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(54) Varnishing furnace.

(57) A varnishing furnace (1) utilizing a plurality of near-ultrared radiation bulbs (2) alternatively arranged into a number of rows spaced apart by a distance on one side, both sides, or both sides and bottom of the furnace to form high temperature regions (3) and low temperature regions (4) alternatively disposed so as to increase varnishing quality, reducing working time as well as saving energy.

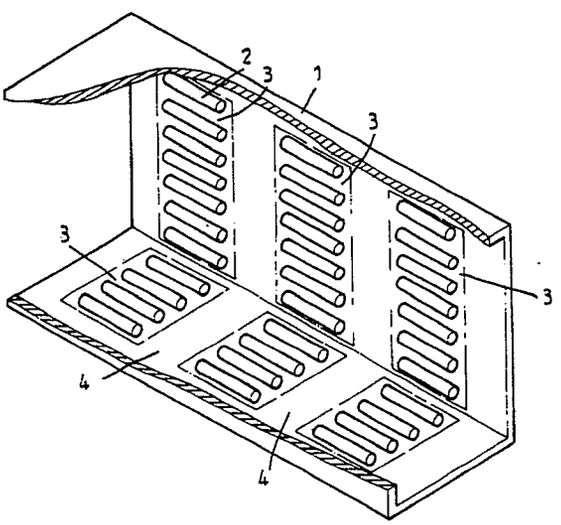

FIG.1

EP 0 378 731 A1

VARNISHING FURNACE

This invention relates to a varnishing furnace which utilizes specially arranged near-ultrared radiation bulbs to bake a workpiece.

The varnishing furnace on the market generally falls into three categories: the electric varnishing furnace, the gas varnishing furnace, and the medium-or far-ultrared varnishing furnace. However, the first two kinds of varnishing furnaces are seldom used due to their poor productivity, insufficient safety and high cost. Then, the medium or far-ultrared furnace, which is provided with medium- or far-ultrared radiation bulbs at one or both sides, becomes the most commonly used furnace for baking. Nevertheless, since the medium- or far-ultrared ray is rather long is wavelength, the penetration capability thereof is poor. Further, it requires a long period of time to raise the temperature and so it is impossible for them to dry the painting on the workpiece in a short period of time, thereby causing the following drawbacks:

1. Since the temperature rising rate is slow, it is necessary to have a long furnace so as to increase the baking time hence easily overheating the workpiece and causing the painting to become a layer of so-called skin.

2. Since the heat penetration capability is poor, the upper and lower layers of the painting will be subject to different temperatures and the solvent in the lower layer of painting and the upper layer of painting will require different periods of time to vaporize thereby forming so-called pin holes or wrinkels on the upper layer of painting on the workpiece.

3. Since the time for baking is rather long, the electricity cost will be increased and the chance for the dust particle to adhere to the surface of the workpiece will become greater.

4. Since the furnaces have a long body, it will be necessary to prepare a large space to accomodate them.

5. Since the medium- and far-ultrared rays cannot raise the temperature in a short time and have weak penetration capability, it will be difficult to bake the recess of a workpiece.

Anyhow, in case the medium- and far-ultrared radiation bulbs are replaced with near-ultrared radiation ones, the temperature will be raised in a short time but there will be the following two defects at the same time:

1. Since the near-ultrared ray will provide higher temperature, the painting on the workpiece will be easily overheated.

2. If the baking time is reduced in order to avoid overheating, it is easier to form so-called pin holes or wrinkles on the painting on the workpiece.

It is, therefore, an object of the present invention to provide a varnishing furnace which may obviate and mitigate the above-mentioned drawbacks.

It is the primary object of the present invention to provide a varnishing furnace which can dry the painting on the workpiece in a short time.

It is another object of the present invention to provide a varnishing furnace which may obviate the occurrence of so-called pin hole, wrinkle or dead point on the workpiece during baking.

It is still another object of the present invention to provide a varnishing furnace which may avoid the occurrence of so-called skin.

It is still another object of the present invention to provide a varnishing furnace which has a rather short body in comparison with the conventional.

It is still another object of the present invention to provide a varnishing furnace which is energy-saving.

It is still another object of the present invention to provide a varnishing furnace which can reduce the chance of dust particle in the air to adhere to the surface painting of the workpiece.

It is a further object of the present invention to provide a varnishing furnace which can make the painting firmly adhere on the workpiece.

The preferred embodiment of the present invention will be described in detail in conjunction with the accompanying drawings wherein like numberals refer to like or similar parts and in which:

FIG. 1 is a perspective view, partly broken, of a varnishing furnace according to the preferred embodiment of the present invention; and

FIG. 2 shows the working procedures of the present invention;

With reference first to FIG. 1, the varnishing furnace 1 according to the present invention is provided with three rows of near-ultrared radiation bulbs 2 on one side, both sides, or both sides and bottom thereof. There is a distance betweeen every two rows of near-ultrared radiation bulbs 2. Then, the space enclosed by or just in front of the near-ultrared radiation bulbs 2 forms a high temperature region 3 while the space between two rows of near-ultrared radiation bulbs 2 builds up a low temperature region 4. Looking now at FIG. 2, when a workpiece 5 enters into the varnishing furnace 1, the workpiece 5 is first preheated at a low temperature region 4 and then passed through a high temperature region 3. Since the near-ultrared radiation bulbs 2 can increase the temperature quickly, the temperature of the workpiece 5 will produce heat due to the vigorous oscillation between the

parties thereof and this will decrease the temperature difference between the upper and lower layers of painting on the workpiece 5. Hence, the time required for the solvent in the upper and lower layers of painting on the workpiece 5 to vaporize will be nearly the same thereby decreasing the occurrence of so-called pin hole and baking dead points. Further, the time difference between the solidifying of the the upper and lower layers of painting on the workpiece 5 will be diminished, avoiding the occurrence of so-called wrinkles. Thereafter, the workpiece 5 passes through a low temperature region 4 where the workpiece 5 is only subject to indirect heat through the air. This is because the near-ultrared radiation bulbs 2 has a short wavelength and small radiation range. Apparently, the temperature at the low temperature region 4 will be lower than that at the high temperature region 3. The low temperature region 4 is designed so that the temperature thereat is lower than that required for solidifying the painting on the workpiece 5. Meanwhile, the temperature of the workpiece 5 is gradually increased eliminating the time difference for the upper and lower layers of painting on the workpiece 5 to vaporize or solidify. Lastly, the workpiece 5 passes a number of high and low temperature regions alternatively diposed for baking.

Other embodiments and modifications will occur to those skilled in the art. No attempts has been made to illustrate all possible embodiments of the invention, but rather intended such alternations and further applications as illustrated herein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Claims

1. A varnishing furnace comprising a plurality of near-ultrared radiation bulbs alternatively arranged into a number of rows spaced apart by a distance on one side, both sides, or both sides and bottom of the furnace, thereby forming high temperature regions in front of the rows of the near-ultrared radiation bulbs and low temperature regions between the rows of the near-ultrared radition bulbs.

2. The varnishing furnace as claimed in CLAIM 1, wherein the low temperature region has a temperature lower than that required to solidify painting on a workpiece.

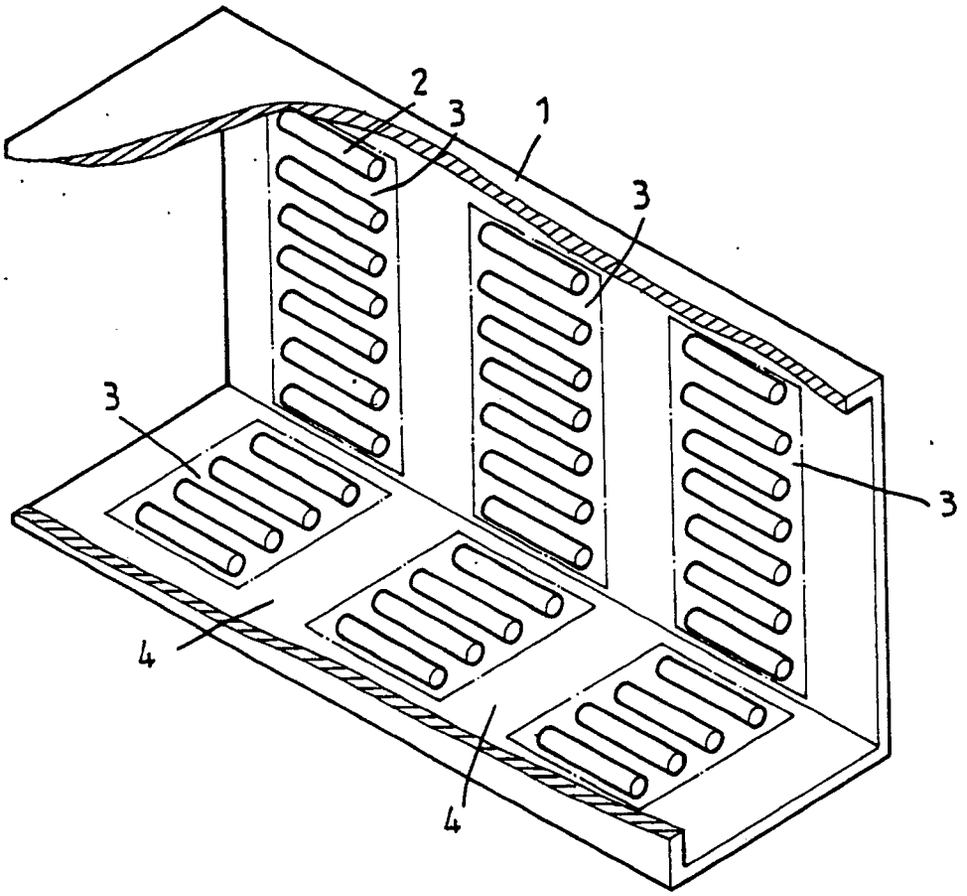

FIG.1

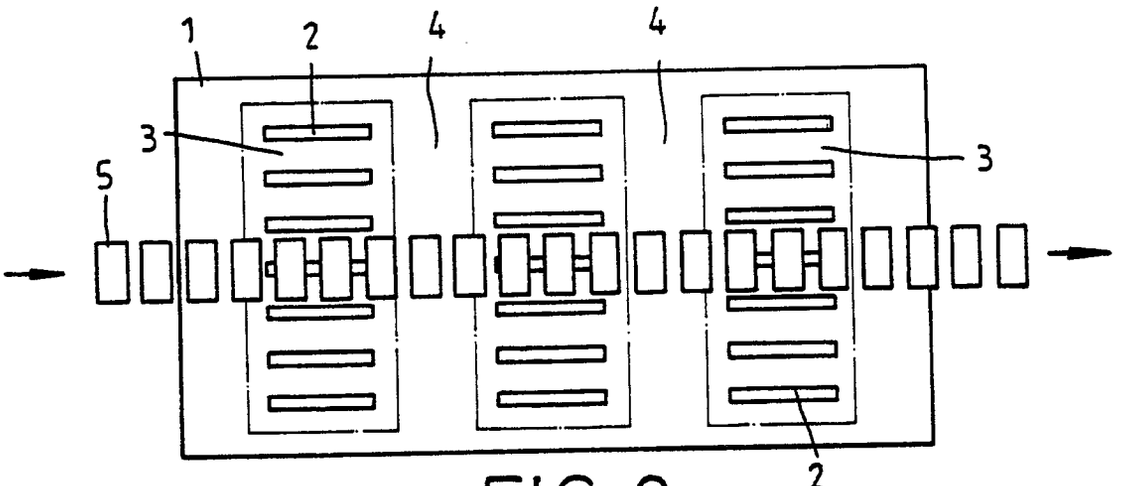

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number

EP 89 10 0977

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-0 095 717 (PICOT) * Page 1, lines 8-10; abstract; figures 1,4 *	1,2	F 26 B 3/30
Y	GB-A-2 096 294 (SVECIA SILKSCREEN MASKINER AB) * The whole document *	1,2	
A	DE-B-1 097 369 (DAIMLER-BENZ AG) * The whole document *	1	
A	US-A-2 660 723 (DELAMARRE et al.)		
A	FR-A-1 303 765 (CARRE et al.)		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 498 878 (CARLSON)		F 26 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-09-1989	SILVIS H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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