United States Patent

Roberts

[15] **3,682,348**

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[54] **HINGE ASSEMBLY**

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[52] **U.S. Cl.** **220/32**, 16/166, 16/179

[51] **Int. Cl.** **B65d 43/16**

[58] **Field of Search** ..220/32; 16/135, 146, 160, 166, 16/190, 179

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[57] **ABSTRACT**

This hinge assembly includes a base having a lid attached thereto by means of a pair of articulating hinges which permit the lid to be swung about the base and also to be raised relative to the base. Each hinge consists of a slotted hinge element attached to the base and a second hinge element attached to the lid. Associated elements of each pair of hinges are interconnected by a pin which is slidably received within the slot of the slotted hinge elements. One of the hinge elements of each pair includes a pair of shoulders and the other includes a pair of associated abutment lugs. One of the shoulders engages one of the abutment lugs to hold the lid in a spaced horizontal position and the other shoulder engages the other lug to hold the lid in a vertical position. A bell crank element, pivotally attached to the slotted hinge element, provides a notched latch supporting the pin and predetermining the space between the lid and the base.

8 Claims, 6 Drawing Figures

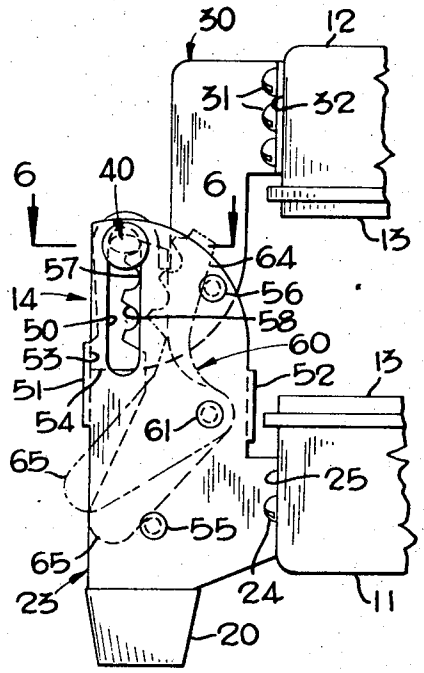
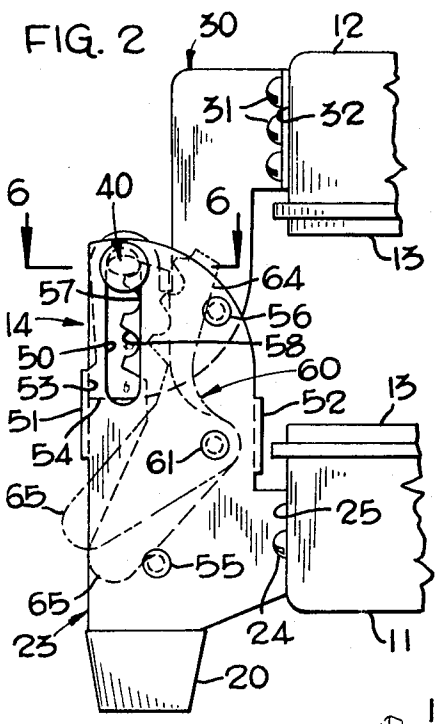


FIG. 2



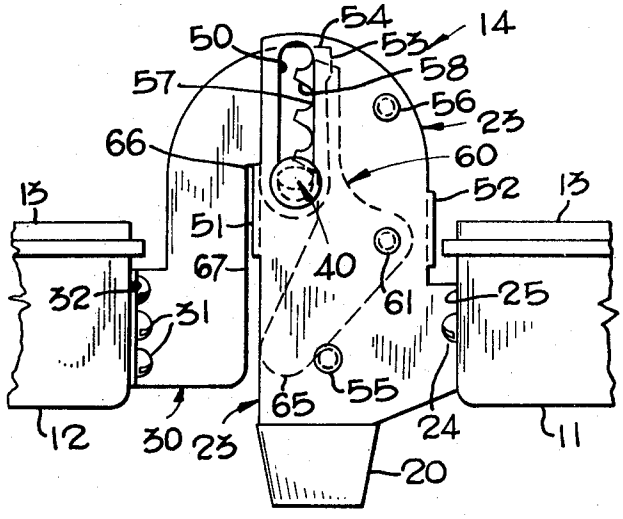


FIG. 4

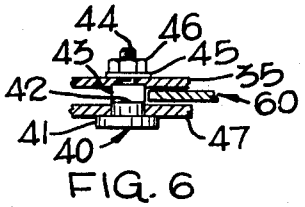


FIG. 6

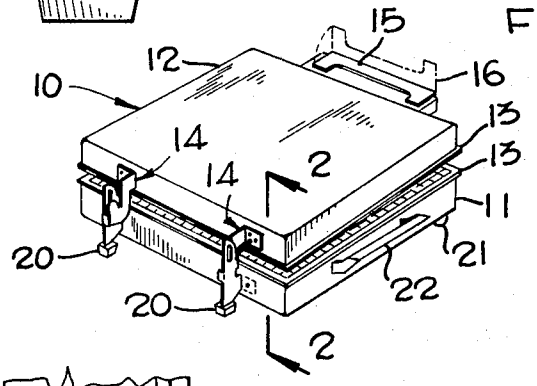


FIG. 1

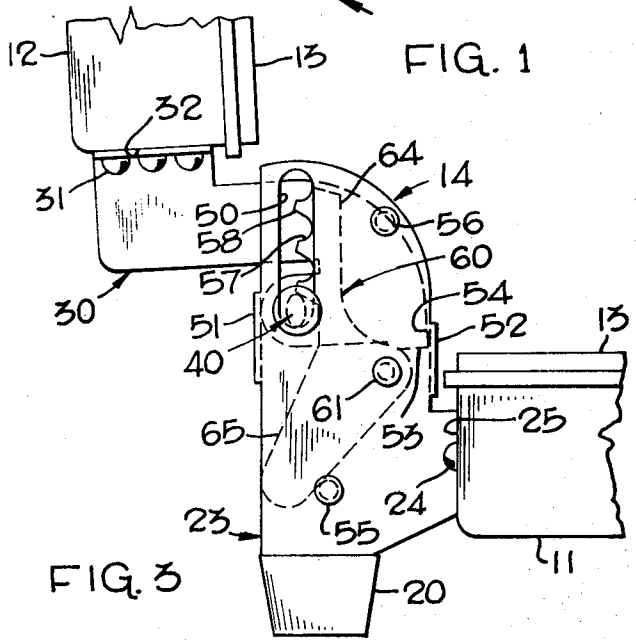


FIG. 3

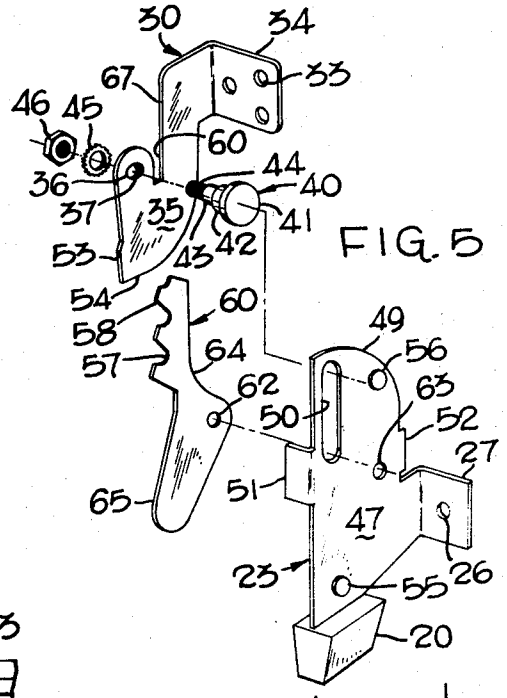


FIG. 5

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HINGE ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates generally to a hinge assembly for an appliance and in particular, to a hinge assembly capable of holding the lid of a cooking appliance at rest in selected positions relative to the base.

Almost all portable cooking appliances in use in the present day kitchen operate by electricity. This applies in particular to the various grills, waffle irons and other appliances which include a base with an overfitting lid. In many conventional items of this variety, both the lid and the base include interconnected heating elements and, for this reason, it is essential that the lid and the base be suitably hinged together.

Of the several types of hinge used for this purpose, by far the most common is the piano or strip hinge which includes opposing hinge elements attached to the lid and the base. This hinge permits only rotational movement of the lid relative to the base, and results in the heating faces of the lid and the base elements bearing an inclined relation to each other when open. Thus, in the grilling of a sandwich, the heating elements do not distribute heat evenly to the item to be cooked.

In addition to this disadvantage, the usual hinged lid bears directly on the sandwich disposed on the base. Moreover, the lid, in addition to being in direct contact with the food, tends to squash the food by virtue of its weight. Another disadvantage of the common hinge connection is that it does not permit the lid to be held in an upright position. Thus, if the appliance is to be versatile and permit the cooking of those food items which must be observed while the cooking is in progress, the lid must be either propped up against a wall or opened fully to a horizontal position. The first of these alternatives renders the device somewhat unstable and the second takes up valuable working space. Thus, neither can be considered particularly suitable.

SUMMARY OF THE INVENTION

The present hinge assembly permits the lid to be swung about the base in the normal manner. In addition, the hinge mechanism is articulated such that the lid may be held in place in a substantially horizontal position spaced above the base. Thus, the heat distribution is even and, in addition, the weight of the lid does not bear on the sandwich or other item to be cooked.

The lid may be moved to an upright position and held securely in place in that position and yet be easily returned to a closed position. By applying a slight upward pull during turning, the lid may also be moved through 180° to a fully open position.

This hinge assembly includes base and lid members disposed in overlying relation and articulating means interconnecting said members for swinging displacement of the lid member relative to the base member about a pivot center, the pivot center being translational.

The articulating means includes a first hinge element attached to the base member and including a slot, and a second hinge element attached to the lid and including a pivot pin extending into the slot. The pivot pin provides the translational pivot center to permit linear displacement of the hinge elements relative to each other.

One of the hinge elements includes an abutment engageable by a shoulder on the other hinge element to provide couple resistance to swingable displacement of the lid member relative to the base member in one direction. Similarly, one of the hinge elements includes an abutment and the other hinge element includes a shoulder engageable by the abutment to provide couple resistance to swingable displacement of the lid member relative to the base member in the other direction. The shoulders are disposed in spaced relation from the pivot center and are preferably disposed on the lid member hinge element. Said lid hinge element includes an arcuate portion rotatable about the pivot center to avoid interference with one of said abutments and is notched to avoid interference with the other of said abutments.

A bell crank latch element is mounted in pivotal relation to the base member hinge element, said crank including a notched arm, adjacent the slot, and a counterbalance arm tending to urge said notched arm into engagement with said pivot pin. The notches provide graduations predetermining the parallel spacing between the lid and base members.

The pivot pin has a shank of non-circular configuration and the notches on the bell crank are compatibly shaped to engage said pivot pin. A limit pin carried by the base member hinge element is engageable by the counterweight arm to limit rotation of said counterweight arm and align said notched arm in overlapping relation to the slot. The pivot pin shank is preferably elliptical and the diameter of the minor axis is less than the net width of the slot and overlapping notched arm to permit said shank to move freely in said slot when the lid member is substantially upright.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a perspective view of the appliance;

FIG. **2** is an enlarged fragmentary elevational view of the hinge assembly taken on line **2—2** of FIG. **1** and illustrating the lid held in a spaced, horizontal position above the base;

FIG. **3** is a similar view to FIG. **2** but illustrating the lid held in a substantially upright position;

FIG. **4** is a similar view to FIG. **2** but with the lid held in the fully open position;

FIG. **5** is an exploded view illustrating the individual hinge elements, and

FIG. **6** is a sectional view taken on line **6—6** of FIG. **2** and illustrating the pivot pin.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now by characters of reference to the drawing, and first to FIG. **1**, it will be understood that the appliance is represented by a sandwich toaster and waffle baker combination, generally shown by numeral **10**. The appliance **10** includes a base member **11** and a lid member **12**, each of said members being provided with a waffle iron **13**.

The lid member **12** is connected to the base member **11** by a pair of opposed hinge assemblies, generally indicated by numeral **14**, each hinge assembly constituting an articulating means. The hinge assemblies are mirror images of each other and are otherwise substantially identical. For this reason, only one of the hinge assemblies **14** will be described, it being understood that this description applies equally to the other.

In general, the structure of the hinge assemblies **14** permits the lid member **12** to be disposed above the base member **11** and held in a substantially horizontal position as indicated in FIG. **2**. Further, the hinge assemblies **14** permit the lid member **12** to be swung about the rear end of the base member **11** by means of a pivoted front handle **15** to an upright position, as indicated in FIG. **3**, and a fully open horizontal position as indicated in FIG. **4**. In the latter case, the handle **15** may be rotated to a position indicated in broken outline by numeral **16** and thereby provide a support for the front end of the lid member **12**. Feet **20** of each hinge assembly **14** provide rear support for the base member **11**. A pair of conventional feet **21** are provided on the underside of the base member **11** to support the front of said base member **11**. Opposed side handles **22** permit the base **11**, and therefore the appliance as a whole, to be lifted and relocated to any desired position.

Turning now specifically to the hinge assembly **14**, shown in detail in FIGS. **2** through **5**, it will be understood that each hinge assembly **14** includes a bracket **23** attached as by fastener **24** to the rear face **25** of the hollow base member **11**. For this purpose, an aperture **26** is provided on an outstanding flange **27** as shown in FIG. **5**. The bracket **23** constitutes a first hinge element.

The hinge assembly **14** also includes a bracket **30**, which is attached as by fasteners **31** to the outside of the rear face **32** of the lid member **12**. Apertures **33** are provided in the outstanding flange **34** of the bracket **30** for this purpose as shown in FIG. **5**. The bracket **30** constitutes a second hinge element.

The brackets **23** and **30** are interconnected by means of a pivot pin **40** which is attached to the outstanding leg **35** of the bracket **30** in non-rotatable relation as shown in FIG. **6**. The pivot pin **40** includes a circular head **41**, a reduced shoulder portion **42**, a substantially elliptical shank portion **43** and a reduced diameter threaded portion **44**. The outstanding leg **35** is provided with an aperture **36** having a recessed portion **37** accommodating the elliptical shank **43**. The pivot pin **40** is secured to the outstanding leg **35** by means of a spring washer **45** and a nut **46**.

The bracket **23** includes an outstanding leg **47** which is provided with a substantially vertical slot **50**. In its installed position as shown in FIG. **6**, the circular shoulder portion **42** of the pivot **40** is received within the slot **50**. The slot **50** is slightly larger than said shoulder **42** and permits the pivot **40** to be moved freely along the length of the slot **50** and also to be rotated about its own axis within said slot **50**. Thus, the lid member **12** may be swung about the base member **11** and may also be raised within the slot **50** relative to the base member **11**, the pivot pin **40** providing a translating pivot center.

The bracket **23** includes a pair of lugs **51** and **52** constituting abutment portions. The bracket **30** includes adjacent shoulder portions **53** and **54** engageable respectively with associated abutment lugs **51** and **52** to maintain the lid member **12** in specific positions relative to the base member **12**. The engaging shoulder portion **53** and abutment lug **51** constitute a first stop means. The engaging shoulder portion **54** and abutment lug **52** constitute a second stop means.

The hinge assembly **14** permits rotation of the lid member **12** about the pivot pin **40** when said pin **40** is disposed at the bottom of the slot **50**, the base hinge bracket **23** being radiused to avoid interference with the corner of said lid member **12**. When the lid member **12** has been rotated to a substantially upright position, the lid hinge bracket **30** may be easily raised relative to the base hinge bracket **23** because, at this point, an upward force may be applied to the pin **40**, causing it to slide upwardly in the slot **50**. When a desired elevation has been achieved, based on the required space between the waffle irons **13**, the lid member **12** may be rotated in a clockwise direction about the newly elevated pivot center and returned to a horizontal position. When the operation is completed, the shoulder **53** of the bracket **30** engages the abutment lug **51** of the bracket **23**, as shown in FIG. **2**. Because the pivot center is spaced from the engaging shoulder **53**, said shoulder **53** bears against the abutment lug **51** and the pin **40** bears against the innermost side of the slot **50**. This results in horizontal couple forces being set up which resist the downward weight of the lid member **12** and said lid member **12** is thereby maintained in spaced, substantially parallel relation to the base member **11**.

In the preferred embodiment of the hinge assembly, a notched bell crank **60** is provided which constitutes a latch means. This bell crank **60** is pivotally mounted to the lower bracket **23** as by a rivet **61** which extends through an aperture **62** in the outstanding leg **47**, and an aperture **63** in the bell crank **60**. The bell crank **60** includes upper and lower angularly related arms **64** and **65** respectively. The upper arm **64** includes a plurality of notches **57** compatibly configurated to receive the elliptical shank **43** of the pivot pin **40** in bearing relation. The lower arm **65**, because of the angular relationship between the arms, tends to rotate the bell crank **60** in a counterclockwise direction and into engagement with the pin **40**. A limit stud **55** limits said rotation and aligns the notched edge of the upper bell crank arm **64** in overlapping relation with the slot **50**.

The bell crank **60** is free to rotate in a clockwise direction to the extent permitted by a second limit stud **56**. Thus, when the pivot pin **40** is moved vertically in the slot **50**, said pin **40** simply pushes the bell crank away from the vicinity of the slot **50**, the inclined upper faces **58** of the notches **57** providing the necessary cam action to accomplish this pushing action. When the desired elevation has been achieved, the elliptical pivot **40** rotated until the major axis of said pin **40** is substantially horizontal and the weight of the lid member is released, resulting in the couple action already referred to. The pin **40** is received in the bell crank notch **57** closest to it and in effect, the bell crank **60** acts as a gauge predetermining the spacing between the waffle irons **13**.

The minor axis of the pivot pin **40** is smaller than the net width of the slot **50** and the overlapping portion of the bell crank arm **64**. Thus, when it is desired to close the lid member **12**, said lid member **12**, and therefore pin **40** are rotated until the lid member **12** is substantially upright whereupon said lid member **12** may be lowered without interference from the bell crank **60**.

FIGS. **3** and **4** illustrate the disposition of hinge parts when the lid member **12** is held in the upright and fully

open positions respectively. For example, as shown in FIG. 3, the lid member **12** is held in the upright position by engagement of the shoulder portion **54** of the bracket **30** with the abutment lug **52** of the bracket **23**. It will be observed that the outstanding leg **35** of the bracket **30** has a quadrant configuration permitting rotation of the bracket **23** through 90° without interference from the abutment lug **52**. Further, the shoulder **54** is tangential to said quadrant configuration so that it will engage the abutment lug **52** and hold the lid member **12** in the raised position. As a practical matter, the structural arrangement of parts is such that the lid member **12** is inclined slightly rearwardly in the raised position and thus the weight of the lid member **12** is slightly eccentric to the pivot pin **40**. Therefore, the pivot pin **40**, which bears against the bottom of the slot **50**, in combination with the engagement of the shoulder **54**, which bears against the abutment lug **52**, provides couple resistance holding the lid member **12** in the upright position.

When it is desired to rotate the lid member **12** to the fully open position from the upright position, the lid member **12** must be raised slightly so that the shoulder **54** of the bracket **30** clears the abutment lug **52** of the bracket **23**. Further counterclockwise rotation can then take place until the lid member **12** is substantially horizontal. As shown in FIG. **4**, the bracket **30** is provided with a notch **66** adapted to receive the abutment lug **51** of the bracket **23** and thereby avoid interference between the upper and lower brackets **30** and **23**. In the open, horizontal position, the lid member **12** is conveniently supported at one end by the front handle **15**, which is rotated to provide a leg. The lid member **12** is supported at the other end by the pivot pins **40**. Alternatively, the lid member **12** may be held in a fully open, cantilever position by a couple force resulting from bearing engagement of the pin **40** against the side of the slot **50** and bearing engagement between the face **67** of the bracket **30** and the abutment lug **51** of the bracket **23**.

It is thought that the functional advantages of this hinge assembly have become fully apparent from the foregoing description of parts, but for completeness of disclosure, the various operational positions of this lid member **12** relative to the base member **11** will be briefly summarized.

The hinge assembly **14** permits the lid member **12** to be rotated about the pivot pin **40**. It permits, in addition, the raising of the lid member **12** relative to the base member **11** in such a way that the appliance is provided with spaced and parallel hot plates, such as waffle plates, which are held apart at a selected distance. This particular arrangement is illustrated in FIG. **2**, and in this position, the downward weight of the lid member **12** is resisted by couple action provided by the pivot pin **40**, acting against the slot **50**, and engagement of the shoulder **53** against the abutment lug **51**. The relatively short couple arm represented by the spacing between the pivot pin **40** and the point of engagement of the shoulder **53** and lug **51** produces a force much in excess of the weight of the lid member and, in consequence, the friction between the engagement points causes a binding which holds the lid member **12** in its preselected position. The notched edge of the bell crank **60** provides additional support and also a gauge by which the spacing between the plates may be predetermined. It will be understood that when the lid member **12** is returned by clockwise motion to the horizontal position, while the pivot pin is elevated, the weight of the base is sufficient to resist any tendency of the appliance to slide.

When the lid member **12** is rotated slightly beyond the vertical position, the center of gravity of the lid is eccentric to the pivot center. The lid member **12** is held, slightly out of vertical, by couple action resulting from engagement of the tangential shoulder **54** against the abutment lug **52** and engagement of the pivot pin **40** against the bottom of the slot **50**. The lid member **12** is thereby held in a stable, substantially upright position. By pulling slightly upwardly, the shoulder **54** is disengaged from the abutment lug **52** and the lid member **12** may be rotated in a continued counterclockwise direction and conveniently supported in the horizontal position by the rotated handle **15**.

I claim as my invention:

1. A hinge assembly for a cooking appliance or the like, comprising:

a. a base member,

b. a lid member disposed above the base member, and

c. articulating means including a translating pivot center, said articulating means interconnecting said base and lid members in translational and pivotal relation whereby said lid member may be swingingly displaced about said base member and selectively spaced in substantially parallel relation above said base member,

d. the articulating means including:

1. a first hinge element,

2. a second hinge element,

3. interconnecting means between said hinge elements providing the translational pivot center that permits the lid member to be raised to the spaced, substantially parallel relation above the base member,

4. stop means between said hinge elements selectively engaging to maintain said selectively spaced, substantially parallel relation between said base and lid members,

e. the interconnecting means including a slot having opposed margins, said slot being disposed in one of the said hinge elements, and a pivot pin, providing said pivot center, said pin being attached to the other of said hinge elements and extending through the slot for translational and rotational movement therein, and

f. the stop means including an abutment disposed on one of said hinge elements and a shoulder disposed on the other of said hinge elements and selectively engageable with said abutment when the lid member is selectively raised to the spaced, substantially parallel relation above the base member, to maintain said selectively spaced, substantially parallel relation of the lid and base members.

2. A hinge assembly as defined in claim **1**, in which:

g. the pivot pin is disposed in spaced relation from the shoulder and is engageable with one margin of the slot to cooperate with the shoulder and abutment selective engagement whereby to provide couple resistance maintaining said selectively

spaced, substantially parallel relation of the lid and base members.

3. A hinge assembly for a cooking appliance or the like, comprising:
a. a base member,
b. a lid member disposed above the base member, and
c. articulating means including a translating pivot center, said articulating means interconnecting said base and lid members in translational and pivotal relation whereby said lid member may be swingingly displaced about said base member and selectively spaced in substantially parallel relation above said base member,
d. the articulating means including:
1. a first hinge element,
2. a second hinge element,
3. interconnecting means between said hinge elements providing the translational pivot center, and
4. stop means between said hinge elements maintaining said selectively spaced, substantially parallel relation between said base and lid members,
e. the interconnecting means including a slot having opposed margins, said slot being disposed in one of the said hinge elements, and a pivot pin, providing said pivot center, said pin being attached to the other of said hinge elements and extending through the slot for translational and rotational movement therein,
f. the stop means includes an abutment disposed on one of said hinge elements and a shoulder disposed on the other of said hinge elements and engageable with said abutment, to maintain said selectively spaced relation of the hinge and base members, and
g. latch means mounted to said one hinge element providing a latch element adjacent the slot, said latch element selectively engaging and supporting the pivot pin.

4. A hinge assembly for a cooking appliance or the like, comprising:
a. a base member,
b. a lid member disposed above the base member, and
c. articulating means including a translating pivot center, said articulating means interconnecting said base and lid members in translational and pivotal relation whereby said lid member may be swingingly displaced about said base member and selectively spaced in substantially parallel relation above said base member,
d. the articulating means including:
1. a first hinge element,
2. a second hinge element,
3. interconnecting means between said hinge elements providing the translational pivot center, and
4. stop means between said hinge elements maintaining said selectively spaced, substantially parallel relation between said base and lid members,
e. the interconnecting means including a slot having opposed margins, said slot being disposed in one of the said hinge elements, and a pivot pin, providing said pivot center, said pin being attached to the other of said hinge elements and extending through the slot for translational and rotational movement therein,
f. the stop means includes an abutment disposed on one of said hinge elements and a shoulder disposed on the other of said hinge elements and engageable with said abutment, to maintain said selectively spaced relation of the hinge and base members, and
g. a bell crank pivotally mounted to said slotted hinge element, said bell crank having opposed arms, one of said arms being disposed adjacent the slot and including a plurality of notches selectively engaging and supporting the pivot pin in latched relation.

5. A hinge assembly as defined in claim 4, in which:
h. the other arm of the bell crank provides a counterweight urging said notched arm into engagement with said pivot pin, and
i. limit means carried by the hinge is engageable by the counterweight arm to limit rotation of said arm and align said notch arm with said one margin of the slot.

6. A hinge assembly as defined in claim 4, in which:
h. the pivot pin includes a shank having a non-circular configuration, and
i. the notches on the bell crank are compatibly configurated to engage said pivot pin shank.

7. A hinge assembly for a cooking appliance or the like, comprising:
a. a base member,
b. a lid member disposed above the base member, and
c. articulating means including a translating pivot center, said articulating means interconnecting said base and lid members in translational and pivotal relation whereby said lid member may be swingingly displaced about said base member and selectively spaced in substantially parallel relation above said base member,
d. the articulating means including:
1. a first hinge element,
2. a second hinge element,
3. interconnecting means between said hinge elements providing the translational pivot center, and
4. stop means between said hinge elements maintaining said selectively spaced, substantially parallel relation between said base and lid members,
e. the interconnecting means including a slot disposed in one of said hinge elements,
f. the stop means including an abutment lug disposed on said slotted hinge element and a shoulder disposed on the other hinge element, and
g. said other hinge element including a notch receiving the abutment lug disposed on the slotted hinge element to permit the lid member to be swung into a substantially horizontal fully open position.

8. A hinge assembly for a cooking appliance, comprising:
a. a base member,
b. a lid member disposed above said base member, and

c. a pair of articulating means disposed in spaced relation at one end of the cooking appliance, each articulating means including horizontally alignable pivot centers, each articulating means including:

1. a first hinge element attached to the base member and including a slot,
2. a second hinge element attached to the lid member and including a pivot pin, said pivot pin extending through and being movable in said slot to provide translational and pivotal interconnecting means between said hinge elements whereby said lid member may be swingingly displaced about said base member and selectively spaced in substantially parallel relation about said base member, and
3. the first hinge element including first and second abutment lugs and the second hinge element including first and second shoulders disposed in spaced relation from the pivot pin,
4. said first shoulder engaging said first abutment in spaced relation from said pivot to provide couple resistance to swingable displacement of said lid member relative to said base member in one direction, and said second shoulder engaging said second abutment in spaced relation from said pivot center to provide couple resistance to swingable displacement of the lid member relative to the base member in the other direction.

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