

Specification

The invention relates to a steam pressure cooker substantially consisting of a lower pot and a cover unit pressure-sealing said lower pot by means of a ring-shaped sealing element, in which said lower pot has a circumferential smooth pot rim angled towards the outside, which pot rim, from a top plan view, has a continuous, preferably circular outer edge and said cover unit has a lower lid and at least one sealing element forming an upper lid substantially sealed in the locking position, which sealing element relative to the lower lid and the lower pot is movable in a plane parallel to the plane of the pot rim and comprises an upper rim section for engaging over an outer rim area of the lower lid and at least one lower flange extending across half the outer circumference thereof and intended for engaging under the pot rim in the locking position.

A steam pressure cooker of this type is known from DE-A-25 34 709. In this cooker, the lower lid and also the sealing ring adapted as a second closed lid are each provided with a continuous flange engaging under the pot rim over approximately half the circumference, so that by rotating the lid and the sealing ring in opposite directions the flanges can be brought into register and in this position the lid and the sealing ring can be slid transversely off the pot rim. In other words, a sliding movement is required to put the cover unit on and take it off. In order to open and close the steam pressure cooker, it is

also necessary to rotate the entire sealing ring adapted as a second closed lid relative to the lower lid.

The object of the present invention is to further modify a steam pressure cooker of the generic type so that it is simpler in design, more reliable in use and easier to handle.

According to the invention, this object is achieved by means characterized in that the upper lid comprises two half lids, that each half lid is rotatably received about an axis of rotation substantially parallel to the vertical geometrical pot center axis relative to the lower lid and the upper pot, that the swivel axes are disposed eccentrically to said central axis of the pot and relative to the latter diametrically opposite each other in a swivel mechanism rotatably disposed in the middle of the lower lid, and that the swivel axis more remote, in the closed position, from the center of gravity of the area of each half lid is associated to each half lid.

In this way, it becomes possible to open and close the cover unit by simply rotating the swivel mechanism relative to the lower pot. On opening, the two half lids move through a semicircle about their respective eccentric axes on the swivel mechanism, i.e., one over the other substantially parallel to its imaginary parting line and vertically out therefrom, until the flanges no longer engage under the pot rim. The cover unit can then be simply lifted off. It is equally simple to close the pot by lowering the cover unit vertically on to the lower pot. On rotating the swivel mechanism in the opposite direction, the two half lids first

move through a semicircle until they once again form a substantially complete upper lid by lying one over or on the other, and the flanges engage substantially completely round the pot rim. The motion of the two half lids is substantially determined by the eccentric location of the swivel axes relative to the pot center axis. On rotating the swivel mechanism through 180° , the swivel axes for example exchange their positions. Thus the swivel axes of each half lid lie on one side of the pot center axis in the closed position and on the other side of the pot center axis in the open position, so that when the swivel mechanism is rotated through 180° out of the closed position the two half lids slide away from each other and the lower flanges disengage from the pot rim. Alternatively, however, the eccentric location of the swivel axes can be so disposed that a rotation of the swivel mechanism through less than 180° , for example through a mere 90° , will suffice. The operation of the closure mechanism is extremely simple and accessible. A very few simple components suffice to assemble the steam pressure cooker of the invention. When the half lids are in the closed position, the steam pressure cooker looks just like an ordinary cooking pot. The technical components of the operating mechanism, which the housewife "fears", are out of sight. The cover unit can be lowered vertically on to the lower pot just like an ordinary pan lid, and can be removed in the same way. In order to close the cooker, the housewife only needs to rotate the swivel mechanism by up to 180° .

DE-A-896 409 describes a known steam pressure cooker

in which closure of the cover on the lower pot is effected by means of radially displaceable claws which engage the cover rim and the pot rim. The radial movement of the claws is brought about by a cylindrical key disc journaled in the pot cover, which has a plurality of arcuate guides engaging pins attached to the protruding claws. This has the disadvantage that the pot rim is only engaged over a relatively small proportion of its circumference. Tight closure with adequate clamping action consequently requires very robust pot rim, cover rim and claw construction. The actuating mechanism, which operates like a shutter closure, requires very accurate guidance of the pins in the guides, and rough handling can readily cause fouling, jamming or other forms of damage. Another disadvantage of this known steam pressure cooker is its "complicated gadget" appearance.

As already pointed out, the two half lids can overlie each other locally when in the closed position. It is however particularly advantageous for both half lids to be substantially identical and preferably, in the closed position, to form a complete upper lid by the interengaging rims facing one another. The closed cover unit thereby acquires a substantially smooth surface.

The swivel axes can be rotatably disposed in the swivel mechanism or be formed by the said swivel mechanism.

In further adaptation of the inventive concept, the edges of the half lids facing one another, respectively from one side of their outer perimeter, under consideration of the eccentric position of the associated swivel axis, extend

substantially radially, from about the height of the swivel axis enclose a concave indentation and then a convex tongue receiving the swivel axis, after which they extend again substantially radially to the diametrically opposite side of the outer perimeter. In this way, constructively simple means can be used to slide the two half lids by rotating the swivel mechanism, when the two half lids are identical.

In order to form a completely closed upper lid in the closed position, indentation and tongue engage in form-locking manner once the substantially radially extending sections of the edges facing one another, of the half lids, interengage.

In another preferred embodiment of the inventive concept, the swivel mechanism contains two circular washer sections disposed eccentrically to the central axis of the pot, in which the mid-points of the washer sections define the position of the geometrical central axis of the swivel axes, and each circular washer section is pivotally disposed in a corresponding circular recess of the associated half lid.

The geometrical central axes of the swivel axes preferably lie in substantially the same vertical symmetry plane both in the fully closed and in the fully opened position of the half lids. In this case, the swivel mechanism must be rotated through exactly 180° to open or close as the case may be, and moreover this can be indicated by appropriate markings.

Another inventive feature consists in that the

lower flanges of the half lids gradually taper in width preferably from the plane of symmetry receiving the geometrical central axes of the swivel axes toward the edges facing one another of the half lids. In this case, a relatively short sliding path suffices to engage the lower flanges with the pot rim or disengage them therefrom.

This advantage is further backed up if the contour of the inner edges of the lower flanges of the half lids corresponds to the contour of the associated area of the outer edge of the pot rim.

When the pot rim is externally of circular configuration, it is preferable for the inner edges of the lower flanges of the half lids to be circular, having a radius corresponding to the radius of the circle upon which the outer edge of the pot rim runs. In the closed position, the flanges then engage the pot rim through almost 360° , as it were like a crescent formation. In the open position, the inner edges of the flanges lie as it were just outside the outer edge of the pot rim, so that the cover unit can be lifted straight off.

A closure mechanism of simple construction and reliable operation is produced when the swivel mechanism projects rotatably, with a little play, through a central lid opening of the lower lid by means of a screw thread means and is rotatably held on the lower lid by means of a counter-nut screwed upon the screw thread means.

In order to ensure rotatability, the screw thread means and/or the lid opening are of a circular cross-section.

The swivel mechanism preferably projects with the screw thread means from the inner side of the lower lid, so that the counter-nut can be screwed on.

According to another embodiment of the inventive concept, reliable operation of the closure mechanism is ensured by means characterized in that the swivel mechanism is supported on the upper face of the lower lid with a widened collar provided between the lower lid and the half lids.

The height of the collar preferably corresponds to the width of the gap between the lower lid and the half lids, so that the half lids are guided on the collar during their outward and inward movements.

In this case, the half lids are preferably supported with a flat middle section on a planar upper face of the collar.

To simplify operation, the swivel mechanism is preferably rigidly connected to a lid handle disposed above the half lids.

In a preferred embodiment of the invention, there is positioned between the lower lid and the half lids a guide piece having two axialsymmetrically disposed guide grooves engaged by the half lids by one guide pin each. This ensures that the half lids will not depart randomly from their opening and closing paths.

It is particularly advantageous if the guide grooves are essentially straight and extend in parallel to each other and to the plane of symmetry in which lie the geometrical central axes of the swivel axes in the closed position

and that the guide piece is rotatably disposed about the central axis of the pot. In this case, the two half lids can execute the sliding movement dictated by their eccentric mounting.

Then, the guide piece preferably surrounds the swivel mechanism in ring-type manner, and is thus itself reliably mounted.

The height of the guide piece can substantially correspond to the width of the gap between the lower lid and the half lids, so that the half lids are also guided on the guide piece.

For the simple embodiment of the inventive concept, the swivel axes can be formed as pins received in boreholes of the swivel mechanism.

According to a further feature of the invention, at least one of the two swivel axes has a channel defined therein to provide a flow connection between the pot interior and a manometer and/or thermometer provided in the lid handle.

In this case, the lid handle can include a recess for housing the manometer and/or thermometer.

To simplify centering the cover unit on the lower pot, the lower lid is preferably formed as a frame lid. In this case it can have, in the area of the lid seat, a circumferential groove for accommodating a gasket.

In this case, the lower pot itself, preferably in the transition zone between the wall and the flanged pot rim, has a circumferential groove to engage the gasket disposed in the circumferential groove of the lower lid.

This circumferential groove also acts as a so-called condensate groove.

In order to ensure that the steam pressure cooker of the invention cannot be opened whilst excess pressure still prevails in the closed pot interior, a further feature of the inventive concept provides that disposed in the lower lid there is an air vent and a pressure relieving means, the vertically movable valve body of which protrudes, at the excess pressure prevailing in the closed pot interior, through a safety opening provided in the associated half lid, the cross-section of said safety opening being slightly larger than the outer cross-section of the valve body. In this way, at least one half lid is prevented from sliding so long as excess pressure prevails in the pot interior. Thus, the opening mechanism can only be actuated when the pressure has completely fallen and the valve body has sunk so low that it no longer hinders the sliding of the half lid.

Further features, advantages and possible applications of the present invention will emerge from the following description of a typical embodiment shown in the drawing, in which:

Figure 1 is a vertical section, taken on the line E-F in Figure 3, through a steam pressure cooker of the invention, the cover unit being in the closed position,

Figure 2 is a vertical section, taken on the line G-H in Figure 4, through a steam pressure cooker as in Figure 1, the cover unit now

however being in the open position but still lying on the lower pot,

Figure 3 is a horizontal section, taken on the line A-B in Figure 1, through a steam pressure cooker as in Figure 1, the cover unit being in the closed position,

Figure 4 is a horizontal section, taken on the line C-D in Figure 2, through a steam pressure cooker as in Figure 1, the cover unit now however being in the open position but still lying on the lower pot,

and

Figures 5a, 5b are schematic plan views of the cover unit in another embodiment of the invention, showing the method of operation.

The steam pressure cooker 1 consists substantially of a lower pot 2 and a cover unit 3. The lower pot 2 has at the top of its wall 32 a circumferential and largely smooth pot rim 4 angled towards the outside. The outer edge 5 of the pot rim 4 is slightly angled downwards. In the transition zone between the wall 32 and the pot rim 4 there runs a circumferential groove 33 in which can be laid with a sealing effect a gasket 34 of the cover unit 3. The cover unit 3 has a substantially closed lower lid 6 and an upper lid 7 set thereon. The lower lid 6 has a flat outer rim area 9 to which is applied, through a vertical circumferential flange 38, a horizontal flat flange 39, also circumferential, whereby it protrudes beyond the pot rim 4. At the inner end of the horizontal flange 39

there abuts, through an outer circumferential groove 30, a frame 37 whereby the lower lid 6 can be set centrally in the lower pot 2.

The circumferential groove 30 accommodates a gasket 31 of the O-ring or bead type. The upper lid 7 set on the lower lid 6 consists of two identical half lids 7a and 7b. These lie with their outer flat rim sections 8a and 8b on the top face of the flat rim area of the lower lid 6. The half lids 7a and 7b can be slid from the closed position shown in Figures 1 and 3 to the open position shown in Figures 2 and 4, and vice versa. In the closed position, the crescent-shaped flanges 10a and 10b of the half lids 7a and 7b engage the pot rim 4 and thereby urge the lower lid 6 against the gasket 31, so that the pot interior 28 is pressure-sealed. The inner edges 16a and 16b of the flanges 10a and 10b lie on a circle the radius of which equals the radius of the circle on which the outer edge 5 of the pot rim 4 runs. Consequently, as shown in Figure 3, the flanges 10a and 10b in the closed position engage the pot rim 4 through almost 360° . In the open position, in which the two half lids 7a and 7b are withdrawn from each other as shown in Figures 2 and 4, the inner edges 16a and 16b lie just outside the outer edge 5 of the pot rim 4, so that the cover unit 3 can be taken off the lower pot 2. Each half lid 7a and 7b is rotatably received about an axis of rotation 11a and 11b substantially parallel to the vertical geometrical pot center axis M and can slide relative to the lower lid 6 and the lower pot. The swivel axes 11a and 11b are adapted as pins and accommodated, eccentrically to the

central axis M of the pot and relative to the latter diametrically opposite each other in boreholes 27a and 27b of a swivel mechanism rotatably disposed in the middle of the lower lid 6. The geometrical central axes D_a and D_b of the swivel axes 11a and 11b lie, as shown in Figures 3 and 4, in substantially the same vertical symmetry plane S, both in the fully closed position of the half lids 7a and 7b and in their fully open position - when the swivel mechanism 12 has been rotated through 180° . The swivel mechanism 12 projects, with a little play, down through a central lid opening 18 of the lower lid 6, by means of a screw thread means 17. The swivel mechanism 12 is supported on the upper face of the lower lid 6 with a collar 20 provided between the lower lid and the upper lid 7. The half lids 7a and 7b lie with a flat middle section 22a and 22b on a planar upper face of the collar 20. A counter-nut 19 is screwed on the screw thread means 17 extending into the pot interior, in such a manner that the swivel mechanism 12 is secured to but free to rotate on the lower lid 6. A lid handle 23 is mounted on the upwardly projecting ends of the swivel axes 11a and 11b, so that it can be rotated together with the swivel mechanism 12 relative to the lower lid 6. The lid handle 23 has a recess 29 for housing a manometer or thermometer, which can be exposed to the pot interior 28 through a channel in one of the swivel axes 11b. The half lids 7a and 7b have edges 13a and 13b facing one another and extending substantially radially and axially-symmetrically towards each other, each from one side of its outer perimeter by virtue of the eccentric location of their respective swivel axes 11a and 11b, as shown in Figure 3,

approximately as far as the axis of symmetry S, i.e., the height of the swivel axes 11a and 11b. Beyond there, they enclose a concave indentation 14a and 14b and then a convex tongue 15a and 15b receiving the respective swivel axes. Finally, they extend again substantially radially to the diametrically opposite side of the outer perimeter. At the tongues 15a and 15b, the material of the half lids 7a and 7b is thickened to a sleeve form, as can be seen in Figures 1 and 2. Figures 1 and 2 further show that in the closed position of the half lids 7a and 7b, the tongues 15a and 15b lie on the opposite sides of the pot center axis M in the symmetry plane S, relative to their respective half lids 7a and 7b, while in the open position they lie on the same sides as their respective half lids 7a and 7b. Thus, on rotating the swivel mechanism 12 by means of the lid handle 23 the swivel axes 11a and 11b exchange places in the symmetry plane S, so that the half lids 7a and 7b move from the closed position in which the lower flanges 10a and 10b engage the pot rim 4 into the open position in which the flanges 10a and 10b are clear of the pot rim 4. When the swivel mechanism 12 is rotated through 180° , from the closed to the open position, the half lids 7a and 7b slide in a horizontal plane, in accordance with the eccentric location of the swivel axes 11a and 11b, initially in substantially the direction of the radial sections of their facing edges 13a and 13b, i.e., approximately at right angles to the symmetry plane S, and then sideways in conformity with the line of the symmetry plane S. In this way, the cover unit 3 can be disengaged from

the pot rim 4 with particular ease. During closure, the opposite movements take place. In order to define the paths of the two half lids 7a and 7b, a guide piece 24 is disposed between the lower lid 6 and the upper lid 7, encircling the collar 20 of the swivel mechanism 12 and thereby guided during its rotation on the collar 20. The guide piece 24 has two axiallysymmetrically disposed guide grooves 25a and 25b, engaged by guide pins 26a and 26b, each attached to one of the half lids 7a and 7b. The guide grooves 25a and 25b extend substantially in parallel to each other and to the plane of symmetry 6. They constantly ensure that the substantially radial sections of the facing edges 13a and 13b remain substantially parallel to each other during the movement of the half lids 7a and 7b. To ensure that the steam pressure cooker 1 cannot be opened whilst excess pressure still prevails in the pot interior 28, there is disposed in the lower lid 6 (and only indicated in Figure 2) an air vent and pressure relieving means 34, which may for example be of a known type, having a vertically movable valve body 35, which prevents any venting of the pot interior 28 at the start of the cooking process, but then rises and actuates a pressure relieving valve at the lower end of the valve body 25. So long as pressure prevails in the pot interior 28, the upper end of the valve body 35 protrudes upwards into a safety opening 36 in one of the half lids 7b. Since Figure 2 illustrates the open position, the safety opening 36 is not disposed over the valve body 35, as it would be in the closed position, but is displaced radially outwards. Since the valve body 36 then extends with its upper end into the safety

opening 36, it is clear that the entire opening mechanism is locked, and the steam pressure cooker cannot be opened whilst it still remains under pressure.

In the embodiment shown in Figures 5a to 5c, the swivel mechanism 12 rotatable about the pot center axis M in the lower lid 6 has two circular washer sections 40, 41, the mid-points P_0 , P_1 of which lie on an eccentric axis diametrically opposite each other and eccentrically to the pot center axis M. Each circular washer section 40, 41 is disposed in a corresponding circular recess of the associated half lid 7a, 7b, so that the mid-points P_0 , P_1 define the axis D_a , D_b about which the half lids 7a, 7b each rotate during their inwards and outwards movements. The symmetry plane S in which the axes D_a , D_b are disposed is displaced through an angle ϕ relative to the vertical mid-plane R in the direction of which the segment-shaped flanges 10a, 10b substantially move towards and away from each other.

Figure 5a shows the cover unit directly after placing on the lower pot 2, with the flanges 10a, 10b in the fully open position. Figure 5b shows the cover unit 3 after rotating through an angle α the swivel mechanism 12 with the eccentrically disposed circular washer sections 40, 41. In conformity with the movement determined by the eccentricity e of the mid-points P_0 , P_1 , the flanges 10a, 10b have moved inwards, slightly sideways relative to the mid-plane R and radially along the said midplane. Figure 5c shows the cover unit 3 after rotating the swivel mechanism 12 through an angle β . The flanges 10a, 10b now lie in

their closed position, in which they engage and lock most extensively on the pot rim 4.

List of Component Reference Symbols

1	steam pressure cooker
2	lower pot
3	cover unit
4	pot rim
5	outer edge
6	lower lid
7	upper lid
7a, 7b	half lids
8a, 8b	rim sections
9	rim area
10a, 10b	flanges
11a, 11b	swivel axes
12	swivel mechanism
13a, 13b	rims
14a, 14b	indentation(s)
15a, 15b	tongues
16a, 16b	inner edges
17	screw thread means
18	lid opening
19	counter-nut
20	collar
21	gap
22a, 22b	middle section(s)
23	lid handle
24	guide piece

25a, 25b	guide grooves
26a, 26b	guide pins
27a, 27b	boreholes
28	pot interior
29	recess
30	circumferential groove
31	gasket
32	wall
33	circumferential groove
34	air vent and pressure relieving means
35	valve body
36	safety opening
37	frame
38	flange
39	flange
40	circular washer section
41	circular washer section
M	pot center axis
D _a , D _b	central axis (axes)
S	symmetry plane
P ₀ , P ₁	mid-points

Annexed: 4 sheets of drawings with Figures 1 to 5.