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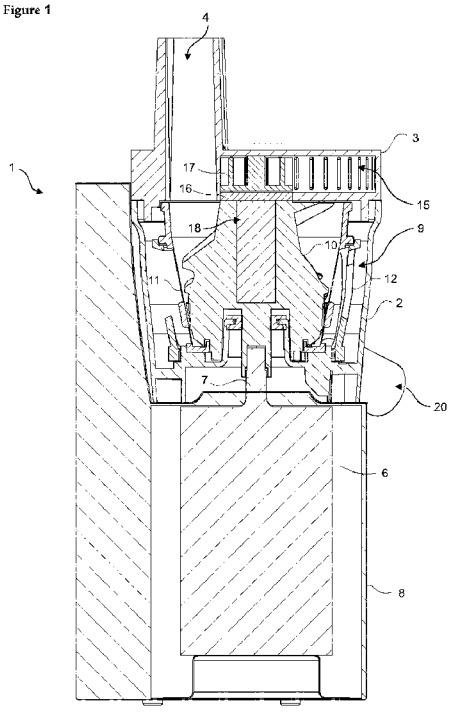
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(54) Title: A FRUIT AND VEGETABLE JUICER

Figure 1



(57) Abstract: The present invention relates to a fruit and vegetable juicer (1) comprising a container (2) wherein the fruits and/or vegetables to be juiced are placed; a crushing mechanism (9) which is placed into the container (2) and which crushes the fruits and/or vegetables in the container (2) by moving; a motor (6) which moves the crushing mechanism (9) and which is disposed under the crushing mechanism (9); a shaft (7) which transfers the motion of the motor (6) to the crushing mechanism (9); a casing (8) which encloses the motor (6) and which supports the container (2); a lid (3) which is placed onto the container (2) and which has a feeding port (4) thereon for putting the fruits and/or vegetables into the container (2); at least one thermoelectric element (16) which is placed onto the crushing mechanism (9) between the lid (3) and the crushing mechanism (9); and at least one heat distribution member (17) which is disposed onto the thermoelectric element (16).

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Description

A FRUIT AND VEGETABLE JUICER

[0001] The present invention relates to a fruit and vegetable juicer which minimizes the vitamin loss of processed fruits and vegetables and which cools down the same.

[0002] A special kind of solid fruit and vegetable juicers, also called "slow juicer", crush the fruit and/or vegetables placed therein by squeezing and rubbing so as to extract the juice. Since the crushing process is performed between a crushing component and a strainer, the pulp and the juice of the fruit and/or vegetable are separated from each other. While the crushing component is rotatably moved by a motor, the strainer remains stationary. During the crushing process, the fruits and/or vegetables are subject to friction and crushing forces. During this process, both the components and the fruits and vegetables in the juicer heat up. In the 10-minute wheatgrass extraction experiments carried out by using the state of the art fruit and vegetable juicers, it is detected that the temperature increases from 22.2°C to 42.3°C. However, the fruit or vegetable juice is preferred to be consumed cold. Moreover, the loss of vitamin in fruits and vegetables heating up is another disadvantage. In another embodiment of the present invention, the fruit and vegetable juicer comprises at least one passage which is provided on the base of the container and which opens into the casing. Thus, the ambient air moved by the fan and passing through the gap in the auger is directed to the casing wherein the motor is disposed before being discharged to the outer environment. Thus, the motor of the fruit and vegetable juicer which heats up during operation is enabled to be cooled down. In this embodiment, the fruit and vegetable juicer comprises at least one second outlet which is bored on the side wall of the casing to discharge the cooling air entering the casing.

[0003] In the state of the art Chinese Patent Application No. CN105996717, a fruit and vegetable juicer is disclosed, wherein the motor and the container are cooled down by means of a thermoelectric element. In this document, there are two alternative embodiments wherein the thermoelectric element

is positioned on the side wall of the container and on the base of the container.

[0004] Another document in the state of the art is the Chinese Patent Application No. CN106691143. In this document, a fruit and vegetable juicer is disclosed, comprising a thermoelectric element which is integrated with the container and which comes into direct contact with the fruits and/or vegetables put into the container.

[0005] The aim of the present invention is the realization of a fruit and vegetable juicer which minimizes the vitamin loss of processed fruits and vegetables and which cools down the same.

[0006] The fruit and vegetable juicer realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises at least one thermoelectric element which is placed onto the crushing mechanism between the lid and the crushing mechanism, and at least one heat distribution member which is disposed on the thermoelectric element.

[0007] The cold surface of the thermoelectric element fixed onto the crushing mechanism cools down the crushing mechanism which heats up. The heat distribution member is positioned on the hot surface of the thermoelectric element.

[0008] In an embodiment of the present invention, the fruit and vegetable juicer comprises a fan which is disposed between the lid and the container, on the heat distribution member positioned on the thermoelectric element placed onto the crushing mechanism; at least one inlet which is provided on the lid and which takes in air from the outer environment; and at least one outlet which provides the discharge of the air to the outer environment and which is bored on the lid wall. The fan sucks the ambient air through the inlet so as to guide the air to the heat distribution member, and thus the air passing through the heat distribution member passes through the outlet to be discharged back to the outer environment.

[0009] In the embodiment of the present invention, the cold surface of the thermoelectric element positioned on the auger cools down the auger which heats up. The hot surface of the thermoelectric element is

connected to the heat distribution member, and the cool air is sucked from the outer environment by means of the fan through the inlet so as to be guided onto the heat distribution member. The heated air passing through the heat distribution member is then discharged back to the outer environment through the outlet. In this embodiment, the auger, the thermoelectric element and the heat distribution member are connected to each other, and the latter two move together with the auger.

[0010] In another embodiment of the present invention, a contact surface is provided between the auger and the thermoelectric element. In this case, the thermoelectric element and the heat distribution member are fixed to the lower surface of the lid so as to be positioned right above the auger.

[0011] The auger is cooled down with the thermoelectric element placed onto the auger, and by cooling down the heat distribution member heating up due to the operation of the thermoelectric element by means of the air moved by the fan, the efficiency of the thermoelectric element (16) is improved. Thus, the auger, the container and the fruits and/or vegetables are cooled down.

[0012] In another embodiment of the present invention, the fruit and vegetable juicer comprises a heat transfer member with one end fixed to the thermoelectric element and the other end entering the auger. Consequently, the thermoelectric element is enabled to cool down the auger more efficiently. The heat transfer member ensures that the heat transfer is dispersed to a relatively deeper and wider area in the auger. In the embodiment of the present invention, the heat transfer member is produced from a metal (copper, aluminum, etc.) with high thermal conductivity coefficient.

[0013] In another embodiment of the present invention, the heat transfer member is a heat pipe. Thus, the performance of the heat transfer member is increased.

[0014] In another embodiment of the present invention, the fruit and vegetable juicer comprises a propeller-shaped heat distribution member and an additional motor which rotates the heat distribution member in such form. Thus, cooling performance is improved and advantage in space is

provided thanks to the compact structure.

[0015] In another embodiment of the present invention, the fruit and vegetable juicer comprises a heat distribution member which sweeps an area almost close to the surface area of the lid. Thus, the cooling performance is improved. In this embodiment, the fruit and vegetable juicer comprises an additional fan which is mounted onto the heat distribution member and which sweeps an area above the heat distribution member in order to cool down the heat distribution member which has a wide surface area.

[0016] By means of the present invention, the crushing mechanism is cooled such that both the auger and the fruits and/or vegetables in the container are prevented from heating up and enabled to be cooled down. By eliminating the risk of the temperature of the fruits and/or vegetables increasing, loss of vitamins is prevented. In the experiments wherein the fruit and vegetable juicer of the present invention is used, it is determined that vitamin gain by 19.3% - 39.6% is achieved in fruits and/or vegetables.

[0017] A fruit and vegetable juicer realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0018] Figure 1 - is the cross-sectional view of a fruit and vegetable juicer.

[0019] Figure 2 - is the exploded perspective view of the fruit and vegetable juicer.

[0020] Figure 3 - is the cross-sectional view of another embodiment of the present invention.

[0021] Figure 4 - is the cross-sectional view of another embodiment of the fruit and vegetable juicer.

[0022] The elements illustrated in the figures are numbered as follows:

1. Fruit and vegetable juicer
2. Container
3. Lid
4. Feeding port
5. Fan
6. Motor
7. Shaft
8. Casing

9. Crushing mechanism
10. Auger
11. Strainer
12. Scraper
13. Transfer mechanism
14. Inlet
15. Outlet
16. Thermoelectric element
17. Heat distribution member
18. Heat transfer member
19. Additional fan
20. Liquid outlet
21. Pulp outlet

[0023] The fruit and vegetable juicer (1) comprises a container (2) wherein the fruits and/or vegetables to be juiced are placed; a crushing mechanism (9) which is placed into the container (2) and which crushes the fruits and/or vegetables in the container (2) by moving; a motor (6) which moves the crushing mechanism (9) and which is disposed under the crushing mechanism (9); a shaft (7) which transfers the motion of the motor (6) to the crushing mechanism (9); a casing (8) which encloses the motor (6) and which supports the container (2); a lid (3) which is placed onto the container (2) and which has a feeding port (4) thereon for putting the fruits and/or vegetables into the container (2); at least one thermoelectric element (16) which is placed onto the crushing mechanism (9) between the lid (3) and the crushing mechanism (9); and at least one heat distribution member (17) which is disposed onto the thermoelectric element (16) (Figure 1).

[0024] The cold surface of the thermoelectric element (16) fixed onto the crushing mechanism (9) cools down the crushing mechanism (9) which heats up. The heat distribution member (17) is positioned on the hot surface of the thermoelectric element (16).

[0025] In an embodiment of the present invention, the fruit and vegetable juicer (1) comprises a fan (5) which is disposed between the lid (3) and the

container (2), on the heat distribution member (17) positioned on the thermoelectric element (16) placed onto the crushing mechanism (9); at least one inlet (14) which is provided on the lid (3) and which takes in air from the outer environment; and at least one outlet (15) which provides the discharge of the air to the outer environment and which is bored on the lid (3) wall. The fan (5) sucks the ambient air through the inlet (14) so as to guide the air to the heat distribution member (17), and thus the air passing through the heat distribution member (17) passes through the outlet (15) to be discharged back to the outer environment (Figure 2).

[0026] The crushing mechanism (9) comprises a hollow helical auger (10) which receives rotational movement from the motor (6) by means of the shaft (7); a fixed strainer (11) which is positioned under the auger (10); a scraper (12) which surrounds the strainer (11) and the auger (10) and which rotates in the opposite direction with respect to the auger (10); and a transfer mechanism (13) which is disposed between the auger (10) and the scraper (12) and which transfers the motion of the auger (10) to the scraper (12) so as to rotate in the opposite direction with respect to the auger (10). In this embodiment of the present invention, the thermoelectric element (16) is fixed onto the apex of the auger (10). The cold surface of the thermoelectric element (16) fixed onto the auger (10) cools down the auger (10) which heats up. The hot surface of the thermoelectric element (16) is connected to the heat distribution member (17), and the cool air is sucked from the outer environment by means of the fan (5) through the inlet (!4) so as to be guided onto the heat distribution member (17). The heated air passing through the heat distribution member (17) is then discharged back to the outer environment through the outlet (15). In this embodiment, the auger (10), the thermoelectric element (16) and the heat distribution member (17) are connected to each other, and the latter two move together with the auger (10).

[0027] In another embodiment of the present invention, a contact surface is provided between the auger (10) and the thermoelectric element (16). In this case, the thermoelectric element (16) and the heat distribution member (17) are fixed to the lower surface of the lid (3) so as to be

positioned right above the auger (10). Thus, the components achieve a simple structure, ensuring ease of use and cleaning.

[0028] The container (2) comprises at least one liquid outlet (20) which provides the discharge of the juice obtained as a result of the crushing process in the crushing mechanism (9) and at least one pulp outlet (21) for transferring the pulp.

[0029] The fruit or vegetable to be juiced is gradually loaded into the fruit and vegetable juicer (1) via the feeding port on the lid (3). By means of the screw-shaped helical structure of the auger (10), the fruit or vegetable put into the container (2) is pushed downwards and squeezed between the strainer (11) and the auger (10). The juice of the squeezed foodstuff passes through the strainer (11) and discharged through the liquid outlet (20) connected to the container (2). The pulp of the squeezed fruit or vegetable cannot pass through the strainer (11) and is guided to the pulp outlet (21) connected to the container. The auger (10) receives rotational movement from the motor (6). Meanwhile, the strainer (11) does not move. The transfer mechanism (13) disposed under the auger (10) comprises a planet gear. Said planet gear engaged with the auger (10) drives the teeth on the scraper (12). Thus, the auger (10) and the scraper (12) rotate in opposite directions. Consequently, a mixing effect is achieved and the clogged holes of the strainer (11) are opened by means of the scraper (12).

[0030] The heat generated on both the fruits and vegetables and the components due to the friction and crushing forces acting on the fruits and vegetables during these processes is minimized in the following manner: As the fruit and vegetable juicer (1) is operated, the fan (5) and the thermoelectric element (16) which are disposed on the crushing mechanism (9) between the lid (3) and the container (2) are also operated. The air sucked from the environment by means of the fan (5) passes through the inlet (14) on the lid (3) and reaches the area between the lid (3) and the container (2) and then passes through the heat distribution member (17) on the thermoelectric element (16) on the auger (10) in the crushing mechanism (9) such that the heat distribution member (17), which distributes the heat

on the hot surface of the thermoelectric element (16), is cooled down. By means of the thermoelectric element (16) on the auger (10), the auger (10) is cooled down, thus cooling down the fruits and/or vegetables in contact therewith. The air passing through the heat distribution member (17) so as to cool down the heat distribution member (7) is discharged out of the fruit and vegetable juicer (1) through the outlet (15). The auger (10) is cooled down with the thermoelectric element (16) placed onto the auger (10), and by cooling down the heat distribution member (17) heating up due to the operation of the thermoelectric element (16) by means of the air moved by the fan (5), the efficiency of the thermoelectric element (16) is improved. Thus, the auger (10), the container (2) and the fruit and/or vegetables are cooled down.

[0031] In an embodiment of the present invention, the outlet (15) is provided on the side wall of the lid (3). In this embodiment, the air passes through the heat distribution (17) fixed onto the thermoelectric element (16) on the auger (10) so as to reach the outlet (15) and to be discharged through the side wall of the lid (3).

[0032] In another embodiment of the present invention, the fruit and vegetable juicer (1) comprises a heat transfer member (18) with one end fixed to the thermoelectric element (16) and the other end entering the auger (10). Consequently, the thermoelectric element (16) is enabled to cool down the auger (10) more efficiently. The heat transfer member (18) ensures that the heat transfer is dispersed to a relatively deeper and wider area in the auger (10). In the embodiment of the present invention, the heat transfer member (18) is produced from a metal (copper, aluminum, etc.) with high thermal conductivity coefficient.

[0033] In another embodiment of the present invention, the heat transfer member (18) is a heat pipe. Thus, the performance of the heat transfer member (18) is increased.

[0034] In another embodiment of the present invention, the fruit and vegetable juicer (1) comprises a propeller-shaped heat distribution member (17) and an additional motor (not shown in the figures) which rotates the heat distribution member (17) in such form. Thus, cooling performance is

improved and advantage in space is provided thanks to the compact structure. In this embodiment, the heat distribution member (17) is mounted onto the thermoelectric element (16) and to the lid (3) with gaps so as to freely rotate on the thermoelectric element (16) (Figure 3).

[0035] In another embodiment of the present invention, the fruit and vegetable juicer (1) comprises a heat distribution member (17) which sweeps an area almost close to the surface area of the lid (3). Thus, the cooling performance is improved. In this embodiment, the fruit and vegetable juicer (1) comprises an additional fan (19) which is mounted onto the heat distribution member (17) and which sweeps an area above the heat distribution member (17) in order to cool down the heat distribution member (17) which has a wide surface area. The orbit of the additional fan (19) is determined by the geometry of the channel on the lid (3). Said additional fan (19) which has its own motor for rotational movement is driven by a mechanism such as crankshaft, connecting rod, etc. for orbital motion. In this embodiment, no additional energy is consumed for the additional fan (19) to sweep any area. Thus, chaotic air flows are generated by means of the area-sweeping additional fan (19), allowing the use of the heat distribution member (17) with a large diameter and wide surface area. Consequently, the cooling performance is improved (Figure 4).

[0036] By means of the present invention, the crushing mechanism (9) is cooled such that both the auger (10) and the fruits and/or vegetables in the container (2) are prevented from heating up and enabled to be cooled down. By eliminating the risk of the temperature of the fruits and/or vegetables increasing, loss of vitamins is prevented.

Claims

1. A fruit and vegetable juicer (1) **comprising** a container (2) wherein the fruits and/or vegetables to be juiced are placed; a crushing mechanism (9) which is placed into the container (2) and which crushes the fruits and/or vegetables in the container (2) by moving; a motor (6) which moves the crushing mechanism (9) and which is disposed under the crushing mechanism (9); a shaft (7) which transfers the motion of the motor (6) to the crushing mechanism (9); a casing (8) which encloses the motor (6) and which supports the container (2); a lid (3) which is placed onto the container (2) and which has a feeding port (4) thereon for putting the fruits and/or vegetables into the container (2), **characterized by** at least one thermoelectric element (16) which is placed onto the crushing mechanism (9) between the lid (3) and the crushing mechanism (9); and at least one heat distribution member (17) which is disposed onto the thermoelectric element (16).
2. A fruit and vegetable juicer (1) as in Claim 1, **characterized by** the thermoelectric element (16) of which the cold surface comes into contact with the crushing mechanism (9), wherein the heat distribution member (17) is fixed on the hot surface thereof.
3. A fruit and vegetable juicer (1) as in Claim 1, **characterized by** a fan (5) which is disposed between the lid (3) and the container (2), on the heat distribution member (17) positioned on the thermoelectric element (16) placed onto the crushing mechanism (9); at least one inlet (14) which is provided on the lid (3) and which takes in air from the outer environment; and at least one outlet (15) which provides the discharge of the air to the outer environment and which is bored on the lid (3) wall.
4. A fruit and vegetable juicer (1) as in Claim 1, 2, **characterized by** the crushing mechanism (9) comprising a hollow helical auger (10) which receives rotational movement from the motor (6) by means of the shaft (7); a fixed strainer (11) which is positioned under the auger (10); a scraper (12) which surrounds the strainer (11) and the auger (10) and which rotates in the opposite direction with respect to the auger (10); and a transfer mechanism (13) which is disposed between the auger (10) and the scraper (12) and which transfers the motion of the auger (10) to the scraper (12) so as to rotate in the opposite direction with

respect to the auger (10), and by the thermoelectric element (16) which is fixed onto the apex of the auger (10).

5. A fruit and vegetable juicer (1) as in Claim 4, **characterized by** a heat transfer member (18) with one end fixed to the thermoelectric element (16) and the other end entering the auger (10).
6. A fruit and vegetable juicer (1) as in Claim 5, **characterized by** the heat transfer member (18) which is a heat pipe.
7. A fruit and vegetable juicer (1) as in Claim 1, **characterized by** a propeller-shaped heat distribution member (17).
8. A fruit and vegetable juicer (1) as in Claim 7, **characterized by** an additional motor which rotates the heat distribution member (17).
9. A fruit and vegetable juicer (1) as in Claim 1, **characterized by** a heat distribution member (17) which sweeps an area almost close to the surface area of the lid (3).
10. A fruit and vegetable juicer (1) as in Claim 9, **characterized by** an additional fan (19) which is mounted onto the heat distribution member (17) and which sweeps an area above the heat distribution member (17) in order to cool down the heat distribution member (17) which has a wide surface area.

Figure 1

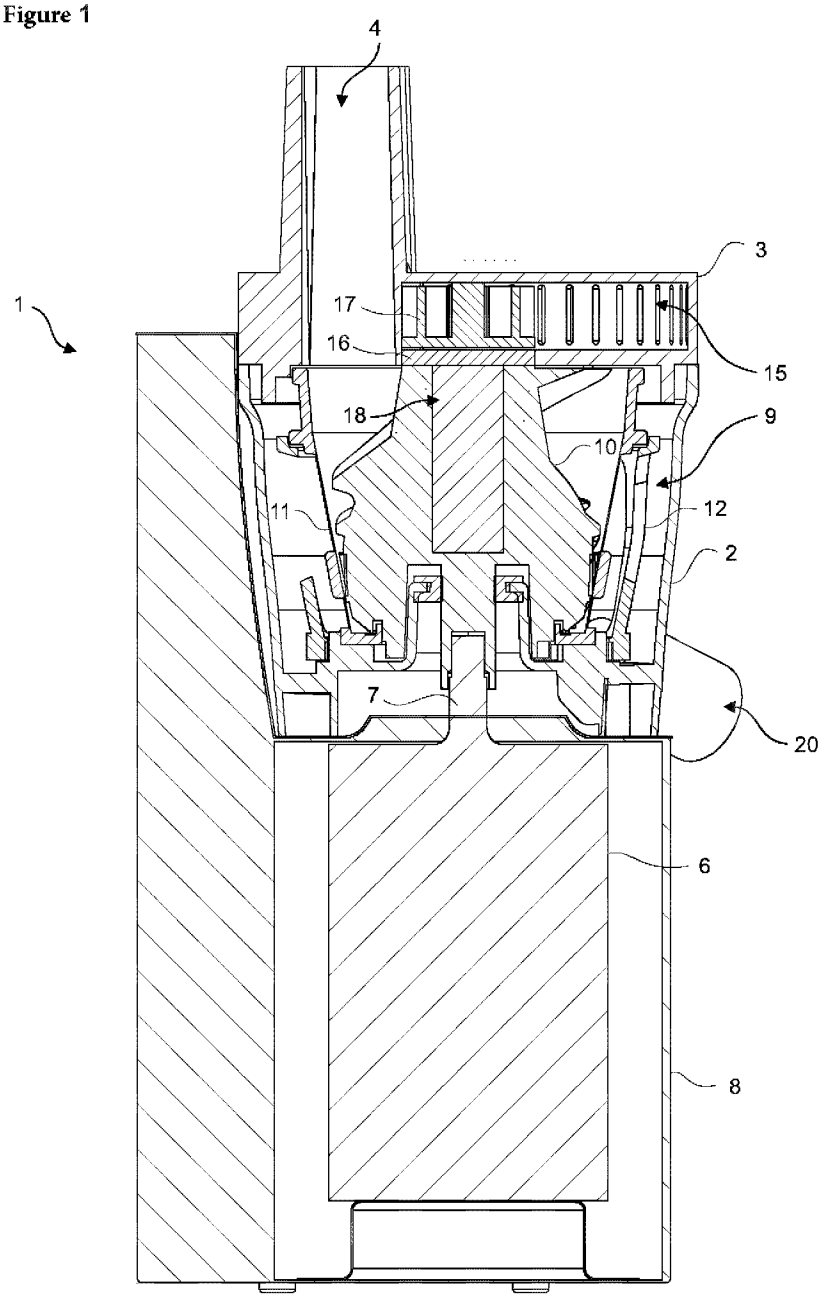


Figure 2

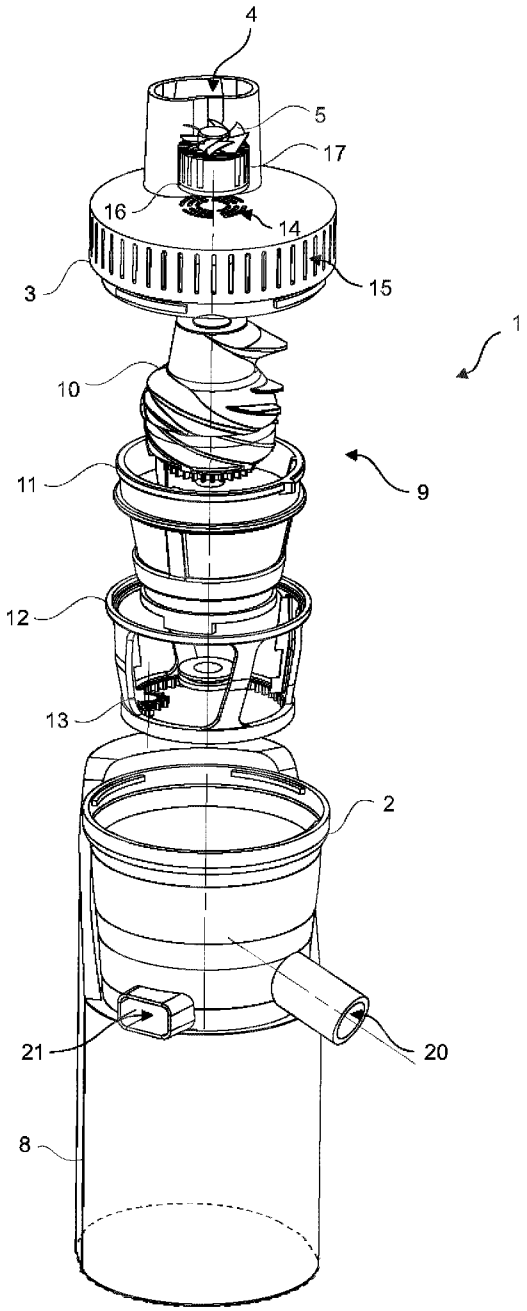


Figure 3

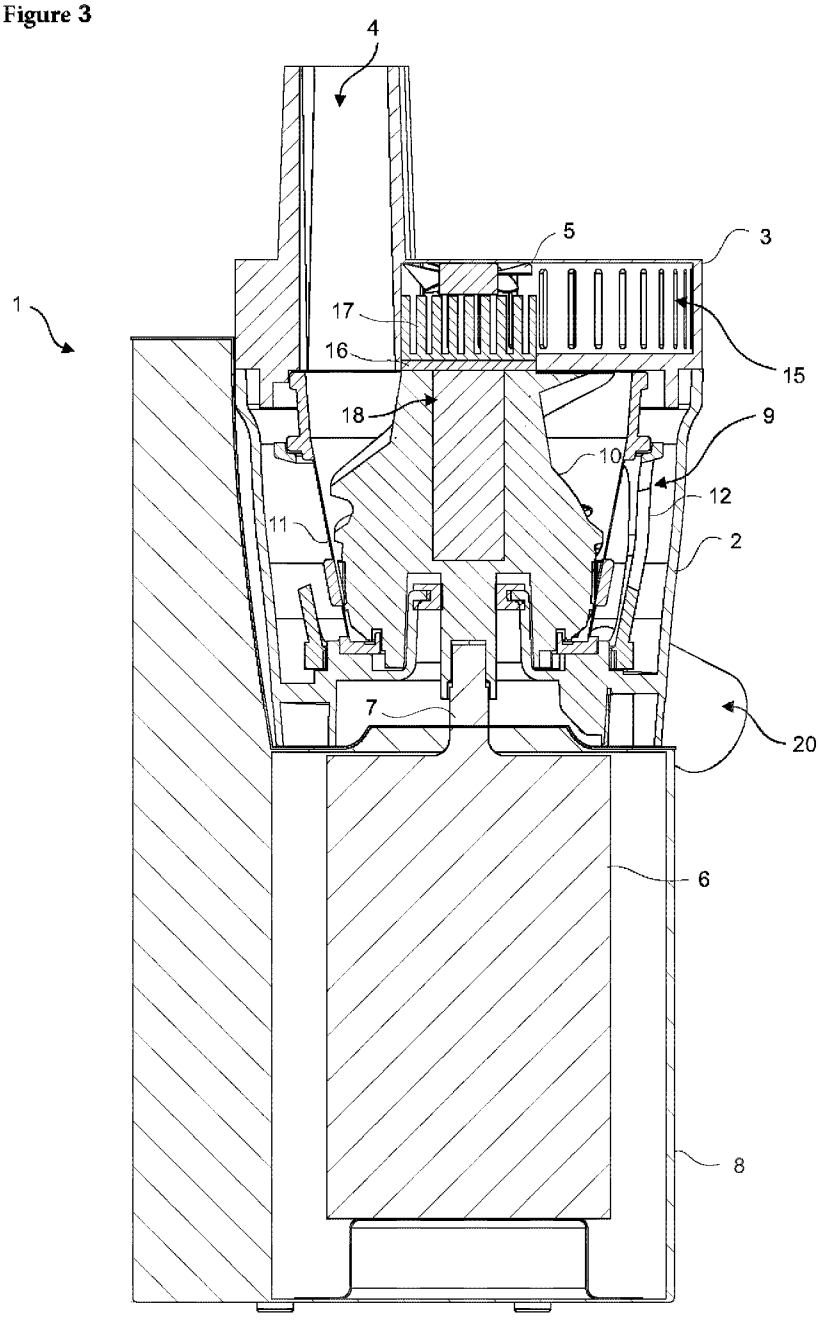
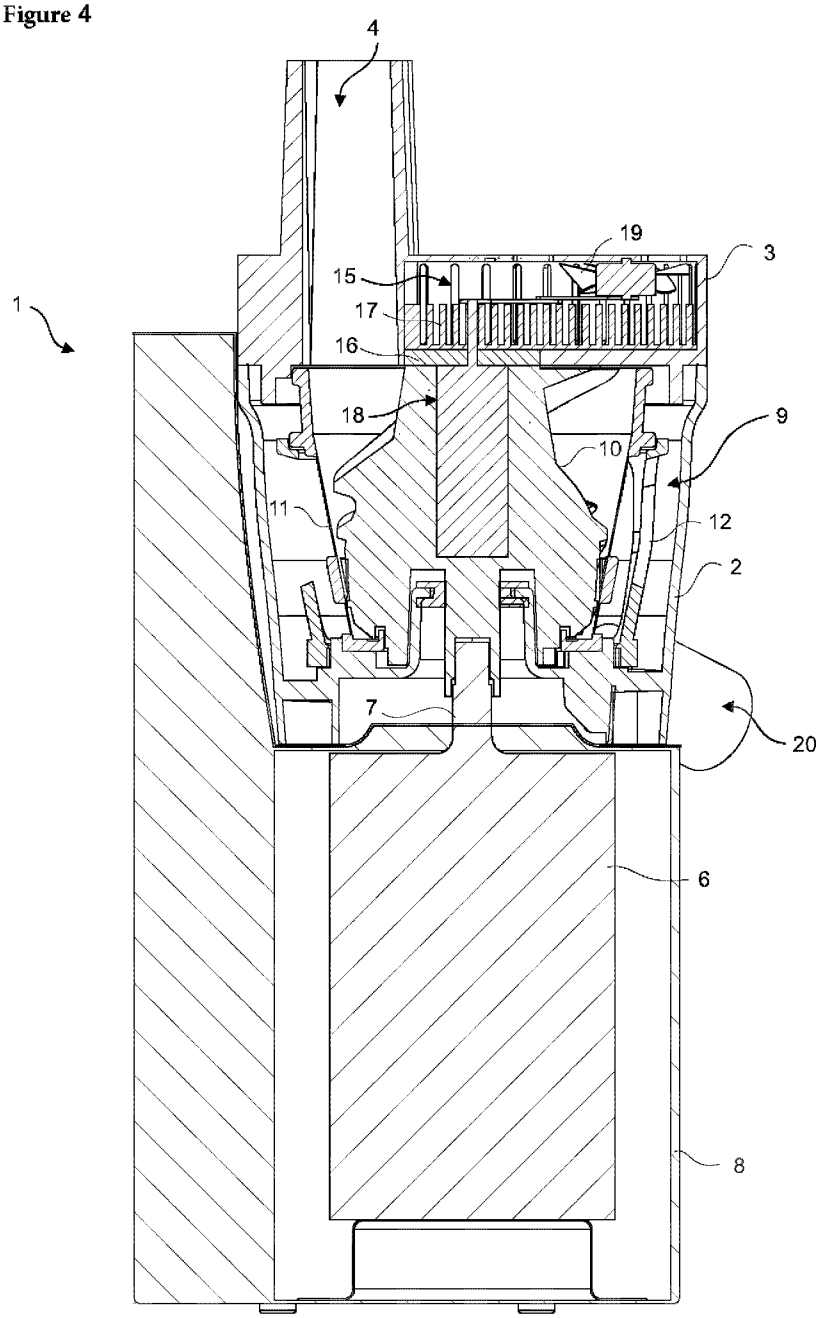


Figure 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/058937

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47J19/02
ADD.

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)
A47J

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 862 488 A1 (VORWERK CO INTERHOLDING [DE]) 22 April 2015 (2015-04-22)	1,7-9
A	claim 1; figure 5 paragraph [0001] paragraph [0008] paragraph [0030] - paragraph [0031] paragraph [0038] paragraph [0043] paragraph [0048]	2-6,10

A	CN 106 136 828 A (FOSHAN SHUNDE MIDEA ELECTRICAL HEATING APPLIANCES MFG CO LTD ET AL.) 23 November 2016 (2016-11-23) claim 1; figures 1, 2 paragraph [0038] - paragraph [0041] paragraph [0084] - paragraph [0086]	1-10

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
13 May 2020	27/05/2020

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Ulubay, Can

3

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 106 691 143 A (FOSHAN SHUNDE MIDEA ELECTRICAL HEATING APPLIANCES MFG CO LTD ET AL.) 24 May 2017 (2017-05-24) cited in the application figures 1-4 paragraph [0032] - paragraph [0038]	1-10
A	CN 108 433 511 A (UNIV ZHENGZHOU AERONAUTICS) 24 August 2018 (2018-08-24) figures 1-3 paragraph [0017]	1-10
A	US 2015/335059 A1 (FIELDS ROBERT [GB]) 26 November 2015 (2015-11-26) figures 1-5 paragraph [0027] - paragraph [0031]	1-10
A	CN 208 491 682 U (ZHEJIANG GEMCORE TECH CO LTD) 15 February 2019 (2019-02-15) figure 2 paragraph [0023] - paragraph [0024]	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2020/058937

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EP 2862488 A1	22-04-2015	CN 104545540 A	29-04-2015
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