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(71) Applicant: **Woodley, Christopher**
78490 Montfort l'Amaury (FR)

(72) Inventor: **Woodley, Christopher**
78490 Montfort l'Amaury (FR)

(74) Representative: **Regi, François-Xavier et al**
Altern IP
310 Avenue Berthelot
69008 Lyon (FR)

(54) **V-shaped splitcut knife made of two assembled distinct parts**

(57) The invention consists in providing two separate blades (10a, 10b) for manufacturing a V-shaped splitcut knife (10).

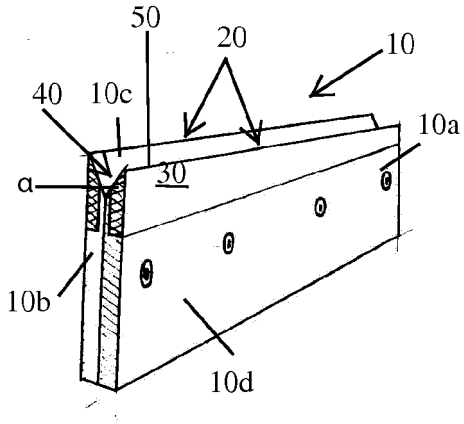

FIG.4

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Description

Field of the Invention

[0001] This invention concerns the V-shaped knife which is one of the cutting elements located in a trimmer. For example, it is located in the three-knife trimmer of a saddle stitcher line. It is for destination of all print finishing workshops and book binderies.

Background of the Invention

[0002] Under the current state of the art, when a splitcut thickness of 12, 10, 8 or 6 mm is required, it becomes necessary to mount in the three-knife trimmer a V-shaped knife (see FIG. 1 which shows a prior art V-shaped knife principle). This V-shaped knife 1 is made out from basic 12% Chrome steel material. Such a knife 1, at manufacturer level, is quite simple to produce. It comprises at least two longitudinal and substantially parallel cutting bevels 2. Each cutting bevel 2 has an external side face 3, an internal side face 4 and a cutting edge 5. The internal side faces 4 of the two cutting bevels 2 face each other with an acute angle α, so as to form a V-shape cross-section. The knife 1 is mounted in three-knife trimmer saddle stitcher lines thanks to screws through mounting holes 6, which are displayed along the knife according to the machine type

[0003] But such a knife, as it exists in the moment, shows three main drawbacks for end-users and the regrinding shops:

- it wears out very quickly compared to the other knives which take part in the trimming operation : the side knives and the front knife are usually of better steel quality than the V-shaped splitcut knife 1 and therefore show longer cutting lifetime before they become dull; because of the premature wear of the V-shaped knife 1, the machine has to be stopped in order to proceed for a change of this splitcut knife 1;
- the regrinding operation of a V-shaped knife 1 is more complicated than a usual knife; indeed, the thickness of the knife cannot be modified, therefore the regrinding of the knife 1 needs to be done from the inner part (see arrows A on FIG. 2) and essentially on the upper portion of the V-shape groove (above line L); the current regrinding technology does not allow a proper regrinding achievement from the inner part of the V-shape groove;
- because the regrinding operation of the V-shape knife 1 cannot be achieved in a proper way, the result of it is a poor cutting quality that generates potential problems at end-users level: discrepancies in the height of the right/left lips, poor sharpening, difficulties to eject the strip of paper to be discarded post cut because the inner grounded surface of the V-shape knife 1 is not polished enough and/or has not the correct angle.

[0004] An aim of the invention is to mitigate, at least one of the above-mentioned drawbacks.

[0005] This aim is at least partially achieved with a V-shape knife made of two 10assembled distinct blades, each one of these blades comprising respectively a cutting bevel.

[0006] Indeed, such a two-parts V-shaped knife ensures the end-user that he gets a finished knife in the identical steel quality as the other knives located in the three-knife trimmer. Furthermore, the two-parts V-shaped technology allows a clean regrinding operation each time. Therefore it enables to space the machine stops and insures a good quality of the cut.

[0007] The invention relates to knives comprising at least two blades assembled together. Once the blades assembled, with means which allows them to be disassembled, this assembly can be specifically machined (cut, bored, etc.) for providing a knife prepared to be mounted on a particular machine or tool. Consequently, the word "knife" in this document relates to a cutting tool at any stage of its manufacturing process (i.e. from the assembly of the blades to the finished tool ready to be used).

[0008] The invention contemplates the provision of complementary features set forth with particularity in the appended claims.

Brief Description of the Drawings

[0009] The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

- FIGURE 1 is a schematic perspective view of a V-shape splitcut knife of the prior art of the type used for example in three-knife trimmer of a saddle stitcher line;
- FIGURE 2 is a schematic perspective view similar to that of Figure 1, showing the regrinding boundaries for this kind of prior art knife;
- FIGURE 3 is a schematic perspective view of two taken apart blades of an exemplary embodiment of a knife according to the invention;
- FIGURE 4 is a schematic perspective view similar to that of Figure 3, the blades being assembled; and
- FIGURE 5 schematically shows a cross section of the blades of FIGURES 3 and 4.

Detailed Description of the Preferred Embodiment

[0010] Referring to the drawings in greater detail, and first to Figure 3, the V-shaped knife 10 is made of two distinct blades or parts 10a, 10b that can be easily and quickly assembled or disassembled: a left side part 10b and a right side part 10a, which, when tighten together, create a single knife 10 that has the particularity to form

a V shape profile in its longitude and two sharp bevels 20 (FIG. 4).

[0011] Each one of the blades 10a, 10b comprises a cutting bevel 20. Each each cutting bevel 20 has an external side face 30, an internal side face 40 and a cutting edge 50 in-between. The internal side faces 30, 40 of the two cutting bevels 20 face each other with an acute angle α, so as to form a V-shape cross-section. The angle α is preferentially comprised between 20 and 40° preferentially comprised between 25 and 30°. and most preferentially equal to 26° (the angle between the two internal side faces 30, 40 being then 52°).

[0012] The left side 10b and the right side 10a are hold together by means of screws 70 which are evenly displayed along the knife length.

[0013] Because the two parts (left 10b + right 10a) of the so formed V-shaped knife 10 can be treated independently when dissociated from one another, it has the following advantages.

- Steel quality: part left 10b and part right 10a can be manufactured in the same manner as any other standard knife; i.e. using cutting tips 10c made of a material harder than the material of the mounting part 10d. For example, HSS or Tungsten Carbide tips 10c are brazed on steel bodies or mounting parts 10d; and therefore reaching higher cutting performances than simple 12% Chrome steel (see FIG.5).
- The regrinding operation becomes a standard grinding operation once the regrinder has unscrewed and dissociated the two parts 10a, 10b.
- Because the regrinding operation has been achieved according to recommended standards, i.e. with respect of recommended bevel angle and the perpendicularity of the grinding wheel with cutting bevel 20, then the longevity of the cut and the cutting performance become identical to the other knives standing in the three-knife trimmer.

[0014] Two semi-fmished blanks, one for the right part 10a and one for the left part 10b, are produced to make a single knife 10. The blanks are produced in the same way it would be done for any other knives. Prior any machining / finishing operation is undertaken it is necessary to link the two parts 10a, 10b together by mean of screws 70 (FIG. 5). The right part 10a is drilled with bore holes 60 of sufficient diameter to allow the screws 70 through. The left part 10b has threaded holes 80 the same dimension of the screw thread of screw 70. It is recommended to use chrome steel screws 70 with a minimum size M5. Once the two parts 10a, 10b are tighten together to form one piece, then the machining / finishing process is identical to a usual 12% Chrome steel single piece V-shaped knife 1. The V-shape knife 1, can then be machined (cut, bored, etc.), as a prior art knife made of a single blank for providing a knife adapted to be mounted on a particular machine (for a prior knife, of course, a step of machining the V-shape groove in the single blank is previously performed).

[0015] The invention also relates to the process of regrinding a V-shaped knife 10 comprising two blades or parts 10a, 10b manufactured as described here above. Such process comprises the steps of

- unscrewing the screws 70 for dismantling the parts 10a, 10b,
- grinding each one of the tips 10c with a grinding wheel having a disk-shaped grinding surface perpendicular to a rotational axis which is substantially perpendicular to the cutting edge 50 of the at least one of the cutting bevels 20; (grinding traces perpendicular to the edge 50 remain visible on the tips 10c after grinding),
- assembling parts 10a, 10b and maintaining them together with screws 70.

Claims

1. A knife comprising at least two longitudinal and substantially parallel cutting bevels (20), each cutting bevel (20) having an external side face (30), an internal side face (40) and a cutting edge (50) in-between, the internal side faces (40) of the two cutting bevels (20) facing each other with an acute angle (α), so as to form a V-shape cross-section,
characterized in that the knife (10) is made of two assembled distinct blades (10a, 10b), each one of these blades (10a, 10b) comprising one of the at least two cutting bevels (20).

2. A knife according to claim 1, wherein the acute angle (α) is preferentially comprised between 20 and 40° and most preferentially comprised between 25 and 30°.

3. A knife according to claim 1 or 2, wherein each blade (10a, 10b) comprises a mounting part (10b) and a cutting tip (10c) made of a material harder than the material of the mounting part (10d).

4. A knife according to claim 3, wherein the mounting part (10d) is made of steel and the cutting tip (10c) is made of HSS or Tungsten Carbide.

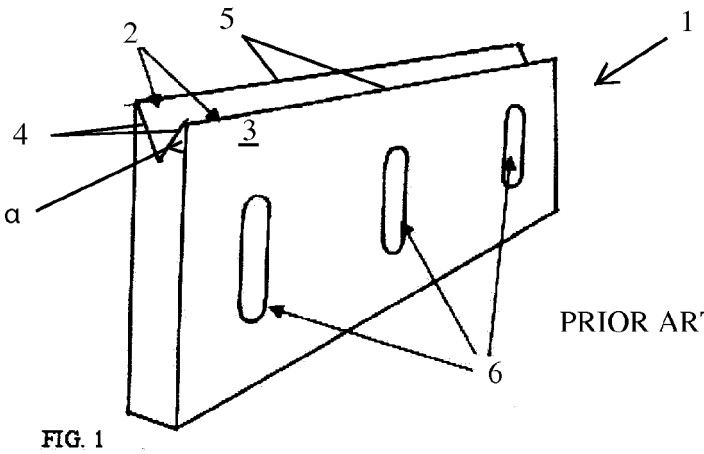
5. A knife according to any preceding claim, wherein the internal sides (40) are grinded substantially perpendicularly to the cutting edges (50).

6. A knife according to any preceding claim, wherein the two distinct blades (10a, 10b) are assembled with screws (70).

7. Process for re-grinding a knife (10) comprising at least two longitudinal and substantially parallel cutting bevels (20), each cutting bevel (20) having an

external side face (30), an internal side face (40) and a cutting edge (50) in-between, the internal side faces (30) of the two cutting bevels (20) facing each other with an acute angle (α), so as to form a V-shape cross-section,
characterized in that it comprises the steps of

- dismantling two assembled distinct blades (10a, 10b), each one of these blades (10a, 10b) comprising one of the at least two cutting bevels (20), and
- re-grinding at least one of the cutting bevels (20) with a grinding wheel having a disk-shaped grinding surface perpendicular to a rotational axis which is substantially perpendicular to the cutting edge (50) of the at least one of the cutting bevels (20).



PRIOR ART

FIG. 1

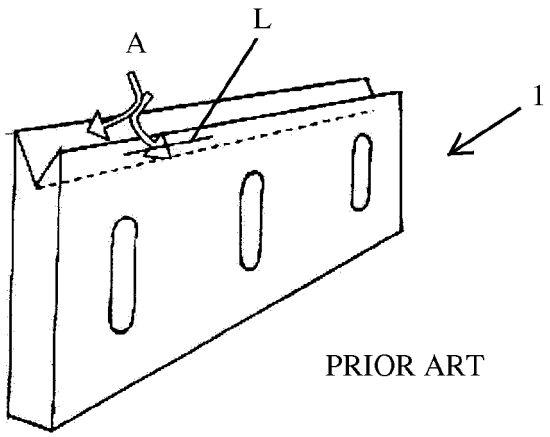


FIG.2

PRIOR ART

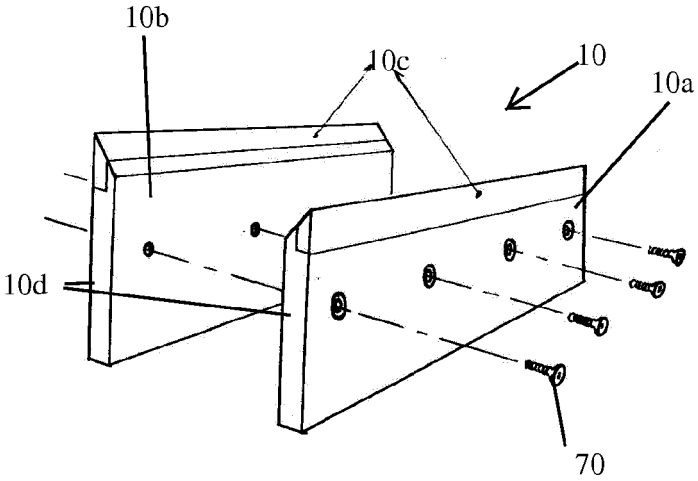


FIG.3

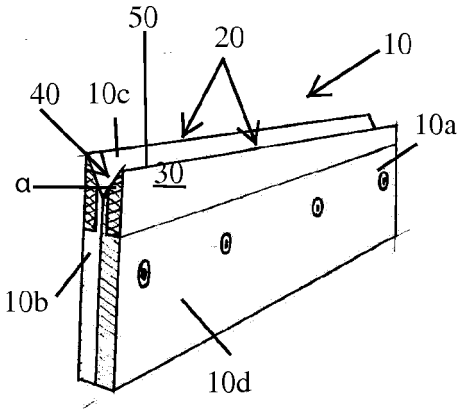


FIG.4

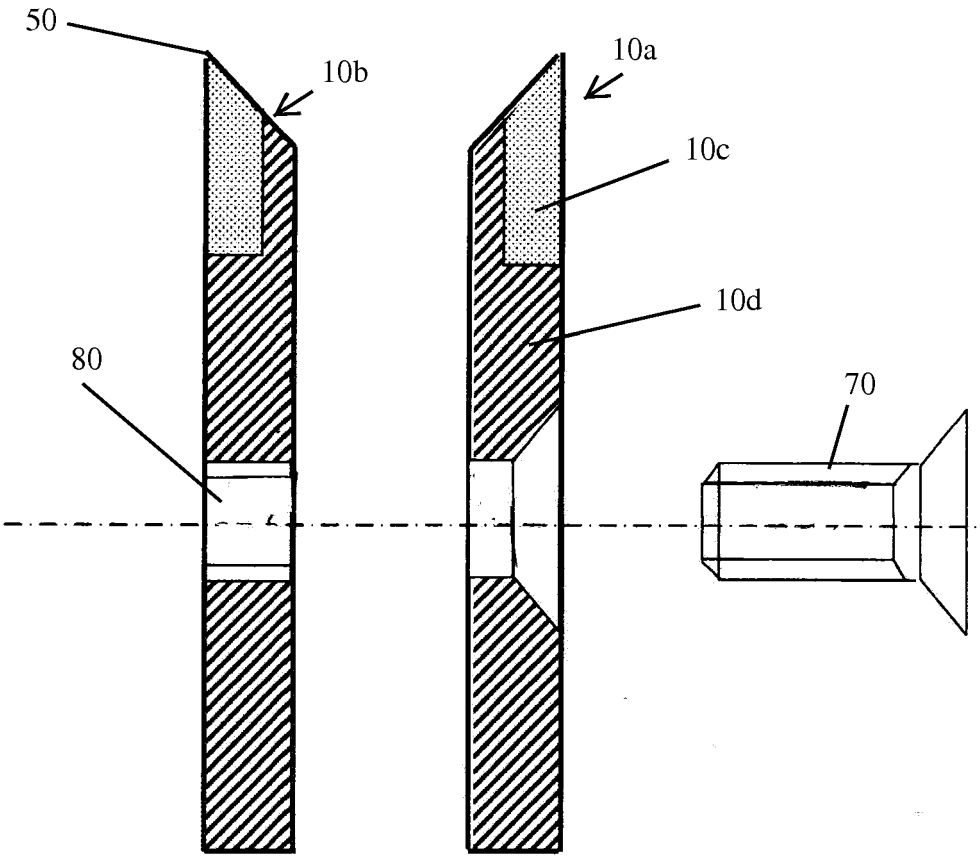


FIG.5

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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 1657

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 20 2004 004275 U1 (IMABT WEICHSELBAUM [DE]) 3 June 2004 (2004-06-03) * paragraph [0019]; figure 3 * -----	1-7	INV. B26D1/00
A	EP 0 640 449 A1 (RIETER AUTOMATIK GMBH [DE]) 1 March 1995 (1995-03-01) * figures 1-4 * -----	1-7	

TECHNICAL FIELDS SEARCHED (IPC)

B26D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 January 2014	Wimmer, Martin

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 19 1657

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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17-01-2014

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82