

The invention relates to a steam pressure cooker.

After a steam pressure cooker has been heated, an excess pressure exists in the interior thereof. With modern steam pressure cookers, it is possible with one hand safely to release the excess pressure (by opening the seal) and also to unlock the lid and lift it off.

With the steam pressure cooker known from WO-A-82 02 699 and considered in the claim 1, the seal or gasket is provided with radial ribs, which have no function in the closed position, but when the lid is pressed down, lift the gasket in lever-like manner from the container or lid, respectively. In this way, the excess pressure can be released with one hand.

It is a disadvantage with this known steam pressure cooker that the turning of the low-pressurised lid requires considerable force, because at this time, the radial ribs, pressed against the container and the lid, respectively, have to slide perpendicularly of their length dimension and the ribs consist of the less slidable elastomeric material. This makes the operation considerably more difficult. The sealing lip in this case is also subject to wear and possibly damage, since the load is concentrated on small bearing surfaces.

It is the object of the invention to provide such a steam pressure cooker operable with one hand, which cooker is to be more easily opened and of which the gasket is exposed to a lesser amount of wear.

For solving this problem, the steam pressure cooker according to the invention has the features which are defined in the patent claim 1.

Advantageous developments are described in the subsidiary claims.

Because of its simple construction, the steam pressure cooker according to the invention can be produced without any great expense. The sliding element supports the sealing lip with the cooker closed. Prior to the opening, it lifts the sealing lip from the lid or from the container and in this way makes possible a fast escape of the excess pressure. With

their coaction, the sliding element and sealing lip are scarcely stressed, being only distributed over a relatively large contact surface, so that the wear remains small. With a gasket having two sealing lips, which bear against the lid and the container, respectively, the sliding element is able by choice to be combined with one of the two. The steam pressure cooker can be of cylindrical construction or have a rectangular base surface.

Irrespective of whether the separation of lid and container is effected by a twisting of the lid relatively to a cylindrical container or by horizontal displacement of the lid of a rectangular container, the sliding element facilitates the movement of the lid and avoids any wear on the then completely raised sealing lip.

Preferred constructional forms of the invention are hereinafter explained by reference to the accompanying drawings, wherein:

Fig. 1 shows a first constructional form of the steam pressure cooker from below, in the locked position;

Fig. 2 is a vertical section of the steam pressure cooker along the line A-A in Figure 1;

Fig. 3 shows the steam pressure cooker from below, in the unlocked position;

Fig. 4 is a vertical section along the line B-B in Fig. 3, with the lid pressed down;

Fig. 5 is a view from below of the steam pressure cooker, with the lid loosely applied;

Fig. 6 is a vertical section on the line C-C in Fig. 5;

Fig. 7 is a broken-away partial section of a second constructional form of the steam pressure cooker, in the locked state;

Fig. 8 is a corresponding partial section of the unlocked steam pressure cooker, with the lid pressed down;

Fig. 9 is a view from below of a third constructional form of the steam pressure cooker, in the closed position;

Fig. 10 shows partial sections along the lines A-B and C-D

in Fig. 9;

Fig. 11 is a view corresponding to Fig. 9, with the lid partially pushed off, and

Fig. 12 shows partial sections on the lines A-B and C-D in Fig. 11.

Figs. 1 to 6 show a cooking container 1 open at the top and with a continuous container rim 9, from the circumference of which segment-like rim projections 4 project radially outwards.

Distributed over the circumference and beneath the container rim 9, locking devices 5 and stops 6 are extended alternately downwards and radially outwards to close to the outside edge of the rim projections 4. The radial dimension of the locking devices 5 and stops 6 is substantially the same (Figs. 1, 3 and 5); however, the locking devices 5 are extended less far downwards than the stops 6.

The locking devices 5 and stops 6 all lie on the peripheral ends of the rim projections 4. Together with complementary devices of the lid and later to be described, they form a closure means.

The rim 10 of a lid 2 (Figs. 2, 4 and 6) projects on all sides beyond the cooking container 1. The lid 2 is bulged outwards and slightly downwards towards the lid rim 10 and then inwards to form an inwardly open channel for accommodating the packing or seal 11 to be later described.

Beneath the inwardly bulged region of the lid rim 10, a ring-like straight flange region 33 is extended downwardly from the lid rim 10.

Projecting radially inwards from the flange region 33 are lid rim projections 3 and these form circular disc segments, which are similar in complementary form to the container rim projections 4. When each lid rim projection 3 is disposed in a rim gap 13 between two container rim projections 4 (Fig. 3), the lid rim projections 3 are able to pass downwardly between the container rim projections 4.

On pressing the lid 2 downwardly, the rim projections 3

thereof are moved over the bottom edges of the locking devices 5, so that the lid 2 is able to be turned with respect to the cooking container 1. It is to be seen on the left side in Fig. 4 that then the rim projections 3 of the lid bear with their upper side on the underside of the locking means 5. It is also to be seen on the right side of the Figure that the larger downward dimension of the stops 6 as compared with the locking devices 5 limits the twisting movement of the lid 2.

As shown in Figs. 5 and 6, the lid 2 is first of all placed in any desired position on the rim of the cooking container 1. The lid rim projections 3 rest on that upper side of the container rim projections 4 further from the bottom of the cooking container 1. The lid 2 is now twisted, until the lid rim projections lie in the rim openings or gaps 13 (Fig. 3) and are then pressed down (Fig. 4). It is then turned further, until the lid rim projections 3 bear laterally on the abutments 6. As shown in Figs. 1 and 2, on letting go, the lid is able to be moved upwardly to a limited extent, until the rim projections 3 of the lid come to bear on the container rim projections 4 (Fig. 2). This is the operative position of the closure means of the steam pressure cooker.

For releasing the lid 2, the procedure as just described is carried out in reverse.

The lid 2 has a seal 11 which - radially inwards - is V-shaped in cross-section and thus forms two sealing lips 7, 8. The seal 11 is extended as a closed, substantially circular profile over the full circumference of the cover rim 10. Its one upper sealing lip 8 bears flat on the underside of the lid 2, while its other, lower sealing lip 7, with the lid 2 removed, projects freely with an inward and outward inclination from the lid rim 10. With the lid 2 fitted, the free end of this lower sealing lip 7 lies on the rim 9 of the cooking container 1 and seals off the lid 2 with respect to the cooking container 1.

Disposed beneath the lower sealing lip 7, as a sliding element 12, is a closed ring of a material which, with the

container 1 or lid 2, forms a sliding pair of lowest possible coefficient of friction, and consisting, for example, of metal or hard synthetic plastics. The seal consists, for example, of a nitrile rubber elastomer (NBR elastomer), or synthetic rubber, perhaps silicone rubber.

The external diameter of the sliding element is almost as large as the internal diameter of the ridge region 33. Therefore, the sliding element 12 does not slip out from its position between sealing lip 7, web region 33 and lid rim projections 3.

If the lid, loosely fitted, for example, according to Figs. 5 and 6, is brought into the position shown in Figs. 3 and 4, in which the container rim projections 4 enter the rim gaps 14 of the lid rim 10, the sliding element 12 comes into contact with the container rim projections 4. On pressing down the lid 2, it is held by these and lifted from its bearing position on the lid rim projections 3.

Due to the lever-like relative position of the sliding element 12 to the underside of the lower sealing lip 7, the latter is swung upwardly when the lid 2 is pressed down (Fig. 4). This movement of said lip 7 can extend as far as the bearing position, on the underside of the upper sealing lip 8.

The spring force of the seal 11 would make the twisting of the lid 2 substantially more difficult, should the sealing lip 7 be bearing on the container rim 9. The substantially lower friction between the sliding element 12 and the container rim 9 essentially facilitates the turning movement of the lid 2; since also the sealing lip 7 is swung completely away from the container rim 9, the friction between the sliding element 12 and the container rim 9 is the only counteracting force when the lid 2 is being twisted or turned.

On account of the relatively high rigidity of the sliding element 12, this is able to support the lower sealing lip 7 in the region of the rim gaps 13, without itself having to be supported on the underside. The sliding element 12 therefore contributes to the prevention of an excessive deformation of

the sealing lip 7 in this region, which deformation could lead to the steam pressure cooker becoming liable to leakages.

With excess pressure in the steam pressure cooker, the sealing lip 7 is pressed so strongly against the container rim 9 that, together with the pressurising effect on the underside of the lid 2 and the twist-preventing action of the locking devices 5 and stops 6, any twisting of the lid 2 with increasing of excess pressure becomes impossible.

A safety valve arranged in the knob-like handle 35 of the lid 2 limits the excess pressure and comprises a valve opening 40, which forms a seating for a valve member 15. The valve member 15 is displaceably guided in a vertical blind bore of the knob grip 35 and is urged by a spring 39 to the valve opening 40 of the lid 2. The spring force of the spring 39 is adapted to the required operational excess pressure.

The knob 35 is provided on the underside with bores 42, in which engage driver pins 41 fixed on the lid 2. Just like the bores accommodating the valve member 15, these bores 42 are arranged eccentrically of the mean axis of the knob-like grip 35.

Arranged centrally of the mean axis of the knob 35 is an extension 16, which projects through a central opening of the lid 2. With interposition of a suitable sealing ring, the extension 16 of the knob 35 forms a steam pressure release valve with the underside of the lid 2, which valve can be opened by pressure applied to the knob 35.

When the cooking operation is terminated, the knob 35 is pressed down. As a result, initially some of the excess pressure escapes through the release valve 16 (Fig. 4). By further pressure on the knob 35, the complete lid is pressed down. By this, the lower sealing lip 7 is swung upwardly in lever-like manner about its support point on the slide element 12; the residual excess pressure can escape by way of the rim gaps 13, 14. Since for this purpose, measured at the release valve, a very large cross-section is available, the steam pressure cooker very quickly becomes completely pressure-free.

The lid 2 can then be twisted and unlocked.

A second preferred constructional form of the steam pressure cooker is shown in Figs. 7 and 8. The food container 1 has an encircling smooth container rim 17. A lid 2 comprises a dome 18 forming its main member. On its external circumference, the dome 18 has an upwardly open groove or channel 32 which is approximately rectangular in cross-section, said groove being surrounded radially outwards by a downwardly open second groove 34. Lying on the outer rim of the lid 2 is a frame ring 20 in the form of a vertical sheet metal strip closed to form a ring and having, embossed in the centre of its height, an annular groove bulged radially outwards and for holding the outer periphery of a seal 11, which corresponds to that already described. Fingers 23 project downwardly over the bottom edge of the frame ring 20.

A cover ring 25 is extended non-displaceably and in a radially outward direction on the upper side of the dome 18 and over both grooves 32, 34.

Provided between the cover ring 25 and the dome 18 are clips 19 which are spaced from one another circumferentially of the lid 2, which clips are movable relatively to the lid 2 in its radial and also circumferential direction.

Lying in slots 27 of the clips 19 are slide blocks 26, which are held between the bottom of the second groove 34 and the cover ring 25. Formed on the bottom edge of the clips 19 is a horizontal locking zone 29.

On the radially inward end of the locking region 29, a bar 36 engages, in the locking position of the lid, behind the outer edge of the container rim 17.

The locking region 29 comprises a slot 24, through which extends a finger 23 of the frame ring 20. As a result, the clip 19 can only be displaced radially.

As shown more especially by Fig. 7, the packing 11 bears with its upper sealing lip 21 on the underside of the dome 18. Provided radially outwards from the point of contact between the upper sealing lip 21 and this region is a dome opening 31.

Lying in the second groove 34 is a slide element 12. The slide element 12 is held in its position by the radially inward wall and the base of the second groove 34, by the frame ring 20 and the top of the upper sealing lip 21.

In the state for operation, an internal excess pressure exists, the escape thereof being prevented by the packing or seal 11. The upper sealing lip 21 is supported against an excessive deformation by the slide element 21, and the lower sealing lip 22 by the sloping of the container rim 17.

The clamp 19 lies in its most radially inwardly displaced position; the upper side of its locking region 29 lies on the bottom edge 30 of the web which extends downwardly on the outer edge of the container rim 17.

The lid 2 is displaced away from the cooked food container 1 by the internal pressure and also by the packing 11; this movement is restricted by the bearing or position of locking zone 29 and bottom edge 30.

After completion of the cooking process, the steam pressure cooker is initially made partially pressure-free, as with the first constructional form. With further fall in pressure, the slide element 12 levers off the upper sealing lip 21 from the dome 18, as shown in Fig. 8. As a result, the residual internal pressure is able to escape by way of the dome openings 31.

With the following rotation of the lid 2 relatively to the food container 1, the dome 18 slides on the slide element 12, which opposes this sliding movement only by a slight frictional force. On the other hand, the seal 11, because of the greater frictional adhesion between the lower sealing lip 22 and the container rim 17, remains unturned relatively to this latter and, in its turn, firmly holds the sliding element 12.

Since the seal 11 is not twisted, also the frame ring 20 bearing flat thereon is not twisted therewith. The fingers 23 prevent the clips 19 from having any turning movement with respect to the cooked food container 1, so that provided as a whole is a twisting of dome and cover ring 25 with respect to

the entity of cooked food container 1, seal 11, frame ring 20, clips 19 and slide element 12. With this relative movement, the slide members 26 slide in the slots 27 and push the clips 19 outwards.

It is now possible for the entire sealing arrangement to be lifted, together with the lid 2; the support of the seal 11 on the frame ring 20 prevents them from falling out. An unlocking of the closure means with excess pressure occurring within the container is excluded.

If lid 2 and cooking food container 1 are not completely locked with one another, the upper edges 28 of the webs 36 of the clips 19 are in engagement with the bottom edges 30 of the web on the container edge 17. Thereby, the lid 2 is pulled so far towards the food container 1 that the upper sealing lip 21 is in its removed position and no excess pressure is able to build up in the pot. The edges 28, 30 therefore act like the locking means 5 of the first constructional example.

A third preferred constructional form comprises a rectangular food container 50 with rectangular lid 52. The lid 52 is able to be slid, on to or off the cooked food container 50, longitudinally of this latter, and is held by a horizontal stay 54 on the container, said stay engaging beneath the container rim 56.

Such a pot is, for example, known from German Patent Specification 28 01 173.

A seal 60 is clamped by a support element 72 on the lid 52, which element lies between two sealing lips 62, 64. Lying beneath the lower sealing lip 64 is a slide element 100 with lateral lugs 68, which project outwardly in tongue-like form through slots 58 in the rim of the lid 52 and hold the slide element 100. Seal 60 and slide element 100 follow the rectangular contour of the lid 52. Material rigidity and support of the slide element 100 by the members 68 are so chosen that the lower sealing lip 64, when the lid is pushed on, is able to bear on the container rim 56, but on the other hand it is possible to carry out an easy clipping of the lid 52

on the container 50.

The sealing function of the steam pressure cooker in operation corresponds fully to that already described. In the state for operation, the bearing of the lower sealing lip 64 on the container rim 56 prevents escape of the internal pressure.

For opening purposes, the lid 52 - after actuating a release valve (not shown) - is pressed down and the lower sealing lip 64 is lifted from the rim 56 of the container, the slide element 100 serving as leverage bearing. The residual steam is able to escape through openings 70 in the container rim 56 (Fig.12). The slide element 100 is also provided on its side remote from the lower sealing lip 64 with openings 66 which, together with the slots 58, form a further possibility as regards egress of steam. In the pressed-down position, the lid 52 is then able to be pushed completely off the cooked food container 50, as shown in Figs. 11 and 12.

With all constructional examples, the sliding element can be integrated into the sealing or packing, for example, by being stuck on, vulcanised on or partial extrusion, or even by production in one piece. Furthermore, it is possible to replace the sliding element by a functionally corresponding lever-like construction (bead) on the lid or container rim.

CLAIMS:

1. Steam pressure cooker comprising a container (1,17,50) to hold food to be cooked, a lid (2,18) with safety valve to be fitted thereon, a closure device securing container and lid in a closed position relatively to one another and a seal arranged between lid and container and by which, in the closed position, the interior of the container is safeguarded against fall in pressure, a radially and inwardly extending sealing lip (7,21,64) of the seal bearing on the lid or on the container, which lip, when the lid is pressed down in the direction towards the container, is lifted by means of a lever-like element (12, 100) from the sealing position on the lid or on the container, and the lid or container, with the subsequent movement of the lid into the opening position, carries out a movement relatively to the sealing lip, characterised in that, between the sealing lip (7; 21; 64) and the lid (2; 18) or the container (1; 17; 50), a ring-like sliding element (12;100) is arranged radially outside the rim of the sealing lip (7; 21; 64), which element consists of a material which, with the container and lid, respectively, provides a sliding pair of low frictional value and forms a lever bearing.
2. Steam pressure cooker according to claim 1, wherein the annular sliding element (12; 100) is arranged along the entire rim (9; 50 or 10) of the container (1; 50) and/or of the lid (2; 18).
3. Steam pressure cooker according to claim 1 or 2, wherein the sliding element (12; 100) has a circular cross-section.
4. Steam pressure cooker according to one of the claims 1 to 3, wherein the seal (11; 60) consists of a nitrile-rubber elastomer (NBr elastomer) or silicone rubber and the sliding element consists of stainless steel or synthetic plastics.
5. Steam pressure cooker according to one of claims 1 to 4, wherein the sliding element is integrated into the seal or packing.
6. Steam pressure cooker according to one of claims 1 to 5,



wherein the surface of the sliding element (12, 100) is resolved into strip-like or punctiform projections.

7. Steam pressure cooker according to one of the claims 1 to 6, wherein the sliding element (12; 100) is arranged radially outside openings (70; 31) provided in the container rim (56) or in the lid (2), said openings lying radially outside the free end edge of the associated sealing lip (64).

8. Steam pressure cooker according to one of the claims 1 to 7, wherein the sliding element (100) engages with outwardly projecting lugs (68) in slots (58) of the lid (52).

9. Steam pressure cooker according to one of the claims 1 to 8, wherein the flat support element (72) is arranged between the sealing lips (62, 64).

10. Steam pressure cooker according to claim 1, wherein the sliding element consists of a lever-like shaping of the lid or of the rim of the container.

11. Steam pressure cooker according to one of the claims 1 to 10, wherein the sliding element (12; 100) is formed with recesses (66) on its side further from the associated sealing lip.

