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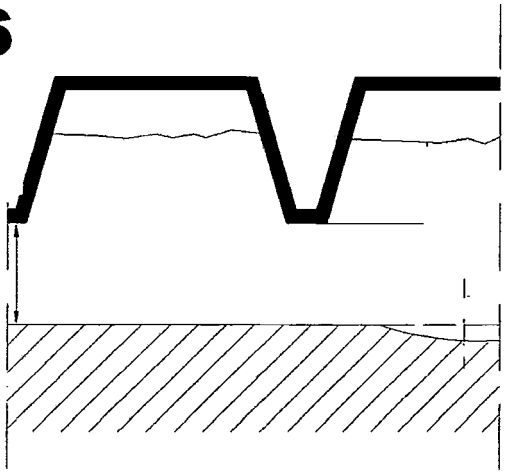
(54) **System for laying floors with rapid adjustment**

(57) Described herein is a system for laying floors allows the possibility to adjust height, flatness, alignment, slope and shape of the exposed surface during the installation directly on the support, quickly, both with manual and automated installation. It consists mainly in a floor and/or tile covering, that on its lower face, useful for the positioning on screed and/or slab, a structure is made integral in a cable box, even of a cubic form, filled with the adhesive for flooring, and on the bottom surface there is a hole that allows the release of the adhesive on the slab and at the outcome of solidification it forms a single body between lower side of the box and then of the tile, the adhesive for the flooring and the screed.

Fig.6



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Description

[0001] The system for laying floors allows the possibility to adjust height, flatness, alignment, slope and shape of the exposed surface during the installation directly on the support, quickly, both with manual and automated installation.

[0002] In the current state of the art it is defined a support the casting of unfinished concrete for floor slabs, not even finished or an even unfinished surface on which subsequently a floor can be placed.

[0003] To level out a flooring (i.e. to form a single body between the visible side and the support) an horizontal surface or a slope, methods used so far, make it necessary to spread the adhesive material (mortar, glue, etc..) between the surface to be coated (substrate support) and the chosen lining.

[0004] This implies that, altitude, slope or flatness and eventual shape (the cover being rigid and fixed support) are dependent on the state of the support, the on the quantity of substance placed between it and the lining and how it is allocated in space and on the ability to lay of the operator to form in the right way the filler material during the laying.

[0005] The main goal of this innovation makes possible to develop a system that facilitates methods, and reduces times, for laying of the coating directly on the support (either in manual installation as well as in automated laying procedures).It also , allows for greater ease of assembly; allows the exposed face of the coating chosen for the floor to take planarity, alignment, slope, altitude and any desired shape, regardless of the intrinsic characteristics of the support and/or coating and/or adjustment operations of the filler , decreases the thickness of the tile and the entire floor with a corresponding decrease of the loads and the weight of the entire slab so improving the static characteristics of the structure and increasing the volume available for the same interpolation, and finally it allows to lay floors of all types (tiles, thin tiles, parquet, marble, glass, stone materials, exterior finish materials for various panels, coated or equipped, floor heating modules, floating floors, etc..) directly on any surface and/or cast concrete and/or screed. The system provided by this invention is shown in the premises (figures no.1 - n.2). The logical premise is based on the concept that by taking a cable box , cube-shaped, with side "1" a hole of diameter "d" is made in the middle of one of the faces and filled the container with adhesive of viscosity "β". By lifting its punched face "h" distance will increase and the adhesive will tend to spread(within the limits of the characteristics of the system "l" "d" "β" as oil spot

[0006] Lifting its punched face , the distance "h" will tend to increase and the adhesive will tend to spread (within the limits of the characteristics of the system "1", "d", "β") as an oil slick. Continuing to distance the box from the support surface to a height of hmax such that a minimal amount of adhesive height "t" remains in box and the adhesive solidifies, in this position, form a single body including support surface and box, as shown in fig. 2.

[0007] As stated above, "h" can vary between 0 and hmax, depending on the diameter of the hole, viscosity 'β' and the amount (at most equal to the volume of the cavity of the box, and then depending on the side "1") of adhesive

[0008] In conclusion then placing the filled box on a supporting plane and taking it to a distance less than or equal to hmax, the adhesive inside the cubical box will come out partially and in time (depending on the adhesive) will solidify the base incorporating the box and the supporting plane making them integral.

[0009] This box represents the basic system for the application of the present invention, it in fact may have various shapes, volumes and materials, and number and shape of the holes can vary.

[0010] The tables No 3, 4, 5, 6 and 7 represent the most suitable way: a box with no face contact with the support, but with possible clamps at the sides, to improve the anchorage. In addition, the box can be filled with glue at the factory and with the content sealed (ie adhesive sheet to be removed before the laying at the time).

[0011] When planning the hollow body, the possible height difference to be overcome should be taken into consideration, to hold the maximum bending moment, the pressure exerted by the loads on the floor, which must be properly opposed by the reaction of the vertical faces of the hollow body of the tile, and also, the sum of the strength that the adhesive exercises on the horizontal section of the hollow body added to the frictional force between the adhesive and the vertical section drowned are to be considered.

[0012] However one of the solutions is size in an opportune manner the vertical faces of the hollow body, defining the distance, thickness, height and roughness, and the wings positioned along the perimeter anchor (anchors).

[0013] Moving on to a concrete description of the Laying a generic tile on a support (ie screed) admits that it is not completely level a difference distance "r ".

[0014] The system described above is constructed and positioned (box with glue, anchors system), at the four corners of the tile. For example, four cubic containers (as described in the introduction) the side "1" and hole diameter d, filled with adhesive viscosity 'β' and h> (r + t), which are made integral with the tile and / or producing a tile with already integrated boxes.

[0015] The boxes can be filled previously and sealed with adhesive, for example with a sheet stuck to the cap, to detach at the time of laying and/or filled at the time of laying the tile and then merely lean on the screed .

[0016] The adhesive, after the tile is resting on support, will be hindered in escaping from the opposition to it.

[0017] During the laying of the lining, to obtain a final surface exposed to the desired height and level, we proceed by using shims between the support (eg screed) and boxes integral with the tile, and then solidifying the

adhesive, the tile will joint to the support with the visible surface at the planarity and altitude imposed by the shims.

[0018] The adjustment of the shims can vary ,as one likes, within the limits of the report of height, both the altitude that the plan to view, presenting itself perfectly horizontal or with the chosen slope.

[0019] Now concerning static conditions it should be clarified that the surface of the visible face of the lining (which we have generalized calling tile), is subject to flexing moments generated by the distance of the bearings (including cube and cube or between the vertical faces of the cubes). The flexing moment applied to tile depends on the "cell", especially on the side of its base because both the cells and the cell system to be taken will vary depending on the material chosen and the loads they carried.

[0020] In fact, the face in contact with the support can be determined by the anchoring system more convenient.

[0021] System for laying of the floors with rapid adjustment for the part in contact with support, can be realized in any form, according to the needs of applications, of the capacity about integrity with the adhesive to the support and being physical support (as demonstrated in hollow cube);) at the same time, the sides of the hypothetical form cavities in the structure, which can be used as box of adhesive, of gripping to the adhesive and physical support to the pavement to be applied to the screed (as shown in the cube cable) support.

[0022] If you wish the operation of "filling" (to be done at the factory and/or on-site) laying of the adhesive may be replaced by its direct spreading on the support; in this case subsequently there will be the application of the system of laying floor with rapid adjustment (even already solidarized to the tile) on the support.

[0023] To explain the functioning in the first analysis it should be spreaded on the support a layer of self leveling glue with its visible face that overhangs all the points of support.

[0024] After the spreading of adhesive the flooring, including the system for floors laying with rapid adjustment, it is possible to lean on the support and to level the visible face of the lining by placing, as previously described, the shims between the support and the system of floor laying with rapid adjustment.

[0025] This system is also designed to level the visible surface, and has no substantial interference with the cementing of the upper face; therefore the property of being self-leveling the cementing can be disregarded. By doing so there will be the possibility to choose or design a glue or adhesive which can be spread without the need to be self-leveling.

[0026] And moreover, the shape of the system of rapid adjustment with the laying of floors, can interface with glue, without necessarily being a container, see fig. No 3 4, 5, 6, and 7.

[0027] Shim indicates a wedge that is interposed between the support and the lining of the floor of the system with of the laying of the floors with rapid adjustment and this provides the ability to functionally regulate the distance between the visible surface and support.

[0028] The system of laying of the floors with rapid adjustment being modular, provides that the various contiguous modules interface with each other, using layers, grafted with one another, making a unique final surface.

[0029] The coupling system between two adjacent modules can be part of the form or a "control" separated from the module to be applied during assembly. The fig. 9, 10 and 11 show the "regulators" and Fig. 4, a system with the appropriate regulatory arrangements of the accommodation along the four sides of the module.

[0030] After the laying on the support, all adjustments can be made (planarity, height, etc.).of the visible face, turning clockwise or counterclockwise the screw contained in the controller.

[0031] All the above features, related to the use of the shim (wedge), are now dependent on the adjustment of the altitudes or by adjusting of the screw.

[0032] The tile (and/or the system of laying of the floors with rapid adjustment) nearby (and applies to all sides) using the fixed arrangements and/or regulators, may have already placed adjacent and grafted, with the result of having an edge already autofilled and aligned to the tile previously installed; a controller (Fig. 11) can also supply the desired grouting between the two tiles. Consequently, if two tiles are mounted in succession with competing gradients along the line of adjacency a compluvium is achieved between these tiles; by inserting a strip of tiles in the compluvium, leaving to the first tiles the competitor slope, a channel drain is obtained; furthermore if a tiled perimeter is mounted and tiles are positioned on perimeter with a slope towards the surface, a shower plate is obtained. This method of installation can thus be automated using the Regulators.

[0033] The adjustment of the altitude is obtained a result to turn the screw in a clockwise or counterclockwise, depending on whether you should raise or lower it.

[0034] This operation can easily perform by an installer, but can also be automated and managed remotely. Case of the first tile (or the first module):the module is to be laid and the four controls should be placed at the four corners; then each control (screw) must interface itself to an automated screwdriver; this latter must be driven by a self-leveling station (already exist in the market with data transmission and laser beam reference plane); from the station the screw position can be registered, obtaining the desired position, planarity or slope of the assembly; furthermore to add another module we should join a side of this module to the controls of the first module; the common edge has the same altitude of the first fixed module; the regulator of the opposite edge should be adjusted accordingly, and so on until the completion of paving.

[0035] Of course the system described here, needs a prior calculation of the altitude and of the planarity to be imposed for the covering to be laid in place on the support.

[0036] Another solution can arise, making the controls (and/or the grafts) with no screw.

[0037] In this case one must proceed by laying the entire floor and subsequently an adequate number of implants and/or manual or pilotable positioners (like mini pulleys) should be joined to the tiles; these implants must be linked to fixed points at the top; therefore, giving a command a pull takes place, consequently the point of the linked floor will go up and with it, as a result of the regulators, all the adjacent linked modules will also go up; when a relaxation is performed, the floor will drop accordingly.

[0038] Depending on the number of modules and positioners you can automatically get the predetermined final disposition of the entire paved surface.

[0039] The same conclusion can be reached if under the system floors laying with rapid adaptation the wireless controllable height adjusters are positioned.

[0040] The positioners can be: a) with manual recording b) operated individually on site or remotely; c) operated in groups on site or remotely; d) manoeuverable in its entirety on-site or remotely, e) have all characteristics described above or combinations thereof.

Claims

1. Floor and/or tile covering, **characterized in that** on its lower face, useful for the positioning on screed and/or slab, a structure is made integral in a cable box, even of a cubic form, filled with the adhesive for flooring, and on the bottom surface there is a hole that allows the release of the adhesive on the slab and at the outcome of solidification it forms a single body between lower side of the box and then of the tile, the adhesive for the flooring and the screed.

2. Floor covering and/or tile, also as in claim No. 1, **characterized in that** on the lower face, useful for positioning on the support and/or the slab, is made an integral structure in the form of shanks, Curvilinear, in the shape of inverted "T", in the shape of "V" shaped splayed, even with clamps, and that these forms are functional to the insertion of shims for leveling (controls) .

3. Shim of leveling **characterized in that** it is in the form of parallelepiped, inclined plane, or in the shape of inverted "T", with in the center of an adjusting screw placed vertically, and that this shim can be interposed between the support and the floor covering with a structure as indicated in claim No. 2 in order, to adjust the distance between the exposed surface and support.

4. System for installation of floor coverings even rough and even in the presence of a difference of height and planarity of the slab, **characterized in that** during the laying of the covering, to obtain a final surface exposed to the desired height and leveled, one proceeds using the shims as specified in claim No. 3, between the screed and the coverings with a structure as indicated in claim No. 2, and then solidifying the adhesive will make the tile integral to the support with the exposed surface with the height and planarity imposed by the shims.

5. System for installation of floor coverings even rough and even in the presence of a difference in height and planarity of the slab as in claim No. 4, **characterized in that** the shims as claimed at No. 3 are modular and pluggable each other and / or between different tiles with the arrangements of the claim No 2, so as to interface with each other, making the final surface a unique piece.

6. Shim of leveling, even as in claim No. 3, **characterized in that** that the regulation of the screw and of the height can be controlled remotely in a completely or partially automatic way.

Fig. 1

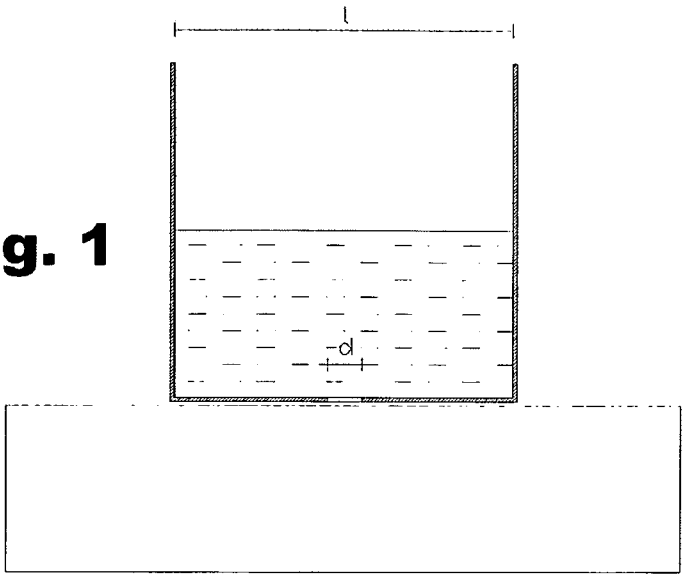

Fig. 2

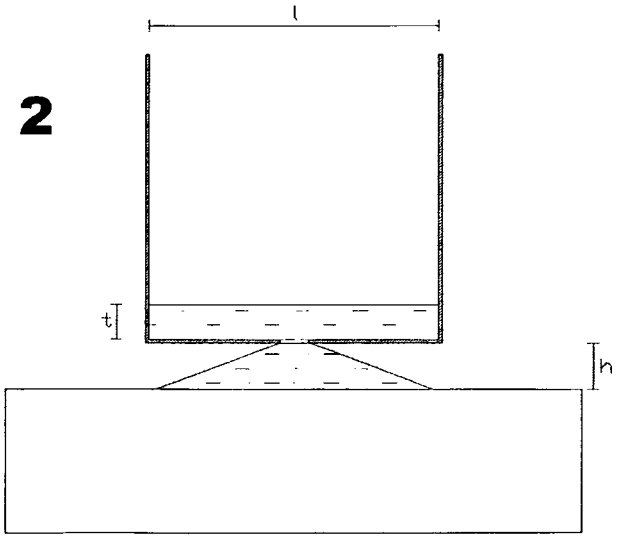

FIG. 3

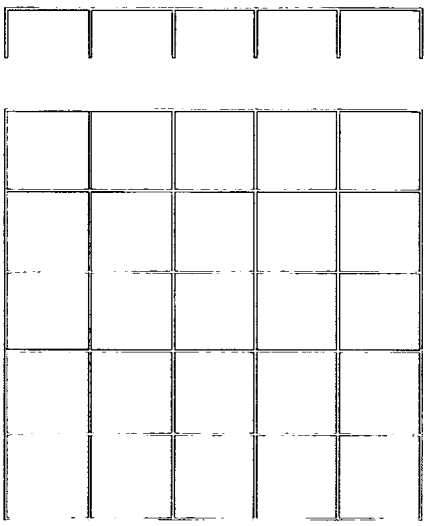

FIG. 4

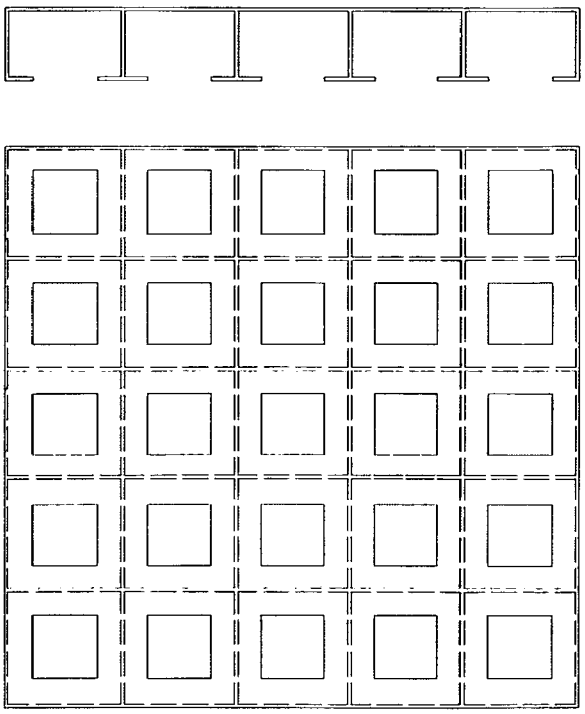

Fig. 5

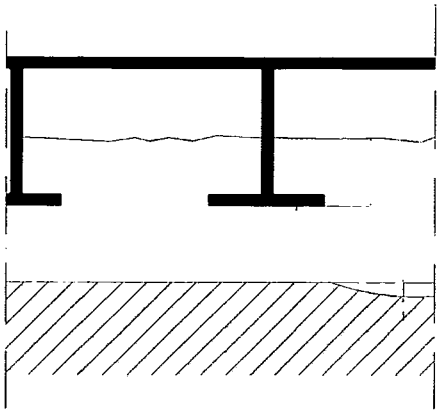

Fig.6

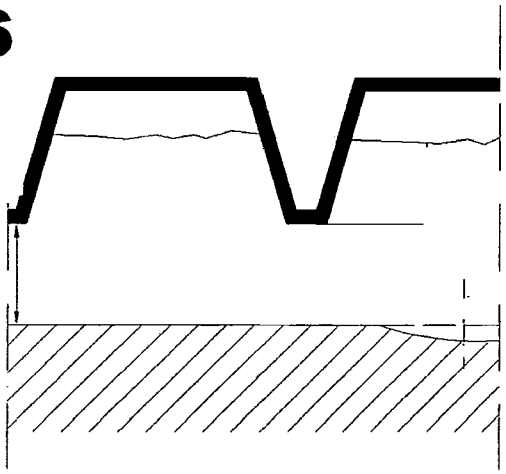

fig.7

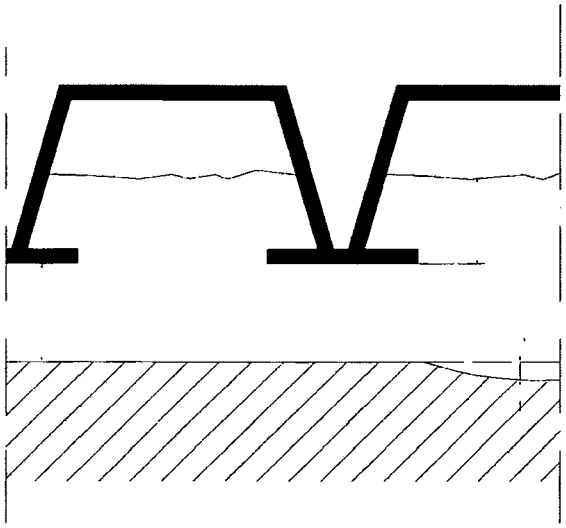

Fig. 8

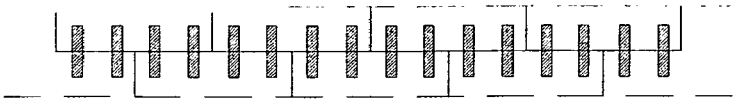

fig.9

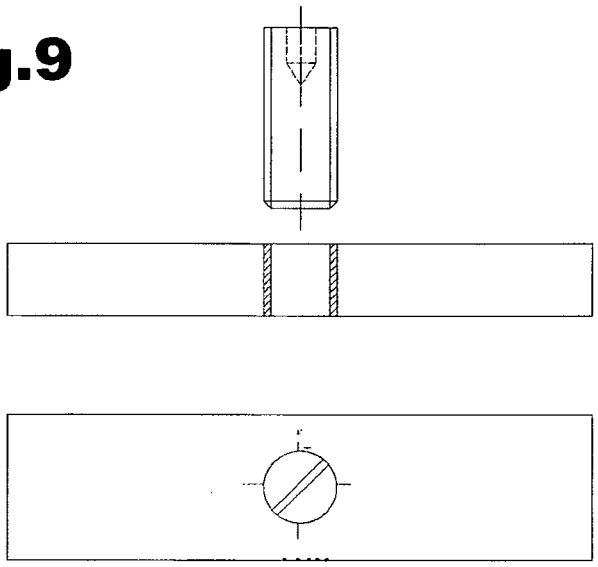

fig. 10

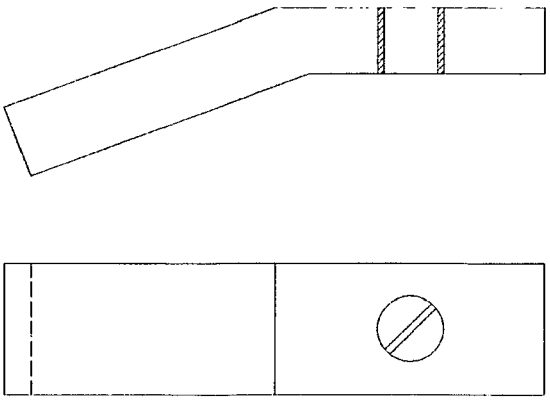

fig. 11

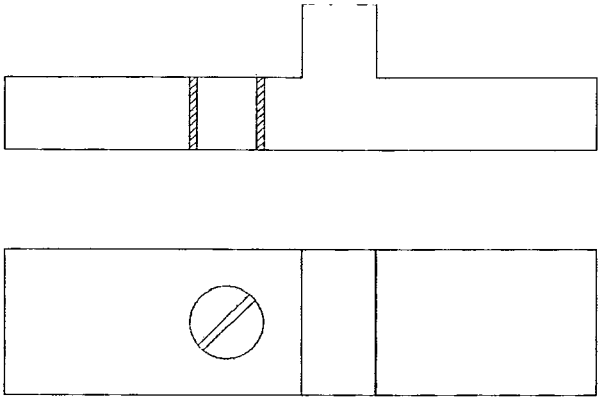

Fig. 12

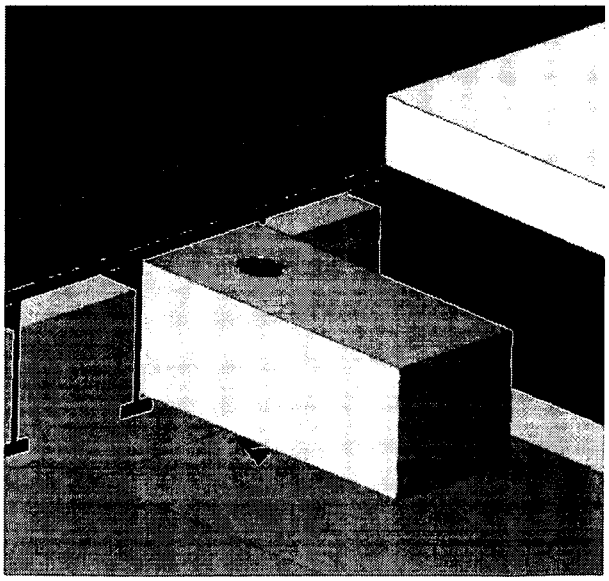

Fig. 13

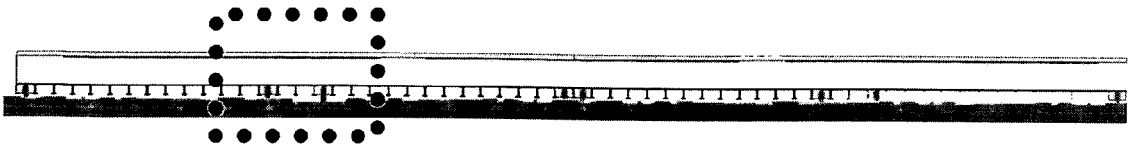

Fig. 14