



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.10.2024 Bulletin 2024/42

(51) International Patent Classification (IPC):
B05B 13/02 ^(2006.01) **B05B 12/20** ^(2018.01)

(21) Application number: **23167834.3**

(52) Cooperative Patent Classification (CPC):
B05B 13/0292; B05B 12/20; B05B 13/0214

(22) Date of filing: **13.04.2023**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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(54) **A FIXTURE FOR USE IN COATING OPERATION**

(57) The present invention pertains to a fixture (100) for holding elements (200) during coating operation. The fixture comprises a first member (10), having a front surface and a plurality of first holders (12), a second member (20), having a front surface and a plurality of second holders (22), and an attachment means (30) for removable

attachment of the first edge (14) of the first member (10) to the second edge (24) of the second member (20) in a position in which the front surfaces of the first member (10) and the second member (20) are in alignment with each other. The respective first holder (12) is arranged opposite to a respective associated second holder (22) so as to form a holding portion (40) configured to hold the element (200).

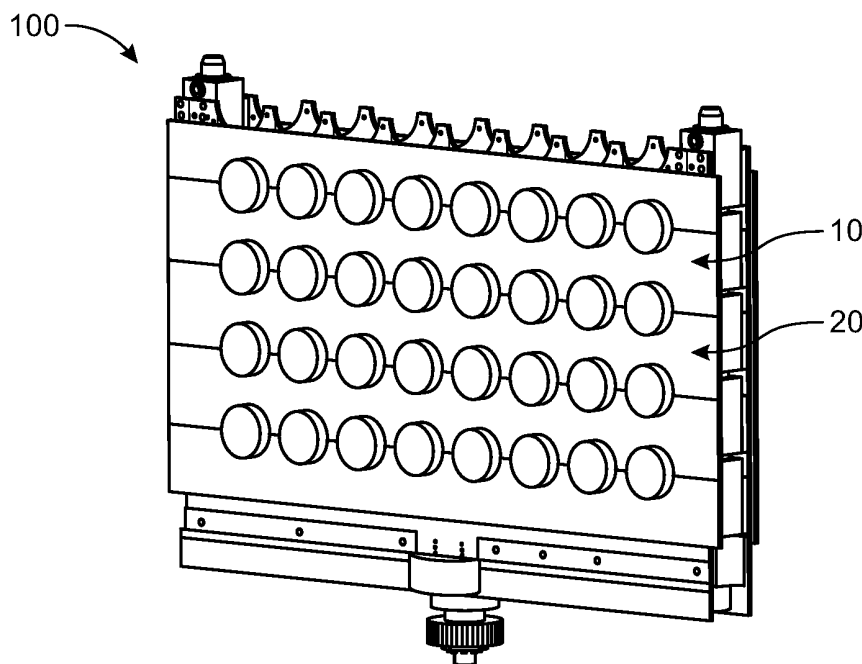


FIG. 1

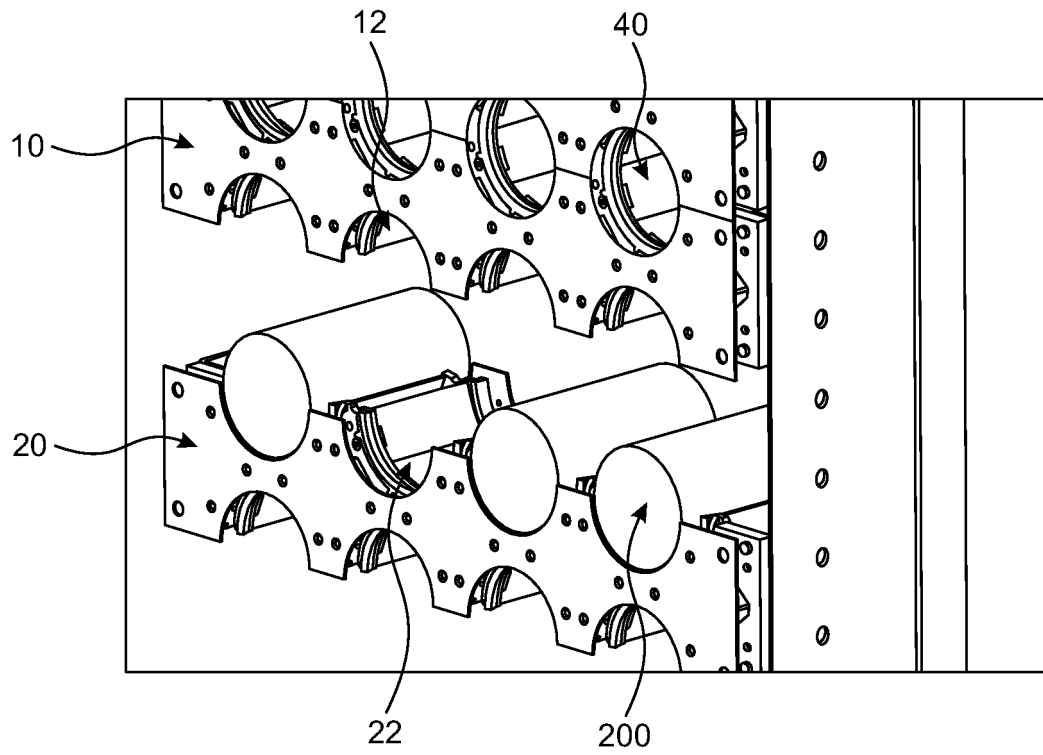


FIG. 6

Description

TECHNICAL FIELD

[0001] The invention relates to a fixture for use in coating operation, more particularly the invention relates to a fixture for holding an element during coating operations.

BACKGROUND

[0002] Film capacitors, plastic film capacitors, film dielectric capacitors, or polymer film capacitors, generically called as film caps as well as power film capacitors, are electrical capacitors with an insulating plastic film as the dielectric, sometimes combined with paper as carrier of the electrodes. These films may be made extremely thin using a sophisticated film drawing process. Once the film is manufactured, it may be metallized or left untreated, depending on the needed properties of the capacitor. In the manufacturing process of thin-film dielectric capacitors, metal coating may be a very critical production process. This process is to use compressed air to coat a liquid metal from a nozzle on the end face of the capacitor core at a high speed to form a metal electrode surface.

[0003] In existing coating process, the coating gun may be fixedly arranged, and the capacitors may be placed on a conveyor and the coating may be performed sequentially. Once the coating is completed, the conveyor is mostly turned over to coat the other side of the capacitor. In large scale manufacturing systems where large scale coating needs to be performed it is difficult to flip the capacitor individually, in addition this may affect the efficiency of coating as well. Further, during coating it is important to coat only the end portions of the capacitor and the remaining portions shouldn't be coated so as not to effect the workability of the capacitor.

[0004] The present methods and device used for coating capacitors include one or more of the issues as stated above. Therefore there is a need for a device or method for coating capacitors that can overcome one or more of the above listed drawbacks of current coating processes.

SUMMARY

[0005] It is an object of the invention to present a fixture, an arrangement and a method that promotes efficient and automated coating of end surfaces of elements while preventing coating material from being applied on side surfaces of said elements during the coating operation.

[0006] It is also an object of the invention to present a fixture and arrangement that promotes efficient and automated cleaning of surfaces thereof that has been subjected to coating material during a coating operation in which end surfaces of elements positioned in the fixture of the arrangement has been coated.

[0007] In an embodiment of the present invention, envisioned is, a fixture for holding elements during coating

operation thereof, the fixture comprising a first member, having a front surface and a plurality of first holders, arranged along an first edge of the first member; a second member, having a front surface and a plurality of second holders, arranged along a second edge of the second member; and attachment means for removable attachment of the first edge of the first member to the second edge of the second member in a position in which the front surfaces of the first member and the second member are in alignment with each other, and in which each respective first holder is opposite to a respective associated second holder so as to form an holding portion configured to hold the element. The technical effect of the said fixture is that efficient and automated coating of end surfaces of elements can be performed while preventing coating from being applied on side surfaces of said elements during the coating operation. According to one embodiment, the element comprises a capacitor, and that, according to yet an embodiment, the capacitor comprises turns of a polymer film, preferably a polypropylene film, and that, preferably, the element/capacitor has a cylindrical shape.

[0008] In an embodiment of the present invention, each first holder has the same maximum width as the second holder to which it is associated and the maximum width of each first holder and the second holder to which it is associated is located at the interface between the two holding portions.

[0009] In an embodiment of the present invention, the fixture comprises a sealing element extending around an inner periphery of each holding portion.

[0010] In an embodiment of the present invention, the first and second member are constituted by a first material, said fixture comprises a masking member applied onto and covering the front surface of the respective first and second member, the masking member has openings of corresponding shape, size and position as the holding portions formed by said first and second holders, the masking member is constituted by a second material having higher abrasion resistance than the first material.

[0011] In an embodiment of the present invention, the masking member comprises a first part having profile corresponding to the first holders of the first member and attached to the front surface of the first member, and a second part having profile corresponding to the second holders of the second member and attached to the front surface of the second member. The first part covers, and protects, the front surface of the first member, and the second part covers, and protects, the front surface of the second member.

[0012] In an embodiment of the present invention, the first member comprises a first part and a second sheet, connected to each other and arranged at a distance from each other, in parallel with each other and having a corresponding shape and having first holders of corresponding shape, size and position, said first edge of the first member being formed by a first edge of the first part and a corresponding first edge of the second part of the first

member, and each holder being provided with a sealing element on its inner periphery.

[0013] In an embodiment of the present invention, the second member comprises a first part and a second sheet, arranged at a distance from each other, in parallel with each other and having a corresponding shape and having second holders of corresponding shape, size and position, said second edge of the second member being formed by a second edge of the first part and a corresponding second edge of the second part of the second member, and each holder being provided, and each holder being provided with a sealing element on its inner periphery.

[0014] In an embodiment of the present invention, each first holder has a cross section that defines a semi-circle, and each second holder has a cross-section that defines a half circle, and the elements aimed to be coated and to be held in the fixture have a circular cross section with a diameter corresponding to the diameter of the holes defined by each pair of first holders and second holders.

[0015] In an embodiment of the present invention, the fixture comprises a holder element on which the first member and second member are stacked, the second member is arranged on top of the first member.

[0016] In an embodiment of the present invention, the first holder is a holder in the first member and the second holder is a holder in the second member.

[0017] In an embodiment of the present invention, envisioned is, an arrangement for coating of elements, in particular cylindrical capacitor elements, said arrangement comprises a fixture according to any of the preceding embodiments of the present invention, a device configured to grip a first member and place the first member in a first position with its first edge directed upwards, picking elements to be coated and placing them in a respective first holder of the first member, grip the second member and place the second member on top of the first members such that the first and second holders form said holding portions, in which said elements are positioned, such that an end of each element is exposed by the holding portions formed by the first and second holders in the front surface of the first and second members, and a coating device configured to apply a metallic coat onto said ends of said elements from a position opposite to said front surfaces. The technical effect of the embodiment is that efficient and automated coating of end surfaces of elements while preventing coating material from being applied on side surfaces of said elements during the coating operation.

[0018] In an embodiment of the present invention, the arrangement further comprises a device for cleaning the rails, the device is configured to grip the second member and move it to a cleaning position in the cleaning device, to pick and remove coated elements positioned in the first holders of the first member, and thereafter move the first member to a cleaning position in the cleaning device.

[0019] In an embodiment of the present invention, envisioned is, a method of coating elements, comprising

the steps of positioning a first member of a fixture according to embodiments of the present invention with its first edge pointing upwards, positioning elements to be coated in said holders, one in each first holder, positioning the second member on top of the first member, with the second edge turned towards the first edge, and with each second holder opposed to a respective first holder, such that the elements are sealingly held in holes defined by the pairs of opposed first and second holders, and coating, by means of a coating device, an end of the elements that is exposed by said holes. The method of coating as discussed provides efficient and automated coating of end surfaces of elements while preventing coating material from being applied on side surfaces of said elements during the coating operation.

[0020] In an embodiment of the present invention, the method further comprises the steps of removing the second member from the first member, and removing each element from the first holder in which is positioned.

[0021] In an embodiment of the present invention, the method further comprising the step of cleaning front surfaces of the rails or mask sheets that have been subjected to coating during the coating of said elements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 shows an assembled view of a fixture for holding elements during coating operation, according to an embodiment of the present invention.

FIG. 2 shows a first member or second member of a fixture, according to the embodiments of the present invention.

FIG. 3 and 4, shows an attachment means of a fixture, according to the embodiments of the present invention.

FIG. 5 shows a sealing element and a masking member of the fixture, according to the embodiments of the present invention.

FIG. 6 shows an arrangement of an element to be coated in a fixture, according to the embodiments of the present invention.

FIG. 7 shows an assembled view of the first member and second member showing a holding portion, according to the embodiments of the present invention. FIG. 8a-8b and 9a-9c shows an assembly of sealing element in the fixture, according to the embodiments of the present invention.

FIG. 10 shows an exploded view of a fixture for holding elements during coating operation, according to an alternate embodiment of the present invention. FIG. 10a shows a masking element for a fixture of FIG. 10, according to an embodiment of the present invention.

FIG. 11 shows an assembled view of a fixture for FIG. 10, according to an alternate embodiment of the present invention.

FIG. 12 shows a masking element, according to an alternate embodiment of the present invention.

DETAILED DESCRIPTION

[0023] The embodiments herein and the various features and advantageous details thereof are explained more fully with reference to the non-limiting embodiments and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0024] Embodiments of the present disclosure will be described and illustrated more fully hereinafter with reference to the accompanying drawings. However, the solutions disclosed herein may be implemented in many different forms and should not be construed as limited to the embodiments set forth herein.

[0025] The present invention pertains to a fixture for holding an element during coating operation. In industry when mass production of certain components are carried out, most often than not the production line carries a certain level of automation. Further, in such production system the efficiency of the system is also paramount as a single issue can affect multiple components in a batch of various batches. In mass production of capacitors it is needed to coat the two ends of the capacitors with at least a layer metal. For coating these components a fixture is generally use that allow holding the coating element in correct position in order to perform coating with high efficiency.

[0026] The present invention as shown in FIG. 1, pertains to a fixture for holding elements during coating operations. As seen in FIG. 1, the fixture 100 comprises a first member 10, a second member 20 and an attachment means 30. FIG. 1 shows an assembled view of the fixture 100 of the present invention, in said fixture a plurality of the first member 10 and second member 20 are assembled in a stacked manner. The first member 10 of the fixture 100 has a front surface and a plurality of first holders 12. As seen in FIG. 2, the plurality of first holders 12 are arranged along a first edge 14 of the first member 10. Similar to the first member 10, the second member 20 has a front surface and a plurality of second holders 22 that are arranged along a second edge 24 of the second member 20.

[0027] As specifically seen in FIG. 2, the first member 10 or the second member 20 includes plurality of first holders 12 or second holder 22 respectively. In FIG. 2 a single first member 10 (or second member 20) is shown, however, for the ease of understanding said member would be explained considering the upper portion of said member as the first member 10 and lower part as the

second member 20. The said arrangement is considered for the purpose of explaining the features of the fixture 100, further, as the first member 10 and second member are assembled in stacked manner on top of each other (as seen in FIG. 1) said assumption will be useful for briefing the invention. The first member 10 and the second member 20 are arranged such that the first edge 14 and the second edge 24 are attachable to each other such that the plurality of first holder 12 and plurality of second holders 22 are aligned with each other.

[0028] For the attaching the first member 10 to the second member 20 attachments means 30 are provided in the fixture 100. Attachment means 30 according to the embodiment of the present invention can be seen in FIG. 3 and 4. The attachment means 30 of the fixture 100 allows a removable attachment of the first edge 14 of the first member 10 to the second edge 24 of the second member 20. As indicated earlier, the removable attachment is made in a position in which the front surfaces of the first member 10 and the second member 20 are in alignment with each other such that the respective first holder 12 is opposite to a respective associated second holder 22 so as to form a holding portion 40 configured to hold the element 200 (as seen in FIG. 6 and 7). The attachment means 30 as shown in FIG. 3, may be in a form of a pin or stub that may be provided on the first member 10 and may be configured to be attachable to a suitable hole or a socket in the second member 20. Alternatively, as shown in FIG. 4, the attachment means can include a lever that can be attached the corresponding member and may be bolted or screwed. The alignment member 30 are configured to align the respective first member 10 and the second member 20 so that the first holder 12 and the corresponding second holder 22 are aligned with each other to form the holding portion 40.

[0029] In an embodiment of the present invention as seen in FIG. 3 and 4, the first holder 12 may be formed as a holder in the first member 10 and the second holder 22 is a holder formed in the second member 20. Further, the profile of the each first holder 12 has a cross section that defines a semi-circle, further, each second holder 22 has a cross-section that defines a semi-circle. The said profile of the respective first holder 10 and second holder 20 when aligned together may form a circular profile. This may be specifically done to the elements 200 aimed to be coated and to be held in the fixture 100 may have a circular cross section with a diameter corresponding to the diameter of the holes defined by each pair of first holder 12 and second holders 22. According to the embodiments of the present invention, each first holder 12 has the same maximum width as the second holder 22 to which it is associated. Further, the maximum width of each first holder 12 and the second holder 22 to which it is associated is located at the interface between the two holding portions 40. In alternate embodiments the different profiles may be formed to accommodate elements of different shapes and sizes.

[0030] The fixture may further comprise a holder ele-

ment 30' on which the first members 10 and second members 20 can be stacked. The stacking arrangement using the holder element 30' can be seen in FIG. 3. As seen in said FIG. 3, the second member 20 is arranged on top of the first member 10. In the embodiment shown the holder member comprises a lever and holder mechanism on which the first member 10 and the second member 20 are attached may be using a bolting arrangement or a screwing arrangement. Other methods of attaching the first member 10 and the second member 20 to the holder element 30' can also be used such a clipping, or a snap fit mechanism.

[0031] In an embodiment of the present invention as shown in FIG. 5, the fixture 100 may further comprise a sealing element 50 that extends around an inner periphery of each holding portion 40. The sealing element 50 may be provided prevent the ingress of the coating material inside the fixture and subsequently prevent the contamination of other surfaces of the element 200 that needs to be coated. Further, the first member 10 and second member 20 may be constituted by a first material. Said material may be metallic or may be any material that can be configured to hold the element in position.

[0032] The fixture 100 further comprises a masking member 60 applied onto and covering the front surface of the respective first member 10 and second member 20. The masking member 60 may be provided to enable easy cleaning of the fixture 100. For said purpose the masking member 60 may be attached in a removable manner. As shown in FIG. 5, the masking member 60 may be snap fitted on to the first member 10 and the second member 20. However, other fixing methods can be used to attach the masking member 60. Further, the masking member 60 has openings of corresponding shape, size and position as the holding portions 40 that is formed by said first holders 12 and second holders 22. The masking member 60 is constituted by a second material having higher abrasion resistance than the first material. The material of the masking member 60 may choose to prevent the coating material from sticking on to the masking member 60 during coating operation.

[0033] The masking member 60 comprises a first part having profile corresponding to the first holders 12 of the first member 10 and to a second part having profile corresponding to the second holders 22 of the second member 20. The masking member 60 may be attached to the front surface of the first member 10 and to the front surface of the second member 20.

[0034] In an embodiment as shown in FIG. 2 and 7, the first member 10 of the fixture 100 comprises a first part 16 and a second part 18, connected to each other and arranged at a distance from each other. Further, the first part 16 and second part 18 may be arranged in parallel with each other and may have a corresponding shape, size and position. As shown in the FIG. 2 and 7, said first edge 14 of the first member 10 may be formed by a first edge 14 of the first part 16 and a corresponding first edge 14 of the second part 18 of the first member

10, and each holder 12 may be provided with a sealing element 50 on its inner periphery as discussed earlier.

[0035] Similarly, the second member 20 may comprise a first part 26 and a second part 28, arranged at a distance from each other, and in parallel with each other. The first part 26 and a second part 28, may have a corresponding shape, size and position. Further, said second edge 24 of the second member 20 may be formed by a second edge 24 of the first part 26 and a corresponding second edge 24 of the second part 28 of the second member 20. Each holder 22 may be provided, with a sealing element 50 on its inner periphery. FIG. 8A to FIG. 9C, shows various sealing elements 50 according to the embodiments of the present invention. Specifically FIG. 9A shows the sealing of the holding portion 40 using said sealing elements 50.

[0036] In an embodiment of the present invention as shown in FIG. 12, the portion of area masked using the masking sheet 60" may be reduced to cover minimum surface of the fixture 100. In said embodiments the lateral surfaces of the element 200 to be coated would be protected by pairs of half shell like structures. Further, the masking element 60" of the embodiment may be designed as a continuous structure.

[0037] In an exemplary embodiment, the element 200 to be coated may be a capacitors such as film capacitors that are made of turns of polypropylene film wrapped around a mandrel giving a cylindrical shape to the capacitor. In said capacitor the electrodes may need to be metalized in a process known as Schoopage process, where the projecting ends of the electrodes are covered with a liquefied contact metal (such as tin, zinc or aluminium), which may be sprayed with compressed air on both lateral ends of the winding. For coating the terminals of said capacitor the fixture 100 of the present invention and its embodiments may be used. For coating, the capacitor may be placed in the holding portion 40 of the fixture 100 that may be formed between the first holder 12 and the second holder 22. As discussed previously, the shape and size of the first holder 12, second holder 22 and subsequently the holding portion 40 may be designed according to the capacitor profile. Further, it may be understood that the different components having different shapes and size that need to be coated and have a similar coating requirements can also be coated using the fixture 100 of the present invention without deviating from the scope of the invention.

[0038] In an embodiment of the present invention, an arrangement for coating of elements 200, in particular cylindrical capacitor elements is envisioned. The arrangement comprises a fixture 100 according to the embodiments of the present invention as discussed earlier. Further the arrangement may comprise a device configured to grip a first member 10 and place the first member 10 in a first position with its first edge 14 directed upwards. The device may further pick elements that needs to be coated and place them in a respective first holder 12 of the first member 10 (as shown in FIG. 6). The device may

then grip the second member 20 and place the second member 20 on top of the first members 10 such that the first holder 12 and second holders 22 form said holding portions 40, in which said elements 200 are positioned. The arrangement may be done such that an end of each element 200 is exposed by the holding portions 40 formed by the first holders 12 and second holders 22 in the front surface of the first member 10 and second members 20. The arrangement may further comprise a coating device configured to apply a metallic coat onto said ends of said elements from a position opposite to said front surfaces. For arranging the first member and the second member the device may be guided using the attachment means 30 and the holding element 30' as discussed earlier.

[0039] The arrangement according to the embodiment of the invention, further comprises a device for cleaning the rails, in particular for cleaning the front surfaces of the masking members that have been subjected to coating during the coating operation. For performing the cleaning operation the device may be configured to grip the second member 20 and move it to a cleaning position in the cleaning device, to pick and remove coated elements positioned in the first holder 12 of the first member 10, and thereafter move the first member 10 to a cleaning position in the cleaning device.

[0040] In a method of coating elements according to an embodiment of the present invention the element can be coated with a metallic coat. The coating method may comprise the steps of positioning a first member 10 of a fixture 100 according to the embodiments of the present invention with its first edge 14 pointing upwards. Afterwards, positioning elements 200 to be coated in said holders, one in each first holder. The profile of the element and the holders may be same so as to enable easy positioning and efficiency. Further, the method includes positioning the second member 20 on top of the first member, with the second edge 24 turned towards the first edge, and with each second holder 22 opposed to a respective first holder, such that the elements are sealingly held in holes defined by the pairs of opposed first and second holders. The method then includes the step of coating, by means of a coating device, an end of the elements that is exposed by said holes. The purpose of the said method and previously discussed arrangement is to coat the end surface of the coating element preventing any contamination of the other surfaces.

[0041] The method further comprises for the purpose of cleaning the fixture the steps of removing the second member 20 from the first member, and removing each element 200 from the first holder 12 in which is positioned. The then includes the step of cleaning front surfaces of the rails or mask sheets that have been subjected to coating during the coating of said elements. The said embodiments of the present invention are thus able to provide an efficient and automated coating of end surfaces of elements while preventing coating material from being applied on side surfaces of said elements during the coating operation

[0042] The above are only the embodiments of the present invention, and do not limit the patent scope of the present invention. Any equivalent structure or equivalent process transformation made by using the description and drawings of the present invention, or directly or indirectly applied to other related technical fields are included in the scope of patent protection of the present invention in the same way.

Claims

1. A fixture (100) for holding elements (200) during coating operation thereof, said fixture (100) comprising:

a first member (10), having a front surface and a plurality of first holders (12), arranged along an first edge (14) of the first member (10);

a second member (20), having a front surface and a plurality of second holders (22), arranged along a second edge (24) of the second member (20); and

attachment means (30) for removable attachment of the first edge (14) of the first member (10) to the second edge (24) of the second member (20) in a position in which the front surfaces of the first member (10) and the second member (20) are in alignment with each other, and in which each respective first holder (12) is opposite to a respective associated second holder (22) so as to form an holding portion (40) configured to hold the element (200).

2. The fixture (100) according to claim 1, wherein each first holder (12) has the same maximum width as the second holder (22) to which it is associated and the maximum width of each first holder (12) and the second holder (22) to which it is associated is located at the interface between the two holding portions (40).
3. The fixture (100) according to claim 1, comprising a sealing element (50) extending around an inner periphery of each holding portion (40).
4. The fixture (100) according to any of the claim 1 to 3, wherein the first member (10) and second member (20) are constituted by a first material, wherein said fixture (100) comprises a masking member (60) applied onto and covering the front surface of the respective first member (10) and second member (20), wherein the masking member (60) has openings of corresponding shape, size and position as the holding portions (40) formed by said first holders (12) and second holders (22), wherein the masking member (60) is constituted by a second material having higher abrasion resistance than the first material.

5. The fixture (100) according to claim 4, wherein the masking member (60) comprises a first part having profile corresponding to the first holders (12) of the first member (10) and attached to the front surface of the first member (10), and a second part having profile corresponding to the second holders (22) of the second member (20) and attached to the front surface of the second member (20). 5
6. The fixture (100) according to claim 5, wherein the first member (10) comprises a first part (16) and a second part (18), connected to each other and arranged at a distance from each other, in parallel with each other and having a corresponding shape and having first holders (12) of corresponding shape, size and position, said first edge (14) of the first member (10) being formed by a first edge (14) of the first part and a corresponding first edge (14) of the second part of the first member, and each holder being provided with a sealing element (50) on its inner periphery. 10
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7. The fixture (100) according to claim 5 or 6, wherein the second member (20) comprises a first part (26) and a second part (28), arranged at a distance from each other, in parallel with each other and having a corresponding shape and having second holders of corresponding shape, size and position, said second edge (24) of the second member (20) being formed by a second edge (24) of the first part and a corresponding second edge (24) of the second part of the second member, and each holder being provided, and each holder being provided with a sealing element (200) on its inner periphery. 25
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8. The fixture (100) according to any preceding claims, wherein each first holder (12) has a cross section that defines a semi-circle, and wherein each second holder (22) has a cross-section that defines a semi-circle, and that the elements (200) aimed to be coated and to be held in the fixture (100) has a circular cross section with a diameter corresponding to the diameter of the holes defined by each pair of first holder (12) and second holders (22). 35
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9. The fixture (100) according to any of claims 1-8, comprising a holder element (30') on which the first member (10) and second member (20) are stacked, wherein the second member (20) is arranged on top of the first member (10). 45
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10. The fixture (100) according to any preceding claims, wherein the first holder (12) is a holder in the first member (10) and the second holder (22) is a holder in the second member (20). 55
11. An arrangement (300) for coating of elements (200), in particular cylindrical capacitor elements, wherein

said arrangement (300) comprises

a fixture (100) according to any one of claims 1-10;

a device configured to grip a first member (10) and place the first member (10) in a first position with its first edge (14) directed upwards, picking elements to be coated and placing them in a respective first holder (12) of the first member (10), grip the second member (20) and place the second member (20) on top of the first members (10) such that the first holder (12) and second holders (22) form said holding portions (40), in which said elements (200) are positioned, such that an end of each element (200) is exposed by the holding portions (40) formed by the first holders (12) and second holders (22) in the front surface of the first member (10) and second members (20); and

a coating device configured to apply a metallic coat onto said ends of said elements from a position opposite to said front surfaces.

12. The arrangement (300) according to claim 11, further comprising a device for cleaning the rails, wherein the device is configured to grip the second member (20) and move it to a cleaning position in the cleaning device, to pick and remove coated elements positioned in the first holder (12) of the first member (10), and thereafter move the first member (10) to a cleaning position in the cleaning device.

13. A method of coating elements, comprising the steps of:

positioning a first member (10) of a fixture (100) according to any of claims 1-10 with its first edge (14) pointing upwards;
positioning elements (200) to be coated in said holders (12), one in each first holder (12);
positioning the second member (20) on top of the first member, with the second edge (24) turned towards the first edge, and with each second holder (22) opposed to a respective first holder, such that the elements are sealingly held in holes defined by the pairs of opposed first and second holders; and
coating by means of a coating device, an end of the elements that is exposed by said holes.

14. The method according to claim 13, further comprising the steps of:

removing the second member (20) from the first member; and
removing each element (200) from the first holder (12) in which it is positioned.

15. The method according to claim 14, further comprising the step of cleaning front surfaces of the rails or mask sheets that have been subjected to coating during the coating of said elements.

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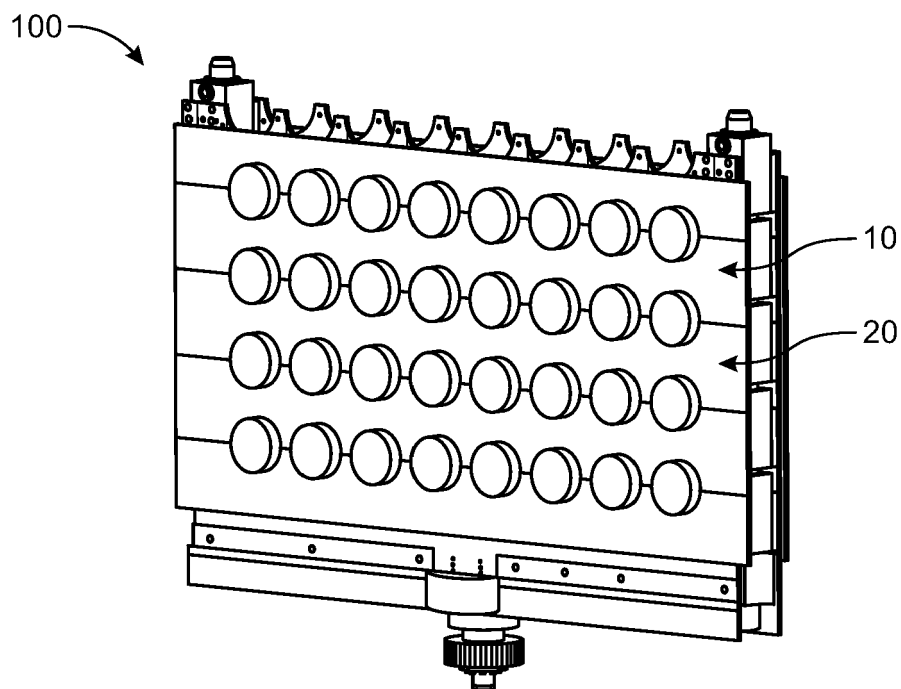


FIG. 1

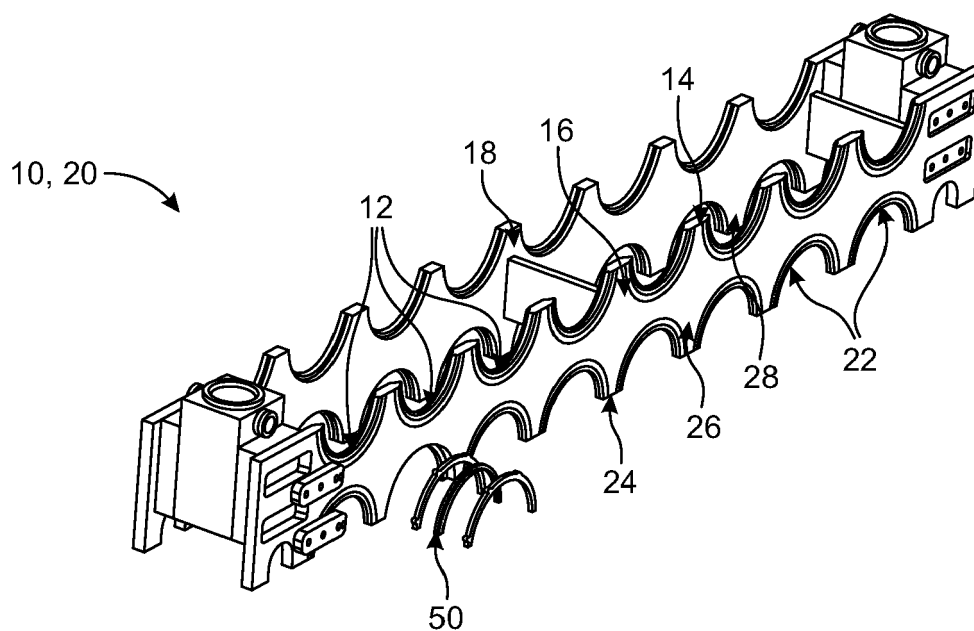


FIG. 2

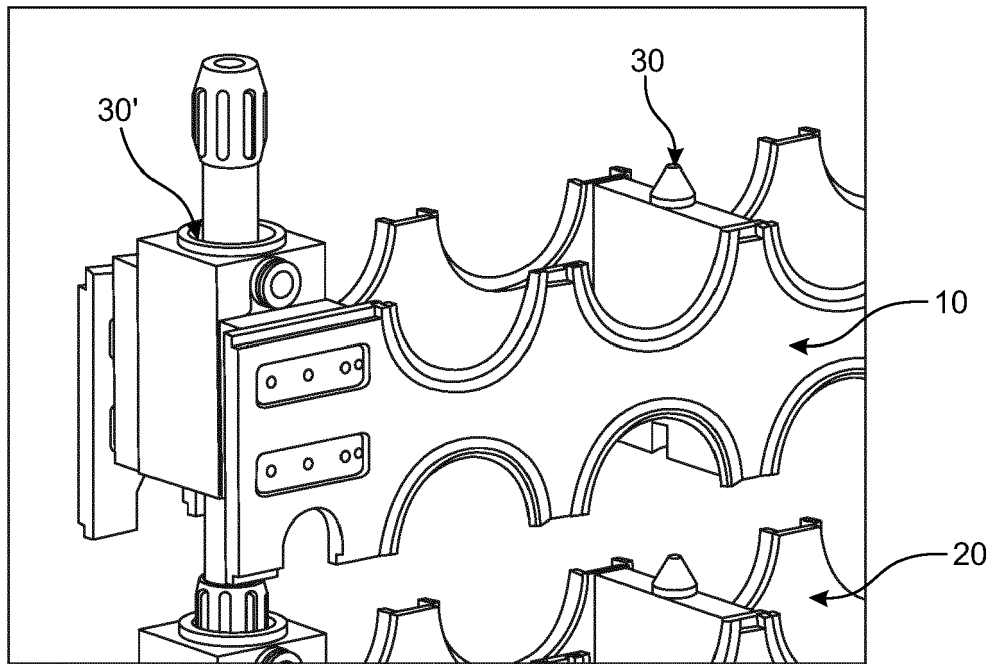


FIG. 3

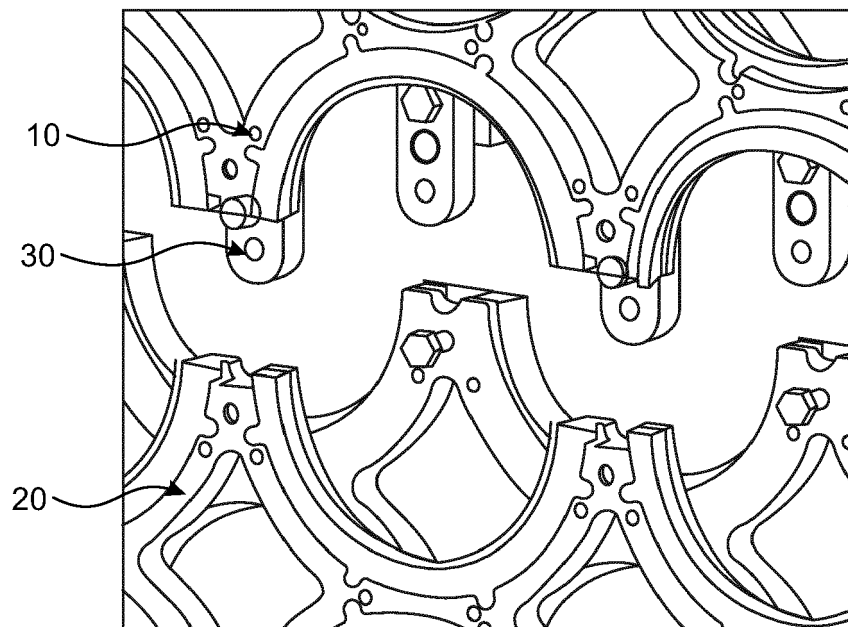


FIG. 4

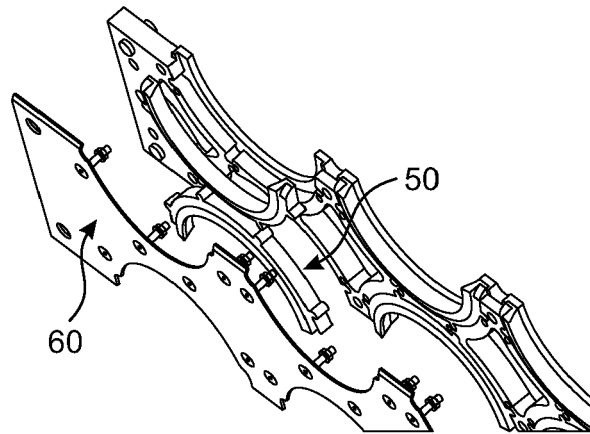


FIG. 5

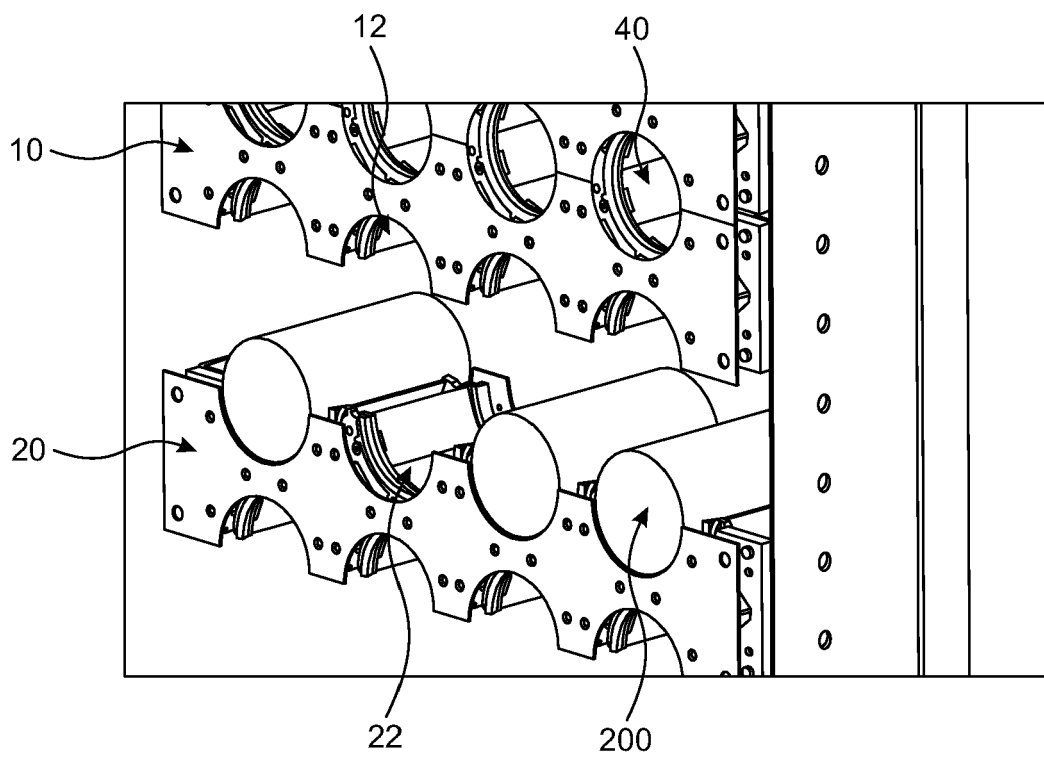


FIG. 6

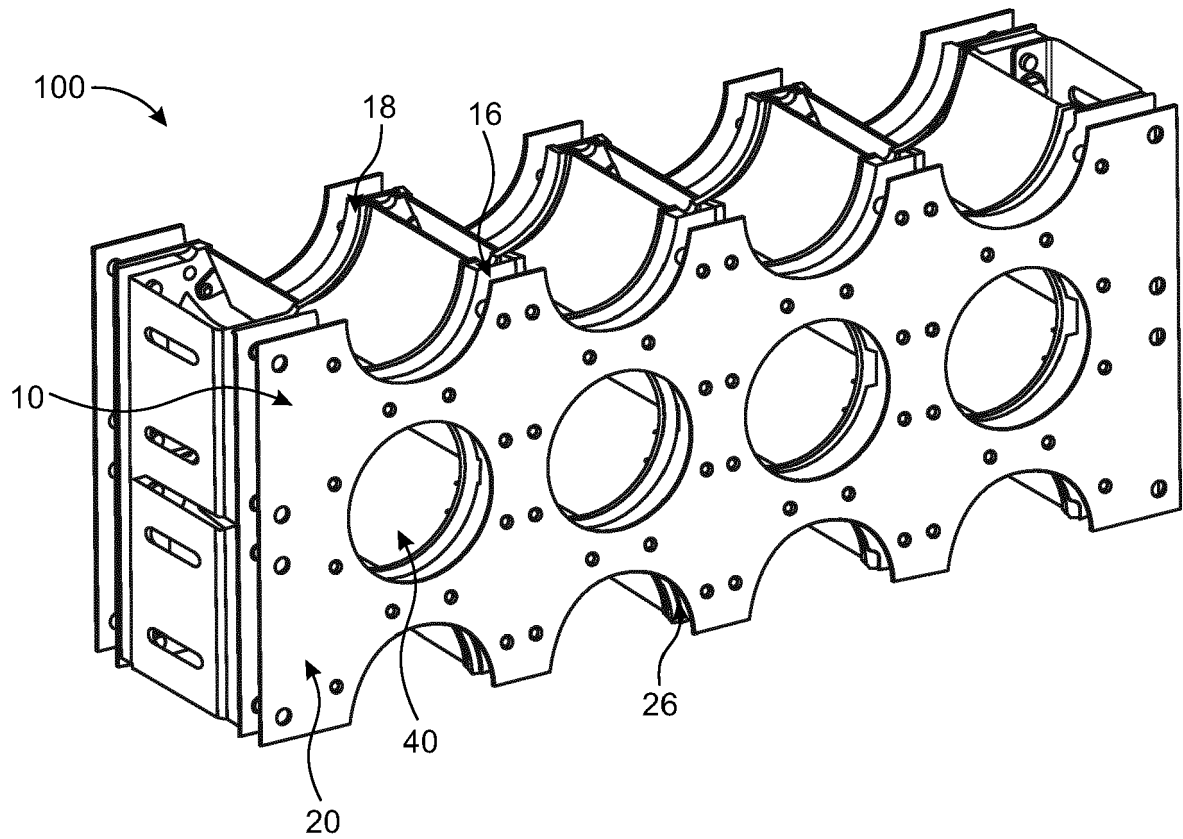


FIG. 7

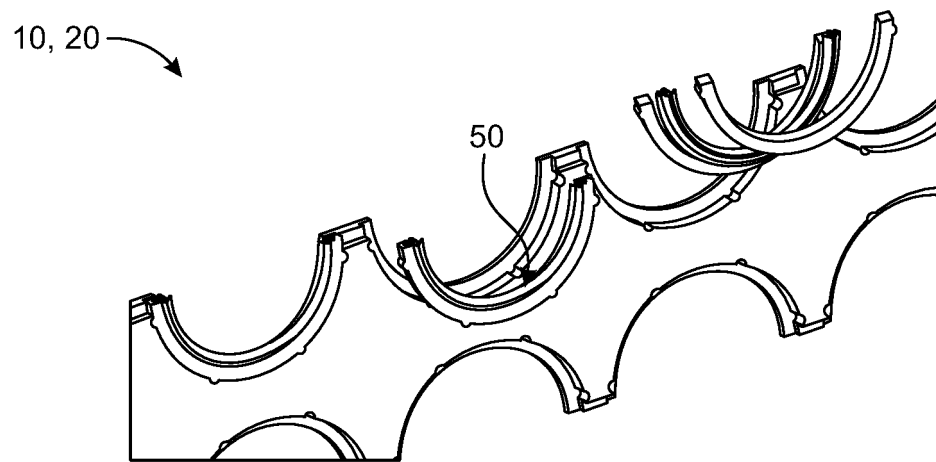


FIG. 8A

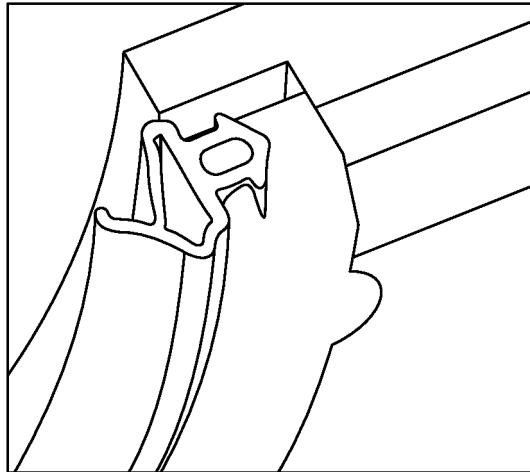


FIG. 8B

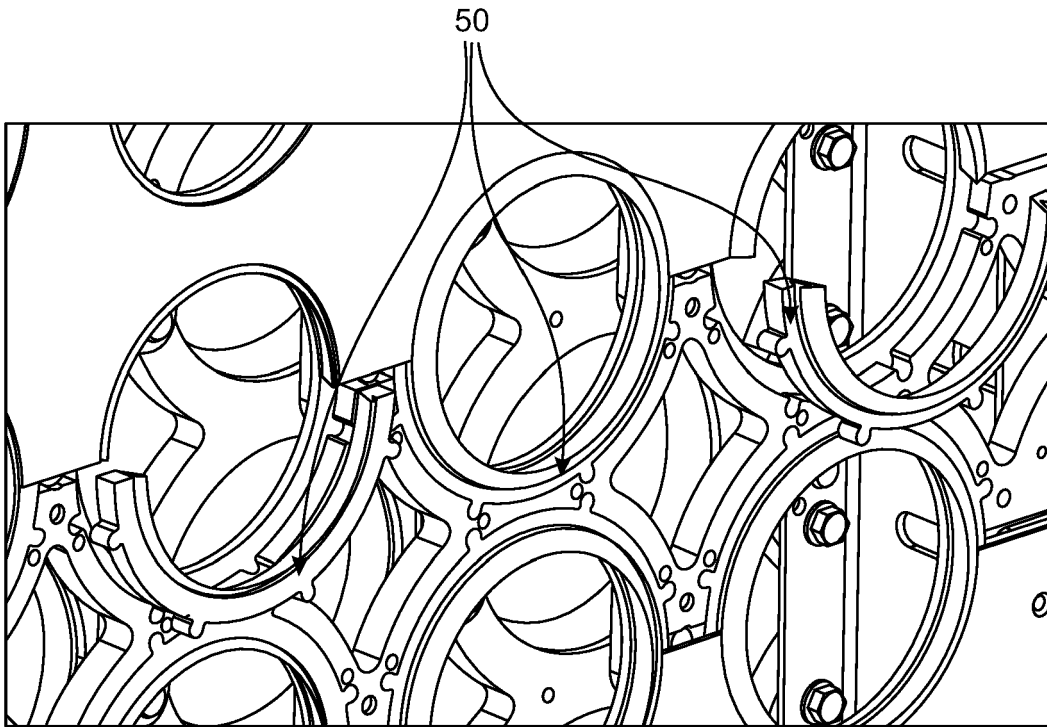


FIG. 9A

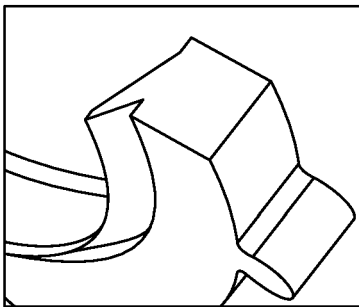


FIG. 9B

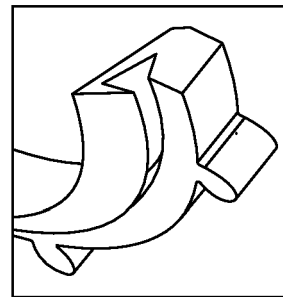


FIG. 9C

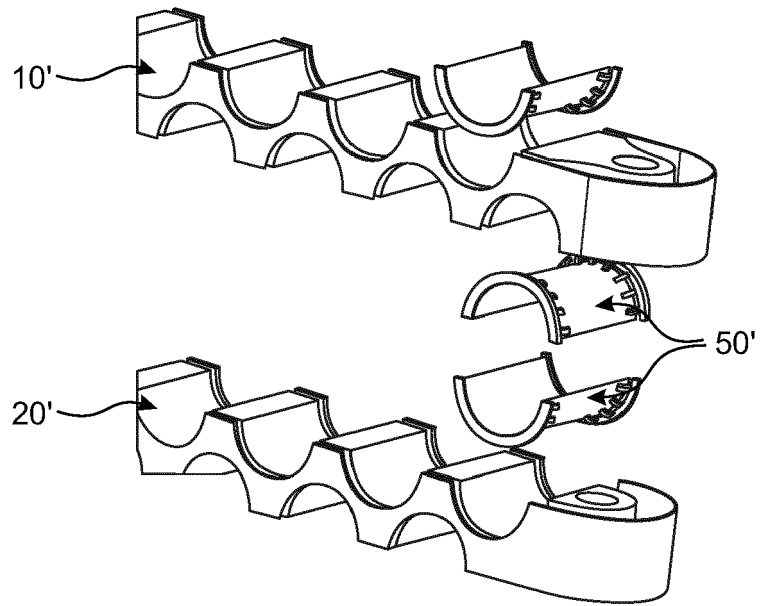


FIG. 10

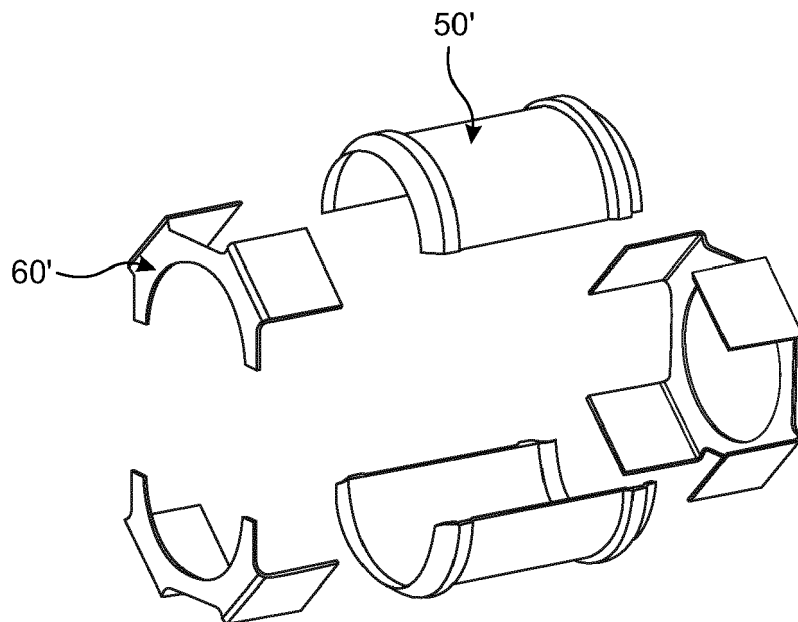


FIG. 10A

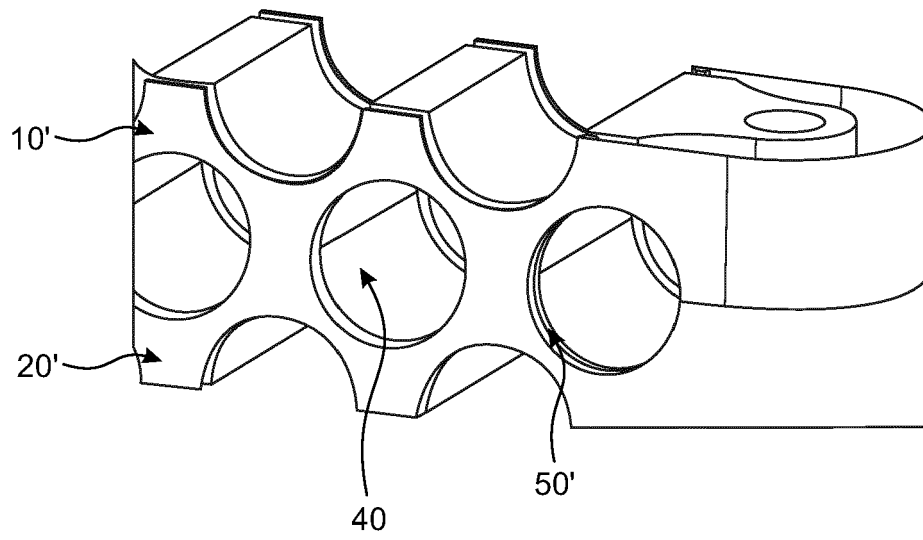


FIG. 11

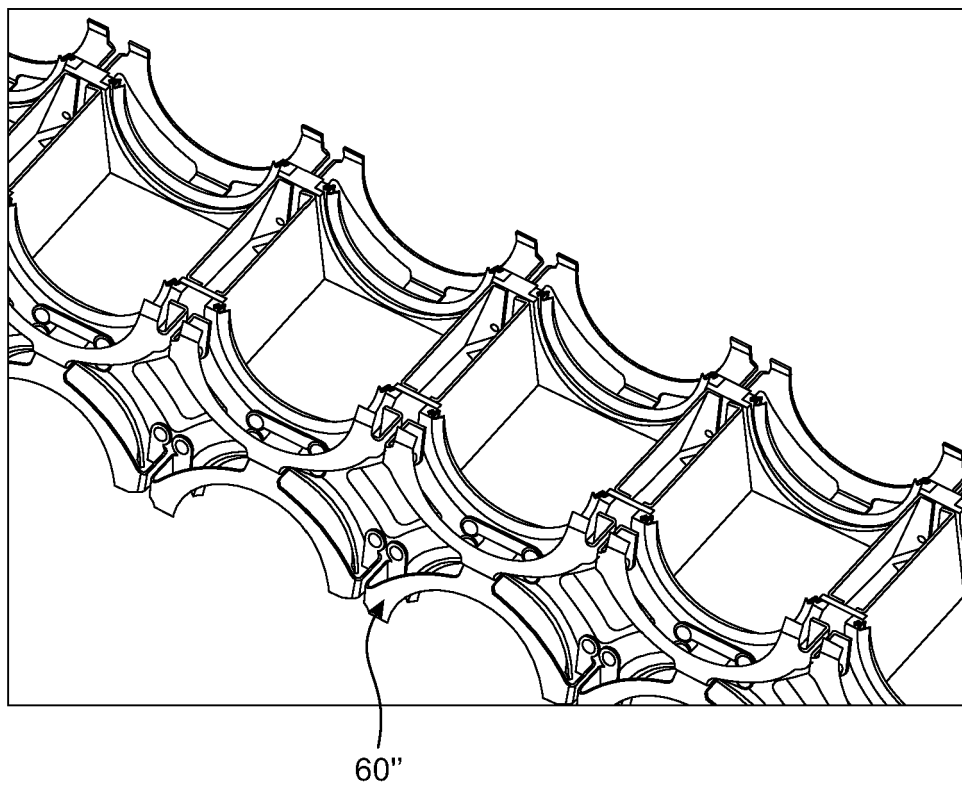


FIG. 12



EUROPEAN SEARCH REPORT

Application Number

EP 23 16 7834

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 257 308 A (COTTOM JOSEPH C) 21 June 1966 (1966-06-21) * the whole document *	1-4, 11-15 5-7	INV. B05B13/02 B05B12/20
A	-----		
X	US 2008/302300 A1 (LEE JUNG GUL [KR]) 11 December 2008 (2008-12-11) * the whole document *	1	
X	GB 2 059 905 A (QURAISHI A H) 29 April 1981 (1981-04-29) * the whole document *	1, 2, 8-10	
X	DE 10 2018 108002 A1 (LESYK GMBH [DE]) 10 October 2019 (2019-10-10) * figures 6, 11 *	1, 2, 4, 11-15 5-7	
A	-----		
X	FR 2 639 524 A1 (RHENANE SA [FR]) 1 June 1990 (1990-06-01) * the whole document *	1, 2, 8-10	

			TECHNICAL FIELDS SEARCHED (IPC)
			B05B C25D B05C C23C B65D B65G F16L A47B
The present search report has been drawn up for all claims			

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EPO FORM 1503 03.82 (P04C01)

Place of search	Date of completion of the search	Examiner
Munich	28 September 2023	Gineste, Bertrand
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

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ON EUROPEAN PATENT APPLICATION NO.**

EP 23 16 7834

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-09-2023

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3257308 A	21-06-1966	NONE	
US 2008302300 A1	11-12-2008	CN 101319298 A	10-12-2008
		JP 4744561 B2	10-08-2011
		JP 2008303463 A	18-12-2008
		KR 100770667 B1	29-10-2007
		US 2008302300 A1	11-12-2008
GB 2059905 A	29-04-1981	NONE	
DE 102018108002 A1	10-10-2019	NONE	
FR 2639524 A1	01-06-1990	NONE	

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45

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