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(54) Modular electric connection system

(57) A modular electric connection system (1) is disclosed, comprising at least one electric transmission module comprising a support element (3), at least two electrically supplied, parallel conductive rails (11, 13), at least one metallic connection rail (15), and preferably at least one metallic rail (17) adapted to lay the electric transmission module onto a magnetic surface, at least one user module composed of a support element (5) of at least one electric user (25) equipped with at least one magnetic element (23) adapted to allow a magnetic connection of the support module (5) with the metallic connection rail (15), and of at least two electric contact elements (31) connected to the electric user (25), wherein each one of the elements (31) is adapted to be in contact with a respective one of the rails (11, 13) to allow an electric supply to the electric user (25).

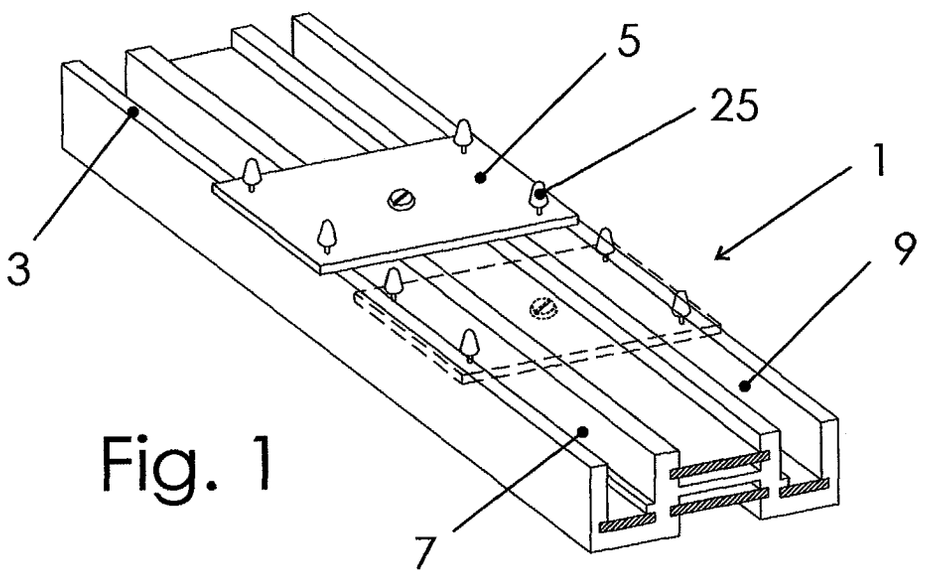

Fig. 1

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Description

[0001] The present invention refers to a modular electric connection system.

[0002] Several arrangements of electric conductive rails for supplying electric devices are known in the art. The advantages of using these systems are known and appreciated since they allow installing electric devices more easily and with greater savings with respect to traditional systems, since they avoid, in particular, to have to provide the passage of supply lines, that often require costly masonry works. Moreover, these systems generally allow quickly connecting the electric devices to the supply systems through one or more magnets, making thereby the plant configuration easier depending on needs.

[0003] For example, document DE-A-10207367 in the name of GRUBER Bruno discloses a conducting system composed of two conductive rails, to which an electric device can be connected by means of two respective magnets in order to simultaneously support and electrically supply it. In this case, the system operates in a way that can be subjected to some problems, since the magnets are not able to guarantee a continuous and reliable electric connection to the users with conductive rails, above all in case of possible stresses such as vibrations.

[0004] Document DE-A-3838209 discloses another electric supply line equipped with conductive supply rails contained in an insulating housing that come in contact with the users to be supplied, magnetically connected with the housing, by means of connection rods inserted in a recess obtained on the housing surface; in this case system complexity appears evident, again with a precarious contact with electric supply rails.

[0005] The above arrangements, moreover, do not provide for elements that make the laying of conductive rails easier, this requiring, as a minimum, the drilling of the surface on which such rails must be placed and their securing through nails, screws or small blocks; another solution could be glueing the rails onto the laying surfaces, this however implying electric safety problems that cannot be neglected, since a possible detachment of the rails and the possible breakage of electric devices connected thereto could generate short circuits, if not even, in particular cases, fire starts.

[0006] Moreover, the known conductive rails provide for the use of only two parallel conductive elements, which obviously limits the type of users to be supplied, excluding more complex users that could require more different supply lines.

[0007] Moreover, none of the above arrangements provides for the modularity of its components, such characteristic allowing an extreme use flexibility, lowering laying costs and times with respect to known systems.

[0008] Object of the present invention is solving the above prior art problems, by providing a modular electric connection system that allows laying electric devices in an easier and cheaper way with respect to traditional systems.

[0009] Moreover, another object of the present invention is providing a modular electric connection system that allows realising electric modules with different sizes and shapes, for example for intercommunication systems luminous boards, lighting furniture, frames, baseboards, signs and lamps.

[0010] Another object of the present invention is providing a modular electric connection system that allows supplying the same user module with more than one line.

[0011] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a modular electric connection system as claimed in Claim 1. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0012] The present invention will be better described by some preferred embodiments thereof, given as a nonlimiting example, with reference to the enclosed drawings, in which:

- FIG. 1 shows a perspective view of an embodiment of the modular electric connection system according to the present invention;
- FIG. 2 shows a sectional view of an electric transmission module of an embodiment of the modular electric connection system according to the present invention;
- FIG. 3 shows a sectional view of an electric transmission module of another embodiment of the modular electric connection system according to the present invention;
- FIG. 4 shows a sectional view of an electric transmission module of another embodiment of the modular electric connection system according to the present invention;
- FIG. 5 shows a sectional view of an embodiment of the modular electric connection system according to the present invention;
- FIG. 6 shows a top view of an element of an embodiment of the modular electric connection system according to the present invention;
- FIG. 7 shows a bottom view of an element of an embodiment of the modular electric connection system according to the present invention; and
- FIG. 8 shows a top view of another element of an embodiment of the modular electric connection system according to the present invention.

[0013] With reference to FIG. 1, it is possible to note that a preferred embodiment of the modular electric connection system 1 according to the present invention comprises at least one electric transmission module and at least one user module.

[0014] As can be noted from FIG. 2, the electric transmission module is composed of a support element 3

made of insulating material and equipped with two parallel grooves 7, 9, as can be seen, whose section is substantially "U"-shaped, and joined by a baffle. On the lower edge of each groove 7, 9, a metallic, electrically supplied conductive rail 11, 13 is arranged. Moreover, preferably parallel with the rails 11, 13 and centrally arranged with respect to these latter ones, at least one metallic connection rail 15 and at least one metallic rail 17 are provided, respectively placed on an upper surface and a lower surface of the electric transmission module.

[0015] The metallic rail 17 is provided in order to allow laying the system according to the present invention onto magnetic surfaces without having to use glues or securing systems, such as nails, screws or small blocks. In case of laying the system of the present invention onto a non-metallic surface, it is possible to provide the securing of a metal blade on such surface on which, in turn, the system according to the present invention will be magnetically connected, this obviously being extremely easier and more reliable than having to secure the whole system by means of traditional methods.

[0016] Obviously, many electric transmission modules can be placed adjacent one to the other, by suitably mutually connecting their respective rails 11, 13 to obtain the desired lengths and shapes, this latter aspect being particularly interesting for creating luminous signs.

[0017] As can be noted from FIG. 3 and 4, the electric supply module can be equipped with further service supply lines 19, 21, 23 and 25 preferably placed on the side walls of the grooves 7, 9 to supply current to more complex users, such as, for example and as will be seen afterwards, electric connection terminal boards.

[0018] Moreover, such service supply lines 19, 21, 23 and 25 can be characterised by suitably different voltage/current values in order to give different operating characteristics to the same user or allow the operation, on the same electric transmission module, or on many mutually connected transmission modules, of many user modules with different electric characteristics.

[0019] FIG. 5 shows the electric connection module coupled with a user module; as can be noted, the user module is composed of a support element 5 on which the following are secured: the electric user 25 to be supplied (in the example in FIG. 5, the electric user 25 are four LEDs), at least one magnetic element 23 fixed, for example, through a screw 24 (as can be noted also from FIG. 6) and aimed to be magnetically connected with the metallic connection rail 15 and at least two electric contact elements 31, on one side connected to the electric user 25, each one aimed to be in contact with a respective rail 11, 13 in order to electrically supply the electric user 25 itself.

[0020] Preferably, the electric contact elements 31 are springs, devices that extremely reliably guarantee the contact with rails 11, 13 and therefore the electric user 25 supply also when there are vibrations. Alternatively, the electric contact elements 31 could be simple blades (not shown) or equivalent elements.

[0021] FIG. 7 shows a user module equipped, on a lower surface thereof, with at least two switches 27 (in the preferred embodiment they are rotating on a securing pin) each one equipped with an electric connection element 29: these switches 27, that are in turn connected to the electric user 25 to be supplied, allow a selective electric connection of the user module with the service conductive rails 19, 21, 23, 25: in this way it is possible, by suitably placing the switches 27, to supply, for example, many electric users placed on the same support element 5 with different electric characteristics or to supply with different voltage/current values an electric connection terminal board 33 (as shown in FIG. 8 in which connection means 35 are also represented).

[0022] As shown in the Figures, the preferred embodiment of the present invention therefore allows quickly installing the electric transmission modules onto metallic parts and extremely practically securing, due to the magnetic element 23 and the metallic connection rail, and reliably securing, due to the springs as electric contact elements 31, the user modules.

[0023] It is further obvious that the electric transmission modules can be of widely different lengths and shapes, mutually connected according to necessary geometries, without departing from the scope of the present invention, in order to suit to different laying needs; it is further clear that also the number of user modules connected to the electric transmission modules will be, compatibly with the energy absorption of electric users and the power delivered by transmission modules themselves, function of specific neeeds.

[0024] It is further clear that the user modules can be any electric device that is able to be supplied by means of electric transmission modules necessary for specific needs.

Claims

1. Modular electric connection system (1), **characterised in that** it comprises:

   - at least one electric transmission module comprising a support element (3), at least two parallel conductive rails (11, 13) that are electrically supplied and longitudinally placed with respect to said support element (3), and at least one metallic connection rail (15) that is longitudinally placed with respect to said support element (3);
   - at least one user module composed of a support element (5) of at least one electric user (25), said user module being equipped with at least one magnetic element (23) adapted to allow a magnetic connection of said support module (5) with said metallic connection rail (15),

said user module being further equipped with at least two electric contact elements (31) connected to said electric user (25), each one of said electric contact elements (31) being adapted to be in contact with a respective one of said rails (11, 13) to allow an electric supply to said electric user (25).

2. Modular electric connection system (1) according to claim 1, **characterised in that** said at least one electric transmission module further comprises at least one metallic rail (17) arranged longitudinally with respect to said support element (3) and adapted to lay said electric transmission module onto a magnetic surface.

3. Modular electric connection system (1) according to claim 1, **characterised in that** each one of said electric contact elements (31) is a spring.

4. Modular electric connection system (1) according to claim 1, **characterised in that** each one of said electric contact elements (31) is a blade.

5. Modular electric connection system (1) according to claim 1, **characterised in that** said electric transmission module comprises at least two further parallel conductive service rails (19, 21; 23, 25) placed longitudinally with respect to said support element (3).

6. Modular electric connection system (1) according to claim 5, **characterised in that** said further parallel conductive service rails (19, 21; 23, 25) are four.

7. Modular electric connection system (1) according to claim 5 or 6, **characterised in that** said support element (5) is equipped with at least two switches (27) connected to said electric user (25), each one of said switches (27) being equipped with an electric connection selector element (29) for connecting with one of said parallel conductive service rails (19, 21; 23, 25).

8. Modular electric connection system (1) according to claim 1, **characterised in that** said electric user is an electric connection terminal board (33).

9. Modular electric connection system (1) according to claim 1, **characterised in that** said electric user (25) is at least one LED.

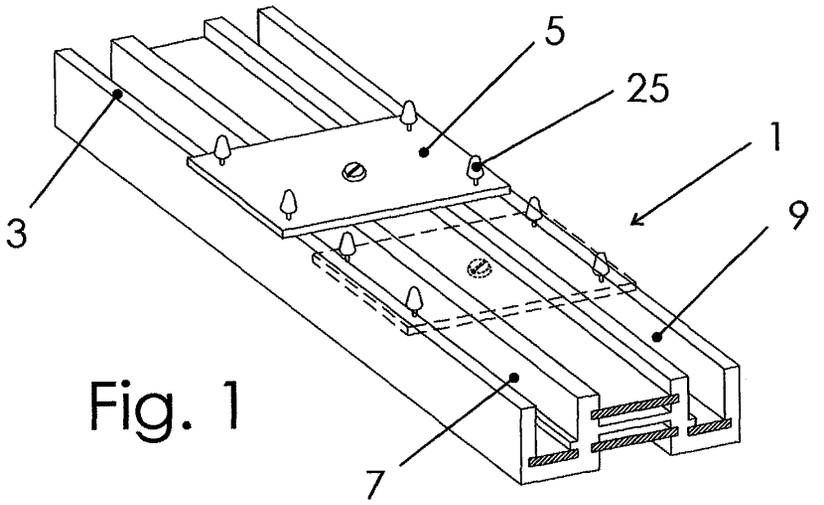

Fig. 1

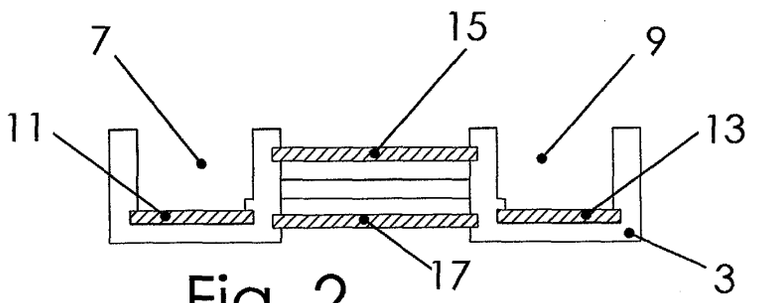

Fig. 2

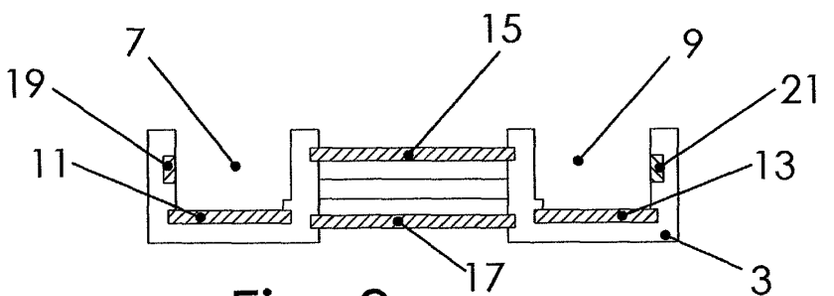

Fig. 3

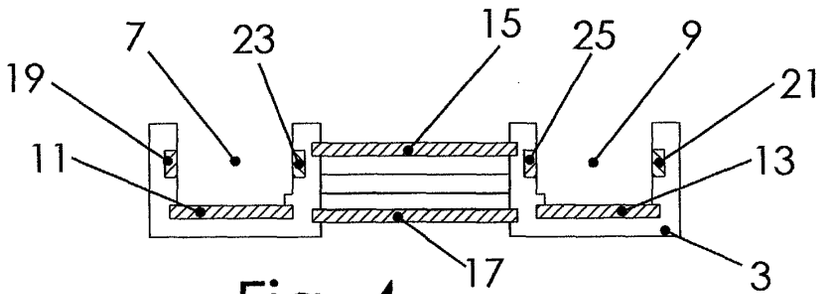

Fig. 4

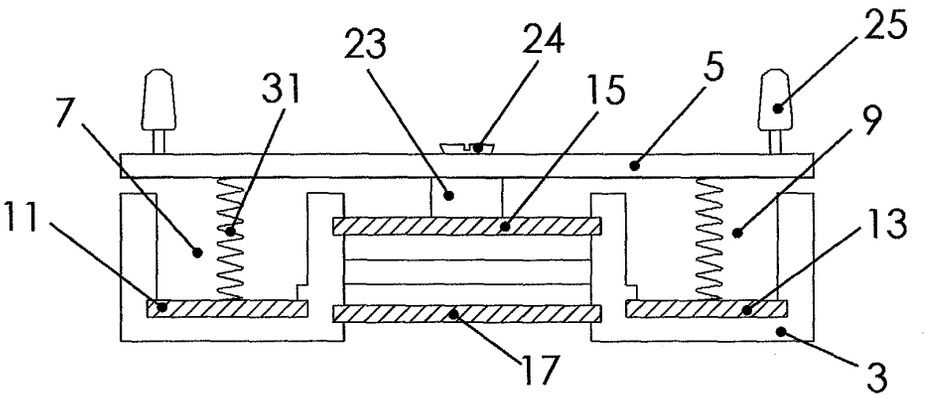

Fig. 5

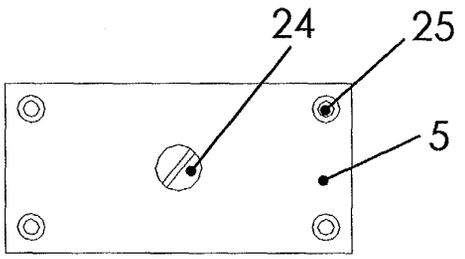

Fig. 6

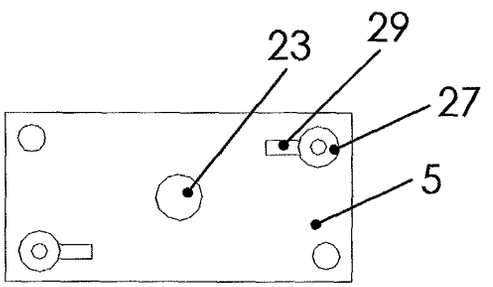

Fig. 7

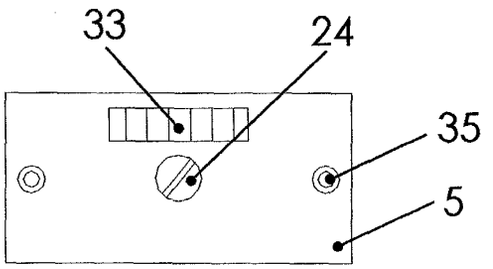

Fig. 8

European Patent Office

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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 July 2004	Salojärvi, K

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