

## Knife

The present invention relates to a knife, particularly a household knife, of the type explained in the preamble of claim 1.

Such a knife is known from US-A-1 793 171. It is considered as a drawback in this publication that known serrations on the knife leave an outwardly bent or upwardly and downwardly extending cutting edge. By contrast, according to this publication, a knife is to be provided that despite the recesses formed on the cutting edge maintains a straight continuous cutting edge. As a consequence, the recesses are only incorporated from one knife surface towards the other knife surface into the material to such an extent that they cannot exit on the other knife surface. The recesses are produced by a grinding disk having a grinding edge of a substantially semicircular cross-section. When the recesses are alternately ground with said grinding disk into the one and then into the other knife surface, this yields the desired razor-sharp cutting edge only in the central portion of the recess, with a stronger cutting edge remaining between the central portions of two neighboring recesses, which contributes less to the cutting success, but is also less prone to wear. By contrast, the razor-sharp portion will wear to a greater degree, so that the effect of the recesses will fade after a few cuts.

Serrated knives, however, are available on the market in many other forms. The most wide-spread serration includes a multitude of adjacent recesses that have been incorporated only from one knife surface into the material to such an extent that they exit on the opposite knife surface, resulting in an arcuate cutting edge. Such a cutting edge has advantages with respect to the severing of the material because the serration provides a cutting edge at the sides of the arc that extends in a direction transverse to the normal direction of movement of the knife during cutting and thus

greatly facilitates the severing of transversely extending fibers, so that the cut will become smoother. Due to the recesses that are only provided at one side, the cutting edge will however slightly shift into a slightly inclined position, which increases the cutting width. On the other hand, the cutting edges cannot be made sharp in an optimum way due to the geometry.

Therefore, the attempt has already been made to counter-grind knives with a one-sided serration on the opposite knife surface with a smooth continuous ground surface, which, although the cutting width is slightly reduced, is not yet optimum with respect to cutting performance.

One aspect of the present invention provides a knife, particularly a household knife, comprising a cutting portion which is provided with a serration and includes two knife surfaces, each extending at one side of a central plane, the serration including recesses formed at both sides of the central plane and in alternating fashion in the one and in the other knife surface, **characterized in** that the recesses extend from one knife surface towards the other knife surface up to and beyond the central plane to form a cutting edge extending up and down on the knife surface in a side view.

The design of the embodiment yields advantages as to a sharper cutting edge and the cutting edge portions of a serration oriented into the direction of movement of the knife, without the drawbacks thereof being noticed. Rather, the cutting edge of the knife according to the embodiment is in symmetry with the central plane, the cutting edge being adapted to be ground in a razor-sharp manner to its predominant portion.

Advantageous developments become apparent from the subclaims.

The recesses are rounded in a particularly preferable manner and designed such that the cutting edge extends in an arc on the knife surface in a side view.

Moreover, arcs of a uniform depth can be produced by way of substantially uniform recesses. However, for specific applications and for forming cutting portions with a special function the arcs may also have a different depth.

Another advantage of the design of the embodiment is that the cutting edge can also be made to reciprocate when viewed from the top, preferably also in an arc. In particular, this design greatly improves the crumble resistance of knives, whereby a particularly smooth cut can be achieved, for instance in the case of bread.

The tip which is positioned between the recesses decisively facilitates the initial slitting and cutting of particularly smooth surfaces, such as a bread crust or the skin of fruit and vegetables.

An embodiment of the present invention shall now be explained in more detail with reference to the drawings, in which:

Fig. 1 is a perspective illustration of a knife designed according to the invention;

Fig. 2 shows a strongly enlarged section of the knife blade of the knife according to Fig. 1;

Fig. 3 is a cross-sectional illustration of Fig. 2; and

Fig. 4 is a strongly enlarged top view on the cutting edge.

Fig. 1 shows a knife 1 which is configured for cutting food, particularly as a household knife. The knife 1 includes the standard knife handle 2 which has secured thereto a cutting portion in the form of a knife blade 3 of the usual outer shape. The

knife blade 3 can be made from any material suited for knives and preferably consists of steel, which is stainless and/or adapted to be re-sharpened.

In the illustrated embodiment, the knife 1 is designed as a household knife, particularly as a bread knife, the blade 3 having an adequately large length of e.g. 20 cm. The invention, however, is also applicable to other household knives having different blade shapes and cutting edges extending in straight or curved fashion, and other dimensions, and to cutting portions in the form of a disk knife, e.g. for bread cutting machines.

As shown in Figs. 2 to 4, the blade 3 has two knife surfaces 3a and 3b that are opposite to one another in symmetry at both sides of a central plane 4. In the illustrated embodiment, the two knife surfaces 3a and 3b enclose a wedge angle  $\alpha$  and coincide in an imaginary apex line 3c located in the central plane 4.

The blade 3 is provided in the vicinity of the imaginary apex line 3c of the knife surfaces 3a and 3b with a cutting edge 5 which has a serration 6. In the illustrated embodiment, the serration 6 extends over almost the whole longitudinal extension of the blade 3, only a piercing portion at the tip of the blade and an area near the handle 2 having a standard straight cutting edge. The arrangement of the serration 6, however, can be varied and adapted to special cutting functions.

As can also be seen from Figs. 2 to 4, the serration 6 has a multitude of recesses 6a, 6b which are incorporated side by side and alternately once into the one knife surface 3a and then into the other knife surface 6b. The recesses 6a, 6b are substantially identical in their dimensions along the apex edge 3c, the term "substantially" covering unavoidable manufacturing deviations that are unavoidable in such thinly ground materials. The recesses 6a, 6b are in direct vicinity and alternate on opposite knife surfaces 3a, 3b. Each of the recesses 6a, 6b, however, extends

towards the opposite knife surface 3b and 3a, respectively, beyond the central plane 4 and through the opposite knife surface, so that tips 7 are formed between neighboring recesses 6a, 6b on the different knife surfaces, the tips being substantially positioned in the central plane 4 and the imaginary apex edge 3c, respectively, whereas the cutting edge 5 first descends and then ascends again between two tips 7.

The recess 6a is incorporated into the knife surface 3a such that it exits on the opposite knife surface 3b at a distance from the apex line 3c, which distance substantially corresponds to the distance at which the recess 6b incorporated into the opposite knife surface 3b exits on the knife surface 3a.

The recesses 6a and 6b are rounded, in the illustrated embodiment with a semicircular grinding tool, resulting in a semicircular boundary line 8 relative to the respective knife surface, and in the direction towards the apex line 3c they have an increasing penetration depth into the knife surface.

As shown in Fig. 2, rounded recesses 6a, 6b yield a cutting edge 5 which descends and ascends in the manner of an arc or curve and has arcs interrupted by tips 7 and curved away from the apex line 3c. Since the recesses 6a, 6b are substantially identical and arranged side by side in a uniform manner, as the recesses 6a, 6b continue to extend each substantially by the same amount over the central plane 4, this yields a cutting edge 5 which consists essentially of arcs of the same size and the same shape that are separated from one another by tips 7 when said cutting edge is viewed in a lateral view on one of the knife surfaces 3a, 3b.

A look at the resulting cutting edge 5 in a top view, as can be seen on a greatly enlarged scale in Fig. 4, reveals a reciprocating extension of the cutting edge 5 around the central plane 4. The rounded configuration of the recesses 6a, 6b makes

the extension of the cutting edge 5 also curved or arcuate, with changes in the direction of curvature in the tips 7.

In a modification of the above-described and drawn embodiments, the corrugation of the invention may only be provided in portions on the blade. The recesses may have different shapes, e.g. they may be designed as trapezoidal or V-shaped notches, which will then result in a substantially zigzag-shaped extension of the cutting edge, both in a top view on the cutting edge and in a side view on the knife surface. The recesses need not necessarily be of the same configuration and have the same spacing over the whole length of the blade and on the two knife surfaces. It is further possible to leave larger straight portions of the cutting edge, instead of the tips, between neighboring recesses arranged at different sides of the blade. The recesses may also be rounded with other uniform or composite radii, so that, instead of the drawn boundary line in the shape of a circular arc relative to the respective knife surface leading to an extension of the cutting edge in the form of a circular arc in top view and side view, a boundary line is obtained that is designed as part of an ellipse or a boundary line with another shape.

## Patent Claims

1. A knife, particularly a household knife, comprising a cutting portion which is provided with a serration and includes two knife surfaces, each extending at one side of a central plane, the serration including recesses formed at both sides of the central plane and in alternating fashion in the one and in the other knife surface, **characterized in** that the recesses extend from one knife surface towards the other knife surface up to and beyond the central plane to form a cutting edge extending up and down on the knife surface in a side view.
2. The knife according to claim 1, **characterized in** that the recesses are rounded.
3. The knife according to any one of claims 1 or 2, **characterized in** that the cutting edge extends in an arc in a side view on the knife surface.
4. The knife according to claim 3, **characterized in** that the recesses extend beyond the central plane to such an extent that in a side view on the knife surface a cutting edge is obtained with arcs of a substantially uniform depth.
5. The knife according to any one of claims 1 to 4, **characterized in** that the cutting edge extends back and forth in a top view.
6. The knife according to any one of claims 1 to 5, **characterized in** that the cutting edge extends substantially in an arc in a top view.

7. The knife according to any one of claims 1 to 6, **characterized in** that the recess relative to the knife surface has a boundary line positioned substantially on a circular arc.
8. The knife according to any one of claims 1 to 7, **characterized in** that two recesses that are positioned in neighboring fashion on different knife surfaces end in a tip substantially positioned on the cutting edge and between the recesses.
9. The knife according to any one of claims 1 to 8, **characterized in** that the recesses on both knife surfaces are arranged with substantially the same size and at substantially the same distance relative to one another.
10. The knife according to any one of claims 1 to 9, **characterized by** its configuration as a bread knife.

### Abstract

Described is a knife (1), particularly a household knife, comprising a cutting portion (3) which is provided with a serration (6) and includes two knife surfaces (3a, 3b), each extending at one side of a central plane (4). The serration (6) includes recesses (6a, 6b) formed at both sides of the central line (4) and in alternating fashion in the one and in the other knife surface (3a, 3b). To improve such a knife in a way that is simple in terms of construction and technical manufacture with respect to its cutting properties, it is suggested that the recesses (6a, 6b) should extend from one knife surface (3a, 3b) towards the other knife surface (3b, 3a) up to and beyond the central plane (4) to form a cutting edge (5) extending up and down on the knife surface (3a, 3b) in a side view.

(Fig. 1)