Dec. 14, 1965 L. A. BETTCHER Re. 25,947

TRIMMING AND SLICING DEVICE

Original Filed June 24, 1960 2 Sheets-Sheet 1

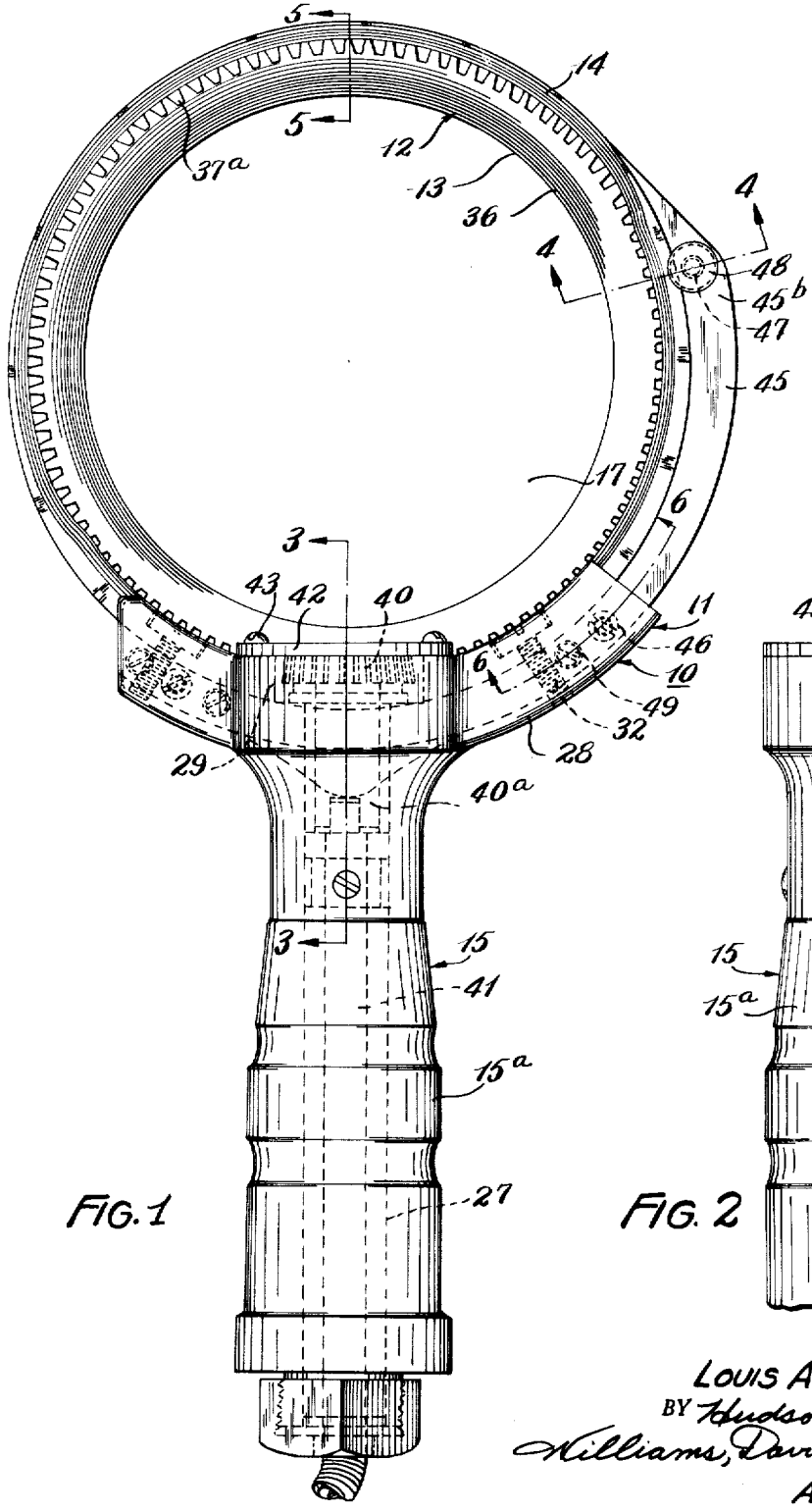


FIG. 1

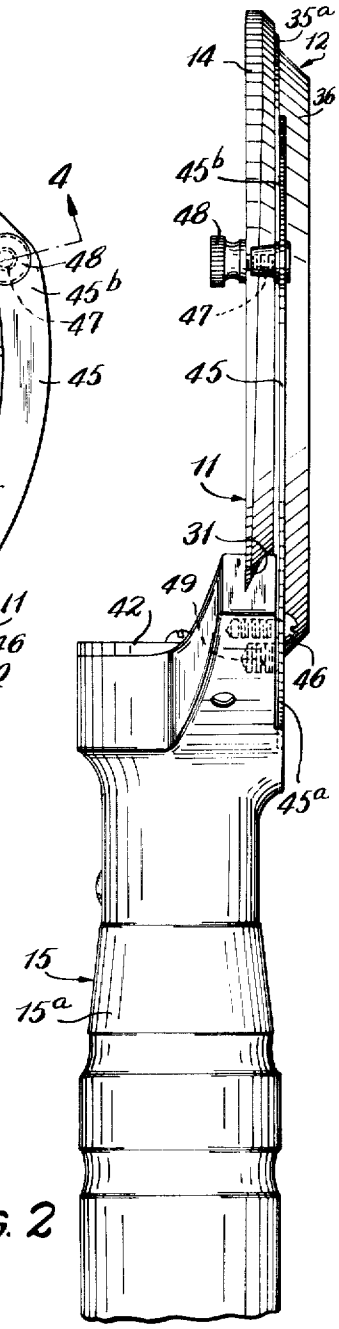


FIG. 2

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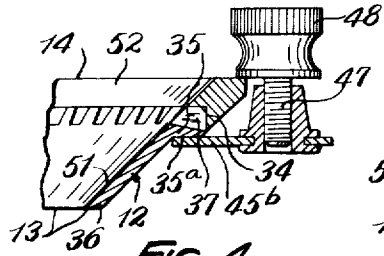


FIG. 4

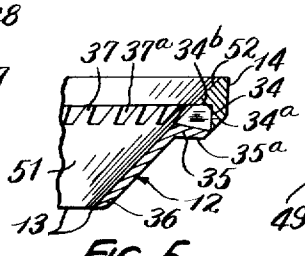


FIG. 5

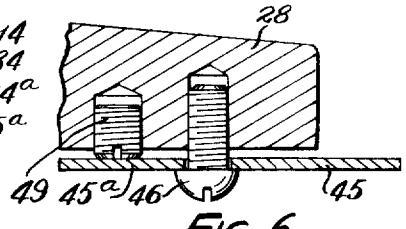


FIG. 6

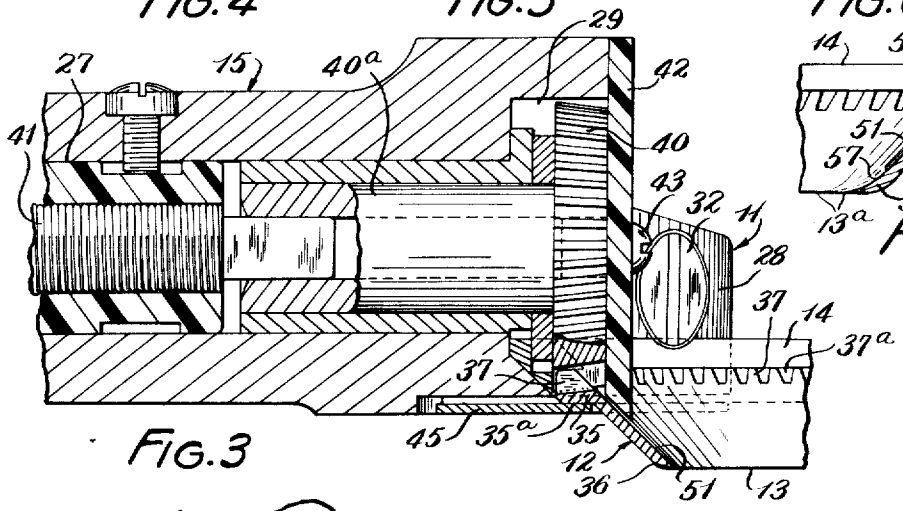


FIG. 3

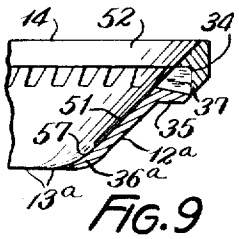


FIG. 9

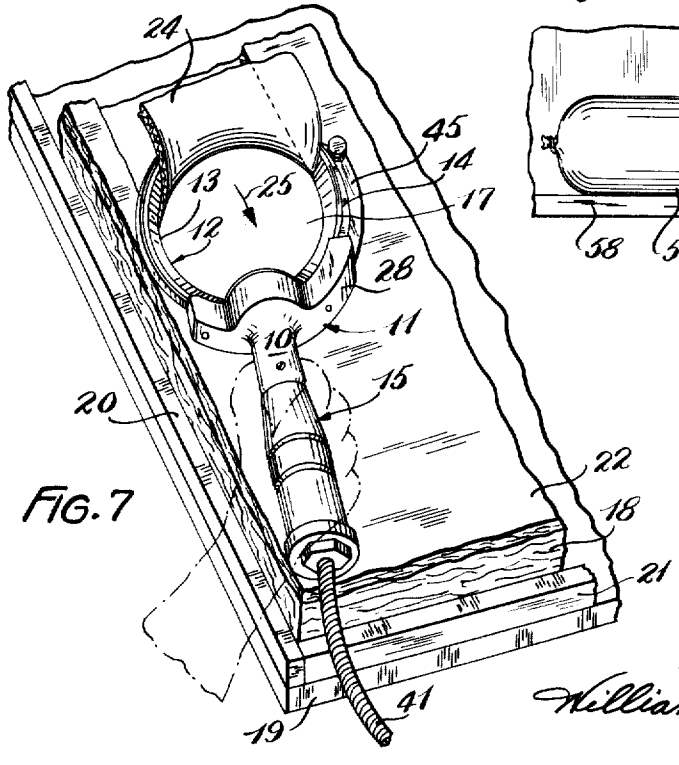


FIG. 7

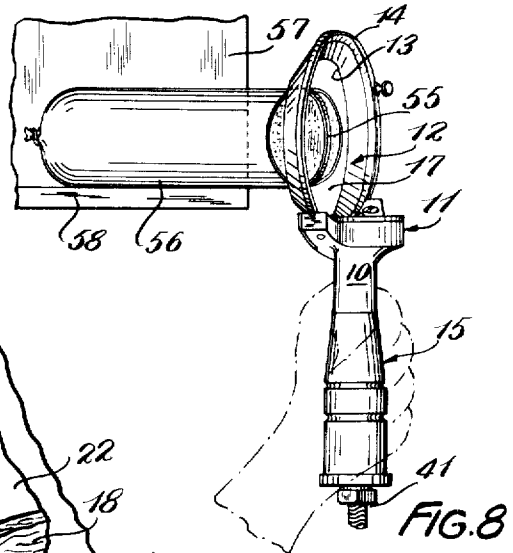


FIG. 8

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TRIMMING AND SLICING DEVICE

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Original No. 3,024,532, dated Mar. 13, 1962, Ser. No. 38,556, June 24, 1960. Application for reissue Mar. 2, 1964, Ser. No. 358,678

14 Claims. (Cl. 30—276)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to cutting devices and, as one of its objects, aims to provide a novel form of cutting device comprising an annular support means having an annular blade (of substantially frusto-conical shape) projecting therefrom and provided with a cutting edge on the small-diameter end thereof, and which device will operate effectively to cut a section or slice from a work body during relative translatory movement between the blade and a workholder means supporting the work body and, during which cutting operation, the severed section or slice passes through the opening of the support means and blade.

The present invention also provides a novel cutting device of the character just mentioned and in the form of a hand tool having handle means rigid with the annular support means and adapted to be grasped for manually drawing the device across the work body with the plane of the annular support means substantially parallel to the portion of the work body from which the section or slice is to be cut.

The invention further provides a novel cutting device of the kind above indicated wherein the blade is rotatable and the handle means had driving means therein for rotating the blade.

The invention likewise provides a novel cutting device of the construction referred to above wherein the *annular blade is* [taper] of [the] frusto-conical shape *converging* [of the annular blade extends along and around the inside of the blade and converges] toward an annular cutting edge on the innermost portion of the small-diameter end of the blade, so that a relative translatory movement between the blade and the work body substantially in or along the plane of the support means will result in an effective trimming or slicing action by the cutting edge.

Additionally this invention provides novel features of construction with respect to the form of the support means and the mounting of the blade thereon and by which advantageous results are achieved in the operation of the blade, as well as in the removability thereof for cleaning, sharpening, and the like.

Other objects, novel characteristics and advantages of this invention will be apparent in the following detailed description and in the accompanying drawings forming a part of this specification and in which,

FIG. 1 is a top plan view of a cutting device embodying this invention;

FIG. 2 is a side elevation thereof;

FIG. 3 is a partial longitudinal section on a larger scale and taken on section line 3—3 of FIG. 1;

FIGS. 4 and 5 are transverse sectional views taken at different points around the annular support ring and blade, as indicated by section lines 4—4 and 5—5 of FIG. 1;

FIG. 6 is a fragmentary sectional view taken on section line 6—6 of FIG. 1 and showing adjustable stop means;

FIG. 7 is a perspective view showing the cutting device being used in a trimming operation;

FIG. 8 is another perspective view showing the cutting device being used in a slicing operation; and

FIG. 9 is a sectional view similar to that of FIG. 5 but showing a modified construction.

As a highly practical embodiment of this invention the drawings show a cutting device **10** which comprises, in general, an annular support means **11** and a circular or ring-shaped blade **12** mounted thereon and having an annular cutting edge **13** on the inside thereof for application to a work body for cutting a section or slice therefrom during a translatory relative movement between the blade and the work body. The cutting device **10** can be used for carrying out such a cutting operation on various different kinds of work bodies but is especially suitable for cutting a section or slice from a slab or body of meat or a meat product, as will be further explained hereinafter.

The support means **11** is ring-shaped and comprises a ring member **14** on which the blade **12** is mounted in a coaxial relation thereto. The support means **11** is here shown as also comprising a handle **15** by which the device can be manually held and manipulated in the manner of a hand tool. The handle **15** extends substantially radially outward from the ring member **14** at one point of the circumfrence of the latter and lies substantially in or adjacent the flat plane of this ring member. The blade **12** and the ring member **14** have a common central opening **17** for the passage of the severed section or slice axially therethrough and themselves lie in a surrounding relation to, and wholly outside of, such common opening.

Before proceeding further with the detailed description of the cutting device **10**, attention is called to FIG. 7 of the drawings as illustrating one manner of use of the device. This view shows a work support structure for a work body or meat slab **18**, in this case a work table **19**, having a flat top surface and side and end rails **20** and **21** rising thereabove and against which edge portions of the meat slab are engageable for locating and holding the same in the desired work position. The meat slab **18** may, for example, be a slab of brisket beef or the like from which a layer of fat **22** is to be trimmed for preparing the slab for further treatment such as a pickling treatment for converting the same into corned beef. The device **10** is also useful for trimming lean meat portions from a slab or layer of fat, as well as for various other cutting and trimming operations.

The cutting device **10** is shown in FIG. 7 as being used in the manner of a hand tool for carrying out such trimming operation during which a strip-like section **24** of the layer **22** is being cut from the work body **18** during relative translatory movement between the blade *12* [13] and the workholder table **19**. During this trimming operation illustrated in FIG. 7 the device **10** is being drawn along the work body **18** in the general direction of the arrow **25** by movement manually applied to the handle **15** and by which the blade **12** is translated along the top of the work body substantially in the flat plane of the ring member **14**, that is, in a plane substantially parallel to the portion of the work body from which the section **24** is being severed by the cutting edge **13**. During the cutting operation thus performed the strip-like section **24** being trimmed from the work body **18** passes through the common opening **17** of the device. The section **24** thus cut or trimmed from the work body **18** can be of any desired thickness, depending upon the manner in which the cutting device **10** is manipulated and the amount of force applied thereto.

The handle **15** comprises a hollow stem portion **15a** of a suitable size and shape to be conveniently grasped by the human hand and has a longitudinal passage **27** ex-

tending therethrough. The handle **15** also comprises a sector portion **28** at one end thereof and rigid therewith. The inner end of the handle **15**, that is the end having the sector portion **28** thereon, contains a recess forming a gear chamber **29** with which the longitudinal passage **27** communicates. The handle **15** is disposed so that its axis lies in a plane which is perpendicular to the plane of the ring member **14** and contains the axis of the common opening **17**.

The ring member **14** is secured along a portion of the circumference thereof to the sector portion **28** by being received in a groove **31** extending along the concave side of the latter and retained in such groove by suitable retaining screws **32**. The screws **32** have the stems thereof threadedly engaged in the sector portion **28** while the heads of the screws partially overlie the groove **31** and engage the ring member **14** at spaced points for holding the latter firmly in its assembled position in the groove.

The ring member **14** is here shown as being a one-piece metal member lying substantially in a flat plane and having a transverse shape and size so that this member will be sufficiently strong to support the blade **13** but will be of minimum transverse dimension and axial thickness for reducing the size and weight of the support means **11**, as well as to offer minimum obstruction to the passage of the severed material through the common opening **17**. FIG. 5 of the drawings shows the relatively small-size cross-sectional shape of the ring member **14** along the side portion thereof substantially opposite the handle **15**, and FIG. 4 shows the somewhat thicker cross-sectional form of this ring member along the side portion thereof adjacent the handle.

For an important purpose which will be presently explained, the ring member **14** has an annular groove **34** therein on the lower side thereof and which groove extends in a continuous relation along this ring member and around the common opening **17**. The groove **34** is of a suitable cross-sectional shape, here shown as being an angular cross-sectional shape, defined by the corner recess formed between two annular walls **34a** and **34b** of the ring member **14** which extend therearound in an intersecting right-angular relation to each other.

The blade **12** comprises a one-piece circular or ring-shaped metal member of a frusto-conical shape and having an annular base portion **35** at the large-diameter end of the frusto-conical shape and an annular cutting edge **13** on the small-diameter end **36** thereof. The blade **12** is mounted on the ring member **14** by having the annular base portion **35** thereof slidably engaged in the groove **34** so as to provide for rotation of the blade on the support means **11** in the direction of its own circumference and around the common opening **17**. The blade **12** and the ring member **14** are thus in a series or tandem relation along the axis of the opening **17**.

The blade **12** is provided with gear teeth on the base portion **35** thereof and extending therearound to constitute a gear member or ring gear **37**. The teeth of the gear **37** are preferably cut directly in the base portion **35** and lie on the side thereof facing the ring member **14** so that this gear will be housed, or partially housed, in the portion of the ring member containing the guide groove **34**.

As shown in FIGS. 1 and 3 of the drawings, the blade **12** is rotatably driven by the engagement of a driving gear or pinion **40** with the ring gear **37**. The driving pinion **40** is located in the gear chamber **29** of the support means **11** and is connected with the drive means contained in the handle **15**, in this case is connected to the end of a rotatable drive shaft **41** extending through the passage **27** of the handle. For the purpose of this connection with the shaft **41**, the pinion **40** preferably has a stem portion **40a** containing a noncircular socket into which a non-circular portion of the shaft **41** is engaged. The gear chamber **29** is closed by the provision of a suitable cover **42** extending thereacross and secured to a portion of the handle **15** by suitable connecting screws **43**.

The support means **11** includes retaining means by which the blade **12** is retained in an assembled relation on the ring member **14** with the base portion **35** annularly slidable in the groove **34** as explained above. This retaining means comprises a sector member **45** which is here shown as being a plate-like member having a first portion **45a** thereof secured to the sector portion **28** of the handle **15** by suitable clamping screws **46**, and a second portion **45b** projecting from the sector portion **28** and extending partway along the circumference of the ring member **14** on the lower side of the latter. The retaining member **45** is flexible in character so that the end portion **45b** thereof will have a limited springing movement relative to the ring member **14** to permit the blade **12** to be removed from and reinserted into the groove **34**.

For retaining engagement by the retaining member **45** the base portion **35** of the blade **12** is provided on the lower side thereof with an annular surface or shoulder **35a**. The shoulder **35a** extends laterally of the blade **12** and annularly therearound on the outside thereof as shown in FIGS. 4 and 5, and, when the blade is assembled into the support ring **14**, the retaining member **45** engages the shoulder **35a** for retaining the base portion **35** in the groove **34**. A screw **47** mounted on the springable portion **45b** of the retaining member is engaged by a knurled nut **48** so that, by manual rotation of this nut, the springable portion can be drawn into holding engagement with the shoulder **35a**, or can be released therefrom to permit removal of the blade **12** from the ring member **14**.

The rigidly secured portion **45a** of the retaining member **45** also acts to retain the blade in the groove **34** by engagement with the shoulder **35a** and, to prevent binding against the blade, stop means is provided on the sector portion **28** of the handle comprising a plurality of pairs of spaced stop screws **49**. These stop screws are located adjacent to, or on opposite sides of, the clamping screws **46** as shown in FIG. 6 so that the exposed tops of the stop screws will be engaged by the retaining member **45** for locating the latter in a properly spaced relation to the sector portion **28** to retain the blade in its assembled position without preventing free rotation thereof in the groove **34**.

Reverting now to the important matter of the shape of the blade **12**, it is pointed out that the frusto-conical shape of this member provides a taper, or tapered surface **51**, on the inside thereof which extends around and along the blade in a converging relation toward the cutting edge **13**.

The angle of the taper **51** is such that the cutting edge **13** will constitute the innermost annular portion of the blade and will occupy a radially disposed, or radially inwardly presented, location or position on the small diameter end **36** of the blade. The location of the cutting edge **13** in this position will result in the cutting edge being exposed in an effective manner for engagement with the work body **18**, but will still be in a shielded position against injurious personal contact therewith by reason of the fact that it is on the inside of the small-diameter end **36**.

Upon relative translatory movement between the blade **12** and the work body **18**, as by the cutting device **10** being drawn across the body with the ring member **14** moving in its own plane and substantially parallel to the surface portion of the work body from which the section is to be severed, the cutting edge will bite into the work body with an efficient cutting action in the nature of a slicing action. The cutting action of the edge **13** is particularly effective as a slicing type of cutting action because of the rotation imparted to the blade **12** during the translatory movement. Since the cutting edge **13** is presented substantially radially inwardly on the blade and is located at or adjacent the start of the taper **51**, the severed material will pass readily through the common opening **17** as the relative translatory movement between the cutting device and work body progresses.

It will also be observed that since the cutting edge **13** is on the small-diameter end **36** of the blade **12**, the taper **51** is divergent in character along the direction of movement of the severed material through the opening **17**. Because of this diverging shape of the blade along the direction of movement of the severed material, the width of the opening **17** increases progressively therealong with the movement of the severed material and this assists the passage of the material through the opening. From the construction of the cutting device **10** as shown in the drawings and described above it will be recognized that the opening **17** is substantially greater in diameter than the combined axial length of the ring member **14** and the blade **12**, and that this size relationship is further conducive to the free passage of severed material through the opening.

The blade **12** is substantially rigid in character and of a relatively short axial length in relation to the numerical value of the diameter across the opening **17** of the blade. The taper of the frusto-conical shape providing the taper **51** on the inside of the blade **12** is of such angular value that the cutting edge will be effective to accomplish the slicing type of cutting action explained above during the relative translatory movement between the blade and the work body resulting from the drawing of the ring member **14** across the work body in a substantially parallel relation to the surface portion thereof from which the section or slice is being cut. The taper angle most suitable for this action by the cutting edge **13** is a 45° included angle between the surface **51** and the axis of the common opening **17**. Although such a 45° taper angle has been found to be highly effective and satisfactory in actual practice, the taper can be varied [somewhat] by the use of either a larger or smaller angular value.

With respect to the shape of the ring member **14**, attention is called to the fact that this member is also frusto-conical in shape on the inside thereof so as to have a taper, or annularly tapered surface **52**, extending therealong and around the opening **17** and which taper is substantially a continuation of the taper **51** of the blade **12** in the diverging direction of the latter taper. Since the taper **52** of the ring member **14** diverges in the direction of the movement of the severed material and provides a progressively increasing dimension for the width of the opening **17**, the movement of the severed material through the ring member will be likewise facilitated.

The shape of the blade **12** on the outside thereof between the base portion **35** and the free end portion **36** can be of any desired form but is preferably of a frusto-conical shape similar to that providing the taper **51** on the inside of the blade, so that the portion of the blade projecting from the ring member **14** outward of the base portion **35** will be of a substantially uniform radial thickness at all circumferential points therearound. This uniform thickness for the blade **12** is advantageous in that it facilitates the construction of the blade, as well as the resharpening thereof by which the cutting edge **13** can be maintained in a sharp and effective condition even though the blade becomes somewhat shortened in its axial dimension by reason of successive sharpening operations performed thereon.

The gear **37** is so formed on the base portion **35** and the blade **12** is so disposed relative to the ring member **14** that the tooth spaces **37a** will be left uncovered to a substantial extent on the upper side of the blade, as shown in FIG. 1. This uncovered condition for these spaces facilitates the escape of meat particles or cuttings therefrom during use of the device **10** and during cleaning of the device after use thereof.

FIG. 8 of the drawings shows the cutting device **10** being used in a slicing operation for cutting a relatively thin slice **55** from a work body comprising a meat product, such as a length of bologna **56**, supported on a workholder table **57** and lying alongside of an edge rail **58** of the latter. During this slicing operation the work body

56 is held in a projecting relation to the workholder member **57** and a translatory movement of the cutting device **10** relative to the projecting portion of the work body causes the cutting edge **13** of the blade **12** to smoothly sever the slice **55** from such body. The severed slice **55** passes through the opening **17** in the manner already explained above in connection with the strip-like section **24** being trimmed from the work body **18**.

FIG. 9 of the drawings shows a modified construction in which the annular blade **12a** differs from the blade **12** described above in that the cutting edge **13a** thereof comprises the innermost annular portion of a curved annular free-end portion **36a** of the blade. When the blade **12a** is of the shape shown in FIG. 9, the cutting edge **13a** is in a radially inwardly presented position similar to that of the cutting edge **13** described above but is contiguous to an inner concave annular surface portion **57**, instead of being immediately adjacent the frusto-conical taper **51** as in the case of the cutting edge **13**.

From the accompanying drawings and the foregoing detailed description it will now be readily understood that this invention provides a cutting device of a highly practical and effective character which can be used for a desired trimming or slicing operation on meat bodies and various other materials. It will also be recognized that since the annular blade is rotatably driven during the cutting operation and the cutting edge is on the inside of the small-diameter end thereof, the blade will be highly effective but the cutting edge will still be in a relatively shielded location and not likely to cause personal injury by accidental contact therewith.

Although the cutting device of this invention has been illustrated and described herein to a somewhat detailed extent, it will be understood, of course, that the invention is not to be regarded as being limited correspondingly in scope but includes all changes and modifications coming within the terms of the claims thereof.

Having described my invention, I claim:

1. In apparatus comprising a rotatable cutter blade for cutting a relatively thin section from a work body on a workholder means by relative traversing movement between the blade and workholder means while the blade is in cutting engagement with said body; support means for said blade comprising ring means having an annular groove therein; means connected with said ring means and providing a gear chamber at one point of the circumference thereof; said blade comprising a one-piece ring member of frusto-conical shape on the inside thereof and having an annular base portion at the large-diameter end of the frusto-conical shape and provided with gear teeth, and an annular cutting edge at the small-diameter end of the frusto-conical shape; said base portion being circumferentially slidably movable in said groove; and rotatably driven gear means in said gear chamber and engaged with said gear teeth for rotating said blade; said ring means and said blade having a common central opening for passage of the severed section therethrough and being disposed so as to extend around and lie wholly outside of said opening; said blade being annularly continuous around said opening and disposed with the small-diameter end thereof projecting from said ring means as a free end and said cutting edge comprising the innermost annular portion of said free end; said frusto-conical shape providing a substantially continuous taper around the inside of and along said blade and extending in a converging relation toward said free end.

2. Apparatus as defined in claim **1** wherein said ring means and blade are in a series relation along the axis of said common opening; said ring means being frusto-conical in shape on the inside thereof for providing a taper thereon which is substantially a continuation of the taper of the blade in a direction along said axis and away from said cutting edge; the tapers on the inside of said blade and on the inside of said ring means being disposed so that said common opening increases progres-

sively in size in the direction of the passage of the severed section therethrough.

3. Cutting apparatus as defined in claim 2 wherein said blade is also frusto-conical on the outside thereof so as to be relatively thin and have a substantially continuous convergent outer taper extending around and therealong toward said cutting edge.

4. Cutting apparatus as defined in claim 2 wherein the convergent axial taper on the inside of the blade is substantially a 45° taper.

5. In a cutting tool adapted to be manually held and manipulated for cutting a strip-like section or slice from a work body by drawing the tool thereacross; annular support means lying substantially in a flat plane and having hollow handle means rigid therewith and projecting substantially radially therefrom; an annular cutting blade mounted on said support means for rotation in the direction of its own circumference; driving means extending within said handle means and operably engaged with said blade for imparting rotation thereto; said support means and blade extending in a continuous relation around, and lying outside of, a common axial opening through which the severed section passes during the cutting thereof from said body; said blade having a free end portion of hollow frusto-conical tapered shape projecting from said support means in a convergent relation along the axis of said common opening and terminating in a radially inwardly presented annular cutting edge; said blade having the taper of said frusto-conical shape as a continuous convergent taper extending around the inside of and along said projecting end portion substantially to said cutting edge; said cutting edge being effective during the rotation of said blade and the manual drawing movement of said support means substantially in said plane across said body to sever said section therefrom; said handle means comprising a curved sector portion having a recess extending therealong on the concave side thereof, and said support means comprising a ring member having a segment thereof received in said recess; and holding means connected with said sector portion and engaging said segment to retain the latter in said recess for connecting said support means with said handle means.

6. A cutting tool comprising ring-shaped support means having an annular groove; handle means rigid with said support means and adapted to be manually grasped for holding and manipulating the tool; a rotatable annular blade of tapered frusto-conical shape having an annular base portion at the large diameter end thereof and provided with gear teeth, and an annular cutting edge at the small-diameter end thereof; said base portion being circumferentially slidably movable in said groove; and rotatable driving means supported by said handle means including a gear meshed with said gear teeth for imparting rotation to said blade; said support means and blade having a common central opening for passage of severed material therethrough and being substantially annularly coextensive so as to extend around and lie wholly outside of said common opening; said blade being disposed with said small-diameter end thereof projecting from said support means and having the taper of said frusto-conical shape as a continuous taper extending axially along and around the inside of said blade and converging toward said cutting edge; said common opening being substantially greater in diameter than the combined axial length of said support means and blade; said cutting edge comprising the intermost annular portion of said small-diameter end whereby said blade is effective to cut a section from a body of material in response to rotation of the blade and simultaneous translatory movement imparted thereto by manual movement of said support means substantially in its own plane and across said body in a substantially parallel relation to the portion of said body from which said section is being cut.

7. A cutting tool as defined in claim 6 wherein the axial taper on the inside of said blade is substantially a 45° taper.

8. A cutting tool as defined in claim 6 wherein said blade has an annular shoulder extending therearound on the outside thereof; and wherein retainer means at least partially coextensive with said ring means and connected therewith engages said shoulder for retaining said base portion in said groove.

9. A cutting tool as defined in claim 8 wherein said retainer means comprises a flexible sector member having a portion thereof springable away from said support means to permit disengagement and removal of said blade therefrom.

10. A cutting tool as defined in claim 6 wherein said annular base has tooth spaces extending thereacross between said gear teeth; said tooth spaces being in communication with said common opening to facilitate clearing movement of particles of said material out of said tooth spaces.

11. A cutting tool comprising ring-shaped support means having an annular groove; handle means rigid with said support means and adapted to be manually grasped for holding and manipulating the tool; a rotatable annular blade of tapered frusto-conical shape having an annular base portion at the large-diameter end thereof and provided with gear teeth, and an annular cutting edge at the small-diameter end thereof; said base portion being circumferentially slidably movable in said groove; rotatable driving means supported by said handle means including a gear meshed with said gear teeth for imparting rotation to said blade; said support means and blade having a common central opening for passage of severed material therethrough and being substantially annularly coextensive so as to extend around and lie wholly outside of said common opening; said blade being disposed with said small-diameter end thereof projecting from said support means and having the taper of said frusto-conical shape as a continuous convergent taper extending axially along and around the inside of said blade and terminating at said cutting edge; said cutting edge being on the innermost annular portion of said small-diameter end whereby said blade is effective to cut a section from a body of material in response to rotation of the blade and simultaneous translatory movement imparted thereto by manual movement of said support means substantially in its own plane and across said body in a substantially parallel relation to the portion of said body from which said section is being cut; said blade having an annular shoulder extending therearound on the outside thereof; and retaining means comprising a sector member at least partially coextensive with said support means and engaging said shoulder for retaining said base portion in said groove; said member having a first portion secured on said support means and a flexible second portion springable away from said support means to permit disengagement and removal of said blade therefrom.

12. A cutting tool as defined in claim 11 wherein said support means has adjustable stop means thereon engageable by said first portion of said sector member for preventing binding thereof against said blade.

13. A cutting tool as defined in claim 11 wherein the portion of said small-diameter end immediately adjacent said cutting edge is annularly concave therearound on the inside thereof.

14. A cutting tool for cutting slices from a meat product by drawing the tool thereacross comprising a ring-shaped support means having an annular groove; handle means extending substantially radially therefrom and rigid with said support means and adapted to be manually grasped for holding and manipulating the tool; a rotatable annular blade having an annular base portion at one end thereof provided with gear teeth, and an inwardly facing annular cutting edge at the other end thereof and lying in a plane parallel to and appreciably spaced from the plane of the adjacent face of said ring-shape support means, the

diameter of said cutting edge being substantially less than the inside diameter of said base portion of said blade, the annular portion immediately adjacent to said cutting edge sloping radially outwardly and towards said annular base portion; said base portion being circumferentially slidably movable in said groove; and rotatable driving means supported by said handle means including a gear meshed with said gear teeth for imparting rotation to said blade; said support means and blade having a common central opening for passage of severed slices therethrough and being substantially annularly coextensive so as to extend around and lie wholly outside of said common opening; said blade being disposed with the cutting end thereof projecting from said support means and said common opening being substantially greater in diameter than the combined axial length of said support means and blade; said cutting edge comprising the innermost annular portion of said other end of said blade whereby said blade is effective to cut a slice from a meat product in response to rotation of the blade and simultaneous translatory movement thereof imparted thereto by manual movement of said support means substantially in its own plane and across said meat product in a substantially parallel relation to the portion of said meat product from which said slice is being cut.

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