United States Patent

Tiffin

[15] **3,636,627**

[45] **Jan. 25, 1972**

[54] RAZOR WITH OSCILLATING HEAD

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[22] Filed: **Aug. 11, 1969**

[21] Appl. No.: **848,924**

[52] **U.S. Cl.** **30/45,** 30/DIG. 1

[51] **Int. Cl.**.....**B26b 21/38**

[58] **Field of Search**.....30/44, 45

[56] **References Cited**

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[57] **ABSTRACT**

A battery-driven vibratory safety razor in which a battery-driven electric motor in the handle of the razor has a very short eccentrically weighted shaft, and the structure is such that the entire assembly may be made by inserting components through the rear of the handle. A blade carrier and blade support are mounted in a plug in the front end of the handle by means of a central threaded post which is on the blade guard and impales a central hole in the blade carrier. The speed of rotation of the eccentrically weighted motor shaft and the size of the orbit in which the razor head moves are coordinated with observed characteristics of hand motions of shavers to minimize possible cutting of the face during shaving.

8 Claims, 4 Drawing Figures

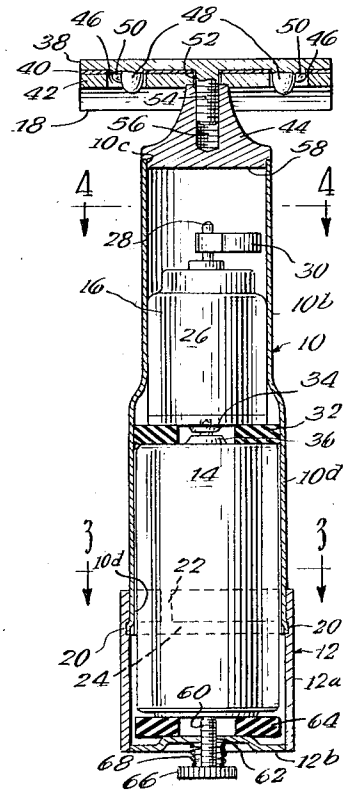


Fig. 1

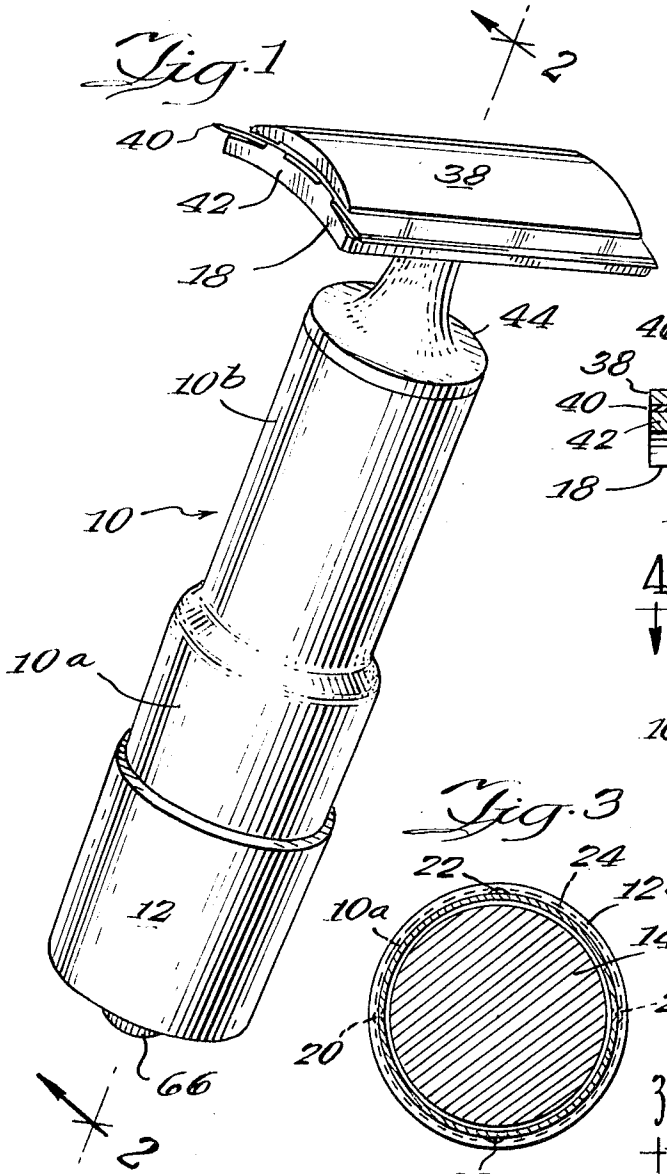


Fig. 2

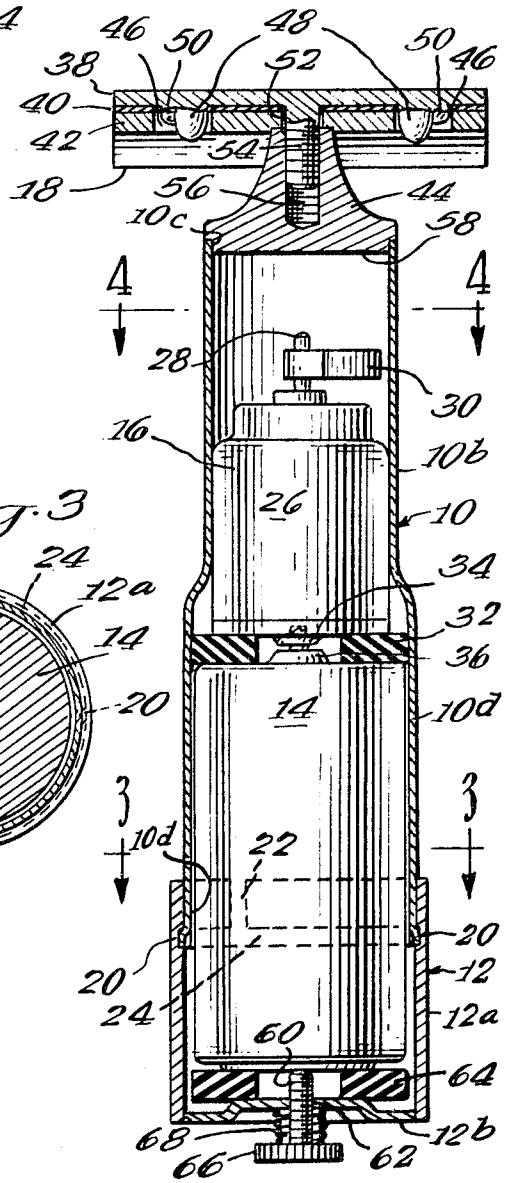
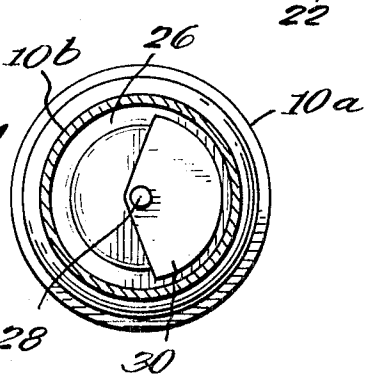


Fig. 3

Fig. 4



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RAZOR WITH OSCILLATING HEAD

BACKGROUND OF THE INVENTION

This invention relates to an improved vibratory safety razor.

Before the present invention, there have been various proposals for safety razors which provide vibratory action through use of various intricate mechanisms that are susceptible to excessive wear and breakage; and that are expensive to produce. Thus, the intricate structure of these razors has curtailed their use.

SUMMARY OF THE INVENTION

It is a principle object of the present invention to provide a new and useful vibratory razor with a lightweight, simplified structure consisting of a minimum number of parts, all of which may be inexpensively fabricated and assembled.

The vibratory razor of this invention includes a hollow one-piece handle having a rearward portion of a first diameter and a forward portion of a smaller diameter, with the handle being open at both ends. A removable closure cap engages the handle and closes the open rear end. A head assembly is mounted in the open front end of the handle by means of a frictionally fitted plug; and the head assembly includes a blade guard, a blade carrier and a blade support of which the plug is a part. An electric cell is snugly received in the rearward portion of the handle, and vibratory means comprising an electric motor driven by the cell and having an eccentrically weighted shaft is snugly received in the forward portion of the handle. Switch means for selectively closing a circuit between the electric cell and the motor consists of a manually operated screw contact in the closure cap.

Thus, the present invention provides simple and inexpensive means for mounting the head assembly on the front of the handle.

The switch means is simple, inexpensive and positive; and a bayonet slot connection fore closure cap also eliminates machining of the cap and handle.

Simple and inexpensive vibratory means is provided by mounting an eccentric mass on the motor shaft.

An object of this invention is to drive the head assembly in a circle of oscillation to provide a comfortable motion of the razor on the face.

Further objects will become more fully apparent in the following description of the embodiment of this invention and from the appended claims.

DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of one embodiment of a vibratory razor made according to the present invention;

FIG. 2 is a longitudinal central sectional view taken substantially as indicated along line 2—2 in FIG. 1;

FIG. 3 is a transverse sectional view taken substantially as indicated along the line 3—3 in FIG. 2; and

FIG. 4 is a transverse sectional view taken substantially as indicted along the line 4—4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2, a one-piece hollow handle 10 is shown having a rearward portion 10*a* of a first diameter and a forward portion 10*b* of a smaller diameter, an open front end 10*c* and an open rear end 10*d*. A removable cuplike closure cap 12 closes the open rear end 10*d*.

An electric cell 14 is snugly received in the rearward portion 10*a* of the handle 10, and vibratory means 16 is snugly received in the forward portion 10*b*. As shown, a razor head assembly 18 is mounted in the forward portion of the handle 10.

Continuing now to the closure cap 12, the extreme rear portion of the handle 10 has a plurality of outwardly struck bosses 20, as shown in FIG. 2. The closure cap 12 includes a cylindrical sidewall 12*a* and a bottom 12*b*; and a set of longitudinal grooves 22 in the sidewall to receive the bosses 20 of the handle 10. A circumferentially extending groove 24 on the inner surface of the sidewall 12*a* allows twisting motion of the handle 10 to lock the bosses 20 in the groove 24 and thus positively but removably secure the closure cap 12 on the handle 10.

The electric cell 14 is held in position by friction between the outer surface of the cell 14 and the inner surface of the handle 10.

The vibratory means 16 received in the forward portion of the handle 10 is held in position by friction between the outer surface of the vibratory means 16 and the inner surface of the handle 10. The vibratory means 16 comprises an electric motor 26 having a short shaft 28 extending which is supported only by the motor and extends toward the front portion of the handle 10, and an eccentric mass 30 mounted on the shaft 28 close to the front of the motor.

A resilient insulator 32 isolates the body of the electric motor 26 from the electric cell 14 while providing correct spacing to allow electrical contact between a motor contact 34 and an electric cell post 36. The other electrical contact for the motor 26 is between the outer surface of the motor 26 and the inner surface of the razor handle 10.

Considering now the razor head assembly 18, a conventional blade guard 38 secures a razor blade 40 on a conventional blade carrier 42. The blade guard 38 and blade carrier 42 are held in position by a blade support 44 which is mounted in the forward portion of the handle 10. The blade carrier 42 and blade guard 38 have conventional interlocking parts, including holes 46 and bosses 48, which fix a razor blade 40 securely in place.

As illustrated, the blade carrier has a central bore 52 to receive an integral threaded post 54 on the blade guard 38; and the blade support 44 has a central threaded bore 56 to receive the threaded post 54.

As illustrated in FIG. 2, the means mounting the head assembly 18 in the open front end 10*c* of the handle 10 comprises a plug 58 which is integral with the blade support 44 and makes a press fit with the handle 10, being held in position by friction between the plug 58 and the handle 10.

In the preferred form, switch means is provided in the bottom of the closure cap 12. A manually operable threaded screw 60 extends through a centrally located threaded hole 62 in the bottom of the closure cap 12 to provide a selective electrical contact between the bottom of the cell 14 and the closure cap 12. The remaining portion of the bottom of the cell 14 is insulated from the closure cap 12 by a resilient insulator 64. Electrical contact between the closure cap 12 and the handle 10 is made through their connecting surfaces. Tension between the screw handle 66 and the bottom 12*b* of the closure cap 12 is provided by a spring 68. The configuration is such that electrical contact between the cell 14 and the closure cap 12 can be opened or closed by manually operating the screw contact 60, thus opening or closing an electrical circuit between the cell 14 and the motor 26.

With the electrical circuit closed, the eccentric mass 30 is driven by the motor 26 and the shaft 28 about the shaft axis causing the entire razor structure to oscillate in a circular manner. When the razor head assembly 18 is pressed against the face in shaving, the circle of oscillation is distorted. In one configuration, the eccentric mass 30 is driven about the shaft 28 at a rotation of about 3,600 revolutions per minute to cause the head assembly to rotate in a circle of oscillation having a diameter of about ten one-thousandths of an inch. Contact with the face elongates the circle of oscillation to about twelve one-thousandths in one direction and correspondingly shortens it in the other direction.

A study of the rate at which various men move the hand during shaving with a safety razor and the customary nature of the strokes taken in such shaving shows that the above-stated speed of rotation and circle of oscillation provide optimum shaving results for many men. Further, ten one-thousandths diameter circle of oscillation appears to be well coordinated with the rate of razor travel and length of razor stroke used by

many men in shaving so as to produce optimum smoothness in the travel of the razor blade over the face.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

I claim:

1. A vibratory razor comprising, in combination: a hollow one-piece handle having a rearward portion and a forward portion, said handle being open at the rear; a removable closure cap engaging said handle and closing said open rear end; an electric cell snugly received in said rearward portion; vibratory means comprising an electric motor driven by said cell snugly received in said forward portion, said motor having a short shaft which is supported only by the motor and extends toward the front of the handle, and an eccentric mass on said shaft immediately adjacent the front of the motor; switch means to selectively close a circuit between said cell and said motor; and a head assembly having a blade guard, a blade carrier and a blade support, said head assembly including means mounting the blade support on the forward portion of said handle spaced forwardly of the motor shaft and the eccentric.

2. The combination of claim 1 in which the switch means comprises a manually operated screw contact in the closure cap.

3. The combination of claim 1 including a bayonet slot connection between the closure cap and the handle.

4. The combination of claim 1 in which the eccentric mass is driven around the shaft approximately 3,600 revolutions per minute to move the head assembly in a circle of oscillation having a diameter of about ten one-thousandths of an inch.

5. The combination of claim 1 in which the means mounting the head assembly comprises a plug which makes a friction fit in the front of the handle.

6. The combination of claim 5 in which the plug is integral with the blade support and makes a press fit in the front of the handle.

7. The combination of claim 1 in which the blade support has a rear end which makes a press fit on the front of the handle and a front end provided with a central threaded bore, and in which the blade carrier and blade guard include a threaded post which screws into said bore.

8. The combination of claim 7 in which the threaded post is on the blade guard and impales a central hole in the blade carrier.

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