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Clamping device

The present invention relates to a holding device, in particular for use as a gripper for food, as well as to a method for holding objects, in particular foodstuffs.

The holding device and the method are characterized in that, by means of a suction cup, which is connected to a low pressure source, secure holding of irregularly shaped objects, in particular of foodstuffs is attained, wherein the interaction of the holding device with the object is controlled.

Known holding devices seal irregular objects, in particular food, by means of a sealing lip or a cutting edge, wherein a predetermined low pressure is applied or regulated. To that effect, the known holding devices are disadvantageous in that the contact of an object, in particular a foodstuff, against a sealing lip or a cutting edge, is not controlled.

State of the art

Patent US 3,880,295 describes annular recesses, which protrude between the annular closed sharp edges, as a holding device for food. The recesses are connected with a low pressure chamber by means of bored holes. The recesses are connected with a low pressure chamber, wherein in one chamber, a pin protrudes into a chamber, with which a plate covering the connections to the low pressure chamber is connected, so that upon an approach of a foodstuff to the recesses, the pin is moved and its plate releases the connections to the low pressure chamber.

Patent DE 10 024 913 A1 describes a holding device for a cutting machine, which has suction cups which may be subject to a vacuum.

Patent US 6,024,392 describes a suction gripper, in which an elastic suction cup is fixed to a piston element, which is slidably held in a bore, and is displaced when loaded against an object in the bore and opened by a flow path for the vacuum. By displacement of the piston element in the opposite direction, the flow channel is closed to the vacuum. Further in general, proximity switches are described which gives the possibility of exerting a vacuum on an object upon approach of a suction gripper.

Patent EP 2 554 344 A1 describes a suction gripper with a suction cup, on which is positioned a limit stop for a sucked-up food, which is movable by means of an actuator.

Patent DE 29 916 647 U1 describes a suction device, in which a micro-switch controls the vacuum pump in dependence on the vacuum.

Task of the invention

The invention consequently gives itself the task of preparing an improved holding device and a holding method, which improves the loading of a foodstuff on a suction cup and preferably controls the loading of the foodstuff for a secure hold. A preferred task consists in preparing a method and a holding device for this, with which the loading of irregularly shaped foodstuffs on the suction cup is controllable, so that the loading of the foodstuff on a sealing lip or a cutting edge of the suction cup is carried out to a minimal required extent, which is required for a secure hold.

General description of the invention

The invention solves the problem with the characteristics of these claims and in particular prepares a holding device, which has a suction cup, to which a low pressure source is to be connected, wherein the suction cup has at its opening a circumferential sealing lip or cutting edge. Preferably the sealing lip or cutting edge is positioned in a plane and correspondingly the opening is stretched in a plane.

The suction cup is characterized by a limit stop, which, along the suction cup in the direction towards the opening and from the opening along the suction cup is slidably introduced. The limit stop is slidably introduced through a guidance element, which is connected with a locking device, or has a locking device. Upon approach or loading of an object on the opening of the suction cup, the limit stop is displaced from the opening on the first end in the direction towards the second end of the suction cup separated from the first end, for example further displaced into the suction cup.

A pressure gauge is connected with the suction cup, which measures the pressure inside the suction cup, which is in particular a vacuum pressure, and transmits the

signal for the measured pressure to a control unit. The locking device is controlled by the control unit, so that the locking device upon application of a predetermined vacuum which is also designated as a first vacuum, is actuated and the guidance element is fixed in its position whereby the limit stop connected with the locking device by means of the guiding element is fixed in its position relatively to the suction cup. In this way, the holding device allows a method for holding objects, in particular foodstuffs on its opening, wherein the foodstuff is only insofar drawn into the suction cup and only insofar it is drawn by the vacuum applied in the suction cup against a circumferential sealing lip or cutting edge positioned on the opening of the suction cup, until a predetermined vacuum is reached. A further penetration of the foodstuff, which is only affected in the opening in the region of application of a sealing lip or a cutting edge, is avoided in this way, while a foodstuff application required for a predetermined pressure inside the suction cup is achieved on the sealing lip or cutting edge of the opening. The predetermined pressure is then a vacuum inside the suction cup, in the case of which a reliable hold of the foodstuff on the suction cup is ascertained. In particular, the predetermined pressure is a vacuum applied on the suction cup, in the case of which the foodstuff is drawn in this way against the sealing lip or the cutting edge of the opening, which the foodstuff preferably covers the opening, and in particular does not allow any leakages between the sealing lip or cutting edge and the foodstuff. In particular this is advantageous in the method for holding a foodstuff, which is impervious to air and/or has a surface, which is uneven and/or not flush with the plane of the opening, which is stretched by the sealing lip or the cutting edge, whereby the locking device fixes the guidance element upon reaching a predetermined vacuum within the suction cup.

Preferably the fixing device is set up, so as to exert braking action on the movement of the guidance element in a second predetermined vacuum, for example by friction, in particular until application of a predetermined vacuum, in which the locking device fixes the guidance element. The second predetermined vacuum is then a higher absolute pressure or a smaller pressure difference relatively to the surrounding pressure as the (first) vacuum, whereby the locking device is fixed. In this embodiment, the locking device is controlled in dependence on the signal of the pressure gauze for the vacuum in the suction cup, which, by application of a second predetermined vacuum, slows down the guidance element and subsequently to the application of the predetermined

(first) vacuum, the locking device fixes the guidance device. This embodiment is particularly advantageous in the method for holding a heavy foodstuff, which has for example a unit weight for example of 1 – 20 kg, since a sudden blocking of the guidance element by the locking device may lead to the adverse effect on the shape and/or the application of the foodstuff on the suction cup, in particular for elastic or soft foodstuffs. The second vacuum may for example be 70% to 95% of the first vacuum, preferably 80% to 90%, when the vacuum is determined as the differential pressure relatively to the surrounding pressure. The locking device is preferably set up, so as to exert braking action on the movement of the guidance element on the second end of the suction cup, in particular adjustable and/or controlled for braking, for example by a hydraulically, pneumatically, mechanically or electronically controlled throttle. More preferably, the locking device is set up, so as to control the movement of the guidance element, in particular in dependence on the reaching of the first predetermined vacuum, which is determined by the pressure gauge device, to be completely stopped or blocked, and the guidance element to be fixed. This prevents a sudden suction of the foodstuff, or the penetration of the suction cup into the product exceeding what is required for sealing, which is in particular predefined as an application or determination of a first vacuum.

The holding device is in particular advantageous for a method for holding foodstuffs, which have an irregularly shaped surface and are rigid so that sealing lips or cutting edges are not applied on the opening. These are for example solid foodstuffs, which for example correspond to hard sausages and smoked foodstuffs, hard cheese, as well as sliced sausage, each optionally in a rod or block form, and raw meat as well as frosted foodstuff cakes. Correspondingly, the holding device is in particular suitable for the use as a gripper for foodstuffs of a cutting machine, wherein the foodstuff has an uneven and/or inelastic or rigid surface, which is loaded against the cutting edge or sealing lip.

The suction cup is preferably attached on a support. The guiding element may be introduced on one of the suction cups and/or a guide connected to the support, so that the guidance element and the thereby connected limit stop along the suction cup are slidably guided. The guidance element may be a guiding rod and the guide a longitudinal guide, for example a bore, or the guidance element may be a pivot lever and the guide pivot bearings.

The suction cup has an opening on its first end and a wall, which connects it to its second end. The wall is preferably cylindrical. The opening is preferably circular. Preferably the limit stop of the first end in the direction towards the second end of the suction cup is slidably introduced, for example over a section from 10 to 90% of the distance from the opening to the second end. The limit stop may have limit stop sections positioned inside and/or outside the suction cup, which preferably have a surface turned towards the suction cup, which is positioned in a common plane, in particular parallel to the plane of the opening of the suction cup. The low pressure source is preferably connected to the second end of the suction cup.

The limit stop or the limit stop section may be massive or transparent, preferably in the form of a grid.

The locking device may be connected with the support, so that the locking device is set up so as to controllably fix the guidance element above the support in a position and to preferably and controllably exert a baking action, by applying a second vacuum. The use of a holding device as a gripper for a slicer with a cutting element, is particularly preferred, which in particular is a slicer for sausage and meat products or cheese. Correspondingly slicers according to the invention for foodstuffs are preferred, which have a holding device according to the invention. The holding device then manages the minimization of cuts and/or residual pieces of foodstuffs in a rod or block form by automatic cutting processes by means of a slicer.

The locking device may have a readjusting element, for example in the form of a spring, which acts against one portion connected to the support of the holding device. Optionally the readjusting element consists of a compression spring, which by the movement of the guidance element from the opening or from the cutting edge is stretched away. Preferably the readjusting element is driven by a motor or by pressurized air, for example the readjusting element may be a pressure cylinder driven by pressurized air. Optionally, the readjusting element is controlled for moving the guidance element depending on the distance of the cutting element from the opening.

The pressure gauge is connected with the inner space of the suction cup, selectably in the section of the suction cup, over which the limit stop is displaceable, or in a section of the suction cup between the low pressure source and the limit stop.

Preferably the suction cup has a valve, which controls the conduit to the low pressure source and is particularly preferably controlled by the control unit in dependence on the signal of the pressure gauge.

In the method for holding foodstuffs, in particular by using the holding device, the suction cup with its opening is positioned against a foodstuff, until the suction cup touches the foodstuff. On the suction cup, a vacuum is applied, so that the foodstuff is drawn by the vacuum acting in the suction cup against the sealing lip or cutting edge circumferentially positioned on the opening of the suction cup. In a first position, the limit stop lies on the first end of the suction cup and is positioned against the foodstuff. When the foodstuff is drawn into the region of the opening by the vacuum in the suction cup, the limit stop is displaced in the direction towards the second end of the suction cup. The pressure gauge transmits a signal for the pressure applied in the suction cup to the control unit, which the locking device controls upon attaining a predetermined pressure and fixes the guidance element. In this embodiment, the locking device controlled in dependence on the signal of the pressure gauge is fixed in the position, in which the predetermined pressure within the suction cup is applied, so that the limit stop is then fixed in the second position by the guidance element, when the predetermined pressure is attained. Since for an applied vacuum, a predetermined pressure is then measured first by the pressure gauge, when a sufficient positioning of the foodstuff is applied against the sealing lip or the cutting edge and the opening is covered sealably, the limit stop limits, in the second position, the displacement of the foodstuff in the suction cup. Preferably the holding device has a damping device, for example a damping element, which allows the movement of the limit stop or of the guidance element only with a predetermined maximum distance per unit time (for example up to 2 mm/s or up to 15 mm/s). The damping device may be set up in order to allow the movement of the limit stop or of the guidance element connected therewith, only with a predetermined maximum distance per unit time, wherein the movement is preferably the movement of the opening of the suction cup. A damping device is on the other hand advantageous, so that for the elements of the device, in particular for the pressure gauge, the control

unit and/or for the locking device is adjustable for a predetermined minimum time, which allows its activity or actuation during the method for holding a foodstuff.

The locking device may a braking device, controlled in dependence on the pressure gauge, which for example is set to control the guidance element. Therefore, the locking device may be force-fitted in a guidance element in a position, in particular frictionally fitted, so that the guidance element is clasped with a predetermined resistance against any further movement. The locking device may be a clamping device and/or a catching device, which optionally has predetermined rest positions along the guidance element and engages into the latter by latching. The locking device is preferably set up, in order to clamp in the rest positions or to engage into the latter. Rest positions along the guidance element may for example be positioned recesses and/or projections or be formed so that the locking device of the guidance element is clamped or latched with the latter. The readjusting element is preferably driven controllably and set up so as to move the guiding element at least in the first position, more preferably over the first position and beyond the opening plane of the suction cup. In this embodiment, the readjusting element may be used as an ejection device for foodstuffs. This is in particular preferred in the embodiments in which the opening has a circumferential cutting edge and engages in the latter for a position against a foodstuff.

A readjusting device used as an ejection device controlled according to the position of the cutting element of a slicer is particularly preferred, which has the holding device. Such an ejection device is preferably controlled, for moving the limit stop in the direction towards the opening of the suction cup, optionally beyond the opening of the suction gripper, when the cutting element of the slicer approaches the holding device by up to a predetermined distance.

The pressure, at which the locking device fixes the guidance element, is also designated as a first vacuum. Preferably the locking device is controlled, for a second predetermined vacuum, for braking the movement of the guidance element, i.e. by friction, in particular by applying a predetermined first vacuum, in which the locking device fixes the guidance element. In this case, the second predetermined vacuum is a higher pressure absolutely set, or a smaller differential pressure relatively to the surrounding pressure than the first vacuum in which the locking device is fixed. In this

embodiment, the locking device is controlled in dependence on the signal of the pressure gauge for the vacuum in the suction cup for slowing down the guidance element, so that upon application of a second predetermined vacuum, a braking action is applied and subsequently upon application of a predetermined first vacuum, the locking device fixes a guidance element. The second vacuum may for example be 70% to 95% of the first vacuum, preferably 80% to 90%, when the vacuum is determined as a differential pressure relatively to the surrounding pressure.

Optionally, the holding device has a switch, which depending on the position of the limit stop is actuated and the valve, which is positioned between the suction cup and the low pressure source and/or controls the low pressure source (31) in dependence on the signal of the switch. Such a switch may for example be a position sensor or an end position switch, which detects the position of the limit stop or of the guidance device relatively to the suction cup. The switch may be fixed on a support connected with the suction cup and/or the locking device, wherein for example the guidance device has for example projections or recesses as position-specific elements detectable by the switch.

Specific description of the invention

The invention will now be described in more details with reference to the figures, which schematically

- in Fig. 1 show a section through a device according to the invention,
- In Fig. 2 show a further section through a device according to the invention,
- In Fig. 3, show the device of Fig. 2 with another position of the limit stop and
- In Figs. 4 and 5, sectionally show the device according to the invention in a method for holding a foodstuff.

In the figures, the same reference symbols designate elements of equivalent functions.

Fig. 1 shows in a suction cup 1, which is stretched from its first end 2, on which the opening 3 is stretched out, which extends to its second end 4, has a limit stop 10, of the limit stop sections 11. The stop sections 11 are slidably guided by means of the guidance elements 12 along the suction cup 1. The guidance element 12 is here for example shown as a guidance rod 13, which is introduced into at least one bore as a

guide 14. Alternatively, the guidance element 12 may be a pivot lever, which may be pivoted around pivot bearings as a guide 14, so that the limit stop 10 may for example move on an arc-formed path.

The opening 3 of the suction cup 1 extends in a plane on the first end 2 of the suction cup 1 and is surrounded by a circumferential cutting edge or sealing lip 5.

The limit stop sections 11 may have perforations 15 and be for example formed as a grid. Such perforations 15 are preferably at least inside the limit stop sections 11 positioned inside the suction cup 1, since the vacuum through these perforations 15 may have an action.

The guidance element 12 is connected with a locking device 17, for example guided in the locking device 17. The locking device 17 may be connected with a support (not shown), to which the suction cup 1 is attached; preferably the guidance element 12 is also introduced into the support.

The locking device 17 is connected with the control device 20, which is connected with the pressure gauge 21 connected in the inside of the suction cup 1 for transmitting a signal for the pressure measured by the pressure gauge 21.

The control device 20 is set up, for transmitting a signal of the pressure gauge 21, which corresponds to a predetermined first vacuum for controlling the locking device 17 with a signal for fixing the guidance element 12. Generally, the locking device 17 may optionally have a brake, which exerts braking action on the movement of the guidance element before reaching or determining a predetermined first vacuum inside the suction cup 1, in particular for determining a predetermined second vacuum by the pressure gauze 21. The locking device 17 may also be formed as a clamping device, which may controllably fix the guiding element 12 with force-fitting, and optionally the guidance element 12, for example by friction, for example controlled in dependence on the second vacuum determined by the pressure gauge. In this embodiment, the locking device additionally forms a brake.

According to the preferred embodiment, a readjusting element 18 is shown, which moves the guidance element 12 in the case of a released locking device 17 into a first position, in which the limit stop 10 is not loaded with a foodstuff.

The readjusting element 18 may, as schematically shown by a spring, load the guidance element 12 or the locking device 17 in the direction towards the first end 2 or against the opening 3. The readjusting element 18 is preferably controlled from the control device 20, for example in the form of a step motor, and is set up in order to allow the displacement of the guidance element 12 in the direction towards the second end 4 of the suction cup 1 without any great resistance, in particular essentially without any opposing force of the movement of the limit stop 10 against the second end 4.

This is preferably for the efficiency of the method, since otherwise a portion of the performance to be provided for the vacuum by the low pressure source 31 in order to load a readjusting element 18 upon displacement of the limit stop 10 against the second end 4 of the suction cup 1 is to be applied.

Preferably the device has a valve 30, which is positioned in the conduit, which connects the suction cup 1 with a low pressure source 31. Optionally, the valve 30 may be controlled in dependence on a signal of the pressure gauge 21 by the control device 20.

An optional switch 19 is applied as an end position sensor on the suction gripper, for example on the guide in the region of the movement path of the limit stop 10, so that the switch 19 is actuated upon approaching the stop 10. Optionally, the control device 21 may be set up, in dependence on a signal of the switch 19 for controlling the low pressure source 30 and/or the valve 31. Preferably, the switch 19 is positioned in the end position of the movement path of the guidance element 12, for example of the limit stop 10 connected with the guidance element and the control device 21 is set up, in the case of a signal of the switch 19 for the end position of the guidance element 12, in order to reduce the performance of the low pressure source 31 and/or in order to close the valve 30.

Fig. 1 shows an optional damping device 25, which is set up for delaying the guidance element away in the direction towards the cutting edge 5 or for allowing the movement

only with a predetermined maximum distance per unit of time. Such a damping device 25 may for example be an element loaded against the guidance element 12 and be the roughening element on it. In the following figures, the optional damping device 25 is also loaded against other sections of the guidance elements 12.

Fig. 2 shows the device in a first position or rest position, in which the limit stop 10 is positioned in the plane, in which the opening 3 extends. Such a position of the limit stop 10 may also be designated as an ejection position, since such a position may also be included by actuation of the readjusting element 18, so as to move away the limit stop 10 against the action of a vacuum of the second end 4 in the plane of the opening 3 or further away.

Figs. 1 and 2 show as a preferred embodiment the layout of a switch 23, which is set up, upon movement of the limit stop 10, to be actuated from its unloaded end position (as shown in Fig. 2) against the second end 4 of the suction cup 1, wherein the signal of the switch 23 is applied, to switch on the low pressure source 31 and/or to open the valve 30. In this embodiment, the switch 23 is used for controlling the applied vacuum in the suction cup 1 only when the limit stop 10 is loaded with a foodstuff or is moved out of its rest position against the second end 4.

Fig. 3 shows the embodiment of Fig. 2 in a second position, in which, without any foodstuff, lying in the opening 3, is moved away from the limit stop 10 from the first end 2 and the limit stop 10 is in its end position. The limit stop 10 actuates the switch 19, so that its signal is applied for controlling the low pressure source 31, in particular for reducing its performance or switching it off and/or for closing the valve 30. This shows the advantage of the switch 19, since without applying a foodstuff on the opening 3, a vacuum applied on the suction cup is without any function. The end position switch 23 may, in the arrangement shown here, switch on the low pressure source 31 or open the valve 30, so that preferably, the signal of the switch 19 dominates the signal of the switch 23 and in the end position shown here, switches off the low pressure source 31 or may close the valve 30.

Figs. 4 and 5 show for the method for holding foodstuffs with the holding device, the approach of a sausage end 24 as an example of a foodstuff with an uneven surface on

the opening 3 of the suction cup 1. In the position shown in Fig. 4 of the limit stop 10, is further illustrated in a section, on the right in Fig. 4, a distance of the foodstuff 24 to the cutting edge or to the sealing lip 5, which comprises the opening 3. Correspondingly, air at low pressure, which is applied onto the suction cup 1, between the sausage end 24 and the cutting edge 5 flows into the suction cup 1. With a further approach of the foodstuff 24 as shown in Fig. 5, the foodstuff 24 sealably lies on the cutting edge or the sealing lip 5 and therefore allows for the same performance of the low pressure source 31 application of a lower pressure inside the suction cup 1. The portions of the cutting edge 5 having penetrated into the sausage end 24, are illustrated in dashed lines in Figs. 4 and 5. By moving the foodstuff 24 from the first end 2 directed towards the second end 4 of the suction cup 1, the limit stop 10 is displaced along the suction cup 1 towards the second end 4 of the suction cup 1. The guidance element connected to the limit stop 10 may upon attaining a predetermined pressure, i.e. a vacuum sufficient for holding the foodstuff, is fixed in its position by the locking device 17. Further the locking device 17 is controlled by the control device 20 in dependence on the signal of the pressure gauge 21 for fixing the guidance element 12.

Optionally, in the second position of the limit stop 10 shown in Fig. 5, the valve 30 is closed by the control device 20. The valve controlled by the control device 20 is generally preferred, since it is used for energy saving, because the low pressure source 31 is actuated not continuously, in particular depending on a signal of the pressure gauge, or applies a vacuum on the suction cup.

Optionally, the control device 20 is set up, without moving the limit stop 12 out of an ejection position or a first position, in which the limit stop is not displaced towards the second end of the suction cup, in order to close it. In this embodiment the valve 30 is closed, when the holding device is not positioned against a foodstuff, which loads the limit stop 10.

List of references:

1. Suction cup.
2. First end.
3. Opening.
4. Second end.

5. Cutting edge, sealing lip.
10. Limit stop.
11. Limit stop sections.
12. Guidance element.
13. Guiding rod.
14. Guide.
15. Perforations.
16. Support.
17. Locking device.
18. Readjusting element.
19. Switch.
20. Control device.
21. Pressure gauge.
23. Switch for unloaded end position.
24. Sausage end.
25. Damping device.
30. Valve.
31. Low pressure source.

HOLDEINDRETNING

PATENTKRAV

1. Holdeindretning, som har en sugekop (1), der kan tilsluttes til en undertrykskilde (31), ved hvis første ende (2) der er opspændt en åbning (3) af en periferisk skærekant eller tætningslæbe (5), og som har en tryksensor (21), der er forbundet med indersiden af sugekoppen (1), kendetegnet ved, at der er ført et anslag (10) glidende langs sugekoppen (1) ved et føringselement (12), hvor føringselementet (12) er forbundet med en låseanordning (17), der styres afhængigt af signalet fra tryksensoren (21) for en første undertryksbelastning af sugekoppen (1).

2. Holdeindretning ifølge krav 1, kendetegnet ved en dæmpningsanordning (25), der er indrettet på en sådan måde, at den tillader, at føringselementets (12) bevægelse kun kan ske med en forudbestemt maksimal afstand pr. tidsenhed.

3. Holdeindretning ifølge et af de foregående krav, kendetegnet ved, at der langs føringselementet (12) er anbragt udsparinger og/eller fremspring og at låseanordningen (17) er en klemmeanordning og/eller en gribeanordning, som er indrettet til at klemme eller gribe udsparingerne og/eller fremspringene eller at låse sig sammen med disse.

4. Holdeindretning ifølge et af de foregående krav, kendetegnet ved, at føringselementet (12) er forbundet med et genjusteringselement (18), som er indrettet til at forskyde føringselementet (12) til en første position, hvor anslaget (10) er positioneret i niveau med åbningen (3), eller til en position, hvor anslaget (10) er positioneret ud over niveauet af åbningen (3).

5. Holdeindretning ifølge et af de foregående krav, kendetegnet ved, at en ventil (30), der er styret afhængigt af et signal fra tryksensoren (21), er anbragt imellem sugekoppen (1) og undertrykskilden (31).

6. Holdeindretning ifølge et af de foregående krav, kendetegnet ved, at låseanordningen (17) er en bremse for føringselementet (12), der styres afhængigt af et signal fra tryksensoren (21) for en anden undertryksbelastning af sugekoppen (1), hvor det andet undertryk er et lavere differenstryk til det omgivende tryk end det første tryk, der belaster sugekoppen (1).

7. Holdeindretning ifølge et af de foregående krav, kendetegnet ved en kontakt (19, 23), som aktiveres afhængigt af anslagets (10) position, og en ventil (30), der er anbragt

imellem sugekoppen (1) og undertrykskilden (31), og/eller undertrykskilden (31), er styret afhængigt af signalet fra kontakten (19).

8. Holdeindretning ifølge et af de foregående krav, kendetegnet ved et genjusteringselement (18), som belaster føringselementet (12) i retning af åbningen (3).

9. Anvendelse af en holdeindretning ifølge et af de foregående krav som en griber for fødevare (24) fra en skæremaskine, hvor den overflade af fødevaren (24), der er anbragt mod den periferiske skærekant eller tætningslæbe (5), er ujævn.

10. Fremgangsmåde til fastholdning af en fødevare (24) ved hjælp af en holdeindretning ifølge et af de foregående krav, hvor anslaget (10) i en første position er positioneret mindst i niveau med åbningen (3), og holdeindretningen anbringes imod en fødevare, hvorved anslaget (10) forskydes i retning mod den anden ende (4) af sugekoppen (1) til en anden position, som ligger tættere på den anden ende (4) af sugekoppen (1) end dennes første position, hvor trykmåleren (21) genererer et signal til trykket inde i sugekoppen (1), og hvor låseanordningen (17) aktiveres afhængigt af signalet fra tryksensoren (21) og fastgør føringselementet (12).

11. Fremgangsmåde ifølge krav 10, kendetegnet ved, at indretningen har en kontakt (19), som aktiveres ved forskydning af anslaget (12) fra den første position og starter undertrykskilden (31) og/eller åbner en ventil (30), som er anbragt imellem sugekoppen (1) og undertrykskilden (31).

12. Fremgangsmåde ifølge et af kravene 10 til 11, kendetegnet ved, at et genjusteringselement (18) aktiveres og virker mod føringselementet (12) på en sådan måde, at anslaget (10) forskydes i retning af sugekoppens (1) åbning (3).

13. Fremgangsmåde ifølge et af kravene 10 til 12, kendetegnet ved, at signalet til trykket inde i sugekoppen (1), ved hvilket tryk låseanordningen (17) fastgør føringselementet (12), er et første undertryk, og at låseanordningen (17) bremser føringselementets (12) bevægelse afhængigt af et signal fra trykmåleren (21) for en anden undertryksbelastning af sugekoppen (1), hvor det andet undertryk er et lavere differenstryk til det omgivende tryk end det første undertryk.

14. Fremgangsmåde ifølge et af kravene 10 til 13, kendetegnet ved, at fødevaren skæres i skiver, mens den er anbragt ved sugekoppen.

15. Fremgangsmåde ifølge et af kravene 10 til 14, kendetegnet ved, at fødevaren (24) er luftigennemtrængelig og/eller har en overflade, som er ujævn, og/eller som ikke

flugter med åbningens (3) niveau, og hvor låseanordningen (17) fastgør føringselementet (12), når der opnås et forudbestemt undertryk inde i sugekoppen (1).

Fig. 1

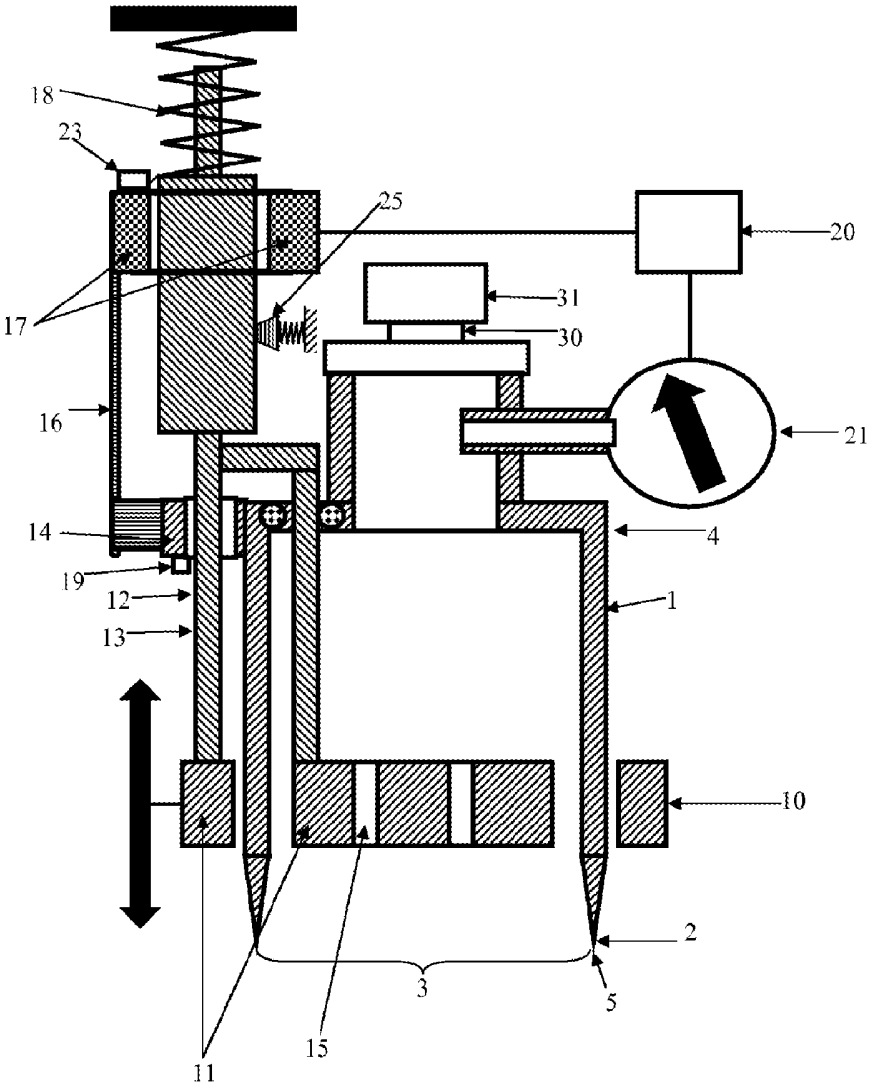

Fig. 2

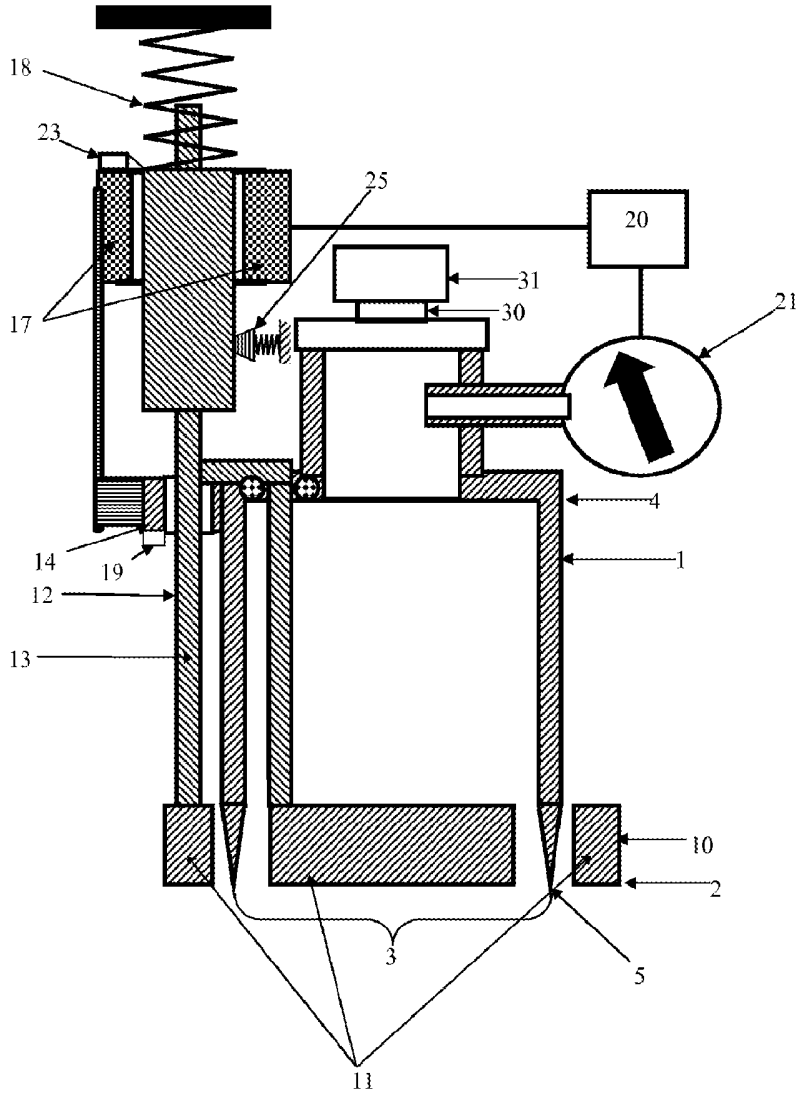

Fig. 3

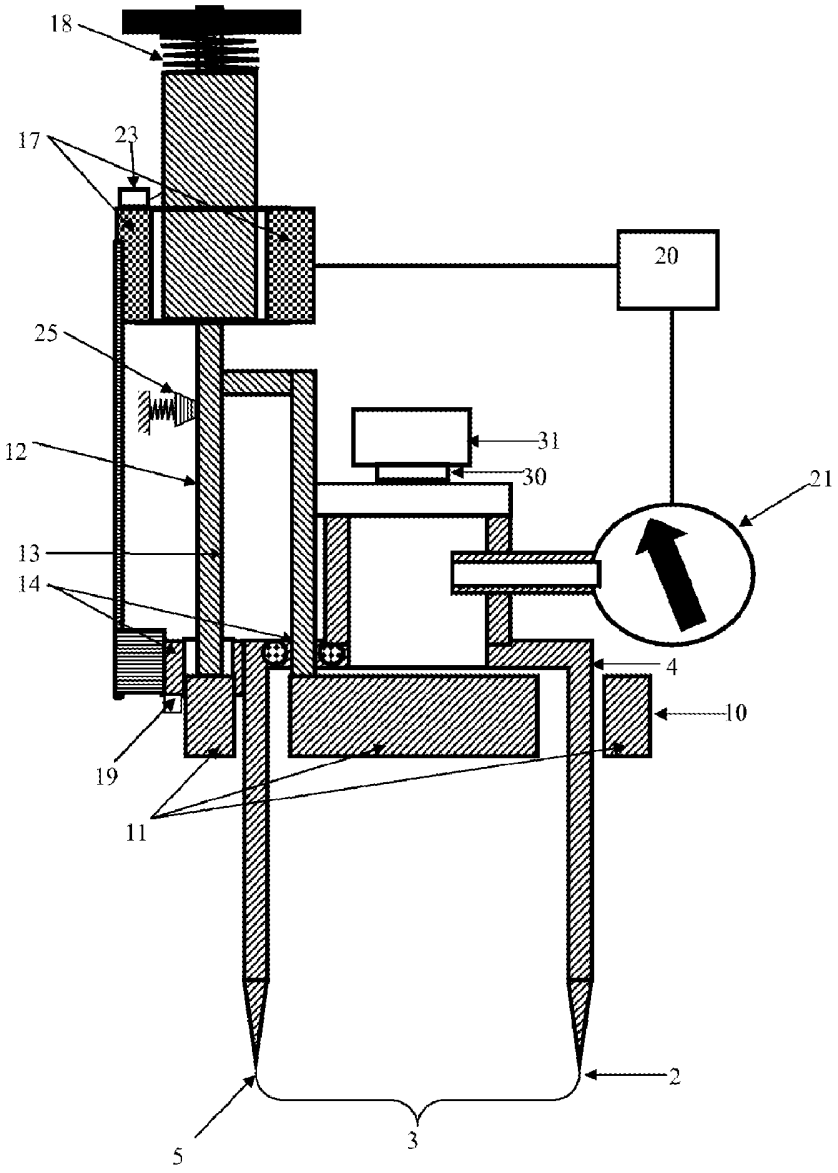

Fig. 4

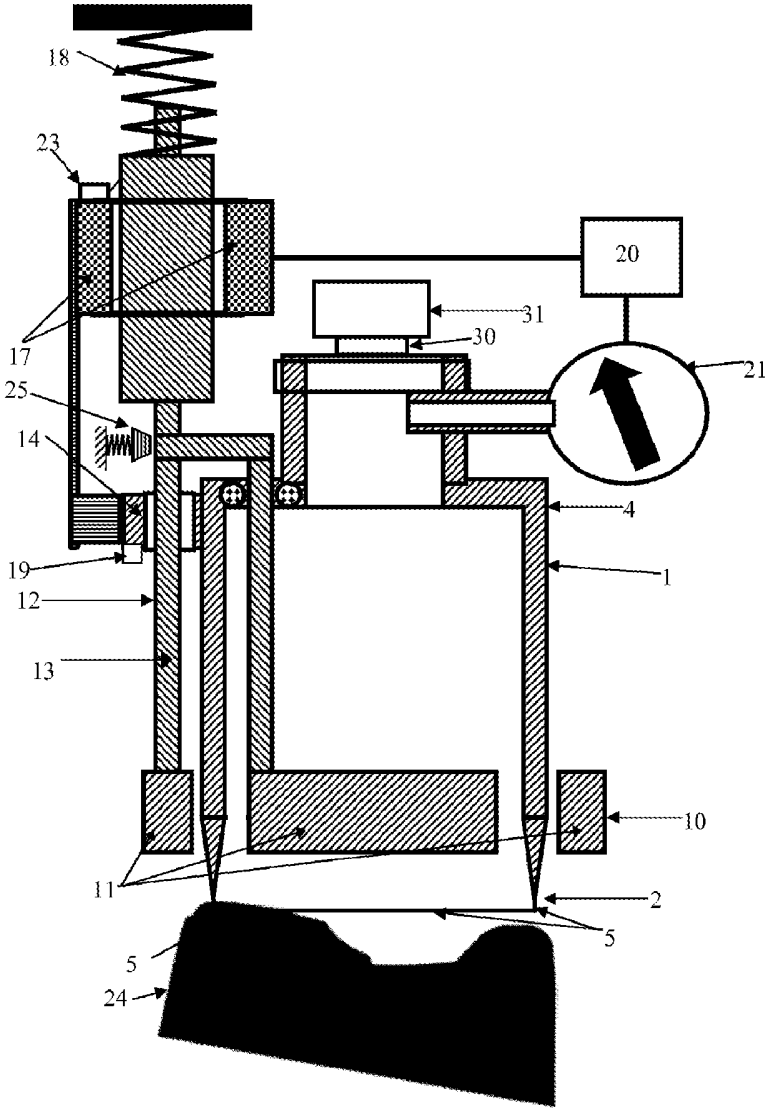

Fig. 5