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(54) **Process for decorating an article by using a ceramic toner, special support sheet used in such process, and corresponding apparatus**

(57) A process for decorating an article (214b) comprising the following succession of steps: producing a special support sheet (210) having the capability of releasing, because of a determined pressure (P) and/or level of heat, an image or decoration (220) formed with ceramic toner (212b) on a print surface (210c) of the same support sheet (210); printing, by a digital printing system press (212) and by using a ceramic toner (212b), a decoration (220) on such print surface (210c) of the support sheet (210); arranging, in a transfer station (213; 313) distinct from said printing system (212), the support sheet (210a) on a raw article (214; 314) in consolidated form or in powdered form not yet consolidated, with the print surface of the support sheet (210a), bearing the printed decoration (220), into direct contact of the raw article (214; 314) to be decorated; and applying a determined pressure (P) and/or level of heat in the contact zone between the printed support sheet (210a) and the raw article (214; 314), so as to release and transfer the decoration (220) from the support sheet (210a) to the article, and thereby decorate it. Preferably this capability of releasing, because of a determined pressure (P), the decoration (220) of ceramic toner is conferred to the paper support sheet (210) by preliminarily coating it with a thin layer (210d) of silicone or similar substance, on the respective print surface (210c) intended to be printed and to receive the decoration (220). The process of decoration results very quick and competitive under the aspect of the costs.

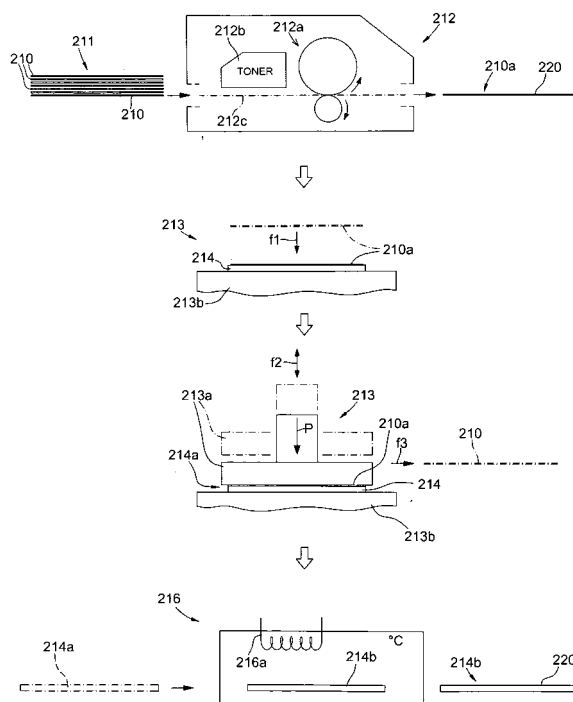


Fig. 1

Description

Field of the invention

[0001] The present invention relates in general to the sector of the processes for decorating an article, preferably but not exclusively a ceramic article, for instance a tile or a similar one, and more in particular to a process, for the decoration of an article, in which the decoration provided for decorating it is formed with a ceramic toner.

Technical background of the invention and state of the prior art

[0002] Various types of processes, methods and equipments for decorating a ceramic article are available in the technique.

[0003] It is for instance generally known to print a decoration or image, provided for decorating an article, on a support sheet by using a ceramic toner; to subsequently apply such support sheet, bearing the printed image of ceramic toner, on a raw article to be decorated; and finally to fire the article with the support sheet applied thereon, so as to obtain the final decorated article.

[0004] The support sheet, as provided for being used in this process, is typically made of a sheet of paper, or in any case of paper material, that burns and thereby disappears during the final phase of firing, while the image of ceramic toner, printed on the paper sheet, in consolidated on the surface of the article.

[0005] The support sheet can also be realized with a sheet of paper or similar, containing in its composition, in addition to the substances typical of the paper, also other substances, as enamel or glass, provided for melting and being integrated in the superficial structure of the article during the final firing phase.

[0006] Therefore in this case the support sheet, other than having the function of receiving and supporting on its surface the image, printed, for the decoration of the article, is also capable of providing materials that enter into and become part of the final superficial structure of the decorated article.

[0007] In general these processes have the drawback that the support sheet, especially of paper, while burning during the final phase of firing, releases some residual substances that might have negative effects on the quality of the final decoration on the article.

[0008] In other words, this support sheet, independently from providing useful materials for the formation of the image on the article, contains additional materials, intended to burn in the final firing phase, that may be a potential cause of problems of quality in the final decorated article.

[0009] There are also known processes of decoration, that use technologies and share characteristics typical of the transfer printing and/or decalcomania.

[0010] More in detail, these processes are such that the image of ceramic toner is in a first phase printed on

a support sheet, for instance of paper, and then coated with a layer or film of a substance, as a colloidal plastics, so as to make the support sheet suitable for allowing the following transfer of the image, printed on it, on the article to be decorated.

[0011] Then, the support sheet is applied into contact of the raw article in an appropriate liquid bath, where the transfer of the image of ceramic toner from the support sheet to the article is effectively carried out, by means of the interposition of the film colloidal provided on the same support sheet.

[0012] However these processes that, as said, exhibit relevant analogies with the processes of printing and decoration based on the printing transfer or decalcomania, have the drawback of implying a preliminary phase, of non negligible cost, for the application of the film of colloidal substance on the image of ceramic toner, formed on the sheet of support, and also of carrying out the successive transfer of the image on the article in cumbersome baths, of expensive and complex management.

[0013] The same substances colloidal, used to allow the transfer of the image on the article, other than implying additional costs, can also be at the origin of problems of pollution, because of the vapours emanating from them during the process.

[0014] Besides, the phase of transfer of the image from the support sheet to the article, with the interposition of the colloidal film, appears to be rather complex and difficult to be handled, with the consequent risk of possible negative effects and problems of quality of the decorated final article.

Summary of the invention

[0015] Object of the present invention is to provide a process, for the decoration of an article, that is directed to obviate to the drawbacks and the problems, above outlined, affecting the known technique; that in particular is simple and really convenient under the aspect of the costs; and moreover that is capable of assuring a good level of quality of the decorated final article, so as to constitute a valid alternative to the actual processes of decoration, both to those that adopt a paper support sheet, with an image of ceramic toner printed thereon, provided for burning during the final firing of the article, and to those that are based on the techniques typical of the transfer printing and/or decalcomania.

[0016] The aforesaid purposes are achieved by the process for decorating an article having the features recited by the first independent principal claim.

[0017] Particular embodiments of the invention are defined by the dependent claims.

[0018] The process of the invention has the advantage, in comparison with the known processes and while assuring the same final quality of the final product, of allowing a relevant reduction of the time for producing the decorated article, and moreover of being adapted to be implemented on simple and inexpensive equipments, with

a positive and immediate effects on the cost of production of the final decorated product or article.

[0019] According to further aspects, the present invention also relates to a special support sheet, exhibiting anti-adhesive properties, for use in the aforesaid process of decoration, and also to an apparatus suitable for implementing and carrying out this process for the decoration of an article.

Brief description of the drawings

[0020] These and other purposes, characteristics and advantages of the invention will be clear from the following description of some preferred embodiments thereof, given as a non-restrictive example, with reference to the attached drawings, wherein:

Fig. 1 is a first scheme that shows the various steps of a process, according to the present invention, for decorating an article, namely a tile, by using a ceramic toner, and the apparatus used for implementing and carrying out such process;

Fig. 2, composed by sections (to), (b), (c), (d) and (and), shows, with reference to the tile of Fig. 1, represented in perspective way and enlarged scale, the advancing of the relative process of decoration according to the invention;

Fig. 3 is a further second scheme directed to specify some aspects of the process of decoration of Fig. 1, when the decoration is applied on a raw article constituted of a material in powder form; and

Fig. 4 shows schematically a possible variant of a step of the decoration process of the invention of Fig. 1.

Detailed description of some preferred embodiments

[0021] Fig. 1 shows in a schematic way the various steps of the process of the invention for decorating an article and the apparatus used in such process.

[0022] In the preferred forms of realization here described, the final article that is produced at the end of the process consists typically of a decorated tile, in turn essentially constituted of a ceramic material and/or other materials, as normally used in the manufacture of tiles.

[0023] However it is understood that the present process can also be extended and applied for the production and decoration of other types and kinds of articles, without departing from the scope of the invention, as also for producing articles made of material different from ceramics, as for instance glass, iron, aluminium, plastics, and others.

[0024] It is also pointed out that that the term "raw article", indicating a crude article that has not yet been decorated, has to be interpreted, at least in the context of the present invention, in a broad way, so as to comprise in addition to a raw or crude article constituted of material in a consolidated form, also a raw article constituted of

a material in form of powder not yet consolidated, or only partially consolidated, as described more in detail in the following.

[0025] The process uses, as starting and basic component, a support sheet, indicated with 210, which is for instance constituted of paper, namely of cellulose or a similar material, wherein this support sheet 210 is provided for receiving, during a printing step, a decoration or image 220, formed with a ceramic toner and suitable for decorating the article, as thereafter described in detail.

[0026] The support sheet 210 is preliminarily subjected to a special treatment which is such as to confer to at least one of its two faces, and specifically to that one on which the decoration 220 will be printed, the capability of releasing, at contact with the article to be decorated and following the application of a determined pressure and/or and level of heat applied in such contact zone, the decoration of ceramic toner printed on the support sheet 210.

[0027] For instance this special treatment, which as before said is such as that the printed decoration 220 does not adhere, but instead detaches from the support sheet 210 for being transferred on the article, as effect of the application of a determined pressure and/or level of heat, consists in coating, typically by a coating or smearing or similar operation, the face or surface of the support sheet 210, provided for receiving successively the decoration 220, with a material or substance, as silicone, having anti-adhesive or similar properties, so as to form on such face a layer or coating of silicone, of appropriate thickness, exhibiting anti-adhesive characteristics, and for this reason also called anti-adherence coating or layer.

[0028] For clarity, Fig. 2 shows separately in the respective section (a) the support sheet 210, which has preliminarily been coated, by such coating operation, along its printing face or surface 210c with the material having anti-adhesive property, so as to form the anti-adherence layer, indicated with 210d, of silicone or equivalent substance.

[0029] In a first step of the process, a single support sheet 210, which has been already submitted to the above special treatment and is therefore provided with the anti-adherence layer 210d, is fed, for instance from a respective reserve 211 constituted by a plurality of support sheets 210, to a digital printing system, indicated generally with 212, of known type, where the effective printing of the support sheet 210 is carried out.

[0030] In detail the printing system 212 prints on the face 210c of the support sheet 210 an image or decoration 220 which corresponds to the decoration to be reproduced on the final product, i.e. the final decorated tile, that is obtained at the end of the process, as it will be better described in the following.

[0031] For clarity, Fig. 2 shows in an enlarged scale in the section (b) the printed support sheet, indicated with 210a, which is released by the printing system 212 and therefore bears, on its print surface 210c coated with the

anti-adherence layer 210d, the printed decoration 220.

[0032] The printing of the decoration 220 on the support sheet 210 is generally carried out by using a composition, indicated with 212b, normally in form of powder and widely known with the term "toner", and more precisely by using a special and appropriate type of toner containing ceramic pigments, and for this also called "ceramic toner", which is suitable for being fixed on the support sheet 210, treated and coated with the anti-adherence layer 210d, during the step of printing the decoration 220.

[0033] To this purpose, as schematized in Fig. 1, the printing system 212 includes feeding means, generally indicated with 212a, which have the function of advancing the support sheet 210, during printing, along a corresponding path 212c; and a reserve, also schematized in Fig. 2, which has the function of supplying the toner 212b to printing means, arranged along the path 212c, that are provided for transferring and fixing the toner 212b on the support sheet 210, so as to print on it the decoration 220.

[0034] The printing system 212 is, as already said, of known characteristics, and therefore it will not be described in detail, making reference for which not expressly here described to the usual information in the availability of the technicians of the sector.

[0035] For clarity it is only specified that the step of printing the support sheet 210 is preferably carried out in a digital way, and in particular it is based on reprographic and printing technologies of the laser or LED type.

[0036] In turn the ceramic toner 212b used in the printing system 212 is prepared in such a way that its composition and properties are selected and appropriate for the use in the process of decoration of the present invention.

[0037] In detail the ceramic toner 212b is prepared so as to exhibit a firing temperature compatible with the firing temperature of the material of the decorated tile that has to be produced, as it will better understood in the following.

[0038] Moreover the specific composition of the ceramic toner 212b, which usually comprises an organic binder and a ceramic pigment, is defined so that the toner ceramic 212b exhibits optimal characteristics in relationship to the special structure and anti-adhesive property of the sheet of support 210, and in particular allows to obtain a printing of good quality of the image of toner on the support sheet 210, as also an optimal transfer, because of the application of pressure and/or heat, of the printed image from the support sheet 210 to the article, as subsequently described in detail.

[0039] For instance, in this composition, preferably the organic binder is in a percentage which varies from 20 to 90% in weight, and the ceramic pigment is in a percentage which varies from 2 to 60% in weight of the composition.

[0040] Moreover the ceramic toner 212b can contain, in addition to the organic binder and the ceramic pigment,

a melting substance as a flux.

[0041] In a following step, the printed support sheet 210a is moved to a transfer station 213, schematized in Fig. 2, distinct from the printing system 212, where a raw article, i.e. an article to be decorated and for instance constituted by a raw tile 214, is supported on a fixed member 213b of the transfer station 213.

[0042] In the transfer station 213, the printed support sheet 210a is arranged above a corresponding surface, of the raw tile 214, intended to be decorated with the decoration 220, with the print face 210c, of the support sheet 210a, bearing the decoration 220, into direct contact with such surface of the raw tile 214.

[0043] For clarity, Fig. 2 shows in enlarged scale in section (c) the raw article 214 with the printed support sheet 210a arranged, along the respective print face 210c, above and into direct contact with the raw tile 214, and therefore with the face 210e of the support sheet 210a, opposite to the print face 210c, faced to the outside.

[0044] The arrows f1 indicate symbolically the step of arranging the printed support sheet 210a on the raw tile 214, in the transfer station 213.

[0045] At this point, a mobile pad or a similar pressure member or element, movably axially, indicated with 213a, of the transfer station 213, is closed above the support sheet 210a, as represented with continuous and dash-dot line in Fig. 1, so as to apply between the support sheet 210a and the raw tile 214, supported by the fixed member 213b, a determined pressure P, thereby causing the transfer of the printed image 220 from the same support sheet 210a to the raw tile 214.

[0046] The pressure P applied between the support sheet 210a and the raw tile 214, that is suitable for causing the transfer. from one to other, of the decoration 220, can be selected within a broad range of values, depending in particular on the type and the characteristics of the anti-adherence layer 210d coating the surface of the support sheet 210.

[0047] For instance preferably this value of the pressure P is greater of 50 gr/cm².

[0048] For clarity, Fig. 2 shows in enlarged form in the relative section (d) the pressure member 213a, when it is arranged above the support sheet 210a, in order to press it against the raw tile 214 with the determined pressure P, thereby causing the transfer of the image 220 of ceramic toner on the raw tile 214.

[0049] Then, after the transfer of the decoration 220 on the raw tile 214, the pressure member 213a is lifted from the support sheet 210a, as clearly shown by arrows f2 in Fig. 2 at respective section (e).

[0050] At the same time, the support sheet 210, lacking in the decoration 220, is eliminated, as represented by an arrow f3.

[0051] Therefore, in this way, a decorated raw tile, indicated with 214a, is obtained, which bears on its surface, after the transfer from the support sheet 210a, the decoration or image 220 formed with the ceramic toner 212b.

[0052] It is also clear that, in the process of the inven-

tion, the step of transferring the image or decoration 220 on the article or raw tile 214 occurs in a transfer station 213, that is separated and distinct from the printing system 212, in which the step of printing the support sheet 210 is executed, as before described.

[0053] Then, the decorated raw tile 214a is moved and transferred to a firing station 216, schematized in Fig. 1 and comprising a heat source 216a, where the raw tile 214a is fired during a corresponding firing step, which characteristics will not be described in detail since being widely known in the art.

[0054] It is only specified that during this final firing step, carried out inside the firing station 216 at an appropriate temperature, indicated schematically with °C in Fig. 2, and in any case within a field of temperature suitably selected, the basic material constituting the raw tile 214 acquires the definitive structural cohesion, while at the same time the ceramic toner forming the image 220 becomes molten, so as to be fixed on and integrate itself with the superficial structure of the tile 214, thereby obtaining the decorated final tile, indicated with 214b.

[0055] As already pointed out, the concept of the present invention must not be limited to the case in which the decoration of ceramic toner is transferred, as effect of pressure, on a raw article consisting of a material already consolidated, but it has to be interpreted in a broader way.

[0056] On this respect, in order to better specify the content of the Italian patent application N. BI2008A000022, in the name of the same Applicant, of which the present application claims priority, it will be described, with reference to Fig. 3, a further preferred embodiment of the process of decoration of the invention, in which the transfer, following the application of a pressure, of the image, formed with ceramic toner, from the respective support sheet, is carried out, instead that on a raw article constituted of material already consolidated, on a raw article not yet consolidated, and in particular constituted of material in form of powder.

[0057] For clarity of exposition, the following description will adopt numerical references increased of 100, in comparison to those already used for describing the preceding preferred embodiment, in order to indicate the parts and features of this further preferred embodiment of the process of decoration of the invention.

[0058] In this case the support sheet 210a, realized and printed in the same way as in the embodiment of the process, before described, is applied, in a transfer station 313, on a raw article 314 that, unlike the article 214, is constituted of a material 314' not yet consolidated, in particular in form of not consolidated powder.

[0059] In detail, this transfer station 313 include a pad 313a, or a similar member, and a fixed part 313b, that receives the material 314', in form of powder, of the raw article 314, wherein the pad 313a is pressed on the article 314 with a determined pressure P, so as to compress and consolidate the powder material 314', contemporarily to the transfer on the raw article 314 of the image 220

of ceramic toner.

[0060] Then the article 314a, so consolidated and bearing on its surface the image 220, is moved to the firing station 216, where it is fired, in a similar way and likewise to how before described with reference to the article 214, thereby obtaining the final decorated article 314b.

[0061] Therefore, in this way, i.e. by supplying the raw article 314 in form of powder, it is possible to obtain with only one pressing operation, in the transfer station 313, both the effect of consolidating the powdered material 314' of which the raw article 314 is constituted, and the effect of transferring the image or decoration 220, of ceramic toner, from the sheet of support 210a to the raw article 314 to be decorated.

Further embodiments and variants

[0062] It is clear that the present process for decorating an article, in particular of ceramics, can be the object of further developments over the embodiments before described, and that it can include changes and improvements, still falling within the scope of the present invention.

[0063] A first variant, represented in Fig. 4, refers to a different transfer station, indicated generally with 230, which, unlike the transfer station 213 before described, does not use a movable axially pad mobile, but instead a pinch roller 231, in order to apply the determined pressure P in the zone of contact between the support sheet 210a and the raw article 214.

[0064] In this first variants, the pinch roller 231 is driven to advance, while rotating, along and at contact with the support sheet 210a, arranged on the raw article 214, as represented with dot-dash-line and an arrow f4, so as to press with a determined pressure P the support sheet 210a against the raw article 214 and therefore cause the transfer on it of the decoration 220 printed on the support sheet 210a.

[0065] At the end of the transfer the sheet of support 210, deprived of the image 220, is evacuated as represented with an arrow f5.

[0066] A further variant refers to when the support sheet 210 has been preliminarily subjected, on the respective face provided for being printed with the decoration 220 of ceramic toner, to a specific treatment suitable for conferring to this face the capability of releasing and transferring the same decoration 220, once printed, on the article to be decorated, because of the application a determined level of heat, in turn usually corresponding to the attainment of a pre-set temperature.

[0067] In this case the transfer station 213 can comprise, in alternative or additionally to the means for applying a determined pressure P between the support sheet 210a and the raw article 214, also specific heating means suitable for heating, in particular at a determined temperature, the support sheet 210a in the zone of contact with the raw article 214, so as to cause the transfer

on it of the image 220 from the support sheet 210a, as effect of the supplied heat and of the determined temperature so obtained in this contact zone.

[0068] For instance, these heating means can be advantageously associated with the pad 213a of the transfer station 213, so as to apply, together with the determined pressure P, also the level or quantity of heat that is necessary for heating the support sheet 210a at the determined temperature corresponding to the detachment and transfer of the image 220 from the support sheet 210a.

[0069] Besides, in this embodiment, the level of heat applied to the support sheet 210a can be such as to considerably reduce the value of the determined pressure P to associate to the level of heat in order to cause the release and the transfer of the decoration 220 on the raw article, and also such as to be sufficient by itself for causing this transfer, thereby making superfluous the application of the pressure P.

[0070] Therefore, these heating means can operate alone or in combination with the pressure means for applying the determined pressure P, in the common purpose of causing the transfer of the decoration 220 from the support sheet 210a to the article 214 for decorating it.

[0071] Still, the silicone or similar materials adapted to confer to the support sheet 210 the capability of release the image of ceramic toner, because of a determined pressure and/or level of heat, can be integrated and mixed in the basic material constituting the support sheet 210, instead of being deposited or smeared in form of layer or coating on the respective surface that will be printed with the decoration 220.

[0072] Besides the present process for decorating an article, based on the application of a determined pressure or level of heat between the same article and a support sheet bearing a decoration, could be combined with and integrate a variety of other operations, subsidiary and complementary to the production of the decorated article, as for instance the enamelling, painting, coloration of certain surfaces of the article, and namely of that one intended to be decorated and therefore to receive the decoration from the support sheet.

[0073] For instance, the raw tile 214, before being moved to the transfer station 213, can be subjected to a preliminary treatment for receiving a layer of dye and/or enamel on the respective surface that will receive, in the transfer station 213, the image 220 from the support sheet 210a.

[0074] Still, when the pressing step of the process, causing the transfer of the image or decoration from the support sheet, is executed on a raw article not yet consolidated, namely in powder form, so as to also compact it at the same time of the transfer of the image of toner, the raw article so compacted can receive on its surface, before the entry in the firing station where it will be fired, other materials, as for instance enamel, and/or to be subjected to other treatments.

[0075] Finally, as already partly anticipated, the proc-

ess of the invention could be used not only for decorating articles as tiles, or in general articles of ceramics or of glass, but also for decorating totally different articles, as articles made of a metal sheet of iron, aluminium, or other materials.

Claims

1. Process for decorating an article (214b) comprising the following succession of steps:

- producing a support sheet (210) suitable for releasing, as effect of the application of pressure (P) and/or heat, a decoration (220) formed with toner, in particular with a suitable ceramic toner (212b), and printed on said support sheet (210);
- printing said decoration (220) on a print surface (210c) of said support sheet (210) by using said ceramic toner (212b);
- arranging the printed support sheet (210a) on an raw article (214; 314) to be decorated, with said print surface (210c), bearing said decoration (220), being into direct contact of said raw article (214; 314); and
- applying a determined pressure (P) and/or level of heat in the zone of contact between the printed sheet (210a) and the raw article (214; 314), thereby causing the transfer of said decoration (220) from said support sheet (210) to said raw article (214; 314), so as to decorate it.

2. Process according to the claim 1, wherein the step of producing said support sheet (210) includes the step of subjecting said print surface (210c), intended to be printed with said decoration (220), to a treatment suitable for conferring to it the capability of releasing, as effect of the application of said determined pressure (P) and/or level of heat, the decoration (220) printed on it and formed with ceramic toner.

3. Process according to claim 2, wherein said treatment comprises the formation on said print surface (210c) of a thin coating or layer of silicone or of a material having similar anti-adhesive properties with respect to toner.

4. Process according to the claim 3, wherein the formation on said print surface (210c) of said coating or layer having anti-adhesive properties is carried out by a coating or smearing operation.

5. Process according to the claim 1, wherein the raw article (314), provided for receiving the decoration printed on the support sheet (210a), is constituted at least partly of a material (314') in form of powder, in particular ceramic powder, whereby the powder of the material (314') constituting the raw article (314)

- is consolidated and compacted during the step of applying said determined pressure (P) on the printed support sheet (210a) into contact with the raw article (314), contemporarily to the transfer of said decoration (220) from said support sheet (210) to said article (314). 5
6. Process according to any one of the preceding claims, wherein the raw article to be decorated is of ceramic type, further comprising the following step: 10
- firing the article (214a) after the transfer on its surface of the decoration printed on the support sheet (210), so that to definitively consolidate the structure of said article and, at the same time, cause the fixing of said decoration (220) on the surface of said article (214b). 15
7. Process according to claim 1, in which the value of said determined pressure (P) it is inclusive in a greater field of 50 gr/cm2s. 20
8. Process according to the claim 1, wherein said article is a tile (214b) of ceramic material or a similar product, and the ceramic toner (212b) forming the decoration (220) printed on said support sheet (210) is selected so as to exhibit a firing temperature compatible with the firing temperature (°C) of said tile (214b) or of said similar product. 25
9. Process according to claim 1, wherein said ceramic toner (212b) is composed of an organic binder and a ceramic pigment, preferably with said organic binder being in a percentage from 20 to 90% in weight and the ceramic pigment being in a percentage from 2 to 60% in weight of the ceramic toner, and wherein said ceramic toner (212b) optionally comprises a flux. 30
10. Process according to claim 1, wherein the step of applying said determined pressure (P) is carried out by pressing a mobile pad (213a), or a similar element, against said support sheet (210a) arranged on said raw article (214), in a transfer station (213) that is separate from the printing system (212) in which the step of printing the decoration (220) on the support sheet (210) is carried out. 35
11. Process according to claim 1, wherein the step of applying said determined pressure (P) is carried out by moving (f3) a rotating roll (231) along and in contact with said support sheet (210a), with said rotating roll (231) exerting said determined pressure (P) on said support sheet (210a) arranged on said raw article (214). 40
12. Apparatus for decorating an article (214b) comprising: 45
- a printing system (212), in which a decoration (220) is printed, by using a ceramic toner (212b), on a support sheet (210) having the capability of releasing, as effect of the application of pressure (P) and/or heat, said decoration (220), formed with said ceramic toner; and
- a transfer station (213), distinct from said printing system (212), in which said support sheet (210a), after having been printed, is arranged on a raw article (214) to be decorated, with the print surface (210c), of the support sheet, bearing said decoration (220) into direct contact with said raw article (214), and in which a determined pressure (P) and/or a level of heat is applied in the zone of contact between the printed support sheet (210a) and the raw article (214), so as to cause the transfer of said decoration (220), of ceramic toner, from said support sheet (210) to said article (214), and thereby decorate it.
13. Apparatus according to claim 12, further comprising a firing station (216), where said raw article, after the transfer on it of the decoration of ceramic toner printed on the support sheet, is fired.
14. Support sheet (210a) on which it is printed, by using a toner and in particular a ceramic toner (212b), a decoration (220) for decorating an article (214, 214b; 314), **characterized in that** said support sheet (210a) exhibits anti-adhesive properties, so as to be suitable for releasing and transferring on said article (214; 314), at the contact with it and as effect of the application of a determined pressure (P) and/or level of heat in such contact zone, said decoration (220), of toner, printed on said support sheet (210a).
15. Support sheet (210a) according to claim 13, **characterized in that** comprises a superficial coating or covering (210d) of silicone or of a similar material suitable for conferring to said support sheet (210a) such capability of releasing and transferring the decoration (220), printed on it, on said article (214; 314), because of said determined pressure (P) and/or level of heat.

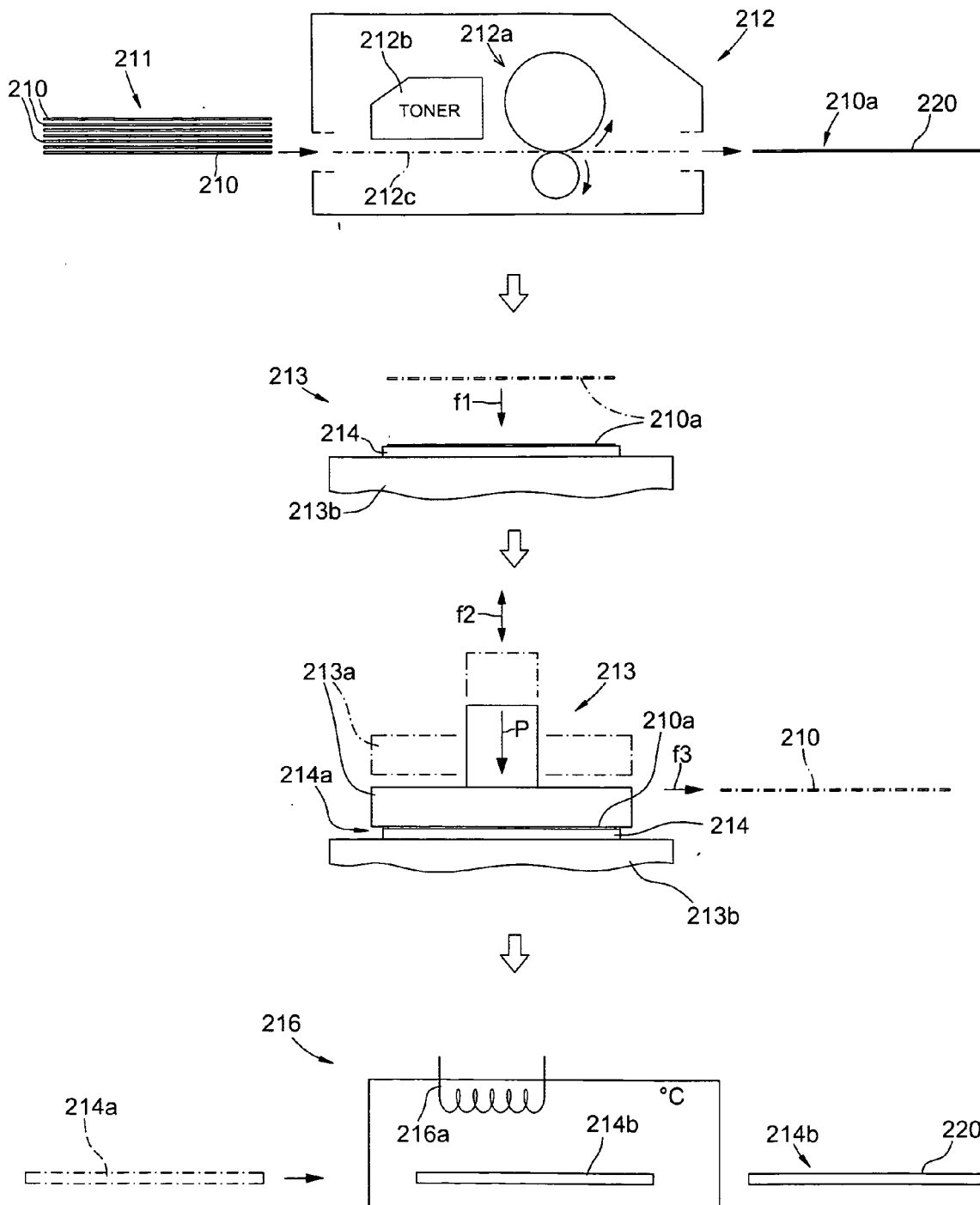


Fig. 1

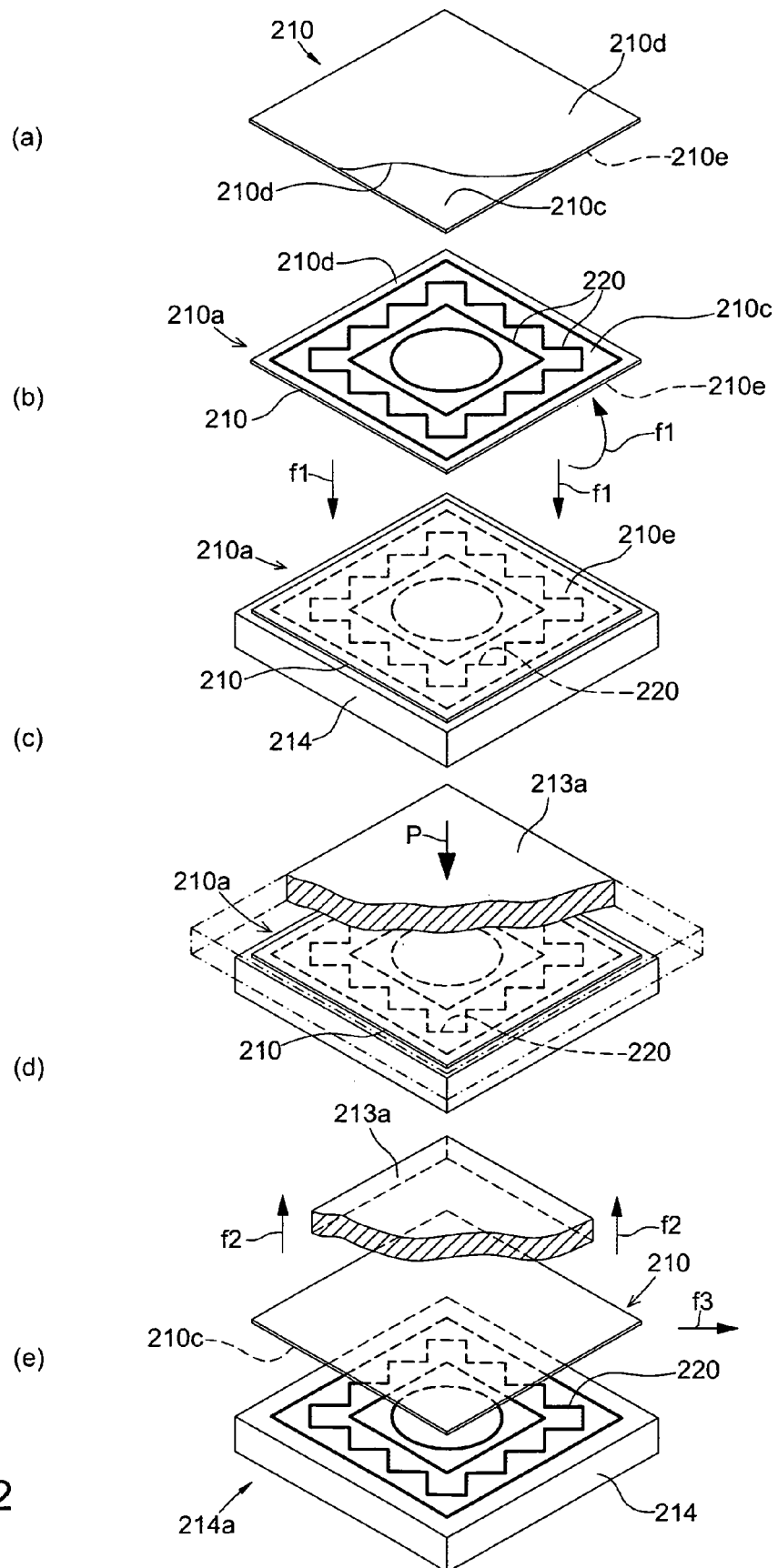


Fig. 2

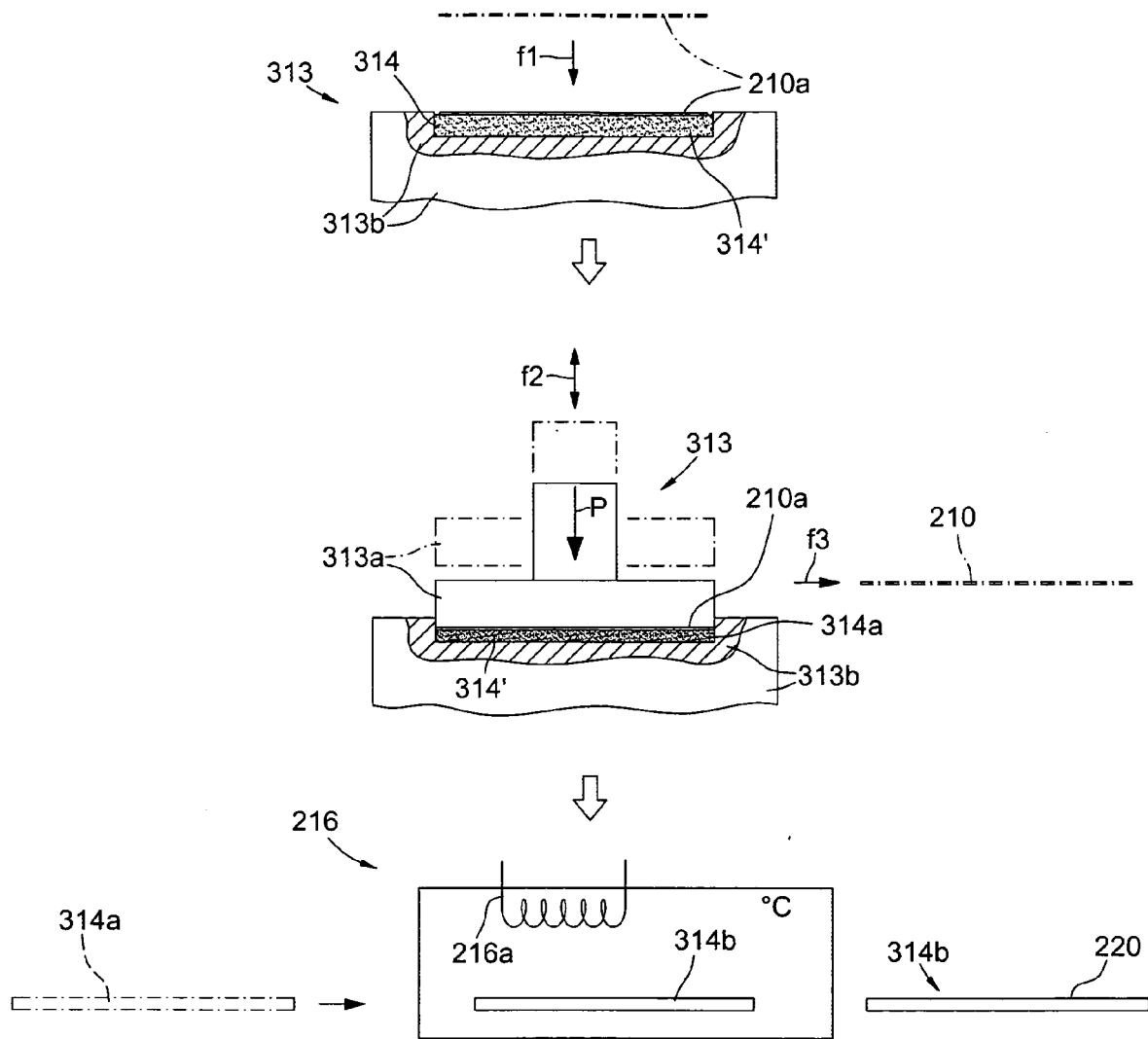
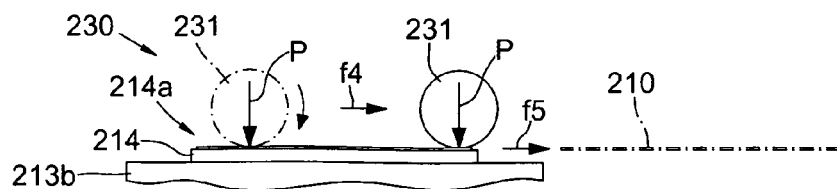


Fig. 3

Fig. 4





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Application Number
EP 09 01 4550

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