

March 7, 1939.

E. GRUESSNER

2,149,995

RAZOR

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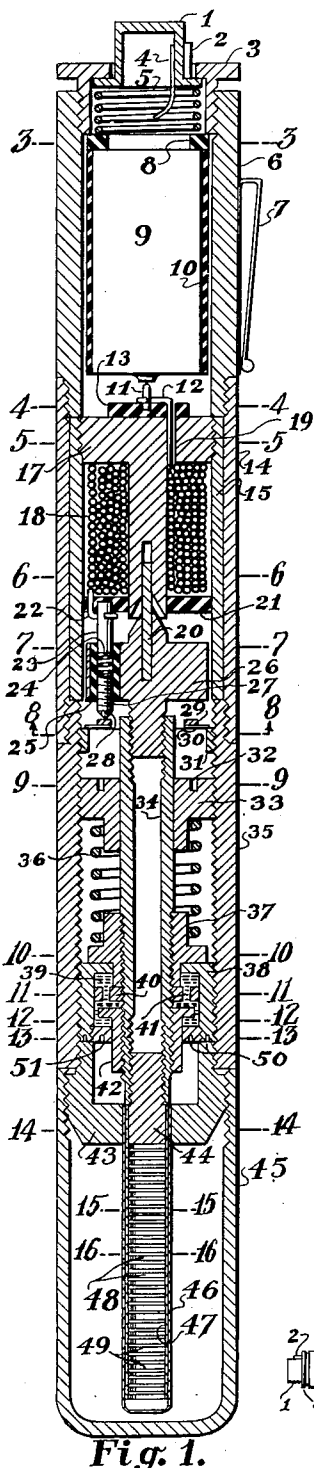
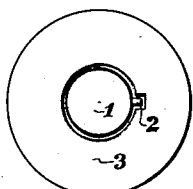


Fig. 2.

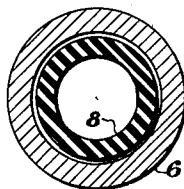


Fig. 3.

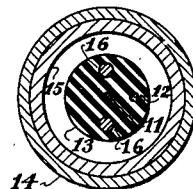


Fig. 4.

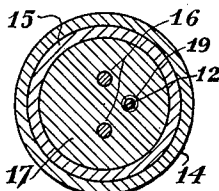


Fig. 5.

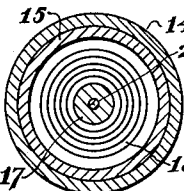


Fig. 6.

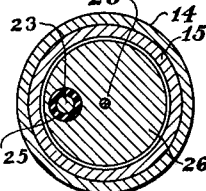


Fig. 7.

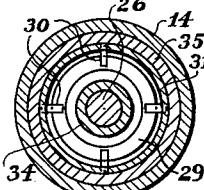


Fig. 8.

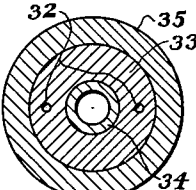


Fig. 9.

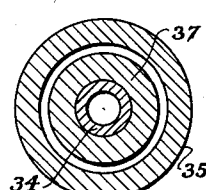


Fig. 10.

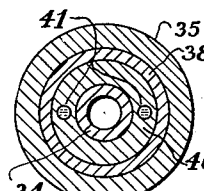


Fig. 11.

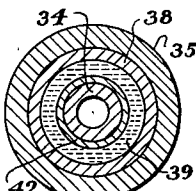


Fig. 12.

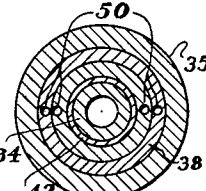


Fig. 13.

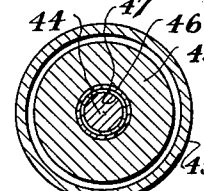


Fig. 14.

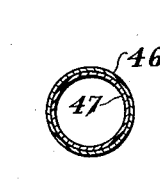


Fig. 15.

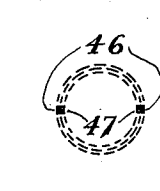


Fig. 16.

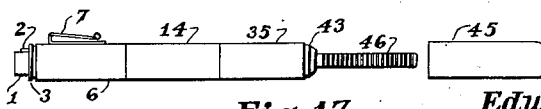


Fig. 17.

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UNITED STATES PATENT OFFICE

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RAZOR

Edwin Gruessner, Brooklyn, N. Y.

Application November 7, 1936, Serial No. 109,652

3 Claims. (Cl. 30-43)

This invention relates to razors, and more particularly to razors having a movable or vibrating blade.

Objects

The objects of the invention are to provide a razor of the character indicated which can be carried in the pocket and of a form for that purpose approximately the size and shape of a fountain pen; to provide a razor capable of a long continuous use with a dry cell for actuating the blade; to employ a magnetic vibrator for actuating the blade; to regulate the rate of vibration; to render the regulation of the rate of vibration readily adjustable; to regulate the force of actuation and the length of time of the duration of such force; to provide for cushioning the reciprocal motion; to provide for readily replacing the dry cell; to provide parts which are readily manufactured and assembled; and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawing in which like numerals of reference indicate similar parts throughout the several views:

Figure 1 is a longitudinal sectional view of a razor embodying my invention;

Figure 2 is a plan view looking toward what will for convenience be hereinafter termed the rear end of the razor;

Figures 3 to 16 inclusive are cross sectional views upon successive planes from the rear end of the razor to the front end of the razor on lines 3-3 to 16-16 respectively of Figure 1; and

Figure 17 is an elevation of the razor and cap.

Description

In the specific embodiment of the invention illustrated in said drawing it will be observed that the razor is constructed with a casing composed of three successive tubular sections for convenience identified as rear section 6, mid-section 14 and forward section 35. The outside diameters of all of these sections are preferably the same so the casing thus constituted is a smooth straight cylinder. The forward end of the casing receives a tip 43 screw-threaded to be seated in the forward end of the forward section and having further threads beyond the forward section for receiving a cap 45. This cap is removable when the razor is to be used and will then expose the cutting head of the razor which, as here shown comprises a fixed element or shield 46 within which is slidably mounted the movable element or blade 47. This movable element in use is

given a vibratory longitudinal motion as will be explained more fully hereinafter. It is by virtue of the vibratory motion of element 47 with respect to the fixed element 46 coupled with the fact that these elements have intimate surface contact and a plurality of openings, the edges of which shear with respect to each other, that the shaving function is accomplished. The openings may be made in any suitable manner, and as here shown each member is provided with a plurality of successive parallel substantially semi-circumferential slots 49 equally spaced. Each member likewise provides said slots in two opposed series for the entire exposed portion of the cutting head. At one position of the movable element, the arcuate or semi-circumferential slots 49 will all register with corresponding arcuate or semi-circumferential slots 49 of the outer or fixed element 46, and in the other extreme position of the movable element the solid portions 48 intervening between the slots 49 of the movable member pass behind the slots 49 of the fixed member to the next successive solid portion 48 of the fixed member intervening between slots, thereby effecting the shearing action upon anything inserted within the slots. Outer element 46 therefore serves both as a complementary shearing element and as guard or shield.

The inner or rearward end of the movable element or blade 47 is cylindrical and rigidly attached and/or arranged to be frictionally applied to and held upon the forward end of a blade holder 44. The rearward end of this blade holder is screwed into a vibrator sleeve 34 positioned substantially co-axially with the forward section 35 of the casing. The rear end of this sleeve 34 is mounted on the neck portion of an armature 26. This armature 26 is within the forward end of the mid-section 14 and is co-axial therewith. From the rearward end of the armature projects a dowel-like guide 20 which in turn slidably enters a central orifice in an axially disposed core 17 of an electro-magnet 18. It will accordingly be observed that the several parts, namely blade 47, holder 44, sleeve 34, armature 26 and guide 20 are assembled for vibratory reciprocation as a unit. The threading of the sleeve with respect to both the armature and the blade holder permits such adjustment as may be required between these parts and permits further adjustment as to the strength of pull of the magnetic coil by varying the air gap between core 17 and armature 26.

Excitation of the electro-magnet functions to attract armature 26 to obtain actuation thereof in a rearward direction. Actuation of the arma-

ture, sleeve and blade forwardly is obtained by means of a coil spring 36 surrounding a middle part of the said sleeve and pressing against a forward shoulder provided for that purpose. In the particular showing the shoulder is constructed as a flange radially projecting from an annular band 37 threaded upon the sleeve. The opposite or rear end of the spring bears against a ring 33 threaded into the interior of the forward section 35 of the casing. Tension of the spring can thus be adjusted by screwing the ring 33 rearwardly or forwardly as desired.

Within the rear section 6 of the casing is introduced a source of electrical potential, such as a dry cell 9 of the type generally employed in small diameter flash lights. The construction of this dry cell includes as usual, a rear metallic end which forms part of one of the electrodes thereof, and a forward knob which forms part of the other electrode. This cell is covered on its circumferential face by a cylindrical insulated enclosure 10 the rear end of which may be flanged inwardly, as at 8, so as to avoid any undesired contact of the cell with the casing. The rear end 25 of the casing is internally screw-threaded and receives a head 3 which in turn is centrally apertured to receive a button 1 shouldered beneath the head to limit outward movement of the button and actuated upwardly by the influence of a coil spring 5 situated between the button and insulative flange 8 around the cell. The button carries a spring contact finger 4 which extends forwardly within the coil spring 5 and which will come into contact with the end of the cell 9 for establishing electric contact therewith when the button is depressed. In order to enable the contact to be maintained, the button is provided with a spline 2 at the side thereof riding in an appropriate notch in the head. The length of the spline is proportioned so that its outer end may be depressed beneath the shoulder of the head and then partially rotated so as to engage beneath that shoulder. When contact is no longer desired between the spring finger 4 and the cell, the button can be rotated back to register the spline with the notch and permit the button to retract to the upward position as shown in Figure 1. In order to mount the razor in one's pocket, a suitable clip 7 may be provided on the outer surface of the casing, for instance upon the rear section 6 thereof.

The mere mounting of the dry cell within the casing and screwing head 3 home obtains continuous contact of the central forward electrode of the dry cell with stud contact 11 fixed upon but insulated from the core 17 of the electro-magnet. I have shown this stud 11 mounted in an insulated disc 13 on the end of said core and have shown a wire 12 from the said stud, passing through a hole 19 in the core to coil 18 of the electro-magnet. It may here be noted that at the forward end of the core is another insulated disc 21 and this forward disc confines the wires making up the coil from displacement forwardly. Any suitable means, such as longitudinal bolts 16 may extend from the rear disc 13 into the next adjacent face of the core for holding those parts assembled. The forward disc may be frictionally or otherwise held upon the core. A shell 15 may surround the coil 18, as shown, and be situated within the mid-section 14 of the casing. This shell 15 is likewise shown as having interior screw-threads to receive the rear threaded core 17 and is likewise shown as projecting beyond the core around at least a part of armature 26.

As above indicated, one end wire 12 from the coil has electrical contact with stud 11 at the rear of the core. The other end of the wire forming the coil 18 passes out of the forward disc 21, as at 22, and is attached to a forwardly projecting pin 23 eccentrically situated with respect to the core. This pin is fixed in said insulated disc 21 and has its forward end projecting into an insulated bushing 25 which extends longitudinally through the armature offset from and parallel to the axis of the armature. Said pin 23 is slidable in said bushing so as to permit the armature to move toward and away from the core of the magnet. The forward end of the said bushing receives a contact point 28, both the said point 15 and the bushing preferably being screw-threaded, as at 27, for obtaining a fixed mounting of said point with respect to the bushing and armature. A spring 24 is interposed between the adjacent ends of said pin and contact point within said 20 bushing, said spring being for purposes of maintaining an electrical contact at all times from the pin to the contact point. In advance of the contact point 28 is a ring or bus 29 the plane of which is perpendicular or normal to the axis of the armature and casing. This arrangement enables contact to be had regardless of a turning of the several parts around the central axis of the casing during assembling and adjusting. In operation, contact between said contact 28 and 30 ring or bus 29 is intermittently made and broken as the armature vibrates back and forth. Making of electrical contact at the forward end of the stroke of vibration accordingly depends in part upon the position of the said bus 29, and I 35 preferably provide means for adjusting the position of said bus. As here shown, said bus is carried by a plurality of resilient spokes or bar springs 30 extending radially outward from the bus to a nut 31 the outer surface of which is screw-threaded to obtain adjustable support from the screw-threads of the forward section 35 of the casing. The spokes or bar springs 30 will flex under pressure from the contact point and thus give an ample period of electrical contact for energizing the magnet and actuating the armature rearwardly.

It will be evident now that the electric circuit is completed (when button 1 is depressed) resulting in a flow of current from the dry cell through the central forward contact thereof, stud contact 11, wire 12 to coil 18 and thence through wire 22 to pin 23, spring 24, contact point 28, bus 29, bar springs 30, nut 31 to the metallic casing and back to the button 1, contact spring 4 and opposite end or electrode of dry cell 9. The current drawn from the dry cell actuates magnet 18 to draw armature 26, and to move the blade 47 rearwardly. It likewise causes contact 28 to retract from bus 29 thereby opening the electric circuit. The compressive action of spring 36 thereupon becomes effective and slides the armature in a reverse or forward direction, that is to say, away from the magnet and thus reverses the sliding movement of the blade 47 and again obtains electric contact between the contact point 28 and bus 29. This operation recurs rapidly and thus obtains a vibratory motion of the blade. It will be noted that the action of the magnet opposes the tension of spring 36, and that the tension of said spring is adjustable by screwing its confining ring 33 one way or the other. The adjustment is preferably made at the factory, and for convenience in doing this the said ring pref-

erably has spanner-wrench holes 32 in its rear face.

It is desirable, in connection with a vibratory razor to have only a very short stroke of vibration, but since the vibration would be relatively rapid for the short stroke necessarily utilized herein, and as it is likewise desirable to reduce the rapidity of stroke as well as to utilize the relatively short stroke, I provide as an essential feature of the invention means to dampen or retard the vibration or reciprocation. As one means for accomplishing this desideratum, I incorporate a fluid retarding means, such as a dashpot, shown within the forward section next the tip 43 and around a forward part of vibratory sleeve 34. This means or dashpot provides housing 38 in the nature of a hollow nut screw-threaded at its exterior so as to be positioned in fixed situation within the forward section 35 of the casing. The rear end of the housing 38 is shown integral with the circumferential wall thereof and is centrally apertured to have a sliding engagement with the outside circumference of annular band 37 fixed upon the vibrating sleeve 34. The said annular band 37 extends within the said housing 38 and may slide with respect thereto. The forward end of housing 38 is closed by a plug 51 which can be screwed tightly home in the end of the housing by a spanner-wrench, holes 50 being shown in the outer end of the plug for receiving such a spanner-wrench. The plug is centrally apertured to provide a sliding engagement with a flanged sleeve 42, the flange of which is within the housing and the sleeve portion of which has sliding contact with the said plug and has threaded engagement with the vibratory sleeve 34. Within the said housing and fixed upon the vibratory sleeve 34, as by having screw-threads thereon, is a perforated disc or piston 40 having a plurality of perforations 41 extending through the piston from the forward to rear surfaces thereof. The circumference or edge of this piston is in sliding contact with the inside surface of housing 38, and the housing is filled with a fluid, such as a light oil 39, which has to pass through said perforations 41 with each vibration of the vibratory sleeve 34. By screwing the flanged sleeve 42 closely to or further from the perforated disc 40, the frequency of the stroke of the vibratory sleeve is thus very simply set and remains constant in operation. The construction likewise obtains a cushioning at the end of the stroke due to the fluid pressure between the flange of said flanged sleeve and said disc 40. Since the perforations 41 provide limited passage for the fluid from either face of the disc to the other face thereof, the vibration will be retarded in both directions, and thus I am enabled to employ an electromagnet actuating mechanism with a circuit making and breaking contact which will give the desired short stroke of vibration with a retarded reciprocation in both directions for the razor blade.

Before closing this description, I wish to point out that not only is the rate of vibration regulated, but also the strength or force of the actuating push or pull and the length of time of the duration of such force can be regulated. Thus I can have a varying strength of pull at the same rate of vibration, and conversely the length of reciprocal motion, that is to say the distance of movement back and forth can be regulated with the rate of movement remaining constant. As indicated heretofore, the tension in spring 36 can be varied by moving the ring

33 forwardly by virtue of the screw-threads holding it. Suffice it to say that the adjustment of this spring tension exerts its influence upon the time of the stroke. The length of stroke is determined by the distance between the piston and the shoulder of band 37 taking into consideration also the thickness of the end wall of housing 38 interposed therebetween. The duration of the magnetic impulse is determined by the position or regulation of bus 29 with respect to contact 28. Obviously the more bus 29 is depressed by contact 28 the longer will be the period of electrical circuit remaining closed. As soon as the current is on, armature 26 moves rearwardly toward core 17. If the contact between point 28 and bus 29 were broken immediately, the armature 26 would only have been given a slight initial impetus. By retaining the electrical contact slightly longer, the magnetic impulse is increased. Since, when the current is on, the force or pull of the magnet on the armature varies inversely as the square of the distance of the air gap between core and armature and directly as the square of the current, it will be seen that for a given current the length of time of contact is of tremendous importance. The tension of spring 36 as well as the position of bus and deflector of the bus by contact 28 enter into the determination of the power applied and rate of movement obtained. Thus, as an example, in one type of electro-magnet, if the current were left on from the beginning of the stroke to the end of the stroke a magnetic pull would be obtained increasing from perhaps $\frac{1}{8}$ of a pound at the beginning of the stroke to 1 and $\frac{1}{2}$ pounds at the end of the stroke. The length of stroke is to be made to substantially agree with or slightly exceed the spacing of the slots 49 in the blade and shield and thus should the blade and shield with slots of different spacing be employed, the stroke can be adjusted to accommodate this difference.

A further mechanical detail to be observed, is the fact that moving parts are all guided so as to move with precision in an axial direction. The ring 33 acts as a guide for vibrating sleeve 34, housing 38 acts as a guide for the band 37 and thus for sleeve 34, plug 51 acts as a guide for flanged sleeve 42 and tip 43 acts as a support for shield 46 and in turn guiding blade 47.

As the current flows through the coil of electro-magnet 18, the magnetic circuit is established through core 17 and shell 15 across the air gap between both the core and shield to the armature 26, these parts being of magnetic material, such as soft iron, electrical steel or other material having the property of rapidly magnetizing and demagnetizing corresponding to the electrical circuit being closed and opened. The enclosing parts of the casing, particularly section 14, are of brass or other non-magnetic material such as not to influence the magnetic circuit.

I claim:

1. A razor constituting a self contained unitary inherently operable instrumentality of convenient pocket size comprising a casing and a blade movable longitudinally of itself and longitudinally of said casing, an elongated element within said casing fast with respect to said blade and longitudinally reciprocable for vibrating the blade, means within said casing for vibrating said element and blade, and a dash-pot in said casing and situated between the ends of said element effective thereon for damping the vibration of

said element and blade simultaneously in the same direction.

2. A razor constituting a self contained unitary inherently operable instrumentality of convenient pocket size comprising a casing and a blade movable longitudinally of itself and longitudinally of said casing, an elongated element within said casing fast with respect to said blade and longitudinally reciprocable for vibrating the blade, means within said casing for vibrating said element and blade, and a fluid damping means in said casing situated between the ends of said element interposing fluid in opposition to the vibration movement of said element and blade in both directions of vibratory movement thereof.

3. A razor constituting a self contained unitary inherently operable instrumentality of convenient pocket size comprising a plurality of aligned casing sections, one of said sections having space therein for a battery, electromagnetic vibration means in another section, and a dash-pot in a third of said sections for damping the vibration exerted by said electro-magnetic means, said sections being secured one to another thereby rendering the instrumentality unitary and operable, said sections being separable one from another for repair, exchange and adjustment of parts constituting the assembly.

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