Jan. 13, 1931. S. SHALER 1,788,547

VIBRATORY SAFETY RAZOR

Filed April 27, 1929

Fig. 1.

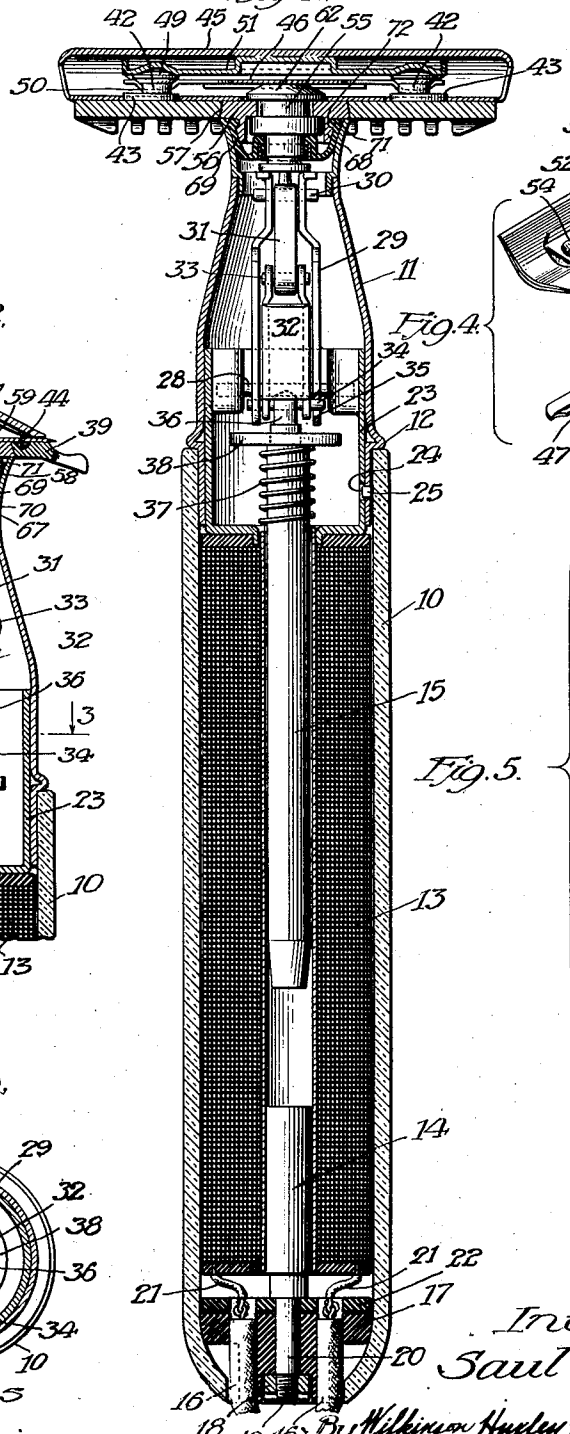


Fig. 2.

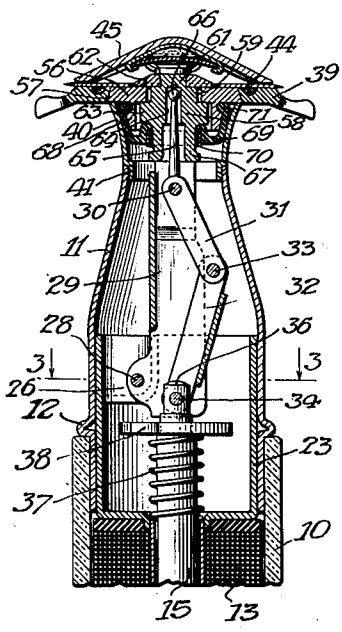
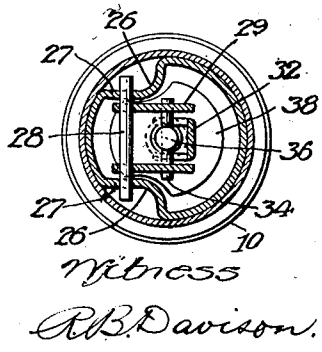


Fig. 3.



Witness

R.B. Davison.

Fig. 4.

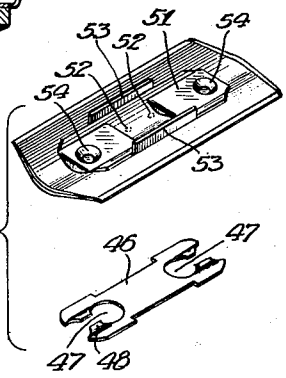
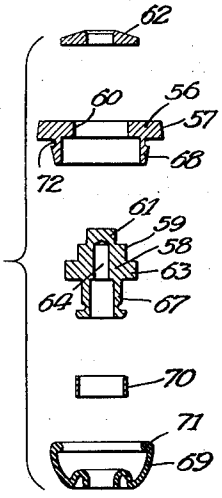


Fig. 5.



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1,788,547

UNITED STATES PATENT OFFICE

SAUL SHALER, OF NEW YORK, N. Y., ASSIGNOR TO ELECTRIC RAZOR CORPORATION OF AMERICA, OF NEW YORK, N. Y., A CORPORATION OF MARYLAND

VIBRATORY SAFETY RAZOR

Application filed April 27, 1929. Serial No. 358,467.

This invention relates to improvements in electric vibratory safety razors of the type which include a mounting for the thin razor blade allowing freedom of vibratory movement in the plane of the blade and having guard combs for the edges of the blade, through which mounting a vibratory stud extends and engages a central driving opening of the blade. The blade is guided by two studs upstanding from the mounting. The vibratory stud is preferably actuated from an armature and solenoid device enclosed in the supporting handle for the razor. My previous improvements along this line have been disclosed in my co-pending application Serial No. 678,136, filed December 3, 1923, and in my Patent No. 1,552,455, issued September 8, 1925.

The present invention relates to various details of improvements which result in efficiency of operation, easy assemblage and general improved utility of a razor of the type mentioned.

It is one object of the present invention to improve the construction of the end cap which carries spring clips for engagement with the guiding studs of the comb plate to retain the blade in position and consists in welding or otherwise securing to the end plate, without the necessity of drilling and milling, a spring holder which includes ears that may be bent to hold the spring plate or clips in place.

It is further an object of the present invention to provide improved means for mounting the driving stud which means serves as a water packing to prevent the entrance of moisture within the handle by providing instead of the spring-pressed packing described in my Patent No. 1,552,455, a resilient rubber washer or nipple which is secured directly between an inwardly extending shank of the driving stud to a flange of the supporting ring for the stud.

Another object of my invention consists in improved mounting means for the handle and the retained actuating means in which the shank is soldered directly to the comb instead of being screw-threaded as previously designed. The toggle and armature mechanism is directly mounted by a pintle held by a cup member that is attached to the solenoid core. The cup member is further provided with an opening to receive a bent tongue of the shank which is retained in its seat by the cover member. Thus the removal of the cover and the bending of the locking tongue will allow the solenoid and the actuating mechanism to be withdrawn as a unit from the blade mounting including the shank and the driving stud.

Further objects and features of the construction will be more readily apparent as the description proceeds taken in connection with the disclosed embodiment shown in the accompanying drawings in which—

Figure 1 is a longitudinal sectional elevation of the assembled razor.

Figure 2 is a partial longitudinal sectional elevation of the upper end of the razor taken at right angles to the section shown in Figure 1.

Figure 3 is a transverse section taken on a plane indicated by 3—3 in Figure 2.

Figure 4 is a perspective view of the parts comprising the end cap shown in separated relation to more clearly illustrate the assembly thereof.

Figure 5 is a sectional view of the parts comprising the driving stud mounting in which the parts are shown in separated relation.

The handle grip 10 comprises a cylindrical body generally of molded composition which is secured directly to the cylindrical end of the conical shank 11. It will be noted in Figure 1 that the handle 10 seats against a rib 12 of the shank 11. Within the handle is mounted a solenoid coil 13 including a fixed core 14 at the lower end thereof.

Within the remainder of the solenoid core opening is arranged a freely movable armature 15. Current is conducted to the solenoid coil 13 through the wires 16—16 which extend through an insulating bushing 17 held by a nut 18, against the lower end of the handle 10. The nut 18 is screwed to the screw-threaded end 19 of an extension 20 from the fixed solenoid coil 14. The wires 16—16 are secured to the fine wires 21 which extend to

the solenoid coil at points within a strain relief bushing 22. To the upper end of the solenoid 13 is secured a cup shaped member 23 which fits within the body of the shank 11 and is provided with an opening 24 to receive a bent tongue 25 of the shank 11. The tongue 25 is held within the opening 24 by the cover member 10. The cup shaped member 23 is generally cylindrical but from its upper end, extend longitudinal recessed portions 26 which are shown most clearly in Figure 3. Thereby parallel sides 27—27 are formed through which may be passed a loose pintle 28.

The pintle 28 serves to hold a toggle frame 29. At the upper end of the toggle frame is mounted a loose pintle 30 serving as a pivot mounting for a toggle lever 31. To the toggle lever 31 is pivoted a toggle link 32 by a pin 33. The lower end of the toggle link receives a pin 34 which is guided by elongated openings 35 formed in the sides of the toggle frame 29. The pin 34 also passes through the reduced end 36 of the armature 15. Thus the longitudinal reciprocal movement of the armature 15 will cause a reciprocation of the pin 34 and effectuate a slight oscillation of the toggle lever 30 about its fixed pivot. The armature is resiliently pressed in an upward direction by the spring 37 which is retained between the upper end of the solenoid 13 and a disk 38 mounted on the armature 15.

The mounting for the razor blade comprises a comb guard plate 39 having an integral neck 40 which is soldered directly to the shank 11 at the point 41. From the guard plate 39 extend spaced stubs 42 which include guiding surfaces 43 to define the path of movement of the blade 44.

In the present embodiment, the blade will be illustrated as vibrated transverse to its guiding edge, but it will be understood that the blade could as well vibrate longitudinally of its cutting edge, as disclosed in my aforementioned patent. As in my previous improvements I provide an end cap 45 which encloses the mounting for the blade and is formed with a smooth exterior so it will slide easily on the face. I also illustrate a spring clip 46 which is formed with key hole slots 47, shown most clearly in Figure 4, and spring edges 48. The spring clip is designed so that the end cap may be secured by a slight longitudinal movement in either direction. Thus the studs 42 are formed with enlarged heads 49 and reduced necks 50. In placing the end cap and spring clip on the mounting in one position, one of the studs 42 is received by the enlarged portion of one of the key hole slots 47 and then by a slight longitudinal movement, the spring projections 48 of the spring clip will be brought to bear against the reduced necks 50 of the mounting studs.

In my previous disclosures the spring clip was made from a strip of metal held by rivets to the end cap 45, which necessitated drilling holes in the end cap and milling the outer ends of the rivets. In the present improvements, I have provided a spring holder 51, illustrated in Figure 4, which is welded to the inner side of the end cap at the points indicated at 52. Spring holder 51 includes upstanding ears 53 which may be bent over the sides of the spring clip 46 to hold the spring clip in place, as shown most clearly in Figure 2. The spring holder 51 is formed with conical depressions 54 which receive and bear against the outer ends of the mounting studs 42. Thus the blade 44 is allowed freedom of vibratory movement in its own plane between the cooperating edges of the end cap 45 and the guard comb 39.

As in my previous improvements, the reciprocal movement of the solenoid armature is transmitted to the blade by means of a driving stud 55 which engages a central circular driving opening of the blade. The improved construction of the driving stud and the mounting thereof is illustrated in Figure 5 in which I show a supoprting ring 56. The ring 56 is formed with a conical edge 57 whereby it may be held in place by swaging the meeting edges of the guard plate 39. The main body of the driving stud is indicated at 58 and includes a cylindrical portion 59 which is slightly smaller than a corresponding opening 60 formed in the supporting ring. To the reduced upper end 61 of the body portion 58 is riveted a driving cap 62. Below the cylindrical portion 59 is provided an enlarged cylindrical portion 63 whereby the body portion 58 of the stud is held against axial movement relative to the supporting ring 56 by the end cap 62 and the enlarged cylindrical portion 63. The construction therefore comprises a driving stud which has upper or lower rings or flanges defining therebetween a circular groove which receives the inner edge of the supporting ring. Thus the stud is prevented from movement in an axial direction with respect to the supporting ring and the mounting but is free to be given a movement of a limited amount in any direction in the plane of the mounting. A tubular opening 64 is formed in the body 58 of the driving stud and receives a driving member 65 extending from the toggle lever 30. The driving member 65 is formed with a spherical driving end 66. The body portion 58 of the driving stud is formed at the lower end with a reduced extension 67 while the supporting ring 56 is formed with a downwardly extending flange 68. Between the flange 68 and reduced neck 67 extends a rubber washer 69. The rubber washer 69 is held in place on the reduced neck 67 of the driving stud by the ring 70. The portion of the rubber washer 69 which engages the flange 68 of the supporting ring is formed with a beaded edge 71 which seats within a

recess 72 of the supporting ring. As will be apparent from Figures 1 and 2, the rubber washer 69 provides sealing means to prevent the entrance of moisture within the handle portion of the razor. The cup shaped washer is held between the flange 68 and the integral necked portion extending from the guard plate 39. The construction which has been described has been found to be more preferable than the previously used spring pressed washer.

In dismantling the razor it is only necessory to remove the nut 18 which is screwed to the end of the solenoid core 14 whereupon the handle 10 may be longitudinally removed, then by bending the locking tongue 25 of the shank 11 out of its locking engagement with the tubular cup 23, the solenoid coil together with the attached cup, the armature and the toggle mechanism may be removed as a unit. The driving stud together with its sealing means will remain mounted in the guide comb and shank unit. By removing the pintle 28, the toggle mechanism and the armature may be removed from the solenoid core. Thus it will be apparent that the assemblage of the razor is made relatively simple.

The razor shown is adapted to be operated by alternating current but direct current may be used if a circuit breaker is used to permit intermittent return of the armature by the force of the spring.

Many modifications and changes may be resorted to without departing from the spirit of my invention as expressed in the appended claims.

I claim:

1. In a safety razor, a handle, a mounting for a blade at one end of said handle, studs on said mounting having reduced necks, a cap overlying said studs and holding said blade in place, a spring holder secured to the inner side of said cap and a spring element held in place by said spring holder, said spring element being adapted to engage the reduced necks of said studs.

2. A safety razor including a handle and a mounting for the blade, said mounting comprising a guard plate, mounting studs upstanding from the guard plate, an end cap overlying the blade and its mounting studs, a spring holder secured to the inner side of said end cap and a spring clip fastened to said spring holder adapted to grasp the ends of said studs to hold said end cap in position.

3. A safety razor including a handle and a mounting for the blade, said mounting comprising a guard plate, mounting studs upstanding from the guard plate, an end cap overlying the blade and its mounting studs, a spring holder secured to the inner side of said end cap and a spring clip fastened to said spring holder adapted to grasp the ends of said studs to hold said end cap in position, said spring holder including depressions forming bearing seats for the ends of said studs in order to correctly space said end cap from said guide plate.

4. A vibratory safety razor including a handle and a mounting for the vibrating blade, said mounting comprising a guard plate, studs upstanding from the guard plate, said studs including guiding surfaces to define the path of movement of said blade, an end cap overlying the blade and its mounting studs, a spring holder secured to the inner side of said end cap and a spring clip fastened to said spring holder adapted to grasp the ends of said studs to hold said end cap in position.

5. A vibratory safety razor including a handle and a mounting for the vibrating blade, said mounting comprising a guard plate, studs upstanding from the guard plate, said studs including guiding surfaces to define the path of movement of said blade, an end cap overlying the blade and its mounting studs, a spring holder secured to the inner side of said end cap and a spring clip fastened to said spring holder adapted to grasp the ends of said studs to hold said end cap in position, said spring holder including depressions forming bearing seats for the ends of said studs in order to correctly space said end cap from said guide plate.

6. A safety razor including a handle and a mounting for the blade, said mounting comprising a guard plate, studs upstanding from the guard plate, an end cap overlying the blade and its mounting studs, a spring holder secured to the inner sides of said end cap and a spring clip held by said spring holder, said spring holder including ears adapted to be bent to hold said spring clip in position, said spring clip including slotted ends adapted to resiliently grasp the ends of said mounting studs.

7. In a vibratory safety razor, a driving mounting for the blade comprising a guard plate and an integral necked portion, a supporting ring secured within an opening formed in said guard plate, said ring including an inwardly extending flange, a driving stud having an annular groove adapted to loosely receive and be mounted by said ring whereby said driving stud is free to vibrate in any direction in the plane of the guard plate but is prevented from axial movement, a cup shaped resilient washer held by said flange and secured to the inner end of said driving stud.

8. In a vibratory safety razor, a driving mounting for the blade comprising a guard plate, an integral necked portion, a supporting ring secured within an opening in said guard plate, said ring including an inwardly extending flange, a driving stud having an

annular groove adapted to loosely receive and be mounted by said supporting ring whereby said stud is free to vibrate in any direction in the plane of the guard plate, a cup shaped resilient washer held between said flange and said necked portion and secured to the inner end of said driving stud.

9. In a vibratory safety razor, a driving mounting for the blade comprising a guard plate, an integral necked portion, a supporting ring secured within an opening in said guard plate, said ring including an inwardly extending flange, a driving stud having an annular groove adapted to loosely receive and be mounted by said supporting ring whereby said stud is free to vibrate in any direction in the plane of the guard plate, a cup shaped resilient washer held between said flange and said necked portion and means for securing said resilient washer to the inner end of said driving stud.

10. In a vibratory safety razor, a driving mounting for the vibratory blade comprising a guard plate and an integral necked portion, a supporting ring having an inwardly extending flange, said ring being secured within an opening formed within said guard plate, a driving stud mounted by said supporting ring, said driving stud including an annular groove adapted to loosely receive said supporting ring and a reduced inwardly extending shank portion, a cup shaped rubber washer held by said flange and means for securing said rubber washer to the inwardly extending shank portion of said driving stud.

11. In a vibratory razor, a blade mounting, driving means for the blade supported by said mounting comprising a stud having a groove to receive the edge of said mounting and a resilient sealing washer secured to the inner end of said stud.

12. In a vibratory razor, a blade mounting, a ring centrally fixed to said mounting, driving means for the blade comprising a stud having a circular groove to receive the inner edge of said ring and be supported thereby, means for moving said stud laterally with respect to said ring and resilient sealing means secured to said stud and to said ring.

13. In a vibratory razor, a mounting for the blade, a handle, operating means in said handle, driving means for the blade, said mounting having an enlarged opening to receive said driving means, said driving means comprising a stud loosely received in said mounting, flanges extending from said stud adapted to retain said stud against movement in an axial direction with respect to said mounting and resilient sealing means secured to said stud and to said mounting.

14. In a vibratory razor, a blade mounting having a central opening, a depending circular flange surrounding said opening, a driving stud loosely received in said opening retained against movement in an axial direction with respect thereto and resilient sealing means secured to said stud and to the depending flange of said mounting.

Signed at New York, New York, this 20th day of April, 1929.

SAUL SHALER.