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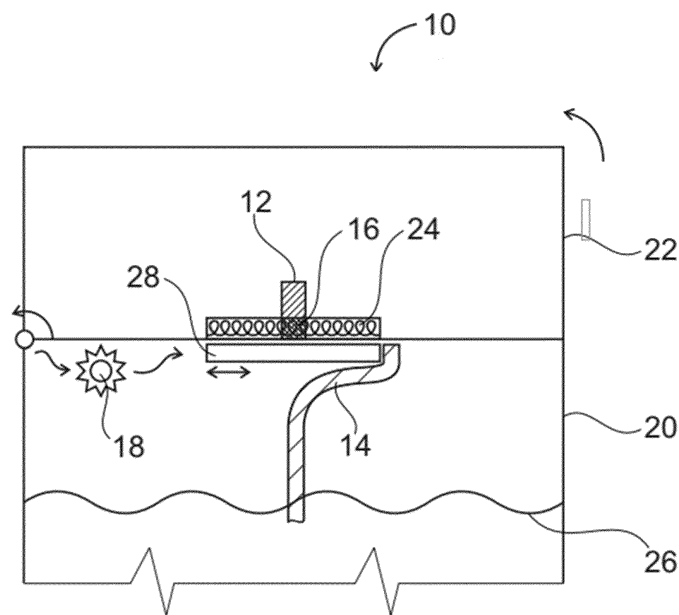
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(54) **FLAME PRODUCING ASSEMBLY REDUCING FUEL EVAPORATION**

(57) The present disclosure relates to a flame producing assembly. The flame producing assembly may comprise a fuel reservoir, a flame wick and a fuel wick in fluid communication with the fuel reservoir. The flame producing assembly may further comprise a translation mechanism, wherein the translation mechanism may be

configured to switch the fuel wick between a first position and a second position. Further, the flame wick may be in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.



**Fig. 1**

## Description

### Technical Field

[0001] The present invention relates to the field of flame producing assemblies. More specifically, the present invention relates to flame producing assemblies with reduced fuel evaporation.

### Background

[0002] Flame producing assemblies, such as lighters, may be used to light candles or tobacco. Further, they may be used in household appliances such as ovens or barbecue grills. Flame producing assemblies commonly comprise a fuel reservoir comprising a fuel, in particular a liquid fuel. A wick is commonly inserted into the fuel reservoir. The wick may transport fuel from the end inserted into the fuel reservoir to a second end not inserted in the fuel reservoir. This second end may be ignited to produce a flame. The wick may transport the fuel through pores or tubular structures of small diameter due to capillary action. The fuel may be volatile and hence evaporate when the flame producing assembly is not ignited. When the fuel evaporates further fuel may be transported from the first end of the wick to the second end of the wick due to capillary action. This newly transported fuel may again evaporate. This may lead to loss of unburned fuel, which is an economic loss and may force the user to refill the fuel reservoir at an earlier time point. Further, the evaporation of fuel may lead to undesirable odors or may even be hazardous in poorly ventilated spaces.

[0003] The present disclosure aims to address the aforementioned issues in flame producing assemblies.

### Summary

[0004] In a first aspect, the present disclosure relates to a flame producing assembly. The flame producing assembly may comprise a fuel reservoir, a flame wick and a fuel wick in fluid communication with the fuel reservoir. The flame producing assembly may further comprise a translation mechanism, wherein the translation mechanism may be configured to switch the fuel wick between a first position and a second position. Further, the flame wick may be in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

[0005] In some embodiments, the flame wick may be in fluid communication with the fuel reservoir when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

[0006] In some embodiments, the flame wick may be in fluid communication with a wicking pad.

[0007] In some embodiments, the wicking pad may be in fluid communication with the fuel wick when the fuel

wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

[0008] In some embodiments, the flame producing assembly may comprise a lid configured to switch between an open and a closed conformation.

[0009] In some embodiments, the lid may be configured to reduce evaporation of fuel from the flame wick when in the closed configuration.

[0010] In some embodiments, the lid may be connected to the translation mechanism.

[0011] In some embodiments, the fuel wick may be in its first position when the lid is in its open conformation and in its second position when the lid is in its closed conformation.

[0012] In some embodiments, the flame wick may comprise a distal end configured to provide a flame upon being lit and a proximal end configured to be in fluid communication with the fuel reservoir when the fuel wick is in the first position, wherein the flame wick has a wick axis disposed between the distal and proximal end.

[0013] In some embodiments, the translation mechanism may move the fuel wick along the wick axis.

[0014] In some embodiments, the translation mechanism may move the fuel wick perpendicular to the wick axis.

[0015] In some embodiments, the flame wick may be a permanent wick.

[0016] In some embodiments, the flame wick may comprise a glass, a ceramic and/or a metal.

[0017] In some embodiments, the flame wick may be porous.

[0018] In some embodiments, the flame wick may comprise metal, glass and/or ceramic fibers.

[0019] In some embodiments, the flame wick may comprise a flame arrester.

[0020] In some embodiments, the flame wick may be in fluid communication with a flame arrester.

[0021] In some embodiments, the flame arrester may be configured to transport fuel from the fuel reservoir to the flame wick and while preventing transmittal of the flame from the distal end to the proximal end of the flame wick.

[0022] In some embodiments, the flame wick may have a higher porosity compared to the flame arrester.

[0023] In some embodiments, the flame wick and the flame arrester may comprise pores, wherein the flame wick's pore-size distribution is higher than the flame arrester's pore size distribution.

### Brief Description of the Drawings

[0024] Other characteristics and advantages of the invention will readily appear from the following description of one embodiment, provided as non-limitative examples, in reference to the accompanying drawings.

Figure 1 is a cross-sectional view of the flame pro-

ducing assembly with a fuel wick in a second position.

Figure 2 is a cross-sectional view of the flame producing assembly of figure 1 with the fuel wick in a first position.

### Detailed Description

**[0025]** Hereinafter, a detailed description will be given of the present disclosure. The terms or words used in the description and the aspects of the present disclosure are not to be construed limitedly as only having common-language or dictionary meanings and should, unless specifically defined otherwise in the following description, be interpreted as having their ordinary technical meaning as established in the relevant technical field. The detailed description will refer to specific embodiments to better illustrate the present disclosure, however, it should be understood that the presented disclosure is not limited to these specific embodiments.

**[0026]** Fuel used for flame producing assemblies, such as lighters, may be volatile and evaporate when the flame producing assembly is not in use. This may lead to loss of unburned fuel, which is an economic loss and may force the user to refill the fuel reservoir at an earlier time point. Further, the evaporation of fuel may lead to undesirable odors or may even be hazardous in poorly ventilated spaces.

**[0027]** Accordingly, in a first aspect, the present disclosure relates to a flame producing assembly (10). The flame producing assembly (10) may comprise a fuel reservoir (20), a flame wick (12) and a fuel wick (14) in fluid communication with the fuel reservoir (20). The flame producing assembly (10) may further comprise a translation mechanism (18), wherein the translation mechanism (18) may be configured to switch the fuel wick (14) between a first position and a second position. Further, the flame wick (12) may be in fluid communication with the fuel wick (14) when the fuel wick (14) is in the first position and not in fluid communication with the fuel wick (14) when the fuel wick (14) is in the second position.

**[0028]** Figure 1 and figure 2 are schematics of a flame producing assembly (10) according to the invention, wherein figure 1 shows the fuel wick (14) in the second position and figure 2 shows the fuel wick (14) in the first position. The flame producing assembly (10) comprises a flame wick (12) connected to the fuel wick (14). The flame producing assembly (10) further comprises a translation mechanism (18) configured to switch the fuel wick (14) between the first and second position.

**[0029]** The term "flame wick" within this disclosure is not particularly limited and refers i.a. to its common meaning in the art. In particular, it may refer to any type of structure which is configured to be ignited to provide a flame through combustion, wherein a fuel (26) is the main source of energy and not the wick itself, in particular wherein the fuel (26) is transported within the wick by

capillary action.

**[0030]** The term "fuel wick" within this disclosure is not particularly limited and refers i.a. to its common meaning in the art. In particular, it may refer to any type of structure configured to transport fuel (26) from one part of the structure to another part of the structure without the provision of external energy for transport, in particular wherein the fuel transport occurs due to capillary action. The fuel wick (14) may extend into the fuel (26) in both the first and second position but may only be connected to the flame wick (12) when in the first position.

**[0031]** The term "fuel reservoir" within this disclosure is not particularly limited and refers i.a. to its common meaning in the art. In particular, it may refer to any type of container configured to store a fuel (26), in particular a liquid fuel.

**[0032]** The translation mechanism (18) is not particularly limited. For example, the translation mechanism (18) may comprise a rack and pinion. The translation mechanism may be actuated by the user, for example using a setting wheel.

**[0033]** The fuel (26) may be a volatile substance and as a result they may evaporate at standard conditions. The flame producing assembly (10) according to the first aspect may reduce evaporation of the fuel (26) as the fuel (26) does not reach the flame wick (12) from where it may evaporate, when the fuel wick (14) is in the second position. Thus, when the fuel wick (14) is in the second position, the flame wick (12) may not be in fluid communication with the fuel reservoir (22). Still, the flame wick (12) may be ignited to fulfill its function, when the fuel wick (12) is in the first position, as the flame wick may then be in fluid communication with the fuel reservoir (22).

**[0034]** In some embodiments, the flame wick (12) may be in fluid communication with the fuel reservoir (20) when the fuel wick (14) is in the first position and not in fluid communication with the fuel wick (14) when the fuel wick (14) is in the second position. The fluid communication between the flame wick (12) and the fuel reservoir (20) may be established by the fuel wick (14) being connected to the flame wick (12) and the fuel reservoir (20). As a result, connecting and disconnecting the fuel wick (14) and the flame wick (12), e.g. by switching the fuel wick (14) between the first and second position, may establish and interrupt the fluid communication between the flame wick (12) and the fuel reservoir (20).

**[0035]** In some embodiments, the flame wick (12) may be in fluid communication with a wicking pad (24).

**[0036]** In some embodiments, the wicking pad (24) may be in fluid communication with the fuel wick (14) when the fuel wick (14) is in the first position and not in fluid communication with the fuel wick (14) when the fuel wick (14) is in the second position.

**[0037]** The wicking pad (24) may facilitate establishing a fluid connection between the flame wick (12) and the fuel wick (14) and/or fuel reservoir (20) in the first position. For example, the flame wick (12) and/or the fuel wick (14)

may exhibit a small diameter. The small diameter of the flame wick (12) and/or the fuel wick (14) may necessitate a precise translation mechanism (18) to align the ends of the flame wick (12) and the fuel wick (14). The wicking pad (24) may allow establishing fluid communication between the flame wick (12) and the fuel wick (14) without alignment of their ends. Further, the flame wick (12) or fuel wick (14) may be flexible structures, thus they may bend which may lead to a non-ideal alignment.

**[0038]** In some embodiments, the flame producing assembly (10) may comprise a lid (22) configured to switch between an open and a closed conformation. Figure 1 shows the lid (22) in a closed conformation and figure 2 shows the lid (22) in an opened conformation.

**[0039]** In some embodiments, the lid (22) may be configured to reduce evaporation of fuel (26) from the flame wick (12) when in the closed configuration. The lid (22) may protect the flame wick (12) from the environment, in particular from contact with ambient air, reducing evaporation from the flame wick (12). The lid (22) may substantially close off the flame wick (12) from ambient air, as a result, fuel (26) from the flame wick (12) cannot evaporate or only evaporate until the air present under lid (22) is saturated.

**[0040]** In some embodiments, the lid (22) may be connected to the translation mechanism (18). For example, the hinge of the lid (22) may comprise or be connected to the gear of a rack and pinion.

**[0041]** In some embodiments, the fuel wick (14) may be in its first position when the lid (22) is in its open conformation and in its second position when the lid (22) is in its closed conformation. The lid (22) and the translation mechanism (18) may work synergistically in preventing the evaporation from the flame wick (12) by stopping fuel (26) flow to the flame wick (12) and contact to ambient air.

**[0042]** In some embodiments, the flame wick (12) may comprise a distal end configured to provide a flame upon being lit and a proximal end configured to be in fluid communication with the fuel reservoir (20) when the fuel wick (14) is in the first position, wherein the flame wick (12) has a wick axis disposed between the distal and proximal end.

**[0043]** In some embodiments, the translation mechanism (18) may move the fuel wick (14) along the wick axis.

**[0044]** In some embodiments, the translation mechanism (18) may move the fuel wick (14) perpendicular to the wick axis. A perpendicular movement may allow building a flame producing assembly (10) of smaller dimensions, however a perpendicular movement may also necessitate the use of additional components such as a shutter (28) whereto the fuel wick (14) may be connected. The shutter (28) may be for example connected to the rack of a rack and pinion or may constitute the rack itself. The shutter (28) may additionally seal off the fuel reservoir (26). The shutter (28) may prevent fuel (26) evaporated within the fuel reservoir (26) from escaping from the fuel reservoir (26).

**[0045]** In some embodiments, the flame wick (12) may

be a permanent wick. Common wicks, such as those made of cotton fibers, may slowly burn away when ignited, whereas a permanent wick may have a longer life span. Further, permanent wicks may be stiff or stiffer compared to common wicks, which may improve alignment of the ends of the flame wick (12) and the fuel wick (14) to allow for fluid communication.

**[0046]** In some embodiments, the flame wick (12) may comprise a glass, a ceramic and/or a metal. Flame wicks (12) comprising a glass, a ceramic and/or a metal may last longer compared to flame wicks (12) made of cotton. Flame wicks (12) made of natural fibers such as cotton may slowly burn when flame producing assembly is ignited and hence degrade. The flame wick (12) may be a sintered structure manufactured for example from glass, ceramic and/or metal powder or granulate.

**[0047]** In some embodiments, the flame wick (12) may be porous. A porous flame wick (12) may provide capillary action to transport the fuel (26).

**[0048]** In some embodiments, the flame wick (12) may comprise metal, glass and/or ceramic fibers.

**[0049]** Similarly, in some embodiments, the fuel wick (14) may comprise metal, glass and/or ceramic. The fuel wick (14) may comprise fibers or be manufactured by sintering from powder or granulate. Wicks (12, 14) made of glass, ceramic and/or metal may be stiff or stiffer compared to common wicks, which may improve alignment of the ends of the flame wick (12) and the fuel wick (14) to allow for fluid communication.

**[0050]** In some embodiments, the flame wick (12) may comprise a flame arrester (16).

**[0051]** In some embodiments, the flame wick (12) may be in fluid communication with a flame arrester (16).

**[0052]** In some embodiments, the flame arrester (16) may be configured to transport fuel (26) from the fuel reservoir (20) to the flame wick (12) while preventing transmittal of the flame from the distal end to the proximal end of the flame wick (12). The flame arrester (16) may protect the flame producing assembly (10) from flames entering the fuel reservoir (20), which may be hazardous.

**[0053]** In some embodiments, the flame wick (12) may have a higher porosity compared to the flame arrester (16).

**[0054]** In some embodiments, the flame wick (12) and the flame arrester (16) may comprise pores, wherein the flame wick's (12) pore-size distribution is higher than the flame arrester's (16) pore size distribution. The term "pore-size distribution" within this disclosure is not particularly and may i.a. refer to its common meaning in the art. In particular, it may refer to the relative abundance of each pore size in a representative volume of a sample. Hence, a higher pore-size distribution in the flame wick (12) compared to the flame arrester (16), refers to the flame wick (12) having more pores of a greater size compared to the fuel wick (14). Bigger pores may allow greater contact of the fuel (26) with ambient air. As contact to oxygen, which is comprised within ambient air, is required for burning most fuels (26) typically used in flame pro-

ducing assemblies, bigger pores may allow more efficient burning of the fuel (26). Smaller pores may reduce the contact to ambient air. Without wishing to be bound by theory, smaller pore's may exhibit strong capillary forces compared to their volume, leading to an almost ideal filling of the pore with a fluid, e.g. the fuel (26). The almost ideal filling may only allow contact to ambient air at the opening of the pore. The capillary forces in bigger pores may be smaller compared to the fluid volume, leading to a non-ideal filling of the pore. The non-ideally dilled pore may then be filled with ambient air which in turn may lead to greater contact with ambient air throughout the pore.

### Aspects

**[0055]** The present disclosure further relates to the following aspects.

1. A flame producing assembly comprising:

a fuel reservoir,  
a flame wick,  
a fuel wick in fluid communication with the fuel reservoir,  
and a translation mechanism, wherein the translation mechanism is configured to switch the fuel wick between a first position and a second position,  
wherein the flame wick is in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

2. The flame producing assembly according to aspect 1, wherein the flame wick is in fluid communication with the fuel reservoir when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

3. The flame producing assembly according to any preceding aspect, wherein the flame wick is in fluid communication with a wicking pad.

4. The flame producing assembly according to any preceding aspect, wherein the wicking pad is in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

5. The flame producing assembly according to any preceding aspect, wherein the flame producing assembly comprises a lid configured to switch between an open and a closed conformation.

6. The flame producing assembly according to as-

pect 5, wherein the lid is configured to reduce evaporation of fuel from the flame wick when in the closed configuration.

7. The flame producing assembly according to aspect 5 or 6, wherein the lid is connected to the translation mechanism.

8. The flame producing assembly according to any one of aspects 5-7, wherein the fuel wick is in its first position when the lid is in its open conformation and in its second position when the lid is in its closed conformation.

9. The flame producing assembly according to any preceding aspect, wherein the flame wick comprises a distal end configured to provide a flame upon being lit and a proximal end configured to be in fluid communication with the fuel reservoir when the fuel wick is in the first position, wherein the flame wick has a wick axis disposed between the distal and proximal end.

10. The flame producing assembly according to aspect 9, wherein the translation mechanism moves the fuel wick along the wick axis.

11. The flame producing assembly according to aspect 9, wherein the translation mechanism moves the fuel wick perpendicular to the wick axis.

12. The flame producing assembly according to any preceding aspect, wherein the flame wick is a permanent wick.

13. The flame producing assembly according to any preceding aspect, wherein the flame wick comprises a glass, a ceramic and/or a metal.

14. The flame producing assembly according to any preceding aspect, wherein the flame wick is porous.

15. The flame producing assembly according to any preceding aspect, wherein the flame wick comprises metal, glass and/or ceramic fibers.

16. The flame producing assembly according to any preceding aspect, wherein the flame wick comprises a flame arrester.

17. The flame producing assembly according to aspect 16, wherein the flame wick is in fluid communication with a flame arrester.

18. The flame producing assembly according to aspect 16 or 17, wherein the flame arrester is configured to transport fuel from the fuel reservoir to the flame wick and while preventing transmittal of the

flame from the distal end to the proximal end of the flame wick.

19. The flame producing assembly according to any one of aspects 16-18, wherein the flame wick has a higher porosity compared to the flame arrester.

20. The flame producing assembly according to any one of aspects 16-19, wherein the flame wick and the flame arrester comprise pores, wherein the flame wick's pore-size distribution is higher than the flame arrester's pore size distribution.

## Claims

### 1. A flame producing assembly comprising:

a fuel reservoir,  
a flame wick,  
a fuel wick in fluid communication with the fuel reservoir,  
and a translation mechanism, wherein the translation mechanism is configured to switch the fuel wick between a first position and a second position,  
wherein the flame wick is in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

2. The flame producing assembly according to claim 1, wherein the flame wick is in fluid communication with the fuel reservoir when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

3. The flame producing assembly according to any preceding claim, wherein the flame wick is in fluid communication with a wicking pad, in particular wherein the wicking pad is in fluid communication with the fuel wick when the fuel wick is in the first position and not in fluid communication with the fuel wick when the fuel wick is in the second position.

4. The flame producing assembly according to any preceding claim, wherein the flame producing assembly comprises a lid configured to switch between an open and a closed conformation, in particular wherein the lid is configured to reduce evaporation of fuel from the flame wick when in the closed configuration.

5. The flame producing assembly according to claim 4, wherein the lid is connected to the translation mechanism, in particular wherein the fuel wick is in its first position when the lid is in its open conformation and in its second position when the lid is in its closed

conformation.

6. The flame producing assembly according to any preceding claim, wherein the flame wick comprises a distal end configured to provide a flame upon being lit and a proximal end configured to be in fluid communication with the fuel reservoir when the fuel wick is in the first position, wherein the flame wick has a wick axis disposed between the distal and proximal end.

7. The flame producing assembly according to claim 6, wherein the translation mechanism moves the fuel wick along the wick axis.

8. The flame producing assembly according to claim 6, wherein the translation mechanism moves the fuel wick perpendicular to the wick axis.

9. The flame producing assembly according to any preceding claim, wherein the flame wick is a permanent wick, in particular wherein the flame wick comprises a glass, a ceramic and/or a metal.

10. The flame producing assembly according to any preceding claim, wherein the flame wick is porous.

11. The flame producing assembly according to any preceding claim, wherein the flame wick comprises metal, glass and/or ceramic fibers.

12. The flame producing assembly according to any preceding claim, wherein the flame wick comprises a flame arrester and/or wherein the flame wick is in fluid communication with a flame arrester.

13. The flame producing assembly according to claim 12, wherein the flame arrester is configured to transport fuel from the fuel reservoir to the flame wick and while preventing transmittal of the flame from the distal end to the proximal end of the flame wick.

14. The flame producing assembly according to any one of claims 12 or 13, wherein the flame wick has a higher porosity compared to the flame arrester.

15. The flame producing assembly according to any one of claims 12 to 14, wherein the flame wick and the flame arrester comprise pores, wherein the flame wick's pore-size distribution is higher than the flame arrester's pore size distribution.

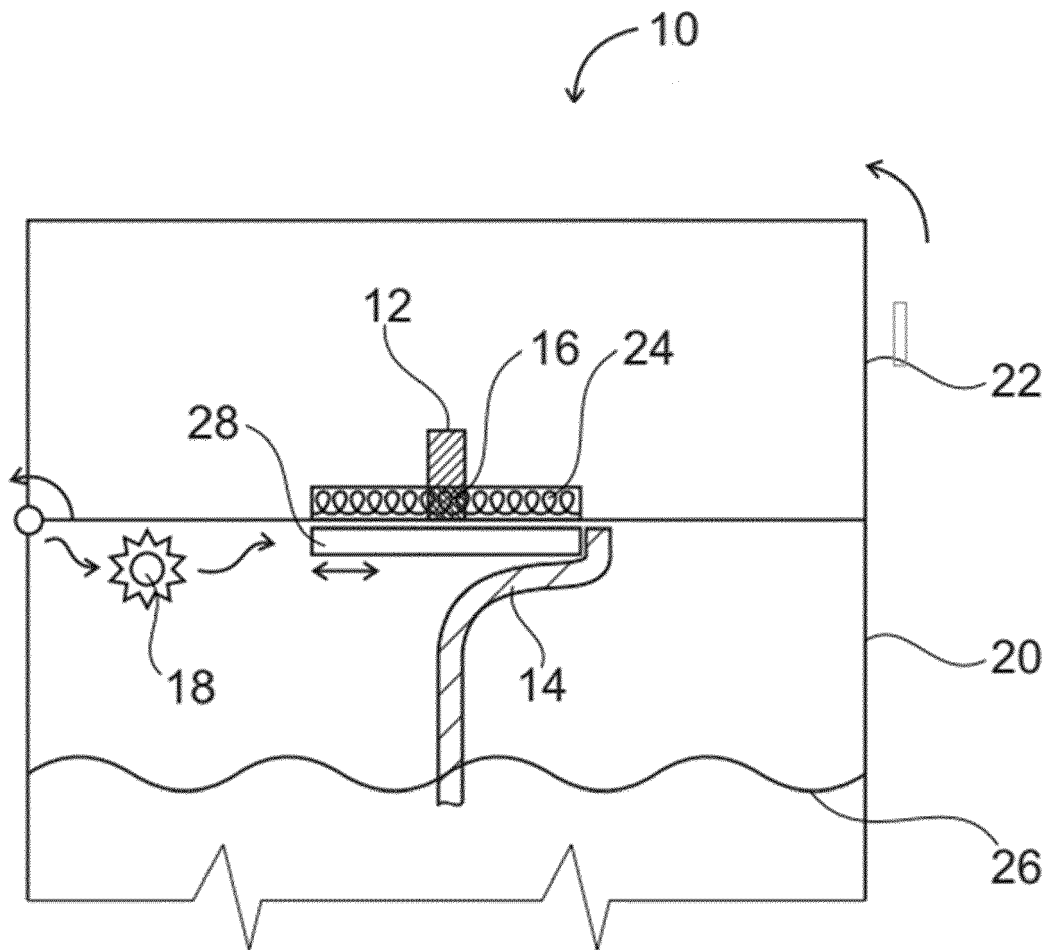


Fig. 1

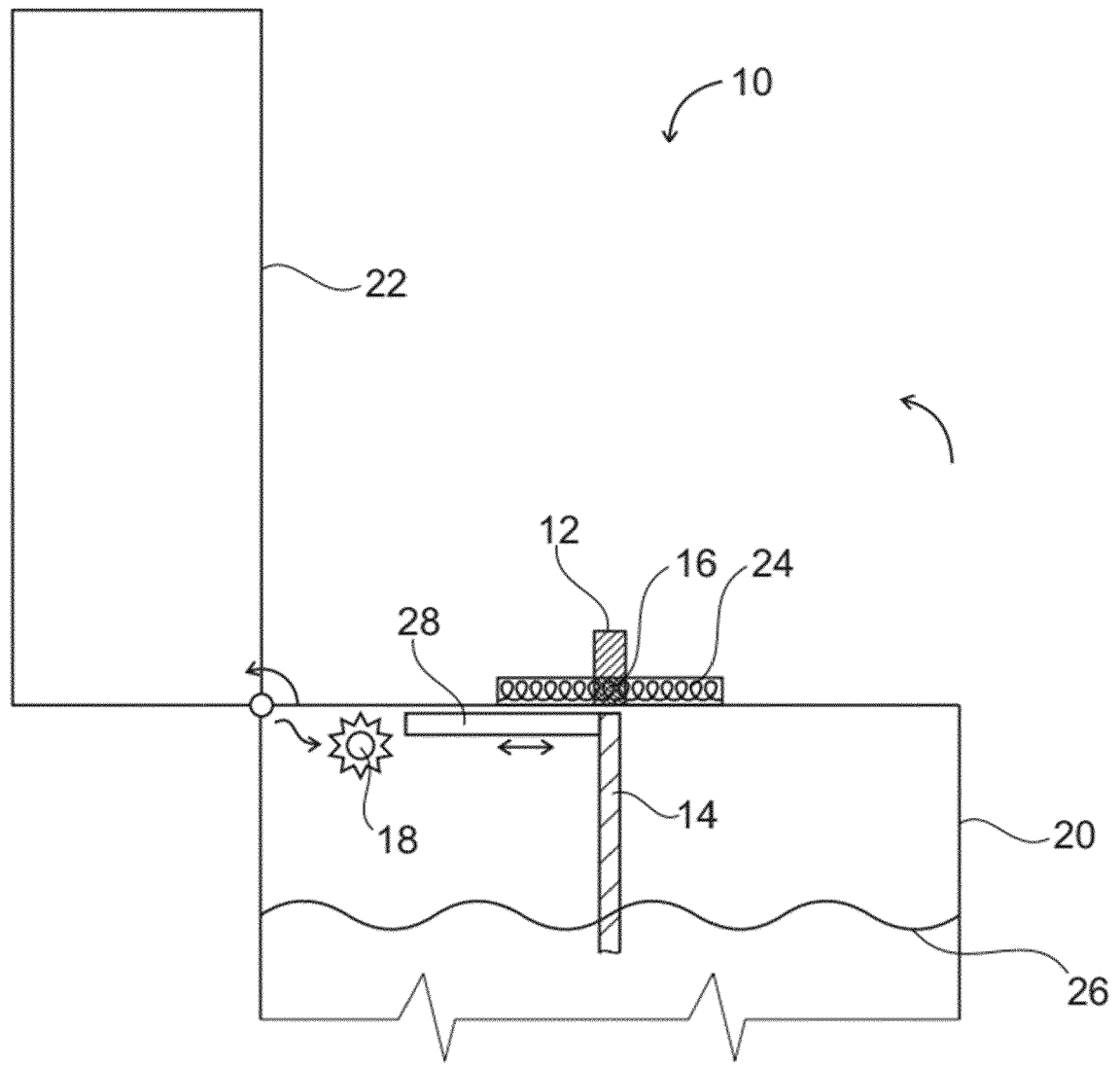


Fig. 2





## EUROPEAN SEARCH REPORT

Application Number

EP 21 30 6271

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 997 869 A (GERHART WEISS) 29 August 1961 (1961-08-29) * column 11, line 43 - column 13, line 45 * * figures 7-11 *	1-7, 9-15	INV. F23D3/30 F23D3/08 F23Q2/44 F23Q2/02 F23D3/40
X	JP S58 43314 A (MATSUSHITA ELECTRIC IND CO LTD) 14 March 1983 (1983-03-14) * Figure 4 and its description *	1-3, 6, 8-11	
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			TECHNICAL FIELDS SEARCHED (IPC)
			F23D F23Q
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>16 February 2022</b>	Examiner <b>Vogl, Paul</b>
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			

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ON EUROPEAN PATENT APPLICATION NO.**

EP 21 30 6271

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<b>US 2997869</b>	<b>A</b>	<b>29-08-1961</b>	<b>NONE</b>
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<b>JP S5993106</b>	<b>A</b>	<b>29-05-1984</b>	<b>NONE</b>

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