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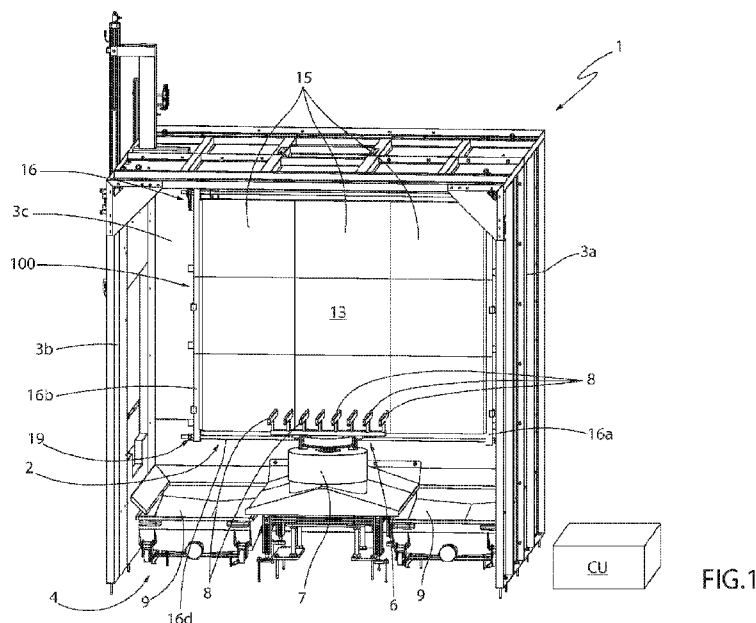
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(54) Title: PANEL FOR A GLAZING BOOTH



(57) Abstract: Panel (100) for a glazing booth (1) comprising: a frame (12); a main body (13) fixed to the frame (12) and comprising an at least partially porous resin; a draining system (11) provided with at least one draining channel (14) which extend inside the main body (13) so as to define at least one draining path; at least one fluid inlet (10) which is configured to feed at least one cleaning fluid to the main body (13) and is in fluid communication with the draining channel (14) so as to allow the cleaning fluid to be drained along said at least one draining path.

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**"PANEL FOR A GLAZING BOOTH"**CROSS-REFERENCE TO RELATED APPLICATIONS

This Patent Application claims priority from Italian  
5 Patent Application No. 102023000011922 filed on June 12,  
2023, the entire disclosure of which is incorporated herein  
by reference.

FIELD OF THE ART

The present invention is in the field of the manufacture  
10 of ceramic articles, in particular sanitary ware items made  
of ceramic material.

BACKGROUND OF THE INVENTION

In the field of the manufacture of ceramic articles, in  
particular sanitary ware items consisting of ceramic  
15 material, such as for example WCs, washbasins etc., ceramic  
articles are known to be manufactured using pressure casting  
systems. The articles thus formed are then dried, subjected  
to surface treatments adapted to give the articles themselves  
the desired aesthetic and/or mechanical and/or functional  
20 properties and finally fired to obtain the final products.  
Among surface treatments, one of the most important and  
expensive in terms of time and cost is certainly glazing,  
which consists of applying a layer of glaze on the already  
formed articles.

25 To date, glazing operations are generally carried out  
by airless spraying in special glazing booths.

The known glazing booths comprise: at least three  
stainless steel walls arranged so as to delimit a glazing  
chamber; a support, preferably rotary, so as to support the  
30 articles to be subjected to glazing; and a glaze dispensing  
system which is configured to dispense glaze jets under

pressure onto the article (or, when there are several supports, on the plurality of articles) to be treated so as to coat the article (or the articles) with as uniform a layer of glaze as possible. In detail, the dispensing system  
5 generally comprises at least one dispensing head, in particular an airbrush, for dispensing glaze jets at high pressure towards the article to be treated. Generally, the dispensing unit dispenses the jets remaining at a certain distance from the article to be treated, in particular at  
10 least 5 cm, in order to ensure an accurate application of the glaze, while avoiding the risk of damage to the article.

It is evident that during this process at least a part of the glaze sprayed towards the article to be treated does not reach the article itself or does not adhere to it and is  
15 instead dispersed in the glazing chamber. This phenomenon is known by the definition of *overspray* and involves wasting about 50% of the glaze dispensed by the dispensing system for each glazing cycle, which instead of ending up on the article to be treated ends up on the walls of the glazing  
20 booth, soiling them. This phenomenon, therefore, in addition to entailing economic losses directly linked to the waste of part of the glaze, also causes an accumulation of the excess glaze on the walls of the glazing chamber. This accumulation of glaze, if it is not removed quickly, is likely to harden  
25 on the walls themselves, making the activity of cleaning the booth difficult, which will take a long time with a consequent drop in productivity.

To date, in fact, the glazing booths are subjected to cleaning operations carried out manually by an operator who,  
30 between one glazing cycle and another, or at least once a day, enters the glazing booth and removes the excess glaze

from the walls of the glazing booth, for example by means of scrapers. These cleaning operations involve stopping the machine for a certain period with a consequent drop in productivity. In particular, it has been observed that these operations can lead to machine downtimes of the order of hours.

Therefore, in addition to the costs related to labor, these cleaning operations also involve economic losses linked to machine downtime periods.

All the disadvantages in terms of safety and precision intrinsically linked to manual work must be added to these economic disadvantages.

Aim of the present invention is to provide a panel for a glazing booth, a glazing booth comprising such a panel and a glazing method, which allow to overcome at least partly the disadvantages of the prior art.

#### SUMMARY

In accordance with the present invention there is proposed a panel for a glazing booth, a glazing booth comprising such a panel and a glazing method, as claimed in the appended independent claims, and preferably, in any one of the claims directly or indirectly dependent on the mentioned independent claims.

The claims describe preferred embodiments of the present invention forming an integral part of the present disclosure.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings, which show some non-limiting examples of embodiments, wherein:

- Figure 1 represents a perspective view of a glazing

booth, in accordance with a first embodiment of the present invention;

- Figure 2 represents a perspective view of a glazing booth in accordance with a further embodiment of the present invention;

- Figures 3 and 4 represent a perspective view of a panel made in accordance with two different embodiments of the present invention;

- Figure 5 is a side sectional view of the panel of Figure 4; and

- Figure 6 is a schematic and side view of the panel of Figure 4 in which some parts have been sectioned to better display some elements.

#### DETAILED DESCRIPTION

In the attached figures, number 1 denotes as a whole a glazing booth for glazing ceramic articles. In particular, the present invention finds advantageous but not exclusive application in the field of the manufacture of sanitary ware items made of ceramic material, such as for example WCs, bidets, washbasins, etc.

Advantageously, the glazing booth comprises a glazing chamber 2 and at least three walls 3 which laterally delimit the glazing chamber 2.

According to some advantageous but non-limiting embodiments, such as, for example, the one shown in Figure 1, the glazing booth 1 comprises: two side walls 3a, 3b facing each other, a rear wall 3c which extend between the two side walls 3a, 3b orthogonally to said side walls 3a, 3b, and a front opening 4 so as to allow placing the article to be treated inside the glazing chamber 2.

Alternatively or additionally, according to some

advantageous but non-limiting embodiments, such as for example the one shown in Figure 2, the glazing booth 1 comprises a first side wall 3a, a further side wall 3b, parallel and facing the side wall 3a, a rear wall 3c which extend between the two side walls 3a, 3b orthogonally to said side walls 3a, 3b; and a front wall (not shown in Figure 2 to allow a better view of the interior of the glazing booth 1) which is parallel and facing the rear wall 3c. Advantageously but not in a limiting manner, the first side wall 3a is a rotary wall and carries a support rod 5 that crosses the wall 3a so that a cantilevered portion 5a of said rod 5 projects from a first side of the wall 3a and a further cantilevered portion 5b projects from a second side of the wall 3a, which is opposite the first side. Even more advantageously, the wall 3a can rotate about a vertical axis Z so that alternatively either the cantilevered portion 5a or the further cantilevered portion 5b extends inside the glazing booth 2 (see Figure 2).

The presence of a side wall 3a thus made allows the articles to be treated to be inserted into the glazing chamber 2 or the articles to be extracted from the glazing chamber 2, once glazed, more quickly and efficiently. In fact, as will be better explained below, in this configuration each cantilevered portion 5a, 5b of the rod 5 carries a support 6a, 6b. Therefore, by turning the wall 3a one can alternatively move one of the two supports 6a or 6b in the glazing chamber 2, allowing, at the same time, to operate on the other support 6a or 6b (which is not inside the glazing chamber 2) by unloading an already glazed article or by loading a new article to be treated.

In detail, advantageously but not in a limiting manner,

the glazing booth 1 also comprises at least one support 6, 6a, 6b so as to receive and support at least one article to be treated, for example a sanitary article made of ceramic material, inside the glazing chamber 2; and a glaze dispensing system (not visible in the attached figures and known per se) which is configured to dispense glaze jets under pressure inside the glazing chamber 2, in particular nebulized glaze jets at a pressure ranging from about 1 bar to about 5 bar, so that at least one layer of glaze adheres to the article to be treated.

In this discussion, "glaze" means a material comprising (in particular consisting of) a water-based suspension of mineral raw materials including clays, kaolins, feldspars, quartz, and molten oxides.

According to some advantageous but non-limiting embodiments, the glaze dispensing system comprises a support structure, for example a robotic arm, advantageously but not in a limiting manner movable in the glazing chamber 2 and a dispensing unit carried by the support structure and provided with a plurality of nozzles for dispensing glaze jets under pressure, in particular at a pressure (of the so-called fan air) ranging from about 1.5 bar to about 6 bar towards the article to be treated. Even more advantageously, the dispensing system is configured to dispense said glaze jets under pressure at a distance from the article to be treated of at least about 5 cm. This ensures that at least one layer of glaze adheres to the article to be treated avoiding.

According to still other advantageous but non-limiting embodiments, the dispensing system comprises a pump configured to feed glaze towards the dispensing unit; in particular, to feed a glaze flow rate ranging from about 500

g/min to about 3000 g/min towards the dispensing unit. Said dispensing unit, advantageously but not in a limiting manner, comprises a plurality of nozzles which are configured to nebulize the glaze before dispensing it into the glazing chamber 2 so that it can deposit on the article to be treated placed inside the glazing chamber 2.

Advantageously but not in a limiting manner, the support 6, 6a, 6b is comb-shaped. In other words, the support 6, 6a, 6b comprises a plurality of teeth 8 which are parallel and equidistant from each other so as to allow the insertion of a fork gripping device (in particular, the insertion of the forks of the fork gripping device) between such teeth 8 for releasing or gripping the article to be treated onto or from the support 6, 6a, 6b. It is understood that according to other embodiments not shown, the support 6, 6a, 6b could be a slab or in any case could have any other shape suitable for supporting the articles to be treated during glazing.

According to some advantageous but non-limiting embodiments, such as for example the one shown in Figure 1, the support 6 is carried by a rotary platform 7 which is placed in the centre of the glazing chamber 2.

Alternatively or additionally, (as already mentioned above) according to some non-limiting embodiments, when at least one wall 3a of the glazing booth 1 can rotate and has a rod 5 as described above with reference to Figure 2, a support 6a is fixed to the cantilevered portion 5a of the rod 5 and the other cantilevered portion 5b carries a further support 6b, which is similar to the first, so that, by turning the wall 3a, alternatively one of said supports 6a, 6b is inside the glazing chamber 2 so as to allow the article supported by it to be glazed.

Advantageously but not in a limiting manner, the glazing booth 1 further comprises at least one collecting tank 9 which is arranged at the bottom of the glazing chamber 2 to collect excess glaze.

5 In accordance with the present invention, at least one of the walls 3 of the glazing booth 1 comprises (in particular, consists of) a panel 100 made in accordance with a further aspect of the present invention which concerns precisely a panel 100 configured so as to be able to be  
10 mounted in a glazing booth 1.

Advantageously but not in a limiting manner, in this case, at least the rear wall 3c of the glazing booth 1 comprises (in particular, consists of) such a panel 100 made in accordance with the aforementioned further aspect of the  
15 present invention (see for example Figures 1 and 2).

Alternatively or in combination, more advantageously but not in a limiting manner when the glazing booth 1 provides at least one rotary wall 3 (as described above with reference to the wall 3a of the embodiment described in  
20 Figure 2), at least such rotary wall 3a comprises (in particular, consists of) such a panel 100.

It is understood that according to other advantageous but non-limiting embodiments each of the walls 3 of the glazing booth 1 could comprise (in particular, could consist  
25 of) such a panel 100.

From the following description it will be clear that the greater the number of walls 3 of the glazing booth 1 comprising (in particular, consisting of) panels 100, the easier it will be to clean the glazing booth 1 and the fewer  
30 the manual interventions that will have to be carried out for the maintenance and cleaning of said glazing booth 1. In

fact, it will be clear from the continuation of the present discussion that the panel 100 made according to the further aspect of the present invention is configured to automatically allow the removal of the excess glaze adhered on the panel 100 itself during the various glazing cycles.

To this end, advantageously, the panel 100 comprises a main body 13 made of porous material (in particular, of resin), is provided with at least one inlet 10 of a cleaning fluid and with a draining system 11 configured to allow, advantageously but not in a limiting manner by gravity, at least such cleaning fluid to be drained together with the excess glaze removed (precisely by the action of the cleaning fluid) from the panel 100 (in particular, from the main body 13 of the panel 100) itself. Furthermore, advantageously, in this case (i.e. when the glazing booth provides at least one panel 100), the glazing booth 1 also comprises a feeding system (not visible in the attached figures and known per se) in fluid connection with the aforementioned at least one fluid inlet 10 of the panel 100 (or, when several fluid inlets 10 are provided, with each of them) in order to feed at least one cleaning fluid under pressure through said fluid inlet 10.

According to some advantageous but non-limiting embodiments, the feeding system comprises a pump connected to the panel 100, by means of at least one duct that leads into the at least one fluid inlet 10, or at least is in fluid connection with the fluid inlet 10, so as to allow at least one cleaning fluid to be introduced into the main body 13 of the panel 100.

With particular reference to Figures 3 to 6, in accordance with this further aspect of the present invention,

advantageously, the panel 100 comprises: the aforementioned draining system 11 and the aforementioned fluid inlet 10; a frame 12, a main body 13 which is fixed to the frame 12 and comprises (in particular, is made of) an at least partially porous resin.

Advantageously, the draining system 11 comprises, in turn, at least one draining channel 14 which extends inside the main body 13 so as to define at least one draining path; and the aforementioned fluid inlet 10 is configured to feed the cleaning fluid to the main body 13 and is in fluid communication with the aforementioned at least one draining channel 14 so as to allow the cleaning fluid to be drained together with the excess glaze removed by (in particular, thanks to the action of) such cleaning fluid along the aforementioned draining path (as will be better explained below).

Advantageously but not in a limiting manner, the panel 100 further comprises at least one further fluid inlet 10, more in particular a plurality of fluid inlets; for example, in the attached Figures from 3 to 6 three fluid inlets 10 on one side of the panel 100 and three fluid inlets 10 on the other side of the panel 100. In detail, this further fluid inlet 10 (or each of these further fluid inlets) is advantageously configured to feed a further cleaning fluid to the main body 13 and is in fluid communication with the aforementioned draining channel 14.

In detail, according to some advantageous but non-limiting embodiments, said further cleaning fluid is different from the aforementioned cleaning fluid.

According to other embodiments, the further cleaning fluid coincides (in particular, is similar to) the

aforementioned cleaning fluid.

More in detail, according to some advantageous but non-limiting embodiments, the cleaning fluid or the further cleaning fluid comprises (in particular, consists of) water.

5 Alternatively or in combination, advantageously but not in a limiting manner, the cleaning fluid or the further cleaning fluid comprises (in particular, consists of) from ambient air.

According to some advantageous but non-limiting  
10 embodiments, the feeding system of the glazing booth 1 is configured to alternatively feed the cleaning fluid comprising (in particular, consisting of) water and the cleaning fluid comprising (in particular, consisting of) air to the inlet 10, in particular to each of said inlets 10.

15 Alternatively, advantageously but not in a limiting manner, when several fluid inlets 10 are provided, the feeding system is configured to feed one of the aforementioned cleaning fluids (for example the one comprising - in particular consisting of - water) to some  
20 fluid inlets 10 and the other (for example the one comprising - in particular consisting of - air) to other fluid inlets 10.

With particular reference to the attached Figures 5 and 6, advantageously but not in a limiting manner, the draining  
25 channel 14 crosses the main body 13.

More advantageously, according to some advantageous but non-limiting embodiments (such as, for example, those shown in Figures 5 and 6), the draining channel 14 crosses the main body 13 and comprises (in particular, is made of) a  
30 plurality of draining branches 14' which extend inside the main body 13 itself and cross it so as to define a plurality

of draining paths. More advantageously but not in a limiting manner, such draining branches 14' are at least partly fluidically connected to one another so as to realize a draining network (or a single branched channel).

5           Advantageously, the draining channel 14 (and, therefore, when each of the branches 14' of said draining channel 13 is also provided) is made in the main body 13 of the panel 100, for example by removing material (in particular, it is obtained by engraving the main body 13 of  
10 the panel 100). More advantageously but not in a limiting manner, the draining channel 14 is made of the aforementioned resin including (in particular, forming) the main body 13 of the panel 100. In other words, the draining channel 14 (and, therefore, when also each of the draining branches 14' is  
15 provided) extends through the resin forming said main body 13.

Advantageously but not necessarily, said draining channel 14 (in particular, each of the different branches 14' of the draining channel) has an equivalent diameter of  
20 at least about 2mm; in particular, ranging from about 2mm (more in particular, from about 8mm) up to about 20mm.

This advantageously allows forming inside the main body 13 a draining volume such as to allow the correct draining of the cleaning fluid (or of the cleaning fluids) once the  
25 excess glaze adhered to the main body 13 of the panel 100 has been removed (i.e. washed away).

In the present text, by diameter of the draining channel 14 or of the branches 14' of the draining channel is meant the diameter of a circle having the same area as the (cross)  
30 section of the draining channel 14 or of each draining branch 14', even if this does not have a circular section.

In particular, the draining channel 14 (with all its possible draining branches 14') is made of the aforementioned resin (in other words, it extends through the resin).

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned at least partially porous resin forming it) has a (total open) porosity of at least 10%, in particular up to 50% (more in particular, up to 28%) by volume, with respect to the total volume of the main body 13.

The porosity is measured with mercury porosimetry with a Pascal 140/240 Thermo Fisher Scientific Porosimeter (following the instructions attached to it). The principles and the operation of the mercury porosimetry are well known and are for example described in: *Mercury Porosimetry: a General (Practical) Overview*, Part. Part. Syst. Charact. 23 (2006) 1-11, Herbert Giesche, DOI: 10.1002/ppsc.200601009; *Characterization of Porous Solids and Powders: Surface Area, Pore Size and Density*, S. Lowell, Joan E. Shields, Martin A. Thomas e Matthias Thommes, Kluwer Academic Publishers 2004, ISBN 1-4020-2302-2 (HB), ISBN 1-4020-2302-0 (e-book). In particular, porosity is measured according to the provisions of ISO standard 15901-1:2016.

Total open porosity is the porosity measured by considering open pores (and not closed pores), i.e. the pores that are accessible by a fluid (ISO 15901-1:2016).

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin that is included therein, i.e. which forms said main body 13) has a bending breaking load of at least 7 MPa (in particular, of at least about 30 MPa), more precisely up to 42 MPa (in particular, up to about 35 MPa).

The bending breaking load is measured according to the provisions of DIN regulation 53452:1977.

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin that is included  
5 therein, i.e. which forms said main body 13) has a tensile breaking load of at least about 3 Mpa up to about 30 Mpa; more in particular, from at least about 5 MPa to about 30 Mpa.

The tensile breaking load is measured according to the  
10 provisions of DIN regulation 53455-1981.

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin which is included therein, i.e. which forms said main body 13) has pores with a median diameter from 0.5 (in particular, from about 5  $\mu\text{m}$ )  
15 to 80  $\mu\text{m}$  (in particular, to about 15 $\mu\text{m}$ ).

Unless otherwise specified, in the present text, by diameter of a pore is meant the limiting diameter, i.e. the diameter of a circle having the same area as the smaller (cross) section of the pore.

20 The median pore diameter is measured with mercury porosimetry with a Pascal 140/240 Thermo Fisher Scientific Porosimeter (following the instructions attached to it). The principles and operation of mercury porosimetry are well known. In particular, the median pore diameter is measured  
25 according to the provisions of ISO standard 15901-1:2016.

Note that by median diameter is meant the diameter corresponding to the fiftieth percentile of the pore volume, i.e. the diameter for which half of the pore volume is in the largest pores and half of the pore volume is in the  
30 smallest pores (ISO 15901-1:2016, in particular paragraph 3.16).

Advantageously but not necessarily, the main body 13 of the panel 100 (in particular, the aforementioned resin included therein; more in particular, the resin forming said main body 13) has a flexural elastic modulus (measured according to the provisions of DIN regulation 53457) from about 440 MPa to about 2100 MPa.

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin included therein; more in particular, the resin forming it) has a tensile elastic modulus (measured according to the provisions of DIN regulation 53457) from about 570 MPa to about 2100 MPa.

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin included therein; more in particular, the resin forming said main body 13) has a compressive breaking load (measured according to the provisions of DIN regulation 53454) from about 11 MPa to about 130 MPa.

Advantageously but not necessarily, the main body 13 (in particular, the aforementioned resin included therein; more in particular, the resin forming said main body 13) has a compression elastic modulus (measured according to the provisions of DIN regulation 53457) from about 300 MPa to about 1700 MPa.

Advantageously but not necessarily, the main body 13 comprises (in particular, is) a resin selected from the group consisting of: acrylic resins, polyester resins, polyurethane resins, epoxy resins and a combination thereof. In other words, the at least partially porous resin of the main body 13 is a resin selected from the group consisting of: acrylic resins, polyester resins, polyurethane resins, epoxy resins and a combination thereof.

According to what is commonly known, acrylic resins are obtained by the polymerization of acrylic and/or methacrylic monomers, mainly acrylic acid and acrylic or methacrylic esters.

5        According to some advantageous but non-limiting embodiments, such as for example the one shown in Figure 4, the main body 13 comprises (in particular, is made of) a plurality of modules 15 which comprise (in particular, are made of) the above-described at least partially porous resin,  
10        and are connected to one another and/or to the frame 12. In detail, advantageously but not in a limiting manner, in this case (i.e. when the main body 13 comprises - is made of - a plurality of modules 15) such modules 15 are arranged like a matrix. In other words, such modules 15 are arranged in  
15        multiple rows or side-by-side columns and are held in place by the frame 12.

      According to some advantageous but non-limiting embodiments, the frame 12 is shaped to wrap the main body 13 (i.e., when provided, the various modules 15 including- in  
20        particular forming- the main body 13).

      According to some advantageous but non-limiting embodiments such as those shown, the frame 12 comprises two parallel and opposite uprights 16a, 16b connected to one another laterally to the main body 13. Advantageously but  
25        not in a limiting manner, these uprights 16a and 16b, extend along a first direction A1 (which, in use - i.e. when the panel 100 is mounted on the glazing booth 1 - is substantially vertical). Even more advantageously but not in a limiting manner, the uprights 16a, 16b are configured to  
30        carry at least one upper rod 16c which extend between the two uprights 16a, 16b transversely (i.e. perpendicularly)

thereto and a lower rod 16d parallel and facing the upper rod 16c. Advantageously but not in a limiting manner, the glazing booth 1 comprises housings 19 so as to receive such rods 16c and 16d during installation (i.e. mounting) of the panel 100 in the glazing booth 1 (see for example Figures 1 and 2).

According to some advantageous but non-limiting embodiments (such as, for example, those shown in the attached figures), the fluid inlet 10 (i.e. each fluid inlet 10) is fixed (i.e. is obtained directly) in the uprights 16a, 16b (see for example the embodiments of the attached figures).

Advantageously but not in a limiting manner, the main body 13 has two main dimensions which extend, respectively, along the aforementioned direction A1 and along a direction A2, substantially perpendicular to the direction A1, and at least one further dimension, which is smaller than the other two dimensions, which extend along a further direction A3, orthogonal to the directions A1 and A2. More in particular, the direction A3 extends orthogonally to the plane defined by the directions A1 and A2 (see for example Figures 3 and 4). In other words, the panel 100 has a plate-like shape.

According to some advantageous but non-limiting embodiments, such as for example those represented in Figures 5 and 6, the draining branches 14' develop inside the main body 13 substantially parallel to each other and along the direction A2 and at least some of these draining branches 14' are hydraulically connected to one another. According to an alternative embodiment not shown, said draining branches 14' could always develop parallel to each other along the direction A1.

Advantageously, when the draining branches 14' develop in the plane defined by the directions A1 and A2, a panel 100 is obtained, with the same draining volume, which is lighter than a corresponding panel 100 having draining  
5 branches 14' that develop along the direction A3, with consequent advantages in terms of costs.

More advantageously but not in a limiting manner, in these cases (i.e. when the draining is a longitudinal draining, in particular when the draining system 11 develops  
10 in the plane defined by the directions A1 and A2), the draining system 11 also comprises a plurality of pipes 17 which extend inside the draining branches 14' (see in particular, Figures 5 and 6). More advantageously but not in a limiting manner, in this case, the draining branches 14'  
15 and the pipes 17 are mutually sized so that between them a draining volume remains defined inside which the aforementioned draining paths develop. More advantageously but not in a limiting manner, the pipes 17 have an equivalent diameter of about 10÷15 mm while the draining branches 14'  
20 have an equivalent diameter of about 2÷20 mm. This advantageously allows to reduce the draining volume for the same area covered by the draining system 11, thus allowing the use of a smaller amount of cleaning fluid.

Advantageously but not in a limiting manner, such pipes  
25 17 also guarantee greater stability in the connection between the various modules 15 including (in particular, forming) the main body 13.

Advantageously but not in a limiting manner, when the main body 13 is subdivided into modules 15 as described  
30 above, at least the draining branches 14' extending inside modules 15 that are placed side by side and in succession

with each other are in fluid connection to each other, and the draining system 11 also comprises connectors 18 so as to connect the pipes 17 that are arranged inside the draining branches 14' extending through modules 15 that are side by side and in succession with each other. More advantageously but not in a limiting manner, such connectors 18 are fluid-tight connectors.

According to some advantageous but non-limiting embodiments, the aforementioned pipes 17 are made of PVC. It is understood that such pipes could also be made of other plastic materials, or of metal.

Alternatively or in combination, according to some advantageous but non-limiting and non-shown embodiments, the draining branches 14' of the draining channel 14 extend along the direction A3, i.e. transversely to the main body 13, all parallel to each other.

In this case, advantageously but not in a limiting manner, the panel 100 comprises a waterproof slab, preferably but not in a limiting manner made of metallic material, which is connected to the frame 12 and at least partly faces the main body 13 in order to receive the material drained from the draining system 11 and, advantageously but not in a limiting manner, convey it towards the collecting tank 9. In particular, in this case, each of these draining branches 14' extends from a front surface of the main body 13 (which in use is intended to face the inside of the glazing chamber 2) to a rear surface of the main body 13, which is parallel and opposite the front surface (which in use is intended to face the outside of the glazing chamber 2); and the waterproof slab is arranged at the back of the main body 13, on the side of the rear surface (in particular, facing the

rear surface) so as to collect the material drained through the draining path or the various draining paths.

Advantageously but not in a limiting manner, when the glazing booth 1 comprises a panel 100 having the draining branches 14' which extend along the direction A3 and the waterproof slab placed at the back of the main body 13, (the glazing booth 1 provides the aforementioned collecting tank 9 and) the collecting tank 9 extends at least partly under the panel 100 (in particular, at least at the waterproof slab) so that the material drained by the draining system 11 through the draining path or the various draining paths reaches said collecting tank 9.

It is understood that according to some advantageous but non-limiting embodiments not shown even when the branches 14' of the draining channel 14 extend longitudinally to the main body 13, i.e. along one of the directions A1 and A2, the panel 100 comprises a waterproof coating (not visible in the attached figures) and connected to the frame 1; in particular, advantageously but not in a limiting manner, such waterproof coating comprises (in particular is made of) a layer of waterproof material, for example a waterproof resin, placed facing (in particular, in contact with) the rear surface of the main body 13, i.e. with the surface which, in use, faces the outside of the glazing booth 1.

It is pointed out that, in this case, the panel 100 will exert its draining action only on one side.

In other cases, such as for example when one of the walls 3 of the glazing booth 1 is made as a rotary wall 3a described above and the panel 100 is including (in particular, forms) such a wall 3a, it is more advantageous to have the possibility of draining the cleaning fluid and

the glaze removed by it through both the rear and front surfaces of the main body 13, since when the wall 3a is rotated the two rear and front surfaces may alternatively face the inside of the glazing chamber 2.

5           Advantageously but not in a limiting manner, the glazing booth 1 further comprises a control unit CU configured to control the activation of at least the dispensing system and of the feeding system of the glazing booth 1. In particular, advantageously but not in a limiting manner, the control  
10   unit CU is configured to cause the activation of the feeding system for a defined feeding period, only once a defined amount of time has elapsed since the deactivation of the dispensing device so as to ensure that the cleaning fluid (and/or the further cleaning fluid, when provided) passing  
15   through the main body 13 succeeds in removing the excess glaze.

          In particular, advantageously but not in a limiting manner, the defined feeding period and the defined amount of time are adjustable based on the operation of the dispensing  
20   system and/or on the type of glaze dispensed and/or on the frequency with which the feeding system is activated with respect to the dispensing system and/or on the dimension of the main body 13.

          According to some advantageous but non-limiting  
25   embodiments, the control unit CU is configured to cause the activation of the feeding system to dispense the aforementioned cleaning fluid for a feeding period having a duration ranging from about 0.5 to about 3 minutes once an amount of time ranging from about 1 hour to about 3 hours  
30   has elapsed since the deactivation of the dispensing device.

          More in detail, according to some advantageous but non-

limiting embodiments, the control unit CU is configured to cause the activation of the feeding system every about 1-3 hours; more in particular, the control unit CU is configured to cause the activation of the feeding system so that each  
5 time this is activated it dispenses one of the aforementioned cleaning fluids, for example a cleaning fluid comprising (in particular, consisting of) water, for a feeding period ranging from about 0.5 to about 3 minutes and immediately afterwards it dispenses the further fluid of the  
10 aforementioned cleaning fluids, for example a cleaning fluid comprising (in particular, consisting of) air, for a feeding period ranging from about 0.5 to about 3 minutes

According to yet a last aspect of the present invention, a glazing method is presented, advantageously but not in a  
15 limiting manner implemented with a glazing booth 1 made in accordance with one of the embodiments described above.

In particular, advantageously, the glazing method comprises the following steps: providing a glazing booth 1, advantageously of the type described above or in any case  
20 comprising at least one glazing chamber 2 delimited by at least three walls 3 (advantageously but not in a limiting manner made in accordance with one of the embodiments described above), and a glaze dispensing system to dispense glaze jets under pressure inside the glazing chamber 2  
25 (advantageously but not in a limiting manner, as already described in relation to the glazing booth 1); and providing at least one article to be treated inside said glazing chamber 2.

Even more advantageously, during the first step of  
30 providing a glazing booth 1, a glazing booth 1 is provided which comprises (in particular, is made of) at least one

panel 100 made in accordance with one of the embodiments described above in detail and provided with a feeding system (advantageously made as described above and) configured to feed at least one cleaning fluid to the fluid inlet 10 or to the fluid inlets 10 of the panel 100.

Advantageously but not in a limiting manner, as described above in relation to the glazing booth 1, during the step of providing an article to be treated in the glazing chamber 2, the article to be treated will be arranged on a support 6, which is part of the glazing booth 1 and which advantageously but not in a limiting manner is of the type described above. Even more advantageously but not in a limiting manner, this step of providing the article to be treated is carried out by means of a gripping device, advantageously but not in a limiting manner (especially when the support is of the comb type) provided with a fork gripping member which is activated so as to place the article to be treated on the support 6 inside the glazing chamber 2, or, when the glazing booth 1 is provided with a rotary wall 3a, on the support 6 of the cantilevered portion 5a projecting externally of the glazing chamber 2, while inside the glazing chamber 2 a glazing cycle is performed (as will be better described below) so that the article to be treated is transferred inside the glazing chamber by rotating the wall 3a.

The glazing method further comprises the step of activating the dispensing system of the glazing booth 1 and dispensing at least one glaze jet under pressure on the article to be treated for a glazing cycle having a defined duration so that a layer of glaze adheres to the article to be treated and the excess glaze ends up at least partly on

the walls 3 of the glazing booth 1.

Advantageously, the glazing method in accordance with this further aspect of the present invention further provides: an automatic cleaning step, which is (at least  
5 partially) subsequent to the activation of the dispensing system, during which the aforementioned feeding system feeds a first cleaning fluid comprising (in particular, consisting of) water under pressure to the fluid inlet 10, or to the fluid inlets 10, for a first amount of time and/or at least  
10 one further cleaning fluid comprising (in particular, consisting of) air under pressure to the fluid inlet 10, or to the fluid inlets 10, for a second amount of time so as to remove the excess glaze present on the panel 100 and form a mixture comprising such excess glaze and at least one of the  
15 above-described cleaning fluids, said mixture is then drained through the aforementioned draining system 11; more advantageously through the aforementioned draining channel 14; even more advantageously through the various draining channels 14'.

Advantageously but not in a limiting manner, during  
20 this automatic cleaning step, the aforementioned feeding system feeds the first cleaning fluid and/or the second cleaning fluid at a pressure ranging from about 0.5 bar to about 4 bar. Alternatively or additionally, according to  
25 some advantageous but non-limiting embodiments, said first amount of time and/or the aforementioned second amount of time are/is ranging from about 0.5 to about 3 minutes.

Alternatively or additionally, advantageously but not in a limiting manner, the method further comprises an  
30 adjustment step, during which the duration of the aforementioned first amount of time and/or second amount of

time is adjusted based on the actual conditions of the panel 100 (in particular, on the amount of excess glaze actually present on the panel 100) and/or on the defined duration of the glazing cycle and/or on the composition of the glaze and/or on the position of the panel 100 with respect to the dispensing system and/or on the dimension of the panel 100, and/or on the time elapsed since the previous glazing step and/or since the previous cleaning step and/or on the frequency of execution of said adjustment step. Furthermore, according to some advantageous but non-limiting embodiments, in this adjustment step the duration of the aforementioned first amount of time and/or second amount of time is also adjusted so as to minimize the quantity of water used for the same result, i.e. the effectiveness of the automatic cleaning operation.

Advantageously but not in a limiting manner, when during the step of providing a glazing booth 1 a glazing booth 1 is provided comprising a collecting tank 9 (as described above in relation to the glazing booth 1), the above-described automatic cleaning step comprises a collection sub-step, during which the mixture consisting of the glaze removed from the panel 100 (in particular, from the main body 13 of the panel 100) and by at least one cleaning fluid drained through the draining system 11 (in particular, through the draining channel 14) reaches the collecting tank 9. In this case, advantageously but not in a limiting manner, the glazing method also comprises a recovery step, (at least partially subsequent to) the automatic cleaning step, during which the content of the collecting tank 9 is recovered and reintroduced into the dispensing system to perform a new glazing cycle.

According to some advantageous but non-limiting embodiments, this recovery step also provides for a preparation sub-step, during which the aforementioned mixture drained and contained in the collecting tank 9 is  
5 filtered and/or supplemented with water and/or solid aggregates in order to obtain a glaze having a density of at least about  $1400 \div 1700$  g/l.

The present invention has numerous advantages, including the following ones.

10 Thanks to the particular configuration of the panel 100, made of at least partially porous resin and having the aforementioned draining system 11, the present invention allows an automatic cleaning of at least part of the glazing booth 1 with consequent efficiency of the maintenance and  
15 restoration operations of the glazing chamber 1, a considerable reduction in machine downtime and maintenance operation costs.

In addition, the present invention also allows at least partial recovery of the glaze adhered on the walls of the  
20 glazing booth 1 in the various glazing cycles with consequent advantages in terms of costs and use of raw materials.

CLAIMS

1. A panel (100) for a glazing booth (1); said panel (100) comprises:

a frame (12);

5 a main body (13), which is fixed to the frame (12) and comprises (in particular, is made of) an at least partially porous resin;

a draining system (11) comprising, in turn, at least one draining channel (14), which extends inside said main  
10 body (13) so as to define at least one draining path;

a fluid inlet (10) to feed at least one cleaning fluid comprising (in particular, is made of) water to said main body (13), said fluid inlet (10) is in fluid communication with said at least one draining channel (14) so as to allow  
15 said cleaning fluid to be drained along said at least one draining path; and

at least one further fluid inlet (10) which is configured to feed a further cleaning fluid comprising (in particular, is made of) air to said main body (13) and is in  
20 fluid communication with said at least one draining channel (14) so as to allow said further cleaning fluid to be drained along said at least one draining path.

2. The panel (100) according to claim 1, wherein said draining channel (14) comprises (in particular, is made of)  
25 a plurality of draining branches (14') which extend inside the main body (13) so as to define a plurality of draining paths.

3. The panel (100) according to claim 2, wherein:

said main body (13) has two main dimensions which  
30 extend, respectively, along a first direction (A1) and a second direction (A2), and at least a third dimension, which

is smaller than the other two, which extends along a third direction (A3); and each of said draining branches (14') develops inside the main body (13) substantially parallel to said third direction (A3).

5           4. The panel (100) according to claim 3, comprising a waterproof slab which is connected to said frame (12) and at least partly faces said main body (13);

each of said draining branches (14') extending from a first surface of the main body (13) to a second surface of the main body (13), which is opposite the first surface; and  
10       said waterproof slab being arranged at the back of said main body (13), on the side of said second surface, so as to collect the material drained through said draining paths defined by said draining branches.

15           5. The panel (100) according to claim 2, wherein:

said main body (13) has two main dimensions which extend, respectively, along a first direction (A1) and a second direction (A2), and at least a third dimension, which is smaller than the other two, which extends along a third  
20       direction (A3); and each of said draining branches (14') develops inside the main body (13) substantially parallel to said first direction (A1) or to said second direction (A2).

6. The panel (100) according to claim 5, wherein:

said draining system (10) comprises a plurality of pipes  
25       (17) which extend into said draining branches (14') of said draining channel (14); and

said draining branches (14') and said pipes (17) are sized so that a draining volume remains defined between them; in particular, said pipes (17) have a diameter of about  
30       10÷15mm and said draining branches have a diameter of about 2÷20mm; and

said plurality of draining paths develops inside said draining volume.

7. The panel (100) according to claim 6, wherein:

said main body (13) comprises (in particular, is made  
5 of) a plurality of modules (15) which comprise (in particular, are made of) said at least partially porous resin, and are connected to one another and/or to said frame (12);

at least the draining branches (14') of said plurality  
10 of draining branches (14'), which extend inside modules (15) of said plurality of modules (15) that are side by side and in succession with each other, are in fluid connection to each other; and

said draining system (11) comprises connectors (18) to  
15 connect the pipes (17) of said plurality of pipes (17) that are arranged inside said draining branches (14') in fluid connection to each other.

8. A glazing booth (1) for glazing ceramic articles, in particular sanitary ware items made of ceramic material;  
20 said glazing booth (1) comprises:

a glazing chamber (2);

at least three walls (3) which laterally delimit said glazing chamber (2);

at least one support (6) to support at least one article  
25 to be treated;

a glaze dispensing system configured to dispense glaze jets under pressure, inside the glazing chamber (2) so that at least one layer of said glaze adheres to said at least one article to be treated;

30 the glazing booth (1) being **characterized in that:**

at least one of said walls (3) comprises (in particular,

consists of) a panel (100) made according to any one of claims 1 to 7 and **in that** it comprises a feeding system in fluid connection with said fluid inlet (10) and with said at least one further fluid inlet (10) of said panel (100) in order to feed at least one cleaning fluid under pressure through said at least one inlet (10) and at least one further cleaning fluid under pressure through said further fluid inlet (10).

9. The glazing booth (1) according to claim 8, comprising a collecting tank (9) which is arranged at the bottom of said glazing chamber (2); said collecting tank (9) at least partly extending under said at least one panel (100) so that the material drained by means of said draining system (11) through said at least one draining path reaches said collecting tank (9).

10. The glazing booth (1) according to claim 8 or 9, wherein:

at least a first wall (3a) of said at least three walls (3) is a rotary wall and carries a support rod (5) which has a first cantilevered portion (5a) projecting from a first side of said first wall (3a) and a second cantilevered portion (5b) projecting from a second side of said first wall (3a), which is opposite the first side;

said at least one support (6) is fixed to said first cantilevered portion (5a);

said second cantilevered portion (5b) carries a further support (6), which is similar to said at least one support (6);

said first wall (3a) can rotate so that alternatively either said first cantilevered portion (5a) or said second cantilevered portion (5b) extends inside said glazing booth

(1) in order to allow the article supported by the relative support (6) to be glazed.

11. The glazing booth (1) according to claim 10; wherein said at least one first wall (3a) comprises (in particular, consists of) a panel (100) made according to any one of  
5 claims 1 to 3, 5, 6 and 7.

12. The glazing booth (1) according to any one of claims 8 to 11, wherein: said feeding system is configured to alternatively feed a first cleaning fluid comprising (in particular, consisting of) water and a second cleaning fluid  
10 comprising (in particular, consisting of) air to said at least one fluid inlet (10) and to alternatively feed said first cleaning fluid and said cleaning fluid also to said at least one further fluid inlet (10).

13. The glazing booth (1) according to any one of claims 8 to 12, comprising a control unit (CU) configured to control the activation of at least said dispensing system and said feeding system; said control unit (CU) being configured to cause the activation of said feeding system for a defined  
15 feeding period, only once a defined amount of time has elapsed since the deactivation of said dispensing system;

said defined feeding period and said defined amount of time being adjustable based on the operation of the dispensing system.

14. A glazing method; comprising the following steps:  
25 providing a glazing booth (1) comprising, in turn, a glazing chamber (2) delimited by at least three walls (3) and a glaze dispensing system to dispense glaze jets under pressure into the glazing chamber (2);

30 providing at least one article to be treated inside said glazing chamber (2);

activating said dispensing system so as to dispense at least one glaze jet under pressure onto said article to be treated for a glazing cycle having a defined duration so that a layer of said glaze adheres to said at least one article to be treated and the excess glaze ends up at least partly on said walls (3) of the glazing booth (1);

the glazing method is **characterized in that**:

at least one of said walls (3) of the glazing booth (1) comprises (in particular, consists of) a panel (100) made according to any one of claims 1 to 8, and said glazing booth (1) comprises a feeding system configured to feed at least one cleaning fluid to said at least one fluid inlet (10) of said panel (100) and at least one further cleaning fluid to said further fluid inlet (10); and **in that** it comprises:

an automatic cleaning step, which is at least partially subsequent to the operation of said dispensing system, during which said feeding system feeds a first cleaning fluid comprising (in particular, consisting of) water under pressure to said at least one fluid inlet (10) for a first amount of time and/or at least a second cleaning fluid comprising (in particular, consisting of) air under pressure to said at least one fluid inlet (10) for a second amount of time so as to remove the excess glaze present on said panel (100) and form a mixture comprising said excess glaze and at least one of said first cleaning fluid and said second cleaning fluid, said mixture is drained by means of said draining system (11); and

an adjustment step, during which the duration of said first amount of time and/or said second amount of time is adjusted based on the actual conditions of the panel (100), and/or on said defined duration of said glazing cycle, and/or

on the composition of said glaze, and/or on the position of said panel relative to said dispensing system and/or on the time elapsed since the previous glazing step and/or since the previous cleaning step.

5           **15.** The glazing method according to claim 14 implemented with a glazing booth made according to any one of claims 9 to 13.

**16.** The glazing method according to claim 14 or 15, wherein:

10           during said step of providing a glazing booth (1), a glazing booth (1) is provided comprising a tank (9) arranged at the bottom of said glazing chamber (2) and at least partly extending under said at least one panel (100);

          said automatic cleaning step comprises a collection  
15 sub-step, during which said mixture drained through said draining system (11) reaches said collecting tank (9); and

          the glazing method comprises a recovery step, which is at least partially subsequent to said automatic cleaning step, during which the content of said collecting tank (9)  
20 is recovered and reintroduced into said dispensing system.

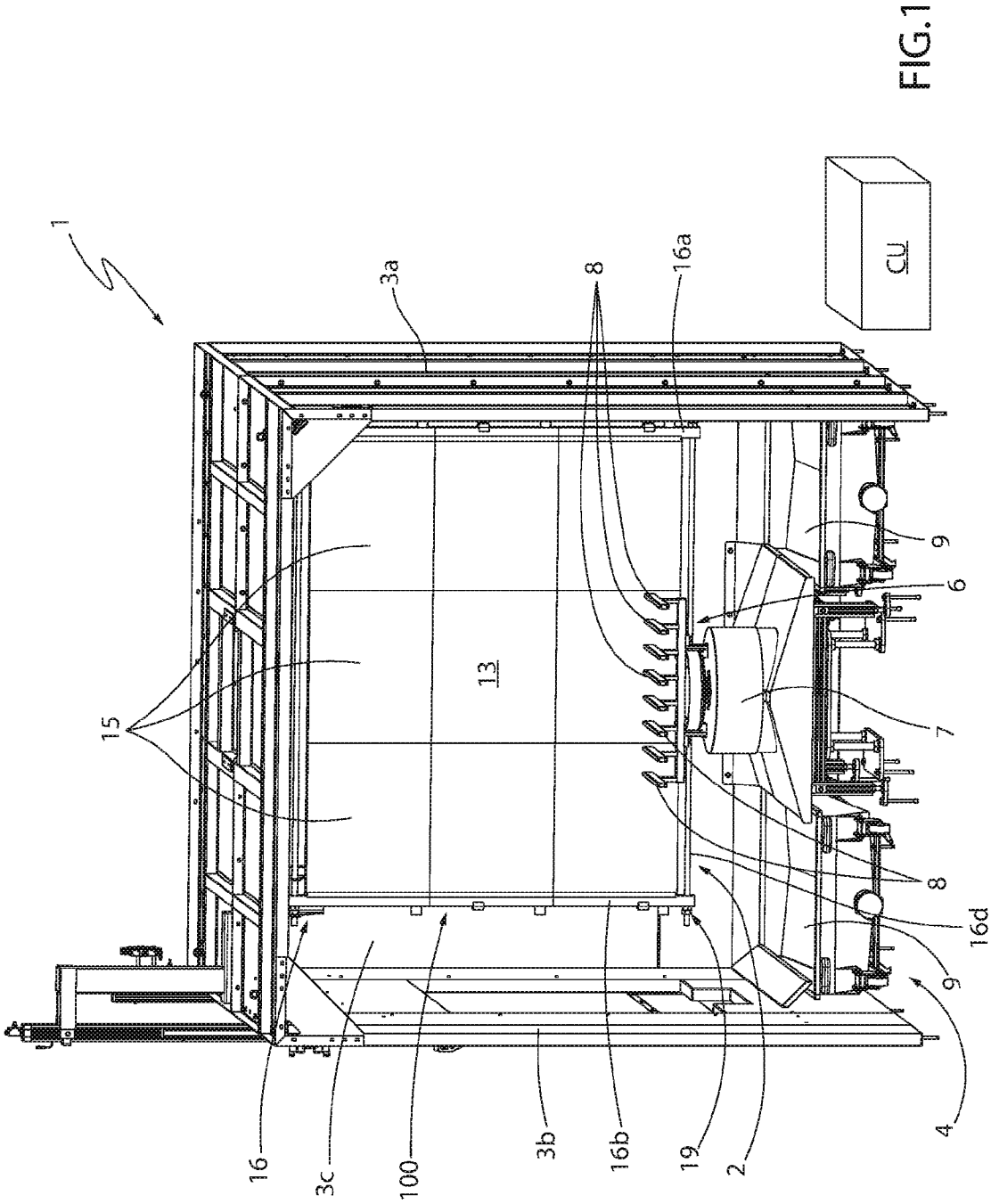
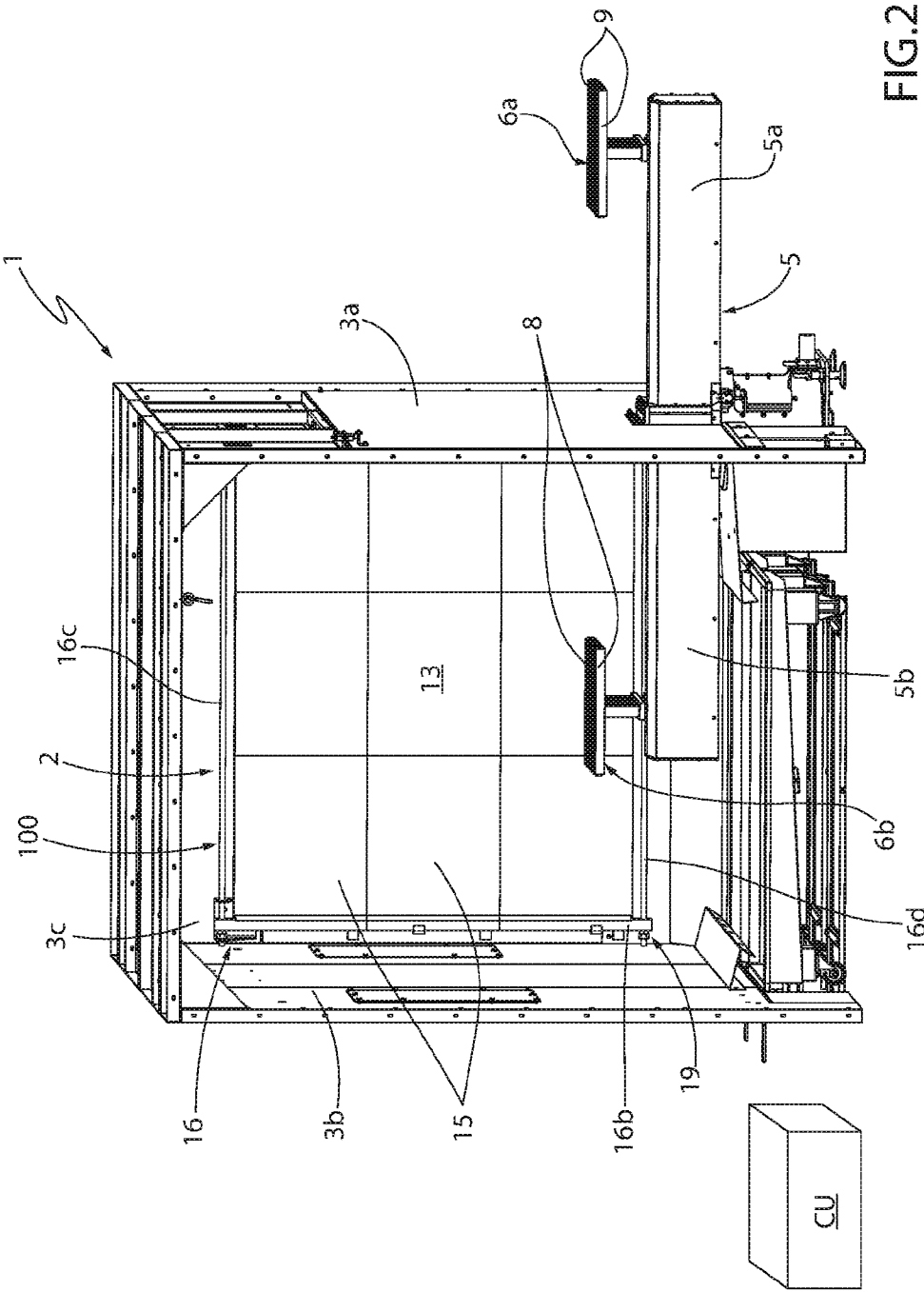
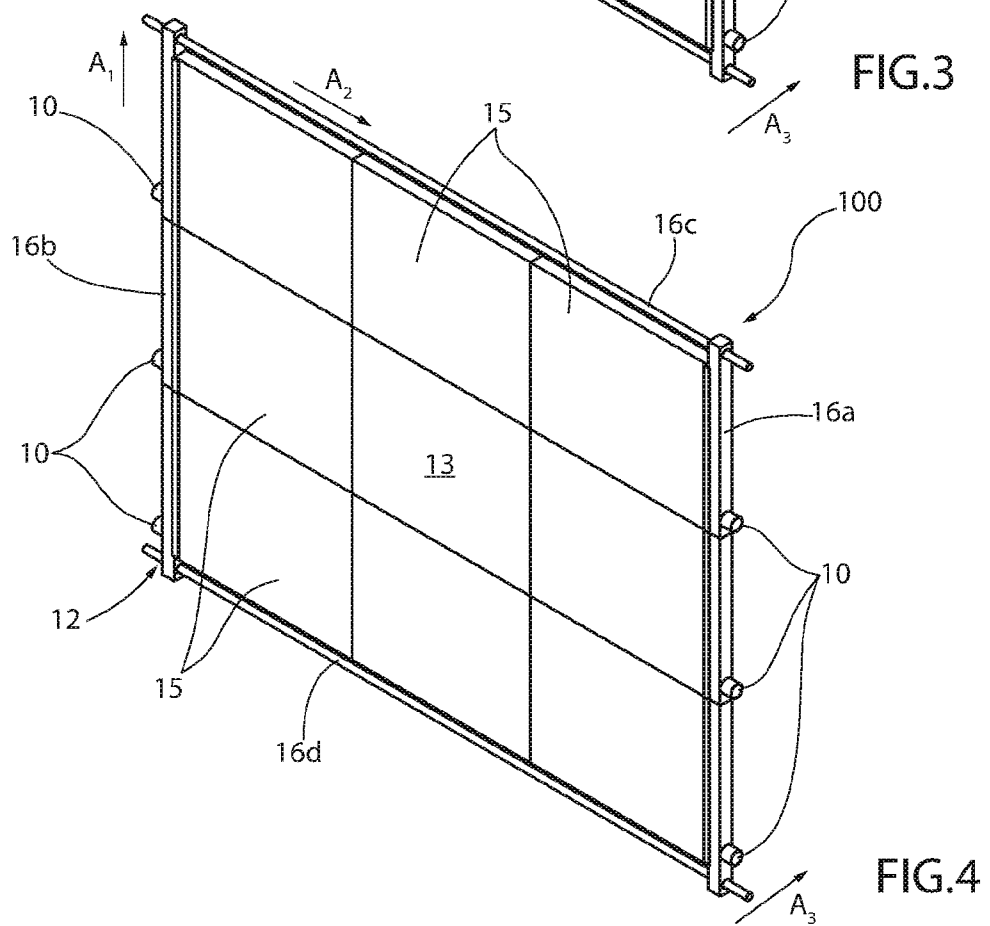
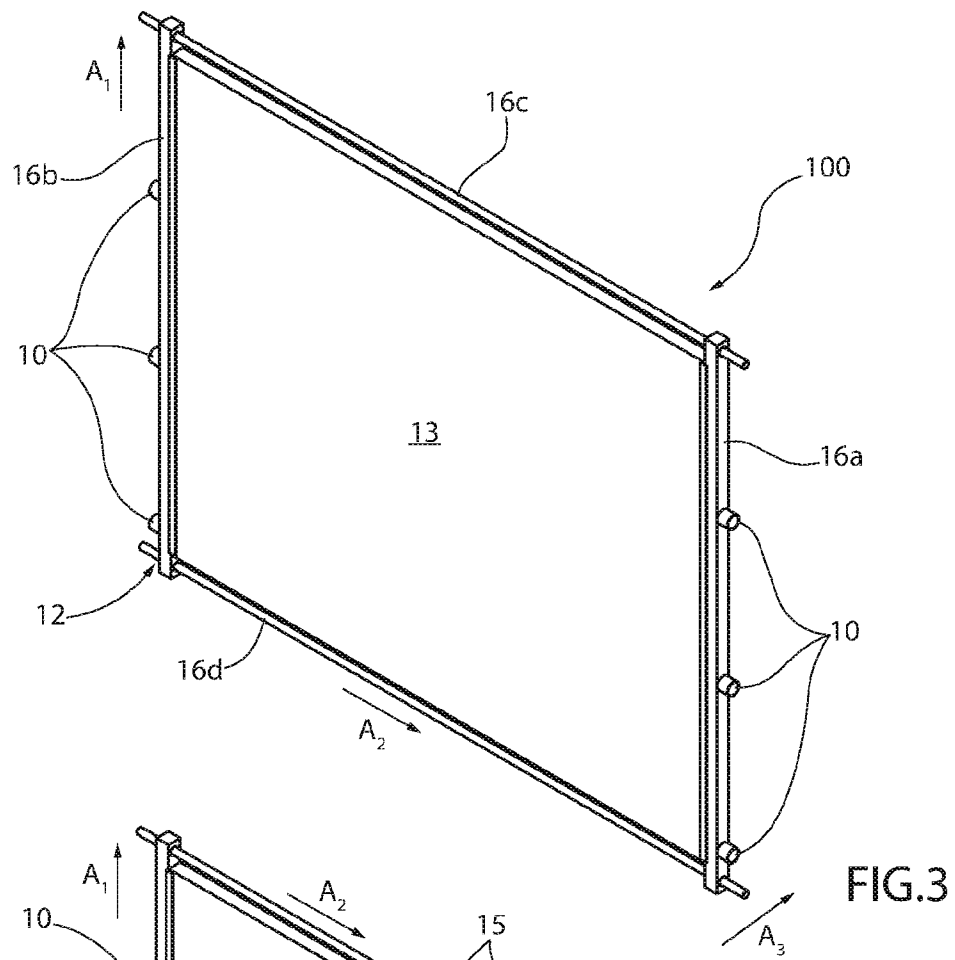
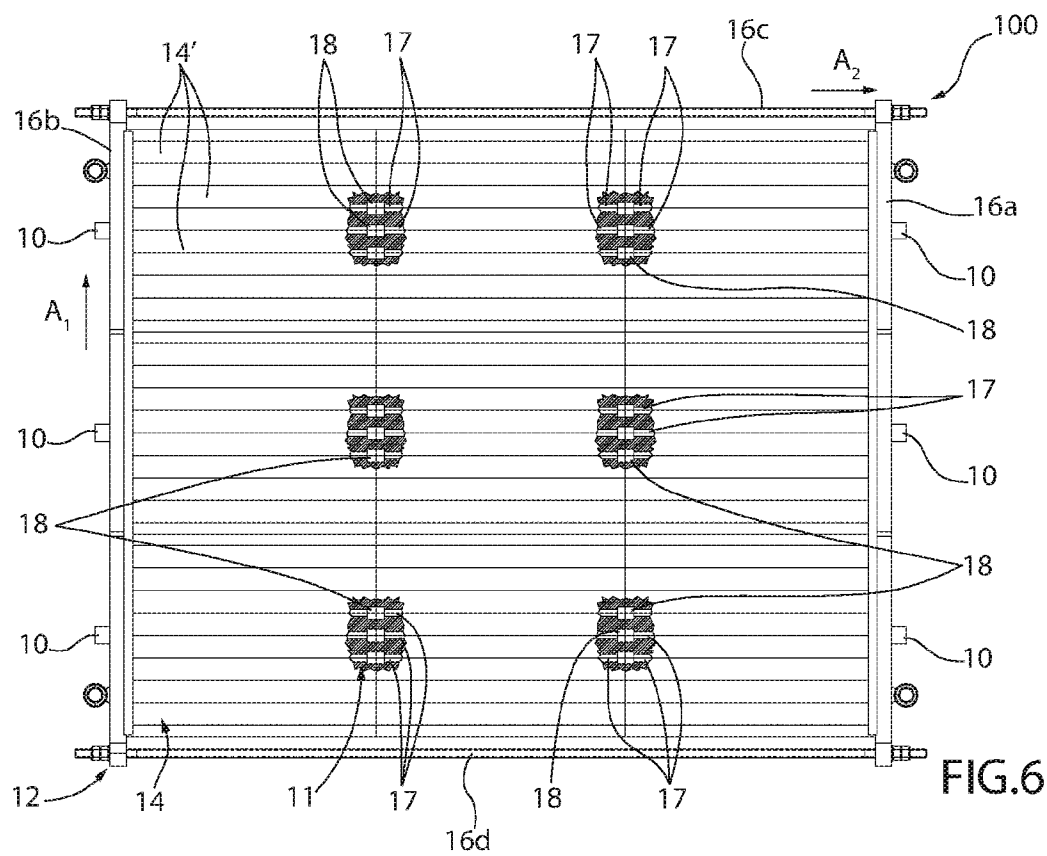
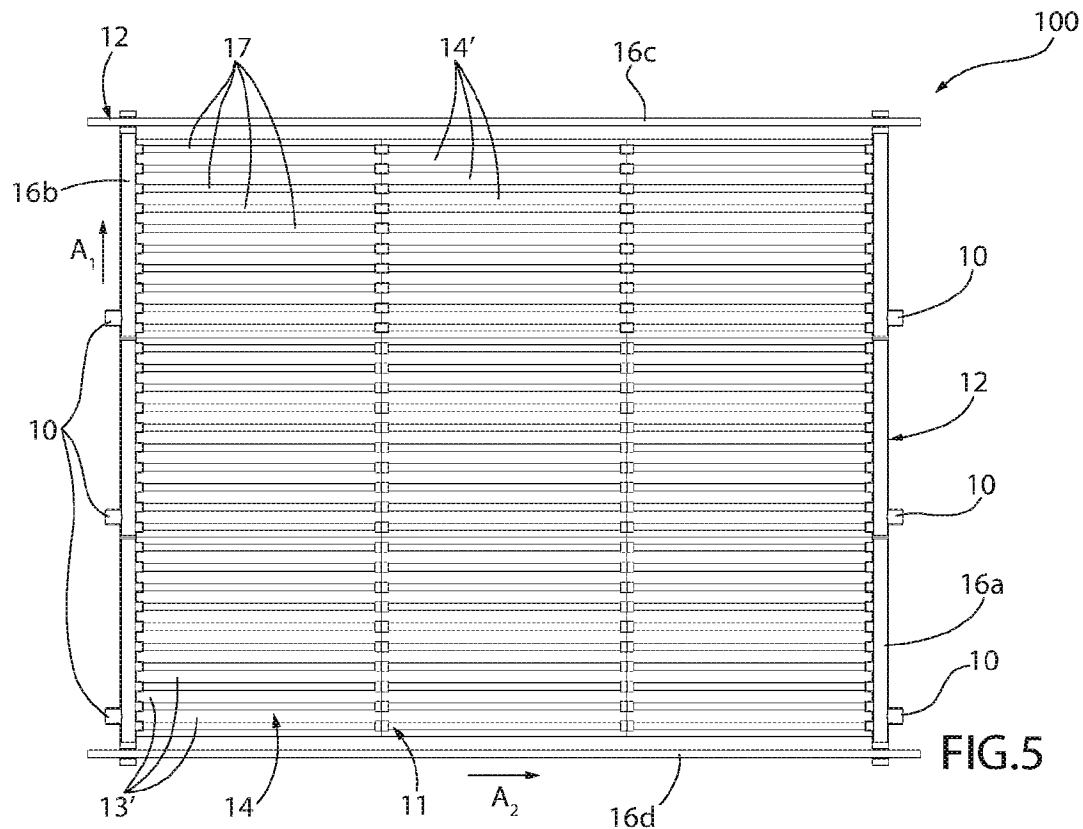


FIG. 1







## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IB2024/055694

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                  |                                                                      |
| INV. B05B13/02 B05B14/41 B05B16/40 B05B16/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                  |                                                                      |
| ADD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                  |                                                                      |
| According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                  |                                                                      |
| <b>B. FIELDS SEARCHED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                  |                                                                      |
| Minimum documentation searched (classification system followed by classification symbols)<br>B05B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                  |                                                                      |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                  |                                                                      |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPO - Internal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                  |                                                                      |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                  |                                                                      |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Citation of document, with indication, where appropriate, of the relevant passages               | Relevant to claim No.                                                |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US 5 326 399 A (TAKAMURA TAKUMI [JP])<br>5 July 1994 (1994-07-05)<br>the whole document<br>----- | 1 - 9,<br>11 - 16                                                    |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                  |                                                                      |
| <p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> |                                                                                                  |                                                                      |
| Date of the actual completion of the international search<br><br>4 October 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                  | Date of mailing of the international search report<br><br>17/10/2024 |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                  | Authorized officer<br><br>Eberwein, Michael                          |

## INTERNATIONAL SEARCH REPORT

### Information on patent family members

International application No

PCT/IB2024/055694

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 5326399 A                              | 05-07-1994          | JP H0541155 A              | 19-02-1993          |
|                                           |                     | KR 930005092 A             | 23-03-1993          |
|                                           |                     | US 5326399 A               | 05-07-1994          |
| -----                                     |                     |                            |                     |