

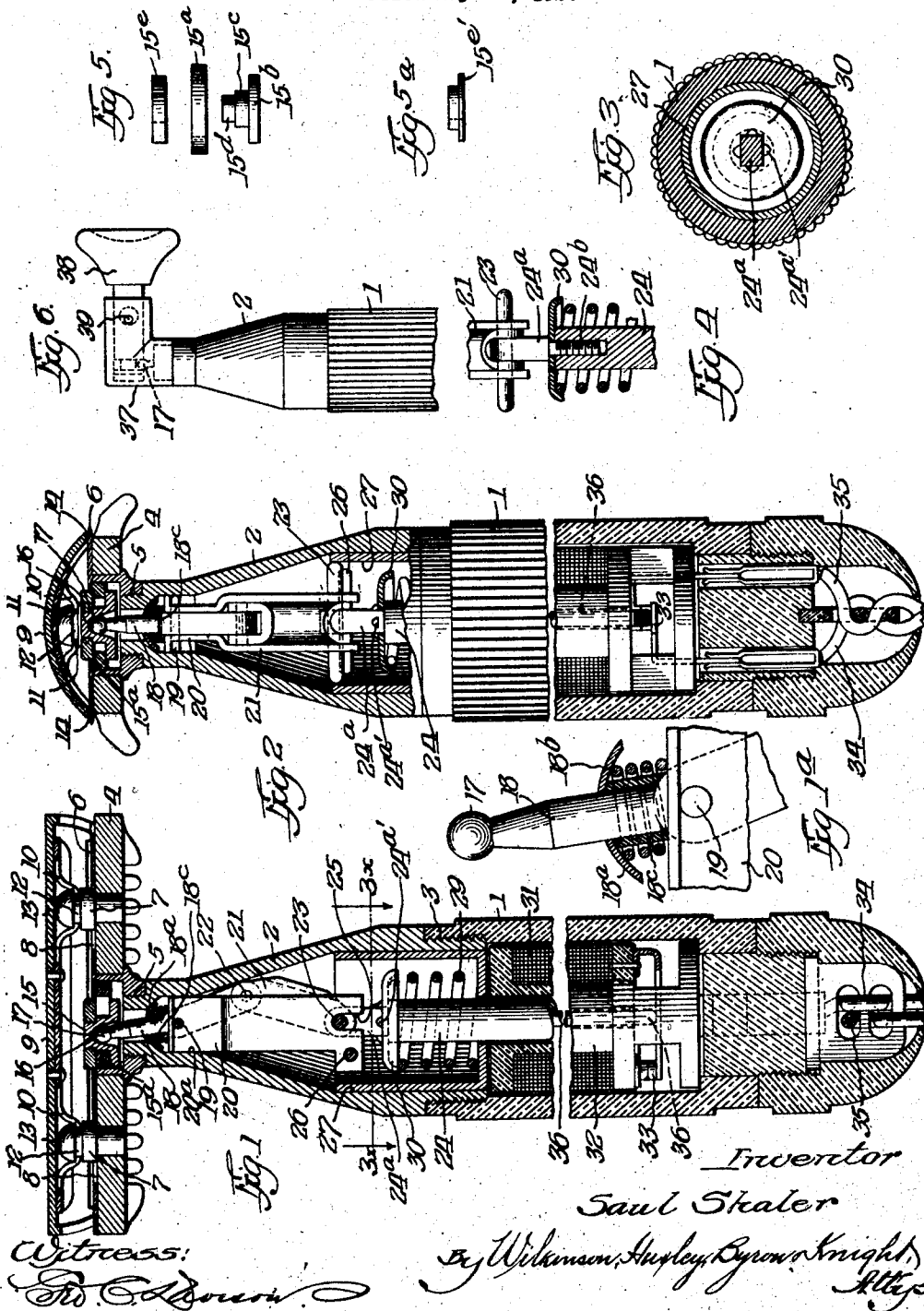
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S. SHALER

VIBRATORY RAZOR

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Witness:
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UNITED STATES PATENT OFFICE.

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VIBRATORY RAZOR.

Application filed May 26, 1924. Serial No. 715,836.

To all whom it may concern:

Be it known that I, SAUL SHALER, a citizen of the United States, residing in the borough of Bronx, in the city and State of New York, have invented certain new and useful Improvements in Vibratory Razors, of which the following is a specification.

This invention relates to razors corresponding in operative principle and general construction to that described in application Serial No. 678,136, filed December 3, 1923, by the same inventor, and has for its object to improve the construction of some of the elements entering into the organization of the instrument described in said application.

The aforesaid application discloses a razor embodying in its organization a grip or handle constituting the housing of a solenoid magnet, the armature of which is reciprocated in the axis of the housing by the pull of the magnet in one direction and by the reaction of a spring in the other direction; a toggle lever mounted in a frame which is supported longitudinally of the housing with one link pivotally connected with the armature and movable therewith in a slot of said frame, and with the other link positioned by a fixed pivot and having an extension beyond said fixed pivot which terminates in a free end that oscillates transversely to the direction of armature movement; a comb plate fixedly supported on the housing and receiving a razor blade in direct mounting thereon without the intervention of a carriage or other moving support for the blade; posts projecting from the comb plate through slots in the blade to maintain the direction of blade movement; a cap overlying the blade to resist its displacement from the comb plate; clip members securing the cap to the posts; and a vibratory stud mounted in the comb plate in position to be received in an opening of the blade, and which in turn receives the rapidly oscillating free end of the toggle lever, so that the longitudinally reciprocated armature transmits, to the blade, through the toggle, rapid movement that is translated into the direction of blade movement. The said application further describes packings for resisting passage of moisture or foreign

matter past the vibratory stud and past the toggle lever extension, and it sets forth various details in the construction of parts above enumerated.

The present invention improves the mounting of the cap relatively to the comb plate and to the blade which it confines, by having the cap enter into a direct seating against the ends of the posts with which its securing clips engage so that the space in which the blade is confined in its reciprocation may be determined with greater accuracy than when the cap is dependent upon more or less resilient clips for fixing its position.

The present invention provides further for an improved construction of the vibratory stud and assembly therewith of a disk which surrounds, guides it in its movements, and serves as a water packing for the stud, to which end, the stud is produced from a stepped socket member with its blade-engaging head riveted thereto but spaced thereon through means of a shoulder that defines with exactness the annular recess in the head that receives the stationary packing washer.

The present invention further provides for a novel form of packing around the toggle link extension, involving the use of a spring seated washer having a spherical seating face concentric with the fixed pivot of the toggle lever, and which preferably is itself packed relatively to the lever extension by means of a rubber sleeve.

The present invention provides further for economical and more freely working assembly of toggle pivots by fitting them freely in the parts through which they extend, and having their ends in abutment with adjacent walls of the housing so as to avoid the necessity of riveting, upsetting, or otherwise manipulating the pivots.

Finally, the present invention improves the spring abutment on the armature by forming this of a concave disk fitted upon a reduced extension through which the armature connects with the toggle, said disk being held against the end of the armature by engagement of the armature extension.

In the accompanying drawings—

Figure 1 is an axial section of a razor em-

bodying the several features of the present invention, the plane of section being longitudinal to the comb plate, and an intermediate portion of the solenoid and its housing being omitted for convenience of illustration.

Figure 1^a is a detail view of the extension toggle lever and its packing.

Figure 2 is a longitudinal section in a plane at right angles to that of Figure 1, with a portion of the housing shown in elevation.

Figure 3 is a section on the line 3^x—3^x of Figure 1.

Figure 4 is a detail view, partly in longitudinal section, showing a modified construction of the assembly of the spring abutment with the armature.

Figure 5 is a segregated view of the parts which constitute the blade-vibrating stud.

Figure 5^a shows a substitute form of head for said stud employed when a blade with a smaller central opening is used; and

Figure 6 is a detail view showing another form of vibratory device for which the instrument, with some of the improvements herein mentioned, may be used.

1 represents a grip or handle constituting a housing for the motion-developing parts of the device, 2 represents a ferrule forming part of said housing which is preferably threaded thereto at 3, and 4 represents a comb plate or razor guard which is threaded to the ferrule at 5. Comb plate 4 is designed to receive a razor blade 6 in direct bearing thereon, and with freedom to reciprocate relatively to the plate without the intervention of a carriage or other bearing member; and in order to guide the blade 6 in its movement upon the plate 4, the latter is provided with upstanding posts 7 received in elongated slots 8 of the blade. To confine the blade 6 upon the plate 4, a cap 9 is mounted upon the posts 7 and secured in such position by means of clips 10 having resilient tongues 11 that engage in the necks 12 of the posts.

As thus far described, the construction follows generally that of the previous application above identified. According to the present invention, the cap 9 is supported with greater accuracy in its relation to the plate 4, and the blade mounted thereon by having the cap enter into direct seating at 13 against the posts 7, and drawn to its said seat by means of the resilient clips so that the spaces 14 in which the blade 6 is confined is determined with greater accuracy and constancy than is obtainable if the resilient clips alone are relied upon to locate the cap.

Motion is imparted to the blade 6 by means of a vibratory stud 15 which enters a central opening in the blade 6, so that the blade will partake of reciprocating movement of

the stud in the plane of the plate 4, and this stud is surrounded by a guiding and packing disk 15^a having a central opening of sufficient size to permit the washer to remain stationary while the stud reciprocates, but having its outer surface and its upper and lower faces sufficiently in bearing with adjacent parts to resist passage of water past the vibratory stud, all as described in the aforesaid application. But according to the present invention, and as shown more particularly in Figure 5, the flanged base member 15^b, the shank 15^c, and the neck 15^d of the stud are made in one part, and the head 15^e is made separate and seated upon the neck 15^d where it is secured by riveting the latter; and the axial dimension of the shank 15^c is so close to the thickness of the disk 15^a that without imposing material resistance to the vibration of the stud relatively to the washer, the surfaces are kept in sufficiently close contact to effectively exclude passage of water. The head 15^e in addition to serving as a burr to confine the disk 15^a, constitutes the part of the stud which enters into bearing with the blade, and will have its external dimension determined partly by that of the central opening through which the blade is to be engaged. Thus, if the razor is to be used with some blades now standard on the market, it will be desirable to form the head with a reduced portion 15^{e'} (Figure 5^a) and depend upon its flange for providing its face bearing against the disk 15^a.

The present invention follows the application aforesaid in determining reciprocating movement in the stud 15, by forming said stud with a socket 16 that receives the ball end 17 of an extension link 18 of a toggle member which is mounted upon a fixed pivot 19 in a frame 20, and has its other end connected with a link 21 through means of pintle 22; and this toggle device is caused to translate longitudinal into transverse movements by having the inner end of its link 21 connected through pin 23 with solenoid armature 24, and permitting said pin 23 to follow the axial movements of said armature by fitting the pin in a slot 25 of the frame 20, with the result that as the armature 24 reciprocates in the direction of its longitudinal axis, the toggle 18—21 will be alternately straightened and deflected, with consequent transverse oscillation of ball end 17 and development of transverse reciprocation in the blade-operating stud 15. Frame 20 is fixed in position by having its outer end fitted within the reduced portion of the ferrule 2, and by having its inner end fixed by pin 26 passing through a lug on the frame and into the cylindrical spring housing 27 which fits within the lower end of the ferrule 2.

According to the present invention, pins

19 and 23, and if desired the pin 22 as well, are merely fitted in the parts which they connect without riveting, upsetting, or other manipulation, and consequently without the expense of insuring freedom of working in the moving parts; and these pins are secured against displacement by extending their ends until they meet opposing walls of adjacent parts, namely, the walls of the reduced portion of the ferrule 2 in the case of the pin 19, the walls of the frame 20 in the case of the pin 22, and the walls of the spring housing 27 in the case of the pin 23. This method of assembly is particularly advantageous with a design of parts permitting the assembly and organization herein shown, since it is merely necessary to slip the several pins and their supporting parts in place, assemble the frame 20 with the spring housing 27, and then introduce the resultant group of elements longitudinally into the ferrule 2 and screw the latter into the solenoid housing 1.

Movement of the solenoid armature 24 in the direction to deflect the toggle 18, 21, is developed by means of a reaction spring 29 acting against an abutment 30, while movement in the opposite direction, which straightens the toggle, is developed by the solenoid magnet 31. Armature 24, as in the previous application, extends but part way through the solenoid 31, the magnetic field being intensified by the use of a fixed core 32 at the inner end of the solenoid. The solenoid is energized and deenergized through the action of a make and break 33 controlling current supplied through wires 34, 35, and in order to actuate the make and break, armature 24 impinges against a rod 36, preferably of non-magnetic material, which extends through the fixed core 32 and into impingement against the make and break.

Another novel feature of the present invention resides in the packing employed around the extension of the toggle link 18, as a further check against the admission of water or foreign matter. This packing consists of a washer 18^a tightly surrounding the extension 18, formed as a segment of a sphere whose center is the fixed pin 19, and pressed constantly against a correspondingly formed spherical seat in the ferrule by means of a spring 18^b confined between the shell and the end of the frame 20. Moreover, a rubber sleeve 18^c tightly fitting the extension 18 just within the shell 18^a, checks the admission of moisture between the shell and the extension, and this in turn is of such dimension as to keep it under compression against the shell.

Abutment 30 for the reaction spring 29 is formed of a concaved disk, as best shown in Figure 4, and this disk is confined against the end of the armature 24 by means of the armature extension 24^a through which

the armature is connected with the sliding pin 23. Such confinement of the abutment may be accomplished by striking up lugs or fillets 24^{a'} on the extension 24^a, or by threading the extension 24^a into the armature 21, as shown at 24^b, gripping the disk between the parts.

The improvements herein described, excepting the mounting of the cap upon the combing plate and the construction of the blade-vibrating stud, are applicable as well to vibratory instruments other than razors, for instance, a massage device such as is suggested in Figure 6, wherein 37 represents the shell containing a vibrator 38 loosely supported therein by pin 39 and constructed at its inner end to receive the ball end 17 of the toggle lever.

I claim:

1. In a razor, a stationary plate, a blade mounted upon said plate with freedom of reciprocation, a post projecting from said plate, a cap overlying the blade and confining it upon the plate, and a clip holding the cap to the post; said cap being in direct bearing against said post and thereby defining the space between the plate and the cap in which the blade is confined.

2. In a razor, a stationary plate, a blade mounted upon said plate with freedom of reciprocation, a post projecting from said plate, a cap overlying the blade and confining it upon the plate, said cap entering into direct bearing against the end of the post, and a resilient clip drawing the cap to the post.

3. In a razor, a stationary plate, a pair of posts projecting from said plate, a blade mounted upon said plate with freedom of reciprocation and having slots through which said posts project, a cap overlying said blade, seating directly against said posts and thereby defining the space between the cap and the plate in which the blade is confined, and an independent spring clip for each post carried by the cap in position to engage the post and draw the clip thereto.

4. In a vibratory razor, a plate adapted to receive a razor blade, and a vibratory stud adapted to engage the blade on said plate to impart reciprocations thereto; said stud being located in an opening in the plate and comprising a base portion, a shank portion, a disk loosely surrounding the shank portion, and a head riveted upon the shank portion and confining the washer upon the base portion.

5. In a vibratory razor, a plate adapted to receive a vibratory razor blade, and a vibratory stud projecting through an opening in said plate, comprising a base portion, a shank portion, a neck portion, and a head portion riveted on the neck portion and forming with the base portion an annular groove having its axial dimension deter-

mined by the shank portion; said stud having a disk confined between its head and base and constructed with an opening of greater diameter than the shank portion.

5 6. In a vibratory instrument, a housing, a vibratory lever extending through an opening in said housing, and means for packing said lever relatively to the opening through which it extends, comprising a spherical washer having a correspondingly formed seat in the housing and a spring pressing said washer to said seat.

7. In a vibratory instrument, a housing, a vibratory lever mounted upon a pivot in said housing and extending through an opening in the housing, a washer surrounding said lever and having a seat against the housing, the seating face of said washer being a portion of a sphere whose center is the pivot of the lever, and means forcing said washer to its said seat.

8. In a vibratory instrument, a housing, a lever pivoted in said housing and having an operating end extending through an opening of the housing, a washer surrounding the operating end of said lever and seating against the housing, and a packing sleeve surrounding the lever and pressing against the inner surface of the washer.

9. In a vibratory instrument, a housing, a frame supported in said housing, a lever pivoted in said frame, a packing washer surrounding said lever and seated against the housing, and a spring interposed between

the packing washer and the frame, pressing said washer to its seat.

10. In a vibratory instrument, a housing, a frame supported in said housing, a lever pivoted in said frame, a packing washer surrounding said lever and seated against the housing, and a spring interposed between the packing washer and the frame, pressing said washer to its seat; said lever being surrounded by a resilient packing sleeve within the spring and between the frame and the washer.

11. In a vibratory instrument, a housing, a toggle lever in said housing for converting longitudinal into transverse movements, and a pivot pin for members of said toggle lever beyond said member and abutting against the walls of the housing to resist displacement of the pin relatively to the members which it connects.

12. In a vibratory instrument, a housing, and means for converting longitudinal into transverse movements in said housing, comprising a frame movable into the housing in a longitudinal direction for assembly therewith, a toggle lever, and a pin mounting said toggle lever in said frame; said pin extending between the toggle lever and frame and sliding into abutting relation with the inner walls of the housing by the assembly of the frame with the housing.

Signed at New York, New York, this 19th day of May, 1924.

SAUL SHALER.