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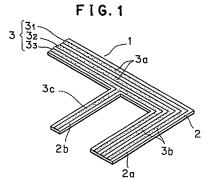
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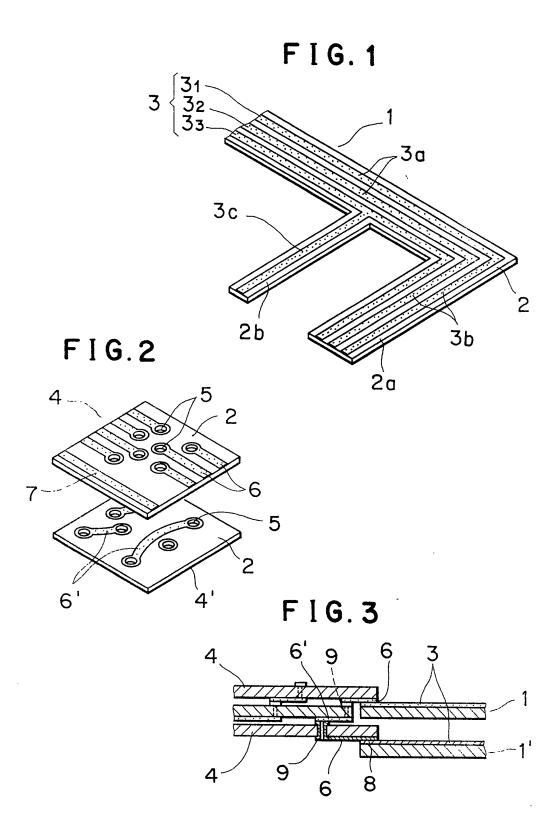
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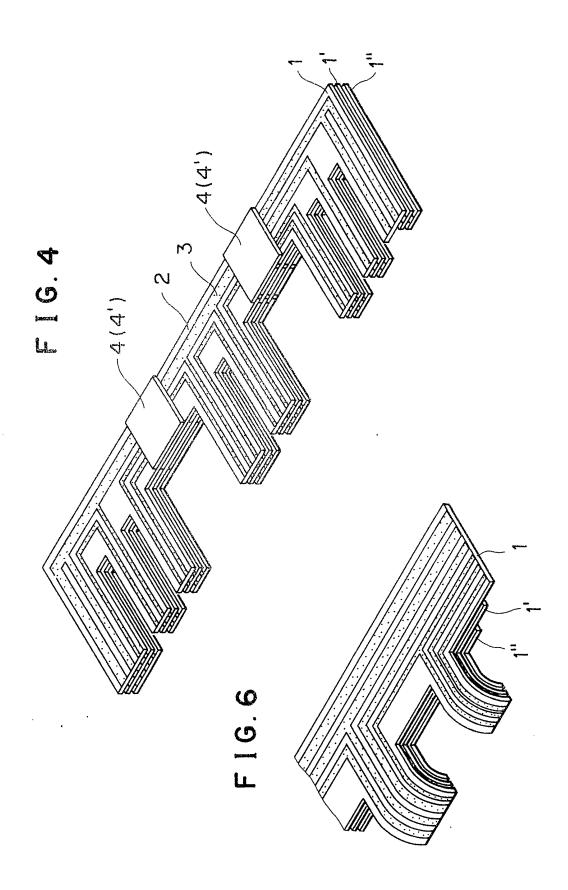
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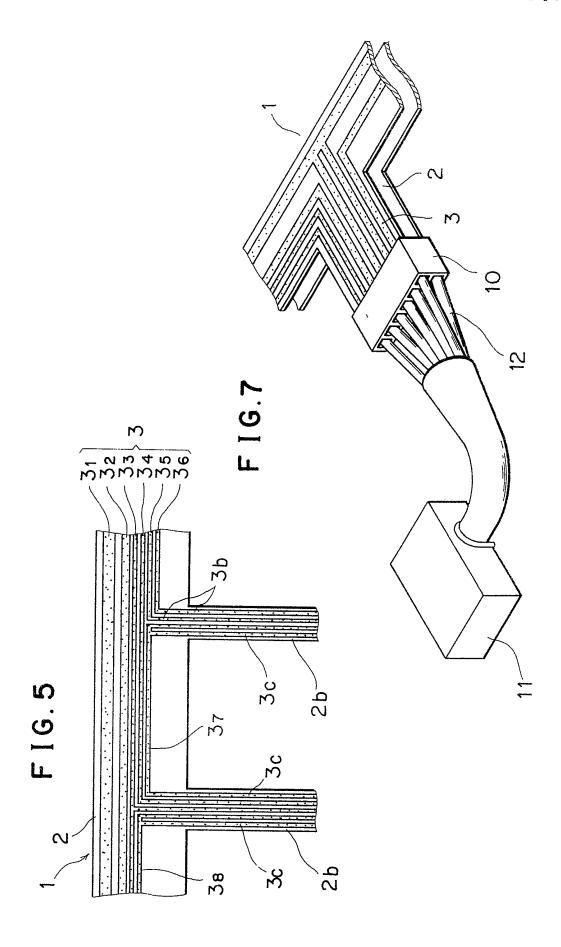
### (54) Circuit board wire harness for automobile

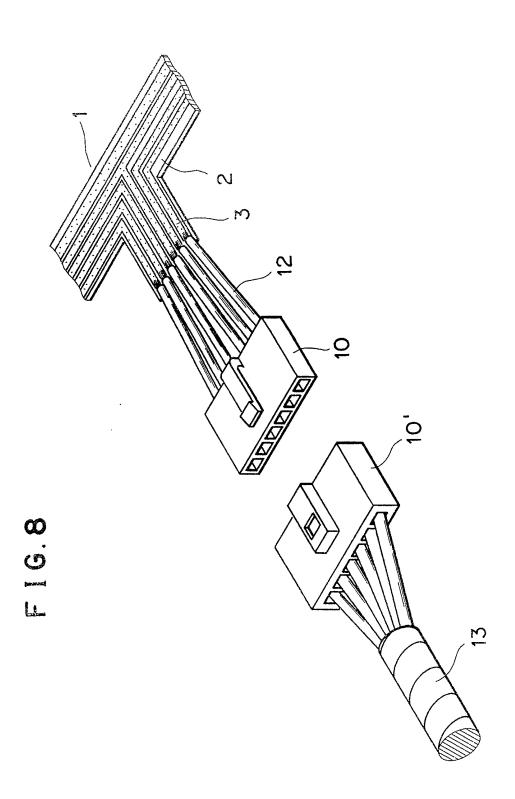
(57) An automobile wiring harness is composed of an insulator substrate 2 and a plurality of parallel conductive strip members 3 may be provided. The strip members may be of uniform thickness but have different widths according to current capacity demands. Boards may be superimposed with cross connections (Figs. 2, 3 & 4) and an intermediate board may be used (Fig. 2). The interconnections may be by grommets or pins (Fig. 3) or by spot welding strip members together through holes in the boards (Figs. 13, 14 & 16). The boards may be terminated by plugs and sockets (Figs. 7 & 8).











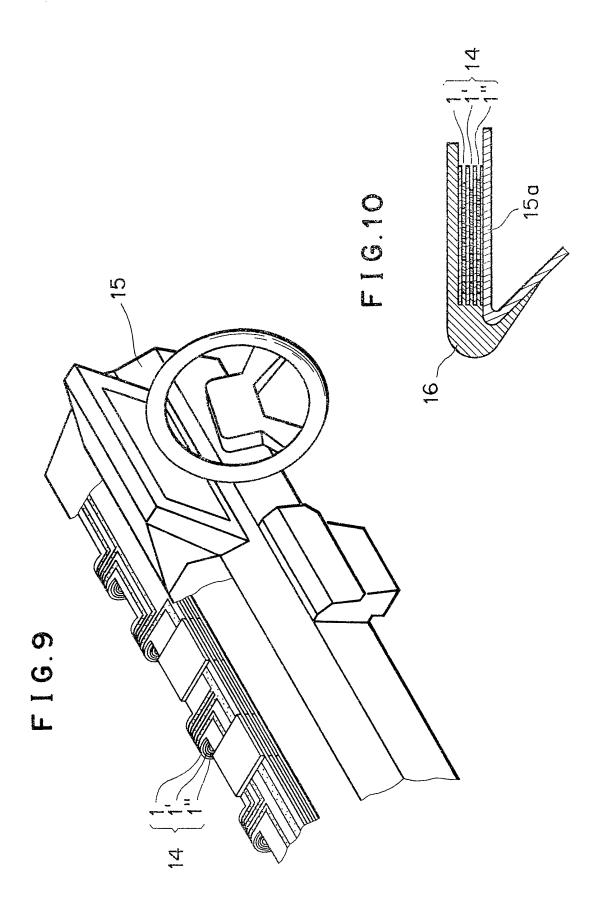
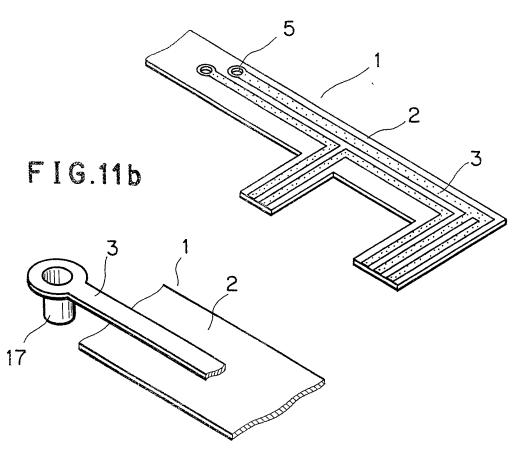


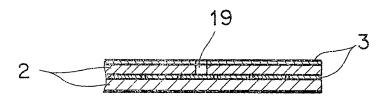
FIG.11a



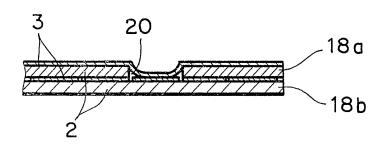
F I G. 12

18a
18b
18
18a
2

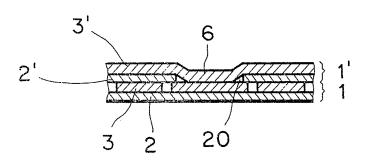
FIG.13

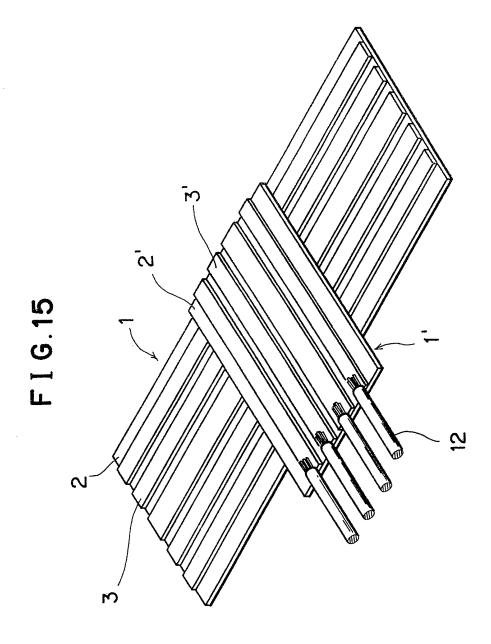


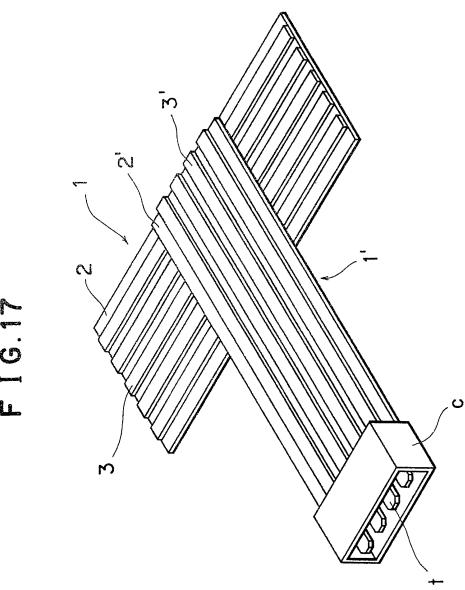
F I G.14

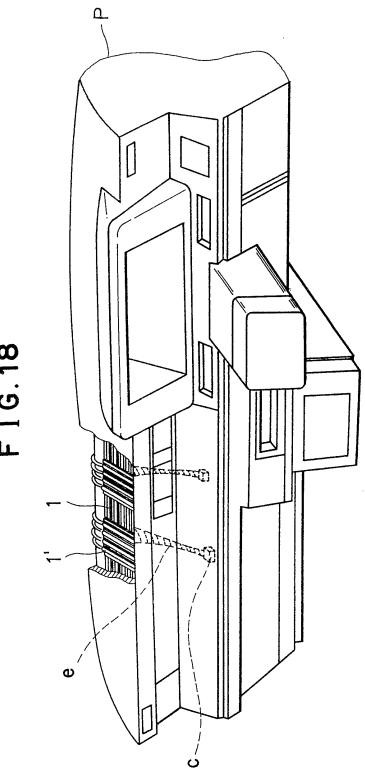


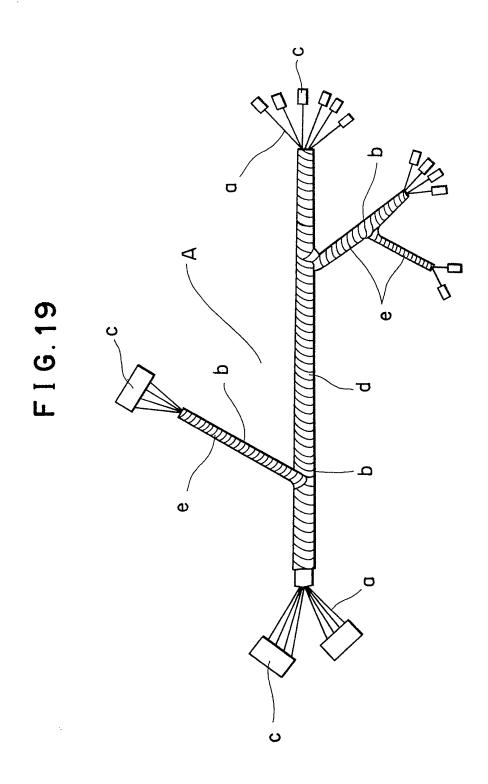
F I G.16

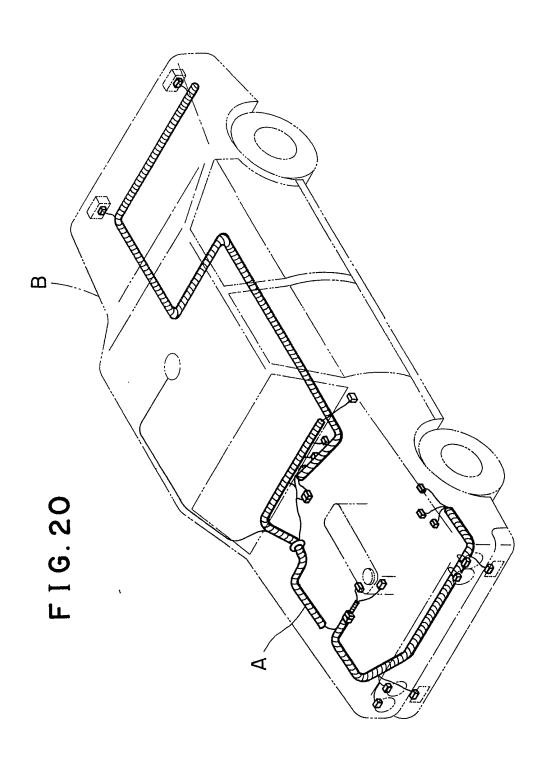


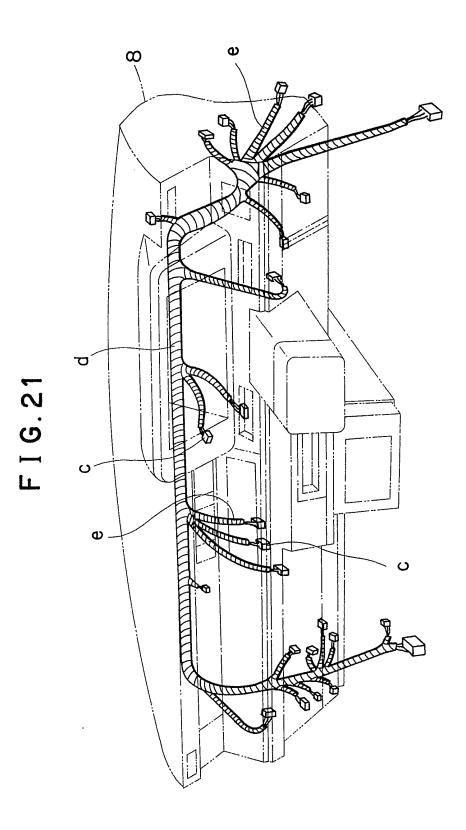












#### **SPECIFICATION**

#### Circuit board wire harness for automobile

## 5 Background of the invention

This invention relates to a circuit board which is capable of serving the purpose of a wire harness for an automobile, and more particularly to a circuit board to 10 replace at least part of a wire harness composed of a plurality of bundled wires, said wire harness having a design corresponding to a predetermined wiring pattern in an automobile structure so that the space taken by the wire harness may be made small, wiring 15 thereof may be made with ease, and productivity may be increased.

A conventional wire harness is formed by determining the wiring path thereof in advance, and tying all electric wires passing therealong into a bundle. One 20 such example is shown in Fig. 19, wherein a denotes an electric wire, b denotes a vinyl tape, and c denotes a connector. A wire harness A has a plurality of sub-harness e jointed (branch connection) to a main harness d. In this way, it has a complicated construction. Fig 20 shows its wiring, wherein the wire harness A is fitted along a predetermined wiring path so that it lies along portions of various constructions, shapes, etc. in an automobile B, and fixed to a vehicle body by clips, clamps, etc. (not shown).

However, the prior art cannot stop the tendency that a wire harness becomes bulkier and bulkier due to ever increasing demand of electronic parts to be mounted to an automobile. Moreover, due to ever increasing various electric items themselves, the wire harness often interferes with various parts and the vehicle body, which makes it difficult to obtain a sufficient space for wiring. Furthermore, as the wire harness becomes larger and its weight increases, manufacturing process, mounting process, etc. are increased, which results in the following probles.

(1) Electric wires constituting a wire harness have many different diameters and lengths, and branch electric wires (above mentioned joint portion) for connecting auxiliaries such as connectors, etc. are 45 exposed from various portions. Accordingly, working processes are increased and automation is difficult to obtain.

(2) Different wire harnesses are required to be made according to different specifications and grades of an
 automobile, even if its kind and model are same.
 Accordingly, they are extremely complicated to manufacture and to control.

(3) When electric wires are jointed with respect to one another, such additional works as peeling of the 55 jackets of electric wires, pressure welding of joint terrminals, wrapping of insulated tapes to joint portions are required. Furthermore, the joint portions are swollen up due to the above mentioned terminals, insulated tapes, etc. Accordingly, shapes thereof 60 become irregular.

(4) There is a tendency that wire harnesses are made even larger according to increase of the number of the

above mentioned circuits. Accordingly, if the wire harnesses should remain in their present form, their wiring would become more and more difficult, which eventually results in a reduced room space of an automobile.

The present invention is accomplished in order to solve the above mentioned problems inherent in the prior art. Especially, in view of the swollen portions of the wire harness, for example, the portion where electric wires are concentrated (main harness d in Fig. 19) and joint portions (sub-harness in Fig. 19), the inventors of the present invention attempted to make these swollen portions flat just like a usual printed circuit board (P.C.B.) and a flexible printed circuit board (F.P.C).

Summary of the invention
It is therefore a general object of the present invention
to provide a circuit board to replace at least part of a
wire harness for an automobile such that the wiring
can easily be effected without taking up much space.

Another object of the invention is to provide a circuit board to replace at least part of a wire harness for an automobile, wherein all joint portions which a conventonal wire harness has can be built-in a circuit board.

A further object of the invention is to provide a circuit board to replace at least part of a wire harness for an automobile, wherein such working processes as peeling of the jackets, of electric wires, pressure welding of joint terminals, etc. are no longer required.

A still further object of the invention is to provide a circuit board to replace at least part of a wire harness for an automobile, wherein a circuit board is formed in 95 a shape of a plain board.

A still further object of the present invention is to provide a circuit board to replace at least part of a wire harness for an automobile such that said circuit board can be integrally molded with, for example, the wall surface of an instrument panel.

An additional important object of the present invention is to provide a wire harness for an automobile, such that wiring can be easily done by simple application of a circuit board, even if additional electric items are employed, or models or grades of an automobile are changed.

In order to achieve the above objects, there is essentially provided a circuit board to replace at least part of a wire harness composed of a plurality of
110 bundled wires, said wire harness having a design corresponding to a predetermined wiring pattern in an automobile structure, said circuit board comprising an insulator substrate having first and second sides and generally having a predetermined design in accordance with a wiring pattern; and conductive strip member provided on selected one of said first and second sides of the insulator substrate substantially parallely with each other to form a plurality of circuit

There is also essentially provided a laminated circuit board to replace at least part of a wire harness composed of a plurality of bundled wires, said wire harness having a design corresponding to a wiring pattern within an automobile structure, said circuit

board comprising a plurality of insulator substrates having first and second sides, each insulator substrate generally having a predetermined design in accordance with a wiring pattern; and conductive strip

5 members provided on selected one of first and second sides of each insulator substrate, said conductive strip members being arranged substantially parallel with each other to form a plurality of circuit patterns; said plurality of insulator substrates being piled up one on

10 top of another such that said insulator substrates and said conductive strip members thereon alternate; and said insulator substrates including a first insulator substrate and a second insulator substrate provided on top of said first insulator substrate, at least one of

15 said plurality of conductive strip members of the first insulator substrate being connected to at least one of said plurality of conductive strip members of the second insulator substrate.

The above and other objects, novel features and asvantages of the present invention will become more apparent from the description on an exemplary embodiment of the invention. The description makes reference to the drawings.

Brief description of the drawings
Fig. 1 is a perspective view of an important portion
of a laminated circuit board according to a first
preferred embodiment of the present invention;

Fig. 2 is likewise a perspective view of interlayer connection boards;

Fig. 3 is a sectional view showing connection of the interlayer connection boards and the laminated circuit board;

Fig. 4 is a perspective view showing a laminated circuit board;

35 Fig. 5 is a plan view of a laminated circuit board according to a second preferred embodiment of the present invention;

Fig 6 is a perspective view showing a piling up state off the laminated circuit board of Fig. 5;

Figs. 7 and 8 are schematic illustrations for explaining how to connect terminal portions of the laminated circuit board, respectively;

Fig. 9 is a perspective view showing an example of the wiring of a circuit board according to the present 45 invention;

Fig. 10 is a sectional view showing a part of Fig. 9; Figs. 11a and 11b are perspective views showing an important portion of modified embodiments of circuit boards, respectively;

Fig. 12 is a perspective view showing another example of a laminated circuit board according to the present invention;

Figs. 13 and 14 are sectional views showing how to connect the conductive strip members in the lamin-55 ated circuit board of Fig. 12 respectively;

Fig. 15 is a further embodiment of the circuit board according to the present invention, in which the circuit board is composed of two insulator substrates having conductive strip members extending perpendicularly to each other therein;

Fig. 16 is a sectional view showing how the conductive strip members on the two substrates are connected;

Fig. 17 is a perspective view of modified form of the 65 embodiment;

Fig. 18 is an illustration showing how the circuit board of the embodiment is build-in in the instrument panel;

Fig. 19 is a schematic illustration for explaining a 70 conventional wire harness;

Fig. 20 is a schematic perspective view showing wiring of the conventional wire harness; and

Fig. 21 is a perspective view showing wiring of the conventional wire harness particularly behind the 75 instrument panel.

Detailed description of the embodiments
Preferred embodiments of the present invention
will be described hereunder with reference to the
accompanying drawings.

80 Fig. 1 is a plan view of a laminated circuit board according to the present invention, and Fig. 2 is a perspective view showing a piling up state thereof.

A laminated circuit board 1 comprises insulated substrates 2 and a plurality of conductive strip members 3 arranged substantially parallel with each other thereon.

Each insulated substrate 2 is formed in a band shape using an insulator material such as, film such as polyester, polyamide resin, etc., paper phenol, glass epoxy, etc. which are used for a usual printed circuit board. Preferably, a film shaped insulator material should be employed in view of light weight and small size, and also for convenient purposes of wiring. The insulator substrate 2 has an L-shaped curved portion 2a and a T-shaped branch portion 2b corresponding to wiring paths of a wire harness.

The conductive strip member 3 is formed in a band shape having a uniform thickness but different narrow widths corresponding to current carrying capacities using a metallic conductor such as copper, aluminium, etc. The conductive strip member 3 is constituted to include a desired pattern corresponding to the wiring path of a wire harness.

In Fig. 1, the conductive strip members 3<sub>1</sub>, 3<sub>2</sub> and 3<sub>3</sub>
105 have different widths, respectively. A linear path 3a is provided at its end portion with an L-shaped curved circuit 3b. At the same time, the member 3<sub>3</sub> is formed in a branch shape having a branch path 3c. In this way, even in the case one path is required to connect to
110 many auxiliaries, switches, etc., a simple alternation of the circuit pattern can meet all these requirements with ease.

Accordingly, the circuit patterns of the conductive strip member 3 arranged in the circuit board 1 are classified in the following three kinds. That is, (i) function of the circuits, (ii) actuation of loads, and (iii) combination of the foregoing. And, a most suitable pattern is selected among them so that the maximum effect can be obtained.

The "function of the circuits" means that in view of functions of circuits such as power circuits for various kinds of electric items (loads) mounted on an automobile, earth circuit, signal control circuit, meter circuit, etc., a sheet of circuit board which covers respective functions of the circuits is formed. The "actuation of loads" means that a sheet of circuit board is formed using all of such circuits as power circuits for actuating loads such as, for example, a wiper, etc., and earth circuit, signal circuit, switch

130 circuits, etc. The "combination of the foregoing"

means that a multifunction circuit board is formed by suitably combining the foregoing circuits, and a most effective circuit pattern such as light weight and small size is designed in view of the whole wiring paths of 5 the wire harness.

Fig. 2 is a perspective view of interlayer connection boards. One of the interlayer connection boards 4 is provided with conductive interlayer connection strip member 6 extending in the lateral direction from a 10 plurality of through holes 5 formed in the central portion of the insulation substrate 2, and a conductive strip member 7 having no through hole. The other interlayer connection board 4' comprises the insulator substrate 2 and a plurality of conductive interlayer 15 connection strip members 6' having the through holes each at its both ends. These boards 4, 4' may be of either a single faced board or a double faced board, and can be used for connecting the upper and lower interlayers of the laminated circuit boards and for 20 connecting the adjacent circuit boards. The interlayer connection circuits 6, 6' and 7 are formed of the same members as those of the conductive strip member 3.

Fig. 3 is a sectional view showing an upper and lower interlayer connection state when the circuit boards are piled up. That is, end portions of the conductive strip members 3, 3 of the upper and lower circuit boards 1, 1' are directly connected with the circuits 6, 6 of the interlayer connection board 4, 4 by soldering 8, and a grommet 9 is inserted in the through hole 5 for fixture. Instead of the grommet 9, a rivet, pin, soldering, etc. may be used. Likewise, instead of soldering 8 for connecting the conductive strip member 8 and the circuit 6, they may be directly connected by screw means, anisotropic conductive rubber, welding, conductive adhesive agent, etc., or otherwise indirectly connected by connectors, etc. as will be described.

Fig. 4 illustrates layers of the laminated circuit board 1, 1', 1" which were formed as shown in Fig. 1. The 40 respective circuit board are classified in view of the above mentioned "function of the circuits", "actuation of the loads", etc., and are connected between the upper and lower layers or adjacent circuit boards by the interlayer connection boards 4, 4'.

45 In this way, various connecting means of the circuit

boards are made available by using the interlayer connection boards 4, 4'. Accordingly, for example, in the case the respective layers are separately disposed, electric power source wires, earth wires, signal wires, etc. may be collected in one layer, or on the contrary, they may be separately disposed according to necessity. Moreover, since the respective conductive strip members 3 arranged in the circuit boards can be divided in several circuit patterns, only circuit pattern of each of such divided portion can be designed and manufactured.

Fig. 5 is a plan view of a circuit board according to a second embodiment of the present invention, and Fig. 6 is a perspective view showing a piling up state thereof.

The circuit board 1 comprises an insulator substrate 2 and a plurality of conductive strip members 3 arranged thereon.

The insulator substrate 2 is formed in a band shape 65 using an insulator material such as, film such as polyester, polyimide resin, etc., paper phenol, glass epoxy, etc. which are used for a usual printed circuit board. Preferably, a film shaped insulator material should be employed in view of light weight and small 70 size, and also for convenient purposes of wiring thereof. The insulator board 2 has T-shaped branch portions 2b corresponding to wiring paths of a wire harness.

The conductive strip member 3 is formed in a band shape having a uniform thickness but different narrow widths corresponding to current carrying capacities using a metallic conductor such as copper, aluminium, etc. The conductive strip member 3 is constituted to include a desired circuit pattern corresponding to the wiring path of a wire harness. In the figure, the conductive strip members 31 through 32 are formed in a linear shape having different widths, 33 are formed in a branch shape having one branch path 3c, and 34 through 38 are formed in a L-shaped or

85 yoke-shape having bent path 3b respectively. Also, the conductive strip members 37, 38 are formed with branch paths 3c as same as in the case already described. Accordingly, even in the case one circuit is required to connect to many auxiliaries, switches, etc.,
90 a simple alteration of the circuit pattern can meet with all these requirements with ease.

In Fig. 6, the plurality of circuit boards 1, 1', 1"...
which were formed as mentioned above are piled up
in several layers. The respective circuit boards are
95 formed per respective circuits such as, for example,
electric power source circuit, earth circuit, wiper
circuit, meter circuit, etc. in a wire harness, and each of
the respective layers is independent from one another
in spite of multilayers.

100 Figs. 7 and 8 are schematic illustrations showing how to connect the terminal portions of the respective circuit boards.

That is, terminals of the conductive strip members 3 are connected with terminal elements (not shown) in the circuit board 1, so that they can be directly connected to auxiliaries 11 such as switches, various electronic devices by a connector 10 corresponding to terminal elements. On the other hand, in the circuit board shown in Fig. 8, electric wires 12 are in permanent connection with the respective conductive strip members 3 by spot welding, soldering, etc. By providing a pair of female and male connectors 10, 10' at the end portion of these wires 12, they can be connected to a sub-harness 13, or a circuit signal can be taken out.

In Fig. 9, a wire harness 14 formed of the plurality of circuit boards 1, 1', 1"...shown in Figs. 4 and 6 is wired within a pad of an instrumental panel 15. Fig. 10 is a sectional view of Fig. 9, wherein 15a denotes a wall surface of the instrument panel 15, 16 denotes an insulating foam material covering the wire harness 16. In this way, the flat-shaped circuit boards and/or the wire harness formed thereof can be integrally wired with a vehicle body of an automobile and articles mounted thereon by molding.

Figs. 11a and 11b illustrate modified embodiments of interlayer connection means of the circuit board, respectively. In Fig. 11a, the conductive strip member 3 or its extension is directly formed with through holes 5. In Fig. 11b, the conductive member 3 projects from

the insulator substrate 2, and a grommet 17 projects from the conductive strip member 3. In this case, the afore-mentioned interlayer connection boards 4, 4' are not required, or at least, the number of them can be 5 reduced extensively.

Fig. 12 illustrates another example of the circuit board according to the present invention. Different from those of Fig. 1 and Fig. 5, this circuit board 18 is separately formed in a vertical pattern circuit board 10 and a horizontal pattern circuit board, so that multilayer effects thereof can be increased. And, the vertical and horizontal pattern circuit boards are connected each other only at portions from where signals are required to take out. Figs. 13 and 14 illustrate 15 connecting means thereof, respectively. In Fig. 13, upper and lower circuit boards 18a, 18b are formed with a through hole 19 and connected each other by soldering, screw means, rivets, grommets, pins, etc. Alternatively, in Fig. 14, the insulator substrate 2 of the 20 vertical pattern circuit board 18a to be connected is formed with a hole 20 of a suitable size, and the upper and lower conductive strip members 3 are connected each other by spot welding, etc.

Referring to Figs. 15 through 18, a still further

25 embodiment of the invention is explained. A first circuit board 1 is composed of a first insulator substrate 2 and a plurality of conductive strip members 3 which are linear and arranged parallel with each other on said first insulator substrate 2. Similarly, a

30 second circuit board 1' is composed of a second insulator substrate 2' and a plurality of conductive strip members 3' which are linear and arranged parallel with each other on said second insulator substrate 2'. Said second circuit board 1' is piled up on

35 said first circuit board 1 such that the conductive strip members 3 of the first circuit board 1 is oriented perpendicular to the conductive strip members 3' of the second circuit board 1'.

Referring to Fig. 16, the second insulator substrate
40 2' is formed with a through hole 20 at a predetermined position thereof such that a selected one of the conductive strip members 3 of the first circuit board 1 is exposed.

Through this hole, one of the conductive strip
45 members 3' is connected to said exposed conductive
strip member 3 by welding or soldering. For ease of
welding or soldering, the conductive strip member 3
to be exposed of the first circuit board 1 may be struck
out upward or the conductive strip member 3' of the
50 second circuit board 1' may be dented downward
beforehand.

Conductive strip members 3 are of a narrow band shaped plate. The conductive strip members 3 are formed differently in cross sectional dimension

55 according to current carrying capacities such as, for example, one with an equal thickness and a different width, or one with an equal width and a different thickness. Connection of the conductive strip members 3 with an outside portion, that is, connection

60 thereof with other portions of a wire harness, switches, electronic equipment, and other electric articles thereof may be directly made at, for example, terminal portions formed in the electric articles, or as shown in Fig. 15, made through electric wires 12 by fixing

65 (permanent connection) the electric wires 12 by

welding, soldering, etc.

Fig. 17 illustrates another mode of connection of the conductive strip members 3. The conductive strip member 3 is continuously formed at its end portion
70 with a male terminal t which is protected and rested in a connector housing c. Instead of the male terminals 5, a female terminal for receiving a male terminal may be continuously formed to the member 3. In this case, since an outside, since an outside terminal portion of
75 the conductive strip member 3 is protected by the connector housing c, its maintenance is improved. At the same time, the above-mentioned electric articles and other connectors can be interconnected by one touch.

Fig. 18 illustrates one example of application of this embodiment. In the figure, circuit boards 1 and 1' are wired within a pad of an instrument panel P, and connector-connected to switches and branch wire portion (usual electric wires) e using the connector housing 6. As seen from the drawing, the first circuit board 1 may be used in replace of the main stream section of a wire harness which is conventionally used whereas the second circuit board 1' may be used for the branch section thereof.

90 Although two circuit patterns A and B are piled up in a check striped-shape in the this embodiment, it will be easily understood that these patterns 1 and 1' may be piled up in three layers or more at desired position.

Since the present invention is such constituted as 95 described in the foregoing, the following effects are obtained.

(1) A wire harness so far formed of a number of electric wires bundled together is replaced with a conductive strip member of a narrow band shape and
 100 an insulator substrate for supporting thereof. Accordingly, the insulator substrate can be made thin, and no vinyl tapes, clamps, etc. for binding are required any more. Thus, the wire harness as a whole can be made light in weight and small in size extensively.

(2) Since the circuit board is a thin board similar to a printed circuit board, it can be integrally built in the floor, wall, articles of a vehicle body. Thus, a space so far required for wiring can be either totally eliminated or reduced extensively.

110 (3) The circuit board can be built therein with a circuit pattern corresponding to a desired wiring path of the wire harness. Accordingly, working processes required for jointing, etc. heretofore, and mounting processes of the wire harness in production line can
115 be reduced extensively. Thus, productivity is rapidly increased.

(4) Various connecting means are applicable to the circuit boards by interlayer connection boards. Accordingly, additional connection of a sub-harness to a
 main harness, and design and manufacture per each circuit pattern are easily obtained.

(5) By installing the circuit boards piled up in layers at every important portion, the wire harness can be assembled in a cassette type.

125 Although the present invention has been described in a form of preferred embodiments, it will be appreciated that many modifications will readily occur to those skilled in the art without departing from the spirit and scope of the present invention.

130 CLAIMS

 A circuit board to replace at least part of a wire harness composed of a plurality of bundled wires, said wire harness having a design corresponding to a predetermined wiring pattern in an automobile structure, said circuit board comprising

an insulator substrate having first and second sides and generally having a predetermined design in accordance with a wiring pattern; and

conductive strip members provided on selected one 10 of said first and second sides of the insulator substrate substantially parallel with each other to form a plurality of circuit patterns.

- A circuit board according to claim 1, wherein said conductive strip members have an identical
   thickness and different widths to provide different current carrying capacities.
  - 3. A circuit board according to claims 1 and 2, wherein at least one selected member of the conductive strip member has a branch path.
- A circuit board according to claim 1, wherein said conductive strip members are divided into a plurality of blocks including first, second and third blocks, said first block being allocated for power source connection, said second block being allocated
   for grounding, said third block being allocated for signal lead connection.
  - 5. A circuit board according to claim 1, wherein said conductive strip members have ends attached with connecting means.
- 6. A circuit board according to claim 1, wherein said circuit board is formed integrally in members including a car body and auto parts.
- 7. A circuit board according to claim 1, further including another insulator substrate having first and 35 second sides and generally having a predetermined design in accordance with a wiring pattern; and conductive strip members provided on selected one of said first and second sides of said another insulator substrate substantially parallelly each other to form a 40 plurality of circuit patterns, said another insulator substrate being piled up on top of said insulator substrate such that each of said two insulator substrates and the conductive strip members provided thereon alternate, at least one of said plurality of 45 conductive strip members of said insulator substrate being connected to at least one of said plurality of
- 45 conductive strip members of said insulator substrate being connected to at least one of said plurality of conductive strip members of said another insulator substrate.
- A laminated circuit board to replace at least part
   of a wire harness composed of a plurality of bundled wires, said wire harness having a design corresponding to a wiring pattern within an automobile structure, said circuit board comprising

a plurality of insulator substrates having first and 55 second sides, each insulator substrate generally having a predetermined design in accordance with a wiring pattern; and

conductive strip members provided on selected one of first and second sides of each insulator substrate, 60 said conductive strip members being arranged substantially parallelly with each other to form a plurality of circuit patterns;

said plurality of insulator substrates being piled up one on top of another such that said insulator 65 substrates and said conductive strip members thereon alternate; and

said insulator substrates including a first insulator substrate and a second insulator substrate provided on top of said first insulator substrate, at least one of said plurality of conductive strip members of the first insulator substrate being connected to at least one of said plurality of conductive strip members of the second insulator substrate.

- A laminated circuit board according to claim 8,
   wherein said second insulator substrate is formed with at least one through hole therein to expose selected one of the conductive strip members of the first insulator substrate, said circuit board further having conductive means within said through hole
   and jutting out therefrom to be connected to at least one of the conductive strip members of the first insulator substrate and at least one of the conductive strip members of the second insulator substrate.
- 10. A laminated circuit board according to claim 8, 85 further including a third insulator substrate having a first section sandwiched between said first and second insulator substrates and a second section extending substantially adjacent said first and second insulator substrates, said third insulator substrate 90 having first and second sides and being provided with conductive strip members on at least one of said first and second sides, said conductive strip members extending over said first and second sections, said third insulator substrate having at least one through 95 hole in said second section and conductive means provided within said through hole and jutting out therefrom, said conductive means being connected to said at least one conductive strip member of the third insulator substrate, said at least one conductive strip member of the third insulator substrate being in contact with said at least one of said plurality of conductive strip members of the second insulator substrate, said conductive means within the through hole in the third insulator substrate being connected to said at least one of the plurality of conductive strip members of the first insulator substrate.
- 11. A laminated circuit board according to claim 10, further including a fourth insulator substrate having a first side and a second side and having 110 conductive strip members on both first and second sides thereof, said fourth insulator substrate being piled up on said third insulator substrate, said fourth insulator substrate having at least one through hole therein and conductive means provided therewithin 115 and jutting out therefrom to be connected to at least one of the conductive strip members on each side therof, said at least one of the conductive strip members on the second side of said fourth insulator substrate being connected to said conductive means 120 of the third insulator substrate, said at least one of the conductive strip members on the first side of the fourth insulator substrate being connected to said at least one of said plurality of conductive strip members of selected one of the first insulator substrate and the 125 second insulator substrate.
  - 12. A laminated circuit board according to claim 8, wherein at least one of the conductive strip members provided on said insulator substrates extend to jut over therefrom.
- 130 13. A laminated circuit board according to claim 8,

wherein said conductive strip members have an identical thickness and different width to provide different current capacities.

- 14. A laminated circuit board according to claim 8,
  5 wherein at least one selected member of the conductive strip members has a branch path.
  - 15. A laminated circuit board according to claim 8, wherein said conductive strip members are divided into a plurality of blocks including first, second and
- 10 third blocks, said first block being allocated for power source connection, said second block being allocated for grounding, said third block being allocated for wiper drive lead connection.
- 16. A laminated circuit board according to claim 8,15 wherein said conductive strip members have ends attached with connecting means.
  - 17. A laminated circuit board according to claim 8, wherein said circuit board is formed integrally in members including a car body and auto parts.
- 20 18. A laminated circuit board according to claim 7, wherein said conductive strip members of the first insulator substrate extend perpendicular to said conductive strip members of the second insulator substrate.
- 25 19. A laminated circuit board according to claim 11, further including a fifth insulator substrate having first and second sides, conductive strip members provided on at least one of said first and second sides, said conductive strip members of the fifth insulator
- 30 substrate being arranged substantially parallel with each other, said fifth insulator substrate being piled up on at least one of the first insulator substrate and the fourth insulator substrate such that at least one of the conductive strip members of the fifth insulator is
- 35 connected to at least one of the conductive members of at least one of the first insulator substrate and the fourth insulator substrate.
- A circuit board substantially as described with reference to, and as illustrated in any one or more of
   Figures 1 to 18 of the accompanying drawings.

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