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(54) **Electrical wiring construction including a bus bar**

Elektrische Verkablungskonstruktion mit einer Sammelschiene

Cablage électrique incluant une barre omnibus

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an electric wiring construction having a bus bar for supplying electricity to one or more electricity-consuming components. A first connection terminal is connected with the bus bar by means of a first screw tightened into the bus bar. A second connection terminal is connected with the bus bar by means of a second screw tightened into the bus bar. An input line is connected with the first connection terminal, and an output line for supplying electric current to one or more other electricity-consuming components is connected with the second connection terminal.

Description of the Prior Art

[0002] Conventionally, the various electricity-consuming components installed on a vehicle (e.g. a glow plug, heater, or the like) are powered by electricity generated by a generator which is operated by the actuation of the engine. A relay box is provided on an electricity supply path connected with the electricity-consuming components. The relay box accommodates a plurality of relays for switching the supply of electric current to electricity-consuming components, to turn them on and off. Fig. 6 shows a known relay box 11. An electrically conductive bus bar 12 is installed on the relay box 11. Relays are electrically connected with the bus bar 12. A part of the bus bar 12 is exposed on an outer surface of the relay box 11. Electricity generated by a generator is transmitted to the relays through an input line 13 and the bus bar 12. The input line 13 is crimped to connect it with a crimping portion 151 of a first connection terminal 15. The first connection terminal 15 is connected with the bus bar 12 by a first screw 16 tightened the bus bar 12.

[0003] The bus bar 12 for supplying electricity to the relays is also used to supply electricity to other electricity-consuming components other than via the relays. An output line 14 for supplying electricity to the other electricity-consuming components is crimped to connect it with a crimping portion 171 of a second connection terminal 17. The second connection terminal 17 is connected with the bus bar 12 by a second screw 18 tightened into the bus bar 12.

[0004] The electricity generated by the generator is transmitted to the relays accommodated inside the relay box 11 and the output line 14 through the input line 13 and the bus bar 12. That is, through the bus bar 12, electricity is sent to the other electricity-consuming components positioned at the other end of the output line 14. When electricity passes through the bus bar 12, heat is generated by the bus bar 12. The generated heat is transmitted to the first and second connection terminals 15 and 17 and the first and second screws 16 and 18. Owing to the heat transmission, the first and second connection terminals 15 and 17 and the first and second screws 16 and 18 are heated. As described above, the input line 13 is fixed by crimping to the first connection terminal 15, and the output line 14 is fixed by crimping to the second connection terminal 17. When the temperature of the generated heat of the bus bar 12 exceeds the thermal resistance temperature of the first connection terminal 15 and that of the second connection terminal 17, the electrical contact between the input line 13 and the crimping portion 151 and that between the output line 14 and the crimping portion 171 become poor.

[0005] A power source terminal assembly comprising a bus bar with first and second connection terminals connected thereto by screws is disclosed in document US-A-4 486 058.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to prevent poor electrical contact between a connection terminal and a bus bar.

[0007] In order to address the object, the present invention provides an electric wiring construction having a bus bar for supplying electricity to one or more electricity-consuming components; a first connection terminal is connected with the bus bar by means of a first screw tightened into the bus bar; a second connection terminal is connected with the bus bar by means of a second screw tightened into the bus bar; an input line is connected to the first connection terminal; and an output line for supplying electric current to one or more other electricity-consuming components is connected to the second connection terminal. The first connection terminal and the second connection terminal are connected to each other by a bypassing member.

[0008] Accordingly, part of the electric current flowing through the input line flows to the output line not via the bus bar but via the bypassing line. This construction allows a smaller amount of electric current to flow through the bus bar than that flowing through a bus bar of the conventional construction.

[0009] Preferably, the first connection terminal and the second connection terminal each have a respective crimping portion; one end of the bypassing member and the input line are crimped to the crimping portion of the first connection terminal; and the other end of the bypassing member and the output line are crimped to the crimping portion of the second connection terminal.

[0010] For example, it is easy to form a construction in which the bypassing member is crimped to the crimping portion of each connection terminal, together with the input and output lines.

[0011] Preferably, one end of the bypassing member is connected with at least one of the first connection terminal and the bus bar by means of the first screw tight-

ened into the bus bar; and the other end of the bypassing member is connected with at least one of the first connection terminal and the bus bar by means of the second screw tightened into the bus bar. That is both the bypassing member and the connection terminals are connected with the bus bar by tightening the screws into the bus bar.

[0012] Usually, the bus bar is installed on a relay box accommodating a plurality of relays, and the relays are electrically connected with the bus bar.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is a perspective view of a first embodiment of the present invention and a partly broken-away enlarged view showing a main portion of the first embodiment;

Fig. 2 is a circuit diagram of the embodiment of Fig. 1;

Fig. 3 is a perspective view of a second embodiment of the present invention;

Fig. 4 is a perspective view of a third embodiment of the present invention;

Fig. 5 is a partly broken-away front view of a fourth embodiment of the present invention; and

Fig. 6 is a perspective view of a conventional construction.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] A first embodiment of the present invention will be described with reference to Figs. 1 and 2. Constituent components of the first embodiment which are the same as those shown in Fig. 6 are denoted by the same reference numerals as those used in Fig. 6.

[0015] As shown in Fig. 1, an exposed core wire at an end portion of an input line 13 and an exposed core wire at an end portion of an electrically conductive bypassing line 19 are crimped to a crimping portion 151 of a first connection terminal 15. The terminal 15 is connected with a bus bar 12 by means of a first screw 16 tightened into the bus bar 12. An exposed core wire at an end portion of an output line 14 and an exposed core wire at an end portion of the bypassing line 19 are crimped to a crimping portion 171 of a second connection terminal 17, which is connected with the bus bar 12 by means of a second screw 18 tightened into the bus bar 12.

[0016] Fig. 2 shows the wire construction of Fig. 1 connected to a generator 20, which generates electricity by the actuation of the engine of a vehicle for transmission to various electricity-consuming components. A relay box 11 accommodates fuses 21, 22, 23, and 24 and relays 25, 26, 27, and 28. The relay 25 performs switching of electric current supply to a glow plug 29, which is an electricity-consuming component, to turn the glow plug 29 on or off. The relays 26 - 28 perform switching of electric current supply to a heater (not shown), which is another electricity-consuming component, to turn the heater on or off. The fuse 24 is electrically connected with an electricity-consuming component which is not shown in Fig. 2. The output line 14 is connected with a bus bar 31 accommodated inside a fuse box 30. The bus bar 31 is electrically connected with a battery 33 through a fuse 32. The bus bar 31 is also electrically connected with an electricity distribution part 35 through a fuse 34. The electricity distribution part 35 distributes electric current to various electricity-consuming components.

[0017] The following effects can be obtained in the first embodiment.

(1-1) A part of the electric current flowing through the input line 13 flows to the output line 14 not via the bus bar 12 but via the bypassing line 19. If the bypassing line 19 was not provided, all of electric current which flows through the input line 13 would flow through the bus bar 12. The construction of the present invention allows a lower amount of the electric current to flow through the bus bar 12 than that flowing through the bus bar of the conventional construction. Thus, the heat generated in the bus bar 12 is lower than the heat generated by the bus bar of the conventional construction. Consequently, the temperature rises of the bus bar 12, the first connection terminal 15, the second connection terminal 17, the first screw 16, and the second screw 18 are smaller than that in the corresponding members of the conventional construction. Accordingly, it is possible to ensure good electrical contact between the bus bar 12 and the first connection terminal 15, as well as between the bus bar 12 the second connection terminal 17, even though heat is repeatedly generated in the bus bar 12 upon switching electric current to and from the electricity-consuming components.

(1-2) The bypassing line 19 transmits heat transmitted to it. Thus, the temperature of the first connection terminal 15, the second connection terminal 17, the first screw 16, and the second screw 18 can be prevented from becoming high. The heat transmission of the bypassing line 19 contributes to preventing poor electrical contact between the input line 13 and the first connection terminal 15 and between the output line 14 and the second connection terminal 17.

(1-3) It is very easy to form a construction in which the input line 13 and the bypassing line 19 are crimped together to the crimping portion 151 of the first connection terminal 15 and the output line 14 and the bypassing line 19 are crimped together to the crimping portion 171 of the second connection terminal 17. That is, the construction can be formed by merely adding the bypassing line 19 to the con-

ventional construction.

[0018] The second embodiment of the present invention will be described below with reference to Fig. 3. Constituent components of the second embodiment which are the same as those of the first embodiment are denoted by the same reference numerals as those of the first embodiment.

[0019] In the second embodiment, a plate-shaped bypassing member 36 and first and second connection terminals 15 and 17 are connected with a bus bar 12 by means of first and second screws 16 and 18 tightened into the bus bar 12. The bypassing member 36 is interposed between the connection terminal 15 and the head of the first screw 16 and between the second connection terminal 17 and the head of the second screw 18. Thus, there is a gap formed between the bus bar 12 and the bypassing member 36.

[0020] In the second embodiment, effects similar to those described above in items (1-1) and (1-3) are obtained. The heat transmission area of the plate-shaped bypassing member 36 is greater than that of the bypassing line 19 of the first embodiment. Therefore, the bypassing member 36 prevents the temperature rise of the bus bar 12, the first connection terminal 15, the second connection terminal 17, the first screw 16, and the second screw 18 more effectively than the bypassing line 19 of the first embodiment.

[0021] In the third embodiment shown in Fig. 4, a bypassing member 36 is interposed between a bus bar 12 and a first connection terminal 15 and between the bus bar 12 and a second connection terminal 17.

[0022] The fourth embodiment of the present invention will be described below with reference to Fig. 5. Constituent parts of the fourth embodiment which are the same as those of the first embodiment are denoted by the same reference numerals as those of the first embodiment.

[0023] In the fourth embodiment, an input line 174, an output line 172, and a bypassing line 173 are formed integrally with one another to form a lead wire 175. A core wire of the lead wire 17, exposed by removing the covering of the lead wire 17, is crimped to crimping portions 151 and 171.

[0024] The fourth embodiment provides effects similar to those of the first embodiment.

[0025] Further embodiments of the present invention may be obtained by adapting the first to fourth embodiments (especially the second or third embodiment) in one or both of the following ways:

(1) Forming the bypassing member integrally with the bus bar 12.
(2) Forming a heat release fin on the bypassing member to increase the heat release area.

[0026] As described above, because the first connection terminal and the second connection terminal are connected with each other by the bypassing member, the present invention may ensure good electrical contact between the connection terminals and the bus bar.

Claims

1. An electric wiring construction having:

a bus bar (12) for supplying electricity to one or more electricity-consuming components (29),
a first connection terminal (15) connected to said bus bar (12) by means of a first screw (16) tightened into said bus bar (12);
a second connection terminal (17) connected to said bus bar (12) by means of a second screw (18) tightened into said bus bar;
an input line (13;174) connected to said first connection terminal (15); and
an output line (14; 172) for supplying electric current to one or more other electricity-consuming components, the output line being connected to said second connection terminal (17),

wherein said first connection terminal and said second connection terminal are connected with each other by a bypassing member (19; 36; 173).

2. The electric wiring construction according to claim 1, wherein said first connection terminal (15) and said second connection terminal (17) each have a crimping portion (151,171), one end of said bypassing member (19,173) and one end of said input line (13,174) are crimped to said crimping portion (151) of said first connection terminal (15), and the other end of said bypassing member and the other end of said output line (14; 172) are crimped to said crimping portion (171) of said second connection terminal (17).

3. The electric wiring construction according to claim 1, wherein one end of said bypassing member (36) is connected to at least one of said first connection terminal (15) and said bus bar (12) by means of said first screw (16); and the other end of said bypassing member (36) is connected to at least one of said second connection terminal (17) and said bus bar (12) by means of said second screw (18).

4. The electric wiring construction according to any one of claims 1 to 3, wherein said bus bar (12) is installed on a relay box (11) accommodating a plurality of relays(25,26,27,28); and said relays are electrically connected with said bus bar.

Patentansprüche

1. Elektrische Verdrahtungs- bzw. Verkabelungskonstruktion, aufweisend:

   eine Sammelschiene (12) zum Zuführen von Elektrizität zu einer oder mehreren Elektrizität verbrauchenden Komponente(n) (29),
   einen ersten Verbindungsanschluß bzw. -kontakt (15), welcher mit der Sammelschiene (12) mit einer ersten Schraube (16) verbunden ist, welche in die Sammelschiene (12) festgelegt ist;
   einen zweiten Verbindungsanschluß (17), welcher mit der Sammelschiene (12) mittels einer zweiten Schraube (18) verbunden ist, welche in die Sammelschiene festgelegt ist;
   eine Eingangsleitung (13; 174), welche mit dem ersten Verbindungsanschluß (15) verbunden ist; und
   eine Ausgangsleitung (14; 172) zum Zuführen eines elektrischen Stroms zu einer oder mehreren anderen Elektrizität verbrauchenden Komponente(n), wobei die Ausgangsleitung mit dem zweiten Verbindungsanschluß (17) verbunden ist,

   wobei der erste Verbindungsanschluß und der zweite Verbindungsanschluß miteinander durch einen Bypass- bzw. Umgehungsglied (19; 36; 173) verbunden sind.

2. Elektrische Verkabelungskonstruktion nach Anspruch 1, wobei der erste Verbindungsanschluß (15) und der zweite Verbindungsanschluß (17) jeweils einen crimpenden bzw. Crimpabschnitt (151, 171) aufweisen, wobei ein Ende des umgehenden Glieds (19, 173) und ein Ende der Eingangsleitung (13, 174) an den crimpenden Abschnitt (151) des ersten Verbindungsanschlusses (15) gecrimpt sind und das andere Ende des umgehenden Glieds und das andere Ende der Ausgangsleitung (14; 172) an den crimpenden Abschnitt (171) des zweiten Verbindungsanschlusses (17) gecrimpt sind.

3. Elektrische Verkabelungskonstruktion nach Anspruch 1, wobei ein Ende des umgehenden Glieds (36) mit wenigstens einem des ersten Verbindungsanschlusses (15) und der Sammelschiene (12) mittels der ersten Schraube (16) verbunden ist; und das andere Ende des umgehenden Glieds (36) mit wenigstens einem des zweiten Verbindungsanschlusses (17) und der Sammelschiene (12) mittels der zweiten Schraube (18) verbunden ist.

4. Elektrische Verkabelungskonstruktion nach einem der Ansprüche 1 bis 3, wobei die Sammelschiene (12) an einem Relaisgehäuse (11) installiert ist, welches eine Vielzahl von Relais (25, 26, 27, 28) aufnimmt; und die Relais elektrisch mit der Sammelschiene verbunden sind.

Revendications

1. Construction de câblage électrique comprenant :

   une barre omnibus (12) pour fournir l'électricité à un ou plusieurs composants consommateurs d'électricité (29),
   une première borne de connexion (15) connectée à la dite barre omnibus (12) au moyen d'une première vis (16) serrée dans la dite barre omnibus (12) ;
   une deuxième borne de connexion (17) connectée à la dite barre omnibus (12) au moyen d'une deuxième vis (18) serrée dans la dite barre omnibus ;
   une ligne d'entrée (13 ; 174) connectée à la dite première borne de connexion (15) ; et
   une ligne de sortie (14 ; 172) pour fournir le courant électrique à un ou plusieurs autres composants consommateurs d'électricité, la ligne de sortie étant connectée à la dite deuxième borne de connexion (17),

   dans laquelle la dite première borne de connexion et la dite deuxième borne de connexion sont connectées l'une à l'autre par un élément de pontage (19 ; 36 ; 173).

2. Construction de câblage électrique selon la revendication 1, dans laquelle la dite première borne de connexion (15) et la dite deuxième borne de connexion (17) ont chacune une partie de sertissage (151, 171), une extrémité du dit élément de pontage (19, 173) et une extrémité de la dite ligne d'entrée (13, 174) sont serties à la dite partie de sertissage (151) de la dite première borne de connexion (15), et l'autre extrémité du dit élément de pontage et l'autre extrémité de la dite ligne de sortie (14 ; 172) sont serties dans la dite partie de sertissage (171) de la dite deuxième borne de connexion (17).

3. Construction de câblage électrique selon la revendication 1, dans laquelle une extrémité du dit élément de pontage (36) est connectée à au moins une de la dite première borne de connexion (15) et de la dite barre omnibus (12) au moyen de la dite première vis (16), et l'autre extrémité du dit élément de pontage (36) est connectée à au moins une de la dite deuxième borne de connexion (17) et de la dite barre omnibus (12) au moyen de la dite deuxième vis (18).

4. Construction de câblage électrique selon une quel-

conque des revendications 1 à 3, dans laquelle la dite barre omnibus (12) est installée sur une boîte de relais (11) contenant une pluralité de relais (25, 26, 27, 28), et les dits relais sont électriquement connectés à la dite barre omnibus.

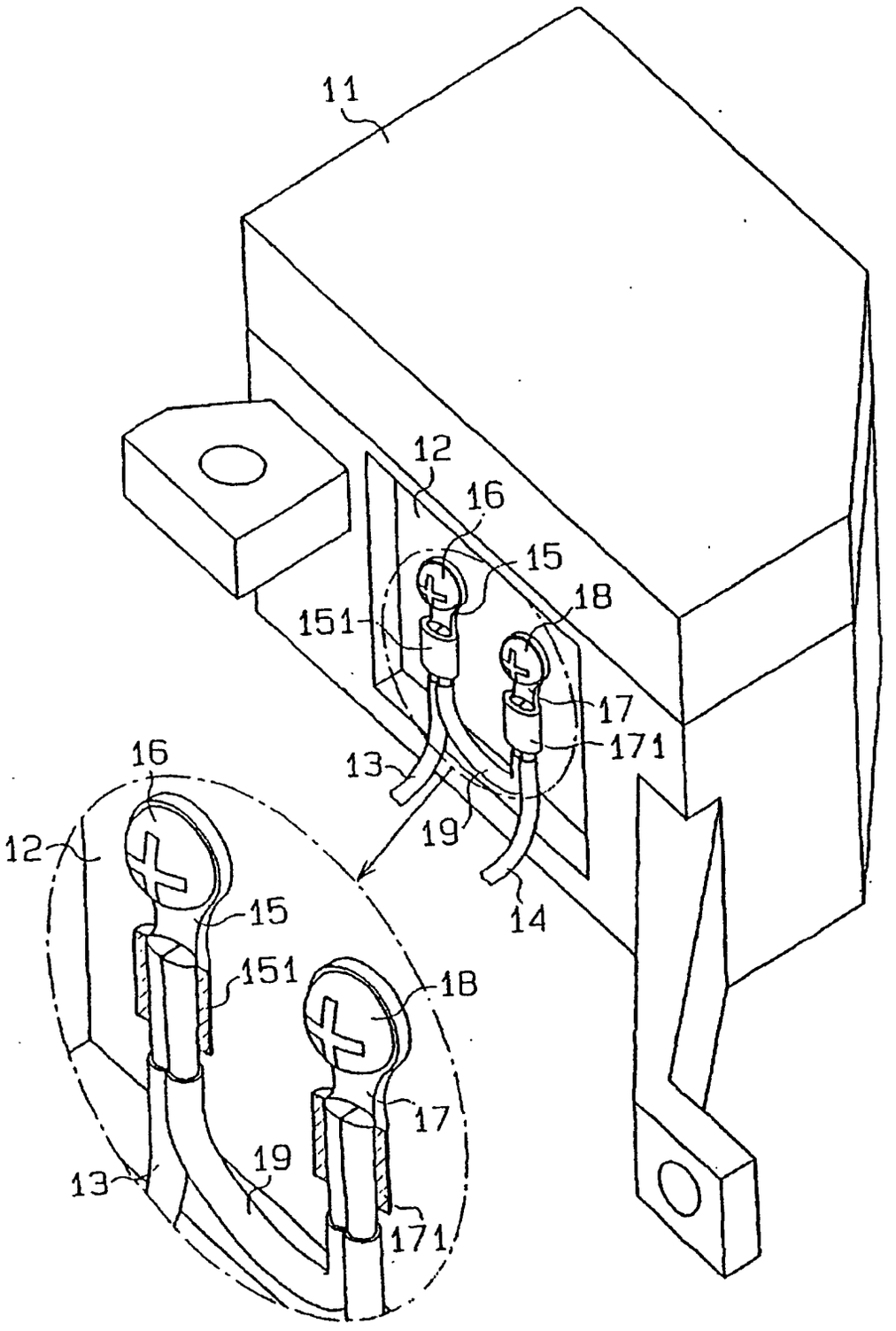


FIG. 1

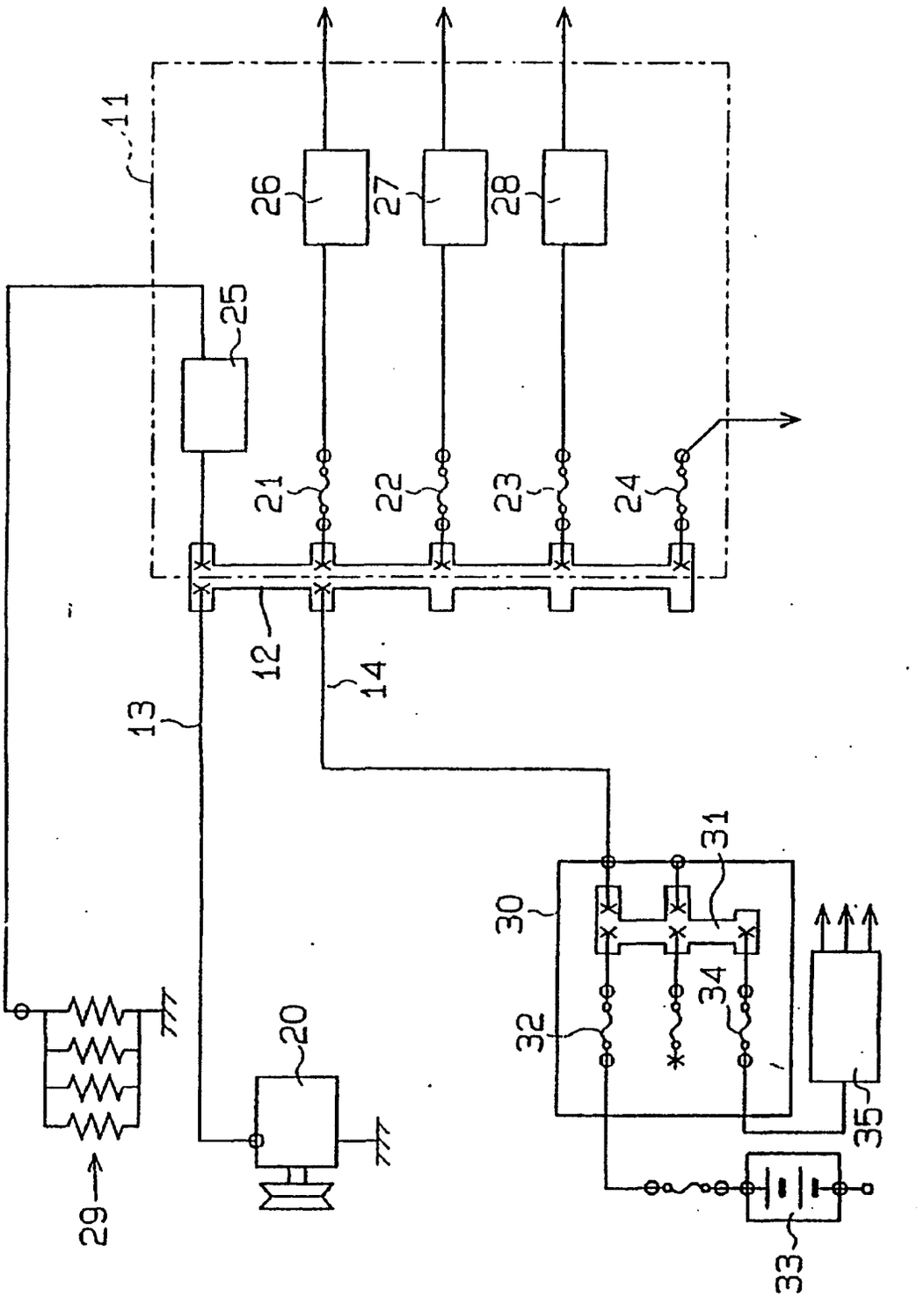


FIG. 2

FIG. 3

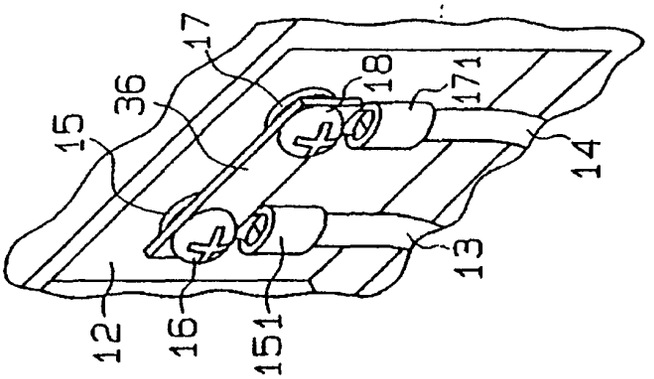


FIG. 4

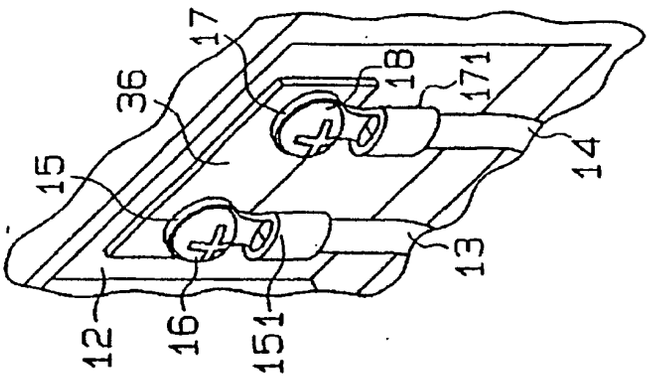
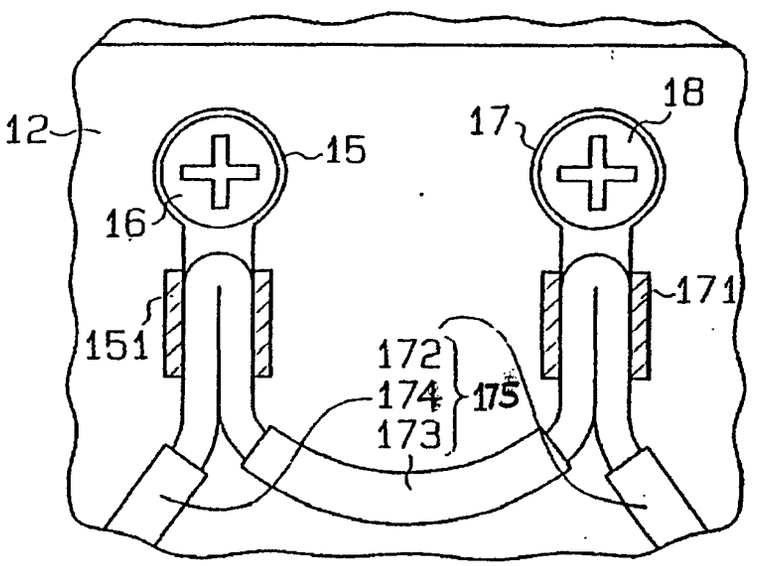


FIG. 5



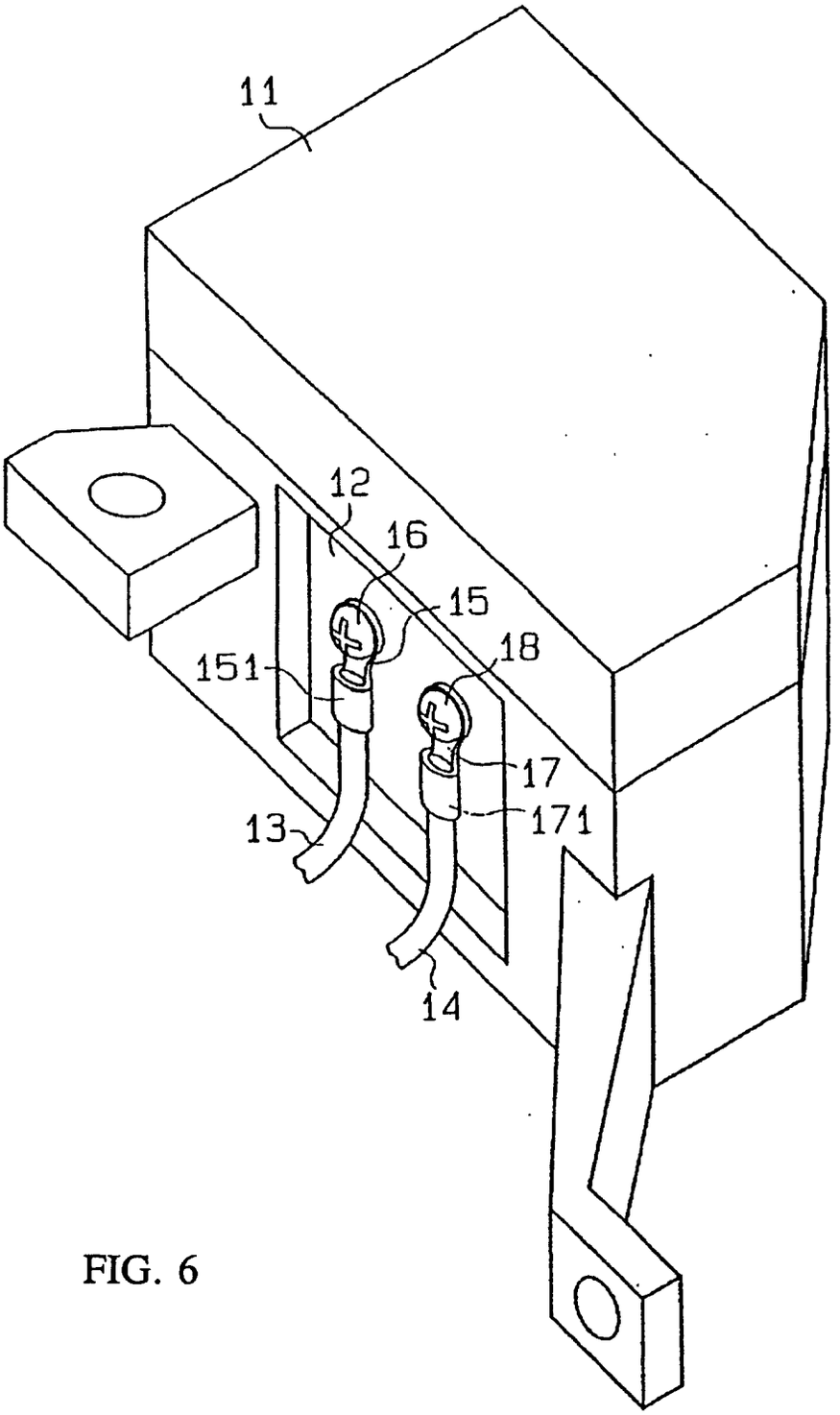


FIG. 6