R. P. HARSHBERGER.

SAFETY RAZOR.

APPLICATION FILED JAN. 13, 1919.

1,404,693. Patented Jan. 24, 1922.

2 SHEETS—SHEET 1

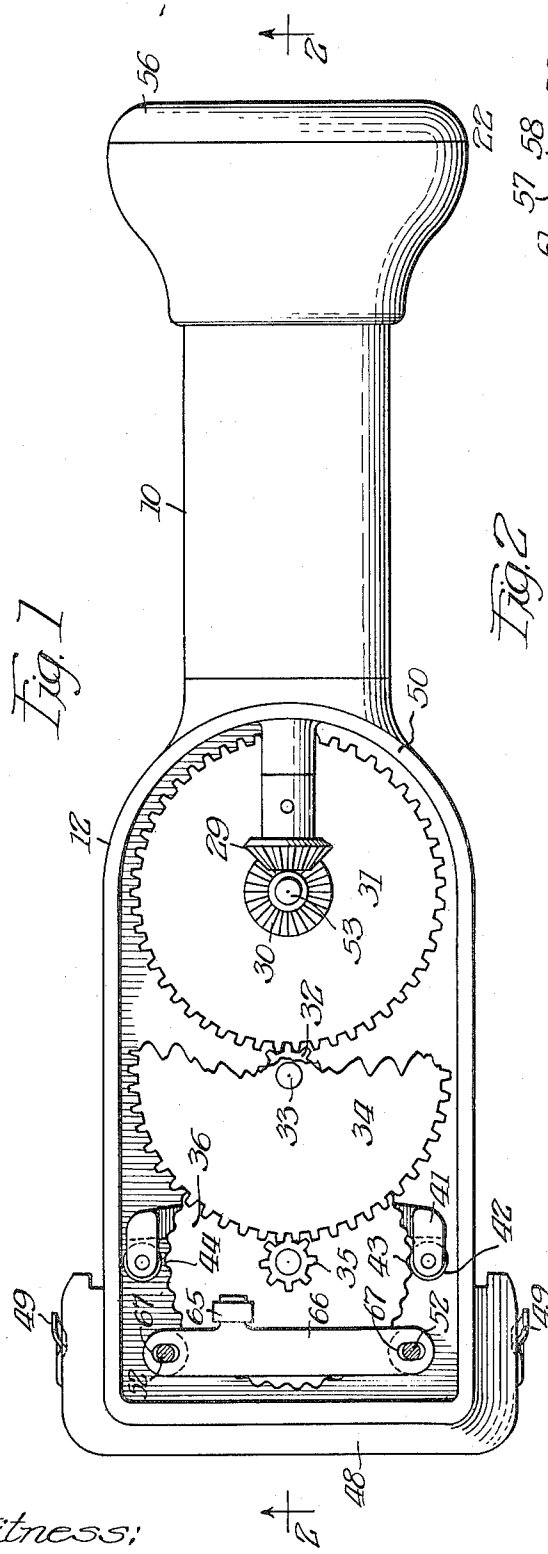


Fig. 1

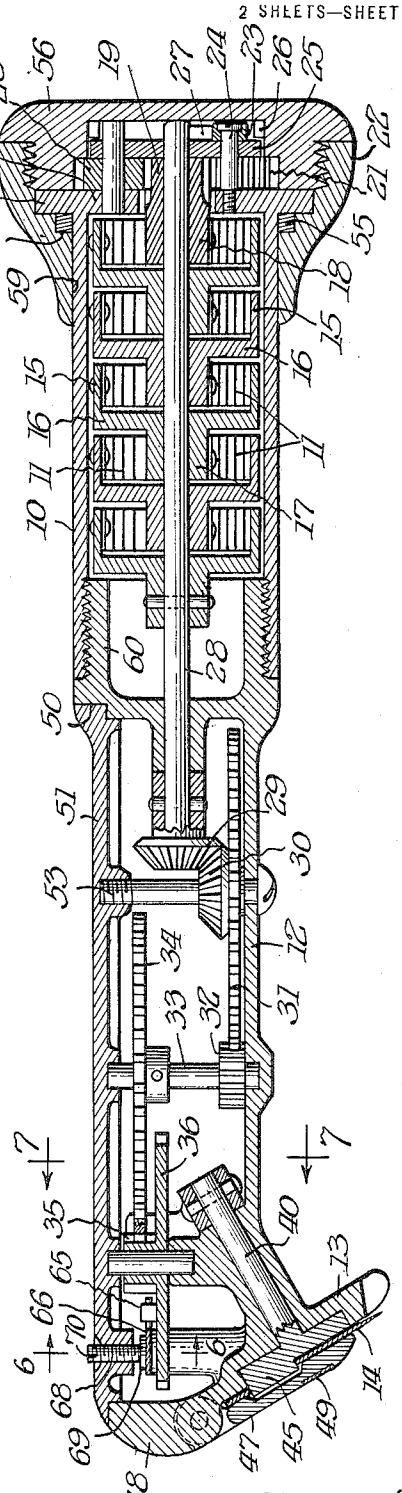


Fig. 2

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Fig. 4

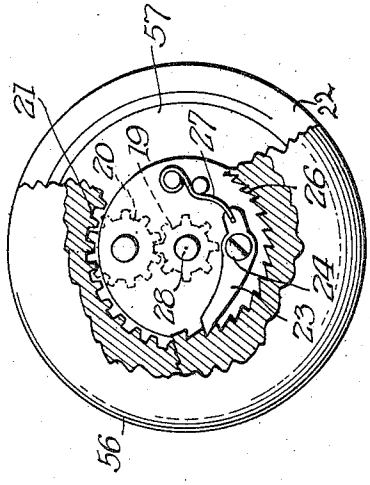


Fig. 6

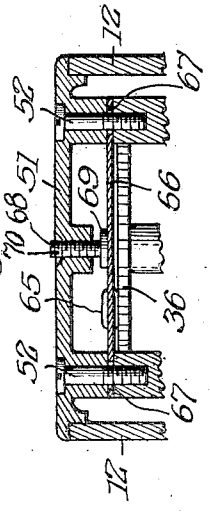


Fig. 3

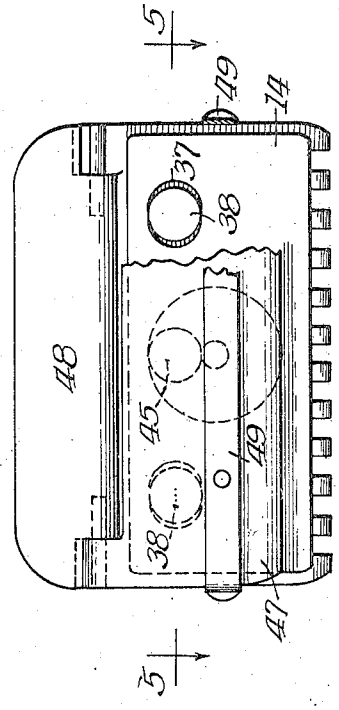


Fig. 5

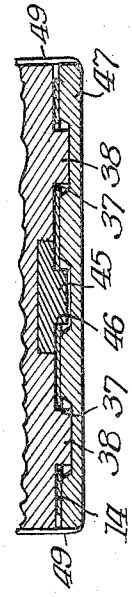
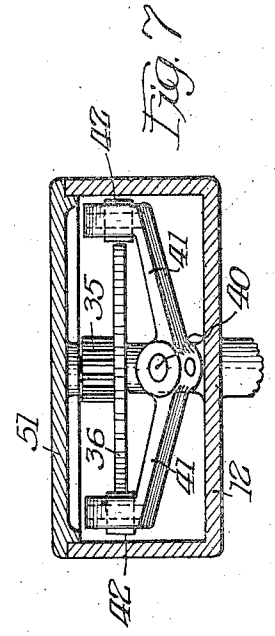


Fig. 7



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UNITED STATES PATENT OFFICE.

RUSSELL P. HARSHBERGER, OF CHICAGO, ILLINOIS.

SAFETY RAZOR.

1,404,693. Specification of Letters Patent. Patented Jan. 24, 1922.

Application filed January 13, 1919. Serial No. 270,852.

To all whom it may concern:

Be it known that I, RUSSELL P. HARSHBERGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Safety Razors, of which the following is a specification.

This invention relates to improvements in safety razors, and has for its object the production of a safety razor, the blade of which is given a vibratory movement when in operation. A further object of the invention is to provide suitable mechanism for vibrating the blade and for protecting such mechanism from injury from dirt and moisture. Other objects of the invention will be apparent from a consideration of the drawings and the following description.

Of the drawings Fig. 1 is an elevation of a razor with a portion of the casing broken away to disclose the operating mechanism thereof, which embodies the features of my invention. Fig. 2 is a section of the razor and its mechanism along the line 2—2 of Fig. 1. Figs. 3 and 4 are end views of the razor, with portions broken away. Fig. 5 is a section along the line 5—5 of Fig. 3. Fig. 6 is a section along the line 6—6 of Fig. 2. And Fig. 7 is a section along the line 7—7 of Fig. 2.

In this particular case I have illustrated and described the razor with the blade set at an angle of about 60° with the handle; but it is to be understood that the invention applies to blades set at any ordinary or suitable angle. Also I have shown and described a spring motor for the power to be used in imparting to the blade its vibratory movement; but any suitable type of motor may be used for the purpose. In general, the invention consists of a razor blade, slidably supported on a suitable framework, which is vibrated by means of a cam or escapement wheel, which is operated by a series of gear wheels meshing with each other and transmitting the power from a driving motor to the cam wheel. I prefer for the driving power a motor comprising a plurality of coil springs, operatively connected in series with each other, and also connected to suitable means for putting the springs under tension.

The operating mechanism of the device is enclosed in a suitable casing, which is sealed so as to prevent moisture or dirt working into the interior of the casing and affecting injuriously the mechanism. The casing comprises in general a handle portion 10 which encloses the motor; also a portion 12 which encloses the gear wheels of the mechanism; and also the framework 13 which slidably supports the razor blade 14.

The motor comprises a series of coil springs 11, each of which is connected in any suitable manner by its outer end to the outer wall 15 of a cup 16, and by its inner end to the projecting hub 17 of the adjacent cup. The outer spring of the series, however, is connected to the hub 18, while the inner spring is connected to the shaft 28. A spur wheel 19 is fixed to the hub 18 and meshes with a spur wheel 20, which, in turn, meshes with an internal gear wheel 21 fixed to the winding knob 22. The knob is rotatably mounted on the end of the handle 10 of the casing. A pawl 23 is pivoted within the knob by means of a pin 24 passing through a disk 25. The free end of the pawl coacts with an internal ratchet wheel 26 which is fixed to the knob. A spring 27 holds the free end of the pawl against the ratchet teeth.

A consideration of this mechanism will show that, as the knob is rotated, the spur wheels 19 and 20 will be rotated, and the wheel 19 rotating the hub 18 will wind up the first spring, the pawl preventing the knob from rotating backwardly when the knob is released by the hand. As the rotation of the knob continues the first spring will impart rotation to the hub of the second spring, and so on until each of the springs is thus put under tension. And, the cup 16 of the inner spring, being fixed to the shaft 28, this shaft will tend to rotate under the tension of the springs.

The rotation of the shaft 28 will, in turn, rotate the beveled gears 29 and 30, and also the spur wheel 31, fixed to the beveled gear 30. The wheel 31 in turn will rotate the spur wheel 32, the shaft 33, to which the spur wheel 32 is fixed, and thus the gear wheel 34, also fixed to the shaft. The gear wheel 34 will rotate the spur wheel 35, which is fixed to the cam disk 36. Hence, whenever the knob 22 is rotated, so as to impart tension to the springs, there will be a tendency for the cam disk 36 to be rotated also.

In my copending application Serial Number 143,810, filed January 22, 1917, I have illustrated and described a safety razor com-

prising a slidably mounted razor blade operated by means of an electromagnet, and an eccentric device transmitting the power from the electromagnet to the razor blade through the casing of the device. The arrangement of the mechanism in this application is similar, except that the eccentric is operated by means of the cam disk 36 instead of by means of the electromagnet. The razor blade 14 is slidably mounted in the casing frame 13 in any suitable manner, for example by means of the openings 37 through which project the posts 38; the posts being fixed to the frame. Journaled in the casing is a rock pin 40, which transmits the vibratory movement from the cam disk 36 to the razor blade. Fixed to the inner end of this pin are projecting arms 41 which have, at their outer ends, rollers or cam wheels 42; the distance between these cam wheels being such that, when one of the wheels is in a depression 43 of the cam disk periphery, the other wheel will be a slight distance beyond the opposite projection 44 of the cam disk; so that the cam disk will be able to rock the pin 40 by alternately forcing the cam wheels out of the depressions and over the projections. The pin 40 projects out of the casing, and has fixed to its outer end an eccentric 45 which projects through an opening 46 in the blade 14. Hence, as the pin 40 is rocked, the blade 14 will be vibrated in a path parallel with the cutting edge. The blade is held in position on the posts 38 by a guard 47, which is hinged to the frame piece 48 and is spaced therefrom by the posts 38, and is held in place by the clip 49, fixed to the guard and normally clasping the frame of the casing. In this way the blade may move freely between the guard and the frame. Hence, as the knob is rotated, or at any time when the springs are under tension, the train of gear wheels, transmitting the power of the springs to the cam disk, and thus rotating the disk, will cause the rock pin to rock and the razor blade to vibrate.

As stated the mechanism is entirely enclosed in the casing, but, in order to allow access to the mechanism, an opening 50 is formed in the casing which is closed by means of the plate 51. This plate is held in place by means of screws 52 and the pin 53 which also serves the purpose of rotatably supporting the wheels 30 and 31. By removing the screws 52 and the pin 53, the plate 51 may be removed, and all of the internal mechanism, with the exception of the spring motor, is easily accessible and may be removed if desired.

The handle 10 of the casing is sealed by means of a gasket 55. In assembling the device, before the plug 56 of the knob 22 is screwed into the inner wall of the knob, the handle 10 of the casing is passed through the gasket 55 and the gasket is placed against the annular flange 57 projecting from the end plate 58 of the handle, and the handle is then passed through the opening 59 of the knob, and is screwed onto the frame 60 of the casing. The plug 56 is then screwed into the wall of the knob sufficiently to bring the shoulder 61 of the knob snugly against the gasket 55, so as to prevent moisture or dirt working between the knob and the handle into the interior of the knob. By these means the knob may be rotated relatively to the handle, imparting rotary movement to the spur wheel 19 and to the hubs of the springs without allowing moisture to pass into the casing.

In order to control the speed of operation of the razor blade, I provide an adjustable brake which comprises any suitable form of shoe, for example the leather shoe 65. This shoe is adapted to be pressed against the surface of the cam disk 36. With this in view, the shoe is fixed to the spring plate 66, which has elongated openings 67 through which pass the screws 52. Threaded in the wall of the casing is a pin 68 which projects outwardly and inwardly. The outer end is provided with any suitable means for rotating the pin, such as the slot 70, so as to adjust the position of the inner end. The inner end is adapted to come in contact with the central portion of the spring plate 66, so as to press the plate, and hence the shoe, against the cam disk 36, thereby retarding the speed of the disk as much as may be desired. On the inner end of the pin 68 is a flange 69 which prevents the pin from being removed without opening the casing.

By these various means I have provided, what may be called, a self-contained mechanically operated vibrating razor. Substantially all of the operating mechanism, including the motor, is entirely enclosed in the casing; and the motor is of such a nature that it receives and stores energy, the system being independent of all other apparatus, such as flexible shafts, electric wires, or the like. At the same time the motor, upon receiving its energy, is of such a nature that it transmits the energy to the blade, and suitably operates the blade for a reasonable length of time before the contained energy is exhausted.

I claim as my invention:

1. A mechanically operated vibrating safety razor comprising a substantially hermetically sealed casing, a razor blade slidably mounted outside of said casing, a member journaled in the wall of said casing and projecting outwardly and inwardly therefrom, an eccentric fixed to said member and operatively connected with said blade, means in said casing for rocking said member, said means comprising a rotatably mounted disk having a cam-wheel runway on its periph-

ery, an arm extending from the inner end of said member, the outer portion of said arm coacting with said runway, a motor mounted in said casing, means operatively connecting said motor with said cam wheel, and means mounted on said casing and outside thereof for energizing said motor.

2. A safety razor comprising a casing, a blade slidably mounted on the outside of said casing, a member rotatably mounted in the wall of said casing and extending outwardly and inwardly therefrom, means operatively connecting said member with said blade, means in said casing operatively connected with said member for rocking said member, said means comprising a rotatably mounted plate, the periphery of said plate being non-circular, means operatively connected with said member and coacting with the periphery of said plate, and means for operating said plate.

3. A safety razor comprising a frame, a blade slidably mounted in said frame, a rock pin mounted in said frame and operatively connected with said blade, means for rocking said pin mounted in said frame comprising a disk rotatably mounted in said frame, said disk having a non-circular periphery, and means operatively connected to said pin, said means coacting with the periphery of said disk.

4. A safety razor comprising a frame, a blade slidably mounted in said frame, a rock pin mounted in said frame and operatively connected with said blade, and means for rocking said pin mounted in said frame comprising a disk rotatably mounted in said frame, said disk having non-circular periphery, means operatively connected to said pin, said means coacting with the periphery of said disk, means for rotating said disk, and automatic means for retarding the motion of said disk.

5. In a safety razor, a frame, a blade slidably mounted on said frame, a motor mounted in said frame, means for operatively connecting said motor with said blade whereby said blade is reciprocated, and means for adjusting the frequency of the reciprocations of said blade, said latter means comprising a spring member, a shoe fixed to said member adjacent one of the moving parts of said operatively connecting means, and a screw extending through said frame and arranged to force said shoe with varying pressures against said moving part.

6. In a safety razor, a frame, a blade slidably mounted on said frame, a rocking device rotatably mounted in the wall of said frame operatively connected to said blade, a cam wheel, a motor operatively connected to said wheel, a yoke mounted to follow the cams on said cam wheel and operatively connected to said rocking device thereby reciprocating said blade in reference to said frame.

In testimony whereof, I hereunto set my hand.

RUSSELL P. HARSHBERGER.