

March 7, 1967

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3,307,259

POWER OPERATED KNIFE

Filed June 22, 1964

4 Sheets-Sheet 1

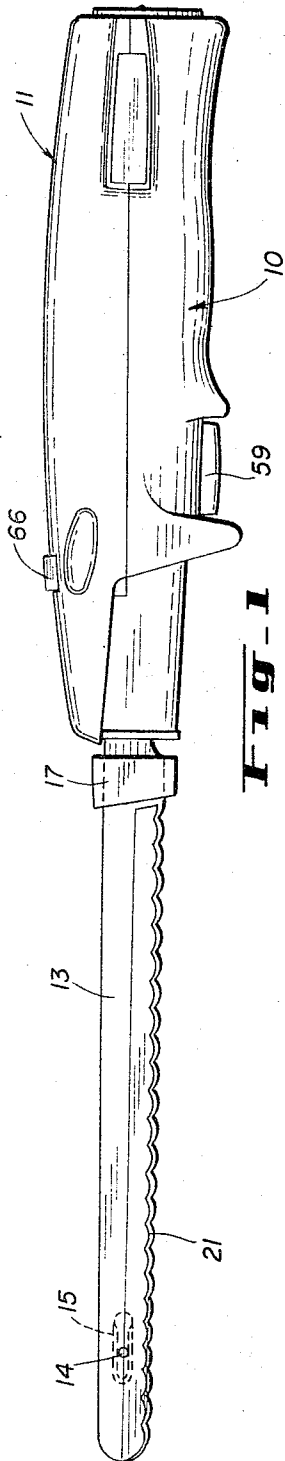


Fig. 1

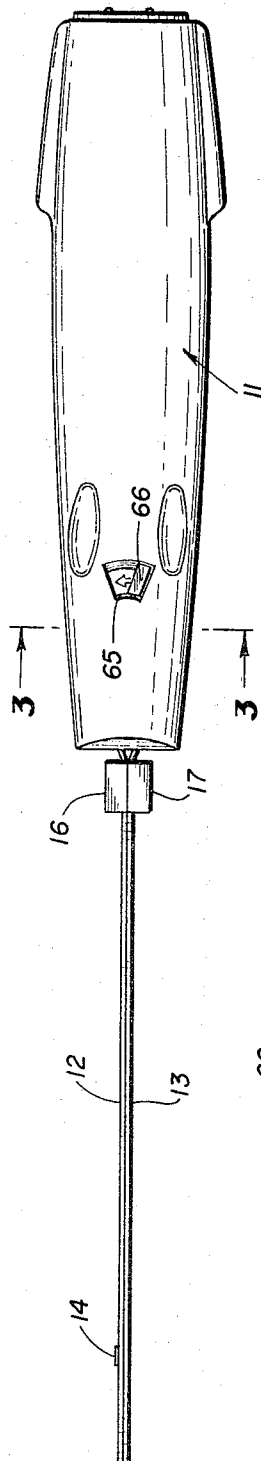


Fig. 2

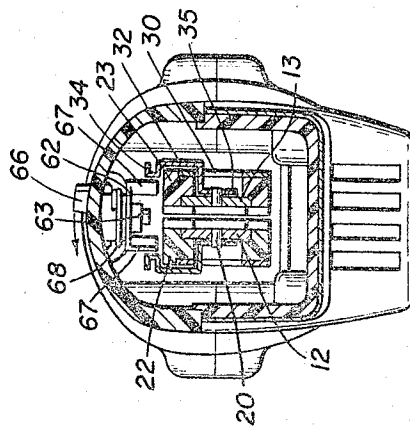


Fig. 3

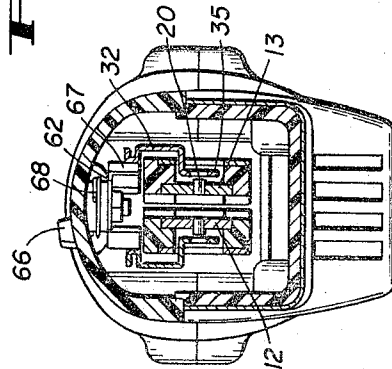


Fig. 4

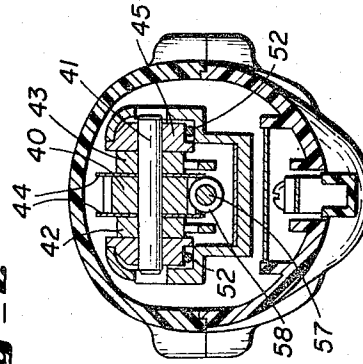


Fig. 5

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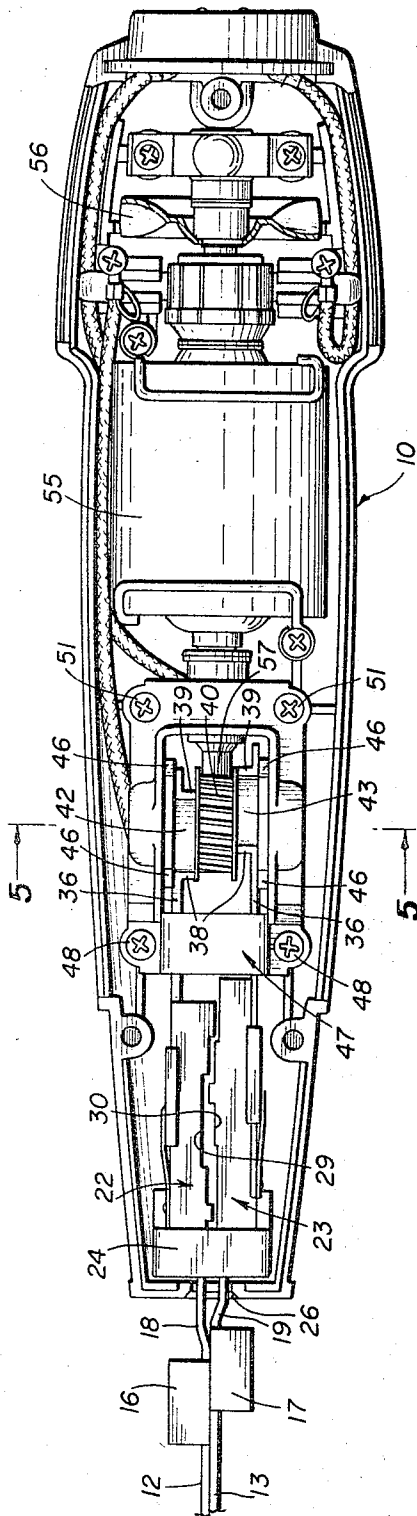


Fig. 6

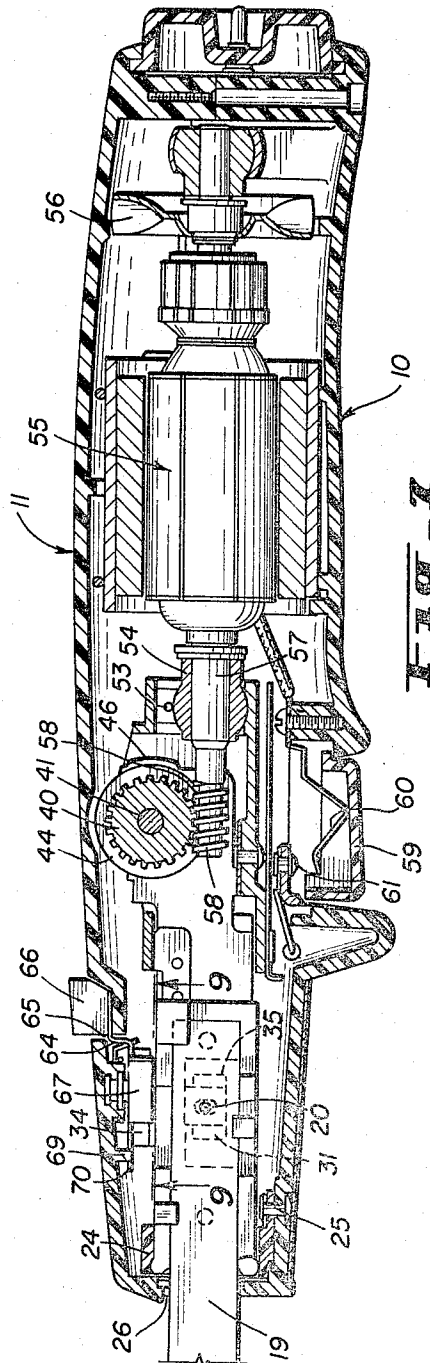


Fig. 7

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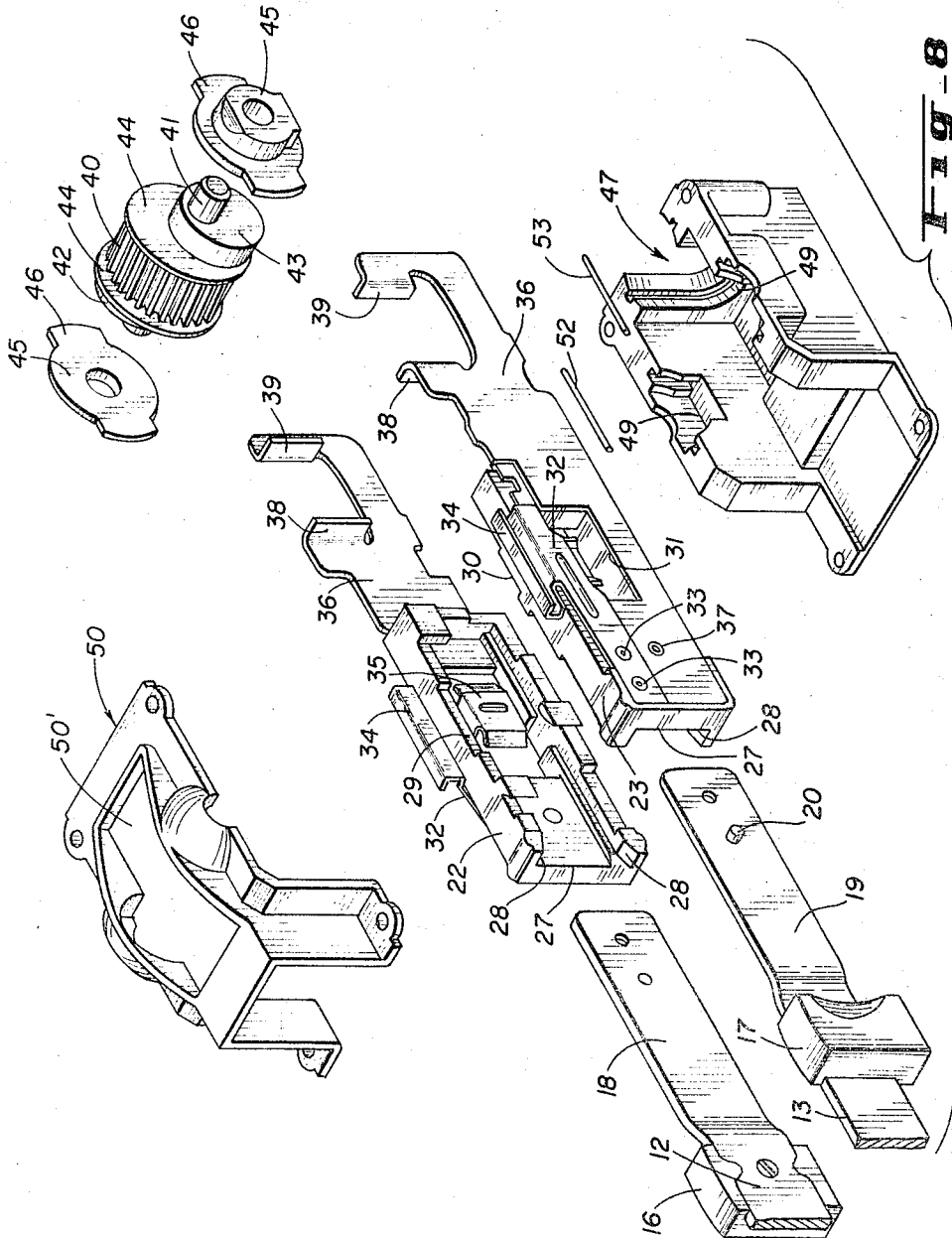
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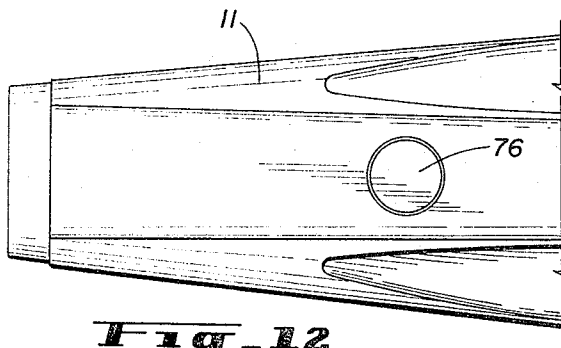
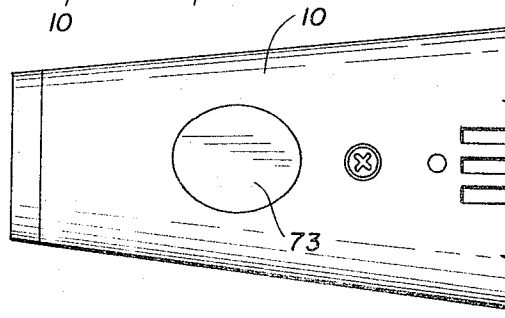
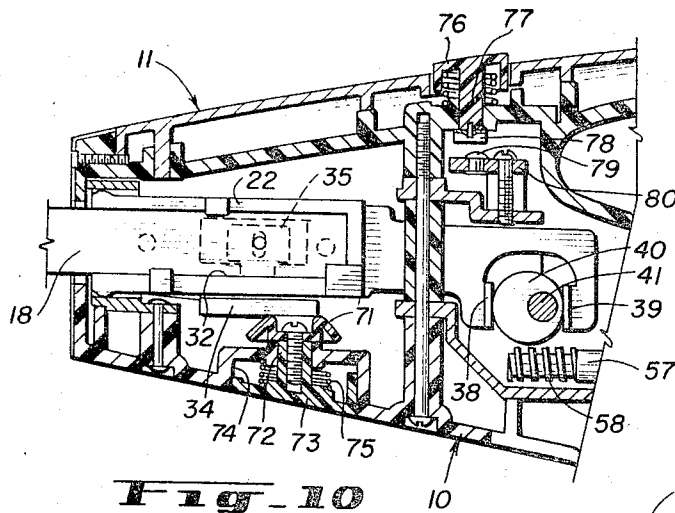
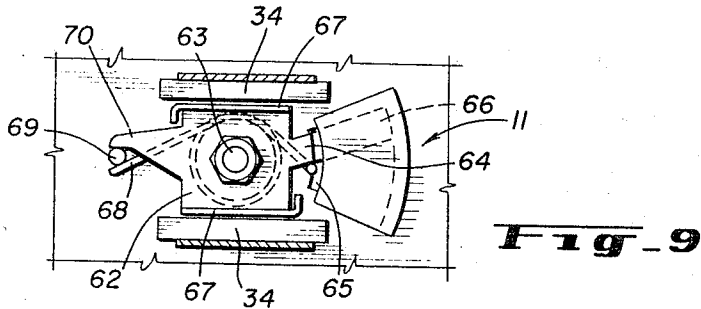
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4 Sheets-Sheet 4



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POWER OPERATED KNIFE

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7 Claims. (Cl. 30-272)

This invention relates to power operated knives, particularly knives provided with reciprocated blades for slicing meat and other foods.

One of the objects of the invention is to provide means for efficiently mounting the knife blades in a housing which encloses the motor and drive mechanism and also serves as a handle; and to provide means for releasing the blades for removal from the housing without manipulation of any exposed blade retaining means. The blade retaining means of prior art constructions are resilient latches connected to the blade tangs externally of the knife housing. They are objectionable because, in order to release the blades and permit their removal from the rest of the knife structure, the user is required manually to compress the spring latches which have been in contact with the meat or other food being sliced when the knife is in use.

Another object of the invention is to provide blade releasing means operable by a knob or button accessible externally of the housing but not in contact with the knife blades.

Another object of the invention is to provide efficient blade carriers and retainers located entirely within the knife housing. The carriers and retainers of my construction are designed so that they may be mounted in the housing in either of two positions, thereby permitting the blade releasing knob or button to be located on either the upper or lower housing surface.

Another object of the invention is to provide improved mechanism for transmitting reciprocatory motion to the knife blades, including an eccentric unit which is loosely mounted in a gear box for push and pull action relatively to a pair of driver bars and blade carriers connected to the driver bars. Another feature of the invention is the means for mounting said carriers and driver bars in the housing for free reciprocatory motion relatively to each other.

The blades which are part of the improved knife of this invention are provided with scallop form cutting edges which are very efficient and not likely to become injured when a bone or hard substance is encountered.

Other objects and advantages of the invention will be apparent from the drawings and the following specification.

In the drawings:

FIG. 1 is an elevational side view of a power operated knife embodying my invention.

FIG. 2 is a top plan view thereof.

FIG. 3 is a transverse vertical sectional view in the plane of the line 3-3 of FIG. 2, showing the blade release means and the blade retainers in their blade retaining positions.

FIG. 4 is a view similar to FIG. 3 but showing the blade release means and the blade retainers in blade releasing positions.

FIG. 5 is a transverse vertical sectional view in the plane of the line 5-5 of FIG. 6.

FIG. 6 is a top plan view of the lower housing and the mechanism carried thereby, showing the knife blades broken away.

FIG. 7 is a longitudinal vertical sectional view of the knife including both upper and lower housing members and the mechanism mounted therein, with the knife blades broken away.

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FIG. 8 is an exploded perspective view of the blade tangs, blade carriers with attached blade retainers, and the driver members, eccentric unit and its bearings, gear box and gear box cover.

FIG. 9 is a bottom view of the blade release means, the view being taken in the plane of the line 9-9 of FIG. 7.

FIG. 10 is a longitudinal vertical sectional view of part of the knife, showing a modified construction of switch actuator and blade release means and parts associated therewith.

FIG. 11 is a bottom view of part of the housing modified to accommodate the form of construction shown in FIG. 10.

FIG. 12 is a top plan view of the housing of FIG. 11. In that embodiment of the invention shown in FIGS. 1-9 of the drawings, 10 designates the lower housing as a whole, 11 the upper housing as a whole, and 12, 13, a pair of blades held in side surface contact with each other by a rivet 14 fixedly mounted on blade 13 and extending into a keyhole slot 15 in blade 12, the slot being of sufficient length to permit reciprocating longitudinal movement of the blades relatively to each other. The blade 12 has attached to its outer surface a grease guard 16 and the blade 13 has a similar grease guard 17, adjacent the blade tangs 18, 19, respectively. The tangs are provided with nibs 20 on their outer side surfaces and are spaced apart as best shown in FIG. 6. The cutting edges 21 of the blades are scallop form and less likely than sharp tooth shaped edges to become injured or broken when the blades encounter a bone or other hard substance.

A blade carrier consists of two box-like members 22, 23, each having one open side facing the other, loosely mounted in the lower housing 10 for reciprocable movement relatively to each other. When assembled adjacent each other, their forward ends are surrounded by a front guide 24 fixed to the lower housing by rivet 25. A rectangular opening 26 in the forward end wall of the housing 10 registers with the space between the forward end walls 27 of the carrier members 22, 23, for passage of the blade tangs 18, 19, into the carrier. The floor and ceiling 28 of the carrier members are inclined at their forward ends to facilitate entry of the tangs into the carrier interior. The facing edges 29, 30 of the carrier members 22, 23, respectively, as shown in FIG. 6, are partially complementary to each other to permit reciprocating movement between the carrier members.

Each carrier member 22, 23 is provided with a rectangular opening 31 in its outer side wall for the purpose of receiving therein part of a blade retainer 32. Each blade retainer 32 consists of a spring metal plate having its flat forward end riveted at 33 (FIG. 8) to one of the blade carriers 22, 23. Each retainer 32 is provided with an extension 34 which extends upwardly and inwardly over the top of the carrier members 22, 23, said extensions being spaced apart from each other a predetermined distance for operation by blade release means to be described hereinafter. Each retainer 32 is also provided with an inwardly bent and downwardly extending tongue 35 located in the opening 31 of a carrier member, apertured to receive the nib 20 of one of the blade tangs 18 and 19. The spring metal retainers 32 are biased so that the apertured tongues 35 bear inwardly toward each other and the nibs 20 of the blade tangs 18, 19, snap into the apertures of the tongues 35 of the retainers and thus are held in the carrier members 22, 23, as shown in FIG. 3.

Each one of a pair of relatively thin single sheet driver bars 36 has a flat forward end adapted to contact the outer side wall of a carrier member 22, 23, and is fastened thereto by a rivet 37. The driver bars 36 are cut away to accommodate the blade retainers 32 attached to the carrier members above the driver bars. The rearward ends of

the driver bars are cut away and bent to form inwardly directed laterally extending flanges 38, 39, spaced apart from each other to bear against opposite peripheral surfaces of the cam members of an eccentric unit about to be described.

As shown in FIGS. 6 and 8, the eccentric unit comprises a worm gear 40, fixed on shaft 41, cam members 42, 43, eccentrically fixed on the shaft 41 to have their working surfaces spaced 180° apart. The worm gear and cam members rotate with the shaft, the cam members being spaced from the gear 40 by washers 44. The ends of the shaft 41 are mounted in bearing members 45 provided with ears 46, shaped to fit into a gear box designated 47 as a whole.

The gear box 47 is fixedly mounted in the lower housing by screws 48. The side walls of the box are provided with recesses 49 open at their tops and inner sides and shaped to receive the eccentric unit shaft bearing 45 in such position that the bearing ears 46 bear against the inner surfaces of the gear box side walls. When the eccentric unit is assembled in the box 47, the cam members 42, 43, are located between and bear on the facing surfaces of the flanges 38, 39 of the driver bars 36, as shown in FIG. 6.

The gear box cover 50 has a central top opening 50' and is shaped to rest on the gear box 47 and bearings 45 of the eccentric unit. It is fastened in place by the screws 48 which also connect the box 47 to the lower housing 10, and by screws 51 which extend through the rearward end of the cover into the gear box 47. A length of spring wire 52 is inserted between the eccentric shaft bearing and the box 47, and a wire spring 53 rests on the motor shaft bearing 54.

The motor 55, fan 56 and motor shaft 57 need not be described in detail. The shaft 57 has a worm 58 on its free forward end in mesh with the worm gear 40 of the eccentric unit. The operation of the motor is controlled by a switch button 59 which when depressed actuates the switch spring 60 to make contact with the point 61 connected in circuit with the motor.

The blades are retained in the carriers 22, 23, by engagement between the nibs 20 and apertured tongues 35 of the retainers 32, as described. To release the blade tangs from the retainers, a cam plate 62 is pivotally mounted on a pin 63 in the upper housing 11. The cam 62 has an arm 64 which extends upwardly through an arcuately curved slot 65 in the housing 11 and is connected to a knob 66 movable in a recess in the upper housing. The cam is provided with downwardly extending parallel side flanges 67 adapted to fit between the extensions 34 of the retainers 32. A wire spring 68 biases the cam 62 in normal position so that the flanges 67 are parallel with the extension members 34 on the blade retainers 32. When the knob 66 is moved manually from the position shown in FIG. 3 to that of FIG. 4, the arm 64 slides in the curved slot 65 and causes the cam 62 to move about its pivot 63 so that the flanges 67 move out of parallel position relatively to the extensions 34, and by contacting the inner surfaces of the extensions 34, the cam flanges 67 cause the extensions to separate from each other and the retainer plates 32 to move outwardly. This movement of the retainers 32 causes the tongues 35 to move outwardly away from each other and thus release the nibs 20 on the blade tangs from the apertures in the tongues 35 so that the blades 18, 19 can be withdrawn by a simple longitudinal movement of the blades.

Operation.—The tangs 18, 19, of the blades 12, 13, are inserted into the knife housing through the opening 26 in the forward end of the housing, and into the space between the carriers 22, 23, defined by the opening 27 and inclined surfaces of the forward ends of the floor and ceiling 28 of the carriers. The nibs 20 on the knife tangs snap into the apertured tongues 35 of the retainer plates 32 to firmly hold the blades in intended positions where they remain until released by manipulation of the knob 66.

When the switch button 59 is depressed, the motor is energized and rotation of the motor shaft 57 and worm 58 rotates the worm gear 40, shaft 41 and cams 42, 43. The cams 42, 43, through their engagement with the flanges 38, 39 on the driver bars 36, transmit reciprocatory movement relatively to each other to the driver bars and carriers 22, 23, and the blades mounted therein. The eccentric unit 40-44 is not connected to the driver bars but is held in intended position within the gear box 47.

The carrier 22, attached to one of the retainers 32 and drivers 36, comprises one reciprocable driving unit, while the carrier 23, attached to the other one of the retainers 32 and drivers 36, comprises the other reciprocable driving unit. Both units are loosely mounted but guided for movement in the housing by the front guide 24 and the gear box 47. Due to the location of the cams 42, 43, between the flanges 38, 39 of the drivers 36, one cam pushes the flange 38 of one of the drivers 36 in a forward direction while the other cam pushes the flange 39 of the other driver 36 in a rearward direction, as shown in FIG. 6. Thus reciprocatory motion is imparted in opposite directions to the blades 12, 13, without any strain on the driving means located between the blades and the eccentric unit driven by the motor.

In the modification shown in FIGS. 10-12, the blade carriers 22, 23, the blade retainers 32 and driver bars 36 are constructed as heretofore described, but they are mounted so that the upper sides of the said parts (as shown in FIGS. 3-8) are downturned, and the lower sides of said parts constitute the top thereof in FIGS. 10-12. Thus the extensions 34 of the blade retainers are downturned and spaced apart to receive between them the wedge-shaped head 71 on the shank 72 of a blade release button 73. The button and shank are located in a recess 74 in the bottom of the housing 10, and a coiled spring 75 bears on the upper wall of the recess and on the inner surface of the button 73 to maintain the button in the position shown in FIG. 10 except when depressed for the purpose of releasing the nibs 20 from engagement with the apertured tongues 35 of the blade retainers 32.

A modified form of switch actuator is located in the upper housing 11, and in this embodiment comprises a button 76 having a shank 77, contact plate 78 on the lower end of the shank 77, for contacting the switch point 79 mounted on support 80. The contact point 79 is electrically connected in the motor circuit (not shown).

In describing the invention, reference has been made to particular examples embodying the same, but I wish it to be understood that the invention is not limited to the construction shown in the drawing and that various changes may be made in the construction and general arrangement of parts without departing from the invention.

I claim:

1. A power operated slicing knife comprising
 - (a) a housing,
 - (b) a pair of blades having tangs removably mounted in the housing,
 - (c) blade reciprocating means in the housing adapted to be connected to a source of power,
 - (c-1) said means including blade carriers and blade retainers attached to the carriers,
 - (d) means on the blade tangs engaged by the retainers, and
 - (e) manually operable blade releasing means mounted on the housing provided with an actuator within the housing located to bear simultaneously on the proximate faces of the retainers to move the retainers away from each other and out of tang engaging positions.

2. The power operated slicing knife defined by claim 1, in which the blade carriers have side walls provided with an opening, and the blade retainers are spring metal plates each attached to a carrier, said retainers having

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extensions extending beyond the carriers for contact with the blade releasing means, and said retainers having tongues extending into said carrier side wall openings for engagement with the blade tangs.

3. The power operated slicing knife defined by claim 1, in which the blade tangs have nibs protruding from their outer side surfaces, and the retainers are spring metal plates attached to the carriers and provided with apertures adapted releasably to receive said nibs.

4. The power operated slicing knife defined by claim 1, wherein the manually operable blade releasing means comprises a pivotally mounted cam plate adapted to engage the retainers and move them away from each other, the housing having a slot therein, an arm on the plate extending through said slot, and a knob accessible externally of the housing for moving said arm in said slot and pivotally moving the cam plate.

5. The power operated slicing knife defined by claim 1, wherein the manually operable blade releasing means comprises a depressible button having a shank mounted in the housing, and a wedge-like head on the shank adapted to engage the retainers and move them away from each other when the button is depressed.

6. The power operated slicing knife defined by claim 1, wherein the blade carriers have side walls provided with an opening, the blade retainers are spring metal plates having extensions extending beyond the carriers for contact with the blade releasing means, said retainers having tongues extending into said carrier side wall openings for engagement with the blade tangs, and the manu-

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ally operable blade releasing means comprises a pivotally mounted cam plate adapted to engage the retainers and move them away from each other, the housing having a slot therein, an arm on the plate extending through said slot, and a knob accessible externally of the housing for moving said arm in said slot and pivotally moving the cam plate.

7. The power operated slicing knife defined by claim 1, wherein the blade carriers have side walls provided with an opening, the blade retainers are spring metal plates having extensions extending beyond the carriers for contact with the blade releasing means, said retainers having tongues extending into said carrier side wall openings for engagement with the blade tangs, and the manually operable blade releasing means comprises a depressible button having a shank mounted in the housing, and a wedge-like head on the shank adapted to engage the retainers and move them away from each other when the button is depressed.

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