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(54) **APPARATUS AND METHOD FOR SEALING A VACUUM BAG**

(57) The present disclosure relates to an apparatus (100) for sealing a vacuum bag (200), comprising: a reception space (110) configured to receive a vacuum bag (200) for sealing; an entry port (120) configured to allow a passage of the vacuum bag (200) into the reception space (110); and a guide member (130) at the entry port (120), wherein the guide member (130) is curved in an insertion direction (101) of the vacuum bag (200) and configured to guide the vacuum bag (200) in an interior thereof.

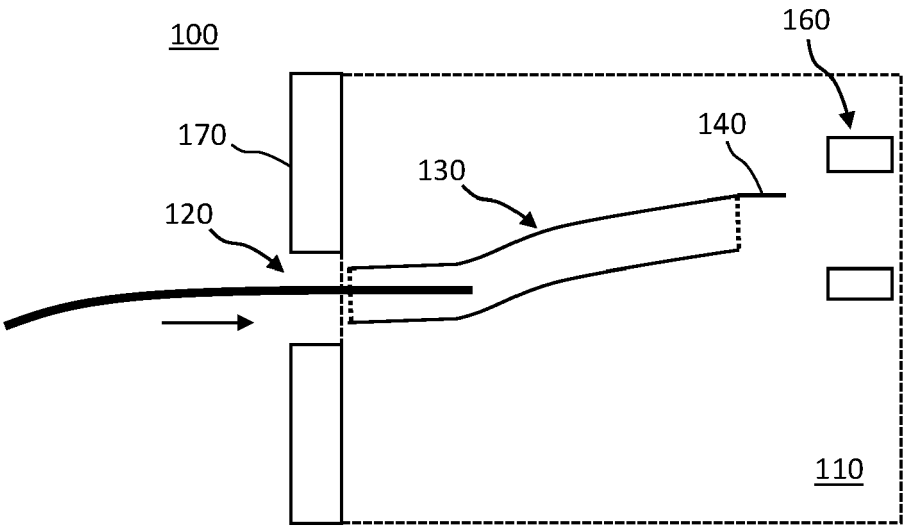

Fig. 1

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Description

FIELD

[0001] Embodiments of the present disclosure relate to an apparatus for sealing a vacuum bag and a method for sealing a vacuum bag. Embodiments of the present disclosure particularly relate to a vacuum-tight sealing of a vacuum bag for storing items such as food.

BACKGROUND

[0002] In vacuum packing, air is removed from a package prior to sealing. The packing involves placing items such as food in a plastic bag, removing air from the inside by means of an evacuation process, and sealing the bag. In particular, the bag is inserted in a vacuum space, evacuated, and heated with a heater to melt and seal the vacuum bag.

[0003] The vacuum bag may be introduced into the vacuum space through an opening on a front panel of a refrigerator. However, coins, liquids, metal parts, paper, and flammable materials can be inserted into the vacuum space, too. This may compromise a safety. For example, children could insert their toys and cause a fire that cannot be controlled.

[0004] In view of the above, new apparatuses for sealing a vacuum bag and methods for sealing a vacuum bag that overcome at least some of the problems in the art are beneficial.

SUMMARY

[0005] In light of the above, an apparatus for sealing a vacuum bag and a method for sealing a vacuum bag are provided.

[0006] It is an object of the present disclosure to improve a safety of the apparatus for sealing a vacuum bag. It is a particular object of the present disclosure to prevent a fire.

[0007] Further objects, aspects, benefits, and features of the present disclosure are apparent from the claims, the description, and the accompanying drawings.

[0008] According to an independent aspect of the present disclosure, an apparatus for sealing a vacuum bag, and particularly a vacuum bag for storing food items, is provided. The apparatus includes a reception space configured to receive a vacuum bag for sealing; an entry port configured to allow a passage of the vacuum bag into the reception space; and a guide member at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof.

[0009] According to a further independent aspect of the present disclosure, a method for sealing a vacuum bag, and particularly a vacuum bag for storing food items, is provided. The method includes inserting a vacuum bag in an entry port configured to allow a passage of the vacuum bag into a reception space for sealing; and guiding the vacuum bag by a guide member located at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof.

[0010] Embodiments are also directed at devices for carrying out the disclosed methods and include apparatus parts for performing each described method aspect. These method aspects may be performed by way of hardware components, a computer programmed by appropriate software, by any combination of the two or in any other manner. Furthermore, embodiments according to the disclosure are also directed at methods for operating the described apparatus. The methods include method aspects for carrying out every function of the apparatus for sealing the vacuum bag.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] So that the manner in which the above recited features of the present disclosure can be understood in detail, a more particular description of the disclosure, briefly summarized above, may be had by reference to embodiments. The accompanying drawings relate to embodiments of the disclosure and are described in the following:

FIG. 1 shows a schematic view of an apparatus for sealing a vacuum bag according to embodiments described herein;

FIG. 2 shows a schematic view of a curved guide member of an apparatus for sealing a vacuum bag according to embodiments described herein; and

FIG. 3 shows a flowchart of a method for sealing a vacuum bag according to embodiments described herein.

DETAILED DESCRIPTION OF EMBODIMENTS

[0012] Reference will now be made in detail to the various embodiments of the disclosure, one or more examples of which are illustrated in the figures. Within the following description of the drawings, the same reference numbers refer to same components. Generally, only the differences with respect to individual embodiments are described. Each example is provided by way of explanation of the disclosure and is not meant as a limitation of the disclosure. Further, features illustrated or described as part of one embodiment can be used on or in conjunction with other embodiments to yield yet a further embodiment. It is intended that the description includes such modifications and variations.

[0013] In order to seal a vacuum bag, the vacuum bag may be introduced into a vacuum space through an opening on a front panel of a refrigerator. However, coins,

liquids, metal parts, paper, and flammable materials can be inserted into the vacuum space, too. This may compromise a safety. For example, children could insert their toys and cause a fire that cannot be controlled.

[0014] The embodiments of the present disclosure overcome the above drawbacks by providing a guide member at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof. Thereby, an insertion of rigid items such as coins and metal parts can be prevented.

[0015] FIG. 1 shows a schematic view of an apparatus 100 for sealing a vacuum bag according to embodiments described herein. FIG. 2 shows a schematic view of a curved guide member 130 of the apparatus 100. The apparatus 100 can also be referred to as a "sealing apparatus".

[0016] The apparatus 100 includes a reception space 110 configured to receive a vacuum bag 200 for sealing; an entry port 120 configured to allow a passage of the vacuum bag 200 into the reception space 110; and a guide member 130 at the entry port 120, wherein the guide member 130 is curved in an insertion direction 101 of the vacuum bag 200 and configured to guide the vacuum bag 200 inside an interior thereof. The reception space 110 may be referred to as "vacuum space".

[0017] The guide member 130 may be located inside of the reception space 110.

[0018] In some implementations, the interior of the guide member 130 is a hollow channel (e.g. similar to a pouch). The hollow channel may be configured such that the vacuum bag 200 can be moved through the hollow channel from the entry port 120 to the reception space 110 along a curved path.

[0019] In particular, the guide member 130 may have an entry portion 132 and an exit portion 134 for the vacuum bag 200. The entry portion 132 may be located adjacent to the entry port 120. In some embodiments, the entry portion 132 of the guide member 130 and the entry port 120 may be configured as a single entity. In other embodiments, the entry portion 132 of the guide member 130 and the entry port 120 of the apparatus 100 may be configured as separate entities. The exit portion may be open to the reception space 110.

[0020] According to some embodiments, which can be combined with other embodiments described herein, the guide member 130 is curved upwards with respect to the insertion direction 101 of the vacuum bag 200. For example, the guide member 130 may be S-shaped. Thus, the exit portion 134 may be located higher than the entry portion 132 in the vertical direction.

[0021] The insertion direction 101 may be an essentially horizontal direction. Additionally, or alternatively, the upward direction may be a direction essentially antiparallel to the vertical direction and/or essentially perpendicular to the insertion direction 101.

[0022] The term "vertical direction" or "vertical orientation" is understood to distinguish over "horizontal direction" or "horizontal orientation". That is, the "vertical direction" or "vertical orientation" relates to a substantially vertical orientation e.g. of the upward direction, wherein a deviation of a few degrees, e.g. up to 10° or even up to 15°, from an exact vertical direction or vertical orientation is still considered as an "essentially vertical direction" or an "essentially vertical orientation". The vertical direction can be substantially parallel to the force of gravity.

[0023] Likewise, the "horizontal direction" or "horizontal orientation" relates to a substantially horizontal orientation e.g. of the insertion direction 101, wherein a deviation of a few degrees, e.g. up to 10° or even up to 15°, from an exact horizontal direction or horizontal orientation is still considered as an "essentially horizontal direction" or an "essentially horizontal orientation". The horizontal direction can be essentially perpendicular to the force of gravity.

[0024] According to some embodiments, which can be combined with other embodiments described herein, the apparatus 100 further includes a closing member 140 configured to block a passage of the vacuum bag 200 into the reception space 110.

[0025] In some implementations, the closing member 140 may be located at the exit portion 134 of the guide member 130. The closing member 140 may be a movable flap, and in particular a rotatable flap.

[0026] The closing member 140 may be rotatable around a rotational axis. The rotational axis may be an essentially horizontal rotational axis. For example, the closing member 140 may be rotatable by about 90° to open and close the passage of the vacuum bag 200 into the reception space 110. In particular, the closing member 140 may open and close the exit portion 134 of the guide member 130 by a rotation around the rotational axis.

[0027] According to some embodiments, the apparatus 100 further includes an actuator (not shown) configured to move, e.g. rotate, the closing member 140. The actuator may include at least one servo motor and/or at least one stepper motor, such as at least one DC stepper motor.

[0028] According to some embodiments, which can be combined with other embodiments described herein, the apparatus 100 further includes an item detection unit 150 configured to determine whether an item introduced into the guide member 130 is a vacuum bag 200. The item detection unit 150 may be located before or at the exit portion 134 of the guide member 130.

[0029] In some implementations, the item detection unit 150 may be configured to determine a material of the item. For example, the item detection unit 150 may include a sensor selected from the group including, or consisting of, a smoke sensor, an infrared thermal camera, a melting sensor, an infrared distance sensor, a material hardness meter pressure sensor, and an image sensor.

[0030] For example, a small heater can melt certain

points of the bag and distinguish between the melting temperature and the material. The melting temperature can be analysed by means of a controller (e.g. a microcontroller) and an algorithm can determine if the material is suitable for an introduction into the reception space 110.

[0031] The apparatus 100 may include a controller configured to control the closing member 140. If the item detection unit 150 detects e.g. a paper material, the item detection unit 150 may notify the controller which can then close the closing member 140 to prevent an introduction of the paper material into the reception space 110.

[0032] In some implementations, the apparatus 100 may include a display unit 170. The display unit 170 may be configured to display an operation state of the apparatus 100. Further, the display unit 170 may be configured as a touch screen that allows a control of the apparatus 100 by means of touch control.

[0033] The display unit 170 may further serve as a notification unit configured to notify a user when an item other than a vacuum bag has been inserted in the guide member 130. In particular, the user can be notified e.g. acoustically and/or visually that the item should be removed to avoid safety issues.

[0034] In some implementations, the entry port 110 of the apparatus 100 may be located at, or on, the display unit 170.

[0035] The apparatus 100 further includes a vacuum mechanism (not shown) configured to perform the evacuation process of the vacuum bag 200. In particular, the vacuum mechanism is configured to remove air from the inside of the vacuum bag 200 to generate a technical vacuum before the vacuum bag 200 is sealed e.g. by heat. The vacuum ensures that items placed in the vacuum bag 200, such as food items, stay longer fresh.

[0036] A vacuum is generally understood as a space essentially devoid of matter. The term "vacuum" as used throughout the present application is particularly understood as a technical vacuum, i.e., a region with a gaseous pressure much less than atmospheric pressure.

[0037] The vacuum mechanism may be configured to generate the (technical) vacuum inside of the reception space 110. The reception space 130 may thus be referred to as "vacuum space".

[0038] The apparatus 100 may include one or more heating elements 160 configured to seal the vacuum bag 200. In particular, a current may flow through the one or more heating elements 160, whereby the one or more heating elements 160 are heated. The heat provided by the one or more heating elements 160 melts a part of the vacuum bag 200 and the vacuum bag 200 is sealed thereby.

[0039] In order to provide the current, the apparatus 100 may further include a power source connected to the one or more heating elements 160. The power source may be configured to provide a predetermined current which is suitable to heat the one or more heating elements 160 and melt the part of the vacuum bag 200 without destroying the vacuum bag 200 and/or the vacuum inside of the vacuum bag 200.

[0040] For example, two opposite side walls of the vacuum bag 200 can be pressed together by two elements of the apparatus 100, such as the heating elements 160, to fix the bag vacuum 200 therebetween. Once the contacts have been established, the current can be supplied by the apparatus 100 to seal the vacuum bag 200 essentially vacuum-tight by melting a part of the vacuum bag 200 such that the two sidewalls of the vacuum bag 200 adhere to each other.

[0041] In more detail, and turning to FIG. 2, the vacuum bag 200 enters the region A and passes through the curved structure. Thus, an introduction of flammable materials, such as metal or plastic structures, is prevented.

[0042] Thereafter, the vacuum bag can be pushed inward until the bag reaches the reception space 110, i.e., the vacuum area. Finally, the vacuum sealing is performed, and the user is notified by means of the display unit 170 to pull back the vacuum bag 200.

[0043] The movable closing member 140 or mechanism as well as the item detection unit 150 are provided in the regions of the guide member 130 indicated by B and C in order to prevent the entrance of unsuitable materials into the vacuum bag mechanism.

[0044] In particular, an identification of the inserted bag can be made in region B. A user may put a flammable material such as paper in the mechanism, but this will be checked. If the microcontroller detects an unexpected situation, the microcontroller closes the flap in region C. In some embodiments, the flap can always be closed until the microcontroller detects a proper vacuum bag.

[0045] FIG. 3 illustrates a flowchart of a method 300 for sealing a vacuum bag, and particularly a vacuum bag for storing food items, according to the embodiments of the present disclosure.

[0046] The method 300 includes in block 310 an inserting of a vacuum bag in an entry port configured to allow a passage of the vacuum bag into a reception space for sealing; and in block 320 a guiding of the vacuum bag by a guide member located at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof.

[0047] The embodiments of the present disclosure provide a guide member at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof. Thereby, an insertion of rigid items such as coins and metal parts can be prevented.

[0048] While the foregoing is directed to embodiments of the disclosure, other and further embodiments of the disclosure may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

Claims

1. An apparatus (100) for sealing a vacuum bag (200), comprising:

   a reception space (110) configured to receive a vacuum bag (200) for sealing;
   an entry port (120) configured to allow a passage of the vacuum bag (200) into the reception space (110); and
   a guide member (130) at the entry port (120), wherein the guide member (130) is curved in an insertion direction (101) of the vacuum bag (200) and configured to guide the vacuum bag (200) in an interior thereof.

2. The apparatus (100) of claim 1, wherein the interior of the guide member (130) is a hollow channel.

3. The apparatus (100) of claim 1 or 2, wherein the guide member (130) is curved upwards with respect to the insertion direction (101) of the vacuum bag (200).

4. The apparatus (100) of any one of claims 1 to 3, wherein the guide member (130) is S-shaped.

5. The apparatus (100) of any one of claims 1 to 4, wherein the guide member (130) has an entry portion (132) and an exit portion (134) for the vacuum bag (200).

6. The apparatus (100) of any one of claims 1 to 5, further including a closing member (140) configured to block a passage of the vacuum bag (200) into the reception space (110).

7. The apparatus (100) of claim 6, when dependent from claim 5, wherein the closing member (140) is located at the exit portion (132) of the guide member (130).

8. The apparatus (100) of claim 6 or 7, wherein the closing member (140) is rotatable around a rotational axis.

9. The apparatus (100) of any one of claims 6 to 8, wherein the closing member (140) is rotatable by about 90°.

10. The apparatus (100) of any one of claims 6 to 9, further including an actuator configured to move the closing member (140).

11. The apparatus (100) of any one of claims 1 to 10, further including an item detection unit (150) configured to determine whether an item introduced into the guide member (130) is a vacuum bag (200).

12. The apparatus (100) of claim 11, wherein the item detection unit (150) is configured to determine a material of the item.

13. The apparatus (100) of claim 11 or 12, wherein the item detection unit (150) includes a sensor selected from the group consisting of a smoke sensor, an infrared thermal camera, a melting sensor, an infrared distance sensor, a material hardness meter pressure sensor, and an image sensor.

14. The apparatus (100) of any one of claims 1 to 13, further including a vacuum mechanism configured to remove air from the inside of the vacuum bag (200) during an evacuation process.

15. A method for sealing a vacuum bag (200), comprising:

   inserting a vacuum bag (200) in an entry port (120) configured to allow a passage of the vacuum bag (200) into a reception space (110) for sealing; and
   guiding the vacuum bag (200) by a guide member (130) located at the entry port (120), wherein the guide member (130) is curved in an insertion direction (101) of the vacuum bag (200) and configured to guide the vacuum bag (200) in an interior thereof.

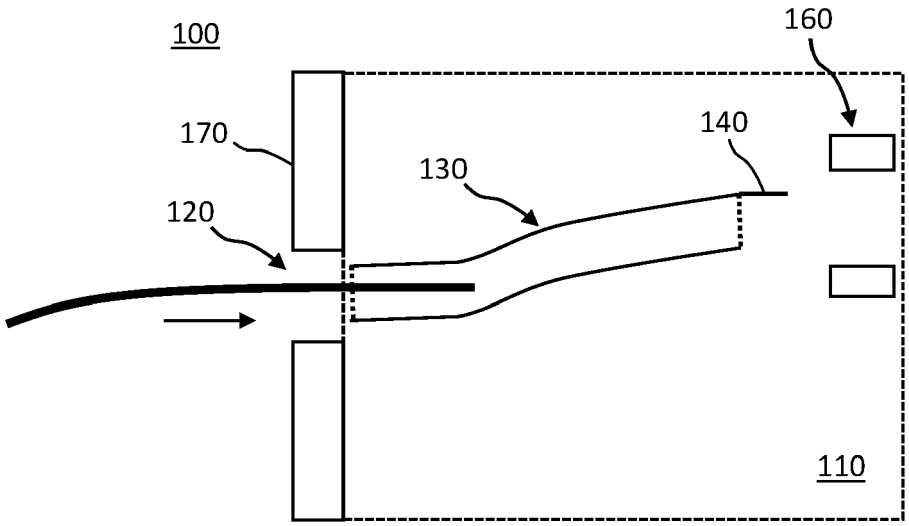

Fig. 1

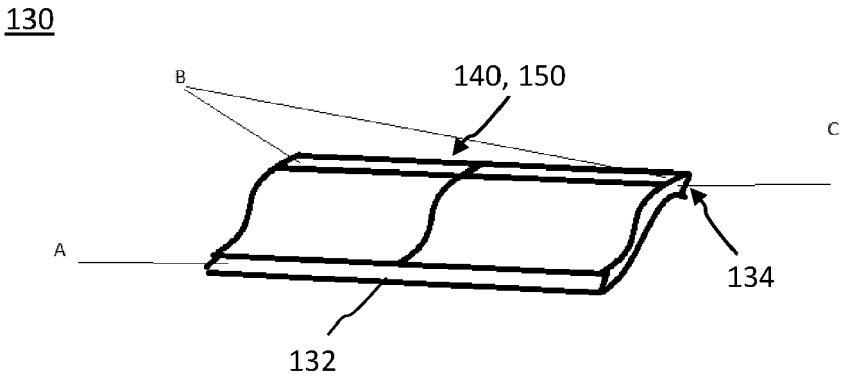

Fig. 2

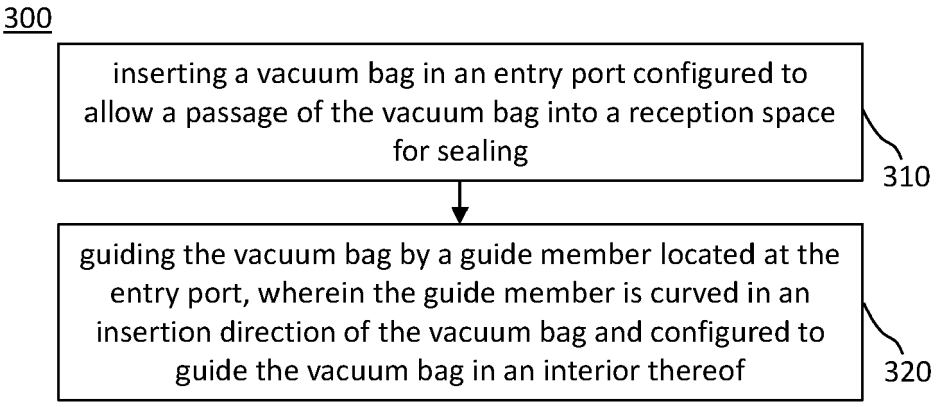
300
inserting a vacuum bag in an entry port configured to allow a passage of the vacuum bag into a reception space for sealing
310
guiding the vacuum bag by a guide member located at the entry port, wherein the guide member is curved in an insertion direction of the vacuum bag and configured to guide the vacuum bag in an interior thereof
320

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 19 21 8511

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 April 2020	Ngo Si Xuyen, G

CATEGORY OF CITED DOCUMENTS

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