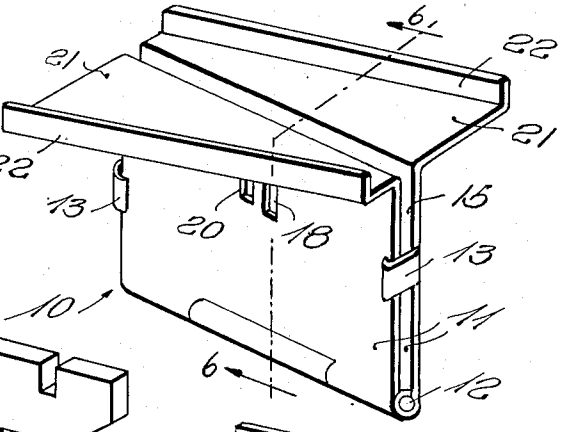
Jan. 29, 1952 W. A. YAEGER 2,584,077

MAINTENANCE OF SERVICEABILITY OF DRY SHAVERS

Filed April 7, 1947

FIG. 3



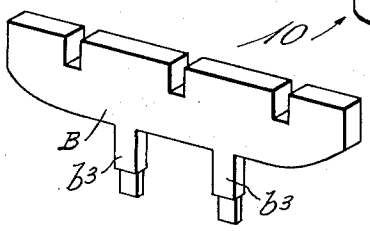


FIG. 2

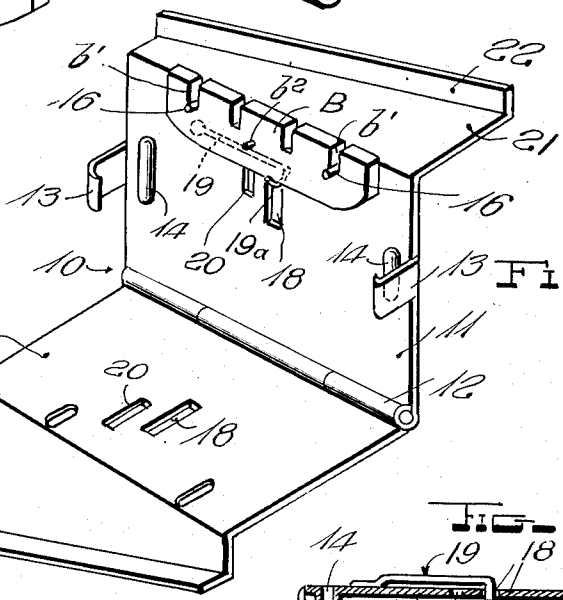


FIG. 4

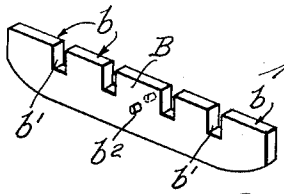
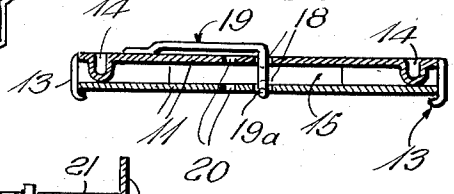


FIG. 1

FIG. 7



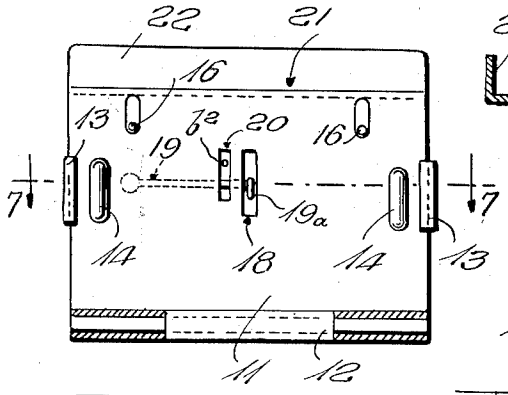


FIG. 5

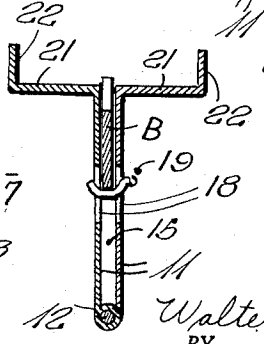


FIG. 6

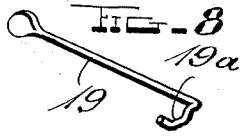


FIG. 8

INVENTOR,
Walter A. Yaeger
BY
Frank L. Allemann,
attorney.

Patented Jan. 29, 1952 2,584,077

UNITED STATES PATENT OFFICE

2,584,077

MAINTENANCE OF SERVICEABILITY OF DRY SHAVERS

Walter A. Yaeger, Norwalk, Ohio

Application April 7, 1947, Serial No. 739,767

10 Claims. (Cl. 51—216)

1

This invention pertains to the honing of the blades of electric or "dry" shavers, relating more particularly to the holder for supporting the blade during the honing operation.

Electric shavers are a modern development in shaving practice, the shavers generally operating without the use of liquids, lathers and the like—usually used during shaving—the action being provided in a different way from that employed by the use of the standard razor structures. Various ways for providing the cutting action have been contemplated, and among these is a standard structure which utilizes what is termed a comb provided with a multiplicity of openings, the lips of which are formed to produce a cutting edge effect; cooperating with the comb is a thin sheet metal blade mounted to swing backward and forward in an arcuate path relative to the lips of these openings, the oscillations of the blade being provided by suitable electrically-driven mechanism.

The success of the shaver depends, of course, upon the coaction of the blade edge with the lips of the openings, the face of the comb being moved across the face of the user, an action which permits the hairs of the face to pass through the comb openings and into the path of oscillating travel of an active edge of the blade, the advance edge of the blade carrying the hair into contact with the lip edge, severing the portion of the hair which has projected through the opening. Since the blade is mounted to oscillatively swing in an arcuate path, the cutting action takes place during both of the strokes of the blade travel. And, as will be understood, the corner edge of the blade must travel in close proximity to the inner face of the opening lips to secure a "clean" shave.

In continuous use of the shaver, the corner edges of the blade tend to become blunted through wear and the active edge of the blade itself may tend to become arc shaped, a condition which tends to reduce the efficiency of the structure during shaving, since the effectiveness depends upon the integrity of such blade edge zone and the clear angular relation between the blade edge and its side faces and which produces the actual cutting effect in connection with the lips of the opening—when such angle is that of a true right angle, the shaver has its most efficient action.

Under service conditions, the tendency to affect the active edge through tending to develop an arcuate trend thereof through wear, sets up less desirable conditions for service and it has been the practice to attempt to meet this by the

2

use of a paste-borne abrasive which is applied to and scoured over the exposed face of the comb. While such action tends to cleanse the surfaces, it also has additional effects in that the abrasive reaching the moving blade can set up an abrading action between blade and the under surface of the cutting lips, a condition which would tend to somewhat accentuate the development of arcuate conditions in connection with the blade, with the additional effect of abrading the cutting lip structure and thus tending to affect the openings of the comb. In other words, the use of such abrasive could serve to deteriorate the effectiveness of the shaver rather than to enhance its serviceability other than merely cleansing.

The present invention serves to produce a different action in attempting to maintain the serviceability of the shaver. In effect, the blade alone is given treatment with a view to restoring the desired blade configuration. To do this, the blade is removed from the shaver and subjected to a honing operation, with the latter provided under very light pressure conditions, the purpose being to restore the active blade edge to its planar form and thereby establish a right angular relation between the plane of such active edge and each of the side planes of the blade; the honing produces this result by a relative movement between the active edge and the hone with the relative movement in a fixed path which extends in directions angular to both the direction of length and of the width of the blade outer face, thus assuring that the planar characteristic of the blade edge will be produced in such way as to set up the right angular form of the outer edge and the sides to thereby produce the sharp corner effect under which the shaver has its best operation.

This result is obtained mainly through the use of a particular form of blade holder which supports the blade relative to a hone travel-path, the blade being so mounted as to be supported by a light spring during the honing operation, so that the pressure between the blade edge and the hone is light, thus securing the desired action without undue removal of blade metal; in other words, restoring the desirable planar form of the active edge by a honing action, rather than by the use of a more or less harsh abrasive.

While the honing of razors and razor blades is more or less universal practice, the character of the blade used in the electric shaver art is such that the usual honing practices do not lend themselves to the restoration of the blade to its desired condition, this being evidenced by the prac-

tice, above indicated, of the use of a paste-borne abrasive which is applied to the shaver itself.

The invention, therefore, has for its principal object the maintenance of the serviceability of the active face of the oscillating blade of a shaver of this type by the practice of honing the blade instead of following the usual practice of the use of a paste-borne abrasive, the serviceability of the blade not only being maintained, but, in addition, tending to maintain the serviceability of the comb, through the fact that the openings of the latter are not affected by the honing activities, since the blade is removed from the shaver during the honing operation. Another object is to provide a holder for the blade during honing, in which the blade is supported under light pressure conditions, so that the honing operation is provided with minimum loss of blade material, thereby increasing the life of the blade while maintaining its serviceability.

To these and other ends, the nature of which will be more clearly understood as the invention is hereinafter disclosed, said invention consists in the improved methods, practices and apparatus hereinafter more particularly described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views:

Figure 1 illustrates a perspective view of one type of electric shaver blade.

Figure 2 illustrates a perspective view of another type of electric shaver blade.

Figure 3 illustrates a perspective view of a preferred form of blade holder used in the present invention, the holder being shown in closed position, with the blade absent.

Figure 4 illustrates a perspective view of the holder with the latter shown in its open position, and with a blade located on one of the members preliminary to closing the holder for the honing operation.

Figure 5 illustrates an elevation of the outer face of one of the members of the holder.

Figure 6 illustrates a cross sectional view of the holder in closed position and showing the blade and its supporting means, the view being taken substantially on line 6—6 of Figure 3.

Figure 7 is a detail sectional view on an enlarged scale, showing a preferred form of finger used in mounting the blade within the holder, the view being taken substantially on line 7—7 of Figure 5.

Figure 8 illustrates a detail perspective view of the supporting spring.

The controlling features of a dry shaver of this type are found in the coaction between what is known as the comb of the shaver, and the sheet metal blade which cooperates therewith in producing the shaving operation; upon this coaction depends the efficiency of the shaver in providing the shaving operation. In practice, the comb is of arcuate shape, and the blade is operated to provide for movements back and forth relative to the inner face of the comb, the blade oscillating through an arcuate path with the outer edge of the blade traveling in proximity to openings which extend through the comb and through which the hairs extend as the user advances the shaver over the user's face with the exposed face of the comb contacting the skin. As is apparent, the thickness of the comb surface is and must be very small, if a close shave is to be had, since the cutting of the hair takes place on the inner side of the comb surface. In the particular shaver used for the purpose of illustrating the invention, the comb may present its characteristics in different ways. For instance, the comb may have the characteristics of the cutting head disclosed in U. S. Patent to Bruecker No. 2,081,694, in which the openings of the head have the cutting lips as of a knife edge type, the blade oscillating in an arcuate path with the outer face of the blade traveling in proximity to such cutting lips; the patent in question can illustrate somewhat of the characteristics of a shaver of this type as to the general structure and operation.

In another form, the comb has its body more or less zonal in type, in that internal ribs are provided for strengthening purposes and with the material between the rib positions very thin and formed with a great multiplicity of openings in close proximity; the thickness of the material is so small, that these openings do not have the knife edge effect, but have the walls of the opening of uniform diameter, thus setting up practically a right angular relation at the inner end of the opening between the wall of an opening and the inner surface of the comb zone. With this arrangement, the presence of a right angular relationship between the active outer face and the side faces of the blade is especially desirable to assure that the proper cutting action will take place as the rapidly moving blade advances its angular edge past the lip of the opening.

Both types of comb are illustrated in the patent to Bruecker No. 2,234,891, March 11, 1941.

One form of the blade is indicated at B, in Figure 1, being formed of sheet metal and provided with a planar outer edge *b* extending the entire length of the blade. The blade is provided with slots *b'* extending inwardly from such planar face, these slots corresponding in position to the ribs of the head, thus permitting the blade to travel in an arcuate path and maintained against laterally canting movements through the presence of the ribs. The blade is supported in suitable manner by a rocking support, the axis of which extends parallel with the direction of length of the blade. By a suitable operating mechanism driven by a small motor, the support is caused to rock on its pivot, and since the blade is removably carried by the support, the planar outer face of the blade will be caused to oscillate backward and forward in proximity to the inner face of the comb in proximity to the inner lips of the openings. The blade may carry a transverse pin *b2* mounted within open-ended slots of the support, the pin serving as a guide against shifting movements of the blade other than outwardly, it being apparent that the rapid oscillatory movements of the support can tend to set up slight centrifugal force conditions on the blade, especially within the midzone of oscillation, a condition which tends to bring the blade planar face in close proximity to the inner lips of the comb openings, the pin *b2* permitting this action to take place.

In Figure 2, the blade B also carries inwardly projecting spaced apart projections *b3*, these being adapted to extend into slots carried by the posts projecting radially from the rocking support, thus distinguishing from the support head previously described. With this form the pin *b2* may be omitted, since the projections are so shaped and arranged in connection with the posts

as to produce the general functions provided by the pin b2.

The honing method and honing procedure is substantially similar with each of the forms of the blade referred to.

As can be understood, the active outer face of the blade will be subject to wear conditions as well as become more or less blunted through the continuous shaving action. Under wear conditions the planar form of the active face of the blade—which cooperates with a curved surface—may tend to become more or less arcuate, a condition which, if permitted to continue to develop, could gradually largely reduce the efficiency of the shaver through the fact that the sharpness of the cutting edge becomes reduced; if the development is permitted to continue, it will be possible for the active edges to become so worn that the cutting action between the comb lips and the blade will be materially impaired.

As above indicated, efforts have been made to remedy the condition by the use of a paste-borne abrasive introduced through the openings of the comb, but while there is seemingly an improvement in the cleansing conditions, the resultant effects may tend to materially shorten the life of the comb and blade, through the fact that both the comb openings and the active face of the blade are necessarily affected by the relative movement therebetween with an abrasive present.

Since the greater efficiency of the shaver is provided when the sides and outer face of the blade provide a right angular formation, the present invention is designed to substitute for the use of the paste-borne abrasive a honing operation to the blade alone as a method and means for maintaining the efficient serviceability of the shaver, thus limiting the action to but one of the two coacting members which provide the shaving operation; by honing the blade outer edge face, thus producing a planar effect, it is possible to maintain such serviceability, especially if the blade is periodically removed from the shaver and subjected to a brief honing action, thus preventing any material development of a curvature to the planar form of the face, thereby tending to increase the life of the blade through the fact that material removal by the honing operation is of a minimum or even negligible amount.

However, one of the problems present with the honing action is the fact that the width of the blade outer face is comparatively small, thus making it difficult to provide a honing action such that the opposite edges of the active face will traverse precisely the same arcuate path, necessary to assure proper cutting action in each direction of oscillation. And since the hone structure is generally of considerable width and length, the honing needs to be provided in such manner as to utilize the greater portion of the hone face instead of tending to rut such face by attempting to provide the relative movement between blade and hone in a direction longitudinally or laterally of the blade; as presently described, the honing operation under the present invention in practice provides for such relative movement to take place in a fixed path with such direction of movement extending angularly to both the length and width of the blade face, thus assuring the development of a true planar blade face with the opposite side edges of said face exactly equidistant from the axis of oscillation of the blade, through the fact that since the relative movement is in a fixed path with the greater portion of the hone face width active in the development of the blade face, both blade face and hone are efficiently arranged to produce the planar effect on the blade face and maintain the planar effect of the hone face during the honing operation.

As will be apparent, the ability to produce these operations and results is primarily dependent upon the form of the holder within which the blade is mounted during the honing operation, the hone structure being of a well known type having its active face planar in type; various forms of hones of this type are well known, a preferred form having characteristics of a very fine grained structure, generally of a composite nature, but which may be of the material of the stones used by barbers when honing their razors.

The blade holder used in the honing operation is disclosed in Figures 3 to 8, and may be formed of sheet metal, plastics or other suitable material capable of providing an efficient support for the blade while the latter is being honed.

The holder, indicated generally at 10, is formed in two sections hingedly connected. Each section is generally of inverted L-shape in cross section, these two sections being arranged with the vertical legs—in the closed position of the holder—designed to extend parallel with a space therebetween sufficient to receive the blade between the legs. These vertical legs 11 have their lower ends arranged to set up a hinge connection 12 therebetween in such lower edge zone, the arrangement being such that the two sections may be moved between open and closed positions by swinging of the sections on the hinge connection. One of the sections is provided at its side edges with ears 13 extending laterally of the inner face of the section and thus serves to provide a gripping effect on the other section when the two sections are moved to their closed positions; in practice the latter section has the upper zone of the vertical leg provided with dents 14 adjacent the ears 13, with the spacing of the dents greater than the length of the blade, these dents being designed to provide projecting faces on the inner side of the leg designed to provide a space between the two legs when the sections are in closed position, the space, indicated at 15, having a width slightly greater than the thickness of the blade when the latter is positioned between the legs, thus permitting freedom of movement of the blade vertically in the closed position of the holder; obviously, the dents may be provided in connection with either or both of the legs.

At approximately the angle which connects the vertical and horizontal legs of one of the sections, the latter is provided with a pair of inwardly projecting pins or hooks forming fingers 16, these being spaced apart a distance equal to the distance between a pair of slots carried by the active face edge zone of the blade; slots extend inward from the plane of the active face, and may be slots especially prepared for the purpose or may be slots (b') which cooperate with the ribs, the depth of the slots being such as to permit the active edge face to move up above the top plane of the body of the horizontal leg for a material distance, thus permitting for continuance of successions of honing operations over extended periods without affecting shaver operations, the pin or hook fingers 16 limiting the projected length of the active edge.

Each of the vertical legs of the two sections is provided with an elongated slot 18, and one of the legs is provided on its outer face with a light spring 19 having one end secured to such face, as by soldering, the opposite end of the

spring being bent to form a laterally extending hook 19a adapted to extend through the slot 18; the hook 19a and its spring is designed to provide a yielding support for the blade when positioned within the holder, the slots (b') of the blade serving to limit the amount of projecting blade movement provided by the hooked spring 19, the blade, when so positioned, being positively and definitely positioned relative to the spring-bearing leg while the sections are in open position, the portion of hook 19a beyond the blade being adapted to extend into the slot 18 of the opposite leg. In addition, both legs carry a slot 20 into which the pin b2 of the blade may extend when the holder is closed.

One of the features of the holder is provided by the horizontal leg of the section. Since it is designed to provide a fixed path of travel for the hone, with this particular arrangement angular to both the direction of length and the direction of width of the active face of the blade, the horizontal legs 21 of the sections are approximately triangular in plan view, with the longer width of the leg of the one section at the end of the path opposite that of the similar width of the leg of the other section, the result being that the positioned blade will extend diagonally of the direction of length of the hone path, thus provided by the upper faces of the horizontal legs 21. Each of such legs 21 has an upturned flange 22 extending along the outer length side of the triangle, the two flanges 22 thus forming the side walls of a fixed path within which the hone is adapted to be reciprocated, the diagonal arrangement of the positioned blade assuring that proper honing action will be provided when the hone is so reciprocated.

As will be understood, when the blade has been removed from the shaver and positioned within the holder and the latter closed, the fixed path into which the active edge of the blade extends is properly positioned to permit the honing action to take place, the hone being positioned within the path between flanges 22, and the holder and hone are given relative movement in the direction of length of the path; since the spring 19 is of light pressure characteristic, the seating of the hone within the path lowers the active edge of the blade to the top plane of the closed horizontal legs, so that the active edge is then simply under the pressure of the spring itself which maintains it in contact with the under surface of the hone, the pressure of the spring being less in value than the weight of the hone. Hence, during the relative movement of hone and holder, the blade will be retained in contact with the hone through the spring pressure, but the latter is so light that no major abrasive effect will be provided, the action being similar in type to the results obtained when honing safety razor blades under usual practice conditions. By providing the honing operation at fairly frequent intervals, the active face of the blade will be retained in its proper condition and permit of the active use of the blade in shaving over long periods of time, since the negligible loss of blade material during the honing period is so small as to not materially affect a long life for the blade.

As will be understood, the position of the blade in the holder is such as to ensure that after the blade is returned to the shaver, the position of the side edges of the blade relative to the axis of oscillation is such that the cutting action of the blade is similar in both of the oscillating strokes of the blade in service. This result is assured through the fact that the blade is fixedly held against rocking, in addition to which the angular direction of length of the blade face relative to the fixed path will cause the blade face to be active with a major portion of the width of the hone, although the immediate contact between blade and hone in the direction of length of the path is comparatively small, due to the blade width and the diagonally seated position of the blade. Since the hone always travels in the same path and the blade is always seated in the holder in the same position, it is apparent that there will be no pitting or rutting of the hone, so that the hone surface will always be in condition to provide the planar effect.

As will be apparent, either of the blades shown in Figures 1 and 2 can be readily honed within the holder, the spring hook 19a cooperating with the blade similarly in both forms, being located between the projections b3 of the form shown in Figure 2.

The advantages of the invention have been generally presented above, and can be summarized in simple manner: The ability to maintain the serviceability of the dry shaver through maintaining the planar characteristic of the oscillating blade through honing operations readily provided, and with an assurance that the opposite cutting edges of the blade traverse the same radial length of arcuate travel during the oscillatory movements, rather than the use of a cleansing paste-borne abrasive, is of definite advantage since the honing operations are of a simple type and can be provided frequently without materially shortening the life of the blade and comb; hence, the serviceability of the shaver is maintained under high efficiency conditions.

The advantages of the blade holder structure shown and described are also apparent. The simplicity of structure; the ability to move the sections between open and closed positions becomes of material advantage through the fact that in open position the blade can be quickly positioned or removed, while in closed position, the blade is so held as to assure the proper honing operation without the requirement of special care on the part of the user, the arrangement being almost "fool-proof" in this respect; the fact that the honing can take place without especial care, and yet assure that the active face of the blade will be treated in such form as to provide for uniform radial length of its opposite cutting edges during oscillation, provides an important advantage through assuring efficient shaver service; while the width of the active blade face is small, the relation of such face relative to the direction of length of the hone travel-path is such as to prevent rutting of the hone while at the same time assuring the planar characteristic of the face. These are all important advantages bearing upon the serviceability of the shaver and especially with respect to the proper and efficient cooperation of the active face of the blade with the inner face of the comb during the shaving operation.

While pin b2 is shown as located centrally of the blade with a corresponding position of its slot in the carrier, it will be understood, of course, that the pin and slot may be located away from such central position; in actual practice, the pin is preferably located asymmetrical to the length of the blade—with corresponding position of its slot—since this assures that the blade will always be located within the shaver in the same position, the asymmetrical position preventing

reversal of the blade when being inserted within the shaver.

While I have herein shown and described a preferred arrangement for maintaining the serviceability of a dry shaver structure, and have also disclosed a preferred form of blade holder which makes possible the production of such results, it will be understood that the specific structures shown are more or less illustrative and that changes or modifications in the holder structure and arrangement may be found desirable or essential in meeting the exigencies of service or the individual desires of a user and I therefore reserve the right to make any and all such changes and/or modifications as may be found essential or desirable insofar as the same may fall within the spirit and scope of the invention as expressed in the accompanying claims, when broadly construed.

I claim:

1. In means for honing the blade of an electric shaver wherein the active outer edge of the blade is of planar type, a blade holder for temporarily supporting the removed blade for honing purposes, said blade holder including a pair of hingedly connected sections, the said sections in their closed position being spaced apart to provide an elongated slot extending angularly with respect to the sections, means carried by one of the sections for yieldingly supporting and guiding the blade under light pressure conditions with the active outer edge of the blade exposed above the slot, and fixed guide means on said sections extending above the slot to define a fixed travel path for a hone respecting the blade supported in the slot.

2. In means for honing the blade of an electric shaver wherein the active outer edge of the blade is of planar type, a blade holder for temporarily supporting the removed blade for honing purposes, said blade holder including a pair of hingedly connected sections, the said sections in their closed position being spaced apart to provide an elongated slot extending angularly with respect to the sections, a pair of fingers carried by one of the sections and adapted to cooperate with slot walls of the blade to position the blade longitudinally of the holder while permitting limited movement of the positioned blade perpendicular to the plane of the blade outer edge, a spring on said section having a hooked end contacting the opposite edge of the blade forming a yielding support for the blade, and fixed guide means on said sections extending above the slot to define a fixed travel path for a hone respecting the blade supported in the slot.

3. A holder as in claim 2 characterized in that each section is L-shape in cross section and that vertical legs of both of the holder sections are slotted to permit free movement of the spring hooked end in directions perpendicular to the direction of length of the blade active face.

4. A holder as in claim 1 characterized in that a section carries a means active to space the sections when the holder is in closed position with the spacing slightly greater than the blade thickness to thereby permit free movement of the blade perpendicular to the direction of length of its active edge during honing operations.

5. A holder as in claim 1 characterized in that each section is L-shape in cross-section and that the vertical leg of one of the sections includes means for temporarily retaining the sections in temporarily gripped closed position, means being provided to space the vertical legs of both sections in such position sufficient to permit a limited free movement of the blade perpendicularly to the direction of length of the blade during such gripped condition of the sections.

6. A holder as in claim 1 characterized in that each section is L-shape in cross-section and that each section includes horizontally-extending legs combinedlly producing a planar surface when the sections are in closed position, each such leg having an upstanding flange to complete the hone travel path.

7. A holder as in claim 6 characterized in that the horizontal leg of each section has its contour in the form of an approximate right-angled triangle with the smaller end of one triangle generally alined to the wider end of the other triangle to thereby place the direction of length of the positioned blade as angular to the direction of length of the upstanding flanges.

8. A holder as in claim 7 characterized in that the pair of flanges are located at the outer sides of the horizontal legs and extend in parallelism to thereby provide a hone path of uniform width.

9. In means for honing the blade of an electric shaver wherein the active outer edge of the blade is of planar type, a supporting member having an elongated slot extending angularly of the length of the supporting member adapted to receive the blade, means within said slot to support the blade with its active outer edge exposed, and guide means on said supporting member extending upwardly respecting the elongated slot for defining a fixed travel path for a hone whereby the hone may travel angularly with respect to the directions of length and width of the blade.

10. In means for honing the blade of an electric shaver wherein the active outer edge of the blade is of planar type, a supporting member having longitudinally extending parallel side edges, the said supporting member being provided with an elongated slot which extends angularly with respect to the longitudinally extending side edges adapted to receive the blade, means within said slot to support the blade with its active outer edge exposed, and an upstanding member along each parallel side edge for defining a fixed travel path for a hone whereby the hone may travel angularly to the directions of length and width of the positioned blade.

WALTER A. YAEGER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,257,927	Reagan	Feb. 26, 1918
1,285,344	Orban et al.	Nov. 19, 1918
1,883,658	Everhart	Oct. 18, 1932
1,897,662	Farrar	Feb. 14, 1933

FOREIGN PATENTS

Number	Country	Date
29,133	Great Britain	Dec. 10, 1915