Blade construction for use in slicing material webs.

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References cited:
DE-A-2 405 849

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Description

The present invention concerns a blade construction for use in longitudinally cutting, or slicing, material webs, such as various paper and cardboard webs, films, recorder tapes, etc., with said cutter a material web being parted longitudinally into partial webs, and the cutter consisting of a blade construction composed of one or several blade pairs.

The cutting blades of this kind of cutter consist of blade pairs, and endeavors have been made to improve the service life of said cutters by using circular blades made of a wear-resistant and hard but brittle material. The material of the blade edges may be e.g. ceramic, or a hard metal.

Such cutting systems are known for example from DE A 2 405 849 or IEEE-Transactions on magnetics, vol. Mag-16'1, January 1980, pages 83–85, wherein the shear knives have a clearing angle lying within the range of 0 to 5 degrees.

The so-called shear-cutting method applied in longitudinal cutting implies that the cutter blades are pressed against each other with a force which acts axially to the blades. Because of the toe-in of the blades, the blades are in contact at one point. The force that is applied and the point contact cause a high stress concentration on the edges of the blades. When brittle blade materials are used, the stress concentration easily exceeds the ultimate strength of the material, and small fractures result on the blade edges.

Damaged blades are, of course, unfit for use.

The object of the invention is to provide an improvement in the blade construction of cutting blades used in longitudinal cutting. A more detailed aim of the invention is to provide a blade construction enabling the stress concentration on the blade edges to be reduced so that no chipping of blade edges will occur.

The aims of the invention are achieved with a blade construction which is mainly characterized in that by grinding on the edge of the first blade, and similarly on the edge of the second blade there has been produced a micro-rounding within 0.5–10.0 μm, and on the apex of the first blade there has been produced a narrow cylindrical surface extending from the knife edge in axial direction.

In the blade construction of the invention, the ground micro-rounding and the narrow cylindrical surface reduce the stress concentration at the contact point to such a degree that the ultimate strength of the material will not be exceeded. The dimensions of the micro-rounding and the narrow cylindrical surface depend on the blade force used and on the material to be sliced. When material webs are sliced with the blade construction of the invention, an excellent cut is obtained for instance in paper. The most common application of the blade construction of the invention is therefore the slicing of thin material webs in particular.

The invention is described in detail referring to an advantageous embodiment of the invention presented in the figures of the drawing attached, yet to which the invention is not meant to be exclusively confined.

Fig. 1 presents, in sectional view, an advantageous embodiment of the blade construction of the invention, at the contact point of the blades.

Fig. 2 shows the upper blade and its geometry.

Fig. 3 shows the lower blade and its geometry.

In the embodiment of Figs 1-3, the blade construction of the invention in general is indicated by reference numeral 10. In the present embodiment, the blade construction 10 consists of an upper blade 11 and a lower blade 12. The hard metal part of the upper blade 11 is indicated by reference numeral 11a and the hard metal part of the lower blade 12, by reference numeral 12a. The edge of the upper blade 11 is indicated by reference numeral 13, and the edge of the lower blade 12 is indicated by reference numeral 15. In the present embodiment, the pair of blades is so disposed that the upper blade 11 is substantially conical. The clearing angle of the upper blade 11 is denoted with α, and the clearing angle of the lower blade is similarly denoted with β.

The magnitude of the angle α is within 0-5°, advantageously about 1°, and the magnitude of the angle β is within 0-5°, advantageously about 2°.

The blades 11 and 12 are circular blades. The central axis of the blade 11 is indicated by A and that of the blade 12, by B.

As taught by the basic idea of the invention, the hard metal part 11a of the upper blade is micro-rounded at the edge 13, and similarly the hard metal part 12a of the lower blade 12 is micro-rounded at the edge 15. The radius r of the micro-rounding applied is advantageously within 0.5-10 μm. Furthermore, in the present embodiment a narrow cylindrical surface 14 is produced on the hard metal part 11a of the upper blade 11, its dimension advantageously within 0.1-1 mm.

In the foregoing is presented only one advantageous embodiment of the invention, and it is obvious to a person skilled in the art that numerous modifications thereof are feasible within the scope of the inventive idea stated in the claims following below.

Claims

1. A blade construction (10) for use in longitudinally cutting material webs, such as various paper and cardboard webs, films, recorder tapes, etc., said cutter being used to slice a material web longitudinally into partial webs, the cutter consisting of a cylindrical blade construction (10) composed of one or several blade pairs (11, 12), said blades being provided with a clearing angle (α, β) and the blade edges (11a, 12a) are made of wear-resistant and hard material, characterized in that by grinding on the edge (13) of a first blade (11), and similarly on the edge (15) of a second blade (12) there has been produced a micro-rounding within 0.5–10.0 μm and on the apex of the first blade (11) there has been produced a narrow cylindrical surface (14), extending from the knife edge in axial direction.

2. Blade construction according to claim 1, characterized in that the length of the narrow cylin-
3 nière similaire sur l’arête (15) de la seconde lame (12), et en ce que l’on produit au sommet de la première lame (11) une étroite surface cylindrique (14) s’étendant à partir de l’arête du couteau en direction axiale.
2. Construction de lame selon la revendication 1, caractérisée par le fait que la longueur de l’étroite surface cylindrique (14) en direction axiale est avantageusement comprise entre 0,1 et 1,0 mm.
3. Construction de lame selon la revendication 1, caractérisée par le fait que la première lame (11) est une lame supérieure conique et la seconde lame (12) est une lame inférieure.
4. Construction de lame selon la revendication 1, caractérisée par le fait que l’amplitude de l’angle de dégagement (α) de la première lame (11) est compris entre 0 et 5°, et est avantageusement d’environ 1°, et l’angle de dégagement (β) de la seconde lame (12) est compris entre 0 et 5°, et est avantageusement d’environ 2°.

Revisions
1. Construction de lame (10) destinée à être utilisée pour la coupe longitudinale de bandes de matériaux, telles que diverses bandes de papier ou de carton, des pellicules, des bandes d’enregistrement, etc., lesdits couteaux étant utilisés pour découper une bande de matériau longitudinalement en bandes partielles, le couteau consistant en une construction de lame (10) composée d’une ou plusieurs paires de lames (11, 12), lesdites lames étant munies d’un angle de dégagement (α, β) et les arêtes (11a, 12a) des lames étant réalisées en un matériau résistant à l’usure, caractérisée par le fait que l’on produit par meulage un micro-arondi compris entre 0,5 et 10,0 μm sur l’arête (13) de la première lame (11) et de ma...