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(54) ARRANGEMENT OF ELEMENTS IN AN ELECTRIC HEATING PLATE AND ITS MANUFACTURING PROCEDURE

(57) This invention reveals an arrangement of elements on a heater plate and its manufacturing procedures, where the plate is constituted for conductor elements and dielectric elements that it can cover any need of heat, either domestic, industrial, farming or livestock activities. The elements that make up the plate in industrial practice can be incorporated by a novel procedure that include some techniques such as serigraphy. The plate arrangement (10) is configured from a facing (30) and on this facing (30) it is impress a conductive paste on the two perpendicular conductive bands (40a) y (40b) joined together and arranged in such a way, that the band (40a) is larger dimensions than the length of the band (40b) and where also it impress a conductive paste on a third conductive band (60) parallel to the band (40a), Over the rectangle surface ABCD is covered with conductive paint (20)

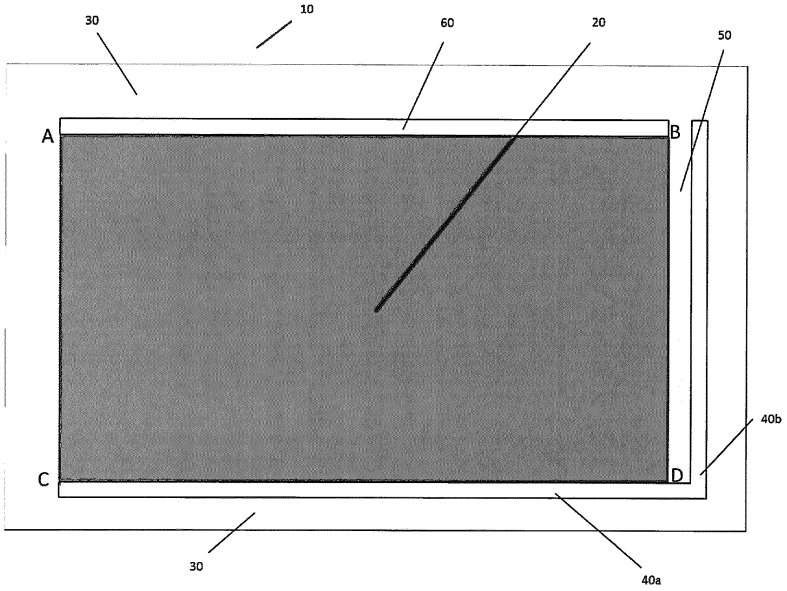

FIG 1

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Description

OBJECT OF THE INVENTION

[0001] The object of the present invention reveals an arrangement of elements in a heating plate and its manufacturing procedure, where the plate is constituted from conductive elements and dielectric elements, that can cover any need for heat, as whether domestic, industrial, agricultural or livestock activities, the elements that make up the plate industrially can be incorporated by a novel procedure that includes techniques such as serigraphy.

BACKGROUND OF THE INVENTION

[0002] A heater plate generally comprises an insulated substrate in which a resistive heater track is provided. Typically, an insulating layer of glass, ceramic or glass is provided on a metal base that has a metal plate, and the track is arranged on the insulating layer. This can be achieved by joining thin resistive material to the substrate or, more generally, by using printed circuit techniques where a resistive ink is placed on the substrate or by metal spraying, for example. The result of any of these techniques is a flat shape heater that can be conveniently formed, formed or joined to the base of a warming container. Resistive heating tracks can also be placed on non-flat substrates, such as tubular objects or other three-dimensional objects.

[0003] The EP-A-0574310 document describes an example of a water heating container that has a plastic body with a printed circuit board heater that forms its base. The electrical connection is made at each end of the spiral track, by wires that are attached to the track and connected to the power supply.

[0004] However, it is very difficult to produce printed circuit heaters with a constant resistance and consequently a constant output power. Variations in the thickness of the printed track, in the nominal resistivity of the ink and in the processing times and temperatures lead to variations in the final resistance of the track and, therefore, to the power in watts of the heaters. In practice, manufacturers do well to maintain power within + 15t of the nominal power. However, international electrical standards require that the power is within + 5 to-10t of the nominal value. Clearly, if the parts out of tolerance are simply rejected, as some manufacturers do, the scrap rate will be high, possibly 25, which is useless and costly.

[0005] It is the object of this invention to establish a manufacturing procedure that allows the proper connection between the conductive metal band and the conductive paint that acts a resistance element.

[0006] In the state of the art is known the patent EP555159, in which the heating element is a sandwich structure adherent to the sole. But this structure requires manufacturing time and precautions that lead to an insufficiently economic production.

[0007] It has been known enamelled steel plates on the inner side on which a thin film circuit or a printed circuit is deposited on the screen. But this process requires the use of sufficiently insulating vitreous compositions to withstand the voltage of the electrical sector. This type of enamel is deposited at high temperature incompatible with an aluminium substrate on one side, and secondly, the differential contraction after the firing of this type of enamel and the aluminium substrate induces voltages to which a flat sole adheres. Iron cannot withstand without deformation.

[0008] Patent FR1584094 describes a circuit deposited on an anodised aluminium substrate. But this realization in which the layer of alumina reaches only a few microns is not suitable for a circuit that works to the voltage of the electrical sector. In addition, the use is limited to lower temperatures than those of an iron sole.

[0009] Document EP120119 describes an aluminium substrate provided to receive a deposited electrical circuit. A thick layer of anodized alumina provides electrical insulation with silicic obstructions. But if this substrate can receive an electrical or electronic circuit, there is no indication that it is adapted to withstand temperatures as high as those experienced by an iron sole.

[0010] Document EP058023 also describes an obstruction treatment of an anodized aluminium substrate. The alumina layer is clogged with a polymerized organometallic product, for example, by heating. But the sealing treatment required to obtain a good dielectric resistance does not constitute a redundant safety and does not assume resistance to thermal shock that finds an iron.

[0011] Patent FR2763780 describes a method for manufacturing printed circuits on an aluminium substrate where a thick layer of alumina is formed on the surface to serve as insulation and can withstand high temperatures without the appearance of defects. The pore blockage is not mandatory. However, if the circuit can work when the substrate is elevated at high temperature, it is specially adapted to support the implementation of integrated circuits or modules. These components, which help to cool down, do not have by far, instantaneous variations of power and temperature of an iron sole.

[0012] Document US3805023 describes a heating element that has an anodized aluminium substrate. The alumina layer obtained in a weak acid bath, is dense in contact with the substrate and is an electrical barrier, while the outer layer is porous. In the porosities, a light sensitive product containing a precious metal was deposited which serves, after irradiation through a negative and development, as a catalyst to a chemical deposition of the nickel conducting track.

[0013] Document US-A-5.943.799 describes a heating element for an iron sole with an insulating inner layer comprising heating tracks, a substrate consisting of an aluminium plate and an external oxidation insulating layer. Aluminium formed by electrolytic oxidation and serves as an antifriction layer.

[0014] One of the problems that exist in the state of art is the disposition of the tracks and their form, for example,

a smooth copper track results in a poor adhesion of the conductive paint that tends to withdraw before drying on the metal surface establishing a bad feed contact. In part, this problem has been solved in the state of the art by looking for varnishes or other substances that are added in a third layer that serve as an interface between the conductive band and the conductive paint. Some of these varnishes or substances are mixed with the same conductive paint to achieve the appropriate degree of contact between the conductive band and the conductive paint. In any case it is necessary the application of a third band that avoids the problem of the bad connection between the conducting track and the conducting paint. Another problem is the arrangement of the elements on the plate, since it has been determined in the whole state of the art, the loss of efficiency of the heating plate over the years by effects of the substrates that compose it.

[0015] This present invention solves the problem in a satisfactory way, since it presents an arrangement of elements in a heating plate allowing a high performance, as well as the manufacturing process for obtaining such a plate.

DESCRIPTION OF THE DRAWINGS

[0016] To complement the description being made and in order to help a better understanding of the characteristics of the invention, according to a preferential example of the practical realization of the invention, it is accompanied as an integral part of this description, a set of drawings in which with illustrative and not limitative character, the following has been represented:

Figure 1.-Shows a heating plate showing the disposition of the different elements

DESCRIPTION OF THE INVENTION

[0017] The object of the invention consists of a heating plate constituted in turn by two elementary plates. Each of the elementary plates consists of a nonconductive electric plate that serves as a resistant support.

[0018] The resistive component to be used is a conductive paint that offers a certain degree of resistance in such a way that the passage of the current through the painted band, dissipates energy in the form of heat achieving the desired effect: the generation of heat.

[0019] The electric power supply of the band painted with conductive paint is carried out by means of two metal tracks between which the conductive paint is interposed. These metallic tracks are the ones that polarize and feed the conductive paint.

[0020] The heating plate of the invention is composed of a facing or elemental plate composed of a nonconductive material, either mica, ceramic, glass, plastic or natural stone not electrically conductive. On it is configured a resistive circuit on its surface. The circuit is consisting, of at least, three conductive tracks, formed by the projection of three metallic bands, in particular constituted by a conductive copper paste. These bands feed the resistive surface, which is achieved by painting the surface between the bands with conductive paint, on the facing of resulting product, a dielectric varnish is printed in order to encapsulate the circuit and then is dried at 450 degrees Celsius.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] The plate arrangement (10) is configured from a facing (30) which can be rectangular, circular, square or similar, composed of a dielectric material such as mica, wood, ceramics, glass, plastics or natural stone, in such a way that it is not conductive electric. On the facing (30) a conductive paste is printed on two perpendicular conductive bands (40a) and (40b), united among themselves and arranged in such a way that the band (40a) is of greater dimensions than the length of the band (40b) and where it is also printed conductive paste on a third conductive band (60) parallel to the band (40a) and located at a distance (50) between the band (60) and the band (40b), in such a way that a rectangle of vertices is formed ABCD between of the band (40a) and the band (60). Over this rectangle surface ABCD is covered with conductive paint (20).

[0022] This plate can be used for the construction of a power supply electric heater. The heater must have the power supply that connects to the terminals of the plate used, and also of the means of protection so that, if possible, it is not directly accessible by the user, to avoid accidents.

[0023] The manufacturing process of the heating plate allows a wide line of automatic serigraphy, for which, the selected meshes have been determined according to the drawing that they will make on the facing, the material to deposit, the chosen dimension, power that will develop, temperature and final destination.

[0024] The line is fed automatically, in the first machine, the line prints the conductive copper paste , on the facing we have chosen according to its final utility, the conductive copper paste, we will use it to introduce the electrical energy in the system, automatically it passes the oven, the paste passes through a drying oven at 450°C

[0025] Once it leaves the oven, the future heating element is reprinted, this time it is printed with conductive paint, which will be deposited the precise amount for the destination to be used, developing the precise power and temperature once finished, this conductive paint is the one that will transform the electrical energy into heat; once printed, it is transported automatically to another oven, where it is dried, cured and stabilized at 450°C.

[0026] With the printed circuit of conductive paint on the corresponding facing (30) (heating element) and completely cured, it is automatically transported to another printing machine, which prints on the facing (heating element) a dielectric varnish, in order to encapsulate

the circuit, not allowing the leakage of electricity; automatically, the facing (heating element) is moved to another oven, which will dry the varnish at 450°C.

[0027] Printing and curing of the varnish, by means of an automatic transfer the facing (heating element) is carried to a new printing machine, which will print water epoxy paint on all the surface (heating element), with the layer necessary for the heating element to be submerged in water, without leakage of electricity, then through the transfer it passes through another drying oven, which dries the paint at 150°C, once dry, the transfer deposits the heating element in the storage area, once this process is completed, the heating element is passed back through the last printing machine to print the other side with water epoxy paint, with this last step the manufacturing process is finished, either in mica plates, ceramics, crystals, plastics, etc., then come the appropriate quality checks.

[0028] The operational steps in the manufacturing process are:

a) On the facing (30) the conductive copper paste is printed on the surface of the conductive bands (40a), (40b) and (60).

b) The resulting facing (30) with the printed conductive paste is inserted in a drying oven at 450 °C

c) On the facing assembly (30) and already dry conductive paste, it is printed of conductive paint (20) on the surface of the rectangle ABCD and inserted it in an oven at 450 °C

d) On the outcome of stage C) an electrical varnish is printed and inserted in an oven at 450 °C

e) All the facing surface is printing with water epoxy paint and inserted in a drying oven at 150° C

f) The heating element is stored and the e) stage is repeated

Claims

1. -Arrangement of elements in an electric heating plate including an isolated substrate in which a resistive heater track formed by three bands is provided which is **characterized by** the layout of the plate (10) is configured from a facing (30) and on that facing (30) a conductive paste is printed on two perpendicular (40a) and (40b) conductive bands, joined together and arranged in such a way that the band (40a) is larger than the length of the band (40b) and where the conductive paste is also printed on a third conductive band (60) parallel to the band (40a) and located at a distance (50) between that band (60) and the band (40b), such that a rectangle of ABCD vertices is formed between part of the band (40a) and the band (60).

2. - Arrangement of elements in an electric heating plate according to claim 1 which is characterized because the parament (30) is rectangular.

3. - Arrangement of elements in an electric heating plate according to claim 1 that is characterized because the parament (30) is circular.

4. - Arrangement of elements in an electric heating plate according to claim 1 which is characterized because the parament (30) is square.

5. - Arrangement of elements in an electric heating plate according to claim 1 which is characterized because the conductive paste is preferably conductive copper paste.

6. - Arrangement of elements in an electric heating plate according to claim 1 which is characterized because the surface of the ABCD rectangle is covered with conductive paint (20).

7. - Arrangement of elements in an electric heating plate according to claim 1 which is characterised because the facing (30) is composed of a dielectric material such as mica, wood, ceramic, glass, plastics or natural stone.

8. - Procedure for the manufacture of the heating plate according to claim 1, which is **characterised by** the following stages:

a) In the facing (30) the conductive cooper paste is printed on the surface of the conductive bands (40a), (40b) y (60).
b) The resulting facing (30) with the conductive paste printed is inserted in a drying oven at 450°C
c) On the facing assembly (30) and the conductive paste already dry, conductive paint is printed (20) on the rectangle ABCD surface and inserted in an oven at 450° C
d) On the results of the stage (C), an electrical varnish is printed and inserted in an oven at 450° C
e) It is printed on the whole of the facing surface (30) is printed with water epoxy paint and is inserted in a drying oven at 150° C
f) The heating element is stored and the (e) stage is repeated.

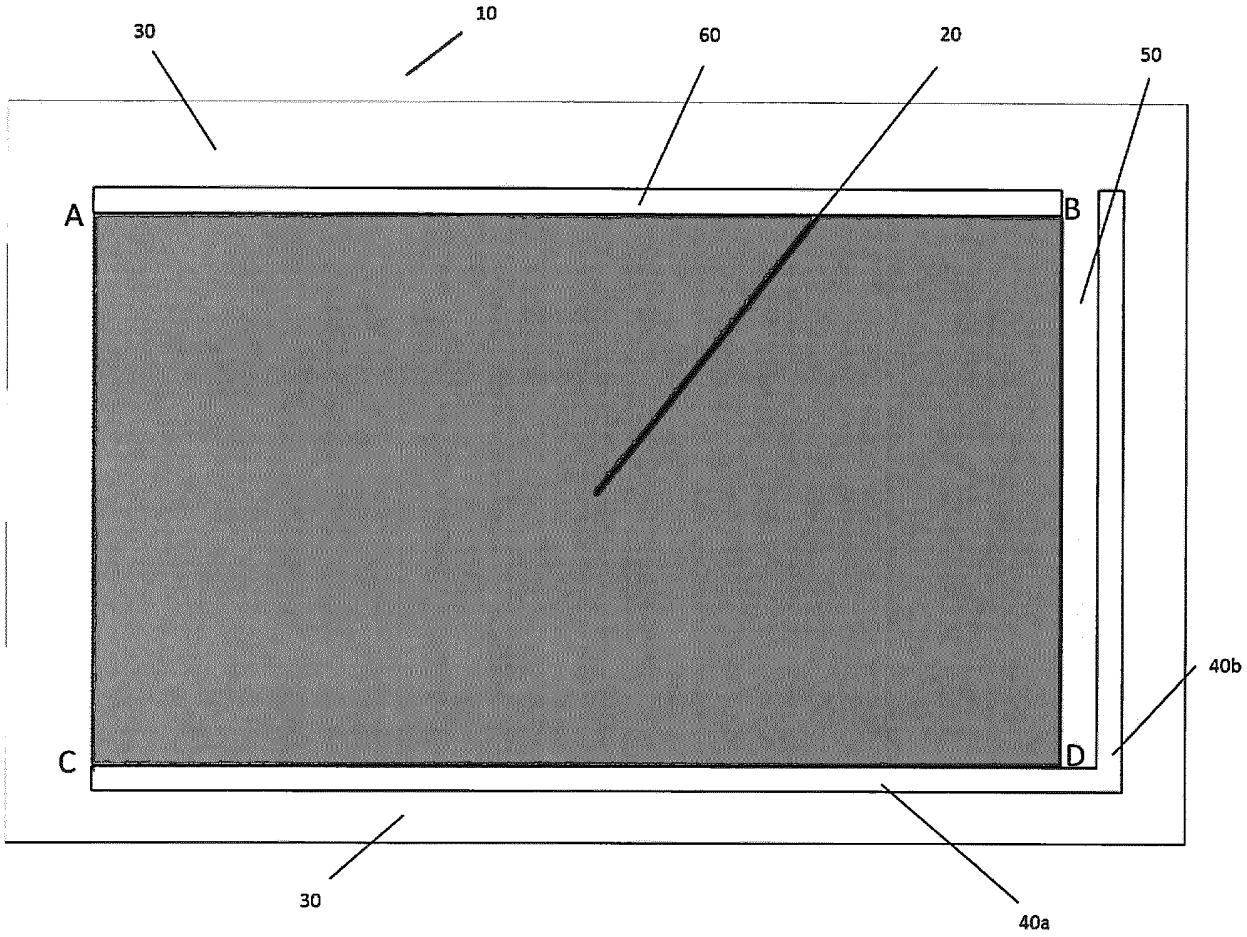

FIG 1

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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2452

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/009232 A1 (DATEC COATING CORP [CA]; OLDING TIMOTHY RUSSELL [CA] ET AL.) 25 January 2007 (2007-01-25) * page 1, line 13 - line 15 * * page 3, line 12 - line 17 * * page 8, line 5 - line 16; figures 1,2 * -----	1-8	INV. H05B3/26
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X	EP 2 081 413 A1 (SANCHEZ DUQUE DAVID [ES]) 22 July 2009 (2009-07-22) * paragraph [0001] * * paragraph [0017] - paragraph [0021] * * paragraph [0028] * * paragraph [0049] - paragraph [0052]; figure 2 * -----	1-7	
			TECHNICAL FIELDS SEARCHED (IPC) H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 October 2019	Barzic, Florent

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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29-10-2019

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