

Description

This invention relates to knife sharpeners of the kind which sharpen a knife blade as a result of the cutting edge of that blade being moved over the sharpener. It will be convenient to hereinafter describe the invention in relation to such sharpeners as used in combination with a scabbard or other protective cover for the blade.

U.S. patents 3,676,961 (Jackson), 3,774,350 (Bayly), 4,041,651 (Bayly) and 4,091,691 (Bayly) relate to scabbard-sharpener combinations as referred to above. Those prior constructions have been satisfactory for sharpening standard blades, but they are not entirely suitable for use with special blades having a narrow tip. Narrow tip blades are used for delicate cutting operations such as filleting fish, and it is important that the cutting edge of such blades be kept in good condition right up to the very tip of the blade. Prior blade sharpener combinations as referred to above are unable to satisfy that requirement.

The Jackson blade sharpener corresponds to the prior art portion of claim 1. The sharpener includes means for maintaining downward pressure on a knife blade during its passage across the actual sharpening device. That pressure applying means is so arranged, however, that it does not engage the knife blade until that blade is moved inwardly some distance beyond the sharpening device and loses contact with the blade during withdrawal before the blade has left contact with the sharpening device. It follows that the cutting edge at the tip portion of the blade is not subjected to the same sharpening control as are other parts of the blade and is therefore not sharpened properly.

The Bayly blade sharpeners are arranged so that pressure applying means of one form or another engages and bears down on the back edge of a blade close to the time at which the blade cutting edge first contacts the sharpening device. In spite of that early contact, the sharpeners have a configuration such that they are unable to effectively sharpen the tip portion of a narrow blade. Each of those sharpeners is arranged to operate with knife blades of substantial depth, even close to the tip, and the maximum downward force on the blade is achieved while the deeper sections of the blade are moving over the sharpening device. Minimum downward force and consequently minimum sharpening effect is achieved while the tip portion of the blade is moving over the sharpening device.

It is an object of the present invention to provide a blade sharpener which is able to effectively sharpen a blade up to the very tip thereof. It is a further object of the invention to provide a blade sharpener which is particularly suited for use with blades which are relatively narrow or have a shallow depth.

In accordance with the invention, there is provided a blade sharpener including, a mounting structure having an access opening through which a blade can be moved, a sharpening device

connected to said structure adjacent a lower extremity of said opening so as to be engaged by the cutting edge of a blade located within said opening, and a reaction member having an upper portion pivotally connected to said structure adjacent an upper extremity of said opening and a lower portion arranged to engage a back edge of a blade located in said opening so as to press the cutting edge of the blade against said sharpening device, said reaction member being resiliently urged about said pivotal connection in a forward direction towards a rest position at which it substantially closes said opening and at which said lower portion is located forwardly of said sharpening device and rearwardly of the axis of said pivotal connection, the arrangement being such that said reaction member is caused to swing rearwardly about said pivotal connection in response to engagement by a blade being moved rearwardly through said opening, whereby said lower portion is moved away from said rest position to pass over and rearwardly of said sharpening device.

An embodiment of the invention is described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings, however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the various features as shown is not to be understood as limiting on the invention.

Figure 1 is a side elevational view of a blade sharpener according to one embodiment of the present invention;

Figure 2 is a front elevational view of the sharpener shown in Figure 1;

Figure 3 is a rear elevational view of the sharpener shown in Figure 1;

Figure 4 is an enlarged cross-sectional view taken along line IV—IV of Figure 2;

Figure 5 is an enlarged cross-sectional view taken along line V—V of Figure 1;

Figure 6 is an elevation view of a scabbard incorporating a sharpener as shown in Figures 1 to 5 and having a knife inserted therein;

Figure 7 is a cross-sectional view taken along line VII—VII of Figure 6;

Figure 8 is a sectional view of part of the scabbard shown in Figures 6 and 7 and showing the sharpener removed from the scabbard;

Figure 9 is a semi-diagrammatic view showing the tip of a knife blade as it is first inserted into a sharpener according to Figures 1 to 5;

Figure 10 is a view similar to Figure 9 but showing the knife blade moved further into the sharpener;

Figure 11 is a view similar to Figure 10 but showing the knife blade even further advanced into the sharpener;

Figure 12 is a view similar to Figure 10 but showing the knife blade being withdrawn from the sharpener;

Figure 13 is a force diagram relating to the action of the sharpener on a knife blade.

The knife blade sharpener 1 shown in the

drawings includes a mounting structure 2 and a sharpening device 3 carried by the structure 2 and arranged for sharpening a knife blade 4 (Figure 6). The structure 2 has an access opening 5 (Figure 3) for receiving the knife blade 4. As best seen in Figures 6 and 9 to 12, the knife blade 4 as shown is of the kind having a relatively shallow depth and the cutting edge 6 extends from an extreme tip 7 rearwardly towards a handle 8 of the knife 9. A back edge 10 of the blade 4 and the cutting edge 6 converge towards the tip 7 over a substantial part of the length of the blade 4 so that the blade 4 has a narrow or fine tip portion. The knife 9 as shown is of a kind suitable for use as a fish filleting knife and the blade 4 may be relatively flexible. It will be convenient to generally describe the invention with reference to the fish filleting knife 9 as shown although the invention is not limited to use with that type of knife.

As shown in Figures 1 to 5, the mounting structure 2 is a sleeve-like member having a passage therethrough which forms the access opening 5. The mounting structure 2 as shown is adapted for connection to a blade scabbard 11 as hereinafter described in detail. In an alternative construction, which is not shown, the structure 2 could be an integral part of the scabbard 11. According to yet another alternative, the structure 2 could be arranged to exist separate from a blade scabbard.

The structure 2 as shown is of substantially rectangular form in transverse cross-section and has two side walls 12 and 13 and upper and lower walls 14 and 15 respectively. The opening 5 is defined between those walls and therefore also has a substantially rectangular shape. In the construction shown, the structure 2 is arranged to be a neat sliding fit within an open end 16 (Figure 8) of the scabbard 11 as shown in Figures 6 and 7. That is, the external configuration as defined by the walls 12, 13, 14 and 15 is substantially complementary to the internal configuration of the open end 16 of the scabbard 11.

Insertion of the structure 2 into the scabbard open end 16 is limited by stop shoulders 17, 18 and 19 formed on the walls 14, 12 and 15 respectively, but other means could be adopted for that purpose. Retaining means is provided to releasably retain the structure 2 within the scabbard open end 16, and in the construction shown that retaining means includes a laterally projecting button 20 connected to the structure side wall 13 and arranged to locate within an aperture 21 (Figure 8) formed through a side wall 22 of the scabbard 11. It is preferred, as shown, that the button 20 is attached to the structure 2 through a flexible connection such that the button 20 can be moved between an operative position (Figure 7) and an inoperative position (Figure 8). It is also preferred that the flexible connection includes an arm 23 which is formed integral with both the structure side wall 13 and the button 20 as best seen in Figure 4.

The connecting arm 23 is predisposed to normally hold the button 20 in the operative

position as shown in Figure 7. Inward pressure applied to the button 20, however, causes the arm 23 to bend or flex so that the button 20 is moved clear of the aperture 21 and the structure 2 is then able to be pulled out of the scabbard 11. As shown in Figure 8, similar inward deflection of the button 20 is necessary to condition the structure 2 for replacement within the scabbard 11.

A recess 24 may be formed in the front edge of the structure side wall 12 as shown in Figure 1. That recess 24 can have a shape substantially complementary to the front end shape of the knife handle 8 as shown in Figure 6 so as to at least partly enclose a front end portion 25 of the handle 8. The knife 9 is thereby located in a particular position relative to the scabbard 11, and the structure 2, when the blade 4 is fully inserted into the scabbard 11 as shown in Figure 6.

The sharpening device 3 includes a sharpening recess 26 which is adapted to receive the cutting edge 6 of the knife blade 4. In the preferred embodiment as shown, the sharpening recess 26 is of V shape so as to have a configuration substantially complementary to that of the blade cutting edge 6. The recess 26 may be defined between a pair of overlapping circular cutters (not shown). It is preferred, however, that the sharpening recess 26 is defined between a pair of sharpening elements 27 of non-circular peripheral shape and which may be made of any suitable material. By way of example, the sharpening elements 27 may be made of tungsten carbide material.

In the preferred construction shown, the sharpening device 3 is mounted on the structure 2 so as to be capable of limited backward and forward rocking movement as the knife blade 4 is respectively inserted into and withdrawn from the scabbard 11. For that purpose the sharpening elements 27 may be mounted on a base member 28 as shown which is pivotally connected to the mounting structure 2 through two stub axles 29, each of which is rotatably mounted in a respective wall 12 and 13 of the structure 2. The facility for rocking movement is desirable so that the cutting edge 6 of the knife blade 4 can be moved through the V-shaped sharpening recess 26 with minimum likelihood of the blade 6 skipping or jamming within the recess 26.

The sharpening device 3 can rock between forward and backward positions as shown in Figures 9 and 11 respectively according to whether the knife blade 4 is being withdrawn from or moved into the scabbard 11. The degree of maximum tilt of the device 3 may be about 25° in the backward direction and about 30° in the forward direction, but it will be appreciated that those angles are merely preferred rather than essential. A blade 30 may be arranged to engage stop surfaces so as to limit the pivotal or rocking movement of the sharpening device 3.

The knife sharpener 1 of the present invention is further provided with a reaction member 31 which is arranged to engage the back edge 10 of a knife blade 4 inserted through the access opening

5 and thereby urge the blade cutting edge 6 against the sharpening device 3. The member 31 is resiliently urged towards a rest position as shown in Figure 4, and is arranged to initially engage the knife blade 4 at a location forward of the sharpening device 3 so as to thereby cause the sharpening action to extend to the extreme tip 7 of the knife blade 4. That is, when a knife blade 4 is being moved into the scabbard 11, it engages the member 31 before engaging the sharpening device 3. Similarly when the knife blade 4 is being withdrawn from the scabbard 11, the member 31 remains in engagement to press the cutting edge 6 into the sharpening recess 26 for the full length of the cutting edge 6 until the extreme tip 7 of the knife blade 4 disengages from the sharpening device 3.

In the preferred construction shown, biasing means 32 (Figures 1 and 5) acts on the member 31 so as to urge it against the back edge 10 of the knife blade 4. The reaction member 31 preferably comprises a lever which has an upper portion 33 pivotally connected at 34 to the mounting structure 2. The axis of the pivotal connection 34 is transverse to the direction of movement of the blade 4. The lever 31 also has a lower portion 35 which is arranged to contact the back edge 10 of the knife blade 4 to apply force thereto so as to urge the knife blade 4 into the sharpening recess 26. The pivotal connection 34 of the lever 31 is located forwardly of the sharpening device 3. When the lever 31 is in the rest position as shown in Figure 4, the lower portion 35 is located rearwardly of the pivotal connection 34 and forwardly of the sharpening device 3. The arrangement is such that the lever 31 slopes in a rearward direction away from the pivotal connection 34 and generally towards the sharpening device 3.

An arrangement as described above is such that the sharpening force applied between the sharpening device 3 and the cutting edge 6 of the knife 9 is greater when the tip region of the blade 4 is being sharpened than when the part of the blade 4 nearer the handle 8 is being sharpened. That is, the sharpening force progressively increases as the point of engagement between the sharpening device 3 and the cutting edge 6 approaches the knife tip 7. The foregoing will be apparent from the Figure 13 force diagram in which P is the force applied by the lever 31, α is the angle between a line 36 which represents the angle of slope of the lever 31 and another line 37 which represents the general direction of movement of a blade 4 being moved across the sharpening device 3, and SF is the sharpening force. The line 36 extends from the lever pivot 34 to the point of contact 38 with a knife blade 4. The value of SF is given by the formula:

$$SF = \frac{P}{\cos \alpha}$$

The foregoing is an approximation since the actual sharpening force is affected by variations

in the value of the force P as the lever 31 moves through its range of positions. The actual sharpening force also depends on frictional forces at the lever pivot 34, and frictional forces between the contact end of the lever 31 and the back edge 10 of the blade 4.

When the knife blade 4 is inserted into the blade sharpener 1, the lower portion 35 of the lever 31 is caused to move towards a position generally opposite to the sharpening device 31 as shown by Figures 9 and 10. It follows that at one stage of insertion of the knife blade 4 into the blade sharpener 1, the lever 31 is applying a force to the back edge 10 of the knife blade 4 at a point directly opposite to the sharpening device 3. As the blade 4 continues to be moved through the sharpener 1, the lower portion 35 moves over and rearwardly beyond the sharpening device 3 so that it moves from a position forward of the sharpening device 3 to a position rearward thereof. The point of application of force to the back edge 10 of the knife blade 4 is therefore moved from one side to the other of the sharpening device 3 and back again as the knife blade 4 is inserted into and withdrawn from the blade sharpener 1. That enables the point of application of force to be kept relatively near to the sharpening device 3 under all conditions of use of the sharpener 1 and that ensures maintenance of sharpening contact between the blade 4 and the device 3. Also the foregoing configuration and manner of operation enables the maximum sharpening force to be applied at the blade tip 7 rather than being expended before the tip 7 reaches the sharpening device 3.

The biasing means 32 for urging the lever 31 into contact with the blade back edge 10 may be of any convenient form and configuration. In the example shown, the biasing means 32 comprises a coil spring 39 having laterally extending arms 40 and 41 (Figure 1) at respective opposite ends thereof. The spring 39 is located around a pin 42 (Figure 5) which forms part of the pivotal mounting 34 of the lever 31, and the arms 40 and 41 engage the lever 31 and the structure upper wall 14 respectively. The spring 31 is preloaded so that the arms 40 and 41 act as torsion arms urging the lever 31 into the rest position as shown in Figure 1. By way of example, such preloading may involve 300° movement of the arms 40 and 41 relative to one another from the position at which the spring 39 is relaxed.

The optimum configuration and various dimensions of the components of the sharpener 1 may be different for different knife blades. In the example of a filleting knife or other knife having a blade depth increasing from 0 to about 23 mm, the lever 31 may be about 33 mm long (pivot 34 to contact point 38) and have its pivot 34 located about 23 mm forward of the sharpening device 3, and the angle (Figure 13) without a knife in the sharpener 1 may be about 67°.

In the construction shown, the sharpener 1 is provided with a ramp 43 which slopes upwardly and rearwardly towards the sharpening recess 26 (Figure 4). A guide slot 44 may be provided at the

upper end of the ramp 43 so as to slidably receive and guide the cutting edge 6 of a blade 4 being moved into the recess 26. When the lever 31 is in the rest position, a lower terminal end surface 45 of the lever 31 is preferably located close to an opposed surface 46 of the structure 2 which is coincident with the upper end of the ramp 43. As a result, the lever 31 substantially closes the access opening 5 when in the rest position. At least, the lever 31 closes the opening 5 to such an extent that a blade 4 cannot be moved through the opening 5 to engage the sharpening device 3 without first engaging the lower end portion 35 of the lever 31. A guide groove 47 is preferably formed in the front side of the lever 31 so as to slidably receive and guide the back edge 10 of a blade 4 being moved through the opening 5. The groove 47 and slot 44 thereby combine to ensure that the blade 4 is restrained against lateral tilting during a sharpening operation.

When a blade 4 is introduced into the opening 5, the tip 7 engages the lever 31 at or near the terminal end surface 45 and the lever 31 is caused to swing rearwardly and upwardly to bear against the back edge 10 of the blade 4 as that blade 4 is moved further through the opening 5. As the knife tip 7 engages with the sharpening device 3, that device 3 swings rearwardly about its pivot and thereby prevents jamming of the blade 4 within the sharpening recess 26.

The force applied to the back edge 10 of the knife blade 4 by the lever 31 ensures that the extreme tip 7 of the blade 4 is pushed into the base of the sharpening recess 26 and consequently the sharpening action will commence at the extreme tip 7. That is, the sharpening elements 27 engage with and move along respective opposite sides of the cutting edge 6 up to the tip 7 of the blade 4. As the blade 4 is moved further into the sharpener 1, it presents a greater depth between the lever 31 and the device 3, and the lever 31 swings about its pivot 34 to compensate for that increase (see Figure 11). The lever 31, however, remains in contact with the blade back edge 10 and continues to apply force thereto to maintain the cutting edge 6 in contact with the sharpening device 3.

When the knife blade 4 is being withdrawn from the sharpener 1 (Figure 12), the sharpening device 3 swings forward on its pivot mounting so that the cutting edge 6 runs through the sharpening recess 26 at an acute angle. The lower portion 35 of the lever 31 continues to apply force to the back edge 10 of the knife blade 4 throughout the withdrawal movement and particularly until the extreme tip 7 of the knife blade 4 separates from the sharpening elements 27.

The inclination of the lever 31 is such that the frictional resistance to withdrawal of the knife blade 4 will be greater than the frictional resistance to insertion of the blade 4. That arises because the frictional force at the back edge 10 acts in the forward direction when the knife blade 4 is being inserted and, because of the rearward inclination of the lever 31, thereby reduces the

resulting component of force acting upwardly along the line of the lever 31. Another component of the frictional force acts vertically upwardly and thereby reduces the reactive sharpening force on the knife blade 4. Conversely, when the knife blade 4 is being withdrawn, the frictional force acts rearwardly and can be analysed into components comprising a downward force which augments the sharpening force and a force which acts upwardly along the general line of the lever 31. The foregoing provides something of a safety feature because it is easier to insert a blade 4 into the sharpener 1 than to withdraw a blade 4 from the sharpener 1.

It will be apparent from the foregoing that a sharpener 1 according to the present invention enables a knife blade 4 to be sharpened effectively right up to the extreme tip 7 of that blade 4.

The scabbard 11 of the preferred embodiment shown, provides both a protective sheath for a blade 4 and also a mounting for the structure 2. The scabbard 11 as shown has a guide plate 48 which extends angularly outwards away from the structure 2 so that the user can readily insert a knife blade 4 into the access opening 5 (Figure 7). The guide plate 48 is preferably provided with a fastening passage 49 at the back surface thereof to enable the scabbard 11 to be attached to a belt, for example. In an alternative arrangement not shown, a resilient jaw may be substituted for the passage 49 to enable the scabbard 11 to be hooked onto a support. The guide plate 48 is at a small angle to the general direction of the scabbard 11 so as to keep the knife handle 8 displaced outwardly from the guide plate 48 as shown in Figure 7 and thereby enable the user to readily grip the handle 8.

Claims

1. A blade sharpener including, a mounting structure (2) having an access opening (5) through which a blade (4) can be moved, a sharpening device (3) connected to said structure (2) adjacent a lower extremity of said opening (5) so as to be engaged by the cutting edge (6) of a blade (4) located within said opening (5), and a reaction member (31) having an upper portion (33) pivotally connected to said structure (2) adjacent an upper extremity of said opening (5) and a lower portion (35) arranged to engage a back edge (10) of a blade (4) located in said opening (5) so as to press the cutting edge (6) of the blade (4) against said sharpening device (3); characterised in that said reaction member (31) is resiliently urged about said pivotal connection (34) in a forward direction towards a rest position at which it substantially closes said opening (5) and at which said lower portion (35) is located forwardly of said sharpening device (3) and rearwardly of the axis of said pivotal connection (34), the arrangement being such that said reaction member (31) is caused to swing rearwardly about said pivotal connection (34) in response to engagement by a blade (4) being moved rear-



upper end of the ramp 43 so as to slidably receive and guide the cutting edge 6 of a blade 4 being moved into the recess 26. When the lever 31 is in the rest position, a lower terminal end surface 45 of the lever 31 is preferably located close to an opposed surface 46 of the structure 2 which is coincident with the upper end of the ramp 43. As a result, the lever 31 substantially closes the access opening 5 when in the rest position. At least, the lever 31 closes the opening 5 to such an extent that a blade 4 cannot be moved through the opening 5 to engage the sharpening device 3 without first engaging the lower end portion 35 of the lever 31. A guide groove 47 is preferably formed in the front side of the lever 31 so as to slidably receive and guide the back edge 10 of a blade 4 being moved through the opening 5. The groove 47 and slot 44 thereby combine to ensure that the blade 4 is restrained against lateral tilting during a sharpening operation.

When a blade 4 is introduced into the opening 5, the tip 7 engages the lever 31 at or near the terminal end surface 45 and the lever 31 is caused to swing rearwardly and upwardly to bear against the back edge 10 of the blade 4 as that blade 4 is moved further through the opening 5. As the knife tip 7 engages with the sharpening device 3, that device 3 swings rearwardly about its pivot and thereby prevents jamming of the blade 4 within the sharpening recess 26.

The force applied to the back edge 10 of the knife blade 4 by the lever 31 ensures that the extreme tip 7 of the blade 4 is pushed into the base of the sharpening recess 26 and consequently the sharpening action will commence at the extreme tip 7. That is, the sharpening elements 27 engage with and move along respective opposite sides of the cutting edge 6 up to the tip 7 of the blade 4. As the blade 4 is moved further into the sharpener 1, it presents a greater depth between the lever 31 and the device 3, and the lever 31 swings about its pivot 34 to compensate for that increase (see Figure 11). The lever 31, however, remains in contact with the blade back edge 10 and continues to apply force thereto to maintain the cutting edge 6 in contact with the sharpening device 3.

When the knife blade 4 is being withdrawn from the sharpener 1 (Figure 12), the sharpening device 3 swings forward on its pivot mounting so that the cutting edge 6 runs through the sharpening recess 26 at an acute angle. The lower portion 35 of the lever 31 continues to apply force to the back edge 10 of the knife blade 4 throughout the withdrawal movement and particularly until the extreme tip 7 of the knife blade 4 separates from the sharpening elements 27.

The inclination of the lever 31 is such that the frictional resistance to withdrawal of the knife blade 4 will be greater than the frictional resistance to insertion of the blade 4. That arises because the frictional force at the back edge 10 acts in the forward direction when the knife blade 4 is being inserted and, because of the rearward inclination of the lever 31, thereby reduces the

resulting component of force acting upwardly along the line of the lever 31. Another component of the frictional force acts vertically upwardly and thereby reduces the reactive sharpening force on the knife blade 4. Conversely, when the knife blade 4 is being withdrawn, the frictional force acts rearwardly and can be analysed into components comprising a downward force which augments the sharpening force and a force which acts upwardly along the general line of the lever 31. The foregoing provides something of a safety feature because it is easier to insert a blade 4 into the sharpener 1 than to withdraw a blade 4 from the sharpener 1.

It will be apparent from the foregoing that a sharpener 1 according to the present invention enables a knife blade 4 to be sharpened effectively right up to the extreme tip 7 of that blade 4.

The scabbard 11 of the preferred embodiment shown, provides both a protective sheath for a blade 4 and also a mounting for the structure 2. The scabbard 11 as shown has a guide plate 48 which extends angularly outwards away from the structure 2 so that the user can readily insert a knife blade 4 into the access opening 5 (Figure 7). The guide plate 48 is preferably provided with a fastening passage 49 at the back surface thereof to enable the scabbard 11 to be attached to a belt, for example. In an alternative arrangement not shown, a resilient jaw may be substituted for the passage 49 to enable the scabbard 11 to be hooked onto a support. The guide plate 48 is at a small angle to the general direction of the scabbard 11 so as to keep the knife handle 8 displaced outwardly from the guide plate 48 as shown in Figure 7 and thereby enable the user to readily grip the handle 8.

Claims

1. A blade sharpener including, a mounting structure (2) having an access opening (5) through which a blade (4) can be moved, a sharpening device (3) connected to said structure (2) adjacent a lower extremity of said opening (5) so as to be engaged by the cutting edge (6) of a blade (4) located within said opening (5), and a reaction member (31) having an upper portion (33) pivotally connected to said structure (2) adjacent an upper extremity of said opening (5) and a lower portion (35) arranged to engage a back edge (10) of a blade (4) located in said opening (5) so as to press the cutting edge (6) of the blade (4) against said sharpening device (3); characterised in that said reaction member (31) is resiliently urged about said pivotal connection (34) in a forward direction towards a rest position at which it substantially closes said opening (5) and at which said lower portion (35) is located forwardly of said sharpening device (3) and rearwardly of the axis of said pivotal connection (34), the arrangement being such that said reaction member (31) is caused to swing rearwardly about said pivotal connection (34) in response to engagement by a blade (4) being moved rear-



wardly through said opening (5), whereby said lower portion (35) is moved away from said rest position to pass over and rearwardly of said sharpening device (3).

2. A blade sharpener according to claim 1, wherein said lower portion (35) is arranged to be engaged by a blade (4) being moved rearwardly through said opening (5) prior to that blade (4) engaging said sharpening device (3).

3. A blade sharpener according to claim 1 or 2, wherein said sharpening device (3) includes a sharpening recess (26) which receives the cutting edge (6) of a blade (4) to be sharpened by said device (3), and said structure (2) includes a ramp (43) which slopes downwardly and forwardly from said sharpening recess (26).

4. A blade sharpener according to claim 3, wherein a guide slot (44) for slidably receiving a blade cutting edge (6) is located at an upper end portion of said ramp (43).

5. A blade sharpener according to claim 3 or 4, wherein said sharpening device (3) includes a base member (28) and a pair of sharpening elements (27) attached to said base member (28) and arranged to define said sharpening recess (26) between them, and said base member (28) is pivotally mounted on said structure (2) for limited rocking movement in the direction of movement of a blade (4) passing through said opening (5).

6. A blade sharpener according to any preceding claim, wherein a guide groove (47) for slidably receiving the back edge portion of a blade (4) is formed in a front side of said reaction member (31) and extends in a direction from said lower portion (35) towards said upper portion (33).

7. A blade sharpener according to any preceding claim, wherein a lower end surface (45) of said reaction member (31) is located close to an opposed surface (46) of said structure (2) when said reaction member (31) is in said rest position.

8. A blade sharpener according to any preceding claim, wherein said reaction member (31) is resiliently urged about said pivotal connection (34) by biasing means (32).

9. A blade sharpener according to any preceding claim, wherein said mounting structure (2) is a sleeve-like member having a passage there-through which forms said access opening (5), and said mounting structure (2) is connected to an end (16) of a hollow scabbard (11) arranged to receive and protect a blade (4) which extends through and rearwardly beyond said access opening (5).

10. A blade sharpener according to claim 9, wherein a guide plate (48) extends from said scabbard end (16) and is located at one side of said scabbard (11) to guide a blade (4) into said access opening (5).

11. A blade sharpener according to claim 10, wherein said guide plate (48) extends angularly relative to the longitudinal axis of a blade (4) located within said scabbard (11).

12. A blade sharpener according to any one of

claims 1 to 8, wherein said mounting structure (2) forms part of a hollow scabbard (11) which encloses and protects a blade (4) passed through said opening (5).

13. A blade sharpener according to claim 8, wherein said biasing means (32) includes a coil spring (39) located at said pivotal connection (34) and having two arms (40, 41) which engage said structure (2) and said reaction member (31) respectively.

14. A blade sharpener according to any preceding claim, wherein said reaction member (31) is in the form of a lever having said upper and lower portions (33, 35) at respective opposite ends thereof, and when said lever (31) is at said rest position the longitudinal axis (36) thereof extends at an angle within a range of 60 to 70 degrees relative to the general direction of movement of a blade (4) passing through said opening (5).

15. A blade sharpener according to any one of claims 9 to 11, wherein said connection between the mounting structure (2) and the scabbard (11) includes retaining means (20) which is movable between operative and inoperative positions, and said mounting structure (2) is separable from said scabbard (11) when the retaining means (20) is in its inoperative position.

16. A blade sharpener according to claim 15, wherein at least part of said mounting structure (2) is slidably located within an end portion (16) of said scabbard (11) so as to be surrounded by side walls of said scabbard (11), an aperture (21) is formed through one said side wall (22), and said retaining means (20) includes a laterally projecting button (20) which locates within said aperture (21) when said retaining means (20) is in said operative position, and a flexible connection (23) between said button (20) and said mounting structure (2) which permits said movement between the operative and inoperative positions and which resiliently urges said button (20) into said operative position.

17. A blade sharpener according to claim 16, wherein said flexible connection (23) comprises an arm (23) which is formed integral with said mounting structure (2).

Patentsprüche

1. Klingenschärfer, mit einer Halterungsanordnung (2), die eine Einstecköffnung (5) aufweist, durch die eine Klinge (4) geschoben werden kann, mit einer Schleifeinrichtung (3), die neben einem unteren Ende der Öffnung (5) mit der Anordnung (2) derart verbunden ist, daß in sie (die Schleifeinrichtung) die Schneidkante einer in der Öffnung (5) befindlichen Klinge (4) eingreift, und mit einem Andruckglied (31), das einen bei einem oberen Ende der Öffnung (5) schwenkbar an der Anordnung (2) gehaltenen oberen Abschnitt (33) sowie einen unteren Abschnitt (35) aufweist, der dazu dient, mit einer Rückenkante (10) einer in der Öffnung (5) befindlichen Klinge (4) in Eingriff zu gelangen, um so die Schneid-



kante (6) der Klinge (4) gegen die Schleifeinrichtung (3) zu drücken; dadurch gekennzeichnet, daß das Andruckglied (31) bezüglich der Schwenkhalterung (34) in einer Vorwärtsrichtung auf eine Ruheposition zu nachgiebig gedrückt ist, in der es die Öffnung (5) im wesentlichen schließt und in der sich der untere Abschnitt (35) vor der Schleifeinrichtung (3) und hinter der Achse der Schwenkhalterung (34) befindet, wobei die Anordnung derart ist, daß das Andruckglied (31) durch Zusammenwirken mit einer nach hinten durch die Öffnung (5) bewegten Klinge (4) veranlaßt wird, nach hinten um die Schwenkhalterung (34) herum zu schwenken, wobei der untere Abschnitt (35) aus der Ruhelage wegbewegt wird, um über und hinter die Schleifeinrichtung (3) zu gelangen.

2. Klingenschärfer nach Anspruch 1, bei dem der untere Abschnitt (35) derart angeordnet ist, daß er mit einer nach hinten durch die Öffnung (5) bewegten Klinge (4) in Eingriff gelangt, bevor die Klinge (4) in Eingriff mit der Schleifeinrichtung (3) kommt.

3. Klingenschärfer nach den Ansprüchen 1 oder 2, bei dem die Schleifeinrichtung (3) eine Schleifkerbe (26) aufweist, die die Schneidkante (6) der durch die Einrichtung (3) zu schärfenden Klinge (4) aufnimmt, und bei dem die Anordnung eine Rampe (43) aufweist, die von der Schleifkerbe (26) aus schräg nach unten und nach vorne geht.

4. Klingenschärfer nach Anspruch 3, bei dem an dem oberen Endabschnitt der Rampe (43) ein Führungsschlitz (44) angeordnet ist, um eine Klingenschneidkante (6) gleitend aufzunehmen.

5. Klingenschärfer nach den Ansprüchen 3 oder 4, bei dem die Schleifeinrichtung (3) ein Trägerelement (28) und ein Paar Schleifelemente (27) aufweist, die mit dem Trägerelement (28) verbunden und so angeordnet sind, daß sie zwischen sich die Schleifkerbe (26) begrenzen, und bei dem das Trägerelement (28) im Sinne einer begrenzten Kippbewegung in Bewegungsrichtung einer durch die Öffnung (5) bewegten Klinge (4) schwenkbar an der Anordnung (2) gelagert ist.

6. Klingenschärfer nach einem der vorhergehenden Ansprüche, bei dem in eine Vorderseite des Andruckgliedes (31) zur gleitenden Aufnahme der Rückenkante einer Klinge (4) eine Führungsnut (47) eingeformt ist, die sich in Richtung von dem unteren Abschnitt (35) zu dem oberen Abschnitt (33) erstreckt.

7. Klingenschärfer nach einem der vorhergehenden Ansprüche, bei dem eine untere Endfläche (45) des Andruckgliedes (31) sich nahe bei einer gegenüberliegenden Fläche (46) der Anordnung (2) befindet, wenn sich das Andruckglied (31) in der Ruhelage befindet.

8. Klingenschärfer nach einem der vorhergehenden Ansprüche, bei dem das Andruckglied (31) durch vorspannende Mittel (32) federnd um die Schwenkhalterung (34) vorgespannt ist.

9. Klingenschärfer nach einem der vorhergehenden Ansprüche, bei dem die Halterungsanordnung (2) ein hülsenartiges Teil mit einem hindurchführenden Durchgang ist, der die Einstek-

köffnung (5) bildet, und bei dem die Halterungsanordnung (2) mit einem Ende (16) einer hohlen Scheide (11) verbunden ist, die dazu vorgesehen ist, eine Klinge (4), die sich durch die Einsteköffnung (5) hindurch und nach hinten über diese hinaus erstreckt, aufzunehmen und zu schützen.

10. Klingenschärfer nach Anspruch 9, bei dem von dem Ende (16) der Scheide eine Führungsplatte (48) ausgeht, die an einer Seite der Scheide (11) angeordnet ist, um eine Klinge (4) in die Einsteköffnung (5) zu führen.

11. Klingenschärfer nach Anspruch 10, bei dem die Führungsplatte (48) unter einem Winkel zu der Längsachse einer in der Scheide (11) befindlichen Klinge (4) verläuft.

12. Klingenschärfer nach einem der Ansprüche 1 bis 8, bei den die Halterungsanordnung (2) Teil einer hohlen Scheide (11) ist, die eine durch die Öffnung (5) gesteckte Klinge (5) umschließt und schützt.

13. Klingenschärfer nach Anspruch 8, bei dem die vorspannenden Mittel (32) eine Wickelfeder (39) umfassen, die auf der Schwenkhalterung (34) angeordnet ist und zwei Arme (40, 41) aufweist, die mit der Anordnung (2) bzw. mit dem Andruckglied (31) in Eingriff sind.

14. Klingenschärfer nach einem der vorhergehenden Ansprüche, bei dem das Andruckglied (31) die Form eines Hebels mit einem oberen und einem unteren Abschnitt (33, 35) an seinen entsprechend gegenüberliegenden Enden aufweist, und bei dem die Längsachse (36) des Hebels (31) in dessen Ruhestellung in einem Winkel in einem Bereich von 60° bis 70°, bezogen auf die allgemeine Bewegungsrichtung einer Klinge (4), liegt, die durch die Öffnung (5) geschoben wird.

15. Klingenschärfer nach einem der Ansprüche 9 bis 11, bei dem die Verbindung zwischen der Halterungsanordnung (2) und der Scheide (11) Rückhaltemittel (20) aufweist, die zwischen einer wirksamen und einer unwirksamen Stellung verstellbar sind, und bei dem die Halterungsanordnung (2) von der Scheide (11) trennbar ist, wenn die Rückhaltemittel (20) sich in ihrer unwirksamen Stellung befinden.

16. Klingenschärfer nach Anspruch 15, bei dem wenigstens ein Teil der Halterungsanordnung (2) innerhalb eines Endbereiches (16) der Scheide (11) derart eingeschoben angeordnet ist, daß sie von Seitenwänden der Scheide (11) umgeben ist, bei dem in einer Seitenwand (22) eine hindurchgehende Öffnung (21) vorgesehen ist, und bei dem die Rückhaltemittel (20) einen seitlich vorspringenden Knopf (20), der sich in der Öffnung (21) befindet, wenn die Rückhaltemittel (20) in der wirksamen Stellung sind, sowie eine biegsame Verbindung (23) zwischen dem Knopf (20) und der Halterungsanordnung (2) aufweisen, welche die Bewegung zwischen der wirksamen und der unwirksamen Stellung ermöglicht und den Knopf (20) federnd in die wirksame Stellung vorspannt.

17. Klingenschärfer nach Anspruch 16, bei dem die biegsame Verbindung (23) einen Arm (23) aufweist, der einstückig mit der Halterungsanordnung (2) ausgebildet ist.



Revendications

1. Affûtoir de lames comprenant: une structure de montage (2) présentant une ouverture d'accès (5) à travers laquelle on peut faire passer une lame (4), un dispositif d'affûtage (3) relié à ladite structure (2) dans la région adjacente à une extrémité inférieure de ladite ouverture (5), de façon à être attaqué par l'arête tranchante (6) d'une lame (4) placée dans ladite ouverture (5), et un organe de réaction (31) possédant une partie supérieure (33) reliée à l'articulation à ladite structure (2) à proximité d'une extrémité supérieure de ladite ouverture (5) et une partie inférieure (35) agencée pour attaquer le dos (10) d'une lame (4) placée dans ladite ouverture (5) de manière à presser l'arête tranchante (6) de la lame (4) contre ledit dispositif d'affûtage (3), caractérisé en ce que ledit élément de réaction (31) est sollicité élastiquement pour tourner autour de ladite articulation (34) dans la direction avant, vers une position de repos dans laquelle il ferme pratiquement ladite ouverture (5) et dans laquelle ladite partie inférieure (35) est située en avant dudit dispositif d'affûtage (3) et en arrière de l'axe de ladite articulation (34), l'agencement étant tel que ledit organe de réaction (31) soit contraint à pivoter vers l'arrière autour de ladite articulation (34) en réponse à l'attaque par une lame (4) qui est tirée vers l'arrière à travers ladite ouverture (5), de sorte que la partie inférieure (35) est ainsi écartée de ladite position de repos pour franchir ledit dispositif d'affûtage (3) et se placer en arrière de ce dispositif.

2. Affûtoir de lames selon la revendication 1, dans lequel la partie inférieure (35) est agencée pour être attaquée par une lame (4) que l'on déplace vers l'arrière à travers ladite ouverture (5) avant que la lame (4) n'attaque le dispositif d'affûtage (3).

3. Affûtoir de lames selon la revendication 1 ou 2, dans lequel ledit dispositif d'affûtage (3) comprend une encoche d'affûtage (26) qui reçoit l'arête tranchante (6) d'une lame (4) qui doit être affûtée par ledit dispositif (26), et ladite structure (2) comprend une rampe (43) qui est inclinée vers le bas et vers l'avant à partir de ladite encoche d'affûtage (26).

4. Affûtoir de lames selon la revendication 3, dans lequel une fente de guidage (44) destinée à recevoir à glissement une arête tranchante de lame (6) est placée à une partie d'extrémité supérieure de ladite rampe (43).

5. Affûtoir de lames selon la revendication 3 ou 4, dans lequel ledit dispositif d'affûtage (3) comprend un élément de base (28) et une paire d'éléments d'affûtage (27) fixés audit élément de base (28) et agencés pour définir ladite encoche d'affûtage (26) entre ces éléments, et ledit élément de base (28) est articulé sur ladite structure (2) pour pouvoir décrire un mouvement de basculement limité dans le sens du mouvement d'une lame (4) qui passe à travers ladite ouverture (5).

6. Affûtoir de lames selon une quelconque des revendications précédentes, dans lequel une rai-

nure de guidage (47) destinée à recevoir le dos d'une lame (4) est formée dans un côté avant dudit élément de réaction (31) et s'étend dans un sens allant de ladite partie inférieure (35) vers ladite partie supérieure (33).

7. Affûtoir de lames selon une quelconque des revendications précédentes, dans lequel une surface d'extrémité inférieure (45) dudit organe de réaction (31) est placée à proximité d'une surface opposée (46) de ladite structure (2) lorsque ledit élément de réaction (31) se trouve dans ladite position de repos.

8. Affûtoir de lames selon une quelconque des revendications précédentes, dans lequel ledit organe de réaction (31) est sollicité élastiquement pour tourner autour de ladite articulation (34) par des moyens de sollicitation (32).

9. Affûtoir de lames selon une quelconque des revendications précédentes, dans lequel ledit organe de réaction (31) est un élément en forme de manchon présentant un passage traversant qui forme ladite ouverture d'accès (5) et ladite structure de montage (2) est reliée à une extrémité (16) d'un fourreau creux (11) agencé pour recevoir et protéger une lame (4) qui s'étend à travers ladite ouverture d'accès (5) et se prolonge vers l'arrière au-delà de cette ouverture.

10. Affûtoir de lames selon la revendication 9, dans lequel une plaque de guidage (48) s'étend à partir de ladite extrémité (7) du fourreau et est placée sur un côté dudit fourreau (11) pour guider une lame (4) qui s'engage dans ladite ouverture d'accès (5).

11. Affûtoir de lames selon la revendication 10, dans lequel ladite plaque de guidage (48) s'étend en formant un angle par rapport à l'axe longitudinal d'une lame (4) logée dans ledit fourreau (11).

12. Affûtoir de lames selon une quelconque des revendications 1 à 8, dans lequel ladite structure de montage (2) fait partie d'un fourreau creux (11) qui enferme et protège une lame (4) qui est passée à travers ladite ouverture (5).

13. Affûtoir de lames selon la revendication 8, dans lequel lesdits moyens de sollicitation (32) comprennent un ressort hélicoïdal (39) placé au niveau de ladite articulation (34) et possédant deux branches (40, 41) qui attaquent respectivement ladite structure (2) et ledit élément de réaction (31).

14. Affûtoir de lames selon une quelconque des revendications précédentes, dans lequel ledit organe de réaction (31) présente la forme d'un levier qui présente desdites parties supérieure et inférieure (33, 35) à ses extrémités opposées respectives et, lorsque ledit levier (31) se trouve dans ladite position de repos, son axe longitudinal (36) forme un angle compris dans l'intervalle de 60 à 70° par rapport à la direction générale du mouvement d'une lame (4) qui passe à travers ladite ouverture (5).

15. Affûtoir de lames selon une quelconque des revendications 9 à 11, dans lequel ladite liaison entre la structure de montage (2) et le fourreau (11) comprend des moyens de retenue (20) qui peuvent se déplacer entre une position active et



une position inactive et ladite structure de montage (2) peut être séparée dudit fourreau (11) lorsque les moyens de retenue (20) se trouvent dans leur position inactive.

16. Affûtoir de lames selon la revendication 5, dans lequel au moins une partie de ladite structure de montage (2) est montée coulissante dans une partie de l'extrémité (16) dudit fourreau (11) de manière à être entourée par les parois latérales dudit fourreau (11), une ouverture (21) est formée à travers ladite paroi latérale (22) et lesdits moyens de retenue (20) comprennent un bouton (20) en saillie latérale qui se trouve dans ladite

ouverture (21) lorsque lesdits moyens de retenue (20) se trouve dans ladite position active, et une liaison flexible (23) interposée entre ledit bouton (20) et ladite structure de montage (2) qui permet ledit déplacement entre la position active et la position inactive, et qui tend élastiquement à placer ledit bouton (20) dans ladite position active.

17. Affûtoir de lames selon la revendication 16, dans lequel ladite liaison flexible (23) comprend un bras (23) qui est formé d'une seule pièce avec ladite structure de montage (2).

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