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(54)

SHELVING UNIT WITH LIGHTED SHELVES

(57) The invention relates to a shelving unit (10) comprising a support structure and a plurality of shelves (20), wherein said support structure comprises a base (11), a pair of uprights (12, 13) that stretch out from said base (11) in a vertical direction (V) and a panel element (14) arranged between said uprights (12, 13), the uprights (12, 13) comprising a plurality of apertures (120, 130) having a substantially slotted shape configured to allow assembly of said shelves (20). The shelving unit (10) also comprises a lighting set for the illumination of the shelves (20), said lighting set comprising a pair of conductive strips (32, 33) respectively connected or connectable to the positive and negative terminals of a low voltage transformer (30) that can be supplied from the mains, said conductive strips (32, 33) stretching out in said vertical direction (V), the lighting set further comprising at least one lighting body (40, 41). For each shelf (20) to be illuminated the lighting set also includes a single pair of rigid electrical conductors (42, 43) configured to be removably restrained to the shelf (20), and said at least one lighting body (40, 41) comprises electrical terminals arranged at its ends and configured for connection to said rigid electrical conductors (42, 43). The overall configuration of the shelving unit (10) is such that in an assembled condition the lighting body (40, 41) is electrically coupled to and mechanically hanging from the rigid electrical conductors (42, 43).

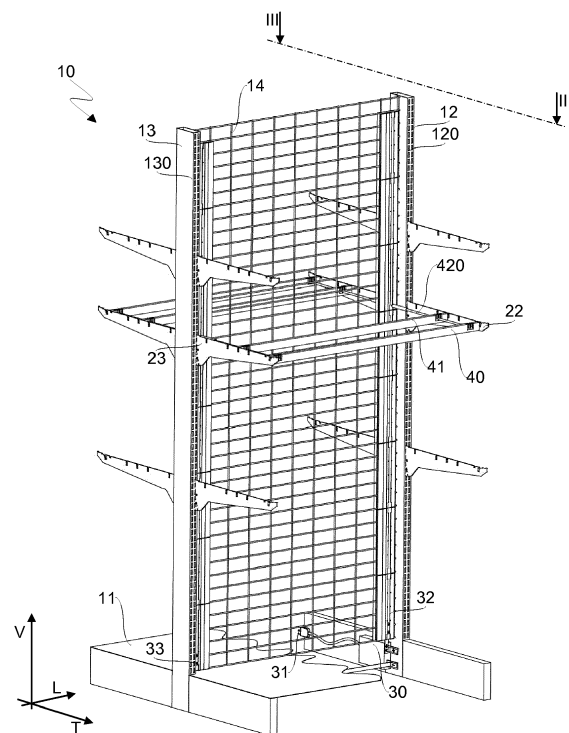


Fig.2

Description

[0001] The present invention generally relates to shelving systems for displaying products and in particular to a shelving unit with lighted shelves.

[0002] In the field of shelving units modular systems are known, which comprise supporting members in the form of uprights and/or panels and one or more shelves that can be mounted on these supporting members by way of suitable connecting means, for example hook-shaped elements formed or arranged at the ends of the shelves.

[0003] Shelving units are also known, which are provided with a lighting set for lighting the shelves. To this aim, the supporting member intended to receive the shelves is provided with a pair of conductive strips supplied by the mains through a low voltage transformer. On each shelf one or more lamps are mounted, whose electrical terminals are arranged such that, when a shelf is mounted onto the supporting member, they are respectively connected to the conductive strips thus forming a closed circuit that may be supplied from the mains.

[0004] Depending on the arrangement of the lamps on the shelves and on the type of mounting of the latter on the uprights of a shelving unit, the electrical terminals of the lamps can be connected to the conductive strips indirectly by way of wires provided with suitable contact elements, or directly, e.g. when the conductive strips are housed in the uprights and these are arranged at the side edges of the shelves, whereby the lamps can be mechanically anchored to the uprights and electrically connected to the conductive strips housed therein.

[0005] A shelving unit with lighted shelves is e.g. described in the patent publication GB 2272279 A. The conductive strips are arranged in special guides that may be restrained, for example by gluing, to a panel element arranged between a pair of uprights configured to allow mounting of the shelves of the shelving unit. This allows to electrify and illuminate not only new shelving units, but also existing ones. The guides housing the conductive strips are arranged parallel to the uprights of the shelving unit and extend vertically, parallel and aside the uprights, while the lamps are mounted on a lower surface of the shelves, opposite to the surface intended to support articles and/or products to be displayed, and they are arranged in the direction of the width of the shelving unit.

[0006] In order to allow electrical connection to the conductive strips, the lamps are provided with a pair of electric wires comprising respective contact terminals of a retractable type. The electric wires are fixed along supporting arms of the respective shelves, so that, when mounting a shelf onto the uprights of the shelving unit, an electrical connection between the contact terminals of the lamp wires and the conductive strips is achieved at the same time.

[0007] Further examples of shelving units provided with lighted shelves of the type above are described in patent publications DE 202014002269 U1, JP

2014166201 A, US 6,231,205 B1 and EP 2842461 A1.

[0008] Despite the availability of numerous examples of shelving units with illuminable shelves, there is still the need to provide improved solutions as far as the assembly of the components of the lighting set is concerned, which is an object of the present invention.

[0009] Said object is achieved with a shelving unit whose main features are specified in the first claim, while other features are specified in the remaining claims.

[0010] An idea of solution underlying the invention is to make a shelving unit with illuminable shelves of the type described in the patent publication GB 2272279 A mentioned above, but wherein the lighting set of each shelf to be illuminated comprises a single pair of rigid electrical conductors, for example in the form of bars made of a conductive material, that may be removably restrained to the shelf itself, as well as one or more lamps that are mechanically hung and electrically connected in parallel and in a removable manner to the rigid electric conductors.

[0011] The main advantage offered by the invention is to provide a modular solution for the illumination of shelving units that may be applied both to new shelving units and to existing ones without resorting to electric wires layouts as in conventional shelving units.

[0012] According to an embodiment of the invention, the conductive strips are associated with respective guides configured to be mounted onto the panel element of a shelving unit, and both the strips and the guides are made up of modular sectors. When assembling the lighting set it is thus advantageously possible to handle small size components. When retrofitting an existing shelving unit, this configuration of the conductive strips also offers the advantage that it does not require to remove the shelves.

[0013] According to another embodiment of the invention, the conductive strips are formed by co-molding or co-injection of electrically conductive materials on flexible substrates, such as e.g. sheets of plastic material, and their assembly is carried out by sliding the conductive strips on a plurality of supporting members that may be mounted at discrete positions of the panel element of a shelving unit. Also in this case assembly of the lighting set involves maneuvering of components that may be easily handled.

[0014] According to a further embodiment of the invention, the conductive strips are formed by co-molding or co-injection of electrically conductive materials on suitably shaped supporting members that are configured to be fitted into the uprights of a shelving unit, which are typically made up of hollow metal profiles with rectangular or square cross-section. This is particularly advantageous in the case of shelving units comprising sheet metal shelves and a sheet metal panel element wherein, unlike shelving units made of metal wires, the shelves substantially contact the panel element, thus not leaving room for the fitting of the conductive strips and related supporting members.

[0015] The supports of the conductive strips may be made up of modular sectors that may be assembled with each other, or by single bodies made of flexible materials, in order to facilitate their fitting into the uprights.

[0016] Further advantages and features of the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of embodiments thereof with reference to the attached drawings, wherein:

- figure 1 is a perspective view showing a shelving unit according to an embodiment of the present invention;
- figure 2 is a perspective view showing the shelving unit of figure 1 without the supporting surfaces of the shelves;
- figure 3 is a side, longitudinal section view taken along a plane passing through line III-III of figure 2;
- figure 4 shows a detail IV of figure 3;
- figure 5 is a perspective, partially exploded view showing the assembly mode of the conductive strips on the panel element of the shelving unit of figure 1 according to an embodiment of the invention;
- figure 6 shows a detail VI of figure 5;
- figure 7 is a perspective, partially exploded view showing the assembly mode of the conductive strips on the panel element of the shelving unit of figure 1 according to an alternative embodiment of the invention;
- figure 8 shows a detail VIII of figure 7;
- figure 9 is a side view of a shelving unit according to the present invention wherein the conductive strips are housed in the uprights of the shelving unit and the electrical conductors are mounted on the arms of the shelves;
- figure 10 shows a detail X of figure 9;
- figure 11 is a cross-sectional view taken along a plane passing through line XI-XI of figure 9;
- figure 12 is a perspective view showing a shelving unit according to a further embodiment of the invention;
- figure 13 is a perspective, partially exploded view partially in cross-section of the shelving unit of figure 12;
- figure 14 shows a detail XIV of figure 13;
- figure 15 is a detailed, partially broken view showing an end of a shelf of the shelving unit of figure 12 during mechanical assembly and electric connection of a lamp to a rigid electrical conductor mounted to the shelf, as well as the electrical connection between the rigid conductor and a label holder profile restrained to the shelf;
- figure 16 is a detailed, partially broken view similar to the view of figure 15 showing the opposite end of the shelf.

[0017] Referring to Figure 1, a shelving unit according to the present invention is generally indicated by the ref-

erence number 10.

[0018] The shelving unit 10 comprises a base 11, a pair of uprights 12, 13 that extend from the base 11 perpendicularly in a substantially vertical direction V and a panel element 14, for example made up of a web of metal wire.

[0019] The base 11 of the shelving unit 10 stretches out in a longitudinal direction L and transverse direction T that are both parallel to a supporting surface of the shelving unit 10, for example a floor, and perpendicular to the vertical direction V. The panel element 14 is mainly extended in the longitudinal direction L and vertical direction V and has a relatively small thickness in the transverse direction T.

[0020] Along the uprights 12, 13 a plurality of apertures 120, 130 are formed, e.g. substantially slotted-shaped openings, which allow mounting of a plurality of shelves 20. In an assembled configuration, the shelves 20 extend perpendicularly to the panel element 14 in the transverse direction T.

[0021] In the illustrated embodiment the apertures 120, 130 are formed on the two opposite faces of the uprights 12, 13 in the transverse direction T, thus allowing mounting of the shelves 20 on the two opposite faces of the shelving unit 10.

[0022] Each shelf 20 comprises in a known way a supporting surface 21 for objects and/or products to be displayed, and a pair of arms 22, 23 which hold the supporting surface 21. The ends of the arms 22, 23 intended to be anchored to the uprights 12, 13 are hook-shaped so as to engage the apertures 120, 130 formed therein. In an assembled configuration, the arms 22, 23 of the shelves 20 protrude from the uprights 12, 13 in the transverse direction T.

[0023] The base 11 may be advantageously provided with a plurality of supporting feet (not shown) configured so as to allow fine adjustments of the position of the panel element 14 relative to the supporting surface of the shelving unit 10.

[0024] The shelving unit 10 also comprises a lighting set for the illumination of the shelves.

[0025] The lighting set comprises in a known manner a pair of conductive strips connected to the positive terminal and the negative terminal of a low-voltage transformer, respectively, for example a 24V transformer, that may be supplied from the mains.

[0026] Still with reference to figure 1, the transformer of the lighting set is indicated by reference number 30 and may be seen in the partially broken view of the base 11. The transformer 30 is e.g. housed inside the base 11 of the shelving unit 10 and e.g. fixed in correspondence of the upright 12. The transformer 30 may be connected to the mains through a power cable 31.

[0027] The conductive strips connected to the positive and negative terminals of the transformer 30 are respectively indicated with reference numbers 32, 33 and stretch out in the vertical direction V e.g. aside each upright 12, 13 of the shelving unit 10.

[0028] With reference to figures 2, 3 and 4, which show for simplicity's and clarity's sake the shelving of figure 1 without the supporting surfaces 21 of the shelves 20, the lighting set further comprises at least one lamp, e.g. two lamps 40, 41 in the illustrated embodiment, as well as a single pair of electrical conductors 42, 43 for each shelf 20 to be illuminated, for example restrained to the supporting surface 21 or along the arms 22, 23. The lamp correspondingly has the electrical terminals arranged at its ends and configured for the connection to said electrical conductors 42, 43, e.g. traditional screw terminals.

[0029] According to the invention, the electrical conductors 42, 43 are rigid elements e.g. in the form of bars or rods, so that in an assembled configuration of the shelving unit 10 the lamps 40, 41 are mechanically hung and electrically connected to the electrical conductors 42, 43. The wording "rigid elements" indicates elements that have a much higher flexural rigidity than traditional electric wires, and that, therefore, can act as means for mechanical supporting the lamps.

[0030] Furthermore, according to the invention the electrical conductors 42, 43 are removably restrained to the shelves, thus making it possible to assemble them onto either new shelving units or to existing ones upon mounting of the conductive strips 32, 33.

[0031] The rigid electrical conductors 42, 43 extend from the respective conductive strips 32, 33 perpendicularly to the panel element 14 in the transverse direction T, and are arranged close to the arms 22, 23 of the shelves, so that the lamps 40, 41 are arranged in the longitudinal direction L. This configuration offers the advantage of allowing to illuminate the whole supporting surface of the shelves.

[0032] As shown in figure 2, the lamps are preferably arranged below the supporting surfaces 21 of the shelves in the vertical direction V, so as not to interfere with the products that will be placed thereon.

[0033] In the illustrated embodiment, the lighting set is associated only to the intermediate shelves of the shelving unit 10 and two lamps 40, 41 are mounted in parallel on each shelf. However, it will be appreciated that the number of lamps associated to the individual shelves 20 is not binding and that each shelf 20 of the shelving unit 10 may be illuminated by simply connecting more pairs of rigid electrical conductors 42, 43 and by mounting on such pairs of rigid electrical conductors further lamps.

[0034] According to a preferred embodiment of the present invention, the rigid electric conductors 42, 43 are made up of bars, for example having a circular cross section, made of a conductive metal material. The bars 42, 43 are accommodated in respective containers 420, 430, for example having a tubular shape, which are made of an electrically insulating material. The containers 420, 430 also house electrical terminals 421, 431 of the rigid electric conductors 42, 43, which are preferably of the type with a retractable pin biased by a helical spring as shown in the detailed view of figure 4. Figure 4 only shows one electrical conductor 42 in its container 420 made of

an insulating material. The electrical conductor is shown by way of dot and dashed lines.

[0035] The use of containers made of an electrically insulating material for the electrical conductors 42, 43 advantageously provides a higher protection to a user against accidental contact with the electric components of a lighting set, as well as of a higher flexural rigidity that contributes to make the assembly of the lamps 40, 41 more simple and effective.

[0036] The rigid electrical conductors 42, 43 with their possible containers 420, 430 made of an insulating material may be removably restrained to the supporting surfaces 21 of the shelves 20 or at their arms 22, 23 for example by means of hooks, guides, magnets or equivalent means (not shown).

[0037] With particular reference to figures 3 and 4, the containers 420, 430 include one or more openings or windows 422, 432 through which the rigid electric conductors 42, 43 are accessible so as to allow electrical connection of the lamps 40, 41.

[0038] Furthermore, the openings 422, 432 are configured for the mechanical connection, e.g. a snap connection, of the ends of the lamps 40, 41 at which their electrical terminals are arranged. To this aim, the lamps comprise mounting elements, for example jaw-shaped members, whose shape matches the shape of the rigid electric conductors 42, 43 housed in the containers 420, 430. The electrical terminals of the lamps 40, 41 face outwards from their mounting elements, so that when mounting a lamp on the electrical conductors 42, 43 housed in the containers 420, 430 mechanical connection and electrical connection are simultaneously achieved.

[0039] Now referring to figures 5 and 6, according to an embodiment of the invention the conductive strips 32, 33 are mounted on the panel element 14 not directly, but through respective guides 320, 330, for example rail-shaped guides. In addition to this, both the conductive strips 32, 33 and the guides 320, 330 are respectively made up of a plurality of sectors configured to be assembled to each other in the vertical direction V.

[0040] With reference to the illustrated embodiment, the sectors of the guides 320, 330 are e.g. mounted in pairs on opposite faces of the panel element 14 and fixed to one another e.g. by way of pins. The connection between the guide sectors, as well as between the sectors of the conductive strips in the vertical direction V may for example be carried out by way of snap hooks.

[0041] This configuration has the advantage of making the structure of the conductive strips and the respective guides modular and thus less cumbersome and more easily maneuverable, which allows to apply the lighting set not only to new shelving units, but also in already existing ones without being obliged to disassemble them.

[0042] Now referring to figures 7 and 8, according to an alternative embodiment of the invention the conductive strips 32, 33 are formed by co-molding or co-injection of electrically conductive materials on flexible substrates, such as plastic sheets, and the assembly of the conduc-

tive strips on the guides is carried out by slidably fitting them on a plurality of supports 340 configured to be mounted at discrete positions of a panel element 14 of a shelving unit 10, wherein mounting may e.g. be carried out by snap fitting the supports into meshes of the panel element 14 when the latter is made up of a metal wire web as in the embodiment shown in figures 1 to 11.

[0043] Similarly the previous embodiment of the invention, also this one is advantageous in that it makes the structure of the conductive strips and the respective supporting elements modular, thus allowing application of the lighting set not only to new shelving units, but also to already existing ones without being obliged to disassemble them.

[0044] Finally referring to figures 9 to 11, according to a further embodiment of the invention the conductive strips 32, 33 are formed by co-molding or co-injection molding of electrically conductive material on guides 320, 330 configured to be fitted into respective cavities of the uprights 12, 13 of a shelving unit 10, typically in the form of hollow metallic profiles having a rectangular or square cross-section. As shown in the cross-section of figure 11, the guides 320, 330 may for example have a cross-section in the shape of an H.

[0045] The conductive strips are thus completely hidden inside the uprights.

[0046] The containers 420, 430 made of electrically insulating material, housing the rigid electrical conductors 42, 43 to be connected to the electrical terminals 421, 431 that allow to power the lamps 40, 41, are configured to be removably connected to the arms 22, 23 of the shelves 20, for example by way of hooks, guides or equivalent means (not shown), so that the electrical terminals 421, 431 may be connected to the conductive strips 32, 33 housed in the uprights 12, 13 through the apertures 120, 130 for the mounting of the shelves 20 formed in the uprights.

[0047] In figures 9 to 11 only one side of the shelving unit 10 is shown. However, it will be appreciated that the opposite side of the shelving unit 10 has the same features as far as the conductive strips, the guides and the arrangement of the electrical conductors, the respective containers and the contact terminals are concerned.

[0048] As described above, the guides 320, 330 of the conductive strips 32, 33 may be made up of modular sectors or be single bodies made of flexible materials, in order to facilitate their fitting into the uprights 12, 13.

[0049] This configuration is particularly advantageous when the shelves mounted on the uprights contact the panel element, as it typically occurs in sheet metal shelving units, wherein there is no room for arranging the conductive strips and their supports on the panel element in the vertical direction.

[0050] Now referring to figures 12 to 16, a further embodiment of the invention will be described. In this embodiment of the invention the rigid electric conductors 42, 43 are configured not only for the mechanical assembly and the powering of the lamps, but also for the pow-

ering of a label holder profile associated to a shelf.

[0051] Similarly to what has been disclosed above, the shelving unit 10 comprises a base 11, a pair of uprights 12, 13 extending perpendicularly from the base 11 in a substantially vertical direction V and a panel element 14.

[0052] A plurality of apertures 120, 130 e.g. having a substantially slotted shape are formed along the uprights 12, 13 so as to allow mounting of a plurality of shelves 20. In an assembled configuration, the shelves 20 extend perpendicularly to the panel element 14 in the transverse direction T.

[0053] Each shelf 20 includes a supporting surface 21 for objects and/or products to be displayed and a pair of arms 22, 23 which hold the supporting surface 21. The ends of the arms 22, 23 intended to be anchored to the uprights 12, 13 are hook shaped so as to engage the apertures 120, 130 formed therein. In an assembled configuration, the arms 22, 23 of the shelves 20 protrude from the uprights 12, 13 in the transverse direction T.

[0054] Each shelf 20 also includes a label holder profile 24 that is restrained in a known manner at the free end of the supporting surface 21 and extends in the longitudinal direction L between the arms 22, 23.

[0055] Also in this case the conductive strips 32, 33 connected to the positive and negative terminals of the transformer (not shown) housed in the base 11 stretch out in the vertical direction V aside the uprights 12, 13.

[0056] The rigid electrical conductors 42, 43 are flat bars, e.g. having a rectangular cross-section, accommodated in containers 420, 430 made of an insulating material. The electrical conductors and their respective containers made of an insulating material may be removably mounted by way of hooks, guides, magnets, or equivalent means. Figures 14 and 15 particularly show only the electric conductor 43 and the respective container 430 arranged close to the arm 23 of the shelf 20. It will be appreciated that the electrical conductor 42 and the respective container 420 that are arranged at the opposite end of the shelf 20 in the longitudinal direction L are identical to the electric conductor 43 and its container 430.

[0057] The rigid electrical conductors 42, 43 are electrically connected to the conductive strips 32, 33 through respective electrical terminals 421, 431.

[0058] In order to allow mounting of the lamps 40, 41, the containers 420, 430 include one or more openings or windows 422, 432 through which the rigid electric conductors 42, 43 are accessible.

[0059] According to this embodiment of the invention, the free ends of the rigid electric conductors 42, 43 are respectively electrically connected to a pair of strips 241, 242 made of a conductive material that are housed or integrally formed in the label holder profile 24. This allows powering of electronic labels (not shown) through the same power supply circuit of the lamps without resorting to respective batteries, which provides the advantage of a cheaper operation of the shelving unit, as well as of a lower environmental impact.

[0060] The strips 241, 242 made of a conductive ma-

terial extend between opposite ends of the label holder profile in the longitudinal direction L.

[0061] As shown in figures 13 to 16, the electrical connection between the rigid electric conductors 42, 43 and the strips 241, 242 made of a conductive material may for example be achieved by way of respective wires 243 and metal plates 244 associated with terminal elements 245 arranged at the ends of the label holder profile 24, or by way of equivalent solutions that are within the reach of a person skill in the art.

[0062] The invention has so far been disclosed with reference to preferred embodiments thereof. It will be appreciated that there may be other embodiments relating to the same inventive idea, as defined by the scope of protection of the claims set out below.

Claims

1. A shelving unit (10) comprising a supporting structure and a plurality of shelves (20), wherein said supporting structure comprises a base (11), a pair of uprights (12, 13) that stretch out from said base (11) in a vertical direction (V) and a panel element (14) arranged between said uprights (12, 13), the uprights (12, 13) comprising a plurality of apertures (120, 130) having a substantially slotted shape configured to allow assembly of said shelves (20), said shelving unit (10) also comprising a lighting set for the illumination of the shelves (20), said lighting set comprising a pair of conductive strips (32, 33) respectively connected or connectable to the positive and negative terminals of a low voltage transformer (30) that can be supplied from the mains, said conductive strips (32, 33) stretching out in said vertical direction (V), the lighting set further comprising at least one lighting body (40, 41),
characterized in that for each shelf (20) to be illuminated the lighting set also includes a single pair of rigid electrical conductors (42, 43) configured to be removably restrained to the shelf (20), and **in that** said at least one lighting body (40, 41) comprises electrical terminals arranged at its ends and configured for connection to said electrical conductors (42, 43), the overall configuration of the shelving unit (10) being such that in an assembled condition the lighting body (40, 41) is electrically connected and mechanically hung to the rigid electrical conductors (42, 43).
2. A shelving unit (10) according to claim 1, wherein the rigid electrical conductors (42, 43) stretch out from the conductive strips (32, 33) in a transverse direction (T), perpendicular to the vertical direction (V) and to the panel element (14), and wherein the at least one lighting body (40, 41) is arranged in a longitudinal direction (L) perpendicular to the vertical direction (V) and to the transverse direction (T) and

parallel to the panel element (14).

3. A shelving unit (10) according to claim 1, wherein the rigid electrical conductors (42, 43) are arranged close to arms (22, 23) holding the shelves (20) or directly connected to said arms (22, 23).
4. A shelving unit (10) according to any one of claims 1 to 3, wherein the rigid electrical conductors (42, 43) are accommodated in respective containers (420, 430), said containers (420, 430) comprising one or more openings (422, 432) through which the electrical conductors (42, 43) are accessible so as to allow electrical connection of the lighting bodies (40, 41).
5. A shelving unit (10) according to claim 4, wherein the lighting bodies (40, 41) comprise connecting means arranged at their respective electrical terminals, said connection means being configured so as to allow mounting of the lighting bodies (40, 41) on the rigid electrical conductors (42, 43) at the openings (422, 432) of the containers (420, 430) made of an electrically insulating material.
6. A shelving unit (10) according to any one of claims 1 to 5, wherein the conductive strips (32, 33) are mounted or mountable onto the panel element (14) by way of respective guides (320, 330), and wherein both the conductive strips (32, 33) and said guides (320, 330) are made up of a plurality of sectors configured for being assembled to one another.
7. A shelving unit (10) according to any one of claims 1 to 5, wherein the conductive strips (32, 33) are manufactured by way of co-molding or co-injection molding of electrically conductive materials on flexible supports, said supports being slidably mounted or mountable on a plurality of support members (340) fixed at discrete positions on the panel element (14).
8. A shelving unit (10) according to any one of claims 1 to 5, wherein the conductive strips (32, 33) are mounted or mountable in cavities of the uprights (12, 13) by way of respective guides (320, 330).
9. A shelving unit (10) according to any one of claims 1 to 8, wherein each shelf (20) also comprises a label holder profile (24) that is restrained at the free end of its supporting surface (21) and that stretches out in the longitudinal direction (L) between its arms (22, 23), and wherein the free ends of the rigid electrical conductors (42, 43) are respectively electrically connected to a pair of strips (241, 242) made of a conductive material, said strips being accommodated or integrally formed in said label holder profile (24) and extending along the profile (24) between its opposite ends.

10. A shelving unit (10) according to claim 9, wherein the rigid electrical conductors (42, 43) are electrically connected to the pair of strips (241, 242) made of a conductive material through respective wires (243) and metal plates (244) that are associated with terminals (245) arranged at the ends of the label holder profile (24). 5

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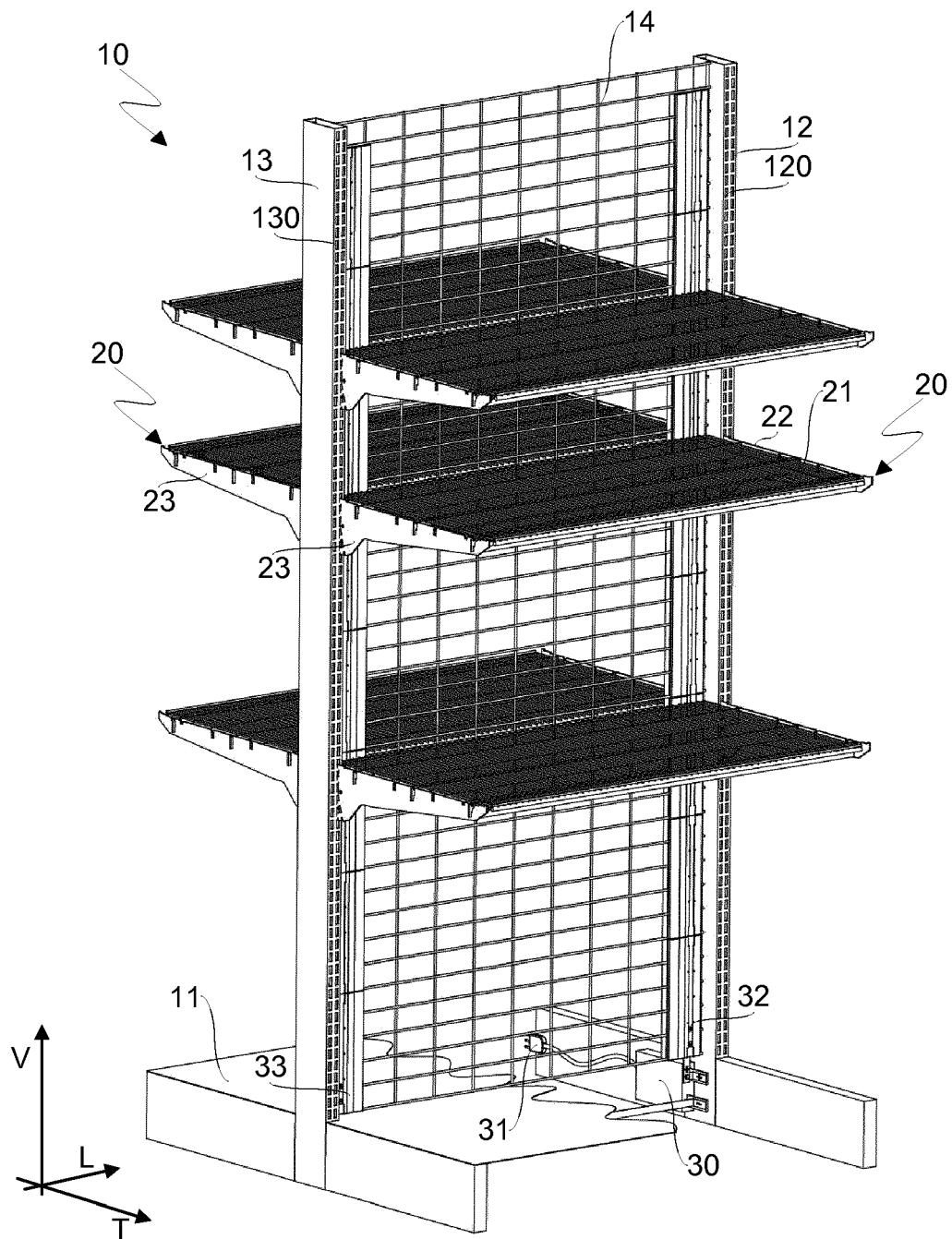


Fig.1

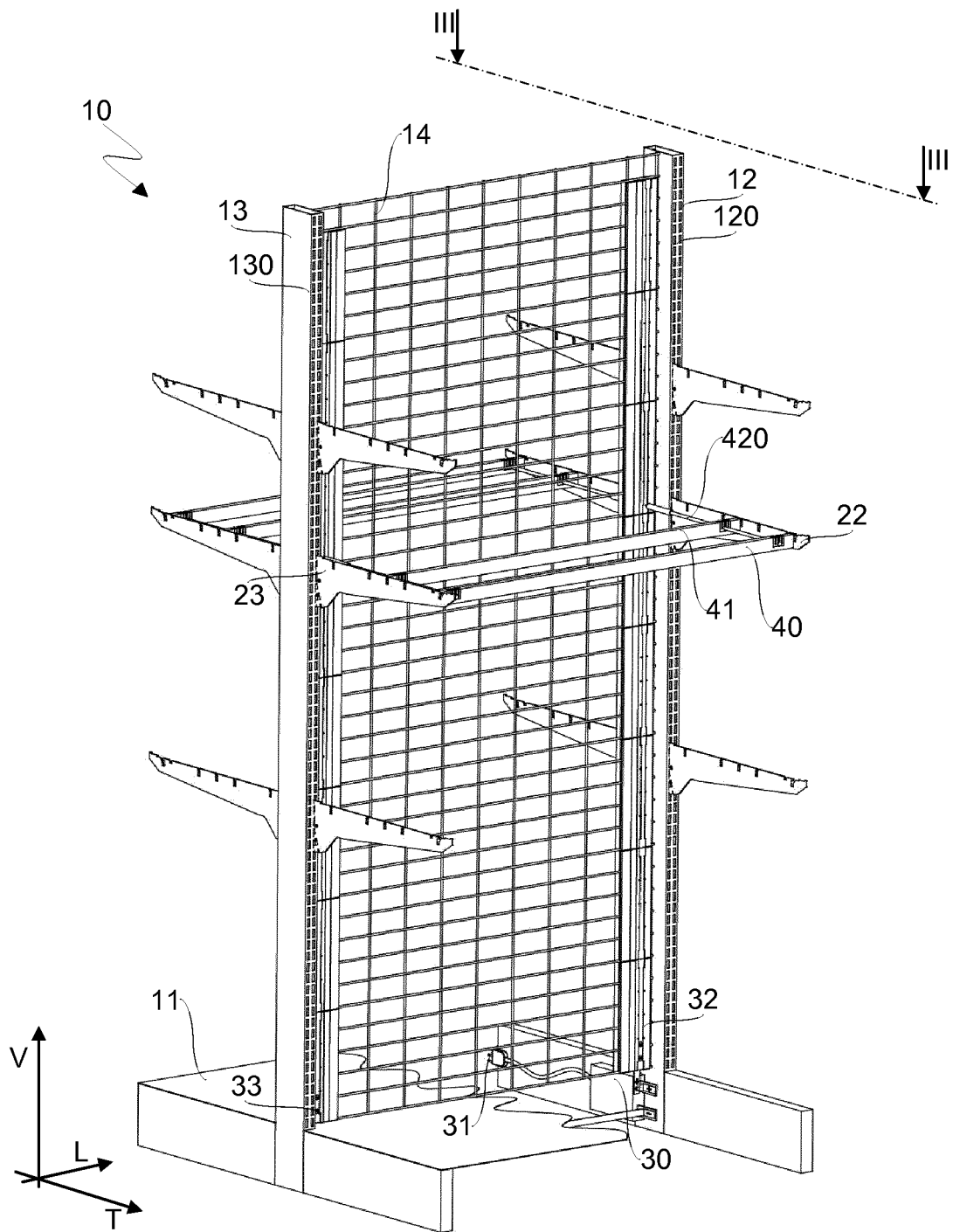


Fig.2

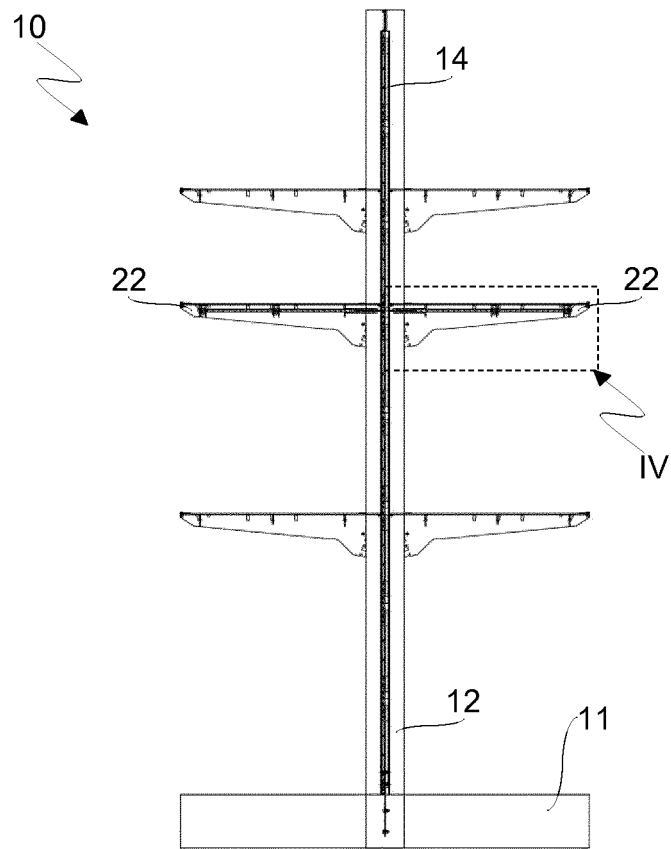


Fig.3

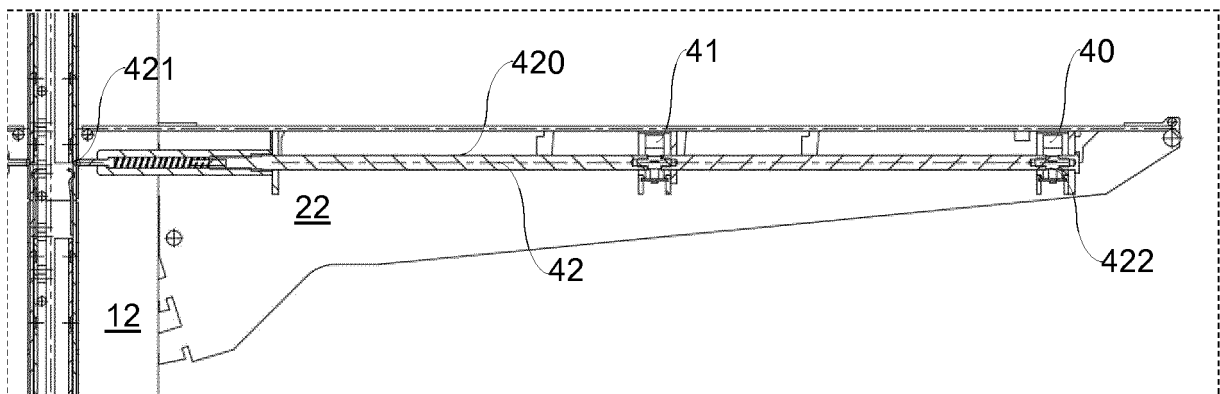


Fig.4

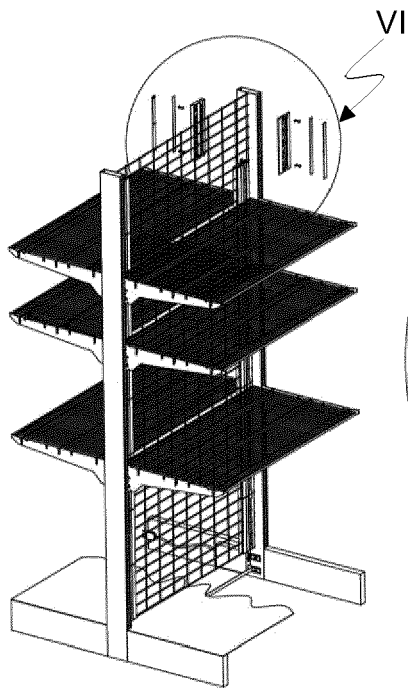


Fig. 5

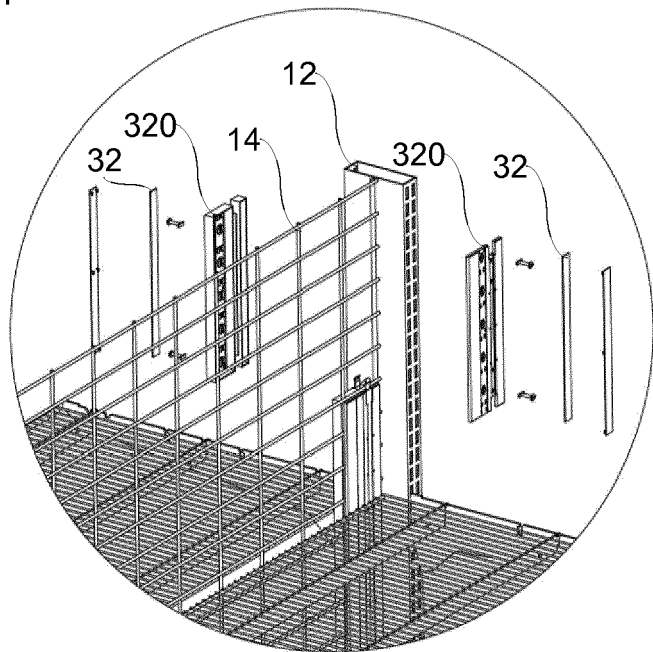


Fig. 6

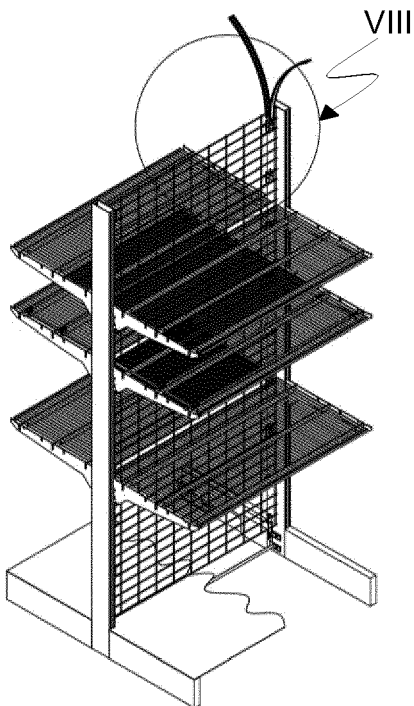


Fig. 7

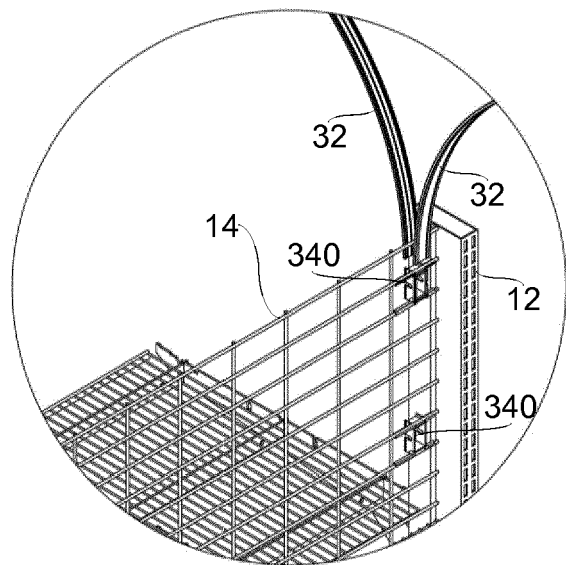


Fig. 8

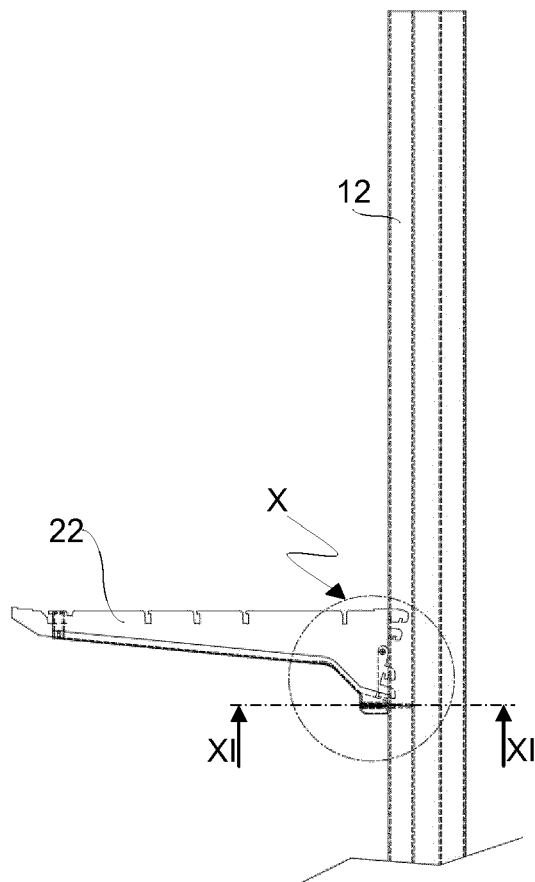


Fig.9

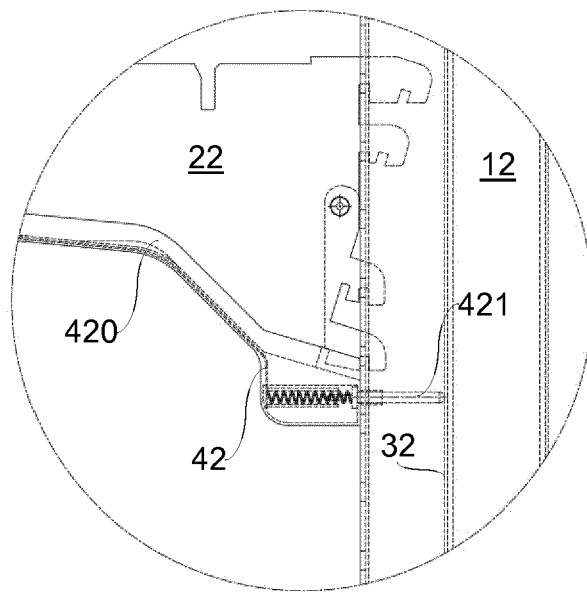


Fig.10

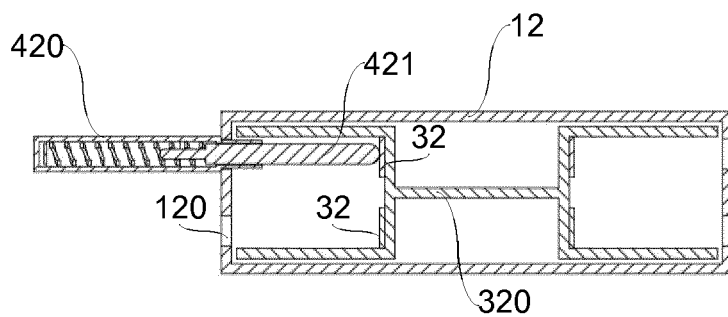


Fig.11

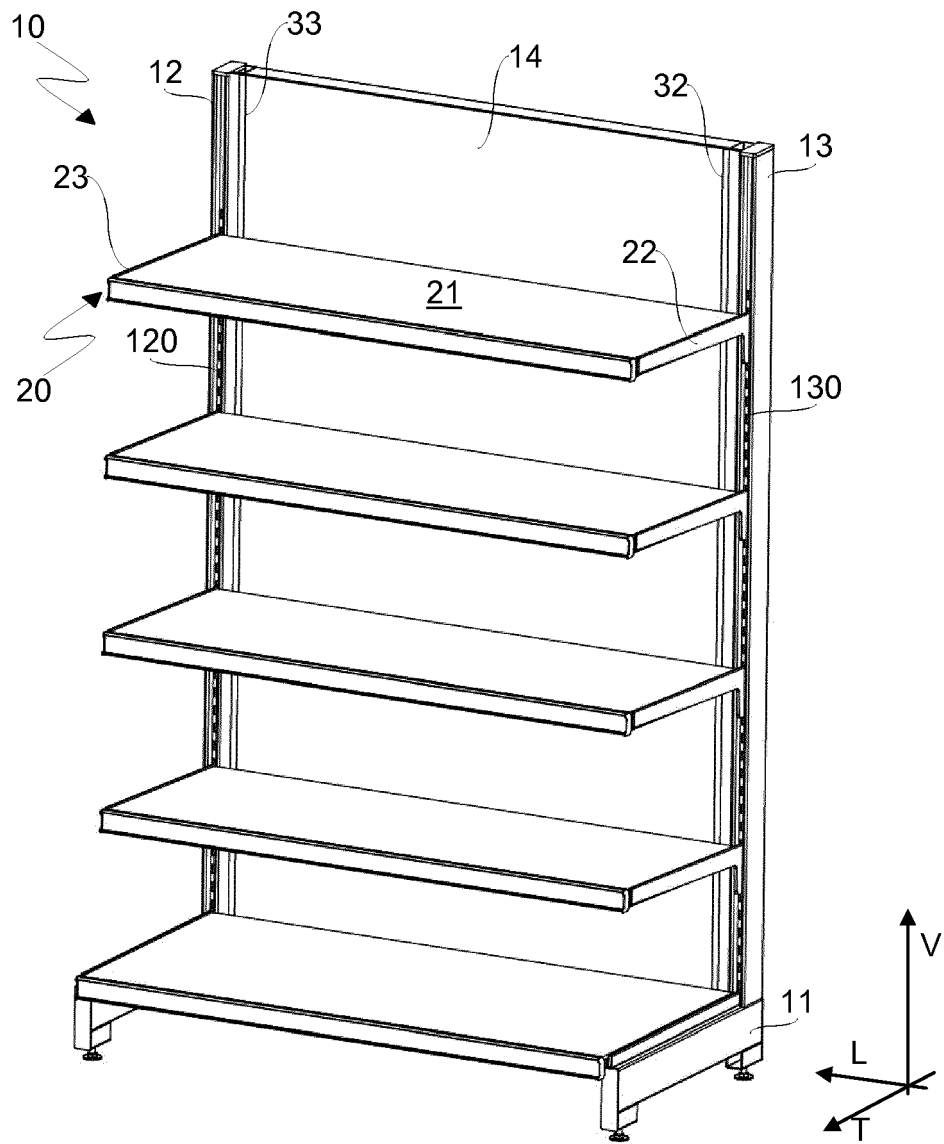


Fig.12

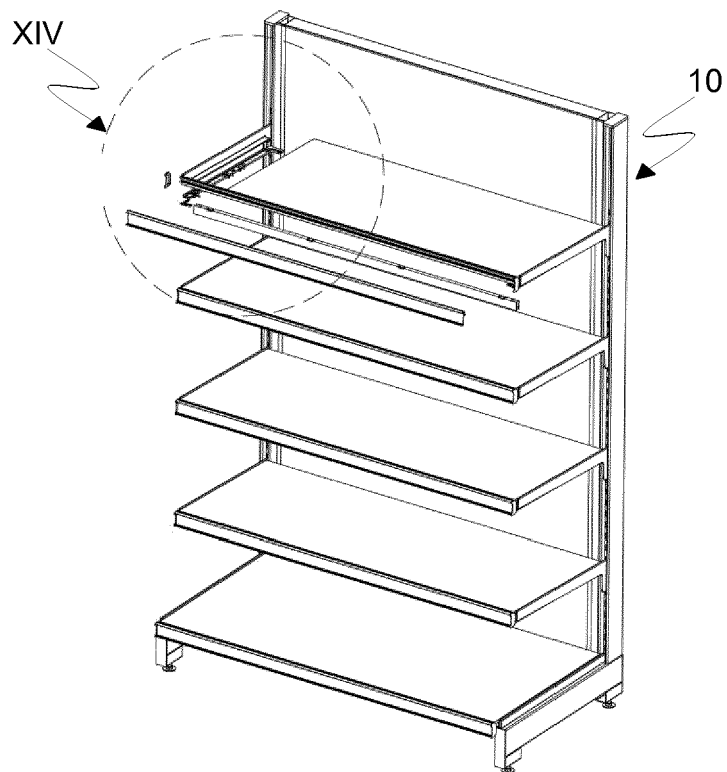


Fig.13

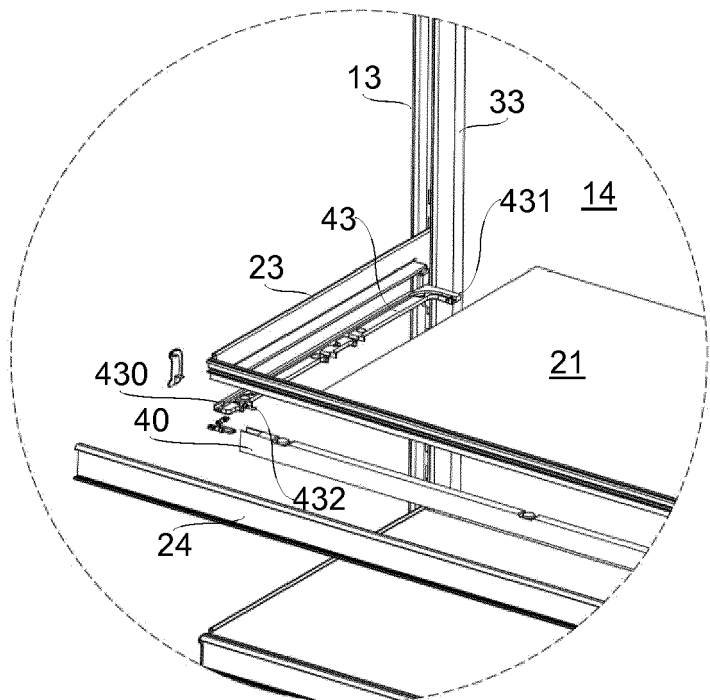


Fig.14

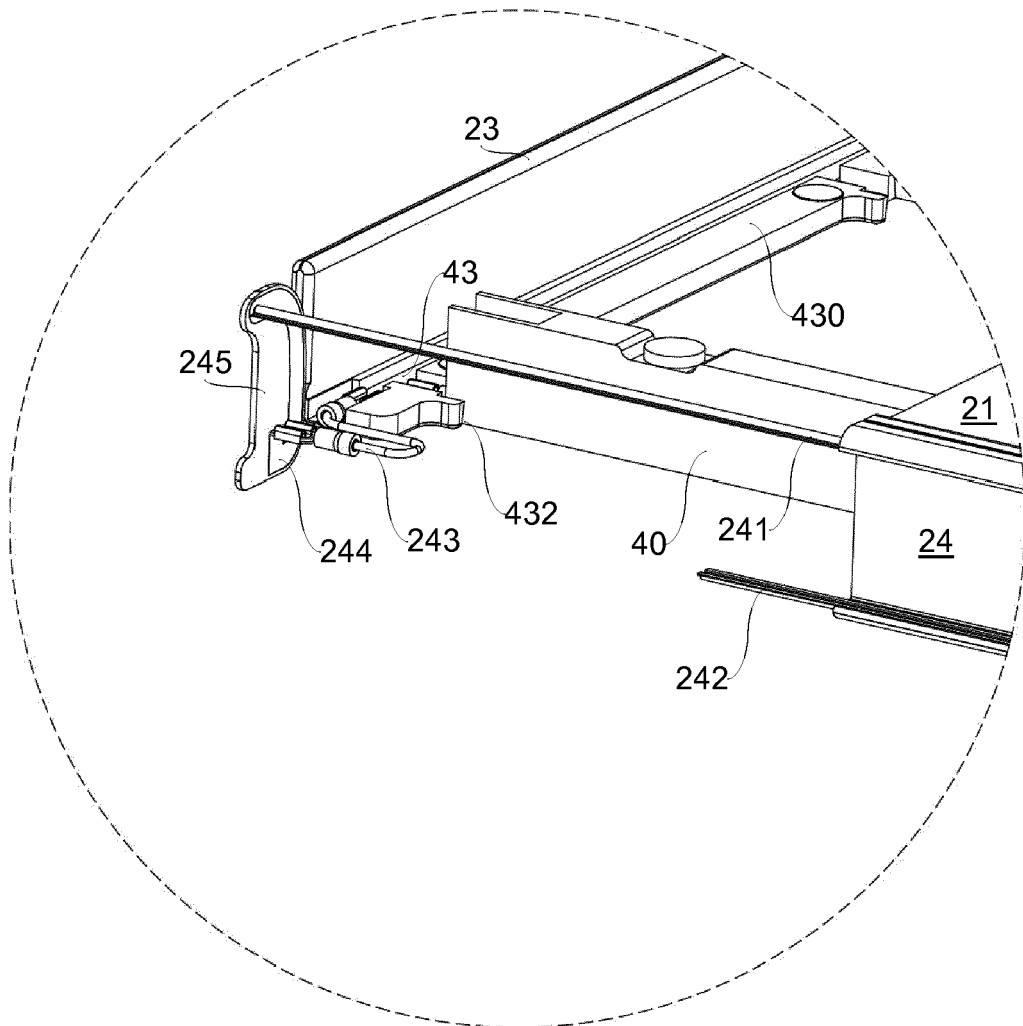


Fig.15

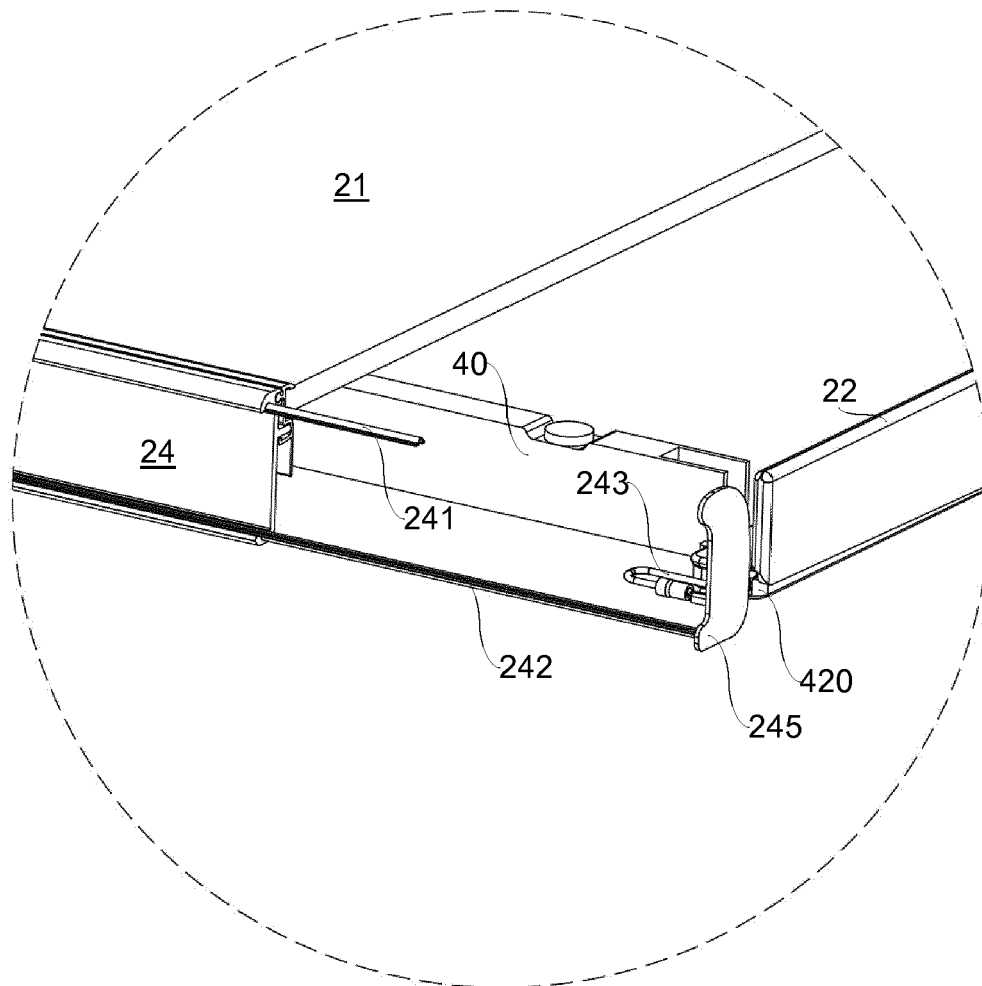


Fig.16



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Place of search The Hague		Date of completion of the search 21 July 2016	Examiner Martinez Valero, J
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