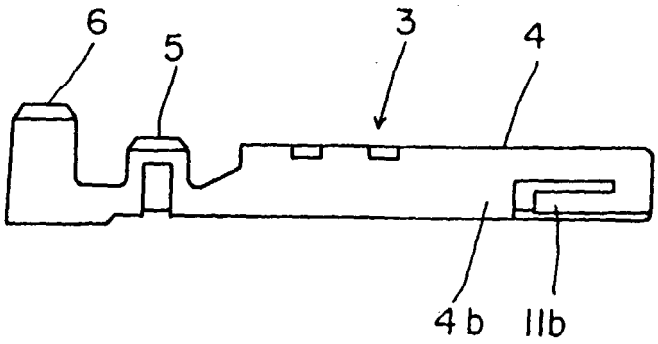

FIG. 11

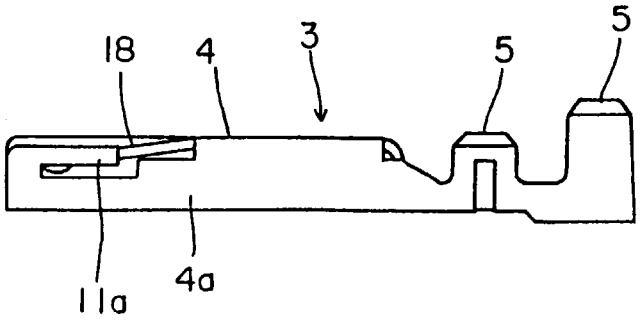

FIG. 12

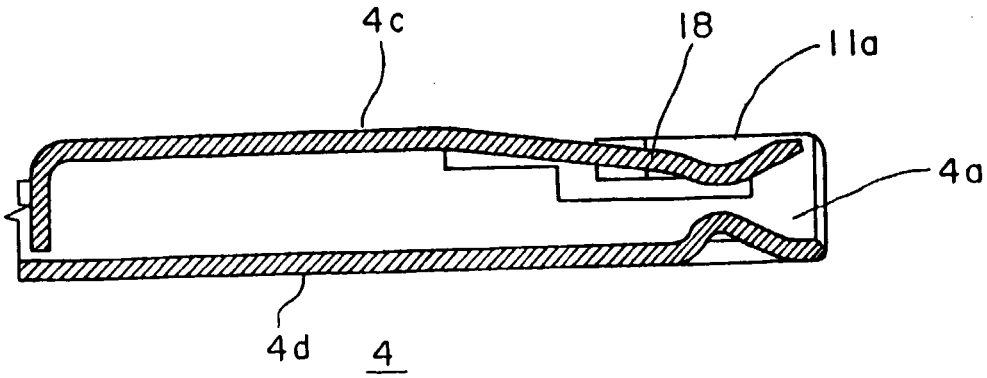

FIG. 13

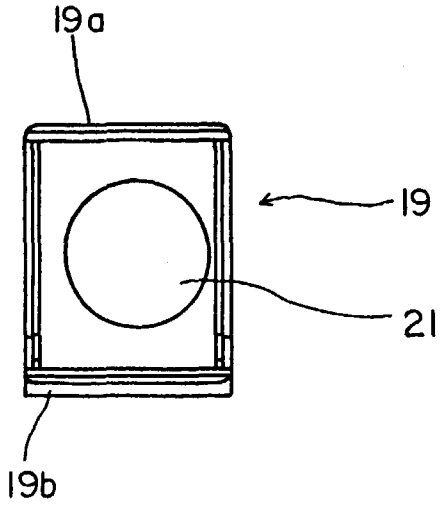

FIG. 14

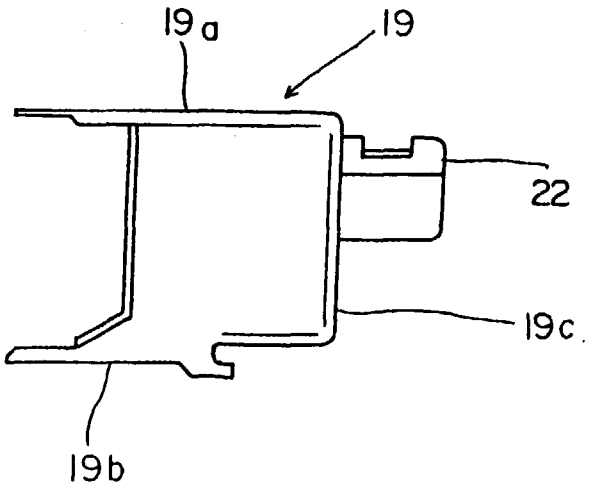

FIG. 15

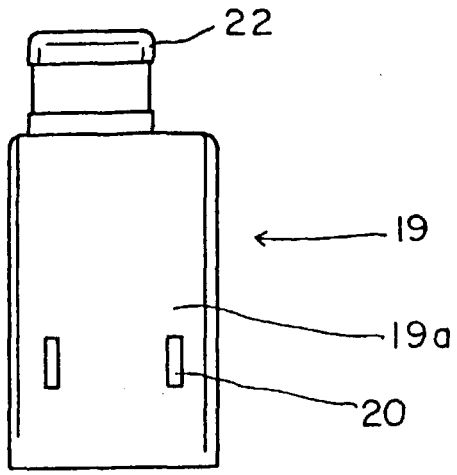

FIG. 16