



(51) International Patent Classification:

C12M 1/32 (2006.01) C12M 1/12 (2006.01)
B01L 3/00 (2006.01)

(21) International Application Number:

PCT/EP2018/064498

(22) International Filing Date:

01 June 2018 (01.06.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

1754955 02 June 2017 (02.06.2017) FR

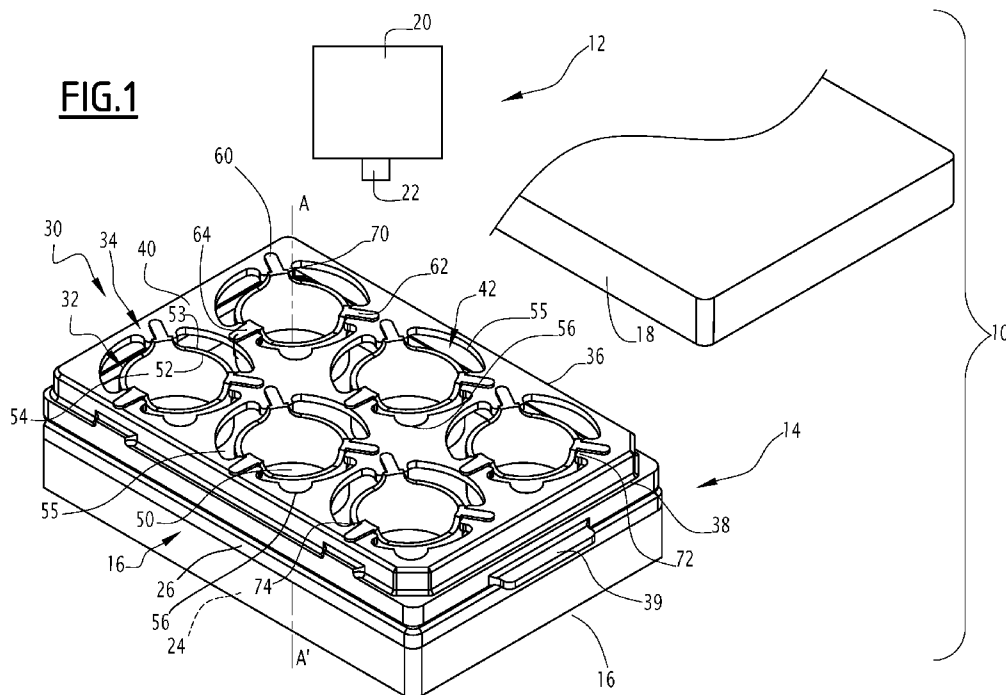
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,

(54) Title: DEVICE INTENDED TO RECEIVE A MATERIAL DEPOSITION BY PRINTING, RELATED ASSEMBLY AND PRO-
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(57) Abstract: This device comprises a support, and at least one insert (32), installed free to move relative to the support between a deposition position and a manipulation position. The insert (32) comprises a first tab (60) defining a first bearing support on a support retaining surface. The first tab (60) comprises a first projection (80) blocking the insert (32) in rotation on the support, the support defining a first housing (90) for reception of the first blocking projection (80). The insert (32) comprises at least a second attachment tab (62) onto the support and a third attachment tab onto the support, the second tab (62) and the third tab projecting from the lateral wall (52), at an angular separation from the first tab (60), the second tab (62) and the third tab comprising a second projection (80) blocking rotation of the insert (32), the support defining a second reception housing (90) for the second blocking projection (80).

MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

Device intended to receive a material deposition by printing, related assembly and process

This invention relates to a device intended to receive a material deposition by printing, comprising:

5 - a support, intended to be installed on at least one tank containing a work medium, the support delimiting a through opening for the reception of an insert and an insert retaining surface, intended to be oriented upwards when the support closes off the tank or each tank;

10 - at least one insert, movably mounted relative to the support between a deposition position in which the insert is blocked in position relative to the support in the through opening and a manipulation position, in which the insert is located at a distance from the support,

15 the insert comprising a bottom wall defining a deposition region, a lateral wall defining an internal volume with a central axis, and at least one first attachment tab on the support projecting from the lateral wall, the first tab defining a first bearing surface on the retaining surface,

 one of the first tab and the support comprising a first blocking projection blocking the insert in rotation on the support, the other of the first tab and the support defining a first housing for reception of the first blocking projection.

20 Such a device is intended particularly to receive a deposition of a material, particularly a biological material that can be used in a culture process.

25 For the purposes of this invention, a "material" means a pure compound or a mix of compounds intended to be deposited by a printing method such as extrusion, inkjet and/or laser printing. In particular, the material may be a polymer, a cosmetic with variable galenic composition such as a cream, an oil, a gel, a liquid or a biological material.

30 Deposition of a biological material by printing is a promising technique to create biological models of tissues with a complex structure. These models are useful for example in medicine, cosmetics, pharmacy, food processing, as such or as a diagnostic tool, or even as a production tool for example as a bioreactor. In some cases, these models cannot be obtained by manual assembly.

 Deposition of material, and particularly a biological material, is done by printing machines that operate for example by a jet of droplets, by extrusion or by laser. Such a deposit, when it is done on a fixed support, can give a printing precision of the order of 100 microns.

35 The biological material sometimes needs to be cultivated after deposition to mature, that will enable satisfactory conformation of the sample and improved

functionalization. In some cases, the biological material must be deposited in mobile inserts, carried on a support that are then brought into contact with a nutrient culture medium, for example by immersion in a culture medium.

Commercially available mobile inserts are not fully satisfactory. These inserts are generally carried by a fixed support in the form of a plate with through openings. The support is directly a tank or an adapter mounted on the tank.

Retention of the inserts on the fixed supports is not very efficient, and the inserts can move over distances up to a millimeter relative to the fixed support. Such a tolerance is not compatible with the precision required for making a precise deposition by printing.

FR2942239 describes a cellular or tissue culture device that significantly improves the precision of positioning. This device comprises inserts fitted with a tab that engages in a slot provided in the support and a rim that bears on the support.

Such a device can be improved because fabrication tolerances between the tab and the slit are additive and in the worst cases lead to a clearance incompatible with use.

One purpose of the invention is to have a device capable of giving the necessary precision to make the required deposition by printing.

To achieve this, the purpose of the invention is a device of the type mentioned above, characterized in that the insert comprises at least a second attachment tab onto the support and a third attachment tab onto the support, the second tab and the third tab projecting from the lateral wall, at an angular separation from the first tab, the second tab and the third tab delimiting a second bearing surface and a third bearing surface respectively on the retaining surface,

one of the second tab and the support comprising a second blocking projection blocking the insert in rotation, the other of the second tab and the support defining a second housing for reception of the second blocking projection,

one of the third tab and the support comprising a third blocking projection blocking the insert in rotation, the other among the third tab and the support defining a third housing for reception of the third blocking projection at an angular separation from the first reception housing and the second reception housing.

The presence of a second tab and a third tab at an angular separation from the first tab significantly reduces the clearance present between each insert and the fixed support, due to tolerances that can be a fraction of production tolerances, of the order of 0.1 mm. These tolerances are compatible with the very specific material printing requirements, particularly for biological materials. Therefore it is possible to print the material in each insert directly with the required precision, and then possibly for a biological material, to cultivate the biological material in the same insert so that it reaches

the desired degree of maturity. It is thus possible to displace the support accompanied by the insert, possibly with the tank, and then put it back into position later for printing once again, keeping the initial positions in all the axes.

The presence of at least one third tab guarantees a statically indeterminate structure in which the inserts are completely blocked.

In one embodiment, the insert comprises exactly three attachment tabs onto the support.

Several alternatives can be envisaged in order to make such a device with at least three tabs, and preferably with three tabs such as a bayonet system or a pin system, but these devices are often fragile and/or difficult to make with the required precision.

Advantageously:

- the first tab, the second tab and the third tab project radially from the central axis, the angle separating the first tab from the second tab measured around the central axis being between 60° and 150° , preferably between 110° and 130° , advantageously between 118° and 122° , and particularly approximately equal to 120° ; and/or

- the angle separating the second tab from the third tab is between 60° and 150° , preferably between 110° and 130° , advantageously between 118° and 122° , and particularly substantially equal to 120° .

The choice of such an angular range is particularly efficient in reducing the clearance, because this clearance is multiplied by the cosine of the supplementary angle. Thus, when the angle between two tabs is 120° , the cosine of the supplementary angle is equal to 0.5 which has the effect of reducing the clearance by a factor of two.

Advantageously, each reception housing is formed by a notch opening up towards the top and towards the bottom and opening up radially in the through opening.

The notch-shaped reception housings are easy to fabricate and make it possible to efficiently respect fabrication tolerances. They also guarantee very precise positioning of the inserts.

Depending on the variant:

- the bearing surface of the or each attachment tab extends radially at a distance from the central axis beyond the rotation blocking projection or the reception housing;

- the or each attachment tab comprises a plane upper tongue located above the rotation blocking projection or the reception housing, the bottom part of the upper tongue defining the bearing surface;

- the bottom of each reception housing is located vertically at a distance from the retaining surface.

The extension of the bearing surface radially beyond the projection or the reception housing guarantees a stable and reproducible bearing over the retaining surface. The tongue shape is easy to make and also provides an efficient bearing.

Depending on the variant:

5 - the or each attachment tab defines an upper surface parallel to the bearing surface.

 - the device comprises an additional blocking plate, intended to be mounted on the support to tighten each attachment tab between the additional blocking plate and the retaining surface.

10 The upper surface parallel to the bearing surface, possibly combined with a blocking plate, assures firm application of each bearing surface on the retaining surface, and therefore very precise vertical positioning of the insert. This variant also makes it possible to turn over the assembly composed of the support and the inserts, possibly accompanied by the tank.

15 According to one variant, the support comprises, for each attachment tab, a pin projecting radially in the through opening, the rotation blocking projection or the reception housing being formed on the pin.

 The presence of support pins receiving the tabs in the through opening leaves an intermediate space for access to the culture medium located between the pins.

20 According to one variant, the support comprises at least one lateral gripping handle, preferable one to four handles, and even more preferably two handles.

 The lateral handle facilitates gripping of the support, and its withdrawal from the fixed support.

25 According to one variant, an intermediate tank access space is defined between the support and the insert in the deposition position.

 The presence of an intermediate space between the insert and the support enables access to the inside of the tank without needing to displace the insert.

 Another purpose of the invention is a material deposition assembly comprising:

30 - a device like that defined above,
 - a deposition system by printing, capable of depositing a biological material in an insert of the device.

 The deposition assembly may also comprise one or several of the following characteristics that may be taken in isolation or in any technically possible combination.

35 - a tank each containing a culture medium, the device being capable of being mounted removably on the or on each tank, to supply culture medium to the insert.

- the printing deposition system comprises a droplets jet injection device, and/or a microextrusion injection device, and/or a laser injection device.

Such an assembly is particularly well adapted for deposition by printing of a material and creation of complex samples with high precision.

5 Another purpose of the invention is a method for deposition of a material including the following steps:

- supply of an assembly like that defined above,

10 - immobilization of an insert in a through opening, by engaging the first rotation blocking projection in the first reception housing, the second rotation blocking projection in the second reception housing, and the third rotation blocking projection in the third reception housing, the first bearing surface, the second bearing surface and the third bearing surface being applied on the retaining surface;

- deposition of material in the insert using the printing deposition system.

According to one variant, the method may include the following characteristic:

15 - the material is a biological material, the method comprising a subsequent step for culture of the biological material in the insert.

20 Such a method can be used firstly for precise printing of the material directly in an insert, for example adapted to hold a culture medium later on. Therefore it is particularly easy to implement, and can be used for example to produce and to mature biological samples with complex structures, without needing to transfer the sample.

The invention will be better understood after reading the following description, given purely as an example, with reference to the appended drawings on which:

25 - figure 1 is a perspective three-quarter front view of a deposition and culture assembly for a possibly biological material comprising a culture device according to the invention;

- figure 2 is a top view of an insert after insertion in the culture device in figure 1;

- figure 3 is a detailed view of the insertion of insert retaining projections in the corresponding housings of the support;

30 - figure 4 is a perspective three-quarter front view of the support of the device in figure 1;

- figure 5 is a view similar to the view in figure 4, of a variant of a culture device according to the invention.

A first material deposition and culture assembly 10 is diagrammatically illustrated on figure 1.

The assembly 10 is intended particularly for the deposition of biological material by printing, and then possibly for culture of this material so that it can be matured if for example it is to be used to form a tissue or keratin material.

For example, the biological material may be composed of animal and/or plant cells, and/or viruses, and/or mycoplasma, and/or fungi and/or proteins such as Elastins, Collagens, Fibronectins, and/or growth factors and/or mono-, oligo- or polysaccharides such as hyaluronic acid, chitosan, cellulose and/or cytokines such as IL6, IL1, and/or amino acids, and/or oligo- or polypeptides, and/or biomaterials, and mixtures of them in any proportion.

A biomaterial means any natural or artificial material comprising all or part of a living structure or a biomedical instrument that performs or replaces a natural function.

With reference to figure 1, the assembly 10 comprises a material deposition system 12, a device 14 designed to receive the material, at least one device support tank 16, and possible a lid 18 shown partially and diagrammatically on figure 1.

The material deposition system 12 is advantageously a material printing system. It comprises a material reservoir 20, and at least one printing device 22, capable of depositing a point or a line of material with a width of less than one millimeter, and particularly between 1 μm and 3 mm, particularly between 2 μm and 2 mm, and even better between 3 μm and 1.75 mm. According to one particular embodiment, the printing device 22 is capable of depositing a dot or a line of material with a width of between 3 μm and 500 μm , particularly between 100 μm and 500 μm .

For example the printing device 22 operates by a jet of droplets, the system then being provided with a piezoelectric actuator, or a heating system to produce the successive droplets.

As a variant, the printing device 22 operates by microextrusion, particularly driven pneumatically, by piston or screw.

As another variant, the printing device 22 functions by laser pulses, the material being positioned under an electron donor material struck by the laser, with the interposition of an energy absorption layer.

Such printing devices 22 may be used alternatively or cumulatively.

The deposition system 12 can be displaced facing the device 14 to enable a point deposition of material in the device 14 on a predetermined trajectory.

The culture tank 16 defines at least one reception cavity 24 for example for a culture medium, and a top edge 26 on which the culture device 14 will be removably mounted.

The cavity 24 opens up at the top, being delimited at its periphery by the top edge 26. In the example shown on figure 1, the tank 16 comprises a single cavity 24 for example containing a common culture medium. As a variant, the tank 16 delimits a plurality of cavities 24 designated by the term “wells”, separated from each other in a leak tight manner for example to contain different media.

The culture medium is advantageously a liquid. It is capable of impregnating the cells or tissues of the biological material to be cultivated to facilitate their growth and to keep them alive. The liquid may for example be an aqueous solution of different nutrients such as sodium salts, amino acids, reagents, vitamins, etc. As a variant, the culture medium may be solid. In this case it is said to be “gelosed”.

The culture device 14 comprises an insert support 30 that can be mounted removably on the tank 16, at least one material deposition and culture insert 32, also called “basket”, designed to be supported by the support 30, and a retaining assembly that can be released from the or each insert 32 on the insert support 30.

In this example, the insert support 30 comprises an upper plate 36 and a rim 38 located under the upper plate 36 for assembly of the support 30 on the upper edge 26 of the tank 16. Advantageously, it is fitted with handles 39 located on each side of the rim 38.

The upper plate 36 defines a flat upper insert retaining surface 40. It has at least one through opening 42 in which the insert is inserted, opening up downwards into the cavity 24 of the tank 16 and opening up upwards through the plane upper surface 40.

When the insert support 30 is mounted on the tank 16, the bottom of the tank 16 being located on a horizontal surface, the flat upper surface 40 extends horizontally.

In this example, the upper plate 36 comprises several through openings 42, in this case at least two parallel rows of through openings 42.

More generally, the number of through openings 42 is advantageously equal to the number of inserts 32. It is between 1 and 96.

In this case each through opening 42 has an approximately circular contour with its central axis extending in the vertical direction when its upper retaining surface 40 is horizontal.

Each insert 32 is generally in the form of a bucket. It comprises a bottom wall 50 and a lateral wall 52 projecting at the periphery of the bottom wall 50 around a central axis A-A' to delimit an internal reception volume 54 for the material and optionally a culture medium.

The bottom wall 50 extends perpendicular to the central axis A-A'. For example, it is at least partially porous to enable for example supply of culture medium to the internal volume 54, separation of two cell types, separation of two phases, and the transfer of

biological material from one compartment to the other. As a variant, it is provided with through passages for the supply of culture medium.

The bottom wall 50 defines at least one flat region intended to receive the culture medium deposited by the deposition system 12. The flat region extends parallel to the upper retaining surface 40 when the insert 32 is positioned bearing on the upper retaining surface 40 through the releasable retaining assembly 34.

The height of the lateral wall 52 from the bottom wall 50 to the upper edge 53 is more than the height of the support 30, so that the bottom wall 50 can dip into the culture medium when the insert 32 is positioned bearing on the insert support 30 in a through opening 42.

In projection in a plane perpendicular to the central axis A-A', the external contour of the lateral wall 52 extends entirely at a distance from the edge of the through opening 42.

Thus, an intermediate peripheral space 55 is delimited between the insert 32 and the support 30. This intermediate space 55 provides access to the cavity 24 of the tank 16 when the culture device 14 is mounted on the tank 16, without needing to move the insert 32. Furthermore, the intermediate space 55 comprises a cutout 56 formed in the support 30 allowing the introduction of a pipette tool to draw off or to pour a product in the cavity 24 of the tank 16 without needing to remove the insert 32 from the support 30.

The releasable retaining assembly 34 comprises a plurality of attachment tabs 60, 62, 64 fixed to the insert 32, and for each tab 60, 62, 64, a retaining tab 70, 72, 74 fixed to the support 30.

In the example shown on the figures, each insert 32 is thus provided with a first tab 60, a second tab 62 at an angular separation from the first tab 60 around the A-A' axis, a third tab 64 at an angular spacing from the first tab 60 and the second tab 62 around the A-A' axis.

Each tab 60, 62, 64 projects radially away from the A-A' axis starting from the lateral wall 52. In the example shown on the figures, each tab 60, 62, 64 extends from the upper edge 53 of the lateral wall 52.

The angle separating the first tab 60 from the second tab 62 measured around the central axis A-A' is between 60° and 150°, preferably between 110° and 130°, advantageously between 118° and 122°, and particularly approximately equal to 120°.

Similarly, the angle separating the second tab 62 from the third tab 64 measured around the central axis A-A' is between 60° and 150°, preferably between 110° and 130°, advantageously between 118° and 122°, and particularly approximately equal to 120°.

Preferably, the tabs 60, 62, 64 are distributed at different angles around the central axis A-A'.

Each tab 60, 62, 64 defines a lower bearing surface 76 on the upper retaining surface 40. In this example, each tab 60, 62, 64 comprises an upper tongue 78 and a retaining projection 80.

With reference to figure 2, the upper tongue 78 extends from the upper edge 53, over a radial extent DRL larger than the radial extent DRS over which the retaining projection 80 extends. The radial extent DRS is larger than the radial extent ER of the intermediate space 55.

The upper tongue 78 thus defines an external region located radially beyond the retaining projection 80. The external region delimits the bottom of the lower bearing surface 76 on the retaining surface 40.

The upper tongue 78 also defines a plane upper surface 82, parallel to the lower surface 76.

The retaining projection 80 is capped by the upper tongue 78. In this case it comprises a rounded external radial edge 84 and two parallel lateral faces 86, 88 that will extend vertically when the A-A' axis is vertical.

The retaining projection 80 extends over a radial extent DRS smaller than the radiation extent ER of the intermediate space 55.

One retaining projection 80 among the radial projections 80 has a smaller radial extent DRS than the other retaining projections 80 to enable angular indexing of the insert 32 in the through opening 42.

In the example shown on the figures, the insert 32 and each tab 60, 62, 64 are formed as a single part from the same material.

Each pin 70, 72, 74 projects radially in the intermediate space 55 towards the center of the opening 42, from the edge of the opening 42.

The pins 70, 72, 74 corresponding to each tab 60, 62, 64 are separated from each other two by two by the same angle as the corresponding tabs 60, 62, 64.

Similarly, each pin 70, 72, 74 is formed as a single part from the same material as the support 30.

Each pin 70, 72, 74 defines a reception housing 90 for a retaining projection 80, with a shape complementary to the shape of the projection 80.

In this example, each housing 90 is formed from a notch that opens up vertically upwards and vertically downwards. The notch also opens up towards the central axis of the through opening 42.

The housing 90 is delimited laterally by two parallel lateral edges 92, 94. With reference to figure 3, the width of each housing 90, measured between the edges 92, 94, corresponds to the width of each retaining projection 80, taken between these lateral faces 86, 88, with a functional clearance J2.

5 The radial depth of each housing 90 corresponds to the radial extent of each retaining projection 80 designed to be inserted in the housing 90, with a functional clearance J1 that can be seen on figure 3.

10 The radial depth of one of the housings 90 is less than that of the other housings 90 to contain the projection 80 that has a smaller radial extent than the other projections 80.

Each insert 32 is thus mounted free to move relative to the support 30 between a manipulation position in which it is located at a distance from the support 30 and a biological material deposition and advantageously culture position in which it is fixed in position relative to the support 30 in the through opening 42, through the releasable retaining assembly 34.

In the deposition position, each retaining projection 80 is inserted in a corresponding housing 90. The lower bearing surface 76 defined on each tongue 78 beyond the projection 80 bears on the upper retaining surface 40 of the insert support 30.

20 With reference to figure 3, at least two tabs 60, 62, 64 are separated by an angle of between 60° and 150° , preferably between 110° and 130° , and in particular approximately equal to 120° .

In other words, the extension axis C-C' of a first tab 60 forms an angle from the extension axis D-D' of a second tab 62 equal to between 60° and 150° , preferably between 110° and 130° , and in particular approximately equal to 120° . When the angle between two tabs 60, 62, 64 is equal to 120° , the cosine of the supplementary angle ($\cos 60^\circ$) is equal to 0.5.

25 Thus, the radial clearance J1 existing between the first tab 60 and its housing 90 along the C-C' extension axis of this first tab 60 affects the second tab 62 in the form of a clearance J1' along this same axis C-C' reduced by a factor corresponding to the cosine of the supplementary angle between the extension axes C- C', D-D' of the first and second tabs 60, 62 respectively. Thus, in the illustrated example embodiment, we have $J1' = J1 * \cos (60^\circ) = J1 / 2$.

30 Similarly, the clearance J2 existing between the first tab 60 and its housing 90 along an axis perpendicular to the extension axis C-C' of this first tab 60 affects the second tab 62 in the form of a clearance J2' along this same axis perpendicular to the extension axis C-C' of the first tab 60 reduced by a factor corresponding to the cosine of

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the supplementary angle between the respective extension axes C-C', D-D' of the first and second tabs 60, 62. Thus, in the illustrated example embodiment, we have $J2' = J2 * \cos(60^\circ) = J2 / 2$.

Due to these arrangements, the position of the inserts 32 on the support 30 along two perpendicular directions located in the same plane defined by the tabs 60, 62, 64 of each insert 32, for example along the extension axis C-C' of the first tab 60 and an axis perpendicular to this extension axis C-C' of the first tab 60 in the plane of figure 3 is improved, the negative effect of the fabrication clearances/tolerance on this position being reduced by a factor of 2 due to the 120° layout of the tabs 60, 62, 64.

This guarantees a positioning clearance along each axis (C-C' ; D-D') equal to approximately half the fabrication clearance, which is of the order of 0.1 mm, thus allowing a positioning precision of less than 100 microns, compatible with printing of biological material.

Before using the deposition and culture assembly 10, each insert 32 is firstly positioned in the support 30. The projections 80 present on the tabs 60, 62, 64 are inserted in the housings 90 of the support 30. The lower bearing surface 76 defined on each tongue 78 bears on the upper retaining surface 40.

Each insert 32 is then precisely positioned on the support 30. Its position along the central axis A-A' is defined by contact between each lower bearing surface 76 and the upper retaining surface 40. Its position in the plane perpendicular to the central axis A-A' is defined by cooperation between the projections 80 and the edges 92, 94 of the housings 90 in which they fit, reducing the functional clearance resulting from fabrication of the device 14.

Once each insert 32 is in position, the culture device 14 is immobilized in a coordinate system specific to the deposition system 12. The deposition system 12 is brought to face the culture device 14. The printing device 22 is placed above and facing the bottom wall 50 of an insert 32, and deposition of biological material by printing takes place with high precision.

The culture device 14 is brought onto the support tank 16 that may for example contain the culture medium. In this example, each insert 32 is inserted in the cavity 24 and comes into contact with the culture medium that supplies the internal volume of each insert 32.

Therefore due to the culture device 14 according to the invention, it is particularly easy to make a very precise deposition of material in an insert 32 and then optionally to cultivate the biological material in order to obtain the required maturing properties.

In the variant illustrated on figure 5, the device 14 also comprises an additional blocking plate 98 that can be mounted on the insert support 30 to keep the inserts 32 in contact with the upper retaining surface 40.

5 The additional blocking plate 98 has through holes 100 placed facing each through opening 42. It has a downturned edge 102 that can fit on the shoulder defined between the upper plate 36 and the rim 38.

10 When the additional blocking plate 98 is mounted on the insert support 30, its lower surface is applied on the upper surface 82 of each tongue 78. This squeezes each tab 60, 62, 64 between the lower surface of the additional plate 98 and the upper retaining surface 40.

It is thus possible to turn over the support of the insert 30 by holding the inserts 32 in position, which facilitates manipulation of the device 14.

In one variant (not shown) of the culture device 14 according to the invention, each tab 60, 62, 64 defines a housing 90. The projections 80 are formed on the pins 70, 72, 74.

15 Moreover, the culture device 14 according to this variant operates in exactly the same way as the culture devices 14 described above.

CLAIMS

1.- Device (14) intended to receive a material deposition by printing, comprising:

- a support (30), intended to be installed on at least one tank (16) containing a work medium, the support (30) delimiting a through opening (42) for the reception of an insert and an insert retaining surface (40), intended to be oriented upwards when the support (30) closes off the tank or each tank (16),

- at least one insert (32), movably mounted relative to the support (30) between a deposition position in which the insert (32) is blocked in position related to the support (30) in the through opening (42) and a manipulation position, in which the insert (32) is located at a distance from the support (30),

the insert (32) comprising a bottom wall (50) defining a deposition region, a lateral wall (52) defining an internal volume with a central axis (A-A'), and at least one first attachment tab (60) on the support (30) projecting from the lateral wall (52), the first tab (60) defining a first bearing surface (76) on the retaining surface (40);

one of the first tab (60) and the support (30) comprising a first blocking projection (80) blocking the insert (32) in rotation on the support (30), the other of the first tab (60) and the support (30) defining a first housing (90) for reception of the first blocking projection (80),

characterized in that the insert (32) comprises at least a second attachment tab (62) onto the support (30) and a third attachment tab (64) onto the support (30), the second tab (62) and the third tab (64) projecting from the lateral wall (52), at an angular separation from the first tab (60), the second tab (62) and the third tab (64) delimiting a second bearing surface (76) and a third bearing surface (76) respectively on the retaining surface (40),

one of the second tab (62) and the support (30) comprising a second blocking projection (80) blocking the insert (32) in rotation, the other of the second tab (62) and the support (30) defining a second housing (90) for reception of the second blocking projection (80),

one of the third tab (64) and the support (30) comprising a third blocking projection (80) blocking the insert (32) in rotation, the other of the third tab (64) and the support (30) defining a third housing (90) for reception of the third blocking projection (80) at an angular separation from the first reception housing (90) and the second reception housing (90).

2.- Device (14) according to claim 1 in which the insert (32) comprises exactly three attachment tabs (60; 62; 64) on the support (30).

3.- Device (14) according to claim 1 or 2, in which the first tab (60), the second tab (62) and the third tab (64) project radially from the central axis (A-A'), the angle separating the first tab (60) from the second tab (62), measured around the central axis (A-A'), being between 60° and 150°, preferably between 110° and 130°, advantageously
5 between 118° and 122°, and particularly approximately equal to 120°.

4.- Device (14) according to claim 3 in which the angle separating the second tab (62) from the third tab (64) is between 60° and 150°, preferably between 110° and 130°, advantageously between 118° and 122°, and particularly substantially equal to 120°.

5.- Device (14) according to any one of the preceding claims, in which each
10 reception housing (90) is formed by a notch opening up towards the top and towards the bottom and opening up radially in the through opening (42).

6.- Device (14) according to any one of the preceding claims, in which the bearing surface (76) of the or each attachment tab (60, 62, 64) extends radially at a distance from the central axis (A-A') beyond the rotation blocking projection (80) or the reception
15 housing (90).

7.- Device (14) according to claim 6 in which the or each attachment tab (60, 62, 64) comprises a plane upper tongue (78) located above the rotation blocking projection (80) or the reception housing (90), the bottom part of the upper tongue (78) defining the bearing surface (76).

8.- Device (14) according to any one of the preceding claims, in which the or each attachment tab (60, 62, 64) defines an upper surface (82) parallel to the bearing surface (76).

9.- Device (14) according to any one of the preceding claims, comprising an additional blocking plate (98), intended to be mounted on the support (30) to tighten each
25 attachment tab (60, 62, 64) between the additional blocking plate (98) and the retaining surface (40).

10.- Device (14) according to any one of the preceding claims, in which the support (30) comprises, for each attachment tab (60, 62, 64), a pin (70, 72, 74) projecting radially in the through opening (42), the rotation blocking projection (80) or the reception
30 housing (90) being formed on the pin (70, 72, 74).

11.- Device (14) according to any one of the preceding claims, in which the support (30) comprises at least one lateral gripping handle (39), preferable one to four handles, and even more preferably two handles.

12.- Device (14) according to any one of the preceding claims, in which the
35 intermediate space (55) for access to the tank (16) is defined between the support (30) and the insert (32) in the deposition position.

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13.- Material deposition assembly (10), comprising:

- a device (14) according to any one of the preceding claims,
- a deposition system (12) by printing, capable of depositing a biological material in an insert (32) of the device (14).

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14.- Assembly (10) according to claim 13, comprising at least one tank (16) each containing a culture medium, the device (14) being capable of being mounted removably on the or on each tank (16), to supply culture medium to the insert (32).

10

15.- Assembly according to one of claims 13 or 14, in which the printing deposition system (12) comprises a droplets jet injection device, and/or a microextrusion injection device, and/or a laser injection device.

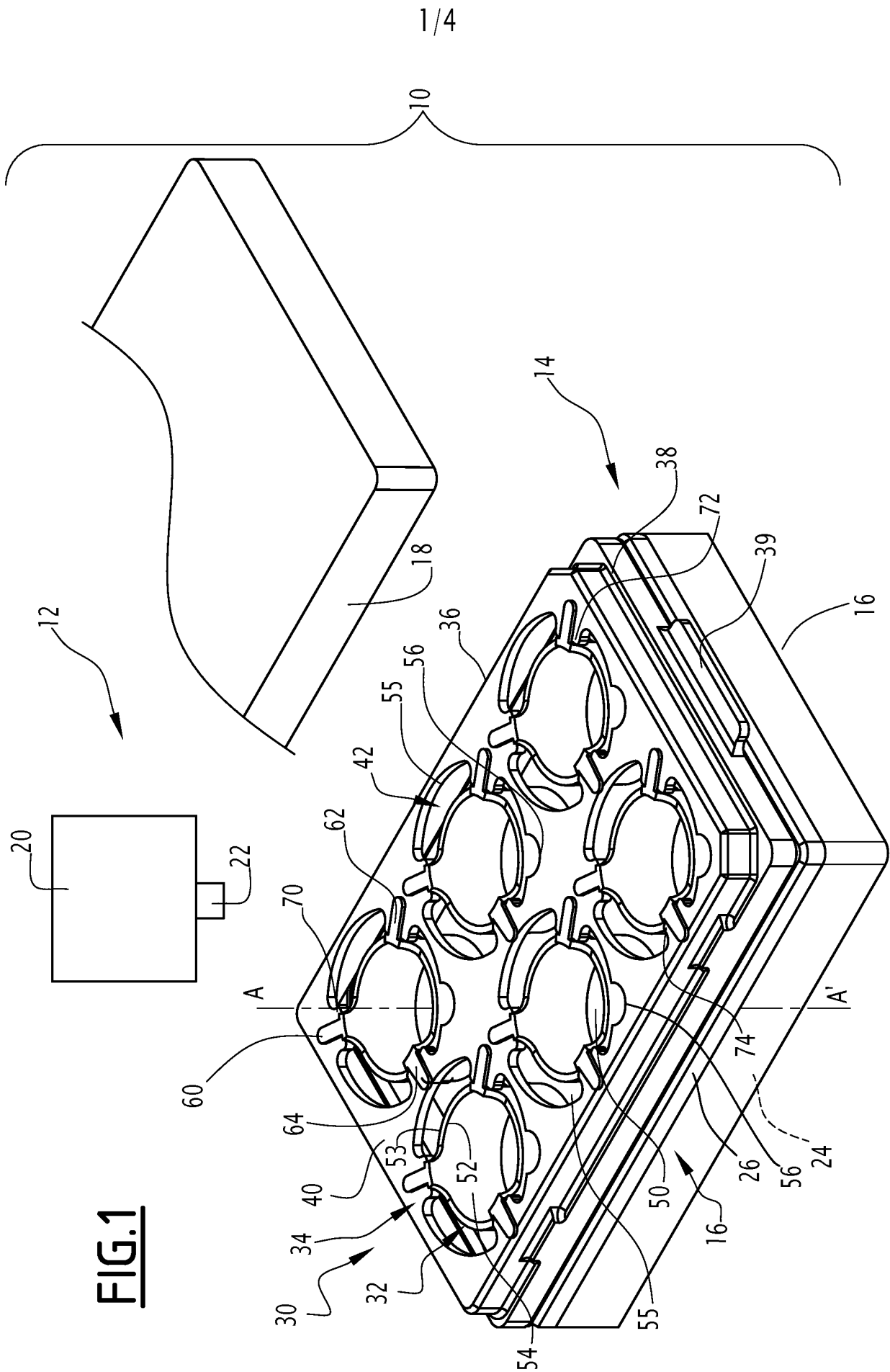
15

16.- Method of deposition of a material comprising the following steps:

- supply of an assembly (10) according to any one of claims 13 to 15;
- immobilization of an insert (32) in a through opening (42), by engaging the first rotation blocking projection (80) in the first reception housing (90), the second rotation blocking projection (80) in the second reception housing (90), and the third rotation blocking projection (80) in the third reception housing (90), the first bearing surface (76), the second bearing surface (76) and the third bearing surface (76) being applied on the retaining surface (40);
- deposition of material in the insert (32) using the printing deposition system (12).

20

17.- Method according to claim 16 in which the material is a biological material, the method comprising a subsequent step for culture of the biological material in the insert (32).



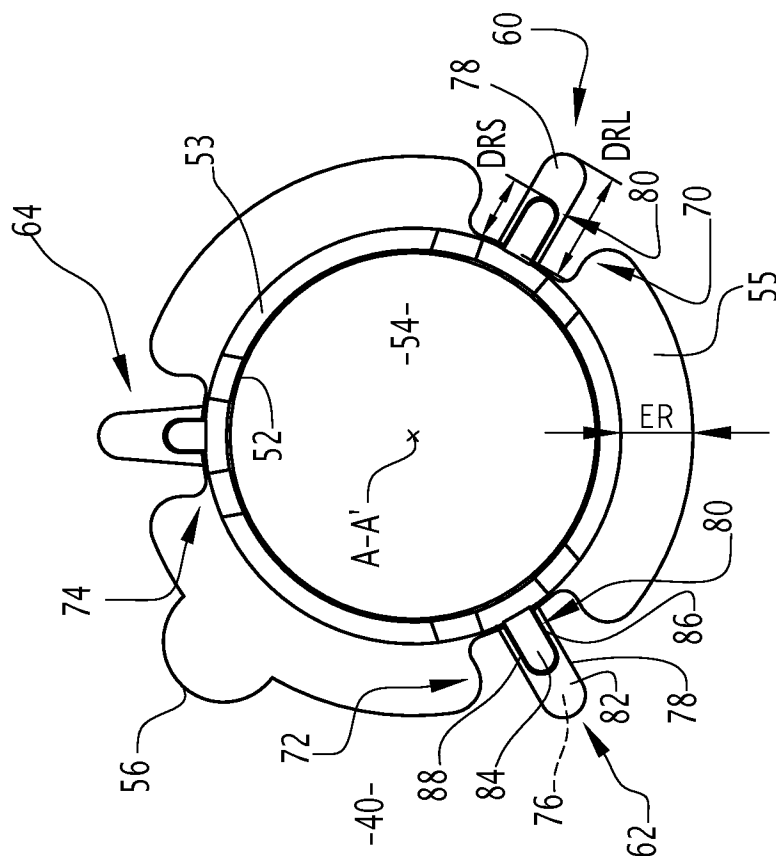
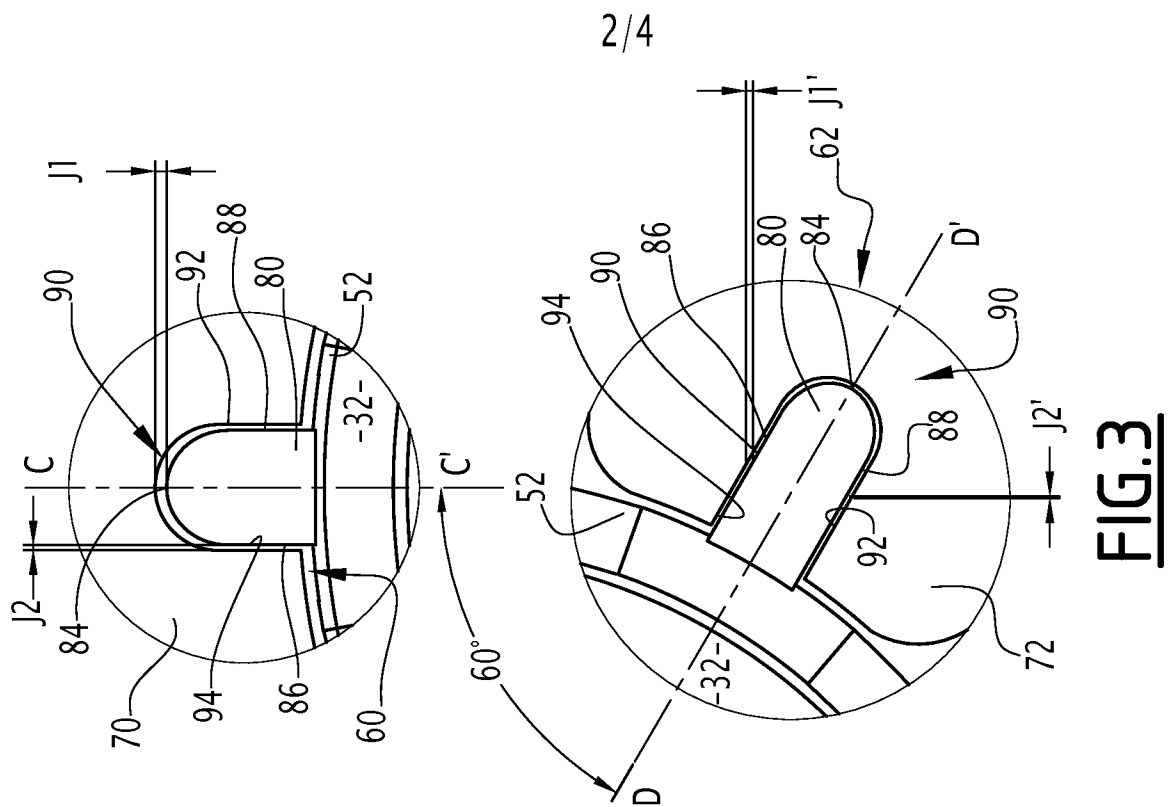


FIG. 2

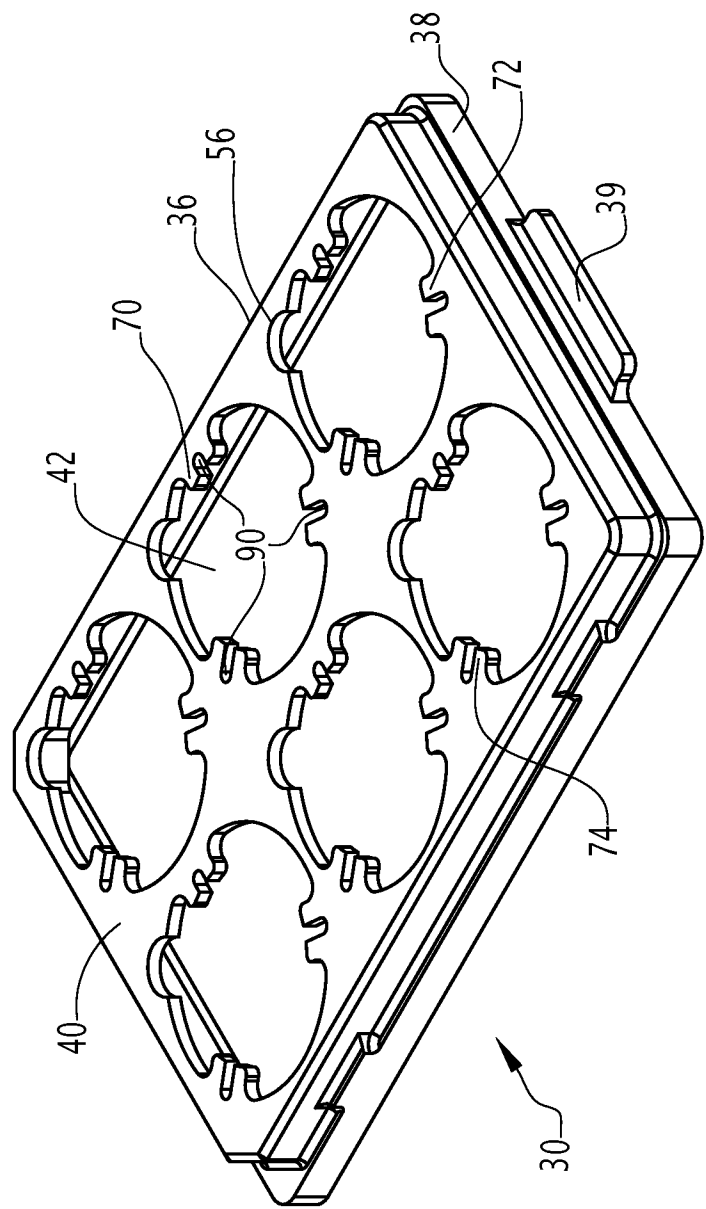
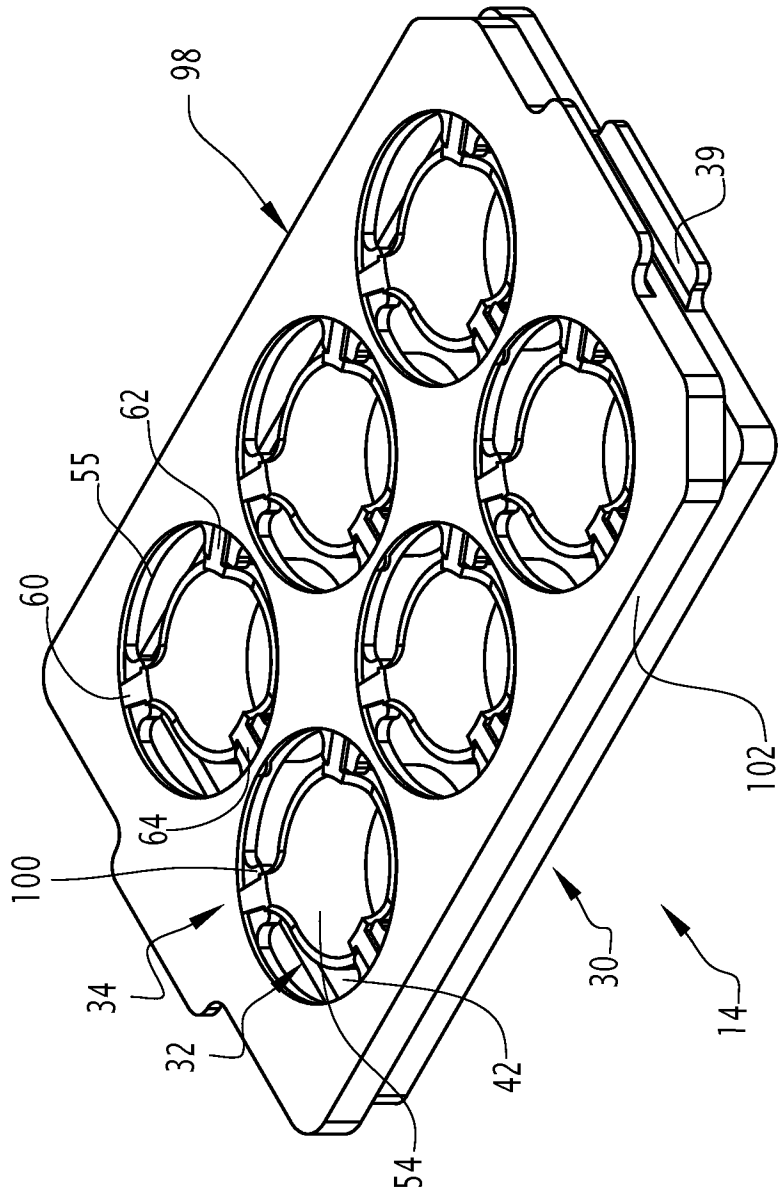


FIG. 4

FIG. 5



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/064498

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12M1/32 B01L3/00 C12M1/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C12M B01L

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)

EPO-Internal

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Y	paragraph [0005] paragraph [0075] - paragraph [0084] paragraph [0090] paragraph [0099]; figures 1-11, 13,18	13-17
Y	WO 2017/074829 A1 (DRAMEDICA L L C [US]) 4 May 2017 (2017-05-04) page 14, line 30 - page 15, line 11 claims 1,5 figures 1-3B	13-17
A	FR 2 942 239 A1 (OREAL [FR]) 20 August 2010 (2010-08-20) cited in the application claims 1-15; figures 1-6 ----- -/-	1-17



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

23 August 2018

Date of mailing of the international search report

31/08/2018

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/064498

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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