April 19, 1938. L. C. HOBART ET AL 2,114,348

SELF CONTAINED ELECTRIC SHARPENING DEVICE FOR SAFETY RAZOR BLADES

Filed March 21, 1934 3 Sheets-Sheet 1

Fig:1

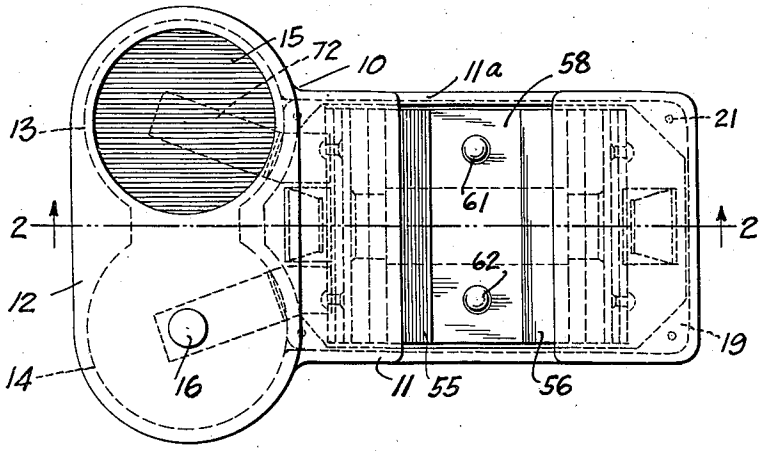


Fig:2

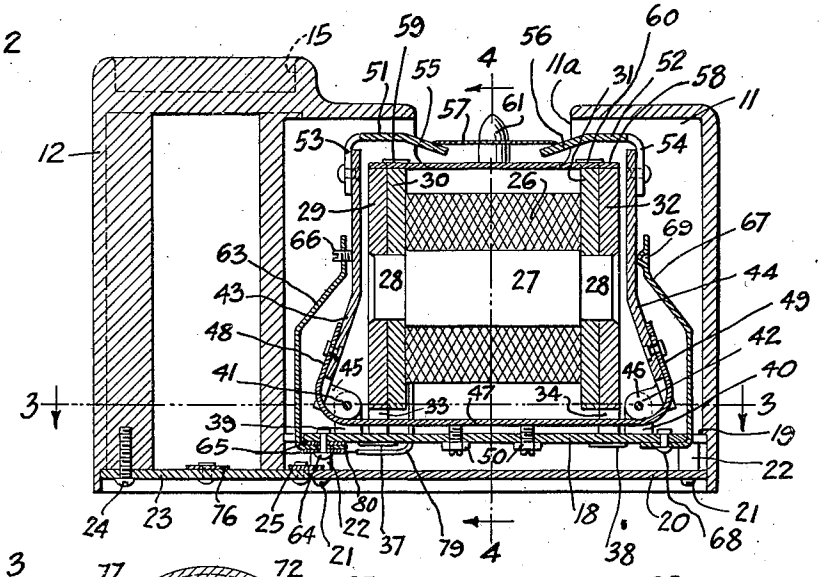
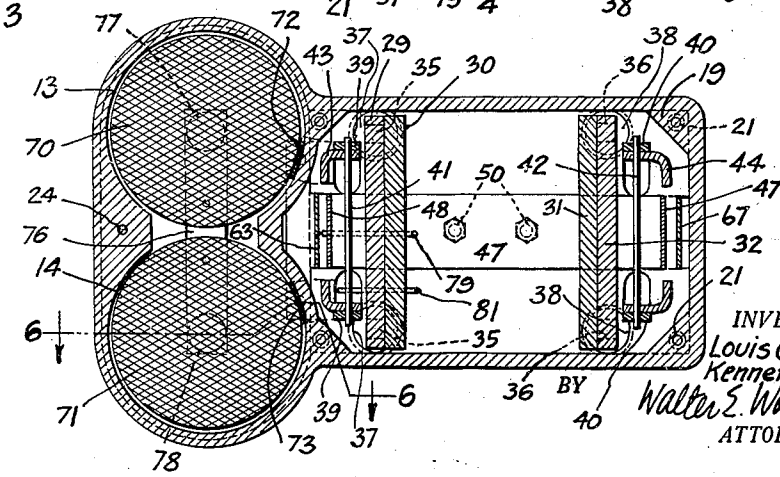


Fig:3



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Filed March 21, 1934 3 Sheets-Sheet 2

Fig: 4

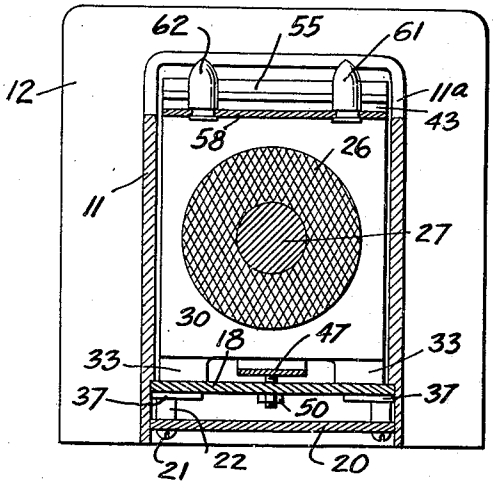


Fig: 5

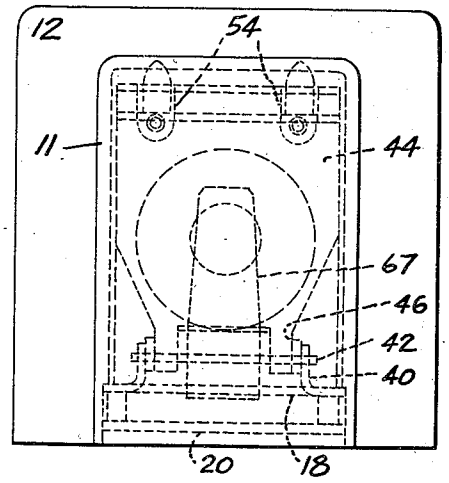


Fig: 6

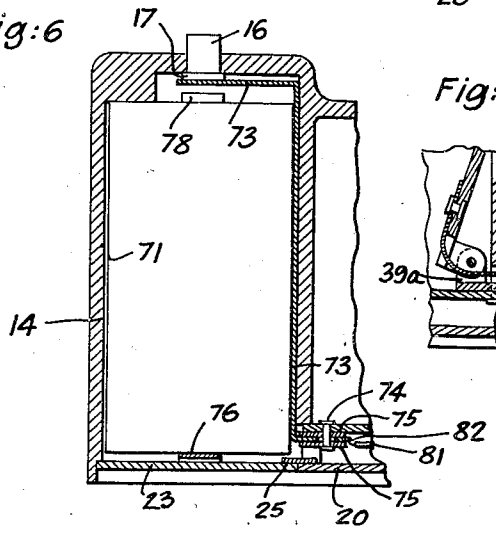
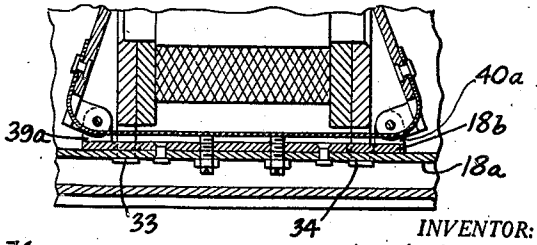


Fig: 7



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Filed March 21, 1934 3 Sheets-Sheet 3

Fig: 9

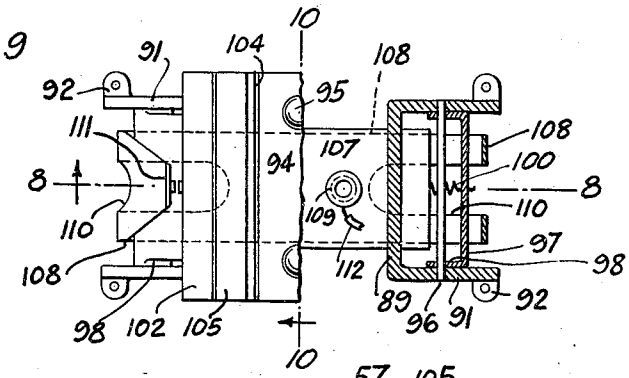


Fig: 8

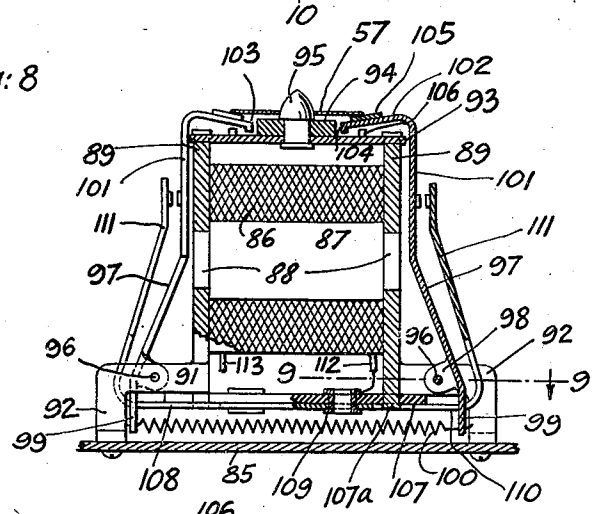
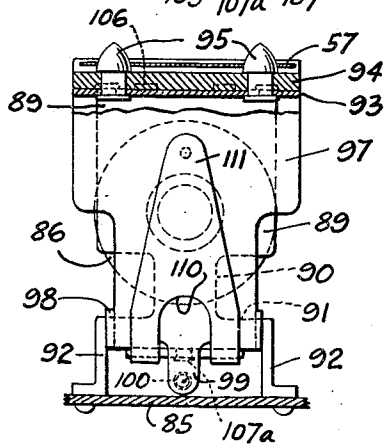


Fig: 10



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SELF-CONTAINED ELECTRIC SHARPENING DEVICE FOR SAFETY RAZOR BLADES

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Application March 21, 1934, Serial No. 716,586

14 Claims. (Cl. 51—58)

This invention relates to electrically operated sharpening devices for safety razor blades. It is one of the principal objects of the invention to provide a device of this kind that is a complete, self-contained, unit furnishing within itself the energy required for its operation. Another object is to make the device readily adaptable for economical manufacture by providing a construction employing a minimum number of parts. A further object is to make possible in a mechanism of this kind the use of standard small battery cells, as flash light cells for instance, in such a way as to insure the life of such cells over a considerable period of time and to accomplish this with a variety of constructions, all, however, employing more or less the same principles of operation. A still further object is to provide means whereby a safety razor blade is held automatically in proper contact with the sharpening members themselves. Still further objects will become apparent after a perusal of the following specification and a study of the accompanying drawings in which preferred embodiments of the invention are, respectively, described and shown.

In the drawings,

Fig. 1 is a plan view of one of the forms of the sharpener;

Fig. 2 is a longitudinal vertical sectional view taken along the plane of line 2—2 in Fig. 1;

Fig. 3 is a longitudinal horizontal sectional view taken along the plane of line 3—3 in Fig. 2;

Fig. 4 is a vertical cross sectional view taken along the plane of line 4—4 in Fig. 2;

Fig. 5 is an end view of the sharpener;

Fig. 6 is a vertical fragmentary longitudinal sectional view taken along the line 6—6 in Fig. 3;

Fig. 7 is a fragmentary sectional view, similar to Fig. 2 showing a modification of the supporting means for the magnet;

Fig. 8 is a longitudinal vertical sectional view of another form of the magnet and co-acting operating parts, partly in section and partly in elevation, taken substantially along the plane of line 8—8 in Fig. 9;

Fig. 9 is partly a plan view of the same and partly a horizontal sectional view taken along the plane of line 9—9 in Fig. 8; and

Fig. 10 is an end view of the same mechanism, its blade supporting structure being shown in cross section fragmentarily along the plane of line 10—10 in Fig. 9.

Like characters of reference denote similar parts throughout the several views and the following specification.

In the drawings, 10 is a housing, preferably made of bakelite or other suitable material, consisting of a substantially rectangular main portion 11 having a rectangular opening 11*a* at its top, and an enlarged end portion 12. The bottom of the housing 10 is open. End portion 12 has two substantially circular compartments 13 and 14 for the reception of battery cells. The roof over compartment 13 is provided with a, preferably, round recess 15 to form a well for a rouge or abrasive, while the roof over compartment 14 is bored out to receive a switch button 16 having a slightly enlarged head 17.

18 is a base plate resting against inner ledges 19 somewhat above the bottom of the portion 11 of the housing 10, and 20 is a bottom closure of this portion of the housing. Base plate 18 and closure 20 are secured to the ledges 19 by screws 21, provided with spacers 22 to keep them in spaced relation with each other. 23 is a closure plate for the bottom of compartments 13 and 14, held against the housing with a screw 24, and being provided with a plate 25 at its inside, riveted thereto, to fit over the adjacent inner surface of the bottom closure 20, so that if screw 24 is unscrewed, this plate 25 can be slipped out of engagement with closure 20 and the closure plate 23 can be removed, to form access to compartments 13 and 14.

A coil 26 is wound upon a central core 27 having reduced end portions 28, adapted to fit into end plates 29, 30, 31 and 32, the end portions 28 being riveted to plates 29 and 32. The outer coil end plates 29 and 32 are provided with feet 33 and 34, having extensions 35 and 36 secured to brass bushings 37 and 38 extending through and fastened to the base plate 18.

Ears 39 and 40 are bent upwardly from base plate 18 and are perforated to receive fulcrum pins 41 and 42. 43 and 44 are armatures provided at their lower ends with ears 45 and 46 perforated to receive fulcrum pins 41 and 42. A spring member 47 has upturned ends 48 and 49 which are riveted to the lower ends of armatures 43 and 44. Adjusting screws 50 in base plate 18 bear against spring member 47 providing adjusting means for the same and armatures 43 and 44. The upper ends of armatures 43 and 44 are provided with sharpening members 51 and 52 having depending ears 53 and 54 suitably riveted to the armatures. The inwardly extending top surfaces of members 51 and 52 are inclined to an angle at 55 and 56 to act on the cutting edges of a safety razor blade 57.

A bridge member or plate 58 is secured to extensions 59 and 60 of end plates 30 and 31. 61

and 62 are dowel pins having reduced lower portions for suitably riveting them to bridge plate 58.

A make and break member 63 is secured to the base plate 18 by a rivet 64 while insulated therefrom by insulating washers 65. An adjustable point formed by a screw 66 through the member 63, is positioned to cooperate with the armature 43 for the interruption of the current. A member 67 is secured to the base plate 18 by a rivet 68 in juxtaposition to member 63. 69 is an indenture in member 67 to cooperate with armature 44 to balance the action of the two armatures. It is obvious, of course, that for this member 67 a make and break member could be substituted similar in construction and function to member 63.

70 and 71 are battery cells located within, respectively, compartments 13 and 14. A strip 72 having a spring tension contact with the upper end of the battery cell 70 and passing downwardly besides the cell and in resilient contact therewith is riveted to the base plate 18, establishing electrical contact therewith. A strip 73 having a spring tension urging the head 17 of the switch button 16 upwardly, passes downwardly besides the cell 71 in resilient contact therewith and is secured to the base plate 18 by a rivet 74 while insulated therefrom by insulating washers 75. The battery cells 70 and 71 seat on either end of a spring member 76 riveted to the closure plate 23 to compartments 13 and 14, spring member 76 being bent upwardly at its end to press the cells upwardly against the roof of the compartments and conducting strips 72 and 73. 77 is a central electrode of battery cell 70 projecting from the cell downwardly to contact with spring member 76, while a central electrode 78 indicated in dot and dash lines in Fig. 3 projecting from battery cell 71 upwardly is adapted to contact with strip 73. It is clear that so long as switch button 16 is depressed, contact is established between strip 73 and electrode 78, and as soon as pressure is released on the switch button 16, contact is broken as strip 73 urges the button 16 upwardly.

One end of the coil 26 is connected by suitable wiring 79 with the foot of the make and break member 63 as by soldering or the like at 80. The other end of the coil is connected by suitable wiring 81 with the foot of the strip 73 as by soldering or the like at 82.

The operation of the device is as follows:

The user moistens one of his fingers, rubs it slightly over the abrasive in well 15 and then passes his finger over the inclined surfaces 55 and 56 of sharpening members 51 and 52 whereby a slight amount of the abrasive is left on these surfaces. The razor blade to be sharpened is then dropped through opening 11*a* of the housing 10 over the dowel pins 61 and 62 so that its edges rest upon the surfaces 55 and 56, as clearly shown in Fig. 2. The electric circuit is then closed by pressing down upon the externally projecting end of the switch button 16. This causes the strip 73 to contact with the electrode 78 of battery cell 71, causing current to flow from electrode 78 to the strip 73, through wiring 81, into coil 26. From the coil 26 current is conducted by wiring 79 to the make and break member 63 which, when contacting with the armature 43, permits current to flow to the base plate 18, the strip 74, the battery cell 70, the spring member 76 into battery cell 71 and thus back to the starting point.

It is clear that this current flow attracts the armatures 43 and 44 towards the core 27 and that when the make and break member 63 interrupts the current the spring member 47 forces the armatures away from the core, thus setting up a vibratory motion of the armatures about their fulcrum pins 41 and 42. The sharpening members 51 and 52 travelling with the armatures are given a reciprocating rubbing action against the edges of the razor blade resulting in a sharpening process that continues so long as the user presses down upon the switch button 16. At the same time magnetism is set up in the armatures and conducted to the sharpening members 51 and 52 which draws the razor blade firmly against their sharpening surfaces 55 and 56. Immediately upon releasing the pressure upon button 16, the spring of strip 73 urges the button 16 upwardly, thus breaking contact between strip 73 and electrode 78 of battery cell 71, and stopping the device.

In Fig. 3, the ears 39 and 40 of the base plate 18, if made of ferrous metal, form a path of flow for the magnetic flux since the ears of the plate 18 contact directly with the ears of the armatures 43 and 44. Brass bushings 37 and 38 are provided for the extensions 35 and 36 of feet 33 and 34 of end plates 29 and 32 to prevent short circuiting of the magnetic flux with a ferrous base plate 18. In Fig. 7, however, we have shown a modification of this arrangement which permits the use of a non-ferrous base plate 18*a* to which feet 33 and 34 may be directly riveted without the brass insulating bushings. A flux plate 18*b*, passing between, but not contacting with feet 33 and 34, provides ears 39*a* and 40*a* for the pivotal support of the armatures, and the plate 18*b* being of ferrous metal, and riveted to the base plate 18*a*, provides the necessary means of magnetic flow from the armature 43 to the armature 44.

We shall now describe the form of mechanism illustrated in Figs. 8, 9 and 10.

85 is a bottom closure to the housing 10 which has been omitted in these figures to be able to illustrate the mechanism more clearly. Closure 85 corresponds to closure 20 of the form of device shown in Fig. 1.

A coil 86 is wound upon a central core 87 having reduced ends 88 adapted to be supported within plates 89. The lower portions of plates 89 are reduced in width at 90 and have outwardly extending and oppositely disposed lugs 91 terminating in feet 92. A bridge member or plate 93 preferably of brass is riveted to the top of plates 89. 94 is a flat steel strip at the center and across the top of plate 93. 95 are dowel pins having reduced lower portions for suitably rivetting them and with them the strip 94 to the bridge plate 93.

Fulcrumed about pins 96 disposed between lugs 91 are armatures 97 having inwardly bent lugs 98 to engage the pins 96 and assist in guiding the armatures between the lugs 91 of the plates 89. The lower ends of armatures 97 terminate each in a narrow strip 99 which are drawn towards each other by a coil spring 100. The armatures 97 which are preferably made of soft steel are each projecting upwardly alongside the outside of plates 89 at 101 and are bent inwardly above the bridge plate 93 towards the steel strip 94, at a slight downward angle at 102, their extreme ends bent downwardly again at 103 to form surfaces 104 slightly spaced from the edges of the strip 94 and substantially parallel thereto. 105 are hard steel strips fastened to the top of the inclined surfaces 102 of the armatures 97 serving

as sharpening members proper, the cutting edges of a safety razor blade 57 resting upon them. 106 are small projections at the top of the bridge plate 93 acting as stops for the outward motions of the armatures 97.

107 is a fiber base plate riveted to the bottoms of plates 89 at 107a. 108 is a plate, preferably made of phosphor bronze, fastened to the bottom of the base plate 107 by the usual form of eyelet rivet 109. The plate 108 is provided with elongated slots 110 to straddle the downward extensions 99 of the armatures and is then bent upwardly to form make and break members 111 to cooperate with armatures 97.

One end 112 of the coil 86 is connected to one of the eyelet rivets 109 and thus with the make and break members 111, while the other end 113 is connected with the foot of the strip 73 of the structure as shown in Fig. 6, the end 113 being connected thereto in the same manner as the wire 81 in that figure. All other parts of the device are substantially identical with the form explained in connection with Figs. 1 to 7.

The operation of the device shown in Figs. 8 to 10 is substantially the same as described in connection with the forms illustrated in Figs. 1 to 7. However, attention is particularly drawn to the fact that in the construction shown in Figs. 8 to 10, all air gaps are reduced as much as possible to facilitate the ready flow of the magnetic flux. In this manner the current consumption is greatly decreased. This is especially caused by the downwardly bent ends 103 of the armatures, presenting parallel surfaces 104 in close proximity to the steel strip 94 which results in an extremely short travel of the magnetic lines of force. The magnetism which is thus set up also tends to hold the safety razor blade in close contact with the sharpening members 105 eliminating clasps or other means for forcing the blade against them.

While we have shown several forms of our invention embodying the principles of the invention, and modifications of some of their details, we do not wish to limit ourselves to the precise arrangements described and illustrated. We want it to be understood that various other changes in the form, proportion and minor details of construction may be resorted to without departing from the principles or sacrificing any of the advantages of the invention, as defined in the appended claims.

What we claim as new, is:

1. In a self-contained sharpening device for safety razor blades, a housing, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit, sharpening members carried by the said armatures adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

2. In a self-contained sharpening device for safety razor blades, a housing having an opening at its top, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit, a bridge member over the said magnet below the opening in the housing having means upon its top for guiding a razor blade, sharpening members carried by the said armatures adapted to support the cutting edges of the said razor blade, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the sharpening members.

3. In a self-contained sharpening device for safety razor blades, a housing, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, a base plate, insulating inserts in the base supporting the said end plates, armatures vibratorily mounted upon the base plate at each end of the magnet, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit and insulated from the said base plate, sharpening members carried by the said armatures in contact with the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

4. In a self-contained sharpening device for safety razor blades, a housing having an opening at its top, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, a base plate, insulating inserts in the base supporting the said end plates, armatures vibratorily mounted upon the base plate at each end of the magnet, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit and insulated from the said base plate, a bridge member over the end plates of the said magnet and below the opening in the housing having means upon its top for guiding a razor blade, sharpening members carried by the said armatures adapted to support the cutting edges of the said razor blade, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the sharpening members.

5. In a self-contained sharpening device for safety razor blades, a housing, battery cells and an electro-magnet within the housing in circuit with each other, a base plate, armatures vibratorily mounted at each end of the magnet, a spring member fastened to the armatures and adjustably supported by the base plate urging the armatures away from the ends of the magnet, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit, sharpening members carried by the said armatures adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

6. In a self-contained sharpening device for safety razor blades, a housing having an opening at its top, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, a base plate, insulating inserts in the base plate supporting the said end plates, armatures vibratorily mounted upon the base plate at each end of the magnet, a spring member

fastened to the armatures and adjustably supported by the base plate urging the armatures away from the said end plates, a make and break member in the said magnet circuit cooperating with one of the armatures for intermittently breaking the circuit and insulated from the said base plate, a bridge member over the end plates of the said magnet and below the opening in the housing having means upon its top for guiding a razor blade, sharpening members carried by the said armatures adapted to support the cutting edges of the said razor blade, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the sharpening members.

7. In a self-contained sharpening device for safety razor blades, a housing, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, make and break members in the said magnet circuit cooperating with the armatures for intermittently breaking the circuit, the armatures being adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the armatures.

8. In a self-contained sharpening device for safety razor blades, a housing, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, make and break members in the said magnet circuit cooperating with each of the armatures for intermittently breaking the circuit, sharpening members carried by the said armatures adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

9. In a self-contained sharpening device for safety razor blades, a housing, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, make and break members in the said magnet circuit cooperating with the armatures for intermittently breaking the circuit, the tops of the said armatures being bent towards each other, a ferrous plate interposed between the said tops of the armatures, the tops presenting flat surfaces to edges of the said plate and in close proximity thereof, sharpening members carried by the said armatures in contact with the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

10. In a self-contained sharpening device for safety razor blades, a housing having an opening at its top, battery cells and an electro-magnet within the housing in circuit with each other, armatures vibratorily mounted at each end of the magnet, make and break members in the said magnet circuit cooperating with the armatures for intermittently breaking the circuit, a bridge member over the said magnet below the opening in the housing having means upon its top for guiding a razor blade, sharpening members carried by the said armatures adapted to support the cutting edges of the said razor blade, a ferrous plate upon the bridge member for reducing the gap between opposed ends of the armature but in spaced relation therewith, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the sharpening members.

11. In a self-contained sharpening device for safety razor blades, a housing, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, an insulating base plate fastened to the bottoms of the said end plates, the said end plates each having lugs forming supports thereof, armatures vibratorily fulcrumed between the said lugs and connected by a retractile spring, make and break members in the said magnet circuit cooperating with the said armatures for intermittently breaking the circuit, sharpening members carried by the said armatures adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

12. In a self-contained sharpening device for safety razor blades, a housing, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, an insulating base plate fastened to the bottoms of the said end plates, the said end plates each having lugs forming supports thereof, armatures vibratorily fulcrumed between the said lugs and connected by a retractile spring below their fulcrums, a strip fastened below the said base plate and extending upwardly at both sides outwardly of the said armatures forming make and break members therewith for intermittently breaking the said magnet circuit, sharpening members carried by the said armatures adapted to support the cutting edges of a razor blade, guides for a razor blade and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of a blade and the sharpening members.

13. In a self-contained sharpening device for safety razor blades, a housing, battery cells connected in series, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, an insulating base plate fastened across the bottoms of the said end plates, the said end plates each having lugs forming supports thereof, armatures vibratorily fulcrumed between the said lugs and connected by a retractile spring below their fulcrums, make and break members in the said magnet circuit cooperating with the said armatures for intermittently breaking the circuit fastened to the said base plate and wired to the said coil, a bridge member over the said magnet fastened to the tops of the said end plates and having means upon its top for guiding a razor blade, sharpening members carried by the said armatures adapted to support the cutting edges of the said razor blade, a ferrous plate upon the bridge member for reducing the gap between opposed ends of the armatures but in spaced relation therewith, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the sharpening members.

14. In a self-contained sharpening device for safety razor blades, a housing, battery cells, an electro-magnet in circuit with the said cells comprising a core, coil, and end plates holding the core, an insulating base plate fastened across the bottoms of the said end plates, the said end plates

each having lugs forming supports thereof, armatures vibratorily fulcrumed in the said lugs and connected by a retractile spring below their fulcrums, make and break members in the said magnet circuit for the said armatures fastened to the said base plate and wired to the said coil, a bridge member over the said magnet fastened to the tops of the said end plates and having means upon its top for guiding a razor blade, the tops of the said armatures being bent towards each other and adapted to support the edges of the said blade, a ferrous plate upon the bridge member central of the said armatures for reducing the gap between the opposed ends of the said armatures, the opposed ends of the said armatures being bent over to present an increased surface directly to the sides of the said ferrous plate, stops for the outward travel of the said armatures, and means to energize the said magnet from the said battery cells causing a reciprocating action between the edges of the blade and the tops of the said armatures.

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