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(54) **Flame simulator for imitation fireplace electric heater**

(57) An imitation fireplace electric heater with a flame simulator, comprises a dynamic light source (1), a fire-shaped wall (2) opened with various flame-shaped transparent holes (9), a translucent imaging screen (3), a semitransparent mirror glass screen (4), and plastics blocks (5,6) having a trunk charcoal shape. The imaging screen (3) is located in front of the fire-shaped wall (2). The mirror glass screen (4) is arranged in front of the imaging screen (3), the plastics blocks (5,6) are placed before the mirror glass screen (4), a dynamic light source (1) is disposed on the other side of the fire-shaped wall, in which an electroluminescent lamp is installed in a hollow cylindrical transparent mask to serve as the dynamic light source. Transparent holes are distributed on the surface of transparent mask, which is fixed to a lamp bracket, itself connected to an electric motor driving it into rotation via a transmission mechanism. It has the advantages of vivid in simulation, suitable for utilisation in an imitation fireplace electric heater.

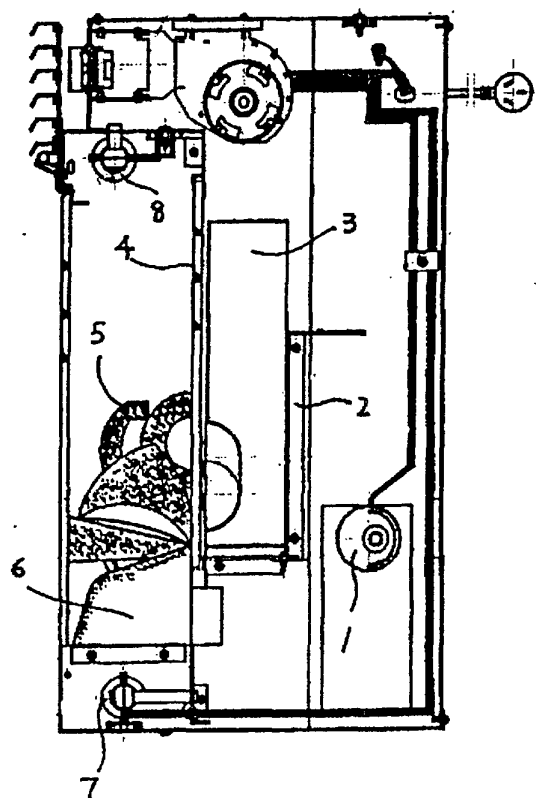


FIGURE 2

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Description

[0001] The present invention relates to an electric heater, more particularly to the technical field of a flame burner simulator in an imitation fireplace electric heater.

[0002] Following the unceasing growth in people's living standard, the public pursues higher grade housing decoration day by day. Houses in coastal areas frequently imitate European styles, with fireplaces being installed in the living room, however this type of fireplace is commonly used for decoration and cannot be employed for heating. To this end an electric heater imitating a fireplace has been designed, which can also be used for heating, is convenient to use and may be used decoratively. For example, Chinese patent no. 962227110 entitled "Fireplace Electric Heater", discloses a device which has the shape of a fireplace and consists of a roof, a sideboard and a vertical plate in a base. A lamp socket and a heating lamp are mounted in the base, the sideboards and backboards are connected to form a trapezoid under the roof, a scenery plate is placed on the base plate, a diaphragm and a longitudinal baffle are mounted on the backwall under the base, a vane is mounted on the bottom of the longitudinal baffle, a lamp is installed in the lamp socket on a supporting plate, a switch on the sideboard controls the lamplight. The hot-gas turns the vane and a shade and the lamp flashes to increase the dynamic artistry. The front and top faces on the base have ventiducts and a heating pipe releases the heat for heating. The structure is light in weight and has a novel appearance. The drawback of this imitation fireplace electric heater is that it is not vivid enough in simulating a charcoal flame combustion effect, and the intensity of combustion of the charcoal flame cannot be regulated at will.

[0003] To this end, Chinese patent no. 00217056.6 entitled "Imitation Fireplace Electric Heater" made a further improvement. This device comprises an imitation fireplace-shaped casing, in which a lamp and an electric warm-air heating system are mounted in the casing and a lamp is installed in the base of the casing. In the casing a motor-driven rotating reflector reflecting lamplight to the imitation fire-shaped wall is installed correspondingly; a curtain wall glass is mounted by a plastic screen nearby the imitation fire-shaped wall, and an imitation charcoal block is installed in front of the curtain wall glass. Light emitted from the light source is reflected onto the fire-shaped wall via a reflector, after passing through a flame-shaped transparent hole on the fire-shaped wall, and becomes a flame-shaped light pencil forming an image on an imaging screen, then it passes through the curtain wall glass, making an impression of unceasing burning flame in human eyes. Consequently a more vivid effect is acquired. However, its structure is formed employing the reflector for light reflection, hence the light energy is not fully utilised, part being scattered. Therefore, the intensity of combustion of the flame is limited, especially at the bottom as the imitation fuel is non-

transparent. The fiery feeling of simulating burning fuel at the bottom cannot be imitated without static light source illumination.

[0004] The present invention seeks to provide a flame simulator for an electric heater having a bright and vivid, better imitation, effect.

[0005] According to an aspect of the present invention, there is provided an electric heater with a flame simulator as specified in claim 1.

[0006] The present invention also provides a flame simulator for such a heater.

[0007] The preferred embodiment provides a flame simulator for an electric heater which comprises a dynamic light source, a fire-shaped wall open with various flame-shaped transparent holes, a translucent imaging screen, a semi-transparent mirror glass screen, the plastic blocks imitating trunk-shaped charcoal, and an imaging screen in front of the fire-shaped wall. A mirror glass screen is mounted before forming the image, the plastic blocks are placed in front of the minor glass screen, a dynamic light source is mounted on another side of the fire-shaped wall, and an electro-luminescence lamp is installed in a hollow column-shaped transparent mask to form a dynamic light source. The transparent holes are distributed on the surface of the transparent mask, while the transparent mask is fixed to the lamp bracket and then connected to an electric motor driving it into rotation via a transmission mechanism.

[0008] The flame simulator in the preferred embodiment of imitation fireplace electric heater employs light emitted from the transparent mask and hole to illuminate the fire-shaped wall directly, after passing through the flame-shaped transparent hole of the fire-shaped wall. This becomes a flame-shaped light pencil projecting on the imaging screen to form an image, enabling a human eye to see a flame burning unceasingly via the curtain wall glass, thereby making the flame effect more vivid and bright than with prior art devices. More specifically, in this embodiment, an abnormal shaped irregular transparent hole is open onto the transparent mask, while a blow-moulded irregular curve is formed on an imaging screen, a translucent white emulsion is coated on the screen, sectors having different transparency are randomly distributed on the curve, causing the light ray to generate up and down, left and right, front and rear distortions on the imaging screen, so that a more stereo and vivid flame image can be formed on the imaging screen. In particular, the simulation fuel is divided into the upper and lower parts, the lower part of plastic block being sprayed in a branch charcoal colour and becomes semitransparent, such that a burning effect is formed under illumination of a static light source. Configured with the illuminated lamp light, a bright effect results from burning of simulation fuel. The electric motor is connected to a rotating speed controlling mechanism, and a synchronous link gear controlling the power and light source brightness in the electric warm-air heating system is installed, which can control the jumping speed

of imitated flame and simulate the speed of fuel combustion.

[0009] Embodiments of the present invention are described below, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view from above of an embodiment of flame simulator in an imitation fireplace electric heater;

Figure 2 is a structural cross-sectional view of the flame simulator of Figure 1;

Figure 3 is a perspective view from above of the flame simulator of Figure 1 with the charcoal block removed to enable the minor glass screen to be seen;

Figure 4 is a structural cross-sectional view of a part of the flame simulator of Figure 1; and

Figure 5 is an exploded view of the part of Figure 4.

[0010] As shown in the Figures, the embodiment of flame simulator for an imitation fireplace electric heater shown comprises a dynamic light source 1. A metal plate provides a transparent mask 10 in the dynamic light source structure and is provided with specially shaped irregular transparent holes 11, which may be triangular, curved and so on. The plate 10 is rolled into a cylinder. A lamp, which may be a fluorescent lamp or a light bulb, can be mounted in the hollow cylinder, the tube or light bulb being fixed on a lamp bracket (not shown). The transparent mask 10 is fixed onto the lamp bracket, then connected to an electric motor driving it into rotation via a transmission mechanism, which may be a transmission gear set or a pulley.

[0011] A fire-shaped wall 2 is located on a side of the dynamic light source. The fire-shaped wall 2 is non-transparent but has various flame-shaped transparent holes 9 on its surface, such that light emitted from the transparent mask 10 is filtered to form a flame-shaped light pencil. A translucent imaging screen 3 is located in front of the fire-shaped wall, the imaging screen 3 being a suction moulded plastic body having an uneven irregular curved surface. Semi-transparent white emulsion is also coated on the uneven irregular curved surface, which enables sectors having different transparency to be randomly distributed on the curved surface. Thus, the light pencil passing through the fire-shaped wall forms an image on the imaging screen, and up and down, left and right. Front and rear distortion can thus occur to form a more vivid and natural charcoal combustion pattern.

[0012] A coloured translucent mirror glass screen 4 is disposed in front of the imaging screen 3 and performs colour filtering for the dynamic flame pattern to be formed on the imaging screen. It enables the seen imitation flame to correspond with the relevant simulated fuel colour. Moreover, the mirror enables the simulated fuel 5 to reflect a symmetric pattern from the back, at one end the depth of simulated fuel stacking is in-

creased. It also causes the generated flame to be emitted from the simulated fuel stacking 5 to produce a more vivid effect.

[0013] The fuel stacking 5 may be formed by injection moulding, suction moulding or blow moulding to a hollow plastic block 6. The simulated fuel plastic block 6 on the lower section is preferably transparent, configured with a static light source 7, which can employ a fluorescent tube or light bulb. The lamp bracket is semi-circular. A condenser focusing light by an arc faces the simulated fuel assembly to form a strong static light source focusing light, enabling part of the semitransparent plastics block transmitting light to be in dark red colour, and thereby generates a combusting effect.

[0014] The surface of upper simulated fuel plastics block 5 is preferably sprayed with a colour corresponding with the simulated fuel. For example, simulated fuel in the shape of a charred trunk is sprayed into colours interphased with yellowish brown, black and pale, the charcoal is sprayed in an ashy colour, the coal sprayed into black colour, as so on, to enhance the sense of reality.

[0015] A light source 8 illuminating to provide simulation flame brightness is mounted above the whole simulated fuel. The electric motor driving the transparent mask into rotation is connected to a rotating speed control mechanism, which can control the motor's rotating speed to regulate the intensity of simulated fuel combustion, and is installed with a synchronous link gear controlling the power and light source brightness in the warm-air heating system. Thus, once the user has regulated the combustion of simulated fuel, warm-air temperature and light brightness generated from simulated fuel combustion, this can then be regulated automatically and enables the imitation fireplace electric heater to be more vivid and natural in use.

Claims

1. A flame simulator for an imitation fireplace electric heater, comprising a dynamic light source (1), a wall (2) provided with one or more flame-shaped substantially transparent holes (9), a semi-transparent imaging screen (3), a translucent mirror screen (4), and one or more imitation combustible products (5,6), the imaging screen being located in front of the wall (2), the mirror screen (4) being disposed in front of the imaging screen (3), the imitation combustible products being located in front of the mirror screen (4), the dynamic light source (1) being arranged on a rear side of the wall (2); wherein an electro-luminescent lamp is located in a substantially hollow mask (10) having substantially transparent holes or apertures (11) therein to serve as the dynamic light source, the holes or apertures (11) being distributed on the surface of mask, the transparent mask being rotatable.

2. A simulator according to claim 1, wherein the imaging screen (3) is made from glass.
3. A simulator according to claim 1 or 2, wherein the imitation combustible products are imitation charcoal-shaped blocks. 5
4. A simulator according to claim 1, 2 or 3, including a lamp bracket to which the mask (11) is fitted, an electric motor being provided to drive the mask (11) into rotation via a transmission mechanism. 10
5. A simulator according to claim 4, wherein said electric motor is connected to a rotating speed controlling mechanism, a synchronous link gear in the warm-air heating mechanism being provided for controlling power and light source brightness. 15
6. A simulator according to any preceding claim, wherein said imaging screen (3) includes a body having a surface with an uneven curvature and is provided with sectors having different transparency which are randomly distributed on the surface. 20
7. A simulator according to claim 6, wherein said body is formed of plastics material. 25
8. A simulator according to claim 6 or 7, wherein said body is coated with a semi-transparent white emulsion. 30
9. A simulator according to any preceding claim, wherein the mirror screen (4) has a flame colour and is semi-transparent. 35
10. A simulator according to any preceding claim, wherein of said imitation combustible products one or more upper blocks (5) is sprayed with imitation fuel colour, one or more lower blocks (6) is sprayed with fuel colour, and is semi-transparent. 40
11. A simulator according to claim 10, including a static light source (7) beneath the semi-transparent block or blocks (6) and a light source (8) imitating flame brightness mounted above the imitation combustible product. 45

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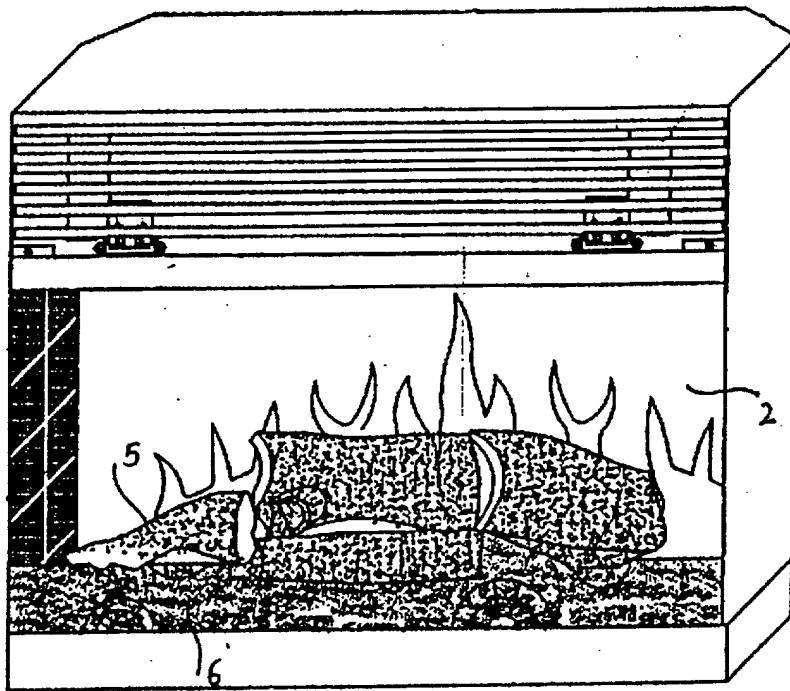


FIGURE 1

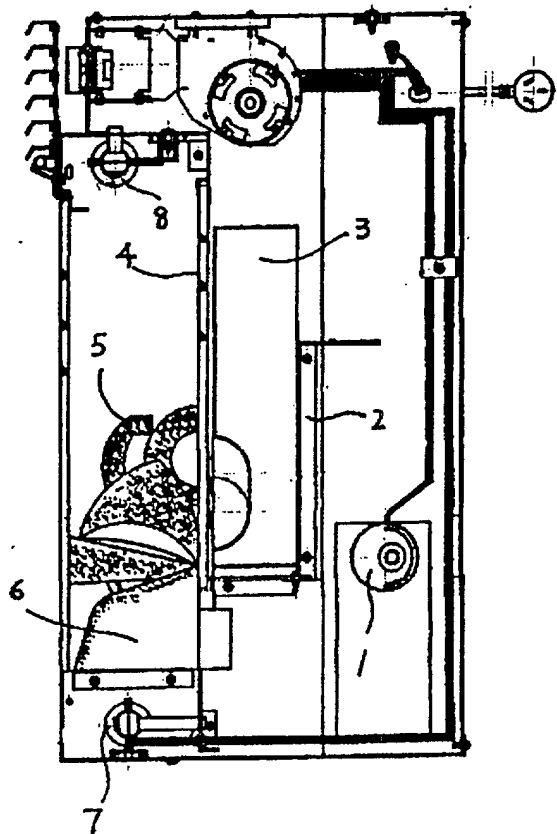


FIGURE 2

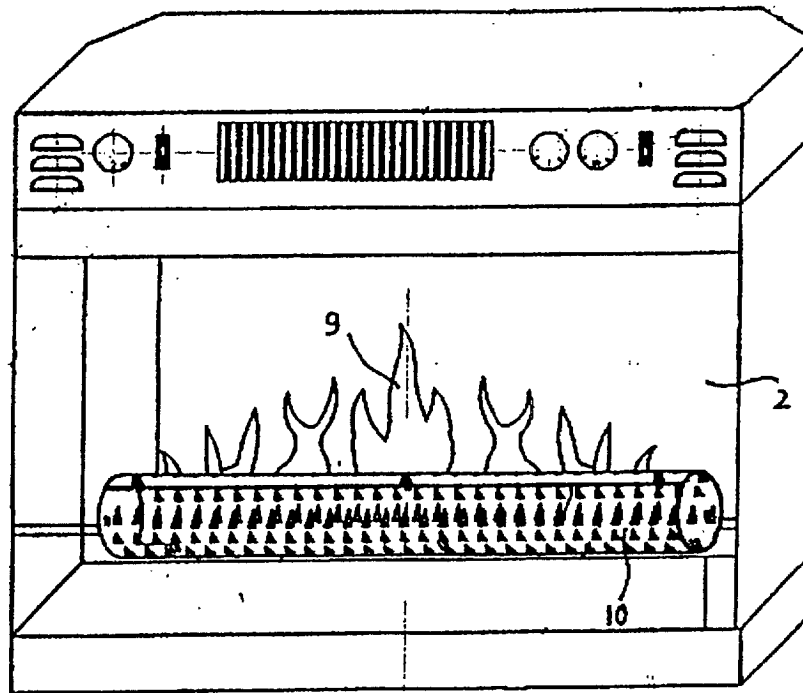


FIGURE 3

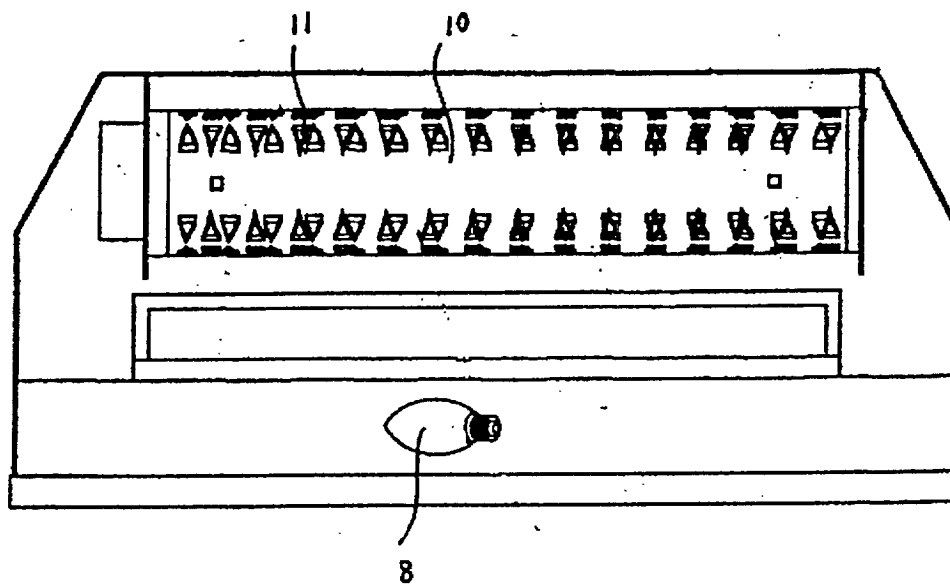


FIGURE 4

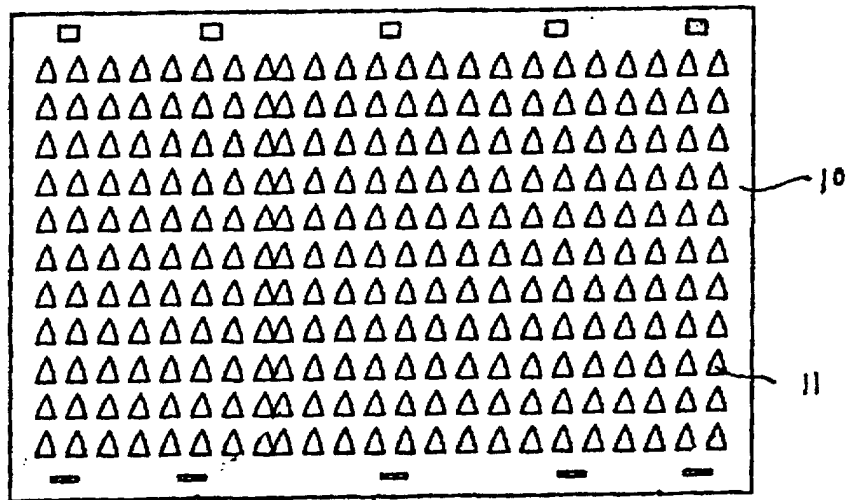


FIGURE 5



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EUROPEAN SEARCH REPORT

Application Number
EP 02 25 0149

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.7)
X	EP 1 020 685 A (CFM MAJESTIC INC) 19 July 2000 (2000-07-19) * the whole document *	1,3-5, 10,11	F24C7/00
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F24C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 September 2002	Examiner Vanheusden, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 02 25 0149

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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10-09-2002

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