The back of the reciprocating blade of a motor-driven knife is supported for sliding movement near its ends by two wear-resistant abutments, and has a central cutout in which a wear-resistant guide means is located in sliding engagement with a longitudinal guide edge of the cutout. By transverse adjustment of the guide means, play-free guidance of the blade is obtained.

21 Claims, 14 Drawing Figures
MOTOR-DRIVEN CUTTING DEVICE

BACKGROUND OF THE INVENTION

Cutting devices are known, particularly for skinning and dividing of the carcasses of butchered animals, which have a motor-driven reciprocating blade whose back slides along a guide face of a support, and which has a cutout engaged by a guide means.

In a cutting device according to the prior art, two blades are supported along the entire length of their backs on a carrier, and are additionally guided by guide pins passing through slots in the blades. When the guide pins are worn off along small engagement faces, there is no possibility of eliminating the play by an adjustment, so that the movable blade vibrates during the operation, and it is not possible to obtain a clean cut.

It is one object of the invention to overcome this disadvantage of the prior art, and to provide a motor-driven cutting device whose movable blade reciprocates without vibrations, and in which the play due to wear of guide parts can be eliminated by adjustments.

Another object of the invention is to provide a cutting device whose blades have no relative play, and which are easily exchangeable.

Another object of the invention is to provide guidance of the movable blade on two spaced parts of its back.

Another object of the invention is to provide adjustable guide means for the movable blade by which wear of the parts can be compensated.

SUMMARY OF THE INVENTION

With these objects in view, one embodiment of the invention comprises a movable blade mounted on a carrier means, and having a cutting edge, a back partly slingly engaging abutment means of the carrier means, and having a free portion spaced from the carrier means, and an elongated cutout having a guide edge in the region of the free portion of the back extending in the longitudinal direction of the blade; guide means including an adjusting part, and a guide part located in the cutout; and adjusting means engaging the adjusting part for securing the guide means to the carrier means adaptably in a direction transverse to the back in a position in which the guide part slingly engages the guide edge and the back partly slingly engages the abutment means. In this manner, the blade is guided for reciprocatory movement so that the position of the blade can be transversely adjusted for eliminating transverse play due to frictional wear.

In the preferred embodiment of the invention, wear-resistant abutment members slingly engage parts of the back of the movable knife located near the forward and rear ends of the same. A free portion of the back extends between the wear-resistant abutment members, and is not engaged by the carrier means. The cutout and the guide means in the same area are located in the region of the free portion of the back so that transverse movement of the blade is bounded in one direction by the guide means, and in another direction by the abutment means. If any wear occurs, the adjusting means can be operated to eliminate the play. The guide edge of the cutout is preferably parallel to the back of the movable blade.

The adjusting means preferably include an eccentric member or cam which is mounted for turning movement in the carrier means, and engages a corresponding opening in the adjusting part of the guide means so that by turning of the eccentric member, the position of the guide part in the cutout is transversely adjusted. Before this operation, screws securing the adjusting part to the carrier means are loosened, and when the guide means is properly adjusted, the screws are tightened again to secure the guide means in the adjusted position.

In addition to the movable reciprocating blade which is driven by a motor shaft in the handle of the device, a fixed blade is provided which is interchangeably mounted on the carrier means. The carrier means and other parts of the housing of the device, consist of several parts permitting the exchange of at least one blade after removal of the cover or closure.

A particularly good cut is obtained, without special grinding of the cutting edge, if a spring is provided for urging the blades into engagement with each other, particularly in the region of the respective cutting edges. Another spring is advantageously provided between the blade in the region of the back of the same, and urges the movable blade to sliding engagement with a lateral low-friction slide member in the carrier means. The slide member or members may consist of any material having a low friction coefficient, and for example of polytetrafluorethylene. It is advantageous to mount corrugated springs in corresponding recesses in the blades or carrier means, respectively.

To reduce the weight of the device, it is advantageous to make the fixed blade narrower than the movable blade, and to provide the latter with openings therethrough.

It is advantageous to provide a smooth sharp cutting edge at the forward ends of the blades, so that the forward end can pierce the meat without tearing the same. The main part of the blade is advantageously provided with a toothed cutting edge.

The movable blade is advantageously driven by a lever member which is pivotally mounted on supporting means of the carrier means and is angularly reciprocated by a wobble ring driven from a drive shaft. The blade and the pivotally mounted lever member are connected by a link which is detachable when two parts which hold the carrier means are separated by loosening of a connecting screw.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view illustrating one embodiment of the invention without a cover of the carrier means, and being partially in section;

FIGS. 2, 3 and 4 are sectional views taken on lines II, III AND IV in the direction of the arrows in FIG. 1;

FIGS. 5 and 6 are cross-sectional views taken on lines V and VI in the direction of the arrows in FIG. 1;

FIG. 7 is a plan view illustrating a fixed blade of another embodiment of the invention;

FIGS. 8 and 9 are cross-sectional views taken on lines VIII AND IX in FIG. 7 in the direction of the arrows;

FIG. 10 is a plan view illustrating a cover forming part of the carrier means of the embodiment of FIGS. 6 to 9;

FIG. 11 is a cross-sectional view taken along line XI—XI in FIG. 10 in the direction of the arrows; and

FIGS. 12 to 14 are cross-sectional views of the embodiment of FIGS. 7 to 11, taken on lines corresponding to the section lines II, III, and IV in the embodiment of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 1 to 6, carrier means include carrier 2 on which a fixed blade 17 is mounted. A cover 3 is secured to carrier 2 by screws 33 and is spaced from the common surface of carrier 2 and fixed blade 17 so that a movable blade 21 can be mounted between the same, as best seen in FIG. 2. As shown in FIG. 3, the fixed blade 17 has a narrower portion due to recess shown in broken lines in FIG. 1. The carrier 2 is extended into holding means including the opening 5, as best seen in FIG. 5. The holding means 4, 5 are connected with a handle 6, as best seen in FIG. 1. A driven motor shaft, which may be rotated by a pneumatic motor, is located in the handle 6 and supported for rotation about an axis by a ball bearing. An eccentric member 8 includes a nut portion 8b having an inner thread connected with the end of shaft 7, a connecting portion 8a, and a pivot 8c having an axis 9 slanted to the axis of shaft 7. Ball bearing means 10 are mounted on the eccentric pivot 8a, and are surrounded by a
A wobble ring 12 whose end face 12a slidingly engages a surface of a lever member 13 which is mounted for angular movement on a shaft 14 between a pair of guide plates 15 which are respectively supported in holder 4 and closure 5, as best seen in FIG. 6. Eccentric pivot 8c and lever member 13 are arranged so that the extended axis of shaft 7 and the axis 9 of eccentric pivot 8c intersect at a point located in the plane of engagement between lever member 13 and end face 12 of wobble ring 11. Wobble ring 11 touches the face of lever member 13 only with two diametrical portions of end face 12 so that during tilting of wobble ring 11 about an axis parallel to the axis of lever member 13 the lever member 13 is angularly displaced about shaft 14. The extended axis of shaft 7 intersects with the axis 9 of shaft 14 at right angles. A link 36 has openings engaged by pins 37, one pin 37 being mounted on lever member 13, and the other on the rear end of the moveable blade 21. During rotation of shaft 7, movable blade 21 is reciprocated.

As shown in FIG. 2, the fixed blade 17 is secured by rivets 38 to the carrier 2. Two wear-resistant abutment members 19 and 18 are secured in recesses of carrier 2, abutment member 18 being also shown in FIG. 4 from which it is apparent that abutment member 18, as well as abutment member 19, respectively engage parts of the back of the moveable blade 21 respectively located at the forward and rear ends of the moveable blade 21. Between the ends of blade 21, an elongated cutout 22, best seen in FIG. 5, is provided which has a longitudinal guide edge 23 extending in the direction parallel to the back 20 of moveable blade 21. A guide means 26 includes a guide portion 26a located in cutout 22 in sliding engagement with the guide edge 23, and an adjusting part 26b having a circular bore in which a circular cam 24 is located. Cam 24 has a shaft portion 24a, as FIG. 3, mounted for rotation in carrier 2, and having a slot 24b which can be engaged by a screwdriver for adjusting the position of the cam 24 and thereby of the guide part 26a.

When the position of the guide part 26a is adjusted, as shown in FIG. 1, so that the front and rear ends of the back of the moveable blade 21 slidingly abut the wear-resistant abutments 18 and 19, screws 25 are tightened to secure the guide means 26 firmly and fixedly to carrier 2. Abutment members 19, which consist of wear-resistant, and preferably low-friction material, may be adhesively attached to carrier 2 in corresponding recesses.

In the adjusted position shown in FIG. 1, only two parts of the back of blade 21 are in sliding engagement with abutment members 18 and 19, and the part of the back between the same is free and spaced from the fixed carrier. The guidance in this free part is obtained by guide member 26a sliding on guide edge 23 when the movable blade 21 is reciprocated. By adjustment of cam 24, the blade 21 is moved transversely until the back thereof engages the abutment members 18 and 19 with the desired pressure, and if due to wear of the parts, for example of the metal part of blade 21, play develops between guide part 26a and guide edge 23, the position of guide means 26 is adjusted until a play-free guidance of the moveable knife 21 on members 18, 19 and 26a is obtained.

The longitudinal cutting edges of blades 17 and 21 have ground teeth 27, while the forward portions of the cutting edges are smooth continuous sharpened cutting edges which may be made wavy or scalloped, if desired. During operation by motor shaft 7, the cutting edge 28 of blade 21 moves parallel to the back 20 so that the forward ends of the blades can be pressed into the meat, piercing the same until the toothed cutting edge portions 27 become effective. Openings and cutouts 29 are provided in blade 21 near the handle 28, to reduce the weight of the blade. As shown in FIGS. 1 and 4, recesses are provided in carrier 2 confronting the moveable blade 21, and slide members 30, see also FIG. 4, are mounted in the recesses engaging a lateral face of the moveable blade 21. Slide members 30 preferably consist of polytetrafluorethylene which has a low friction coefficient. Cover 3, which forms part of the carrier means 2, 33, 3, is also provided with at least one recess in which a corrugated spring 31 is mounted for urging blade 21 toward the fixed blade 17 as best seen in FIG. 4. The rear end of carrier 2 is mounted between a holder 4, and a closure 5. A fitting pin engages corresponding bores in holder 4 and carrier 2. Screws 33 pass through carrier 2, and cover 3, as shown in FIG. 2, and through closure 5, carrier 2, and holder 4 in the forward region of holding means 4, 5, as shown in FIG. 1. As shown in FIG. 5, an attaching screw 34 passing through closure 5, a slot 35 in blade 21, carrier 2 and holder 4, holds these parts together, but permits the reciprocating motion of blade 21 due to the elongated slot 35. Blade 21 has a narrow extension 26 connected by link 36 with the movable slide member 13.

The embodiment illustrated in FIGS. 7 to 14 includes a moveable blade 21, see FIG. 7, and the cover 3 of the carrier means 2, 3, of which cover 3 is shown in FIG. 10. As shown in FIG. 12, carrier 2 has openings 39 in which attaching bolts 40 are secured whose heads project into openings 41 in blade 17, so that the same cannot perform a reciprocating movement, but can be removed from bolts 40 when cover 3 is separated from carrier 2 by opening of screws 33. When the device is assembled, blade 21 is simply placed on the heads of bolts 40, and cover 3 is secured to carrier 2. The openings 41 are also shown in FIG. 9.

Near the back 42 of the blade 17, two recesses 45 are provided, as best seen in FIGS. 7, 8 and 12. A corrugated spring 46 is placed in every recess 45 which engages blade 21 in the region of cover 3 and presses the same against the inner surface of cover 3, and more particularly against wear-resistant abutment members 49 provided in corresponding recesses 48. The wear-resistant abutment members 49 preferably consist of hard metal sintered to cover 3.

As in the embodiment of FIGS. 1 to 6, recesses 50 are provided in the inner surface of cover 3 in which corrugated springs 31 are mounted which urge the part of blade 21 near the cutting edge 51 toward the carrier 2, and particularly the part of fixed blade 17 so that particularly the cutting edges 51 and 52 tightly engage each other so that a very good cut is obtained even if the cutting edges are not hollow ground. The spring 46, acting in the back region of blade 21, obtains the same effect. FIG. 13 clearly shows a screw 25 cooperating with the guide means 26 in the manner described in detail with reference to FIG. 1. The guide portion 26a is located in the recess 22 of the moveable blade 21. As also shown in FIG. 7, blade 17 has a corresponding recessed portion 22a.

FIG. 14 shows the wear-resistant abutment 18 slidingly abutting the back 20 of the moveable blade 21, as described with reference to FIG. 4.

It will be understood that the embodiment of FIGS. 7 to 14 is substantially constructed as the embodiment of FIGS. 1 to 6, the main difference being the provision of the spring 46 in the fixed blade 17, and the wear-resistant abutment 49 in slots 48, as shown in FIGS. 12 and 10. FIG. 10 shows openings 52 through which screws 33, as FIG. 12 and FIG. 1, pass for securing cover 3 to carrier 2, the rearmost screw 33 in the last bore 52 serving for connecting holder 4 with closure 5, see FIG. 5. FIG. 10 also shows the recesses 50 on the inside thereof for mounting the springs 31.

Both embodiment of the invention can be used for a long period of time without substantial wear, and with a long span of life of the cutting edges. Gradually developing play can be eliminated by adjustment means 24, 25, and the quiet running of the device has the advantage of causing less fatigue of the operator.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of driven cutting devices differing from the types described above.

While the invention has been illustrated and described as embodied in a reciprocating blade guided at two parts of its back, and along a guide edge of a cutout by adjustable means, it is not intended to be limited to the details shown, since various modifications and structural changes may be made
without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed is and to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. Motor-driven cutting device comprising carrier means having abutment means; a movable blade mounted on said carrier means and having a cutting edge, a back partly slingly engaging said abutment means and having a free portion spaced from said carrier means, and an elongated cutout having a guide edge in the region of said free portion of said back extending in the longitudinal direction of said blade; guide means including an adjusting part, and a guide part located in said cutout; and adjusting means engaging said adjusting part for securing said guide means to said carrier means adjustably in a direction transverse to said back in a position which said guide part slingly engages said guide edge and said back partly slingly engages said abutment means for guiding said blade for reciprocatory movement so that the position of said blade can be transversely adjusted for eliminating transverse play due to frictional wear.

2. Cutting device as claimed in claim 1 wherein said abutment means includes at least one wear-resistant insert.

3. Cutting device as claimed in claim 1 wherein said movable blade has a forward end and a rear end; wherein said abutment means include two abutment members respectively located near said forward and rear ends, and slingly engaged by parts of said back, respectively; wherein said free portion of said back extends between said parts and said abutment members, and wherein said cutout and said guide means are located in the region of said free portion of said back.

4. Cutting device as claimed in claim 1 wherein said movable blade has a forward end and a rear end; wherein said abutment means include two wear-resistant abutment members respectively located near said forward and rear ends, and slingly engaged by parts of said back, respectively; wherein said free portion of said back extends between said parts and said wear-resistant abutment members, and wherein said cutout and said guide means are located in the region of said free portion of said back.

5. Cutting device as claimed in claim 1 wherein said guide edge of said cutout is parallel to said back of said blade.

6. Cutting device as claimed in claim 1 wherein said adjusting means include a turntable eccentric member engaging said adjusting portion for adjusting the position of said guide part, and screw means for clamping said adjusting portion to said carrier means in an adjusted position of said guide means.

7. Cutting device as claimed in claim 1 comprising another blade located laterally adjacent said movable blade; and attaching means secured to said carrier means for mounting said other blade nonmovably, but detachably from said carrier means for exchange and servicing.

8. Cutting device as claimed in claim 7 wherein said other blade has openings therethrough; and wherein said attaching means include bolts secured to said carrier means and having heads located in said openings.

9. Cutting device as claimed in claim 7 wherein said carrier means include a carrier to which said attaching means are secured so that said other blade is detachably secured to said carrier, a cover located adjacent said movable blade; and means for detachably securing said cover to said carrier so that upon removal of said cover, said other blade can be detached from said carrier.

10. Cutting device as claimed in claim 7 wherein said carrier means includes a carrier portion located adjacent said movable blade and having a face laterally adjacent the same formed with at least one recess in the region near said cutting edge; and a spring located in said recess for pressing said movable blade adjacent said cutting edge toward said other blade.

11. Cutting device as claimed in claim 1 wherein said other blade has another recess confronting the respective other blade in the region of said back of said movable blade; and another spring in said other recess for pressing the respective other blade in the region of said back of said movable blade against a surface portion of said carrier portion.

12. Cutting device as claimed in claim 11 wherein said other recess is formed in said blade which is attached to said carrier means; wherein said carrier portion has a lateral recess confronting said movable blade and includes a wear-resistant member in said lateral recess forming said surface portion and being slingly engaged by said movable blade due to the action of said other spring.

13. Cutting device as claimed in claim 1 wherein said carrier means include slide means consisting of a low-friction material located laterally of said movable blade near said back of the same and being slingly engaged by the same.

14. Cutting device as claimed in claim 13 wherein said slide means include two slide members located near the forward and rear end of said movable blade, respectively, and consisting of polytetrafluoroethylene.

15. Cutting device as claimed in claim 1 wherein said movable blade has openings therethrough for reducing the mass and weight of the same.

16. Cutting device as claimed in claim 1 wherein said cutting edge of said movable blade has a main portion formed with cutting teeth, and a forwardly located sharp continuous edge portion.

17. Cutting device as claimed in claim 1 comprising supporting means secured to said carrier means; a drive shaft located at one end of said supporting means and having a main axis of rotation; a lever member pivotally mounted on said supporting means for angular movement about a tilting axis perpendicular to said main axis; transmission means connecting said drive shaft with said lever member so that said lever member is angularly reciprocated about said tilting axis; and a link means connecting said lever member with said movable blade.

18. Cutting device as claimed in claim 17 wherein said supporting means includes two spaced guide plates located on opposite sides of said drive shaft, said lever member being secured to said plates, a holder on one side of and secured to said carrier means, and a closure on the other of said carrier means secured to said holder, said guide plates being mounted on said holder and said closure, respectively.

19. Cutting device as claimed in claim 18 comprising a screw passing through said closure, said movable blade, said carrier means, and said holder for securing the same to each other; and wherein said movable blade has a longitudinal slot through which said screw passes so that said movable blade is free to reciprocate.

20. Cutting device as claimed in claim 1 wherein said movable blade has a forward end and a rear end; wherein said abutment means include two abutment members respectively located near said forward and rear ends and slingly engaged by parts of said back, respectively; wherein said free portion of said back extends between said parts and said abutment members; wherein said cutout and said guide means are located in the region of said free portion of said back.

21. Cutting device as claimed in claim 20 comprising a fixed blade secured to said carrier means adjacent said movable blade; and a fixed blade mounted on said carrier means near said cutting edge for urging said cutting edge of said movable blade toward said fixed blade; wherein said carrier means include two slide members located near the ends of said movable blade, consisting of a low-friction material and located laterally of said movable blade and slidingly engaged by the same; and second spring means between said blades for urging said movable blade into sliding engagement with said slide members.
21. Cutting device as claimed in claim 17 wherein said
transmission means include an eccentric member secured to
said drive shaft and including a pivot having a pivot axis
slanted to said main axis and intersecting the same at a point
of intersection; a wobble ring rotatably mounted on said pivot
for angular movement about a wobble axis perpendicular to
said main axis at said point of intersection, and parallel to said
tilting axis of said lever member, said wobble ring having an
end face transverse to said slanted axis; said lever member
having a face slidingly engaged by two diametrical portions of
said end face of said wobble ring.

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