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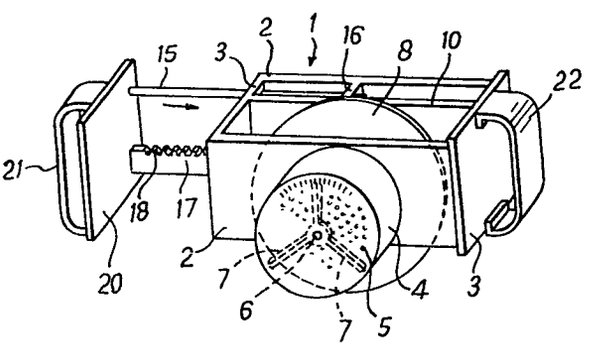
(54) Semiautomatic rotary razor.

(57) A semiautomatic rotary razor comprises a rectangular box-like frame (1), an annular cap (4) mounted on the front face (2) of the frame and having a reticulate outer blade (5), a rotary shaft (6) extending across the frame with one end protruding out of the front face of the frame, an inner blade assembly (7) mounted on the protruding end of the rotary shaft inside the blade (5), a fly wheel (8) and a pinion (9) mounted on the rotary shaft within the frame, a partition wall (10) extending within the frame along the length thereof, a stub shaft (12) displacably mounted in the frame adjacent to and parallel to the rotary shaft (6), and a slidable rack bar (17) having rack teeth (18) thereon for driving a pinion (13) on the stub shaft to rotate the stub shaft and displace the stub shaft so that a transmission pinion (14) on the stub shaft engages and drives the pinion (9) and thus the rotating shaft together with the flywheel and the blade assembly to provide a shaving action.



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Semiautomatic Rotary Razor

This invention relates to a semiautomatic rotary razor or shaver which eliminates the need for a separate power source as has been required in conventional electrically driven razors, and which can effectively perform shaving in the same manner as prior electrically driven razors.

There have been proposed and employed a great variety of electrically driven razors, and most of the commercially-available types comprise a hollow cylindrical main body or grip member closed at its opposite ends and having a switch adjacent to one end thereof, an annular cap detachably secured at one end to the one end of the main body and having an outwardly-convex reticulate outer blade or foil secured to and extending across the other end of the cap, a small motor mounted within the main body and having a rotary shaft one end of which protrudes out of the one end of the main body, and an inner blade assembly mounted at the protruding end of the rotary shaft closely adjacent to the concave inner surface of the reticulate outer blade. In use, an electric battery is placed within the main body to be electrically connected to the motor, or the motor is electrically connected to an external power source by means of an electrical cord whereby, when the switch

is turned on, the motor and thus also the inner blade assembly on the rotary shaft of the motor rotates to perform shaving in cooperation with the outer blade.

However, the prior electrically-driven razors using batteries as their power source have the disadvantage that the razor can not be operated when the battery is exhausted. The prior razors using electrical cords have the disadvantages that their operation is subject to limitation with respect to the availability of an external power source, that the cord interferes with the shaving operation, and that the motor may moisten easily and thus be liable to be damaged.

Therefore, one object of the present invention is to provide a semiautomatic rotary razor which can eliminate the disadvantages inherent in the known electrically-driven razors referred to above.

Another object of the present invention is to provide a semiautomatic rotary razor which eliminates the use of a battery or other external power source, whereby the razor can be operated in any desired location at a desired time and which is relatively free of trouble which may be caused by moisture.

According to the present invention there is provided a semiautomatic rotary razor comprising a frame including a pair of opposed side walls and a pair of opposed end walls, a transverse rotary shaft extending between said side walls with one end protruding out of the outer face of one of the side walls, an annular cap secured at one end to said outer face of the one side wall and having a reticulate outer blade secured to and extending

across the other end of said cap, an inner blade assembly secured to said rotary shaft closely adjacent to the inner surface of said outer blade to cooperate therewith, a fly wheel mounted on said rotary shaft inwardly of said inner blade assembly, a longitudinal member extending within the frame and parallel to said side walls, a stub shaft slidingly received in said member and in the other of said side walls in a position offset from said rotary shaft, pinions on said stub shaft and said rotary shaft, a slidable guide bar received in one of said end walls, a slidable rack bar received in said one end wall and having rack teeth for engagement with a pinion on the stub shaft to rotate the stub shaft and thus drive the fly-wheel through engagement between pinions on said stub shaft and said rotary shaft, spring means loading said guide bar and said rack, and an operating member attached to the outer ends of said guide bar and rack bar for manual movement against the spring loading.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view of a semiautomatic rotary razor in accordance with the present invention, with the casing of the razor removed;

Fig. 2 is a plan view corresponding to Fig. 1; and,

Fig. 3 is a section substantially on the line A - A of Fig. 2.

Referring to the drawings, the semiautomatic rotary razor generally comprises a rectangular box-shaped frame 1 formed of light metal or synthetic resin (plastics). The frame 1 includes a pair of opposed side walls 2 and a pair of opposed end walls 3 which are connected at their opposite ends to the adjacent ends of the side walls 2. An annular cap 4 is detachably secured to the outer face of one of the side walls 2 (the front side wall) and has an outwardly-convex reticulate or perforated outer blade or foil 5 secured to and extending across the outer or front end of the cap. The inner or rear end of the inner periphery of the cap 4 may be threaded to be received on the outer threaded surface of a conical boss (not shown) formed integrally with the outer face of the front side wall 2.

A rotary shaft 6 extends through and is rotatably supported centrally in the side walls 2, with the leading or front end of the shaft terminating short of the concave inner surface of the outer blade 5. An inner blade assembly including a plurality of equally-spaced inner blades 7 (three inner blades in the illustrated embodiment) is detachably secured to the outer end of the rotary shaft 6 within the cap 4 and positioned closely adjacent to the inner concave surface of the blade 5 to perform shaving operations in cooperation with the blade 5. A fly-wheel 8 in the form of a steel or lead disc is mounted on the rotary shaft 6 within the frame 1, and also mounted on the shaft 6 within the frame 1 rearwardly of the fly-wheel 8, is a driven pinion 9.

A partition wall 10 extends between and is secured at its opposite ends to the end walls 3 of the frame 1, parallel to and spaced from the side walls 2. The shaft 6 also extends through an opening (not specifically shown) in the wall 10. The partition wall 10 is formed with a horizontally elongated slot 11 (Fig. 3) in a position spaced from the rotary shaft 6, and a stub shaft 12 is slidingly received at its opposite ends in the slot 11 and in a similar slot (not specifically shown) in the rear side wall 2, for the purpose hereinafter described. A drive pinion 13 is mounted on the leading portion of the stub shaft 12, in front of the partition wall 10, for rotation with the shaft 12, and a transmission pinion 14 is also mounted on the shaft 12 forwardly of the driven pinion 13.

A slidable guide rod 15 extends through a guide opening (not shown) in the left-hand end wall 3 (as seen in the Figs. 1 and 2) and in a guide opening (not shown) in a transverse guide plate 16 which extends between the rear side wall 2 and the partition wall 10, at a position between the shafts 6 and 12 and parallel to the end walls 3. The guide rod 15 is spring-urged to the extended position shown in the drawings, and is movable to a retracted position within the frame as will hereinafter be described.

A spring-loaded rack bar 17 having rack teeth 18 on its upper face extends, below the guide bar 15, through a guide opening (not shown) in the left-hand end wall 3 as seen in the drawings and another aligned opening (not shown) in the guide plate 16. The bar 17 is slidable between the extended position shown in

the drawings, and to which it is urged by spring 19, and a retracted position under manual effort which acts against the spring loading. The spring 19 extends between and is anchored at its opposite ends to the inner end of the rack bar 17 and the left-hand end wall 3 so as to urge the guide bar and rack bar to their extended positions. The teeth 18 on the rack bar 17 are in engagement with the driven pinion 13 on the stub shaft 12. A manual operating plate 20 is attached to the outer end of the guide road 15 and of the rack bar 17, so that the guide rod 15 and the rack bar 17 move together. Reference numerals 21 and 22 denote finger pieces carried by the plate 20 and the right-hand end wall 3, respectively.

In operation, the user places the thumb of his one hand into the space between the finger piece 22 and the adjacent end wall 3 and one or more of his remaining finers of the same hand into the space between the finger piece 21 and the adjacent end wall 3. The user then first pushes the operating plate 20 against the force of the spring 19 so as to depress the guide rod 15 and rack bar 17 into the frame 1 whereby the rack teeth 18 on the bar 17 rotate the driven pinion 13 on the stub shaft 12. The retraction of the rack bar 17 shifts the stub shaft 12 to the right (as seen in the drawings) along the slot 11 in the partition wall 10 and the corresponding slot (not specifically shown) in the rear side wall 1, so that the transmission pinion 14 engages the driven pinion 9 on the rotary shaft 6 to rotate the driven pinion 9 which in turn rotates the shaft 6 as well as the fly-wheel 8 and the inner blades 7 on the shaft. Thereafter, the user releases his pressure on the operating plate 20 so that the

guide bar 15 and rack 17 are allowed to return to their initial or extended positions under the force of the spring 19, and the transmission pinion 14 disengages from the driven pinion 9.

Each time the manual press-and-release cycle is performed, rotary energy is transferred to the fly-wheel 8 which causes the shaft 6 and the blades 7 to rotate continuously. After an amount of rotational energy sufficient to perform one shaving operation has been accumulated in the rotary fly-wheel, by repeating the cycle, the user ceases his manual effort and, thereafter, shaft 6 should rotate for a time sufficient to perform a shaving operation. In this operation, the inner blades 7 on the rotating shaft 6 cooperate with the outer blade 5 on the cap 4 in the same manner as in conventional electrically-driven razors.

As will be clear from the foregoing description of one preferred embodiment of the present invention, the semiautomatic rotary razor according to the present invention does not require any separate power source, such as a battery, as is required by known electric razors. Furthermore, the razor of the invention is substantially free of trouble due to moisture which can be a principal source of trouble in conventional electrically-driven razors; in addition, the razor of the invention is simple in construction, inexpensive and durable.

Claims:-

1. A semiautomatic rotary razor comprising a frame (1) including a pair of opposed side walls (2) and a pair of opposed end walls (3), a transverse rotary shaft (6) extending between said side walls with one end protruding out of the outer face of one of the side walls, an annular cap (4) secured at one one to said outer face of the one side wall and having a reticulate outer blade (5) secured to and extending across the other end of said cap, an inner blade assembly (7) secured to said rotary shaft closely adjacent to the inner surface of said outer blade to cooperate therewith, a fly wheel (8) mounted on said rotary shaft inwardly of said inner blade assembly, a longitudinal member (10) extending within the frame and parallel to said side walls, a stub shaft (12) slidingly received in said member and in the other of said side walls in a position offset from said rotary shaft, pinions (14, 13, 9) on said stub shaft and said rotary shaft, a slidable guide bar (15) received in one of said end walls, a slidable rack bar (17) received in said one end wall and having rack teeth (18) for engagement with a pinion (13) on the stub shaft to rotate the stub shaft and thus drive the fly-wheel through engagement between pinions (14, 9) on said stub shaft and said rotary shaft, spring means (19) loading said guide bar and said rack, and an operating member (20) attached to the outer ends of said guide bar and rack bar for manual movement against the spring loading.

2. A semiautomatic rotary razor comprising a rectangular box-like frame (1) including a pair of opposed side walls (2) and pair of opposed end walls (3), a transverse rotary shaft (6) extending through said side walls with one end protruding out of the outer surface of one of the side walls, an annular cap (4) detachably secured at one end to said outer surface of the one side wall and having a convex reticulate outer blade (5) secured to and extending across the other end of said cap, and an inner blade assembly (7) detachably secured to said rotary shaft closely adjacent to the concave inner surface of said outer blade to cooperate therewith, the razor being characterised in that it further comprises a fly wheel (8) and a driven pinion (9) mounted on said rotary shaft inwardly of said inner blade assembly, a longitudinal partition wall (10) extending between said end walls and in parallel to said side walls, a stub shaft (12) slidingly received in said partition wall and the other of said side walls in a position offset from said rotary shaft, a transmission pinion (14) mounted on said stub shaft for engagement with said driven pinion on the rotary shaft, a second driven pinion (13) mounted on said stub shaft inwardly of said transmission pinion, a spring-loaded slidable guide bar (15) received in one of said end walls, a spring-loaded slidable rack bar (17) received in said one end wall and having rack teeth (18) thereon in engagement with said second driven pinion on the stub shaft, an operating plate (20) attached to the outer ends of said guide and rack bars, and a pair of finger pieces (21, 22) attached to the outer face of said operating plate and the outer face of the other end wall, respectively.

3. A razor as claimed in Claim 1 or Claim 2, in which a spring (19) extends between and is anchored at its opposite ends to said one end wall (3) and to the inner

end of said rack bar (17) to urge said rack bar and said guide bar (15) outwardly of said frame but adapted to be overcome by manual effort applied to said operating member or plate (20).

4. A razor as claimed in any preceding claim, in which said longitudinal member or partition wall (10) and said other side wall (2) are provided with aligned horizontally-elongated slots (11) in which the opposite ends of said stub shaft (12) are slidingly received.

5. A razor as claimed in any preceding claim, in which a transverse guide plate (16) extends between said other side wall (2) and said longitudinal member or partition wall (10) in a position between said one end wall (3) and said rotary shaft (6), and said one end wall (3) and said guide plate are provided with aligned openinings for slidably receiving said guide bar (15) and said rack bar (17), respectively.

6. A semiautomatic rotary razor, substantially as hereinbefore described with reference to the accompanying drawings.

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FIG. 1

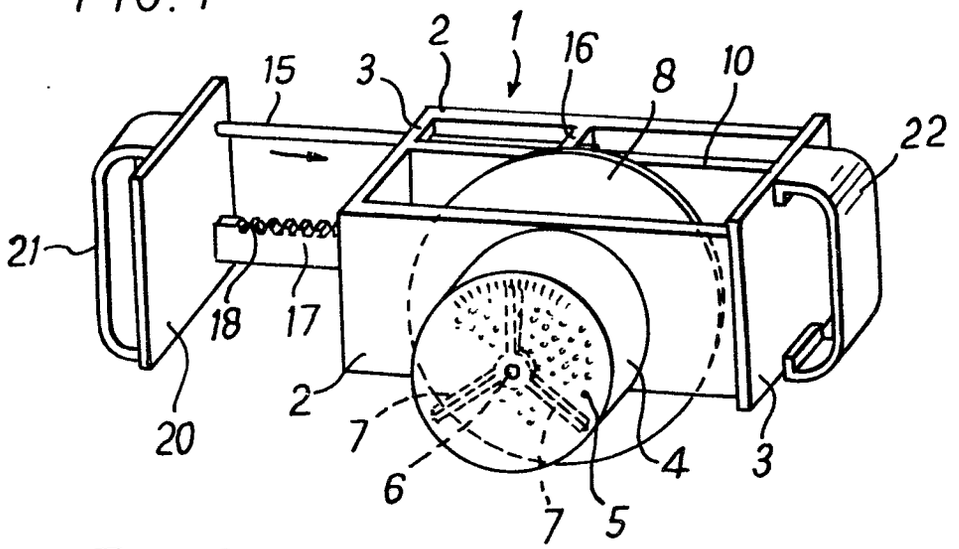


FIG. 2

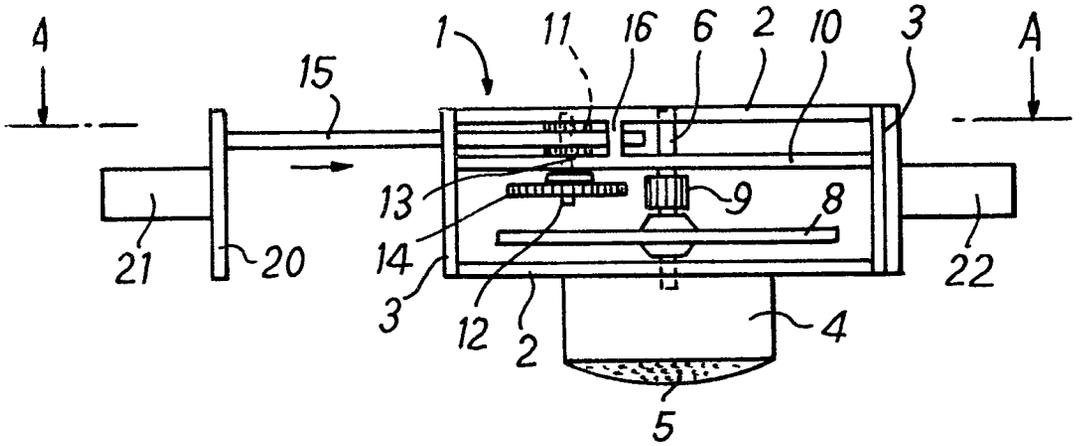
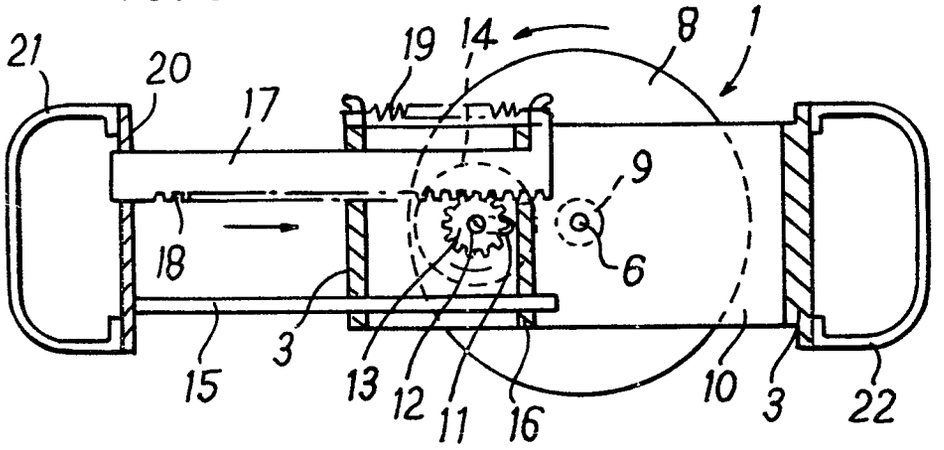


FIG. 3



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EUROPEAN SEARCH REPORT

0032603
Application number
EP 80 30 0115

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	US - A - 2 619 720 (RASMUSSEN) * Columns 1-4; figures 1-11 *	1-6
X	FR - A - 1 030 580 (DUFFY) * Pages 1 and 2, figures 1-3 *	1-6
X	FR - A - 1 137 269 (PIERLUCA) * Pages 1 and 2; figures 1-7 *	1,2,4, 5,6

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

B 26 B 19/30

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

B 26 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	05-09-1980	WOHLRAPP

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