

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO SHARPENING DEVICES

(71) We, WILTSHIRE CUTLERY COMPANY PROPRIETARY LIMITED of 36—38 Albert Road, South Melbourne, Victoria, Commonwealth of Australia, a body corporate organised and existing under the laws of the State of Victoria, Commonwealth of Australia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sharpening devices such as those used for maintaining a cutting edge on a knife blade, and although the invention has other applications it will be convenient to describe it in relation to knife sharpeners.

The invention is applicable to any sharpening device which includes two or more sharpening elements relatively arranged to act on a knife blade so as to treat opposite sides thereof to create or sharpen the cutting edge of the blade. A typical sharpening device of that type includes a pair of elements mounted in or on a support structure, which may be formed of a plastics material. Each element is at least partially made from a relatively hard material such as tungsten carbide, or an abrasive material, and has at least one but preferably two edges arranged to remove material from a knife blade and thereby function to sharpen that blade. The two elements are arranged in crossed relationship so that a suitable sharpening angle is formed between their respective sharpening edges. That is, a sharpening recess of V-shape is defined between the two elements, and a knife blade is sharpened by location of the blade cutting edge within the apex region of that recess and then moving the blade longitudinally across the sharpening elements.

In the above typical construction, it is common practice to secure the two elements to the support structure against relative movement, but it is also known to

pivot the support structure so that the configuration of the sharpening recess relative to the knife blade alters during each sharpening operation. Such a sharpening device is generally satisfactory if the longitudinal axis of the knife blade is maintained in alignment with the direction of movement of that blade during the sharpening operation. If however, the blade is held so as to be skewed to one side relative to that direction, the effectiveness of at least one of the sharpening elements may be impaired.

According to one aspect of the present invention there is provided a blade sharpening device including two sharpening elements each defining a respective sharpening edge, said elements being arranged in overlapping relationship so that said sharpening edges define a sharpening recess between them, and pivot means connecting each said element to a support structure to permit each said element to move relative to the other, the axis of each said pivot means extending in a direction such that the angular relationship between adjacent surfaces of said overlapping elements varies according to the relative pivotal positions of said elements.

According to a further aspect of the invention there is provided a blade sharpening device including at least two sharpening plates each defining a respective sharpening edge, said plates being arranged in overlapping relationship with said sharpening edges extending angularly relative to each other so that each edge contributes to a sharpening recess defined between the edges, pivot means connecting each plate independently of another to a support structure to permit relative movement of said plates, the axes of at least two of said pivot means being located on respective opposite sides of the recess and the axis of each pivot means extending substantially parallel to a plane containing the sharpening edges contributing to the recess.

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Furthermore, the blade sharpening device may be, or form part of, a knife scabbard.

Thus, the present invention provides a sharpening device of the general type discussed above in which the sharpening elements are mounted for relative movement during a sharpening operation. Such relative movement permits the elements to adapt themselves to a skewed disposition of a knife blade and thereby allows suitable sharpening to be effected under a variety of conditions. The plates will swing generally in the direction of movement of a knife blade engaged in the sharpening recess and moved therethrough for sharpening. In the preferred construction, the axis of each pivot extends substantially parallel to a plane containing the sharpening recess — e.g. the plane of the two overlapping surfaces of the plates when those surfaces are parallel and abutting.

Resilient means may be provided to urge the plates into a rest position, but that is not essential.

The following description refers in more detail to the essential features and further optional features of the invention. To facilitate an understanding of the invention, reference is made to the accompanying drawings where these features are illustrated in preferred form. It is to be understood however, that the essential and optional features of the invention are not limited to the specific forms of these features as shown in the drawings:

In the drawings:

Figure 1 is a longitudinal cross-sectional view of a typical scabbard to which a sharpening device in accordance with the invention may be applied, and showing one particular embodiment of the sharpening device.

Figure 2 is an enlarged cross-sectional view taken along line II—II of Figure 1.

Figure 3 is a view similar to Figure 2 but showing the sharpening elements pivoted away from a rest or neutral position.

Figure 4 is a cross-sectional view taken along line IV—IV of Figure 3.

Figure 5 is a plan view of one sharpening element of the device shown in Figure 3, but modified to include biasing means.

Figure 6 is a view similar to Figure 5 but showing the biasing means flexed to impose a returning force on the sharpening element.

Figure 7 is a view similar to Figure 2 and showing an alternative form of sharpening device.

It is to be understood that Figure 1 is intended to show a typical application of the sharpening device, and does not show the only form of scabbard with which the device can be used. Nevertheless, the particular scabbard shown has been found to have

certain practical advantages as are fully explained in British Patent Specification No. 1 332 598.

The scabbard shown in Figure 1 includes a housing 2 having a knife receiving passage 3 defined therein. An access opening 4 is provided at one end of the housing 2, and the sharpening device 5 is supported by a carrier member 6 within the passage 3 so as to be located adjacent to the opening 4. The carrier member 6 is pivotally connected to the housing 2 at a position 7 remote from the access opening 4, and a spring 8 functions to bias the carrier member 6 towards an upper wall 9 of the housing 2. In the drawing, the carrier member 6 is shown in the rest position, but it can be pushed down into a lowered position against the action of the spring 8 by insertion of a knife blade into the passage 3 between the sharpening device 5 and upper wall 9.

A reaction member 11 is pivotally mounted on the carrier member 6 at a position 12, and functions to form a guide for a knife blade and to also react with the upper wall 9 so as to assist in initial insertion of a knife blade into the passage 3. That is, a part 13 of the member 11 is engaged by the upper edge of the knife blade and is thereby forced against the wall 9 so that a downwardly directed reaction force is transferred to the carrier member 6 through the pivot connection 12.

As shown in Figures 2 to 4 of the drawings, the device 5 includes two sharpening elements 14 pivotally connected to the carrier member 6, which forms the support structure for the device 5. Each element 14 may be formed of a plate or block of tungsten carbide or other suitable material, or combination of materials, but they are preferably plate-like elements as shown in the drawings. The two plates 14 are relatively disposed to define a cutting recess 15 at previously described, and the edge surfaces 16 defining that recess are sharpening edges of the plates 14.

The adjacent broad faces of the two plates 14 overlap so that the sharpening recess 15 is defined between the edges 16 of the plates 14, and in a neutral position of the plates 14, the adjacent broad faces are preferably parallel and abutting. In the construction shown, each plate 14 is secured by adhesive or other appropriate means to a mounting section 17 which is pivotally connected to the carrier member 6 through a pin or trunnions 18. As shown in Figure 2, the axes of the two pivots extend substantially parallel to each other and the broad faces of the plates 14. Also, each pivot is located remote from the sharpening edge 16 of the associated plate 14. Ribs or walls 19 and 21 are disposed on opposite sides of the plates 14 to limit their swinging

movement as shown in Figure 4, but it will be appreciated that other forms of stop means may be employed.

When a knife blade is located within the sharpening recess 15 and is moved in a direction to effect sharpening, the initial response of the plates 14 is to move with the blade, and that movement may continue until they engage the limit stop 19 or 21 — e.g. as shown in Figure 4. It will be seen from Figure 4 that the angular relationship of the adjacent broad faces of the plates 14, alters in accordance with the pivotal position of those plates. Such pivotal movement of the plates 14 minimizes the possibility of the knife blade jamming within the recess 15, and the fact that the two plates 14 are independently movable has the further advantage of permitting the plates 14 to adapt to misalignment between the longitudinal axis of the knife blade and its direction of movement.

Any suitable biasing means may be provided to urge the plates 14 into a central position, or any other neutral position as may be desired, and one particular arrangement is shown in Figures 5 and 6 (only one sharpening plate 14 is shown for convenience of illustration). In that arrangement, a leaf spring 22 is formed integral with or attached to each mounting section 17 and locates within an aperture 23 formed within the adjacent side wall 24 of the carrier member 6. When the plate 14 is moved out of the rest position (Figure 5), the spring 22 is caused to flex as shown in Figure 6 and thereby imposes a returning force on the plate 14. It will be appreciated that the illustrated arrangement is open to variation, and that other form of biasing means may be employed, whilst still achieving the basic objects of the invention.

A modified form of the invention is shown in Figure 7, and for convenience of identification parts of that embodiment corresponding to parts of the Figures 1 to 4 embodiment, will be given like reference numerals, but of a higher series. The principal distinction of the modified embodiment is that the pivotal axis of each pair of trunnions 118 extends substantially parallel to the sharpening edge 116 of the respective plate 114. With this arrangement, a constant sharpening angle is maintained within the recess 115 if the sharpening edges 116 are straight, as shown, regardless of the pivotal position of the plates 114. In the embodiment of Figures 1 to 4 however, the sharpening angle will vary with movement of the plates 114 on each side of the rest or neutral position, if the sharpening edges 116 are straight.

Limit stops corresponding to stops 19 and 21 of the Figures 1 to 4 embodiment, are preferably provided in the Figure 7 embodi-

ment, but only the stop 119 is shown. In addition, the Figure 7 embodiment may be varied to include biasing means as previously described.

The embodiments of the invention herein described are constructed so that the sharpening elements are operative to sharpen a knife blade during both forward and rearward movement of that blade relative to the sharpening device. In addition, the invention can be applied to a knife scabbard of appropriate construction, such as those shown and described in Australian patent No. 424,122 and British patent No. 1 332 598.

Finally, it is to be understood that various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the invention as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A blade sharpening device including two sharpening elements each defining a respective sharpening edge, said elements being arranged in overlapping relationship so that said sharpening edges define a sharpening recess between them, and pivot means connecting each said element to a support structure to permit each said element to move relative to the other, the axis of each said pivot means extending in a direction such that the angular relationship between adjacent surfaces of said overlapping elements varies according to the relative pivotal positions of said elements.

2. A blade sharpening device including at least two sharpening plates each defining a respective sharpening edge, said plates being arranged in overlapping relationship with said sharpening edges extending angularly relative to each other so that each edge contributes to a sharpening recess defined between said edges, pivot means connecting each said plate independently of another to a support structure to permit relative movement of said plates, the axes of at least two of said pivot means being located on respective opposite sides of said recess, and the axis of each pivot means extending substantially parallel to a plane containing the sharpening edges contributing to the recess.

3. A device according to claim 1, wherein the axes of said pivot means extend substantially parallel to each other.

4. A device according to claim 1, wherein the axis of each said pivot means extends substantially parallel to the general direction of the sharpening edge of its respective said sharpening element.

5. A device according to claim 1, wherein stop means is provided on each side of said



movement as shown in Figure 4, but it will be appreciated that other forms of stop means may be employed.

When a knife blade is located within the sharpening recess 15 and is moved in a direction to effect sharpening, the initial response of the plates 14 is to move with the blade, and that movement may continue until they engage the limit stop 19 or 21 — e.g. as shown in Figure 4. It will be seen from Figure 4 that the angular relationship of the adjacent broad faces of the plates 14, alters in accordance with the pivotal position of those plates. Such pivotal movement of the plates 14 minimizes the possibility of the knife blade jamming within the recess 15, and the fact that the two plates 14 are independently movable has the further advantage of permitting the plates 14 to adapt to misalignment between the longitudinal axis of the knife blade and its direction of movement.

Any suitable biasing means may be provided to urge the plates 14 into a central position, or any other neutral position as may be desired, and one particular arrangement is shown in Figures 5 and 6 (only one sharpening plate 14 is shown for convenience of illustration). In that arrangement, a leaf spring 22 is formed integral with or attached to each mounting section 17 and locates within an aperture 23 formed within the adjacent side wall 24 of the carrier member 6. When the plate 14 is moved out of the rest position (Figure 5), the spring 22 is caused to flex as shown in Figure 6 and thereby imposes a returning force on the plate 14. It will be appreciated that the illustrated arrangement is open to variation, and that other form of biasing means may be employed, whilst still achieving the basic objects of the invention.

A modified form of the invention is shown in Figure 7, and for convenience of identification parts of that embodiment corresponding to parts of the Figures 1 to 4 embodiment, will be given like reference numerals, but of a higher series. The principal distinction of the modified embodiment is that the pivotal axis of each pair of trunnions 118 extends substantially parallel to the sharpening edge 116 of the respective plate 114. With this arrangement, a constant sharpening angle is maintained within the recess 115 if the sharpening edges 116 are straight, as shown, regardless of the pivotal position of the plates 114. In the embodiment of Figures 1 to 4 however, the sharpening angle will vary with movement of the plates 114 on each side of the rest or neutral position, if the sharpening edges 116 are straight.

Limit stops corresponding to stops 19 and 21 of the Figures 1 to 4 embodiment, are preferably provided in the Figure 7 embodi-

ment, but only the stop 119 is shown. In addition, the Figure 7 embodiment may be varied to include biasing means as previously described.

The embodiments of the invention herein described are constructed so that the sharpening elements are operative to sharpen a knife blade during both forward and rearward movement of that blade relative to the sharpening device. In addition, the invention can be applied to a knife scabbard of appropriate construction, such as those shown and described in Australian patent No. 424,122 and British patent No. 1 332 598.

Finally, it is to be understood that various alterations, modifications and/or additions may be introduced into the constructions and arrangements of parts previously described without departing from the invention as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A blade sharpening device including two sharpening elements each defining a respective sharpening edge, said elements being arranged in overlapping relationship so that said sharpening edges define a sharpening recess between them, and pivot means connecting each said element to a support structure to permit each said element to move relative to the other, the axis of each said pivot means extending in a direction such that the angular relationship between adjacent surfaces of said overlapping elements varies according to the relative pivotal positions of said elements.
2. A blade sharpening device including at least two sharpening plates each defining a respective sharpening edge, said plates being arranged in overlapping relationship with said sharpening edges extending angularly relative to each other so that each edge contributes to a sharpening recess defined between said edges, pivot means connecting each said plate independently of another to a support structure to permit relative movement of said plates, the axes of at least two of said pivot means being located on respective opposite sides of said recess, and the axis of each pivot means extending substantially parallel to a plane containing the sharpening edges contributing to the recess.
3. A device according to claim 1, wherein the axes of said pivot means extend substantially parallel to each other.
4. A device according to claim 1, wherein the axis of each said pivot means extends substantially parallel to the general direction of the sharpening edge of its respective said sharpening element.
5. A device according to claim 1, wherein stop means is provided on each side of said

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- sharpening elements to limit the degree of movement thereof about said pivot means.
6. A device according to claim 1, wherein biasing means acts on each said element to urge it into a rest position.
7. A knife scabbard including, a housing having a knife receiving passage defined therein; an access opening at one end of said passage; and a sharpening device mounted within said passage adjacent said opening; said sharpening device including two blade sharpening elements each defining a respective sharpening edge, said elements being arranged in overlapping relationship so that said sharpening edges define a sharpening recess between them, and pivot means connecting each said element to a support structure to permit each said element to move relative to the other, the axis of each said pivot means extending in a direction such that the angular relationship between adjacent surfaces of said overlapping elements varies according to the relative pivotal positions of said elements.
8. A knife scabbard including, a housing having a knife receiving passage defined therein; an access opening at one end of said passage; and a sharpening device mounted within said passage adjacent said opening; said sharpening device including at least two blade sharpening plates each defining a respective sharpening edge, said plates being arranged in overlapping relationship with said sharpening edges extending angularly relative to each other so that each edge contributes to a sharpening recess defined between said edges, pivot means connecting each said plate independently of another to a support structure to permit relative movement of said plates, the axes of at least two of said pivot means being located on respective opposite sides of said recess, and the axis of each pivot means extending substantially parallel to a plane containing the sharpening edges contributing to the recess.
9. A blade sharpening device substantially as herein described with reference to the accompanying drawings.
10. A knife scabbard substantially as herein described with reference to the accompanying drawings.
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