July 15, 1941. A. E. MEADE ET AL 2,249,218

KNIFE SHARPENER

Filed March 8, 1939 2 Sheets-Sheet 1

Fig. 1.

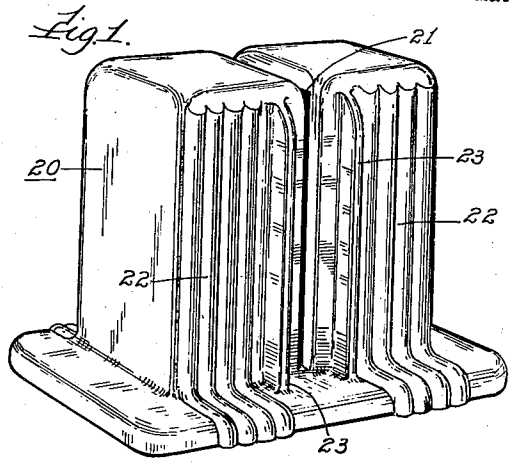


Fig. 2.

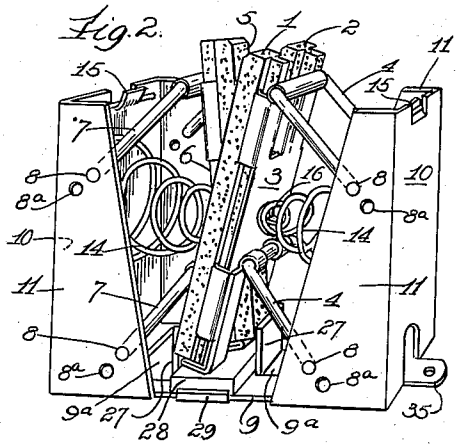


Fig. 3.

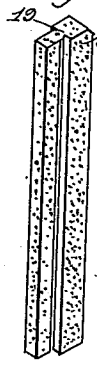


Fig. 4.

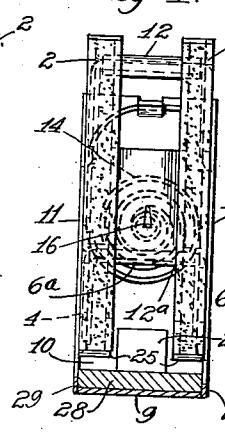


Fig. 5.

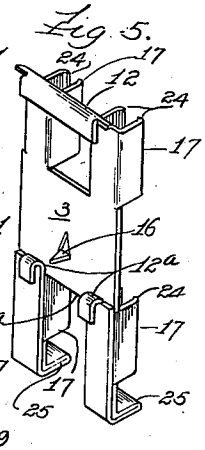


Fig. 6

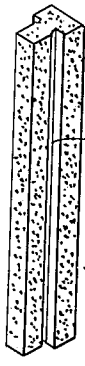


Fig. 7.

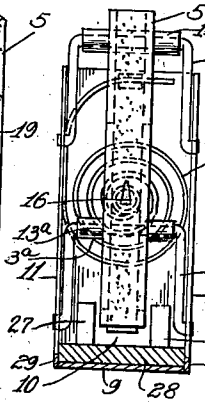


Fig. 8.

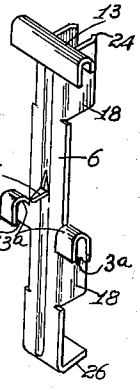


Fig. 9.

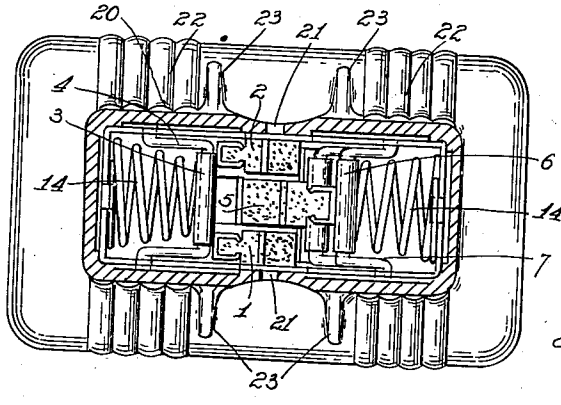
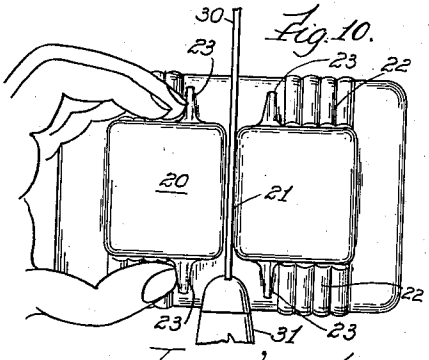


Fig. 10.



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Fig. 11.

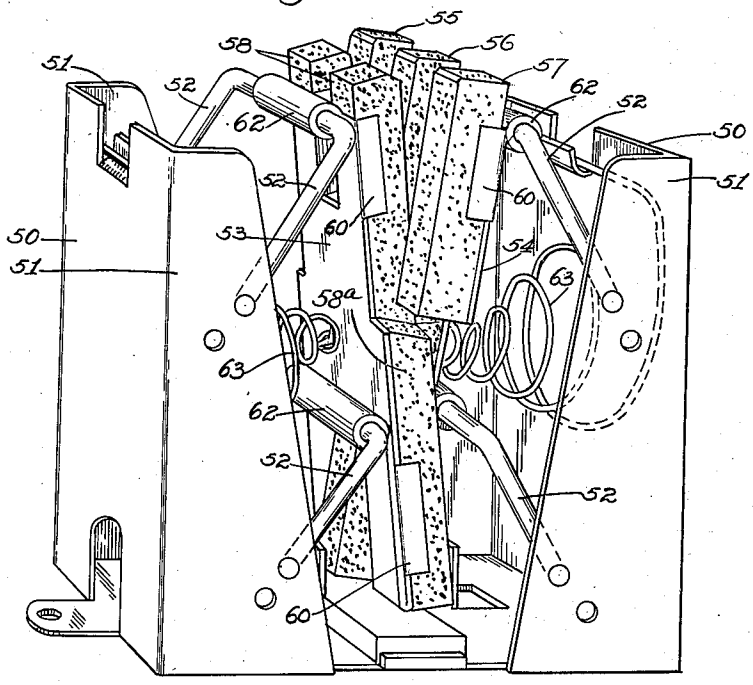


Fig 12.

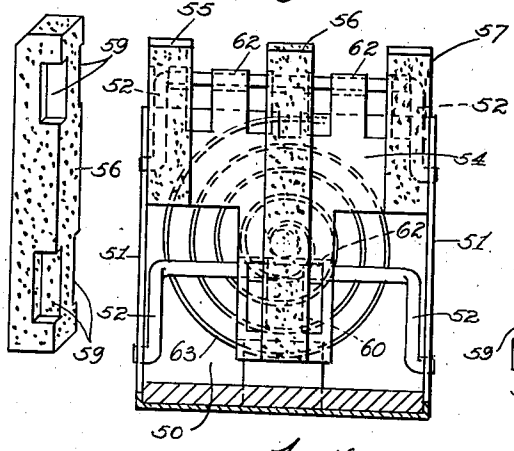


Fig. 13.

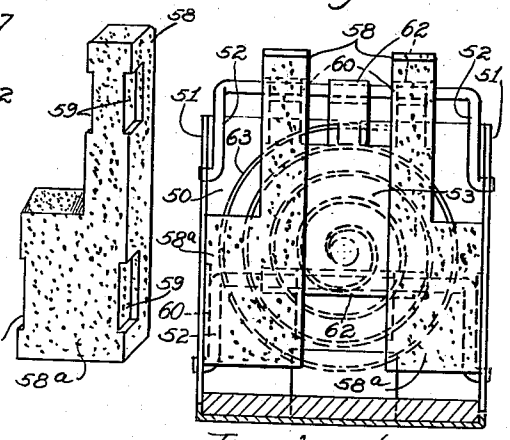
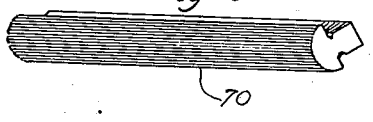


Fig 14.

Fig 15.

Fig 16.



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UNITED STATES PATENT OFFICE

2,249,218

KNIFE SHARPENER

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Application March 8, 1939, Serial No. 260,581

10 Claims. (Cl. 51—214)

This invention relates to sharpening devices designed for sharpening or honing the cutting edge of a knife or like implement, the particular operation depending upon the abrading element employed; and the invention is shown embodied in a structure of the type in which the knife is moved in the direction of its cutting edge with respect to the sharpening or honing means for securing the desired abrasive or edge-straightening action.

One object of the invention is to provide a neat and simple portable knife sharpener suitable for household and like use, and particularly for keeping the usual supply of kitchen knives in proper working condition. Another object is to provide a yielding mounting for the abrasive sharpening members adapting them to be shifted readily upon introduction of the knife between them so that the sharpening action may be well distributed over the surfaces of said members. Another object is to provide a novel method of so-called "steeling" or straightening the cutting edges of knives by employing smooth steel blocks in place of abrasive stones. A further object is to provide carrying means for the abrasive members designed to maintain them in fixed angular relation to each other throughout their range of yielding movement, and also to provide guiding means for holding the knife blade in proper relation to the abrading or honing members to insure the formation of a correct and uniform bevel at its cutting edge. It is also an object of the invention to provide a design adapted for economical construction and assembly. Other objects will appear as the description proceeds.

The invention thus consists in certain features and elements of construction in combination as herein shown and described and as indicated by the claims.

In the drawings:

Fig. 1 is a perspective view showing the exterior of a knife sharpener embodying this invention and enclosed in a suitable casing.

Fig. 2 is a perspective view of the supporting frame and associated mechanism of the knife sharpener with the casing removed.

Fig. 3 is a perspective view of one of the abrading members.

Fig. 4 is a vertical sectional view through the mechanism looking at the face of the abrading members and their holder.

Fig. 5 is a perspective view of the holder shown in Fig. 4.

Fig. 6 is a perspective view of a cooperating abrading member.

Fig. 7 is a vertical section similar to Fig. 4, but looking in the opposite direction, and including a face view of the abrading member of Fig. 6, together with its holder.

Fig. 8 is a perspective view of the holder shown in Fig. 7.

Fig. 9 is a plan section taken just above the mechanism within the casing.

Fig. 10 is a top plan view showing the sharpener in the position of use, and indicating the function of the guard flanges for protecting the fingers from the knife blade which is being sharpened.

Fig. 11 is a perspective view similar to Fig. 2, but showing a modified arrangement of abrading members.

Fig. 12 is a perspective view of one of the abrading members of the mechanism shown in Fig. 11.

Fig. 13 is a vertical section showing one set of abrading members and their supporting holder.

Fig. 14 is a perspective view of one of the abrading members of the opposing set.

Fig. 15 is a vertical section including a face view of the opposing set of abrading members as supported on their holder.

Fig. 16 is a perspective view of one of the honing members adapted to be substituted for the abrading members shown in the other views.

Referring first to Fig. 2, it may be understood that the sharpening device of this invention comprises abrading stones or holders disposed at an angle to each other and in somewhat interlapping relation, so that a knife blade may be introduced edgewise into the angular gap between the abrading stones, and may then be reciprocated in the direction of its cutting edge with some vertical movement in its own plane to secure the sharpening effect. In the form of the device illustrated in Figs. 1 to 10, one pair of abrading stones 1 and 2 is supported in a holder 3 which may be constructed of bent sheet metal, and which is carried by a pair of parallel links 4, 4. A cooperating abrading stone 5 extends at an angle to the stones 1 and 2 and is interlapped with them, being supported by a holder 6, preferably of bent sheet metal, which is carried by parallel links 7, 7. The links 4 and 7 are formed with cranked end portions which engage pivot apertures 8 in a supporting shell, which may also be formed of sheet metal, and which, as shown, consists of a bottom wall 9,

with upstanding end walls 10, 10 and side flanges 11 which contain the pivot apertures 8.

Each of the links or hangers 4 and 7 may be formed of heavy wire or rod, bent U-shape, with cranked ends, as noted, to engage the pivot apertures 8. The middle portions of the links 4 are journaled in the tubular bearings 12 and 12a, bent from the stock of the holder 3, and the middle portions of the links 7 are similarly journaled in bearings 13 and 13a, formed on the holder 6.

The holders 3 and 6, with their abrading members, are urged toward each other yieldingly by coil springs 14, each reacting between the back of the holder and the inner surface of the adjacent end wall 10 of the shell. A lug 15, bent out of the end wall, serves to anchor the base of the spring 14, and the opposite end of the spring is coiled about a centering lug 16, projecting from the back of the holder (see Figs. 4 and 8). The arms of the two links 4, 4 and, similarly, the arms of the two links 7, 7, are parallel to each other, so that any movement of either holder 3 or 6 toward or from the end wall 10 of the shell, takes place under control of these parallel links or cranks, with the result that the abrading members are maintained at all times at positions parallel to their initial positions. Thus, as the abrading stones 1 and 2 on the carrier or holder 3, and the stone 5 on the other holder 6, are forced apart by the insertion of a knife blade between them, the stones maintain their original angular relation to each other, with the result that a definite angle of bevel is produced at the cutting edge of the knife. At the same time, the yielding movements of the abrading stones on their holders are easy swinging movements.

And a further advantage of the parallel link mounting of the stones is secured by arranging these parallel links or hangers 4 and 7, so that they initially extend obliquely upward from their pivot bearings 8; thus, when the abrading stones are forced back toward the end walls 10 of the shell, they are simultaneously swung upwardly in arcs controlled by the links 4 and 7, and this movement, combined with the reciprocation of the knife blade in its own plane, produces an effective honing action which very rapidly results in a keen edge on the blade.

To secure full advantage of the maintenance of a uniform angle between the abrading stones of the sharpener mechanism, the enclosing case 20, shown in Figs. 1, 9 and 10, includes a central vertical slot 21, which serves as a guide for the blade of the knife, and maintains it in a vertical plane bisecting the angle between the working faces of the abrading stones 1, 2 and 5. Thus, the faces of the knife blade are prevented from becoming scratched by the abrasive material, and if the casing 20 is molded of plastic material, such as "Bakelite," the blade will not be marred by its contact with the edges of the slot 21. Preferably, the external faces of the casing 20 are designed with corrugations 22, which afford convenient gripping surfaces; and at opposite sides of the slot 21 the casing includes guard flanges 23, which extend in position to protect the thumb and fingers of the hand which holds the casing steady while the device is in use. This relation is indicated clearly in Fig. 10, which shows a plan view of the device with the casing being held by the fingers of the left-hand, while the knife blade 30 is positioned in the slot 21, so as to be reciprocated therein by the right-hand. The guard flanges 23 prevent the thumb and fingers from grasping the casing too close to slot 21. At the same time, the two guard flanges at each side of the casing are set far enough apart to permit the handle portion 31 of the knife to approach as closely as possible to the outer wall of the casing 20, adjacent the slot 21.

In order to secure abrasive action of the stones against the cutting edge of the knife as close to the hilt or handle as possible, it is necessary to have the abrading surfaces extend closely proximate to the inner faces of the confining walls of the casing. In the structure shown in Figs. 1 to 10, this is accomplished by employing stones of T-shaped cross-section, so that the lugs 17 of the holder 3 and the lugs 18 of the holder 6 may embrace the stem portion of the T-shaped stones, allowing the broader portions, which include the abrading surfaces, to project laterally beyond the outlines of the holders, and thus to extend as close as possible to the inner surfaces of the casing walls, with safe working clearance.

The lugs 17 and 18, being bent from a sheet metal blank, may be slightly sprung so as to engage frictionally with the surfaces of the stones 1, 2 and 5, and the abrasive nature of these surfaces will ordinarily furnish sufficient friction to insure their retention by the holders. However, as a further precaution to prevent the stones from dropping out of place when the device is moved about or laid away in a drawer, the stem portions of their T-shaped cross-section may be formed with grooves, as seen at 19, and the extremities of the lugs 17 and 18 may be slightly inturned, as at 24, to interlock with the grooves 19 when the stones are slid into position in the holders. And, to further position the stones definitely, the holder 3 is formed with foot flanges 25, and the holder 6 has a similar foot flange 26, to engage the lower ends of the stones.

To define the initial positions of the abrading members so that they shall form a V-shaped opening in correct registration with the slot 21 of the casing, their initial positions are limited by stop lugs 27, struck up from the bottom wall 9 of the shell, as seen in Fig. 2, and, if desired, the carriers 3 and 6 may be so designed that the lower edge portion 3a (see Fig. 5) simultaneously contacts the face of the single stone 5, while the lower edges 6a of the cross-bar portion from which lugs 13a are formed (see Fig. 8) engage the faces of the two stones 1 and 2, thus supplementing the stop lugs 27 and serving in conjunction with stops 27 to maintain correct registration of both sets of stones with the central guide slot 21 as the working faces of the stones wear down; the springs 14 thus urge the stones into contact with the stops 27 until, upon introduction of the knife blade between them, they are forced back in opposition to the spring pressure. If the knife blade should be carried downwardly past the lower ends of the abrading members, its cutting edge may contact, without injury, a block 28 of hard wood or lead, or other suitable substance, held in position between the stop lugs 27 and flanges 29, turned up from the edges of the bottom wall 9 of the shell.

To provide for altering the angle between the abrasive members so as to produce a different bevel, if desired, at the cutting edge of the knife blade, the flanges 11 of the shell may be fur-

nished with supplemental pivot holes 8a, as shown in Fig. 2. Thus, by shifting the upper link 4 and the upper link 7 into the holes 8a, the stones will be tilted apart at a wider angle; or, by shifting the lower links 4 and 7 into the pivot holes 8a, the angle between the abrading members will be made more acute. It should be understood that the supplemental pivot holes 8a will be so placed as to maintain the parallelism of the links 7, 7 with each other, and of the links 4, 4 with each other, so that the initial angle between the stones will be maintained throughout their yielding movements as the knife blade is reciprocated between them. The mechanism may be secured in the outer casing by providing the shell with lugs 35, apertured to receive fastening screws which will enter suitable tapped holes in the bottom of the casing 20. This will render the mechanism readily removable from the casing for the purpose of adjusting the links to alter the angle of operation, or for replacing the abrading members 1, 2 or 5 when they become unduly worn.

Figs. 11 to 15 illustrate a sharpener embodying the same general principles as that already described, but designed to afford a larger abrasive surface suitable for use with large butcher knives and carving tools, such as those employed in hotels and restaurants. The sheet metal shell for the mechanism is substantially like that shown in Fig. 2, and includes end walls 50 and side flanges 51, in which the swinging links 52 are pivoted to support the holders 53 and 54 for the abrading members. The latter comprise three narrow stones 55, 56 and 57, carried on the holder 54, and two additional stones 58, supported on the holder 53. As seen in Fig. 13, the middle stone, 56, on the holder 54, is full length, but the other two stones, 55 and 57, are only half-length. The lower portions 58a of the stones 58 are more than double width, while the upper portions are substantially similar in width to the stones 55, 56 and 57, and intermember with the latter. The stones 55 and 57 are only half-length, so that they register above the broad portions 58a of the stones 58, in the initial position of the parts, as shown in Fig. 11. Thus, as the knife blade enters between the abrading members, it is engaged by three stones on the one side and two on the opposite side. But as it passes downward between the stones, this relation is reversed, so that in the lower portion of the mechanism the side of the blade which initially engaged the three narrow stones 55, 56 and 57 is engaged by only one of them, the stone 56, while the opposite side is acted upon by the broader abrading surfaces 58a of the two stones 58. And it may be understood that the relative areas and widths of the several stones may be varied from the proportions illustrated so as to accomplish an approximate equalization in the working surfaces which act on opposite sides of the knife blade if it is operated against both upper and lower areas of all the stones. In other words, the middle stone, 56, may be made somewhat broader than shown.

Another important advantage of the arrangement of stones shown in Figs. 11 to 15 is that the half-length stones 55 and 57, occupying spaces above the broad portions 58a of the stones 58, are those disposed closely adjacent the walls of the casing. Thus, at each reciprocation of the knife blade between the stones the abrasive members act upon both sides of the blade at the cutting edge and as close to the hilt or handle as the thickness of the sharpener casing will permit.

Another feature of the modified structure of Figs. 11 to 15, is that the stones are formed with recesses 59, to receive the lugs 60 of the holders 53 and 54. Thus, the lugs fit substantially flush in the lateral faces of the stones, permitting the abrasive surfaces to extend very close to the inner walls of the enclosing casing (not shown). This relation is readily observable in Figs. 13 and 15, which indicate that the abrasive surfaces extend substantially to the planes of the side flanges 51 of the shell which supports the mechanism. In view of the fact that the lugs 60 fit snugly in the recesses 59, it is not necessary to provide foot flanges to support the stones in position on their holders.

It will be understood that the holders 53 and 54 may be formed of sheet metal, and are so illustrated, and that they include tubular bearings 62 for the links 52. These bearing sleeves or tubes 62 stop short of the lateral margins of the holders, so that the arms of the links 52 may be accommodated within the width of the abrasive surfaces, as indicated clearly in Figs. 13 and 15. And in this construction, as in the other, the abrading members are urged toward each other yieldingly by coil springs seen at 63.

Thus, either of the mechanisms herein shown and described provides a convenient and efficient device for quickly putting a keen cutting edge on a knife blade. Preferably, the abrading members will be moistened with water just before use, and this can be done conveniently by holding the slot 21 of the device under a water faucet. The openings 9a in the bottom wall (see Fig. 2) which are formed by striking up the lugs 27, will permit the excess water to drain off promptly. With the smaller mechanism illustrated in Fig. 2 the design of the stones 1, 2 and 5 may be such that the effective working face of the stone 5 is substantially equivalent to that of the two stones 1 and 2, so that both faces of the knife blade receive substantially equal treatment. However, if it is found preferable to make all three stones of the same width, the operation may be approximately equalized by turning the mechanism around at intervals so as to pass the knife through the slot 21, first from one side and then from the other side of the casing.

For putting a keen finish on a knife edge it is usually desirable to employ a hone or a "steel." For this purpose substitute honing elements 70, like that shown in Fig. 16, may be provided for the device of Figs. 1 to 10, and these elements may be slipped into the holders or carriers 3 and 6 in place of the abrasive elements 1, 2 and 5. The working faces of the members 70 are shown as convex, and, if desired, they may be finely milled or grooved like the surface of a "steel" commonly employed for sharpening carving knives and the like. Or, to avoid the inconvenience of taking out the stones and replacing them with the honing members, a second device may be kept at hand, fitted with honing members 70, for the final "steeling" and straightening of the cutting edge.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and re-arrangements of the parts may be made without departing from the spirit and scope of the invention, and that the same is not limited to the particular form

herein shown and described, except in so far as indicated by the appended claims.

We claim:

1. In a knife sharpener which includes a pair of carriers, abrading members on said carriers disposed respectively with their working faces in planes which intersect at an acute angle, a supporting base and a pair of parallel swinging links connecting each carrier to said base, the links of each pair being of equal length, whereby the abrading means on each carrier may be shifted transversely of its working face but maintained with said face always parallel to its initial position.

2. In a knife sharpener which includes a pair of carriers, abrading means on said carriers disposed respectively with their working faces in planes which intersect at an acute angle, a supporting base and a pair of parallel swinging links connecting each carrier to said base, the links of each pair being of equal length, and spring means urging the carriers toward each other to maintain contact of the abrading means with opposite sides of a knife blade inserted between them.

3. In a knife sharpener which includes a pair of carriers, abrading members on said carriers disposed respectively with their working faces in planes which intersect at an acute angle, a supporting base and a pair of parallel swinging links connecting each carrier to said base, the links of each pair being of equal length, the said planes of the working faces of said abrading means extending divergently upward from their line of intersection, and the links of each carrier extending obliquely upward from their pivotal connections with the base, whereby the abrading means move upwardly as they are forced apart by the introduction of a knife blade between their divergent working faces.

4. In a knife sharpener which includes a pair of carriers, abrading members on said carriers disposed respectively with their working faces in planes which intersect at an acute angle, a supporting base and a pair of parallel swinging links connecting each carrier to said base, the links of each pair being of equal length, and means providing for the shifting of the pivotal connections of said links to the base for altering the angle at which the planes of said working faces intersect.

5. In a knife sharpener which includes a pair of carriers, abrading members on said carriers disposed respectively with their working faces in planes which intersect at an acute angle, a supporting base and a pair of parallel swinging links connecting each carrier to said base, the links of each pair being of equal length, and means forming a guide slot for the blade to be sharpened, said slot extending in a plane which substantially bisects the angle between said planes of the working faces.

6. In a knife sharpener which includes a pair of carriers, abrading members on said carriers respectively disposed with their working faces in planes which intersect at an acute angle, spring means urging the carriers toward each other to maintain contact of said abrading members with opposite sides of a knife blade inserted between them, and guiding means controlling the movement of both carriers and maintaining the angular relation between working faces of the abrading members as the latter are forced apart by the introduction of a knife blade between them, together with a housing which encloses the abrading members and their carriers, said housing having a guide slot for the blade to be sharpened disposed in a plane between the planes of the working faces of said abrading members, and said housing having guard flanges projecting exteriorly thereof adjacent the guide slot and vertically co-extensive with the slot.

7. In a knife sharpener which includes a pair of carriers, abrading members on said carriers respectively disposed with their working faces in planes which intersect at an acute angle, spring means urging the carriers toward each other to maintain contact of said abrading members with opposite sides of a knife blade inserted between them, and guiding means controlling the movement of both carriers and maintaining the angular relation between working faces of the abrading members as the latter are forced apart by the introduction and reciprocation of a knife blade between them, the working faces of the abrading members on both carriers extending to the same vertical plane transverse to the direction of reciprocation of the blade for acting upon both sides of the knife blade to the same point in its length.

8. In a knife sharpener which includes a pair of carriers, abrading members on said carriers respectively disposed with their working faces in planes which intersect at an acute angle, spring means urging the carriers toward each other to maintain contact of said abrading members with opposite sides of a knife blade inserted between them, and guiding means controlling the movement of both carriers and maintaining the angular relation between working faces of the abrading members as the latter are forced apart by the introduction and reciprocation of a knife blade between them, said working faces of the abrading members on both carriers extending to the same vertical plane transverse to the direction of reciprocation of the blade at the lateral margins of said working faces, and the marginal portion of an abrading member on one carrier being registered above the marginal portion of an abrading member on the other carrier to provide for abrasive action upon both sides of the knife blade at the same portion of its length when the blade is reciprocated and forced downwardly between the working faces.

9. In a knife sharpener which includes a pair of carriers, abrading members on said carriers respectively disposed with their working faces in planes which intersect at an acute angle, spring means urging the carriers toward each other to maintain contact of said abrading members with opposite sides of a knife blade inserted between them, and guiding means controlling the movement of both carriers and maintaining the angular relation between working faces of the abrading members as the latter are forced apart by the introduction and reciprocation of a knife blade between them, together with a casing enclosing the abrading members and their carriers and having a guide slot in its wall for supporting a knife blade in correct angular relation to the working faces, said faces of the abrading members on both carriers extending to the same vertical plane transverse to the direction of reciprocation of the blade for acting upon both sides of the knife blade to the same point in its length.

10. In a knife sharpener which includes a pair of carriers, abrading members on said carriers respectively disposed with their working faces in planes which intersect at an acute angle, spring means urging the carriers toward each other to

maintain contact of said abrading members with opposite sides of a knife blade inserted between them, guiding means controlling the movement of both carriers and maintaining the angular relation between the working faces of the abrading members, means providing a guide slot for the blade to be sharpened, said slot extending in a plane substantially bisecting the angle between the working faces of said abrading members, and stop means fixed relatively to said guide slot and positioned to engage portions of the working faces of the abrading members respectively and alter the limits of movement of the carriers toward each other in accordance with the wear of said portions of said working faces.

ALEXIS E. MEADE.
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