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(54) **Method for producing screen means**

(57) A method for producing screen means (2) suitable for depositing a flowable product on a support, which screen means (2) are provided with microholes through which said flowable product can pass, comprising

es preparing a lamina of impermeable material to said flowable product to obtain said screen means and subjecting said screen means (2) to the action of a laser beam to create said microholes.

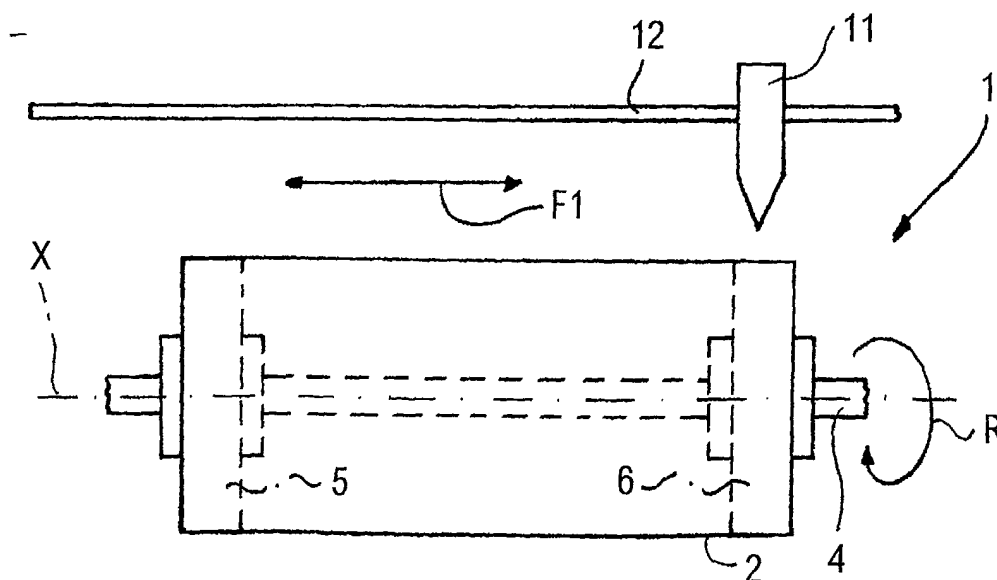


Fig. 3

Description

[0001] The invention concerns an apparatus for producing flexible screen means suitable for placing a flowable product on a support, particularly a decorative product on a ceramic support.

[0002] Italian patent application MO99A000141 discloses an apparatus for forming decorated ceramic tiles, comprising transfer means provided with cells that are open at the top and bottom, so as to be filled with a base ceramic material and pour said base ceramic material into cavities of a ceramic mould, and further comprising flexible screen means provided with openings that enable the flowable decorative material to pass through them, the screen means being supported by winding means on said carriage transfer means.

[0003] The ends of the screen means are coupled with support rollers with which said winding means are provided. Said support rollers are rotatably coupled with the transfer means and are contrasted by return springs during rotation. During operation, during each mould cavities feed cycle, the screen means are unwound from one of the rollers and are wound onto the other roller, or vice versa. Thus, at each passing through, the openings of the screen means go underneath the containing means for containing the decorative material and assist the exit of particles of decorative material from the container means.

[0004] The screen means comprise a lamina wherein said openings can be obtained by incisions made by a laser beam.

[0005] However, said incisions are rather difficult to make because of the flexibility of the lamina. It is thus complicated to obtain in said lamina means microholes that define a decorative pattern that can be clearly reproduced on the ceramic tiles that are to be formed.

[0006] It is also necessary to set up complex equipment that is arranged to make said laser incisions.

[0007] One aim of this invention is to improve the methods for producing the screen means that are suitable for placing a flowable product on a support.

[0008] Another aim of the invention is to supply a method for creating on screen means for decorating supports a decorative pattern obtained by using a plurality of microholes in a simple and very precise manner.

[0009] A further aim of the invention is to supply a method that enables screen means to be produced to decorate supports on which a plurality of microholes is obtained, which microholes define a decorative pattern that is well-defined on a visible surface of the supports.

[0010] In a first aspect of the invention, a method for producing screen means that are suitable for depositing a flowable product on a support is provided, said screen means comprising microholes through which said flowable product can pass, comprising preparing a lamina of material that is impermeable to said flowable product to obtain said screen means and subjecting said screen means to the action of a laser beam to create said mi-

croholes.

[0011] In a preferred version, said preparing comprises cutting and squaring said lamina.

[0012] In another preferred version, before said subjecting, it is provided winding the screen means onto support means to obtain sleeve means.

[0013] In a further preferred version, during said subjecting, it is providing rotating the sleeve means around a respective longitudinal axis.

[0014] In yet another preferred version, before said winding, it is provided blocking a first end of said screen means in contact with said support means.

[0015] In a further preferred version, after said winding it is provided movably fixing to the support means a second end of said screen means opposite to said first end, i.e. fixing said second end to an area of the screen means near the first end.

[0016] In a further preferred version, after said winding, it is provided tensioning the screen means in a transverse direction to optimise the subsequent incision phase.

[0017] In yet a further preferred version, during said subjecting, it is provided translating the laser beam parallel to the axis of said sleeve means to obtain the microholes in preset portions of the screen means.

[0018] In yet a further preferred version, said subjecting further comprises making series of aligned holes in opposite edge areas of the screen means, which aligned holes are suitable for receiving dragging peg means, said peg means being part of apparatuses for decorating ceramic products that must be equipped with said screen means.

[0019] Owing to this aspect of the invention, screen means can be obtained that are provided with decorative patterns obtained by a group of microholes that pass through said screen means and are made to a high degree of precision. In particular, it is possible to obtain screen means that are suitable for transferring a flowable decorative material onto a ceramic support in order to clearly reproduce a decorative pattern on one of its visible faces.

[0020] The screen means can be advantageously made in polyester acetate, such material being in fact easy to work and having high mechanical resistance.

[0021] The invention can be better understood and carried out with reference to the enclosed drawings, which illustrate some exemplifying and not restrictive embodiment forms thereof, wherein:

Figure 1 is a frontal view of support means suitable for receiving screen means that have to be subjected to laser incision;

Figure 2 is a side view of the support means of Figure 1 showing the screen means fixed to them;

Figure 3 is a side view of an apparatus for laser incision of the screen means;

Figure 4 is a top view of the screen means that have already received incisions;

Figure 5 is an enlarged and interrupted detail of Figure 4.

[0022] Figures 1 to 4 show an apparatus 1 for producing screen means 2 that can be used to decorate ceramic products.

[0023] The apparatus 1 comprises support means 3 provided with a shaft 4 that can be rotated around a relative longitudinal axis X, in the direction indicated by arrow R, by means of usual motor means that are not shown.

[0024] A pair of flanges 5, 6 is associated with the shaft 4, which flanges 5, 6 can be fixed to the shaft 4 by known fixing means. One or both of the flanges 5, 6 are movable in the direction shown by the arrow F and can therefore be positioned in longitudinally consecutive sections of the shaft 3 to enable screen means 2 that have different transverse dimensions to be processed.

[0025] Flanges 5 and 6 are arranged for receiving the screen means 2 that are to receive the incision, which screen means 2 are wound onto the flanges to create a sleeve 7.

[0026] Such winding occurs in the ways indicated below.

[0027] A first end 8 of the screen means 2 is inserted inside grooves 9 formed in the flanges 5, 6. Subsequently, the central part 2a of the screen means 2 is wound onto the flanges 5, 6 until a second end 10 of the screen means 2, opposite to said first end 8, partially recovers the central part 2a.

[0028] Subsequently, the second end 10 is movably fixed to the central part 2a by means of adhesive tape, or gluing.

[0029] Alternatively, the first end 8 and the second end 10 can be fixed directly to the flanges 5, 6 by mechanical blocking means.

[0030] The screen means 2 are associated with the flanges 5, 6 when at least one of said flanges is free to run on shaft 4: thus, after winding, flanges 5 and 6 can be moved apart from each other to obtain optimal screen means tension, which is required for correct incision, as will be described in greater detail below.

[0031] The apparatus 1 further comprises an emitter head 11 suitable for emitting laser radiation and movable in the direction indicated by the arrow F1 on a guide rod 12 arranged parallel to the shaft 4, said laser radiation generating a beam that is suitable for creating in the screen means 2 a plurality of microholes passing through the screen means 2, which microholes are so arranged to create one or more decorative patterns indicated by reference numeral 16 in Figure 4.

[0032] An electronic control and monitoring device is associated with the emitter head 11 and can store a high number of decorative patterns and subsequently reproduce them on the screen means 2 by guiding the shift of the emitter head 11 on the guide rod 12 and running the laser radiation emission command.

[0033] During incision, the shaft 4 is rotated in the di-

rection of the arrow R and simultaneously the emitter head 11 is moved along the guide rod 12 in such a manner that the laser radiation can reach any point of the screen means 2 to create on them the microholes that define the desired decorative pattern.

[0034] The intensity of the emitted laser radiation is suited to the material out of which the screen means 2 are made and to the diameter of the microholes that are intended to be obtained.

[0035] As figure 5 shows, the emitter head 11 also creates aligned holes 15 in opposite edge areas 13, 14 of the screen means 2.

[0036] Said holes 15 are suitable for receiving dragging pegs that are part of driving devices mounted on the machines for decorating ceramic products, which decorating machines are equipped with screen means 2.

[0037] At the end of incision, the second end 10 is separated from the central part 2a and the screen means 2 are unwound from the pulleys 5, 6 to again take on a substantially flat configuration.

Claims

1. Method for producing screen means (2) suitable for depositing a flowable product on a support, said screen means comprising microholes through which said flowable product can pass, comprising preparing a lamina of material that is impermeable to said flowable product to obtain said screen means and subjecting said screen means (2) to the action of a laser beam to create said microholes.
2. Apparatus according to claim 1, wherein before said subjecting it is provided winding said screen means on support means (3) to obtain sleeve means (7).
3. Method according to claim 2, wherein before said winding it is provided blocking a first end (8) of said screen means (2) in contact with said support means (3).
4. Method according to claim 3, wherein said blocking comprises housing said end (8) inside groove means (9) formed in said support means (3).
5. Method according to one of claims 2 to 4, wherein after said winding it is provided movably fixing to said support means (3) a second end (10) of said screen means (2) that is opposite to said first end (8).
6. Method according to one of claims 2 to 4, wherein after said winding it is provided movably fixing a second end (10) of said screen means (2), that is opposite to said first end (8), to an area of the screen means near said first end (10).

7. Method according to claim 5, or 6, wherein said movably fixing comprises fixing by adhesive tape.
8. Method according to claim 5, or 6, wherein said movably fixing comprises fixing by gluing. 5
9. Method according to one of claims 2 to 8, wherein after said winding it is provided tensioning said screen means (2). 10
10. Method according to claim 9, wherein said tensioning comprises moving apart from each other flange means (5, 6) of said support means (3) to which said screen means (2) are fixed. 15
11. Method according to one of claims 2 to 10, wherein during said subjecting it is provided rotating said sleeve means (7) around said axis (X).
12. Method according to claim 11, wherein during said rotating it is provided translating emitter head means (11) of laser radiation along a direction that is parallel to said axis (X) to obtain in preset areas of said sleeve means (7) decorative patterns (16), identified by groups of said microholes. 20 25
13. Method according to one of the preceding claims, wherein said subjecting further comprises making aligned holes (15) in opposite edge areas (13, 14) of said screen means (2). 30
14. Method according to one of the preceding claims, wherein said preparing comprises cutting and squaring said lamina. 35
15. Method according to one of the preceding claims, wherein said impermeable material comprises polyester acetate.
16. Method according to one of the previous claims, wherein said support is a ceramic product. 40

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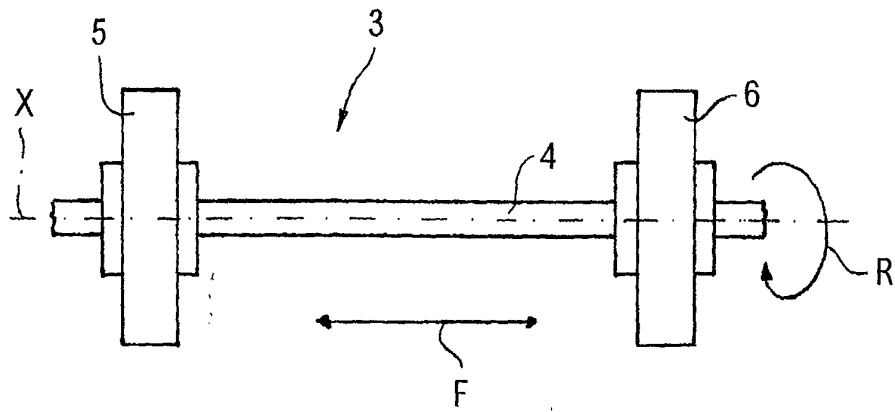


Fig. 1

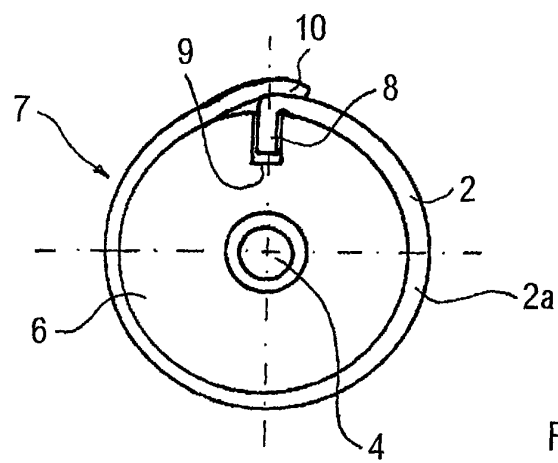


Fig. 2

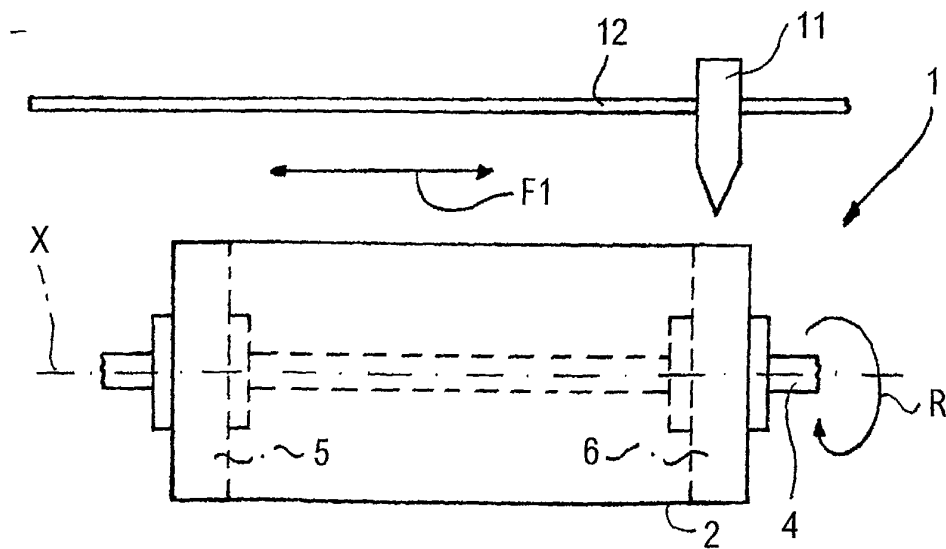


Fig. 3

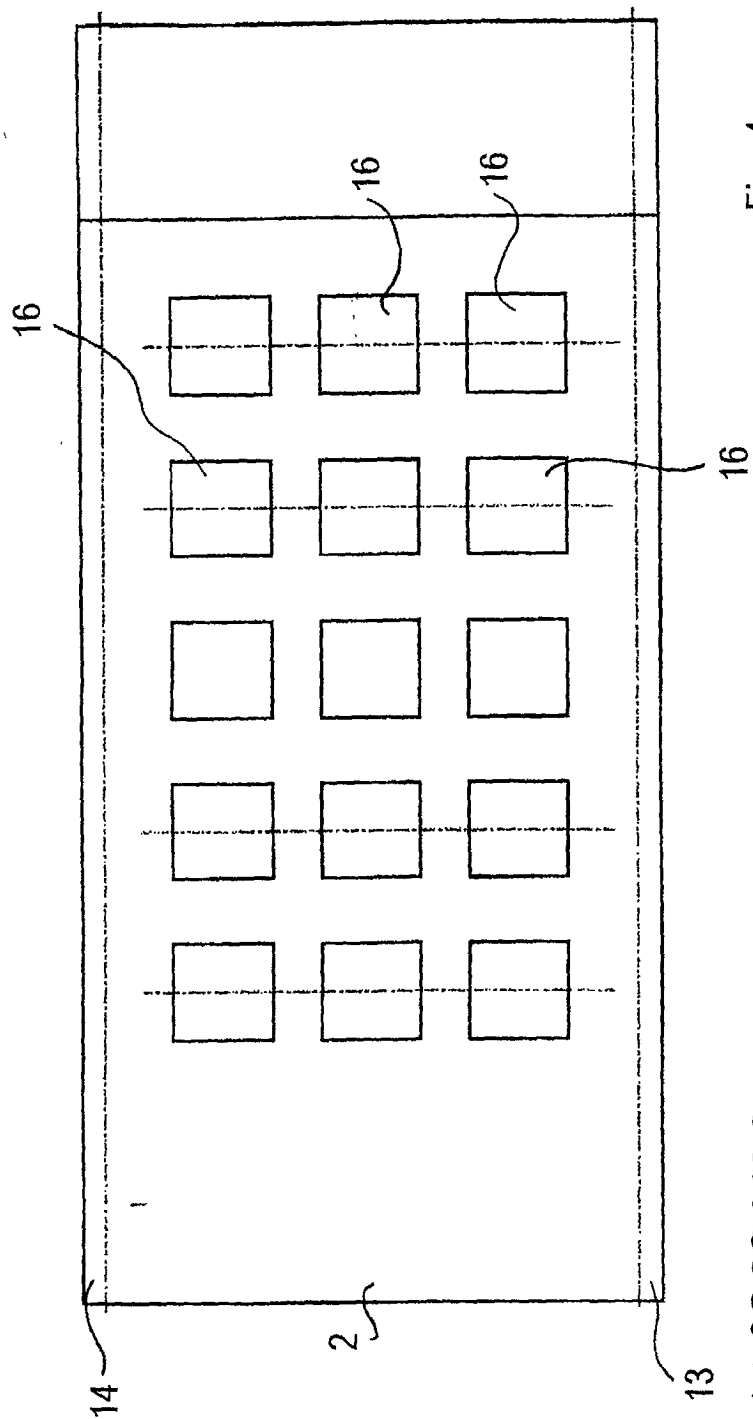


Fig. 4

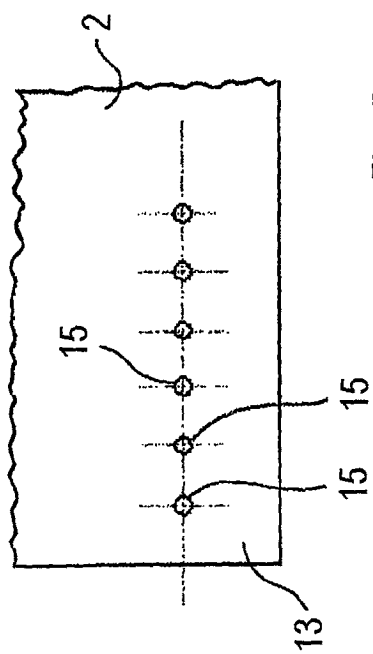


Fig. 5