April 6, 1954 V. SWENSON 2,674,037

CLIPPING DEVICE

Filed Jan. 4, 1951

Fig-1

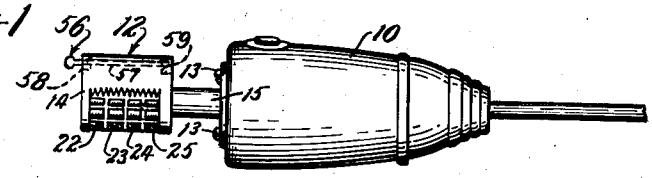


Fig-2

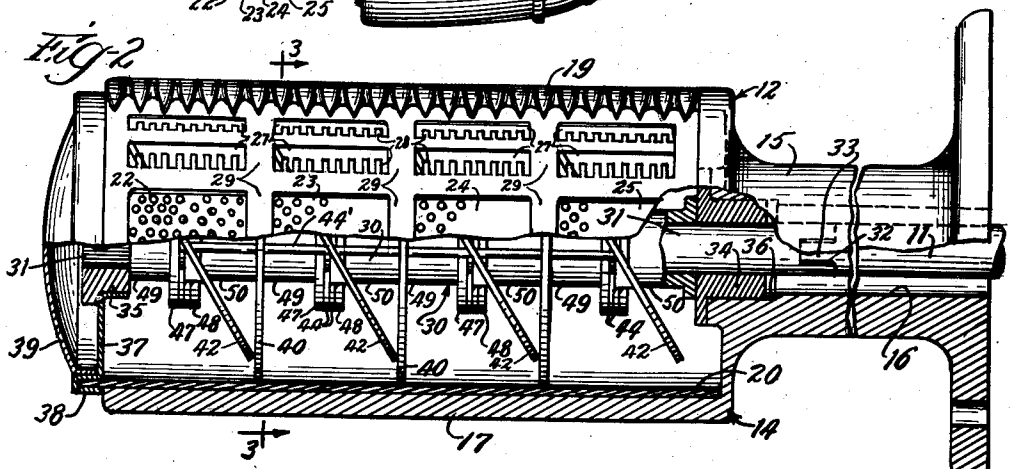


Fig-3

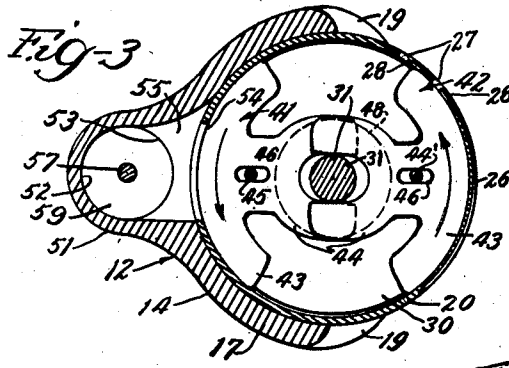


Fig-4

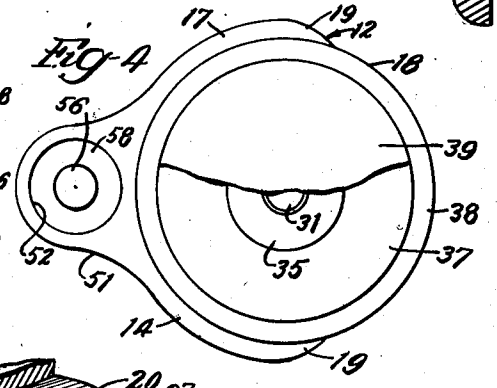
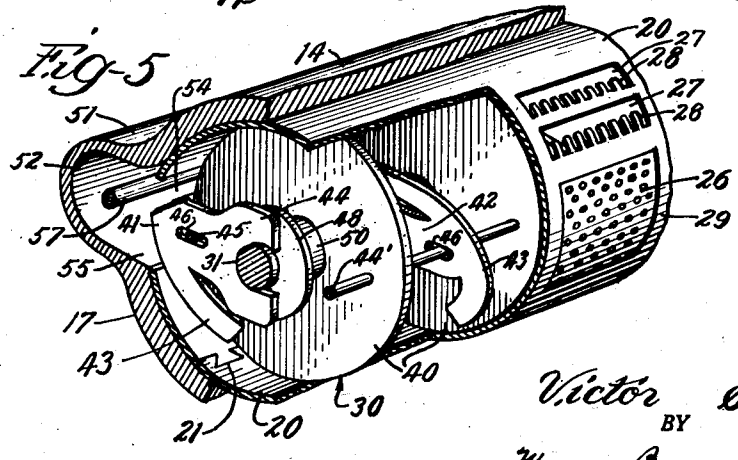


Fig-5



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UNITED STATES PATENT OFFICE

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CLIPPING DEVICE

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11 Claims. (Cl. 30—41)

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This invention relates to a clipping device that is characterized by providing a reciprocating shearing action derived from the rotation of a simple rotor. The invention is particularly suitable for use in a dry shaver for beards and will be so described, but its use is not thus limited.

There are certain inherent advantages in providing reciprocating shearing action in a dry shaver since such action tends to keep the beard stubble upright and therefore more easily sheared. Heretofore, this reciprocating action has generally been obtained through use of a reciprocating arm carrying a cutting head, but this causes considerable vibration in the shaver and tends to induce excessive wear.

In the present invention, the desired reciprocating shearing action is obtained through the use of a simple rotor upon which blades are mounted of such character that rotation of the rotor shaft in either direction causes one or more cutting blades to traverse a given point adjacent the rotor, first in one direction, and then in the other. The rapidity with which the reciprocating shearing action is obtained depends upon the shape and dimensioning of the blades, and the speed of rotation of the rotor may be controlled within wide limits.

One important object of the invention is to provide a dry shaver having reciprocating shearing action derived from a simple rotor and in which the cutting blades are self-sharpening and self-adjusting. Another object is to provide in a shaver of this type suitable means for collecting the beard stubble as it is removed by the shaver and neatly and simply disposing of it. A still further object of the invention is to provide a shaver that will operate effectively on long hairs as well as short hairs.

Further and other objects of the invention will become apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawings, in which

Fig. 1 is a side elevational view showing a dry shaver embodying the present invention;

Fig. 2 is an enlarged view of the shaving head with portions broken away for exposing the parts underneath;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is an end elevational view of the shaving head with a portion of the top cover broken away; and

Fig. 5 is a fragmentary perspective view of the cutting head showing particularly the mounting of the cutting blades on the rotor shaft.

The invention may be variously embodied within the scope of the appended claims, and the specific description that follows of a preferred form

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of the invention and its adaptation to dry shavers is for the purpose of complying with section 4888 of the Revised Statutes, and should not be interpreted as unduly limiting the appended claims.

The shaver comprises a motor housing 10 in which a suitable motor is mounted for driving a shaft 11. The shaving head, generally designated 12, is mounted over the exposed end of the shaft 11 and is secured to the motor housing 10 by screws 13. It should be understood that the shaving head 12 may be mounted at right angles to the position in which it is shown in Fig. 1 so that the cutting face is transverse to the axis of the motor housing 10 rather than parallel to it, and in such instance, suitable bevel gearing may be used for driving the moving parts of the shaver from the shaft 11.

When the shaving head is mounted in the manner shown in Fig. 1, it preferably comprises a head housing 14 having a stem portion 15 drilled at 16 to receive the shaft 11, and having also a barrel portion 17 open at its outer end and provided with a side opening 18 to accommodate the working surface of the shaving head. Preferably the margins of the opening 18 are provided with smoothly rounded teeth 19 to assist in aligning hairs for cutting action by the shaver.

Mounted within the barrel portion 17 of the head housing 14 is a thin-walled steel cylinder 20 which is formed in any suitable manner into a true cylinder, preferably from a flat blank provided with dove-tailed margins indicated at 21. The portion of the cylinder that is exposed through the opening 18 in the barrel end 17 of the head housing 14 is divided into sections 22, 23, 24, and 25, each of which comprises an area 26 characterized by having a multiplicity of small openings formed therein, and an area 27 characterized by a serrated edge 28 particularly adapted for guiding long hairs into the interior of the cylinder 20.

Each of these sections 22, 23, 24, and 25 are separated by a solid portion 29 for a purpose that will later be described.

Mounted within the cylinder 20 is a rotor generally designated 30, comprising a rotor shaft 31 having a slotted end 32 which mates with the raised end 33 of the motor shaft 11 to form a driving connection therebetween.

The shaft 31 is supported within the head housing 14 by means of bearings 34 and 35, the former being seated within a counterbore 36 in the stem 15, and the latter being mounted in a cap 37, the marginal edge of which is spun over or otherwise affixed to the outer end of the cylinder 20 as indicated at 38. The cap 37 is provided with a cover 39 to protect the end of the shaft 31 and give the head a pleasing appearance.

Mounted on the shaft 31 and rigidly secured thereto are a plurality of spaced bearing discs 40 between which are mounted opposed cutter blades 41 and 42. The discs have light, running clearance with the solid portions 29 of the cylinder 20, and serve the important function of maintaining the cylinder 20 in true cylindrical shape by preventing deflection of the thin walls inwardly to such an extent that permanent deformation of the cylinder walls can take place. The shape of the cutter blades 41 and 42 is best shown in Figs. 2 and 3, and it will be seen that each comprises an arcuate outer segment 43 and an inner yoke 44, which yoke is adapted to straddle the shaft 31 and have limited radial movement with respect thereto. Each of the cutter blades is planar throughout its central or yoke section, but the arcuate segment is bent or twisted through an angle of some desired amount so that in elevation, the arcuate segment 43 is inclined with respect to the disc bearings 40 and has its shearing edge lying on the surface of a right cylinder. It is important to note that the arcuate segments 43 of the cutting blades 41 and 42 are twisted in opposed directions when viewed from the center of the shaft 31 radially outwardly (or when viewed in elevation from a point adjacent the nearest blade), with the result that in side elevation (Fig. 2, the arcuate segment for the rear cutter blade has the same plan projection as the arcuate segment for the front cutter blade. In other words, assuming that the arcuate segments 43 of the cutter blades 41 and 42 are given the same amount of twist when fabricated, they will be sloped in the same direction when viewed from side elevation as in Fig. 2.

The cutter blades 41 and 42 are movably supported on the shaft 31 by guide rods 44' and 45 which pierce the bearing discs 40 and are carried thereby. The cutter blades are each provided with an elongated slot 46 which enables them to have radial movement with respect to the shaft 31 so that they may adjust themselves by centrifugal force into firm running contact with the cylinder 20. In this way, the blades are self-adjusting and self-sharpening.

Obviously, the guide rods 44' and 45 may be made rigid with the cutter blades 41 and 42 and have slotted engagement with the bearing discs 40 if this reversal of structure is desirable.

The yokes 44 of the cutter blades 41 and 42 are loosely supported between opposed flanges 47 and 48 of spacers 49 and 50 respectively, the latter being mounted on the shaft 31 and pinned or otherwise secured to the shaft 31 so as to provide the desired spacing between the flanges 47 and 48.

It will be seen that as the shaft 31 is rotated, the bearing discs 40 will ride on the strips 29 between the perforated or slotted areas 26 and 27 of the cylinder 20, and provide along with the shaft bearings 34 and 35 adequate support for the rotor shaft. Since the bearing discs 40 rotate with the shaft, and they in turn carry the guide rods 44' and 45, the cutter blades 41 and 42 necessarily rotate with the shaft but are capable of radial movement with respect to the shaft so they may adjust themselves closely to the interior contour of the cylinder 20.

Because the cutter blades 41 and 42 are shaped in the manner disclosed, for any given single revolution of the shaft 31 each hair or beard stubble that projects through one of the perforations in the areas 26 and 27 is subjected to a reciprocating shearing action, i. e., the first cutter blade that strikes it will provide a shearing action in one direction, say, to the right in Fig. 2, and the next cutter blade will provide a shearing action in the other direction, namely, to the left in Fig. 2. It is this reciprocating shearing action derived from the rotation of a simple rotor that provides the unique action that characterizes my invention, and such action is highly desirable because it has no tendency to make the hair or beard stubble lie down in a given direction, but continually tend to straighten the hair stubble for more effective cutting.

It will be noted also that the serrations 28 are particularly adept for the reception of long hairs, whereas the perforations in the area 26 are best suited to the reception of short beard stubble, with the result that the shaver operates with great effectiveness on either long or short hair.

On the side of the barrel portion 17 that is opposite to the opening 18 is a longitudinal enlargement 51 that is bored out to provide the channel 52 having cylindrical guideways at each end, but which is in open communication with the interior of the cylinder 20 through an opening 54 therein and a passageway 55 formed in the barrel portion 17 of the head 14. The razor clippings will be thrown by centrifugal force outwardly through the openings 54 and 55 into the channel 52, and a plunger 56 is conveniently mounted in the channel 52 for ready removal of the clippings. The plunger 56 includes a stem 57 having cylindrical heads 58 and 59 at each end thereof (see Fig. 1), which heads normally occupy the cylindrical guideways 53 at the ends of the channel 52, and thereby seal the chamber during normal operation of the chamber. When it is desired to remove the clippings, the plunger 56 is moved outwardly, carrying with it the clippings, after which the plunger is reinserted for subsequent use of the shaver.

The materials used in the fabrication of the shaving head are a matter of choice, but preferably the cylinder 20, the bearing discs 40, and cutter blades 41 and 42 are formed of high-grade steel properly hardened for long wear.

I claim:

1. In a dry shaver, a shaving head comprising a head housing, a perforated thin-walled cylinder mounted in the housing, a rotatable cutter in the cylinder, said cutter including a pair of opposed cutter blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of said cylinder, and spaced bearing discs mounted on the cutter and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls.

2. In a dry shaver, a shaving head comprising a head housing, a perforated thin-walled cylinder mounted in the housing, a rotatable cutter in the cylinder, said cutter including a pair of opposed blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior of said cylinder, said shearing edges being included in opposite directions from a plane normal to the longitudinal axis of the cutter when each such blade is viewed in side elevation from a point adjacent such blade, and one or more discs mounted transversely within the cylinder intermediate the ends thereof and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls.

3. In a dry shaver, a shaving head comprising a head housing, a perforated thin-walled cylinder mounted in the housing, a rotatable cutter in the cylinder, said cutter including a shaft, a pair of opposed cutter blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of said cylinder, said cutter blades each including an arcuate shearing portion and a yoke portion, the latter portion straddling said shaft, and one or more discs mounted transversely within the cylinder intermediate the ends thereof and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls.

4. In a dry shaver, a shaving head comprising a head housing, a perforated cylinder mounted in the housing, a rotatable cutter in the cylinder, said cutter including a shaft, a pair of opposed cutter blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of said cylinder, said cutter blades each including an arcuate shearing portion and a yoke portion, the latter portion straddling said shaft and lying in a plane normal to the longitudinal axis of the shaft, said arcuate portion lying in a plane that is inclined with respect to said normal plane.

5. In a cutting device, a thin-walled cylinder provided with side openings therein for the reception of material to be cut, a shaft rotatably mounted concentrically within the cylinder, a pair of opposed cutter blades rotatable with the shaft and adjustable radially into shearing contact with said cylinder, said blades having their outer shearing edges inclined in opposite directions from a plane normal to the axis of the shaft when each is viewed in side elevation from a point adjacent said blade, and one or more discs mounted transversely within the cylinder intermediate the ends thereof and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls.

6. In a dry shaver, a shaving head comprising a head housing, a perforated cylinder mounted in the housing, and a rotatable cutter in the cylinder, said cutter including a shaft, a plurality of spaced bearing discs mounted on the shaft normal to the axis thereof, oppositely inclined cutter blades loosely mounted on the shaft and movable in a radial direction with respect to the shaft, and guide rods extending through the blade members and the bearing disc members and having a slotted connection with one of said members for causing the cutter blades to rotate with the shaft and have radial movement with respect thereto.

7. In a dry shaver, a shaving head comprising a head housing, a perforated cylinder mounted in the housing, and a rotatable cutter in the cylinder, said cutter including a shaft, a plurality of spaced bearing discs mounted on the shaft normal to the axis thereof, oppositely inclined cutter blades loosely mounted on the shaft and movable in a radial direction with respect to the shaft, and guide rods extending through the blade members and the bearing disc members and having slotted connection with one of said members for causing the cutter blades to rotate with the shaft and have radial movement with respect thereto, the shearing edges of said opposed cutter blades being oppositely inclined with respect to the bear- discs when each is viewed in side elevation from a point adjacent said blade.

8. In a dry shaver, a shaving head comprising a head housing provided with a side channel, a perforated thin-walled cylinder mounted in the housing parallel to said channel, a rotatable cutter in the cylinder, and one or more discs mounted transversely within the cylinder intermediate the ends thereof and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls, said cutter including a pair of opposed cutter blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of said cylinder, said channel being in open communication with said cylinder, whereby clippings thrown by centrifugal force from said cylinder will collect in said channel for ready removal therefrom.

9. In a dry shaver, a shaving head comprising a head housing provided with a side channel, a perforated cylinder mounted in the housing parallel to said channel, a rotatable cutter in the cylinder, said cutter including a pair of opposed cutter blades radially expansible under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of said cylinder, said channel being in open communication with said cylinder, whereby clippings thrown by centrifugal force from said cylinder will collect in said channel for ready removal therefrom, and a removable plunger in said channel to aid in removal of said clippings.

10. A cutter blade for a dry shaver of the class described, comprising a sheet metal stamp having a yoke portion at one end and an arcuate shearing portion at the opposite end, said shearing portion being twisted with respect to said yoke portion.

11. In a dry shaver, a shaving head comprising a head housing, a perforated cylinder mounted in the housing, and a rotatable cutter in the cylinder, said cutter including a shaft, spaced bearing discs mounted on the shaft and having a diameter substantially equal to the inner diameter of the cylinder for limiting inward deflection of the cylinder walls, and a plurality of sets of opposed cutter blades mounted on the shaft for rotation therewith with one set being mounted between each pair of adjacent bearing discs, each set of opposed cutter blades having means associated therewith for permitting the cutter blades to independently move radially outwardly under the action of centrifugal force to maintain the shearing edges of the blades in firm contact with the interior surface of the cylinder, each cutter blade including an arcuate shearing portion and a yoke portion, the latter portion straddling said shaft.

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