**Title:** AN ELECTRIC CURRENT DISTRIBUTING DEVICE

**Abstract**

A current distributing device presenting at least three current feed and/or current supply components oriented in or substantially in three orthogonal directions, where each component presents pairs of current conducting elements. A first plane (x) common to the two current conducting elements (10, 11) of a first component (2), a second plane (y) common to the two current conducting elements (12, 13) of a second component (3), and a third plane (z) common to the two current conducting elements (14, 15) of a third component (4) are all mutually rotated and form an angle of between 60° and 90°.
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TITLE OF INVENTION: An electric current distributing device.

TECHNICAL FIELD

The present invention relates generally to an electric current distributing device and particularly to an electric current distributing device of the kind which comprises at least three current feed and/or current supply components. These components shall be oriented in, or at least substantially in three orthogonal directions. Each component normally incorporates current conducting elements oriented in pairs.

Such current distributing devices are normally used as distributing boxes or multisocket plugs, so designed that from a wall socket provided with current supply means a plurality of current taking or current consuming apparatus, normally two or three such apparatus, can be connected to current supply components incorporated in the multisocket plug.

BACKGROUND ART

Current distributing devices of this kind are known to the art in various designs.

Thus it is known to produce a one-piece current distributing device having the form of a multisocket plug so designed as to enable one current supply component to be inserted into the current feed component of a wall socket while leaving two mutually adjacent current feed components available for current consuming apparatus.

It is also known to provide a multisocket plug having one current supply component and three current feed components, the one current feed component being positioned diametrically to the current supply component and the two remaining current feed components forming right angles with the current supply component and located diametrically opposite one another. With such a device three current feed components are available for current consuming appa-
ratus. All the aforesaid components are oriented in one and the same plane.

The current supply components normally comprise two current conducting elements, in the form of pins or the like. The current feed components normally comprise two current conducting elements, in the form of sleeves or the like.

The French Patent Specification Number 716 519, however, describes a current distributing device provided with at least three current feeding or current supplying components oriented in three orthogonal directions. Each component presents pairs of current conducting elements. This device has one component (a male plug means) intended for current supply and may present at most four current feed components (female socket means).

The cost of producing a device of the nature described in the French Patent Specification is relatively high, since the device does not lend itself to the rational methods of manufacture now available.

DISCLOSURE OF THE PRESENT INVENTION

TECHNICAL PROBLEM

There is a desire to provide a current distributing device which presents a large number of current feeding components; the need for such a device is illustrated by the present state of the art.

There is also a desire to be able to design such a current distributing device with small external dimensions. A further, prominent desire is to provide a current distributing device which is highly reliable and which fulfils rigorous safety regulations.

Against this background it has been found technically problematic to design a current distributing device which presents six different readily available components and which, if desired, can be caused to present a smaller number of such components with the aid of simple means.

A further technical problem is one of producing a
device which presents a large number of readily available components but which, nevertheless, can be given small external dimensions.

One qualified technical problem associated with the provision of measures which enable the external dimensions of said device to be reduced while providing a large number of available current feeding and/or current supplying components is the provision of sufficient distance and insulation resistance between electrically conductive parts of different potentials.

Another qualified technical problem is that of providing a current distributing device so designed that while observing the aforementioned considerations it obtains a form and a general design which lends itself to a simple process of manufacture, and enables the individual parts thereof to be produced in a simple manner.

A still further technical problem in this context is one of providing ways and means whereby the pairs of current conducting elements forming part of the device can all be mounted readily on an electrically insulating carrier section which is of simple design and which can be readily arranged to firmly hold all current conducting elements.

A further technical problem is one of providing simple means which enable a current conducting element of a first component to be formed in a manner which allows it firstly to be firmly connected to carrier sections and secondly to be connected electrically to a current conducting element of a second component.

Another technical problem is that of providing a complete current distributing device which is so designed that with the aid of simple means each, or practically each current feeding component presents current conducting elements which extend diametrically through the device and the mutually opposite end surfaces of which are intended to co-act with a respective current taking or current consuming component (electric plug) or apparatus, so as to provide thereby conditions which enable the number of
current feed components at the disposal of current consuming apparatus to be increased.

A further technical problem is one of providing design conditions which enable one and the same current-distributing device structure to be used substantially as a multisocket plug having a plurality of current feeding components and one current supply component for insertion into a wall socket, or with which the device presents components solely intended to feed current and the supply of current to said feed components is effected through a supply cable connected to the interior of the device.

Finally, a further technical problem in the present context is one of providing ways and means for constructing the current conducting elements of the device in a manner which enables them to be produced by simple mechanical working operations, and of providing conditions whereby current conducting elements allotted the same potential can be readily connected electrically in combination with an effective use of material.

**SOLUTION**

The present invention relates to a current distributing device designed to present at least three current feeding and/or current supplying components oriented in or substantially three orthogonal directions, in which device each such component presents current conducting elements which are normally arranged in pairs.

The device according to the present invention is mainly characterized in that a first plane common to the two current conducting elements of a first such component, a second plane common to the two current conducting elements of a second such component, and a third plane common to the two current conducting elements of a third such component together form therebetween an angle of between 60 and 90°.

In accordance with one embodiment each, or practically
each current feeding component of said device is provided with current conducting elements which extend diametrically through the device and the mutually opposite end surfaces of which are each intended to co-act with a respective current taking means or apparatus.

Conveniently, the device according to the invention also incorporates a carrier section arranged to hold firmly all current conducting elements, the carrier section being formed from an electrically insulating material, and sufficient distance being provided between current conducting elements of different potential.

The current conducting element of the first component shall be designed in a manner which enables it to be connected firmly to a carrier or support section and also be connected electrically to a current conducting element of a second component. In this respect the current conducting element suitably has the form of an elongated, folded flat blank or pre-form where a flap of the pre-form is formed to provide the electrical connection.

ADVANTAGES

The advantages primarily afforded by a current distributing device designed in accordance with the invention is that it can be made in a simple manner to present up to six current feeding or current supplying components while at the same time taking steps to provide sufficient insulating distance between electrically conductive parts of different potentials.

The prime characteristic features of a current distributing device according to the invention are set forth in the characterizing clause of Claim 1.
BRIEF DESCRIPTION OF THE DRAWINGS

A number of current distributing devices exhibiting the characteristic features significant to the present invention will now be described in detail with reference to the accompanying drawings, in which

Figure 1 is a perspective view of a current distributing device constructed in accordance with the invention;

Figure 2 illustrates the principle internal design of the device shown in Figure 1, although in this figure a centrally arranged electrically insulated carrier section has been omitted for the sake of clarity;

Figure 3 is a perspective view of an electrically insulated carrier section having mounted thereon a plurality of current conducting elements designed to fit on American model type current taking components;

Figure 4 is a plan view of a flat blank or pre-form which can be used to form current conducting elements capable of being applied to a carrier section of the principle design illustrated in Figure 3 and adapted to a European model type current taking element;

Figure 5 illustrates the pre-form of Figure 4 when bent and upset to form one of a plurality of current conducting elements for attachment to the carrier section; and

Figure 6 is a perspective view of a flat pre-form bent and upset to form one of a plurality of current conducting elements of American model for attachment to the carrier section.

DESCRIPTION OF AN EMBODIMENT NOW PREFERRED

In Figure 1 there is illustrated in perspective a current distributing device 1 which presents at least three current feeding or current supplying components, referenced 2, 3 and 4. The embodiment illustrated in Figure 1 presents one current supply component 2 in the form of a male plug and five current feed components 3, 3a, 4, 4a and 2a in the form of female sockets. By current supply component is meant here a component which is designed to be able to
receive current and therewith supply current to the device. By current feed components is meant components which are designed to be able to feed and distribute the input current to different current consuming or current taking apparatus and devices.

The component 2 comprises means for supplying current to the device 1 in the form of two cylindrical pins of European model, while the components 3 and 4 comprise current feed means in the form of two sleeves of European model. It is also possible within the scope of the invention, however, to replace the current supply component 2 with a current feed component similar to the components 3 or 4, in which case the current supply must be effected through a separate supply cable inserted through the casing 5 of the current distributing device, for example through a hole 5a in said casing.

It is important to the present invention that the current feed or current supply components 2, 3, 4 are oriented in or at least oriented substantially in three orthogonal directions. Each component 2, 3, 4 shall also present pairs of current conducting elements. The current conducting elements for the component 2, in the form of cylindrical pins, have been referenced 10, 11, the current conductive elements for the current supply component 3, in the form of cylindrical sleeves, have been referenced 12, 13, and the current conducting elements for the current feed component 4, in the form of cylindrical sleeves, have been referenced 14, and 15.

In accordance with the present invention a first plane "x", common to the two current conducting elements 10, 11 of the first component 2, a second plane "y", common to the current conducting elements 12, 13 of the second component 3, and a plane "z" common to the two current conducting elements 14, 15 of the third element 4 shall all form therebetween an angle within the region of 60°-90°. It will be seen from Figure 2 that the angle between the plane "x" and the plane "z", is a right angle, as is also
the angle between the plane "x" and the plane "y". This is also true of the angle between the plane "z" and the plane "y".

In accordance with the invention, however, this angle may be less than 90°, and it will be seen that the rotatio
tional angle can be selected down to 60°. At smaller angles the insulation distance between electrical conductive parts of different potential will increase.

Figure 2 also illustrates the orientation of the current conducting elements for the various components. For the sake of clarity, however, a carrier section intended for firmly supporting the conducting elements and made of an electrically insulated material has been omitted from Figure 2. Figure 2 shows that all current conducting elements have the form of cylindrical sleeves and are adapted for a European model, where the one end surface of respective sleeve 10a, and 11a are provided with round, cylinder-like pins 10,11, so that the current supply component 2 obtains the form of a male plug. It will be understood that when the pins 10,11 are removed the component 2 can serve as a current feed component in the form of a female socket.

According to the invention it shall be possible for each, or practically each current feed component to present pairs of current conducting elements. With regard to the component 3, the sleeves 12,13 thus extend diametri
cally through the device 1 and the mutually opposite end surfaces 13', 13" and 12' and 12" are intended to co-act with a respective current taking means or apparatus. Thus, with this arrangement, it is possible to insert two electrical plugs so that the pins of said plugs are caused to co-act with the sleeves 12 and 13 via their ends 12', 13' and 12", 13".

Thus, Figure 2 illustrates a current distributing device which presents at least three current feeding and/or current supplying components oriented in or sub
tantially in three orthogonal directions, where each
component presents pairs of current conducting elements. The two current conducting elements 10,11 for one component 2 are arranged on each side of two current conducting elements 12,13 for a second component 3 and arranged between two current conducting elements 14,15 for a third component. In the case of each component the current conducting elements incorporated therein are oriented on each side of two current conducting elements and oriented between two further current conducting elements.

Figure 3 illustrates an electrically insulated carrier section 6 intended for enclosure in a casing 5 of a current distributing device 1. In this case all of the current conducting elements have been formed for incorporation in current feeding components, so as to be able to co-act with one or more current taking means 7 or plug-in contacts presenting contact pins according to the American model. In this embodiment the contact pins 8,9 are flat and each provided with a respective recess 8a, 9a. These recesses 8a, 9a are arranged to co-act with beads 8a' and 9a' formed on the current conducting elements 20 and 28.

The carrier section 6 has the form of a cube and is arranged to hold all current conducting elements of all the aforesaid components, meaning that one end part 20b of the current conducting element 20 can be brought into co-action with the pin 9 and that said element is firmly secured to the carrier section 6 via an attachment 21. The element 20 is connected electrically to the adjacent element 23 with the aid of a flap 22, said adjacent elements 23 also presenting free ends 23a, 23b for co-action with contact pins corresponding to the contact pins 8,9. The electrically conducting element 23 is secured to the carrier section 6 via an attachment 26. A flap or tag 24 connects the electrically conducting element 23 to an adjacent electrically conducting element 25, which is also secured to the support section 6 via an attachment 27.

The securing means may have the form of a screw or a bead formed in the carrier section, so that the current
conducting elements can be secured to two beads formed in the carrier section at right angles to one another with the snap-in action.

It will be understood from this that the current conducting element 20 for the first component can be formed in a manner which enables it to be firmly connected to the carrier section, via the attachment 21, and to be electrically connected to an adjacent current conducting element 23 of a second component, via the flap or tag 22, but in addition also firmly to the carrier section 6 via attachment 26. The carrier section 6 may be provided with ridges or like promontories in order to increase the creep distance between electrically conducting elements.

In the Figure 3 embodiment respective current conductive elements comprise an elongated folded flat blank or pre-form, and the ends 20a and 20b of the element 20 are bent to a U-shape with the free leg 20b having formed thereon a bead 9a' for co-action with the recess 9a, and where a tab 22 is formed to create the electrical connection. The length of the tab may be at least twice the width of the electrically conducting element.

The end surface 23b and corresponding end surface 29b of the undermost electrically conducting element 29 could be formed as a current supply component with pins, similar to the embodiment of Figures 1 and 2.

Figure 4 is a plan view of a flat pre-form which can be bent and upset in a manner to enable it to co-act with a current taking means or plug-in contact of the European model. The pre-form 30 has two mutually parallel parts 31, 32 which are divided partially via a score line 33 and a score line 34, both of which are parallel with one another.

A part 38 of the pre-form 30 is removed therefrom with the aid of a score line 35, a second score line 36 and a third score line 37, so as to obtain the shape for parts 31 and 32. The pre-form also has a hole 39 arranged centrally thereof, together with a further hole 40 provided
in a tab 41 formed via the grooves 33 and 34.

By folding the pre-form illustrated in Figure 4 to
the shape illustrated in Figure 5 while, at the same time,
punching or hobbing the portions 43 and 43' of the pre-
form parts 31 and 32 into part-cylindrical shape there is
provided conditions for obtaining a contact component which
is firstly able to co-act effectively with a current taking
means of European model and secondly can be caused to co-
act readily and in simple fashion with the carrier section
6, at the same time as means are provided for obtaining an
electrical contact bridge 41 to the adjacent current
conducting element. Those parts in Figure 5 which correspond
to the parts illustrated in Figure 4 have been identified
with corresponding references.

The tabs 43a and 43a' are embossed or punched in the
same manner as the tabs 43 and 43'.

The pre-form illustrated in Figure 4 is preferably
punched from material strip, thereby enabling the tab 41'
for a first element 30' to be formed from the material removed
for the recess 38 in an adjacent element 30.

The hole 39 is intended to co-act with one planar
surface of the carrier section 6 and the hole 40 is intended
to co-act with the adjacent planar surface of the carrier
section 6, the material encircling the hole 40 being adapted
for co-action with adjacent electrically conducting elements.

As illustrated in Figure 6, with respect to the American
model it is also possible to produce the electrically conduc-
ting element 20" incorporated therein from material strip,
where the end surface 20a' is bent to a U-shape and the
end surface 20b' is also bent to U-shape, although this
latter bend is continued to a last right-angular bend, so
as to form a tab 22'.

Although the aforesaid embodiments have not been
shown to incorporate earthing contacts or child-safety
devices it will be understood that other embodiments of
the invention not illustrated here may incorporate such
earthing contacts and safety devices.
A common feature of the illustrated and described embodiments is that the carrier section 6 having electrically conducting elements securely connected and mounted thereon and fitted with a collar 2a can be obtained as a unit capable of being inserted into the casing 5 and secured thereto.

Thus, Figure 1 illustrates a current distributing device having at least three current feeding and/or current supplying components oriented in or substantially in three orthogonal directions, where each component presents pairs of current conducting elements, but with only one single current supplying component 2. Three current feed components 2a, 3 and 4, however, are oriented in orthogonal directions.

It will be understood that the invention is not restricted to the aforesaid illustrated embodiments, but that modifications can be made within the scope of the following claims.

Thus, the device need not have the geometrical shape illustrated but that other symmetrical, geometrical shapes such as spherical shapes, hexagonal shapes etc. fall within the scope of the present invention. These embodiments may be provided with collars or recesses, depending upon prevailing safety requirements.
CLAIMS

1. A current distributing device presenting at least three current feed and/or current supply components oriented in or substantially three orthogonal directions and in which each such component presents pairs of current conducting elements, characterized in that a first plane (x) common to the two current conducting elements (10,11) of a first component (2), a second plane (y) common to the two current conducting elements (12,13) of a second component (3), and a third plane (z) common to the two current conducting elements (14,15) of a third component (4) all form therebetween an angle within the range of 60°-90°.

2. A device according to Claim 1, characterized in that each, or practically each current feed component presents current conducting elements which extend diametrically through the device and the mutually opposite end surfaces (12', 13' and 12", 13") of which are intended to co-act with a respective current taking means or apparatus.

3. A device according to Claim 1, characterized in that an electrically insulating carrier section (6) is arranged to hold all current conducting elements.

4. A device according to Claim 1, characterized in that a current conducting element (20) for one component is formed in a manner which firstly enables it to be firmly connected (21) to a carrier part and secondly to be electrically connected (22) with a current conducting element (23) of an adjacent component.

5. A device according to Claim 4, characterized in that the current conducting element comprises an elongated, folded flat pre-form in which a tab (41) is formed to provide the electrical connection with an adjacent electrically conducting element.

6. A device according to Claim 1, characterized in that said angles are all right angles.
7. A current distributing device presenting at least three current feed and/or current supply components oriented in or substantially in three orthogonal directions, where each component presents pairs of current conducting elements, characterized in that the two current conducting elements (10,11) for one component (2) are arranged on each side of two current conducting elements (12,13) of a second component (3) and arranged between two current conducting elements (14,15) of a third component.

8. A device according to Claim 7, characterized in that in each of said components the current conducting elements incorporated therein are oriented on each side of two current conducting elements and oriented between two further current conducting elements.

9. A current distributing device presenting at least current feed and/or current supply components oriented in or substantially in three orthogonal directions, where each said component presents pairs of current conducting elements and comprises one current supply component, characterized in that the three current feed components are oriented in orthogonal directions.
INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC 4

H 01 R 19/00

II. FIELDS SEARCHED

Minimum Documentation Searched *

<table>
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<th>Classification System</th>
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<td>US Cl 339:147-195, 206-211, 278</td>
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Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

<table>
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<tr>
<th>Category</th>
<th>Citation of Document, * with indication, where appropriate, of the relevant passages **</th>
<th>Relevant to Claim No. ***</th>
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<td>A</td>
<td>US, A, 2 565 075 (HARCHAREK J M) 21 August 1951</td>
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* Special categories of cited documents: 16

"A" document defining the general state of the art which is not considered to be of particular relevance

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"M" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search *

1984-12-03

Date of Mailing of this International Search Report *

1984-12-05

International Searching Authority 1

Swedish Patent Office

Signature of Authorized Officer 30

Christie Akerblom

Form PCT/ISA/210 (second sheet) (October 1981)