May 27, 1952 O. M. BURKHARDT 2,598,220

COVER SEALING MEANS FOR COOKING UTENSILS

Filed Nov. 5, 1945 3 Sheets-Sheet 1

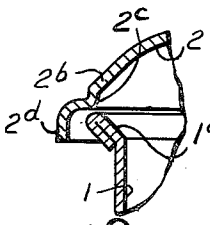


FIG.3

FIG.2

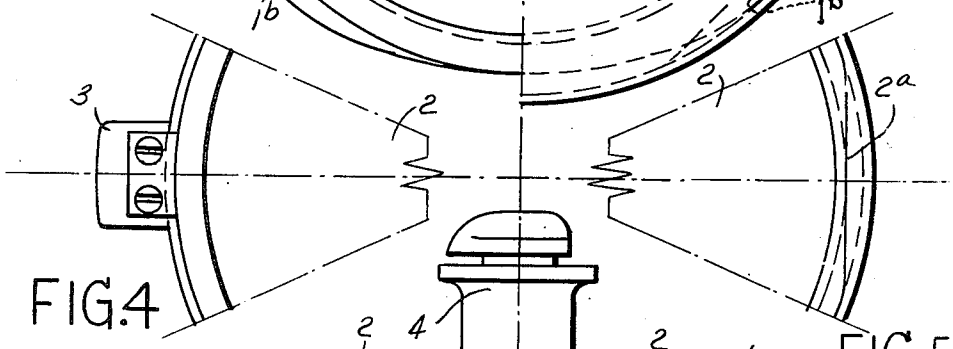


FIG.4

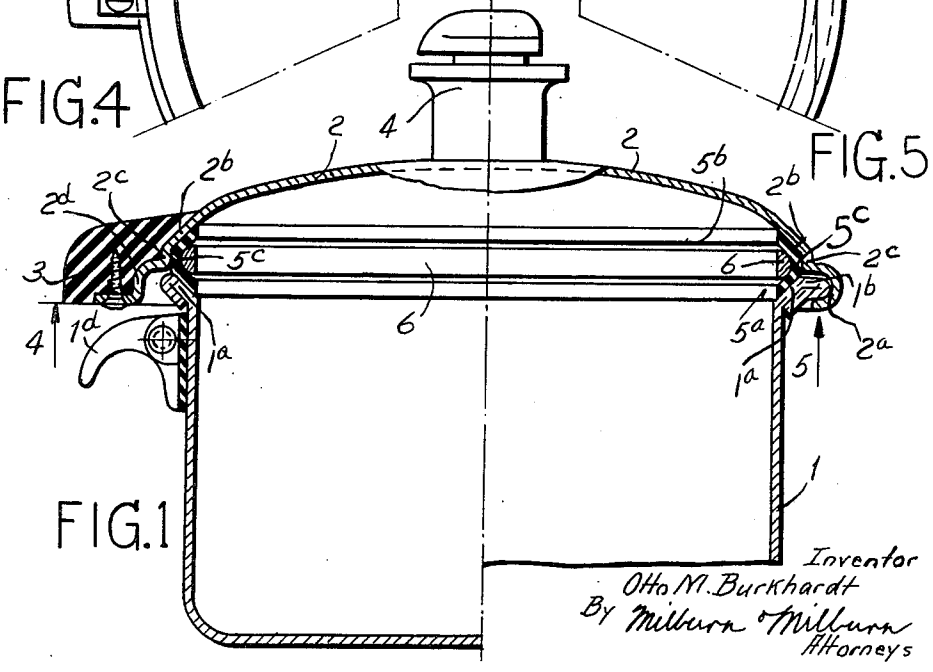


FIG.5

FIG.1

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COVER SEALING MEANS FOR COOKING UTENSILS

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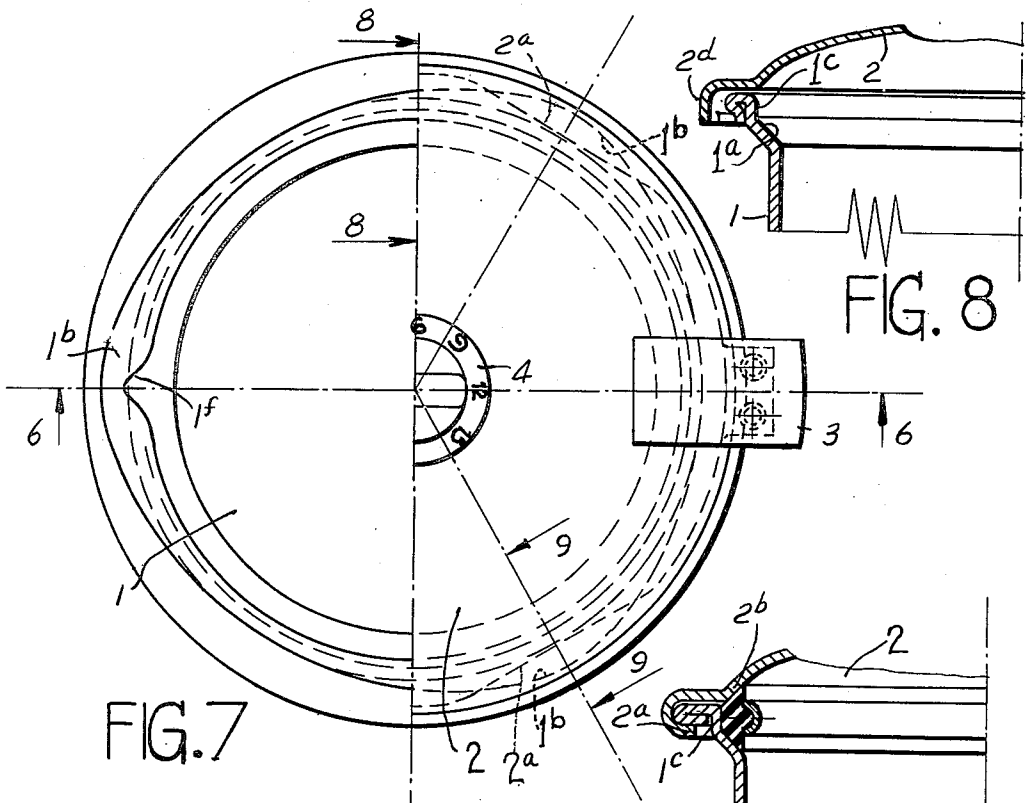


FIG. 7

FIG. 8

FIG. 9

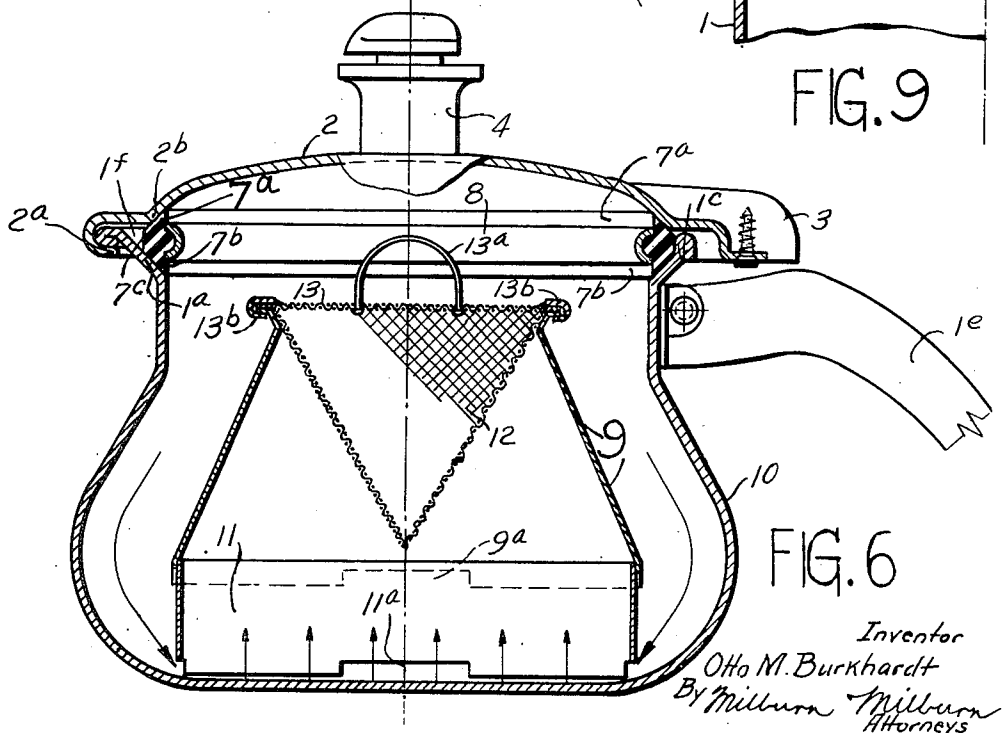


FIG. 6

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COVER SEALING MEANS FOR COOKING UTENSILS

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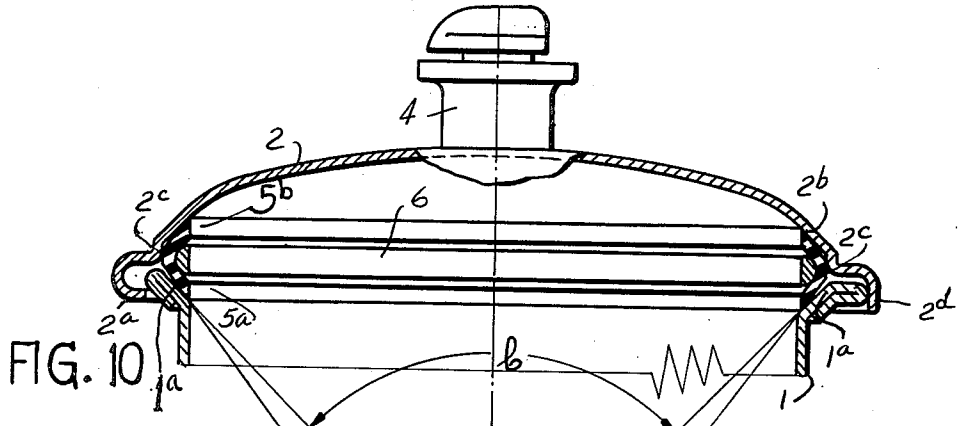


FIG. 10

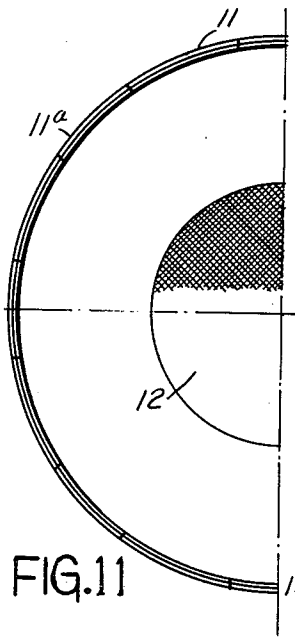


FIG. 11

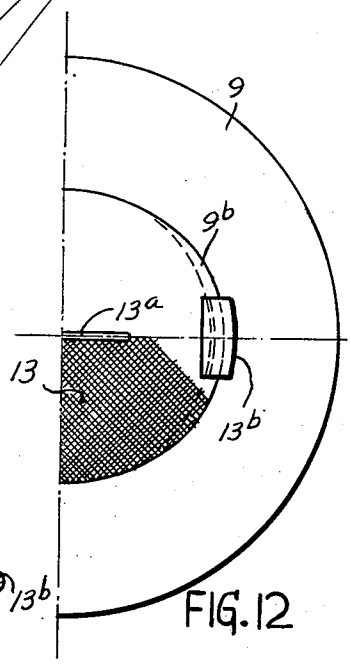


FIG. 12

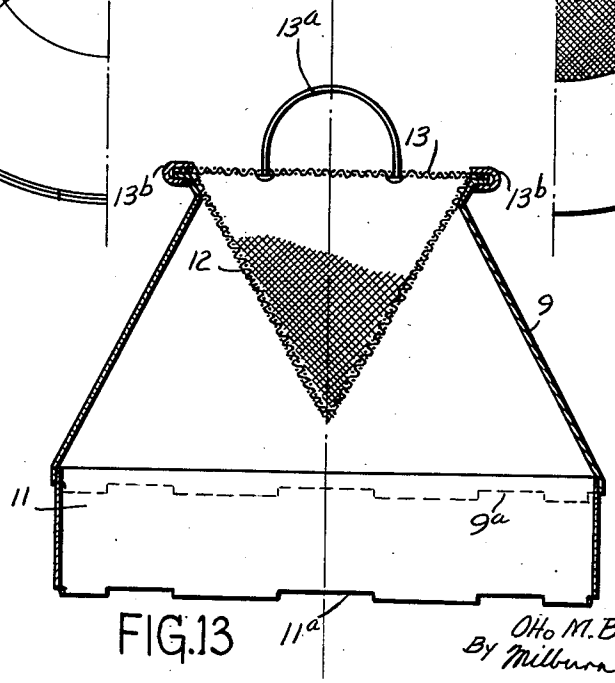


FIG. 13

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Patented May 27, 1952

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UNITED STATES PATENT OFFICE

2,598,220

COVER SEALING MEANS FOR COOKING UTENSILS

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Application November 5, 1945, Serial No. 626,873

2 Claims. (Cl. 220—46)

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This invention relates to the art of cooking utensils and, more specifically, pressure cookers.

Heretofore pressure cookers have been provided with various external means for clamping the closure upon the container and for compressing the sealing gasket between the closure and container. This has, in some instances, required considerable exertion upon the part of the user and has caused a permanent distortion of the sealing gasket. Also, the force of such clamping means has been opposed by the pressure developed within the cooker, so that the clamping means must exert excessive force in order to more than off-set such internal pressure and to maintain a sealed condition. Furthermore, in many instances, it is necessary to finish the sealing surfaces of the container and closure by machining the same in order to ensure dependable sealing engagement at all times. In this connection it might be noted that the common practice of striking a spoon or other utensil upon the edge of the container, is apt to mar rather seriously the finished sealing surface about the mouth of the container of a conventional pressure cooker. Also, the external clamping means often detracts from the appearance of the device and is apt to limit the number of purposes for which the container may be used and to interfere with the use of the same to a certain extent. Furthermore, the provision of such clamping means and the machining of the parts increase the cost of such a device.

Accordingly, the general objects of my present invention are to improve the sealing efficiency of a pressure cooker and hence its operation, to enlarge its range of usefulness, to improve its appearance, to facilitate and render more effective the cleaning of the same, and to simplify its manufacture and reduce the cost of the same.

More specifically, one of the objects of my present invention is to provide a cooking utensil in which there is effected a dependable sealing between the closure and container without the use of the usual external closure-clamping means heretofore required to compress the sealing gasket between the closure and container.

I intend to accomplish this object by means of a unique form of device in which the weight of the closure suffices for the initial sealing engagement and by utilizing the internal heat and pressure as a means of perfecting and maintaining engagement of the sealing means, and by providing a special form and arrangement of the sealing means and the seat therefor that will permit such sealing operation and in which the sealing engagement becomes more effective as the temperature and pressure increase. This constitutes another object of my present invention. That is to say, my purpose is to make it possible to utilize the forces or phenomena which are incident to the use of the device as a means of effecting operative engagement of the sealing

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means and without requiring the use of the external closure-clamping means as heretofore.

Thus another object may be said to consist in providing a sealing means which is so constructed and arranged that the heat within the device may be depended upon for at least partially effecting the sealing engagement.

And, accordingly, another object may be said to consist in providing a sealing means which is so constructed and arranged that the pressure within the device may be depended upon as a means for at least partially effecting the sealing engagement between the closure and the container.

Another object is to devise a cooking utensil with such an efficient seal between the closure and container that it is capable of performing a cooking operation that is especially well adapted for the preparation of a beverage from roots, herbs, leaves or beans, as for instance tea or coffee, which has heretofore been impractical in such a device.

A further object consists in devising a new method of preparing a beverage in such a device from roots, herbs, leaves or beans, as for instance tea or coffee.

A still further object is to devise a particular form of device that is peculiarly well adapted for carrying out the new method just referred to.

Another object is to devise such a cooker in which the method of manufacture is greatly simplified and hence the cost of the same is greatly reduced, while at the same time the appearance of the same is greatly enhanced.

Another object is to devise such a cooker in which the sealing means does not require a machined surface or surfaces and in which other sealing means may be employed.

Another object is to devise such a cooker that not only possesses the mechanical advantages above briefly referred to but also presents an attractive appearance.

Another object is to devise a separate form of sealing ring which can be most readily applied to the cooker and which will serve as a means of centering the closure upon the container.

More specifically, another object is to devise a sealing ring of unitary form separate from the container and closure, consisting of metal and rubber or rubber-like material and adapted to function in such manner as to prevent scoring action between the metal surfaces of the closure and the container as the closure is applied thereto.

Other objects will appear from the following description and claims when considered together with the accompanying drawing.

Fig. 1 is a vertical sectional view of one form of my present invention with the closure in closed position and corresponds to the plane of line 1—1 of Fig. 2;

Fig. 2 is a top plan view of the device shown

in Fig. 1, the left half of this view showing the container without the closure and the right half of this view showing the closure upon the container;

Fig. 3 is a partial view taken on line 3—3 of Fig. 2;

Fig. 4 is an inverted plan view of the closure, in part, taken in the region indicated by the arrow 4 in Fig. 1;

Fig. 5 is an inverted plan view of the closure, in part, taken in the region indicated by the arrow 5 in Fig. 1;

Fig. 6 is a vertical sectional view of a form of my device corresponding to line 6—6 of Fig. 7, this particular form of device being designed especially for cooking and serving coffee or other beverage and this view showing also a specifically different form of sealing means from that shown in Fig. 1;

Fig. 7 is a top plan view of the form of cooker shown in Fig. 6, the left half of this view showing the container without the closure, and the right half of this view showing the closure upon the container;

Fig. 8 is a partial view taken on line 8—8 of Fig. 7;

Fig. 9 is a partial sectional view taken on line 9—9 of Fig. 7;

Fig. 10 is a partial sectional view illustrating the condition of the sealing gasket when the closure has been only initially placed upon the container and before it has been turned into closed position thereupon;

Fig. 11 is an inverted plan view of the holder for the coffee beans or the like and the supporting means therefor;

Fig. 12 is a top plan view of the same; and

Fig. 13 is a vertical sectional view of the holder for the coffee beans or the like, which may be removably placed within my pressure cooker.

It is to be understood that the present form of disclosure is merely for the purpose of illustration and that there might be devised various modifications thereof without departing from the spirit of my present invention as herein set forth and claimed.

The container 1 may be stamped or pressed out of metal or any other suitable material and its side wall may be of plain cylindrical form, as illustrated in Fig. 1, or of a modified form as indicated in Fig. 6 to which further reference will be made below. In Fig. 1 the top edge of the container extends angularly outwardly and thence downwardly and inwardly upon itself and affords an annular inclined inner surface 1*a* for the lower part of the sealing means. At spaced intervals this container flange is provided with outwardly extending horizontal flat portions 1*b* for operative engagement with the downwardly and inwardly extending portions 2*a* at equally spaced intervals at the edge of the closure 2. The closure is provided with an annular inclined portion which affords a surface 2*b* for engagement by the upper part of the sealing means. In this particular form of device, the closure 2 beyond the inclined portion 2*b*, is provided with the annular portion 2*c* that extends substantially co-axially with respect to the container body and that is so located as to constitute with the inclined portion 2*b* and the inclined portion 1*a* a groove for the sealing means. Not only does the groove ensure proper sealing engagement but it also acts as a mold for the flexible rubber or rubber-like sealing gasket so that, at elevated temperatures and pressures, it cannot take a

set. The portion 2*c* is continued in the form of a depending skirt 2*d* which constitutes the marginal edge of the closure except for the intermittent portions 2*a* and the handle 3 which may be screwed or otherwise secured to a flange extending outwardly from the skirt portion 2*d*. Portion 2*c* will assist in locating the gasket concentrically and will ensure initial sealing engagement uniformly about the marginal edges of the sealing gasket. Portion 2*d* acts as a shield to deflect downwardly any escaping contents of the utensil if opened to the extent of unlocking the closure before the pressure drops to that of the atmosphere.

The closure 2 is provided with the safety vent means 4, one form of which is fully described in my co-pending application Serial No. 530,547, filed April 11, 1944, now Patent No. 2,524,558, to which reference may be had for a fuller understanding of this feature.

The closure 2 may be applied to the container 1 by positioning the closure projections 2*a* between the container flat projections 1*b* and then turning the closure so as to bring the closure projections into position to loosely embrace the container projections. However, as will be observed, there is no camming or wedging action between the projections 1*b* and 2*a* but, on the other hand, there will be slight vertical clearance between these projections when in inter-engagement. The purpose of this inter-engagement between the projections 1*b* and 2*a* is to prevent dislodgement of the closure in any way other than by turning it about its own axis and to hold the same in proper position for effective engagement of the sealing means between the closure and container.

The one form of sealing means, as disclosed in Figs. 1 and 10, comprises a rubber or rubber-like endless ring member and an endless metal ring member. The rubber ring member is of a truncate-like form in cross-section and is adapted to seat in the similar form of groove provided between the closure and container, as above described. The rubber ring member has upwardly and downwardly inclined portions 5*b* and 5*a* which are adapted for sealing engagement with the surfaces 2*b* and 1*a*, respectively; while the rubber ring member has an intermediate portion 5*c* which is adapted for sealing engagement with the cylindrical portion 2*c* of the closure, according to the form of device as illustrated in Figs. 1 and 10.

From Fig. 10 it is to be noted that the outer surfaces of the inclined portions 5*a* and 5*b* of the rubber ring extend at more acute angles to the longitudinal axis of the device than do the surfaces 1*a* and 2*b*; hence, without any weight resting upon the sealing member, there will be a gap between the surfaces 5*a* and 1*a* and also between the surfaces 5*b* and 2*b*. The inclined portions 5*a* and 5*b* of the rubber ring are of such resilience that the weight of the closure 2 upon the sealing means will cause the portions 5*a* and 5*b* to be flexed sufficiently to take up the gap between the same and the adjacent surfaces 2*b* and 1*a*, whereby the corresponding sealing surfaces are brought into more intimate engagement so as to effect an initial seal. The sealing gasket is so designed as to have minimum resistance in the direction of the longitudinal axis of the cooker, which permits the initial seal without axial pressure being applied by either cam or other means.

When the sealing means is in position, as herein indicated, and heat is applied to the under-side

of the container, that heat will be transferred to the food within the container mainly by convection and only a small part of it will be transmitted to the side walls through the metal. Experience has shown that in closed cooking utensils, when heat is applied in the usual manner, the contents of the utensil are hotter than the closure and side walls. Therefore ring 6 will expand more than either the closure or the side walls and it will thus exert a force radially outwardly against the rubber gasket which is so shaped as to accommodate the metal ring 6, as herein illustrated. In Figs. 1 and 10, for instance, the metal ring is of substantially semi-circular cross section and the curved surface thereof has engagement within the groove upon the inner side of the companion rubber ring.

The effect of the outward radial force that is caused by expansion of the metal ring 6 against the rubber ring, as above referred to, will be to brace and ensure roundness of the rubber ring which alone would be limp, and to cause the same to conform to the walls of its groove and to engage the same more firmly and even to compensate thereby for any irregularities in such surfaces. The groove formed by the closure and container, as defined by the surfaces *1a*, *2b* and *2c*, accommodates the similarly formed gasket 5 so that high temperature and pressure will not deform the gasket but rather more firmly mold it to the desirable shape. Furthermore, as ring 6 expands and the gasket is forced more tightly into the groove, the result is that the gasket tends to separate the closure from the container and thereby ensures firm engagement of portions *2a* with the corresponding portions *1b*. It might be said that the gasket anticipates and compensates for the partial movement of the closure away from the container, which under ordinary circumstances often causes leakage.

My unitary reinforced sealing ring ensures and greatly facilitates the concentric location of the closure upon the container; and the correct positioning of the reinforced ring itself is greatly facilitated, as no particular care is required in placing the ring upon the container. In fact, the reinforced sealing ring may be placed upon the container in a careless manner and it will assume its proper position thereupon as the closure is applied, while at the same time the closure will be guided into its truly concentric position with respect to the container and the sealing ring therebetween. Experience has shown that when the ring is too small and the sealing engagement thereby is rendered too loose laterally, then the application of tangential force to the handles will cause scoring between the metal surfaces of the closure and container. But, with my present type of sealing ring constructed and arranged in the manner herein described, less pressure is required to turn the closure into sealed position upon the container and the frictional engagement between the metal surfaces is relieved. The metal ring 6 or 8 engages only the middle part of the rubber gasket so as to leave the marginal edge portions of the rubber gasket free to respond to the outward pressure thereupon in order to complete the sealing effect as pressure develops within the cooker. Thus I am able to produce a greater and more dependable sealing effect between the closure and container, which improves as the temperature and pressure increase, such internal pressure exerting itself outwardly against the sealing means and causing still further increased sealing engagement of the rubber gasket with all of the surfaces *1a*, *2b* and *2c*.

The interengagement between the projections *1b* and *2a* will prevent the closure from being forced off of the container; or, in other words, this interengagement serves to hold the closure in proper position upon the container for proper functioning of the sealing means at the joint between the container and closure. Since the closure is not clamped down upon the rubber gasket so as to distort the same in the manner usually found in such devices, the sealing means of my device is free to respond to the forces within the cooker in the manner just described; and such internal forces may be utilized and depended upon to produce an effective engagement of the sealing means. As will be readily understood, the force of the clamping action which has heretofore been employed for effecting sealing engagement, and the force of the pressure within the cooker, are exerted in such different directions that they may be considered as opposing each other and, as a result, the effect of the outside clamping action upon the sealing means is at least partially off-set or nullified by the pressure within the cooker.

Without the usual external clamping means for compressing the sealing gasket, my present arrangement permits the internal forces of heat and pressure to be exerted without opposition; and my present structure is especially designed to render the sealing gasket fully responsive to the forces within the cooker. In this way I am able to obtain an efficient and dependable seal. Also, the sealing means is molded to the desired shape by the elevated temperatures and pressures incident to actual use of the device, instead of being permanently deformed by such temperatures and pressures. Moreover, I am able to eliminate the usual external clamping means and the cost thereof and at the same time to improve the appearance of the device.

The form of sealing means, as indicated in Fig. 6, is specifically different from that of Fig. 1. In Fig. 6 the rubber gasket has its outer surfaces formed in substantially the same manner as those in Fig. 1, and the upwardly and downwardly extending portions *7a* and *7b* thereof are capable of operation in substantially the same manner as in the form shown in Fig. 1. Whereas in Fig. 1 the rubber gasket has its inner surface of concave form to accommodate the metal ring 6 of substantially semi-circular cross section, the middle inner part of the rubber gasket in Fig. 6 is of convex rounded form that is adapted for interengagement with the correspondingly formed concave outer surface of the metal ring 8, the inner surface of which is of convex form.

Whereas in Fig. 1 the portion *2c* is provided upon the closure, a corresponding portion *1c* is provided upon the edge of the container in Fig. 6 except where one of the intermittent outwardly extending flat projections *1b* is provided with a depression *1f* to facilitate pouring. The portion *1c* is adapted for seating engagement by the middle part *7c* of the rubber gasket.

In Fig. 1 there is shown a handle *1d* which may serve as an aid in tilting the container for emptying the same and it may also be employed in conjunction with the handle 3 on the cover. The design of container in Fig. 1 is intended especially for meat and vegetables.

In Fig. 6 the container is provided with the handle *1e* which may be gripped for pouring from the spout *1f* at the side opposite that of the han-

dle on the container. For instance, my present invention is especially adapted for use in preparing coffee, tea or other beverages made from beans, leaves, roots or herbs, which may then be served from the same container, and the design in Fig. 6 is intended for this purpose.

In fact, my present improved manner of sealing engagement between the closure and container, makes possible a new method of cooking these beverages with decidedly improved results. With this in mind, the container in Fig. 6 has its lower part bulged outwardly and the container encloses an auxiliary hood 9 which is of hollow form and is spaced from the wall of the container which is indicated by reference numeral 10. The hood 9 may have a removable cylindrical bottom part 11 with openings 11*a* at the bottom edge thereof for circulation therethrough, the main part of this hood decreasing in diameter towards the top where it terminates in an upstanding annular flange for supporting the holder 12 for the coffee beans or the like. If it be desired to position the holder 12 at a lower level in the container 10, then the bottom part 11 may be omitted; in which event, the openings 9*a* at the bottom edge of the hood 9 will permit circulation. The holder 12, as here shown, is entirely foraminous so as to permit circulation therethrough upon application of heat to the bottom of the container 10, the path of such circulation being indicated by arrows in Fig. 6. The application of heat to the container 10 immediately beneath the open bottom of the hood 9, will cause motion up through the same and through the holder 12, while the cooler liquid or vapor will descend between the walls of the container 10 and the hood 9 and pass through the openings at the bottom of the hood, thereby completing the circuit. It should be noted that theoretically this circulation starts the moment when heat is applied to the bottom surface of the container. It becomes more active as the vapor pressure approaches the pressure of the atmosphere or whatever pressure exists within the utensil if it is hermetically sealed. This circulation causes a washing past the coffee beans or the like within the holder 12, which action is augmented by the pressure which ensures speedy penetration of the coffee beans or the like and extraction of the flavor from the same in an expeditious manner. Circulation in a hermetically sealed cooker is assured because of the dissipation of heat by the closure and side walls of the container and the resultant cooling and condensation therewithin. The vapor condenses irrespective of the pressure and hence induces circulation in a hermetically sealed cooker is assured because of the dissipation of heat by the closure and side walls of the container and the resultant cooling and condensation therewithin. The vapor condenses irrespective of the pressure and hence induces circulation. The top 13 of the holder 12 has a handle 13*a* for ready removal and replacement of the same. The removable cone-shaped holder 12 is supported upon the inclined throat of the hood 9. The upper end of the hood 9 has diametrically opposite lateral flanges 9*b* beneath which the lower parts of the locking members, attached to the top 13, are adapted to be engaged by turning the top 13 through ninety degrees in a manner resembling that of engaging a bayonet lock, these locking members being indicated by reference numeral 13*b*. The top 13 is of the same foraminous character as the holder 12.

It has been found that at temperatures considerably above the boiling point of water, the desired volatile oils may be more readily extracted from the coffee beans or the like. Also, pressures above that of the atmosphere, commonly obtained in pressure cookers, facilitate the penetration of the bulky particles to such an extent that whole coffee beans from the roaster may be used in such form for making a beverage therefrom. This means that it is possible to obtain two very desirable results. First, none of the natural coffee flavor is lost by the usual grinding process or afterwards, but it is all retained. Second, there results a prefectly clear beverage which is saturated with only the desirable volatile oil which carries the natural coffee flavor and is free of the colloidal parts of the coffee without the necessity of filtering. Thus I am able to retain only the desirable parts of the coffee and to discard the bulk which remains in the coffee holder. The same thing is true of other beverages which may be made in the same manner and with the same resultant advantages.

Thus my new method of preparing coffee contemplates placing the coffee beans in the holder 12 so as to preclude the loss of a substantial part of the natural flavor, as is usually the case; and this new procedure is made possible by my new sealing means which permits more efficient pressure cooking. In fact, my present pressure cooker is capable of such a high degree of efficiency that it may be possible to prepare coffee from coffee beans that are only partially roasted or not at all roasted when placed in my coffee-holder in the present pressure cooker. In other words, my present method permits the application of such high temperatures that the roasting of the coffee bean may be completed or performed entirely while the beverage is being prepared therefrom in my cooker. That is, the partially or entirely green coffee beans may be subjected to what may be considered as wet-roasting and brewing at the same time in my present device. All of the desirable volatile oil, with the natural flavor of the coffee, is captured at once and none of it is lost in my present invention.

The exact location of the coffee-holder within the cooker may vary and the same thing is true of the level of the water in the container. The principle of my new method is that the coffee beans, while suspended within the cooker, are subjected to considerable washing due to a circulation of hot water or vapor therethrough and to the pressure which may be developed within my improved form of cooker.

In the case of coffee as well as any other beverages or foods that are prepared in my present cooker, it is to be understood that during the initial period of application of heat, the air within the cooker is removed therefrom through the vent in the top of the closure, as more fully explained in my co-pending application above referred to. Thus, in my present method, the cooking is done in a space from which the air is exhausted and which is most effectively sealed against the escape of the flavoring component of the food, tea or coffee or the like.

It is to be understood, of course, that my present form of cooker is capable of producing marked improvements in the preparation of various foods as well as in the preparation of coffee or the like. The point is that I have discovered a new and improved method of preparing coffee or the like, that can be carried out with my present form of pressure cooker that is also

adapted for most efficient use in the preparation of foods.

My present sealing means, aside from being automatic in its sealing action, is of symmetrical form and thus requires no particular attention to install or assemble the same. It may be very readily applied and removed for cleaning and it is reversible. Also, it may be placed either upon the container or within the closure. By properly inclining the walls of the gasket groove, there is realized a means of compensating for the variations which may occur in the height of the rubber gasket or the groove into which it fits, and this feature also enables the sealing gasket to find its concentric position when it is placed between the closure and container. Also, the co-axial portions *1c* and *2c* serve as a centering means for the gasket. My present form of sealing means is not apt to become set and to lose its original shape as a result of pressure thereupon but, on the other hand, the shape of my gasket is maintained and will therefore have a long life of usefulness. The seat provided for the sealing gasket is of substantially the same shape as the gasket itself which is forced into such accommodating and suitable space so that it is continually re-formed instead of being deformed by the heat and pressure.

The expansion of the metal ring 6 or 8 not only contributes to the sealing effect but it also partly covers the rubber sealing ring and thereby greatly reduces the objection of contamination of the food from the rubber gasket. Also, the form of the groove between the closure and the container, having outwardly converging side surfaces, allows for any diametrical enlargement of the gasket which is due to internal pressure, my gasket having an inherent tendency to follow the closure which, under internal pressure, tends to separate from the container until the portions *2a* of the closure firmly abut against the portions *1b* of the container.

It is desirable that pressure cookers be made from stainless steel and, for the sake of economy, they should be made by the stamping process in order to avoid the necessity of machining operations in producing suitable sealing surfaces. But it is well known that the stamping operation does not permit as accurate dimensions as does machining. However, with my present form of sealing means, it is possible to avoid the necessity of the machining operations with the expense incident thereto, and I am able to produce a most efficient and dependable device by stamping.

My new form of container may be of substantially regular or symmetrical shape throughout, the flat projections *1b* being only slightly out-of-round, as compared with a continuous circumference, and not at all unsightly or objectionable in any respect. On the other hand, the entire device presents a very pleasing appearance especially in the absence of the usual clamping means or sharp corners for the securing of the closure upon the container.

The edge portion of the container not only strengthens the same and preserves its normal shape but its particular form serves also as a convenient means for pouring or otherwise emptying the contents from the container. Also, this reinforced edge of the container affords an efficient form of seat for the sealing gasket which may be readily applied to and removed therefrom. Furthermore, my improved form of container is capable of being used for various purposes either with or without the closure. Since the sealing takes place well below the top edges of the container, the sealing efficiency will not be affected at all by any nicks or cuts that may occur in the top edge of the container from rough usage or handling.

What I claim is:

1. A cooking utensil comprising a container, a closure therefor, releasable means for holding the closure upon the container, the adjacent portions of the closure and container having their inner surfaces so formed as to provide together a radially unobstructed internal annular groove with outwardly converging marginal surfaces, and an annular flexible sealing means of like form arranged in said groove and having axially and radially freely-acting yieldable marginal portions adapted for sealing engagement with the marginal surfaces of said annular groove, the normal angle of inclination of the outer surfaces of the marginal portions of the sealing means, with respect to the longitudinal axis of the container, being of less degree than that of the marginal surfaces of said annular groove.

2. A cooking utensil comprising a container, a closure therefor, releasable means for holding the closure upon the container while at the same time permitting slight axial clearance between the closure and the top edge of the container when said closure holding means is in effective position, the adjacent portions of the closure and container having their inner surfaces so formed as to provide together an internal annular groove with outwardly converging inclined marginal surfaces of symmetrical form with respect to its horizontal axis, and an annular flexible elastic sealing means of like form arranged entirely within said groove so as to have the upper and lower edge portions thereof in engagement with the inclined surfaces of said groove, said closure resting upon only the upper edge of said sealing means so as to provide a floating arrangement of said closure with respect to said container, said sealing means being of symmetrical form with respect to its horizontal axis so as to be reversible with respect to said groove, said sealing means including the upper and lower marginal portions thereof being directly in the path of laterally exerted pressure within the utensil so as to be forced laterally into sealing engagement against the converging portions of said groove, and the surface portions of said groove being entirely free of obstruction to the edges of said sealing means so as to permit freely-acting engagement of the same upwardly and downwardly along the inner inclined surfaces of the container and the closure for centering and compensating engagement therebetween.

OTTO M. BURKHARDT.

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1,077,289	Nash	Nov. 4, 1913
1,221,707	Durbin	Apr. 3, 1917
1,519,767	Demuth	Dec. 16, 1924
2,277,824	Franson	Mar. 31, 1942
2,292,819	Breese	Aug. 11, 1942
2,330,425	Hilton	Sept. 28, 1943
2,399,115	Hansen et al.	Apr. 23, 1946
2,424,800	Coverley et al.	July 29, 1947