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(54) Title: A FORCED DRAFT COOKSTOVE FOR CLEANER COMBUSTION

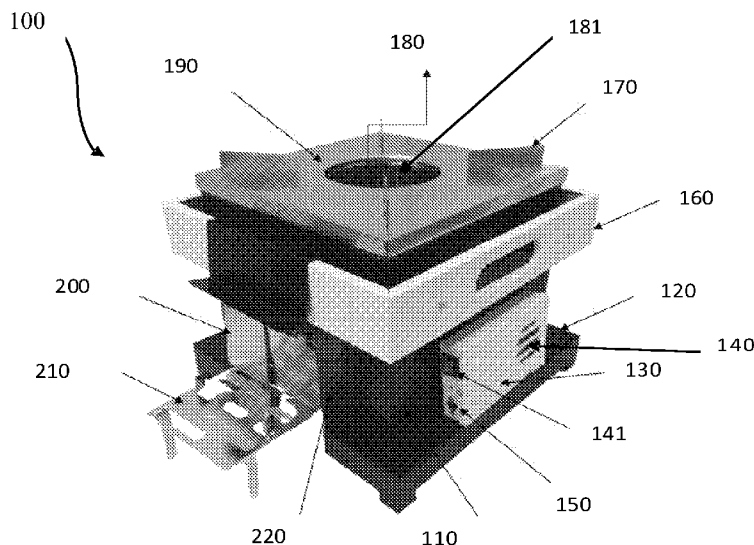


Figure 1

(57) Abstract: The present invention relates to a forced draft cookstove (100) with efficient heating and combustion properties. The cookstove (100) includes a housing (110) having a combustion chamber (180) with a plurality of air jackets (181) of varied sizes. A fuel feeding section (220) which includes a front flap (200) and a flippable tray (210) to include different sized fuels. A safety handle (160) is being arranged on the periphery of the housing (110). A cap (190) having a vessel setter (170) arranged on it is installed at the top portion of the housing (110). The housing (110) is placed on a squared shaped base (120) having a anti slip legs arrangement (240) for sturdy grip of the cookstove (100). A blower (140) powered using a rechargeable battery are enclosed in a casing (130) which is used to supply the air in the combustion chamber (180).



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- *of inventorship (Rule 4.17(iv))*

Published:

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- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

A Forced Draft Cookstove for Cleaner Combustion

Field of the Invention

[0001] The present disclosure relates to a cookstove. More
5 particularly, the present disclosure relates to an improved forced draft cookstove.

Background of the Invention

[0002] As of now, the global commercial market for improved
10 and efficient forced draft cookstoves is still a nascent one. Though there have been decades of improvements in stove programs, the impact of these programs has been limited due to poor durability and performance, or a lack of understanding of the market such as price, misplaced subsidies, lack of promotion and education. Few attempts are made to develop a complete forced draft cook stove. The air can be
15 forced into to combustion chamber with the aid of a pump or blower that may also aid in drawing in exhaust gas. The combustion process increases the internal energy of a gas, which translates into an increase in temperature, pressure, or volume of the gas. In a forced draft system, a blower is installed near the base of the cook stove and air is forced to pass through the chamber. This draught system is known as
20 positive draught system or forced draught system because the pressure and air is forced to flow through the system. The natural draught created by primary air source is very less, due to this the fuel under combustion chamber is not burnt properly and combustion does not take place properly which results less efficiency of the stove

and wastage of fuel. Also, the air holes provided on the combustion chamber are not variable and same in sizes which restrict the combustion process by not efficiently burning of fuel and also reduces the overall heat generating capacity of the cookstove. In some cookstoves only natural draft method of air is used and no
5 holes or jacket arrangement is made which reduces the overall efficiency of the cookstove.

[0003] Also, when the fuel burns inside the combustion chamber, the smoke generated by burning of the fuel is hazardous to health of the user nearby.
10 As no flaps are used to cover the fuel feeding section of the cookstove which makes the smoke due to burning of fuel to come out of the cookstove and adversely affect the user or people standing near the cookstove. The exhaust gas or smoke helps in maintaining the burning temperature of the fuel and the dismissal of this smoke directly outside while burning creates burning eye and lungs issues if used for a
15 prolonged period of time. Further, a tray is used to place the fuel such as wooden chips of a particular size for burning as the tray is not having an adjustment to allow sizes of different wood to be placed. The usage of a single sized and shaped fuel restricts the usage of the cookstove to the availability of fuel and decreases the efficiency of the cookstove. Furthermore, natural draft cookstove and the forced
20 draft uses a fan or blower to blow air into the combustion chamber directly. It needs a constant supply of electricity to power the motor and blower which limits the functionality and usage of the cookstove.

[0004] Therefore, there is a need to overcome the above drawback(s) and provide a forced draft improved cookstove, which overcomes few or all drawback of existing cookstoves.

5 Objects of the Invention

[0005] Some of the objectives of the present invention, which at least one embodiment herein satisfies are as listed herein below.

10 [0006] Object of the present invention to provide a forced draft cookstove having maximum efficiency and usability.

[0007] Another object of the present invention to provide a forced draft cookstove with a kind of combustion chamber for better overall combustion.

15

[0008] Yet another object of the present invention to provide a forced draft cookstove with cleaner combustion and reduced heat loss.

[0009] One more object of the present invention to provide a
20 cookstove with better thermal insulation and usability.

[0010] Further object of the present invention to provide a forced draft cookstove with battery management and portability.

Summary of the invention

[0011] According to the present invention, there is provided a forced draft cookstove with improved efficiency. The cookstove includes a squared shaped base on which a housing is arranged. A handle is peripherally arranged on the housing for ensuring safe handling of the cookstove. A combustion chamber is arranged inside the housing having a cap arranged on a top portion of the combustion chamber and the cap having a central opening to facilitate proper airflow and ventilation. The combustion chamber and the cap are made of heat resistant material to withstand high temperatures during the combustion process. Also, a vessel setter is arranged above the cap to support cooking vessels along with a fuel feeding section at bottom portion of the housing for facilitating fuel feeding and ash removal. Also, the cook stove includes a tray having a flip arrangement such that when the tray is in a first position, fuel of smaller lengths is accommodated therein and when the tray is flipped to a second position, wider range of fuel with varied and larger lengths is accommodated and the tray is adapted to be inserted inside the fuel feeding section of the cookstove for allowing of easy and efficient fuel replenishment.

[0012] Further, a front flap is pivotally arranged on a portion of the fuel feeding section which prevents the smoke to come out. A blower which is operatively coupled with a motor for supplying air to the combustion chamber and the blower is adjustable in speed or intensity to regulate the combustion process.

The front flap is having a dual flap arrangement made of heat resistant material to withstand the high temperature during combustion. Furthermore, a casing is attached on the periphery of the housing inside a case, the casing includes a rechargeable battery which powers the motor allowing blower to supply air to the combustion chamber through an air cap arranged at a bottom portion of the housing.

5 The air cap is an air distribution channel having an ingress and an egress channel to allow the supply of air from the blower to a narrow air passage arranged width wise the combustion chamber along with the air jackets arranged on the top portion of the combustion chamber. The casing is having a magnetic arrangement for attachment and detachment on the periphery of the housing. The casing further

10 comprises a charging port for external power input to recharge the rechargeable battery along with a power switch to operate the blower.

[0013] Also, an insulation support surrounding the combustion chamber is also arranged for configuring a filter chamber therebetween to absorb the smoke released while burning fuel in the combustion chamber. A plurality of air jackets are radially and circumferentially arranged around a top portion of the combustion chamber wherein the air jackets have an alternating diameter followed by periodic repetition and the air jackets are aligned in a same radial plane. The air

15 jackets are small holes having alternating diameter which lies on a single radial plane perpendicular to the central axis of the combustion chamber and the air jackets are of different and predesigned sizes to allow better air flow and efficient overall combustion. Further, an anti-slip legs arrangement is adapted below the squared

20

shaped base at end points to enable a sturdy grip. The cookstove provides a forced draft method of supplying air to the combustion chamber which ensures improved efficiency and usability.

5 Brief Description of the Drawings

[0014] The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary
10 embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure. The diagrams are for illustration only, which thus is not a limitation of the present disclosure.

[0015] In the figures, similar components and/or features may
15 have the same reference label. Further, various components of the same type may be distinguished by following the reference label with a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second
20 reference label.

[0016] Figure 1 illustrates a schematic representation of a forced draft cookstove in accordance with the present invention;

[0017] Figure 2 illustrates a bottom view of a forced draft cookstove in accordance with the present invention; and

[0018] Figure 3 illustrates an exploded view of a forced draft
5 cookstove in accordance with the present invention;

Detailed Description of the Invention

[0019] The following is a detailed description of embodiments of
10 the disclosure depicted in the accompanying drawings. The disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all
15 modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0020] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present
20 invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0021] The present invention relates to an improved forced draft cookstove for better and cleaner combustion. The cookstove is using both natural and forced draft method for supplying air into the combustion chamber to increase maximum efficiency and usability. The present invention provides a cleaner
5 combustion with reduced heat loss. Also, the cook stove has a better thermal insulation and usability with better battery management and portability.

[0022] Referring now to figure 1, a schematic representation of a forced draft cookstove (100) in accordance with the present invention is illustrated.
10 The forced draft cookstove (100) comprising a housing (110), a combustion chamber (180), a tray (210), and a casing (130). The housing (110) encloses all the stove components and serves multiple purposes, including containing the heat generated during combustion, providing insulation, and directing the airflow for efficient operation. In the present embodiment, the housing (110) is provided with
15 a squared shaped base (120) for better stability. Further, a handle (160) is peripherally arranged on the housing (110) for ensuring safe handling of the cookstove (100).

[0023] The handle (160) of the forced draft cookstove (100)
20 extends from the top portion of the housing (110) surrounding the cookstove (100). The handle (160) is designed to provide a convenient grip for users to hold and carry the stove (100). The handle (160) extends outward from the housing (110), creating a protrusion that can be easily grasped by the user's hand. This extension allows for

a secure grip and provides stability while lifting or moving the cookstove (100). Further, to facilitate holding the handle (160), the embodiment includes openings on opposite sides of the handle's (160) extension. These openings serve as spaces for the user's fingers to grip the handle (160) firmly. By placing fingers through
5 these openings, users can achieve a comfortable and secure hold on the cookstove (100) while lifting or transporting it.

[0024] Further, a vessel setter (170) is arranged above the top cap (190) to support cooking vessels. The vessel setter (170) is a metal frame that is
10 placed above the top cap (190) of the stove (100) to support cooking vessels such as pots and pans. The cook stove (100) also includes a fuel feeding c type section (220) which is arranged at bottom portion of the housing (110) for facilitating fuel feeding and ash removal. The fuel feeding C type section (220) is arranged at the bottom portion of the housing (110) of the forced draft cook stove (100) which is
15 designed to facilitate fuel feeding and ash removal. A safety cover (280) is also used to cover the front c type fuel feeding section (220).

[0025] Furthermore, the combustion chamber (180) is arranged inside the housing (110) with a cap (190) arranged on a top portion of the
20 combustion chamber (180) to facilitate proper airflow and ventilation. The combustion chamber (180) is the area where the fuel is burned to produce heat for cooking. The combustion chamber (180) uses the fuel, such as wood or pellets, biomass pellets or coal. The fuel is ignited and burns inside the combustion chamber

(180), generating heat that is then used for cooking. In the present embodiment, a plurality of air jackets (181) is radially and circumferentially arranged around a top portion of the combustion chamber (180). The air jackets (181) have an alternating diameter followed by periodic repetition and are aligned in a same radial plane. The
5 air jackets (181) are small holes having alternating diameter which lies on a single plane perpendicular to the central axis of the combustion chamber (180). It may be obvious to a person skilled in the art to configure air jackets of different and predesigned sizes, to allow better air flow and efficient overall combustion. The air jackets allow fresh air to enter the combustion chamber (180) and provide oxygen
10 for the burning fuel.

[0026] The casing (130) includes a charging port (150) for external power input to recharge the rechargeable battery along with a power switch (141) to operate the blower (140). The power switch (141) can be turned ON or
15 OFF depending on the requirement of the user. When operating the blower (140), the air is circulated into the combustion chamber (180). In the present embodiment, an air cap (230) is arranged at the bottom portion of the housing (110) to receive air from the blower (140) and to circulate or supply towards the combustion chamber (180) (as shown in figure 2). The air cap (230) is an air distribution channel having
20 an ingress and an egress channel to allow the supply of air from the blower (140) to the combustion chamber (180). In the present embodiment, a narrow air passage is arranged width wise at the bottom portion of the combustion chamber (180). The air cap (230) distributes the air towards the combustion chamber (180) through the

narrow air passage at the bottom of the housing and through the air jackets (181) arranged on the top portion of the combustion chamber (180).

[0027] Further, the airflow into the combustion chamber (180) through the air jackets (181) is assisted by a blower (140). In the present embodiment, the casing (130) includes a rechargeable battery and a blower (140) which is removably attached to a portion of the housing (110). Specifically, the casing (130) is magnetically attached to the periphery of the housing (110) and also having a cover (131) for the casing (130) and a body (132) for the casing (130) (as shown in figure 3). The casing (130) has a projection which is adapted to fit inside a cavity arranged on the housing (110). In an embodiment, the cavity may have magnetic arrangement to positively fit the projection of the casing (130) therein. In another embodiment, the projection may have magnetic arrangement to fit inside the casing (130). It may be obvious to a person skilled in the art to place magnets on both the cavity and the projection to attach the casing (130) with the housing (110).

[0028] Furthermore, an insulation support (250) is arranged surrounding the combustion chamber (180) to provide insulation and prevent the transfer of heat from the combustion chamber (180) to the outer surface of the stove (100). A filter chamber is configured between the insulation support (250) and the combustion chamber (180) to capture and filter the smoke generated during the burning of fuel inside the combustion chamber (180). The filter chamber includes a filter member which absorb and trap the smoke particles released during the

combustion process. As the fuel burns in the combustion chamber (180), smoke is produced. Instead of allowing the smoke to directly escape into the surrounding area, it is directed into the filter chamber. The filter member within the combustion chamber (180) absorbs the smoke, removing particulates and impurities. The filter member in the filter chamber can be made of various materials designed to effectively absorb and trap smoke particles. This could include activated carbon, special fibres or other filter media that have a high affinity for smoke. The filter is removably arranged within the filter chamber. The insulation (260) is made thermal insulation or made of glass wool or other similar insulating material.

10

[0029] In the present embodiment, the tray (210) is arranged below the housing (110) for holding fuel and it is adapted to insert inside the fuel feeding section (220) of the cookstove (100), allowing for easy and efficient fuel replenishment. The tray (210) is a substantially elongated structure with a portion having a surface for holding fuel. The tray (210) can be flipped such that when the tray (210) is in a first position, fuel of smaller lengths is accommodated therein and when the tray (210) is flipped to a second position, wider range of fuel with varied and larger lengths is accommodated.

20

[0030] Further, a front flap (200) is pivotally arranged on a portion of the fuel feeding section (220) prevents the smoke to come out through the fuel feeding section (220). Specifically, the front flap (200) is a movable component which is suspended or hinged on a specific portion of the fuel feeding

section. The front flap (200) serves to close the opening of the fuel feeding section (220) through which the fuel is fed into the combustion chamber (180). When the front flap (200) is in a closed position, it effectively blocks the passage through which smoke could escape from the combustion chamber. By closing the opening of the fuel feeding section (220), the front flap (200) ensures that smoke generated during combustion remains contained within the combustion chamber (180) and will be redirected towards the filter chamber. A safety cover (280) is used to cover the fuel feeding section (220) having the front flap (200) and where the tray (210) is to be placed.

10

[0031] In the present embodiment, the front flap (200) is having a dual flap arrangement made of heat resistant material to withstand the high temperature during combustion. Furthermore, an anti-slip legs arrangement (240) is adapted below the squared shaped base (120) at end points to enable a sturdy grip.

15

[0032] Therefore, the advantage of the present invention is to provide a forced draft improved cookstove (100) having improved combustion properties along with increased efficiency. The cookstove (100) has air jackets around the combustion chamber (180) which ensures the improved combustion by an air cap (230) for supplying air from the bottom portion of the cookstove (100) to the top portion along a passage using a blower (140) arranged inside a case (130) which is having a rechargeable battery for powering the motor (not shown). A frontal dual flap arrangement (200) ensures that no smoke is coming out of the fuel

feeding section (220) thereby ensuring cleaner combustion. A tray (210) for placing wood fuel is used which is flappable and can be turned upside down for incorporating a number of different sized wood fuel. The forced draft cookstove (100) ensures with the combustion chamber (180) covered with high quality
5 insulating material (260) retains the heat generated and avoids heat loss.

[0033] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by
10 the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

I Claim:

1. A forced draft cookstove (100) for cleaner combustion, the forced draft cookstove (100) comprising:

a housing (110) with a squared shaped base (120);

a handle (160) peripherally arranged on the housing (110) for ensuring safe handling of the cookstove (100);

a combustion chamber (180) arranged inside the housing (110);

a cap (190) arranged on a top portion of the combustion chamber (180), the cap (190) having a central opening to facilitate proper airflow and ventilation;

a vessel setter (170) arranged above the cap (190) to support cooking vessels;

a fuel feeding section (220) at bottom portion of the housing (110) for facilitating fuel feeding and ash removal, wherein the fuel feeding section (220) is a c type section;

a tray (210) for holding fuel, the tray (210) is adapted to insert inside the fuel feeding section (220) of the cookstove (100), allowing for easy and efficient fuel replenishment wherein the tray (210) is having a flip arrangement such that when the tray (210) is in a first position, fuel of smaller lengths is accommodated therein and when the tray (210) is flipped to a second position, wider range of fuel with varied and larger lengths is accommodated;

a front flap (200) pivotally arranged on a portion of the fuel feeding section (220), the front flap (200) prevents the smoke to come out through the fuel feeding section (220);

a blower (140) operatively coupled with a motor for supplying air to the combustion chamber (180);

a casing (130) removably attached to a portion of the housing (110), the casing (130) covers a rechargeable battery and the blower (140), wherein the rechargeable battery powers a motor allowing blower (140) to supply air to the combustion chamber (180) through an air cap (230) arranged at a bottom portion of the housing (110);

an insulation support (250) arranged surrounding the combustion chamber (180) configuring a filter chamber therebetween to absorb the smoke released while burning fuel in the combustion chamber (180); and

a plurality of air jackets (181) radially and circumferentially arranged around a top portion of the combustion chamber (180) wherein the air jackets (181) have an alternating diameter followed by periodic repetition and are aligned in a same radial plane.

2. The forced draft cookstove (100) as claimed in claim 1, wherein the air jackets (181) are small holes having alternating diameter which lies on a single plane perpendicular to the central axis of the combustion chamber (180), air jackets (181) are of different and predesigned sizes, to allow better air flow and efficient overall combustion.

3. The forced draft cookstove (100) as claimed in claim 1, wherein the combustion chamber (180) and the cap (190) are made of heat resistant material to withstand high temperatures during the combustion process.

4. The forced draft cookstove (100) as claimed in claim 1, wherein the blower (140) supplying air to the combustion chamber (180) through the air cap (230) is adjustable in speed or intensity to regulate the combustion process.

5. The forced draft cookstove (100) as claimed in claim 1, wherein the air cap (230) is an air distribution channel having an ingress and an egress channel to allow the supply of air from the blower (140) to a narrow air passage arranged width wise at a bottom portion of the combustion chamber (180) and towards the air jackets (181) arranged on the top portion of the combustion chamber (180).

6. The forced draft cookstove (100) as claimed in claim 1, wherein the casing (130) is magnetically attached to the periphery of the housing (110), the casing (130) has a projection which is adapted to fit inside a cavity arranged on the housing (110).

7. The forced draft cookstove (100) as claimed in claim 1, wherein the casing (130) is having a charging port (150) for external power input to recharge the rechargeable battery along with a power switch (141) to operate the blower (140).

8. The forced draft cookstove (100) as claimed in claim 1, wherein the front flap (200) is having a dual flap arrangement made of heat resistant material to withstand the high temperature during combustion.

9. The forced draft cookstove (100) as claimed in claim 1, wherein the fuel placed inside the tray (210) is mainly made of wood.

10. The forced draft cookstove (100) as claimed in claim 1, wherein an anti-slip legs arrangement (240) is adapted below the squared shaped base (120) at end points to enable a sturdy grip.

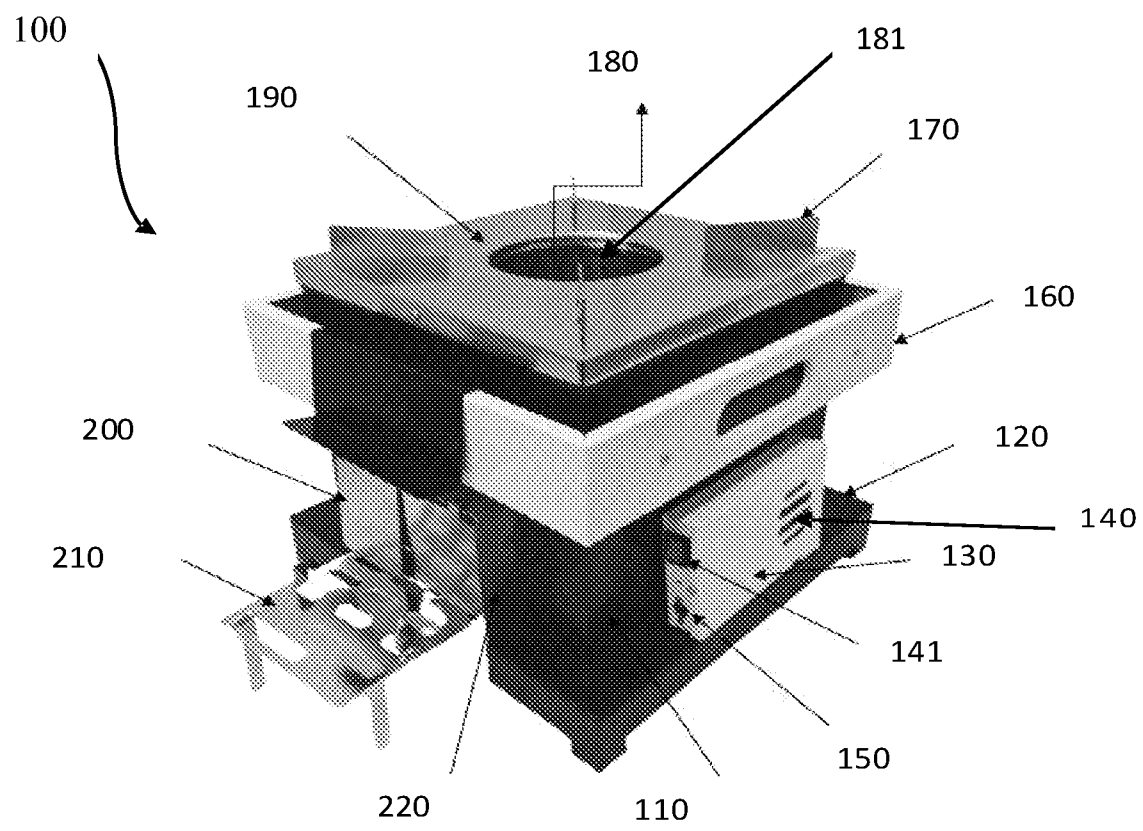


Figure 1

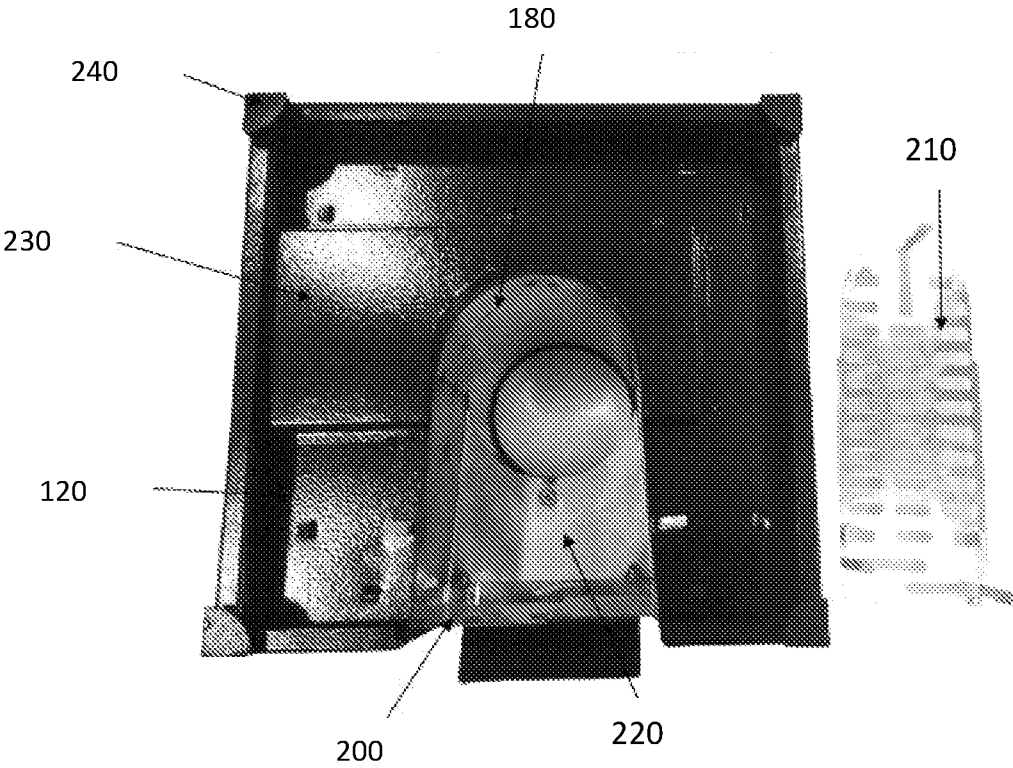


Figure 2

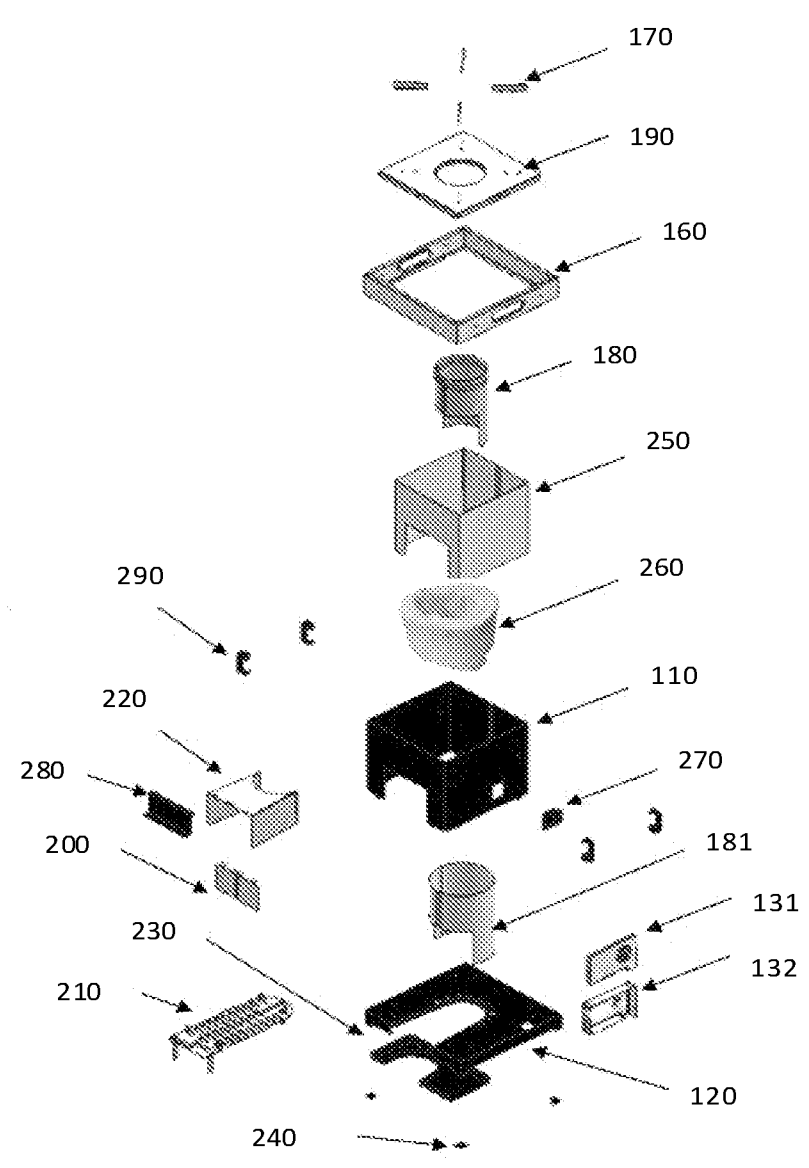


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2024/055785

A. CLASSIFICATION OF SUBJECT MATTER
F24B5/02 Version=2024.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2015201805A1 (BIOLITE LLC) 23 July 2015 (23-07-2015) Abstract; Paragraphs [0030] - [0036]; Figures 1-3	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

04-10-2024

Date of mailing of the international search report

04-10-2024

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2024/055785

Citation	Pub.Date	Family	Pub.Date
US 2015201805 A1	23-07-2015	CN 106471314 A	01-03-2017
		EP 3097359 A1	30-11-2016
		US 2018192822 A1	12-07-2018
		WO 2015112606 A1	30-07-2015