

(19)



(11)

EP 4 488 579 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

08.01.2025 Bulletin 2025/02

(21) Application number: **24183993.5**

(22) Date of filing: **24.06.2024**

(51) International Patent Classification (IPC):

F23D 14/04 ^(2006.01) **F24C 3/00** ^(2006.01)
F24C 3/04 ^(2021.01) **F24C 3/08** ^(2006.01)
F23D 23/00 ^(2006.01) **F24C 5/02** ^(2021.01)
F24C 5/18 ^(2006.01)

(52) Cooperative Patent Classification (CPC):

F23D 14/045; F23D 23/00; F24C 3/006;
F24C 3/042; F24C 3/082; F24C 5/02;
F23D 2900/14042; F23D 2900/14641

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA

Designated Validation States:

GE KH MA MD TN

(30) Priority: **06.07.2023 CN 202321763983 U**

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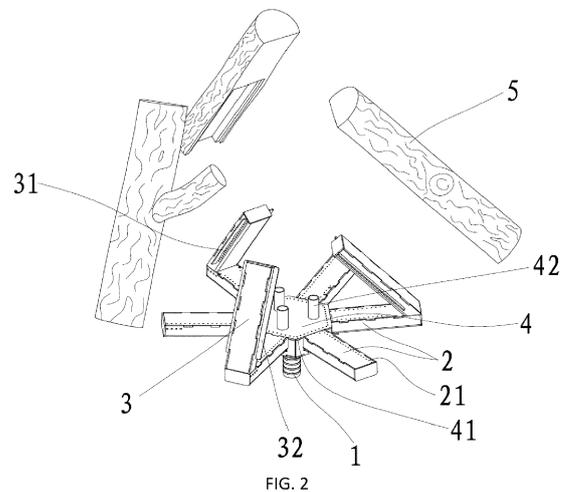
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(54) **BURNER FOR BURNING GASEOUS FUEL**

(57) Disclosed in the present invention is a burner for burning gaseous fuel. The burner includes a gas intake port, several horizontal portions, and several inclined portions. One end of each inclined portion located at a lower position is connected and fixed to one end of a horizontal portion, and the other ends of all the horizontal portions are connected to each other either directly or by means of a combustion chamber main body. The horizontal portions, the inclined portions, and the combustion chamber main body each have an internally hollow structure and are in communication with each other. The inclined portions are inclined upwardly at an angle $\angle\alpha$ with respect to the horizontal portions, and the inclined portions and the horizontal portions are combined into the shape of a three-dimensional geometric space. The gas intake port is provided at the very bottom of the burner and is in communication with the interior of the burner. First flame holes are provided in the horizontal portions, second flame holes are provided in the inclined portions, and third flame holes are provided in the combustion chamber main body. When a gaseous fuel is introduced and ignited, flames burn in each of the combustion chamber main body, the horizontal portions, and the inclined portions, thereby forming a flame effect in a three-dimensional (3D) form.



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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of burners, and relates specifically to a burner for a gaseous fuel-burning fireplace.

BACKGROUND ART

[0002] In recent years, fireplaces having dual functions of decoration and heating have become increasingly popular, especially real-fire gas fireplaces and real-fire alcohol fireplaces which have become a first choice for decoration and heating in the home due to their clean and hygienic use, stable combustion, and high thermal efficiency utilization. In order to make combustion sufficient and easy to control in real-fire alcohol fireplaces, generally, a liquid alcohol fuel is vaporized and then introduced into a burner for combustion.

[0003] However, basically all of the burners for burning gaseous fuel currently available on the market have flames directly burning on metallic burners, or have an elongated shape or a circular shape. The burners are flat, the flames are relatively rigid and insufficiently lively, and there is no graduated feeling. Furthermore, there is a lack of decoration of simulated solid fuels and lack of harmonious correspondence between flames and fuels, and there is an unnatural feeling that flames appear out of nowhere. Even if a mode in which a plurality of burners are combined to form a flame appears on the market, it is necessary to separately introduce gaseous fuel for combustion. The structure is complicated, and the installation is complicated.

CONTENT OF INVENTION

(I) Technical problem to be solved

[0004] The problem to be solved by the present invention is to provide a burner for burning gaseous fuel, so as to overcome the problem of rigid and insufficient flames in the prior art, and to provide a three-dimensional flame shape and give users more visual enjoyment.

(II) Technical solution

[0005] In order to solve the technical problem, the present invention provides a burner for burning gaseous fuel, comprising a gas intake port, several horizontal portions, and several inclined portions, one end of each of the horizontal portions being connected, and one end of each inclined portion located at a lower position being connected and fixed to the other end of a horizontal portion; the horizontal portions and the inclined portions each have an internally hollow structure and communicate with each other, the inclined portions are inclined upwardly at an angle $\angle\alpha$ with respect to the horizontal

portions, and the inclined portions and the horizontal portions are combined into the shape of a three-dimensional geometric space; the gas intake port is provided on bottom surfaces of the horizontal portions and communicates with the interior of the horizontal portions, and gaseous fuel may enter the interior of the horizontal portions from the gas intake port and further diffuse into the interior of the inclined portions; and the horizontal portions are provided with a plurality of first flame holes, and the inclined portions are provided with a plurality of second flame holes.

[0006] Further, the upwardly inclined angle $\angle\alpha$ of each of the inclined portions (3) may be the same or different, where $\angle\alpha$ is 20° to 80° .

[0007] Further, lower surfaces of the horizontal portions each have an upwardly inclined angle $\angle\beta$, where $\angle\beta$ is 1° to 10° .

[0008] Further, the burner further comprises several simulated solid fuels, wherein the simulated solid fuels are provided with textures and colors simulating real solid fuels, and the simulated solid fuels are fastened to the inclined portions.

[0009] Further, the inclined portions are provided with supporting surfaces which may be used to support the simulated solid fuels.

[0010] Further, when two horizontal portions are provided, the two horizontal portions may be arranged opposite to each other and connected to each other so as to form one body.

[0011] Further, the number of horizontal portions is greater than or equal to three, and the burner for burning gaseous fuel according to the present invention further comprises a combustion chamber main body connecting all the horizontal portions together, wherein the combustion chamber main body has a hollow structure and is provided in the middle of all the horizontal portions, the horizontal portions are arranged around the circumference of the combustion chamber main body, and spacing between any two of the horizontal portions may be the same or different; the gas intake port is provided in a bottom surface of the combustion chamber main body, the gas intake port communicates with an interior of the combustion chamber main body, and the interior of the combustion chamber main body communicates with the interior of the horizontal portions; and the combustion chamber main body is provided with a plurality of third flame holes.

[0012] Further, the combustion chamber main body is provided with several combustion air inlets through which combustion air can be supplemented for a middle region of the burner.

[0013] Further, upper surfaces of the combustion air inlets are higher than an upper surface of the combustion chamber main body.

[0014] Further, when the burner is mounted on a product, the bottom of the burner may be provided with pebbles and/or crystal stones and/or crushed glass and/or simulated charcoal beds and simulated solid fuels for

decoration, which are used to simulate the structure of a carbon bed after a real solid fuel is burned and may cover the combustion chamber main body and/or the horizontal portions, so that it looks more beautiful and realistic as a whole.

[0015] In the above technical solutions, the term "several" means one or more than one.

Basic principle of the present invention:

[0016] During the operation of the present invention, gaseous fuel or the fuel obtained by gasifying liquid fuel is introduced into the interior of the burner through the gas intake port, diffused into the combustion chamber main body and/or the interior of the horizontal portions and the inclined portions, and further emitted from the first flame holes, the second flame holes and the third flame holes. Then, when flames are ignited, the flames are burning on each of the combustion chamber main body and/or the horizontal portions and the inclined portions, thereby forming a flame effect in a three-dimensional (3D) form. Moreover, the combustion air inlets may be used to supplement the middle region of the burner with air required for combustion, so that the combustion is more complete and the flames are brighter.

[0017] In addition, the simulated solid fuels are provided on the inclined portions, so that the flames are more realistic like real firewood burning in a bonfire, which is warm and comfortable.

(III) Beneficial effects

[0018] Compared with the prior art, the advantageous effects of the present invention are as follows:

In the burner for burning gaseous fuel provided by the present invention, since the inclined portions inclined upwardly are provided, the inclined portions, the horizontal portions, and/or the combustion chamber main body form three dimensional flames in a 3D space, the bonfire effect of real firewood burning can even be imitated, and the decorative effect of the flames is stronger, with better visual appreciation. Moreover, the burner has a simple structure and is easy for installation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a schematic view of a three-dimensional structure according to Embodiment 1 of the present invention;

FIG. 2 is a schematic view of an exploded structure according to Embodiment 1 of the present invention;

FIG. 3 is a top view according to Embodiment 1 of the present invention without simulated solid fuels;

FIG. 4 is a schematic cross-sectional view according to Embodiment 1 of the present invention without simulated solid fuels;

FIG. 5 is a schematic structural view according to Embodiment 1 of the present invention mounted on a product;

FIG. 6 is a schematic view according to an exploded structure of Embodiment 2 of the present invention; and

FIG. 7 is a schematic cross-sectional view according to Embodiment 2 of the present invention.

[0020] The names of the components corresponding to the respective reference numerals in the figures are as follows:

1-gas intake port; 2-horizontal portion; 21-first flame hole; 3-inclined portion; 31-second flame hole; 32-supporting surface; 4-combustion chamber main body; 41-third flame hole; 42-combustion air inlet; 5-simulated solid fuel; 6-pebble.

DETAILED DESCRIPTION

[0021] For a better understanding of the content of the present invention, further description will be made below with reference to specific embodiments and the accompanying drawings. It should be understood that these embodiments are provided for further illustration of the present invention only and are not intended to limit the scope of the present invention. Further, it should be understood that after reading the content of the present invention, those skilled in the art may make some non-essential changes or adjustments to the present invention, which still fall within the scope of protection of the present invention.

Embodiment 1:

[0022] As shown in FIGS. 1 to 5, a burner for burning gaseous fuel according to this embodiment includes a gas intake port 1, horizontal portions 2, inclined portions 3, and a combustion chamber main body 4. In this embodiment, six horizontal portions 2 and three inclined portions 3 are provided. The horizontal portions 2 are arranged around the circumference of the combustion chamber main body 4. In this embodiment, the spacing between any two of the horizontal portions 2 is the same. Moreover, one end of each horizontal portion 2 is welded and fixed to the combustion chamber main body 4, and the inclined portions 3 are alternately welded and fixed to the other ends of the horizontal portions 2. The combustion chamber main body 4, the horizontal portions 2, and the inclined portions 3 each have an internally hollow structure and communicate with each other. The horizontal portions 2 are provided with a plurality of first flame holes 21, the inclined portions 3 are provided with a plurality of second flame holes 31, and the combustion chamber main body 4 is provided with a plurality of third flame holes 41. The gas intake port 1 is provided below the combustion chamber main body 4. The gas intake port 1 is connected to a gas fuel liquid supply device in a

product. The combustion chamber main body 4 is further provided with three combustion air inlets 42 through which combustion air can be supplemented for a middle region of the burner, and upper surfaces of the combustion air inlets 42 are higher than an upper surface of the combustion chamber main body 4.

[0023] In this embodiment, upwardly inclined angles $\angle\alpha$ of the three inclined portions 3 are different from each other, and are 46° , 55° , and 62° , respectively. In this embodiment, an upper surface of each horizontal portion 2 is horizontal, and a lower surface of the horizontal portion 2 has an upwardly inclined angle $\angle\beta$. In this embodiment, $\angle\beta$ is 3° for all the horizontal portions.

[0024] In addition, in this embodiment, three simulated solid fuels 5 are further included. The simulated solid fuels 5 have textures and colors simulating real solid fuels. Supporting surfaces 32 are provided on the inclined portions 3, and the simulated solid fuels 5 are fastened to the inclined portions 3, and supported and positioned by the supporting surfaces 32.

[0025] As shown in FIG. 5, when the present invention is mounted on a product, the bottom thereof may be provided and covered with pebbles 6, which are used to simulate the structure of a carbon bed after a real solid fuel is burned and may cover the combustion chamber main body 4 and the horizontal portions 2. When viewing as a whole, only the pebbles 6 and the simulated solid fuels 5 can be seen.

[0026] The operating process of the burner for burning gaseous fuel in this embodiment is as follows:

During the operation of the present invention, gaseous fuel or the fuel obtained by gasifying liquid fuel is introduced into the interior of the combustion chamber main body 4 through the gas intake port 1, diffused into the interior of the horizontal portions 2 and the inclined portions 3, and further emitted from the first flame holes 21, the second flame holes 31, and the third flame holes 41. Then, when flames are ignited, the flames are burning on each of the horizontal portions 2, the inclined portions 3 and the combustion chamber main body 4, thereby forming a flame effect in a three-dimensional (3D) form. Moreover, the combustion air inlets 42 may be used to supplement the middle region of the burner with air required for combustion, so that the combustion is more complete and the flames are brighter.

[0027] In addition, the simulated solid fuels 5 are provided on the inclined portions 3, and the pebbles 6 are arranged on the bottom of the product to cover the combustion chamber main body 4 and the horizontal portions 2, so that a user can see only the pebbles 6 and the simulated solid fuels 5 at the time of viewing for enjoyment, which is more harmonized and unified as a whole, making the flames more realistic like real firewood burning in a bonfire, which is warm and comfortable.

Embodiment 2:

[0028] As shown in FIGS. 6 to 7, this embodiment is

different from Embodiment 1 described above in that there is no combustion chamber main body in this embodiment, and only two horizontal portions 2 are arranged opposite to each other; and the two horizontal portions 2 are connected to each other to form one body, and the gas intake port 1 is provided below the horizontal portions 2.

[0029] The above description does not limit the present invention, and the present invention is not limited to the above examples. Changes, modifications, additions, or substitutions made by those of ordinary skill in the art within the essence of the present invention shall also fall within the protection scope of the present invention.

Claims

1. A burner for burning gaseous fuel, **characterized by**: comprising a gas intake port (1), several horizontal portions (2), and several inclined portions (3), one end of each of the horizontal portions (2) being connected, and one end of each inclined portion (3) located at a lower position being connected and fixed to the other end of a horizontal portion (2); the horizontal portions (2) and the inclined portions (3) each have an internally hollow structure and communicate with each other; the inclined portions (3) are inclined upwardly at an angle $\angle\alpha$ with respect to the horizontal portions (2); the gas intake port (1) is provided on bottom surfaces of the horizontal portions (2) and communicates with the interior of the horizontal portions (2); and the horizontal portions (2) are provided with a plurality of first flame holes (21), and the inclined portions (3) are provided with a plurality of second flame holes (31).
2. The burner for burning gaseous fuel according to claim 1, wherein: the upwardly inclined angle $\angle\alpha$ of each of the inclined portions (3) may be the same or different, where $\angle\alpha$ is 20° to 80° .
3. The burner for burning gaseous fuel according to claim 1, wherein: lower surfaces of the horizontal portions (2) each have an upwardly inclined angle $\angle\beta$, where $\angle\beta$ is 1° to 10° .
4. The burner for burning gaseous fuel according to claim 1, wherein: the burner further comprises several simulated solid fuels (5) fastened to the inclined portions (3).
5. The burner for burning gaseous fuel according to claim 4, wherein: the inclined portions (3) are provided with supporting surfaces (32) which may be used to support the simulated solid fuels (5).
6. The burner for burning gaseous fuel according to claim 1, wherein: the number of horizontal portions

(2) is greater than or equal to 3; the burner further comprises a combustion chamber main body (4) connecting each of the horizontal portions (2) together, the combustion chamber main body (4) having a hollow structure and being provided in the middle of all the horizontal portions (2), wherein the horizontal portions (2) are arranged around the circumference of the combustion chamber main body (4), and spacing between any two of the horizontal portions (2) may be the same or different; the gas intake port (1) is provided on a bottom surface of the combustion chamber main body (4), the gas intake port (1) communicates with the interior of the combustion chamber main body (4), and the interior of the combustion chamber main body (4) communicates with the interior of the horizontal portions (2); and the combustion chamber main body (4) is provided with a plurality of third flame holes (41).

7. The burner for burning gaseous fuel according to claim 6, wherein: the combustion chamber main body (4) is provided with several combustion air inlets (42).

8. The burner for burning gaseous fuel according to claim 7, wherein: upper surfaces of the combustion air inlets (42) are higher than an upper surface of the combustion chamber main body (4).

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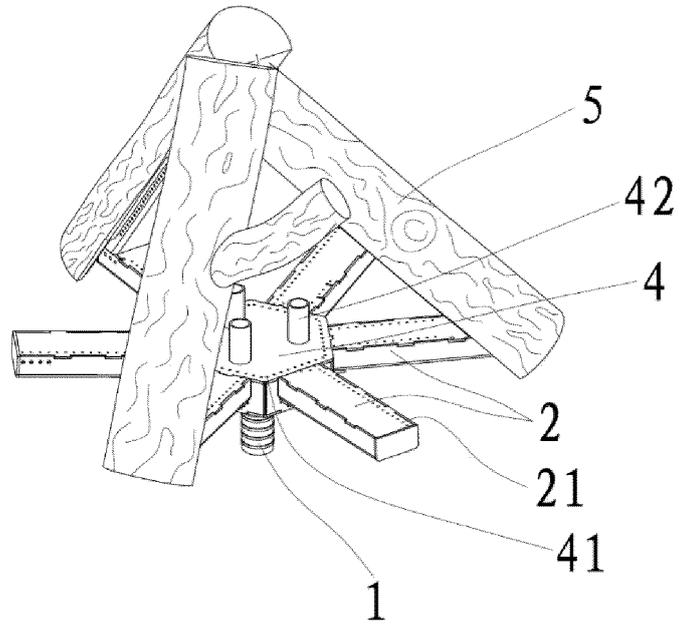


FIG. 1

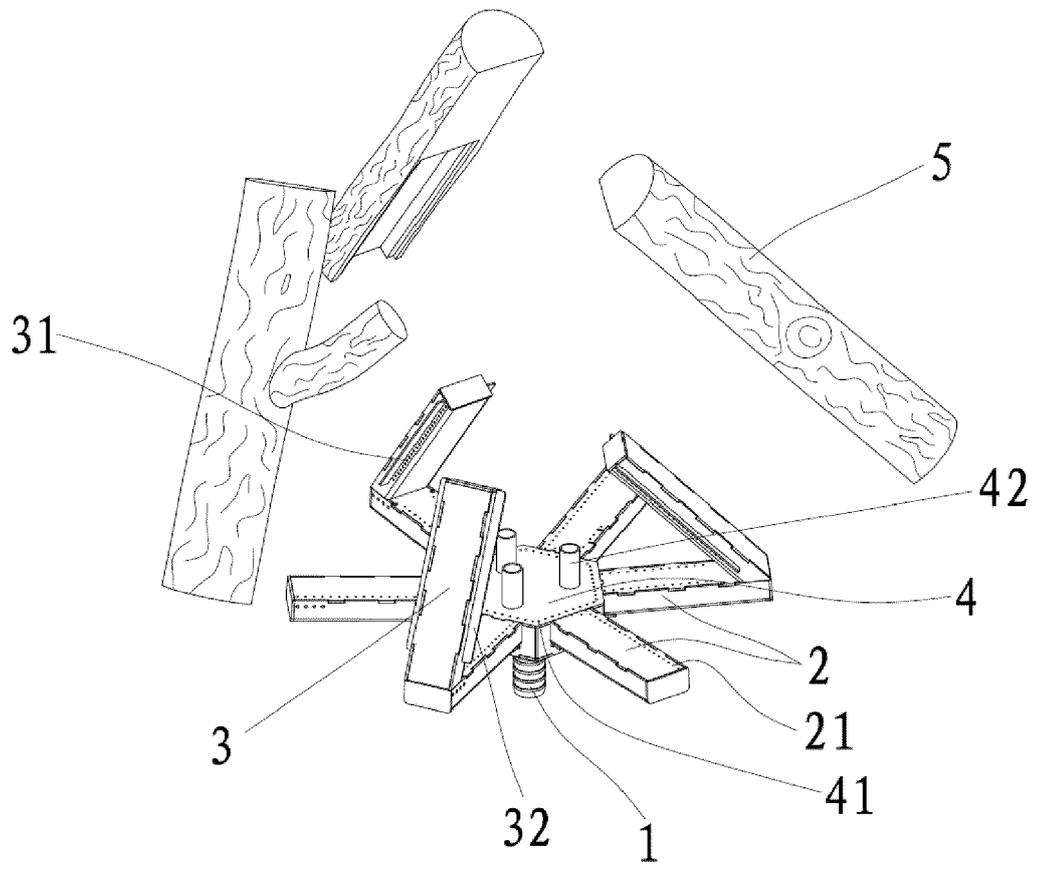


FIG. 2

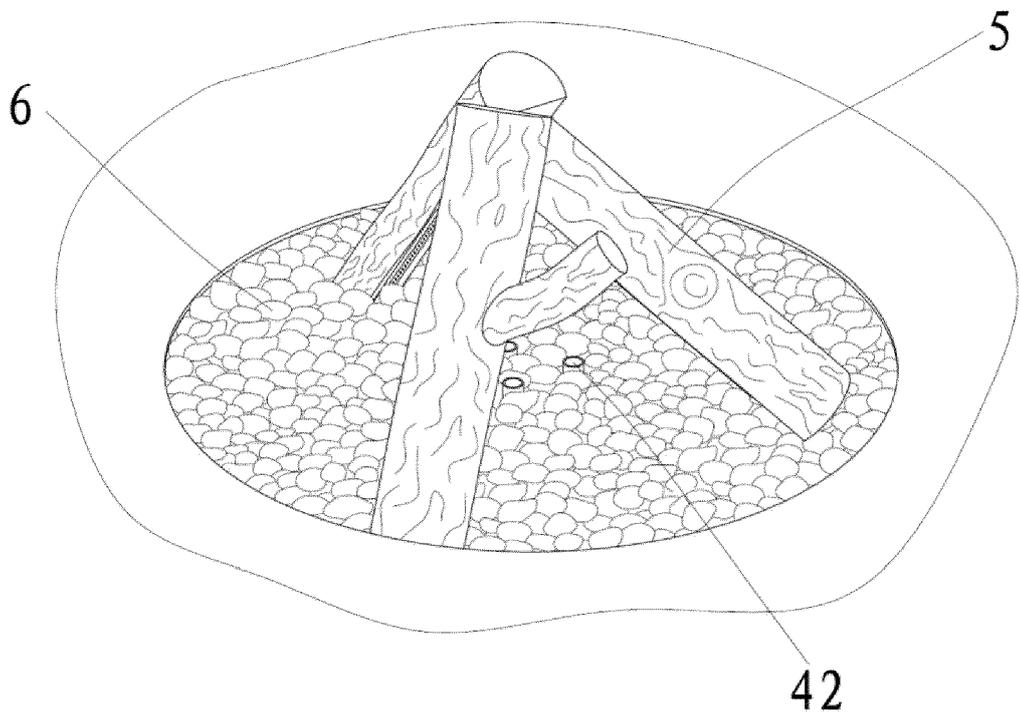


FIG. 5

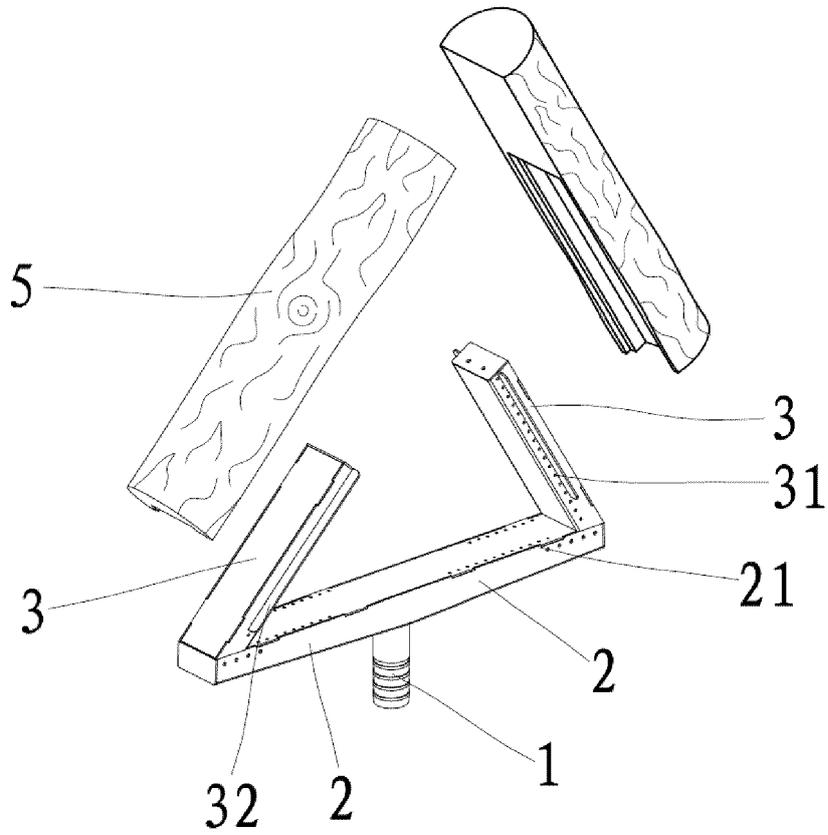


FIG. 6

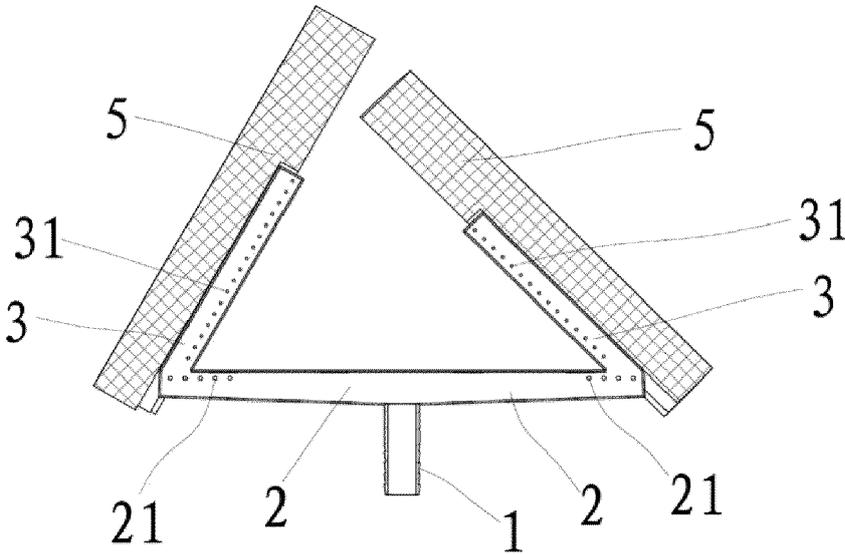


FIG. 7



EUROPEAN SEARCH REPORT

Application Number

EP 24 18 3993

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	WO 2022/269521 A1 (FPI FIREPLACE PRODUCTS INT LTD [CA]) 29 December 2022 (2022-12-29) * paragraphs [0023] - [0028] * * figures 1, 2A-C * -----	1-6	
X	US 6 048 195 A (SHIMEK RONALD JOHN [US] ET AL) 11 April 2000 (2000-04-11) * column 2, line 52 - column 3, line 15 * * figures 3, 4 * -----	1-5	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24C F23D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 November 2024	Examiner Vogl, Paul
CATEGORY OF CITED DOCUMENTS 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		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	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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