Dec. 12, 1950

H. B. RANDOLPH

2,533,622

DRY SHAVING APPLIANCE

Filed Aug. 19, 1947

2 Sheets-Sheet 1

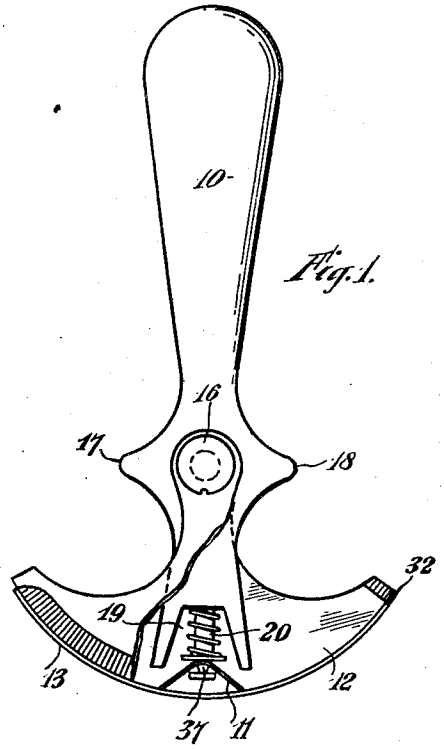


Fig. 1.

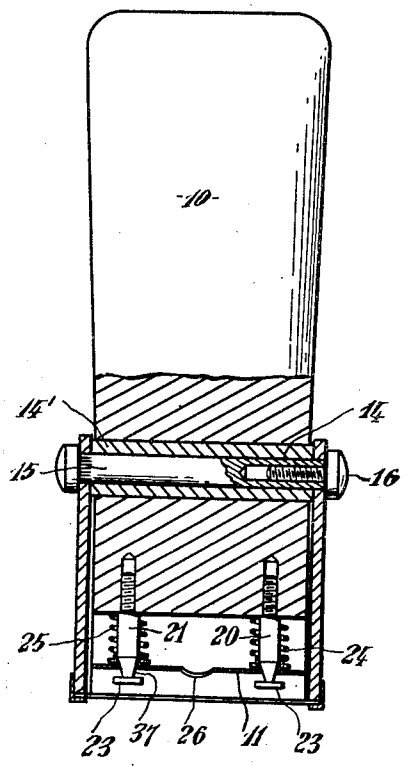


Fig. 2.

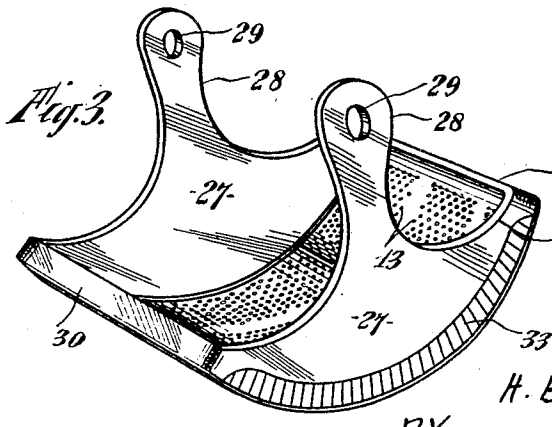


Fig. 3.

INVENTOR

H. B. RANDOLPH

BY

Ben J. Chaney

his attorney

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Fig. 4.

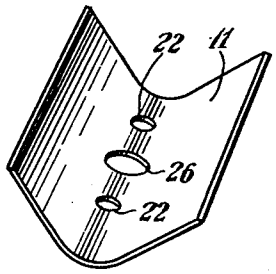


Fig. 5.

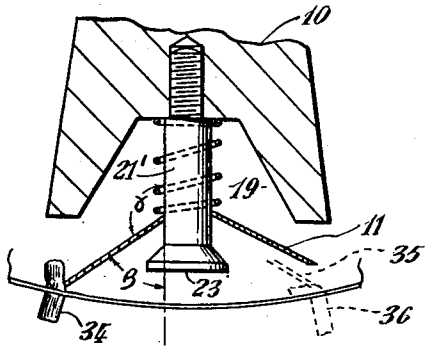


Fig. 6.

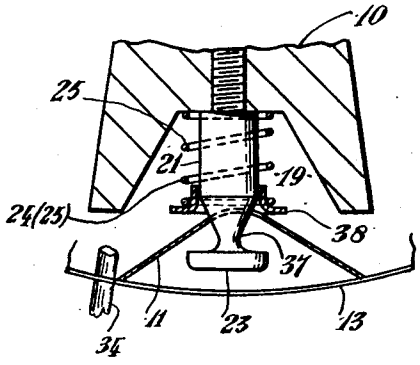
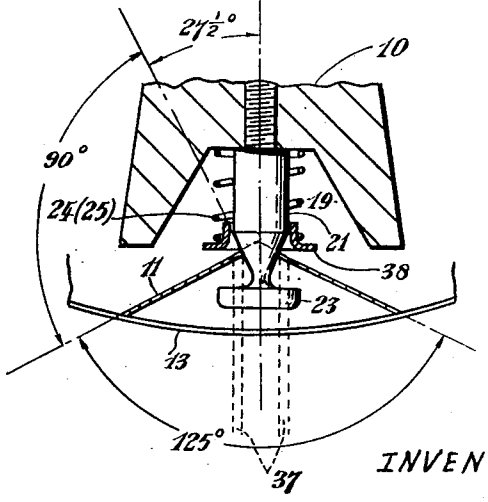


Fig. 7.



INVENTOR

H. B. RANDOLPH

BY

Ben. J. Chromy

his attorney

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DRY-SHAVING APPLIANCE

Harry Beckham Randolph, London, England

Application August 19, 1947, Serial No. 769,507
In Great Britain September 24, 1946

4 Claims. (Cl. 30—43)

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This invention relates to dry shaving appliances of the kind comprising a perforated guard associated with a reciprocating or oscillating cutter of shallow V-shape in cross-section and mounted on one or more pins.

Dry shaving appliances of the kind referred to are subject in use to the disadvantage that when meeting with abnormal resistance as in the case of shaving comparatively tough hairs, there is a tendency for the cutter to slide and tilt upon the pin or pins on which it is mounted, with the result that the cutting edge of the blade will jump or drag over the hairs to be cut and will not cut them cleanly and properly.

In order to overcome this disadvantage it has been previously proposed to press the cutter on to the guard plate by spring means, but this has hitherto resulted in producing too much friction between the cutter blade and the guard plate, so that the cutter does not move smoothly.

The object of the present invention is to provide a dry shaving appliance of the kind referred to in which these disadvantages are substantially reduced or eliminated.

With this object in view a dry shaving appliance made according to the present invention comprises a handle, an arcuate perforated guard rockably mounted on said handle intermediate the ends thereof, a cutter of shallow V-shape in cross-section and pin means secured to and projecting from the inner end of said handle, said cutter being apically mounted on said pin means for movement over the inner surface of said guard plate, said pin means comprising a conical surface on which said cutter bears, the apex angle of the cutter and the conicity of the conical surface being such that each of the two sides of the cutter extends from said conical surface at an angle of between 75°–105° and preferably approximately 90°.

Theoretically, the best results are obtained when the two sides of the cutter blade extend respectively at angles of 90° to the inclined surface of the supporting pin or pins, but in practice better results than hitherto are obtained when the apex angles of the conical portion of the supporting pin or pins and of the cutter blade are so related that the sides of the cutter blade extend at an angle between 75°–105° from the conical surface of the pin or pins.

The blade may be flexibly mounted by means of a spring on the cylindrical part of each pin arranged to exert a flexible pressure on the blade, through a collar slidably mounted on the pin between the spring and cutter, to press the cutter against the guard plate.

The cutter may be suitably apertured to engage the pin or pins the diameter of the aperture or apertures being such as to permit the cutter to be slidden on to and off from the cylindrical

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parts of the pins, whereby in use lost motion is provided between the cutter and the conical portion of each pin substantially as and for the purpose described.

The invention is illustrated in the accompanying drawings wherein

Fig. 1 is an end view partly broken away and Fig. 2 is a sectional side view of a razor the general construction of which has been previously proposed but which incorporates the present invention;

Fig. 3 is a perspective view of part of the razor shown in Figs. 1 and 2 carrying the guard plate;

Fig. 4 is a perspective detail view of the cutter blade;

Fig. 5 is a detail view illustrating the disadvantage above referred to which is overcome by the present invention;

Fig. 6 is a detail view illustrating the cutting action of the blade in a razor made according to the present invention, and

Fig. 7 is a detail view illustrating the relative angles of the cutter and supporting pins and also another advantage resulting from the present invention.

Referring first to Figs. 1–4 the razor shown in these figures comprises a shaped handle 10 (Figs. 1 and 2) carrying the cutter blade 11 (shown separately in Fig. 5) and a frame 12 carrying a reticulated guard plate 13. The handle is formed with a transverse boring 14 to receive bush 14' which in turn receives a pivot pin made in two parts 15, 16 which are internally and externally screwed respectively to permit the part 16 to screw into the part 15. The handle is formed with two protuberances 17, 18, disposed respectively on opposite sides of the boring 14, which serve as finger and thumb rests for the user. The handle is formed with a recess 19 in its lower edge, and two blade retaining pins 20, 21 are screwed in the bottom of this recess, the blade 11 being formed with apertures 22, 22 whereby it is slidably mounted on these two pins, and is pressed towards the heads 23, 23 thereof and on to the guard plate by two springs 24, 25.

As shown in Fig. 4 the blade 11 is substantially of shallow V-shape in cross-section, with a rounded apex and is made of spring steel, the longitudinal edges being ground to constitute the cutting edges. The blade is also formed with a central aperture 26, the purpose of which is to increase the flexibility of the blade.

The frame 12 (Fig. 3) is made of metal of about $\frac{1}{16}$'' thickness and comprises two side plates 27, 27 each formed with an upward extension 28 having a bearing aperture 29, the side plates being rigidly connected by end members 30, 30. The sides and ends of the guard plate 13 are connected as by soldering denoted by 32, Fig. 1, to the side plates and end members. The end

members 30, 30 are angularly disposed so as to constitute stops to limit the movement of the blade in both directions.

It will be understood that the guard plate is so thin that it can readily be curved to conform with the curvature of the lower edges of the side plates 27, 27. This curvature is arcuate and in the form described the radius of curvature of the guard plate when soldered to the frame, from the centre of the bearing aperture 29, is 1".

The outer surfaces of the side plates are knurled or serrated as denoted by 33, or the knurling may be incorporated in a separate strip soldered on to the frame. The object of this knurling is to grip the skin on the face when cutting hairs at an angle to the face, for example when cutting hairs adjacent the ears.

As will be understood from the foregoing description and the drawings the handle and frame are assembled by passing the pin 15 through the apertures 29 of the frame and through the bush 14' aligned with these apertures and then screwing the part 16 of the pin into the part 15 as clearly shown in Fig. 2, the handle 10 and frame 12 then being relatively rockable around the pin.

In operation the handle 10 is grasped in the hand with the thumb and index fingers resting respectively on the protuberances 17, 18, the guard plate 13 is pressed on to the face and the handle is rapidly reciprocated while the handle remains substantially at right angles to the surface to be shaved. The straight line pressure applied by the handle during the reciprocation of the latter causes the frame to rock around the pivot pin 15, 16 in conformity with the oscillation of the handle so that that part of the guard plate 13 which is opposite to the cutter blade 11 is pressed on to the face at any given time. The razor is slowly moved bodily over the face, so that constantly new surfaces are presented for shaving.

Thus, during the rocking of the guard plate, hairs on the face enter successively the rows of apertures in the guard plate just as the blade is about the pass over these apertures, and the hairs trapped in the apertures of the guard plate are cut off by the blade.

The general construction and operation of the razor above described has been previously proposed but in the prior construction the pins 21 on which the cutter blade 11 is mounted have been of the form shown in Fig. 5 comprising a shank 21' which is cylindrical along the whole of its length and terminates in a flanged head 23. As shown in Fig. 5 the outer angle α and inner angle β are respectively relatively very obtuse and acute.

As above explained, it has been found in practice that with the cylindrical pins 21' of Fig. 5 there is a tendency, when the cutting edge effective for the time being of the blade 11 encounters tough hairs such as denoted by the reference numeral 34 for the blade to slide upwards on the pins 21' against the pressure of the springs 24, 25 and to tilt for example into a position such as shown in Fig. 5, in which figure the edges of the blade are out of contact with the guard plate. Thus no proper cooperation is obtained between the cutter and guard plate to cut the hairs. Moreover, if at such a time the direction of movement of the razor is reversed the other edge of the blade will drop on to the guard plate and tend to nip hairs projecting through the apertures in the guard plate instead of cutting them. This is illustrated by the dotted line extension 35 of the blade which has dropped on to the hair 36, turning it down and nipping it, instead of severing it. It is this disadvantage which the present invention seeks to avoid in a manner now to be described and which is illustrated in Figs. 6 and 7.

As illustrated in Figs. 6 and 7 each of the pins 20, 21 is formed with a conical or tapered portion 37 adjacent its head 23 and the pressure of the springs 24, 25 is exerted on the cutter 11 through a flanged sleeve 38 slidably mounted on the pins between each spring and the cutter blade. The conical portions of the pins may be produced by machining otherwise parallel pins.

The appropriate apex angle of the cone 37 is related to the apex angle of the cutter 11. As shown in Fig. 7 the apex angle of the cutter is 125°, and the apex angle of the cone is 55°, giving an angle of 27½° between the wall of the cone and the centre line of the pin, and an angle of 90° between the wall of the cone and the cutter blade. The above angular relationships between the apices of the cone and cutter are those of a preferred construction, but an angle of substantially 90° between the wall of the cone and a cutter blade can be produced by correspondingly varying the apex angles of the cone and cutter. For example the apex angle of the cutter could be 105° if the apex angle of the cone were 75°, but this latter angle would result in a very stub cone and the cutting action might not be so satisfactory as with the angles shown in Fig. 7.

As a result of the angular relationships described the operating pressure is transmitted substantially along the plane of the side of the cutter blade and consequently there is no tendency for the cutter blade to tilt as a result of abnormal resistance such as may be encountered when dealing with tough hairs such as 34, 36. The cutting edges of the blade thus remain in the normal cutting position and effective cutting action is thereby obtained at all times thus also when reversing the direction of movement of the blade.

The invention is not limited to an arrangement in which the sides of the cutter blade extend respectively at angles of precisely 90° since, as above described, results which are an improvement over what has heretofore been achieved in dry shaving appliances of the kind above referred to, can be obtained with a tolerance of ±15°, i. e. an angle between 75°–105°.

By reason of the conical formation of the lower ends of the pins the holes 22, 22 in the apex of the blade will be larger than the reduced diameter of the conical portion of the pin and this will provide a certain amount of lost movement or back lash 37.

The lost movement or back lash is illustrated in Fig. 7 which shows the cutter in its mean position on the pin. This back lash is desirable inasmuch as on reversing the direction of movement of the blade it allows of rapidly picking up speed in the reverse direction and thus reduces the possibility of nipping hairs when starting the return movement due to the relatively slow movement of the operating handle.

Since the tendency of the cutter to tilt is thus reduced or eliminated the springs holding the cutter in contact with the reticulated guard plate may be comparativelly light, sufficient only to hold the blade lightly in contact with the guard. This reduces wear on the cutter and guard plate and gives a smooth action and movement to a

manually operated shaver constructed in accordance with the invention.

The invention is not limited to manually operated dry shavers but is also applicable to power operated dry shavers.

What I claim and desire to secure by Letters Patent is:

1. In a shaving appliance comprising a handle, an arcuate perforated guard rockably mounted on said handle intermediate the ends thereof, a cutter of shallow V-shape in cross section, and pin means secured to and projecting from the inner end of said handle, said cutter being apically mounted on said pin means for movement over the inner surface of said guard plate, said pin means having a conical surface on which said cutter bears, the apex angle of the cutter and the conicity of said conical surface being such that each of the two sides of the cutter extends from said conical surface at an angle of between 75°–105°.

2. A shaving appliance according to claim 1 in which said pin means comprises two pins in spaced relationship, each of said pins having in addition to said conical surface a cylindrical part, and further comprising a collar slidably mounted on the cylindrical surface of each pin above said cutter and a spring bearing at one end against said handle and at the other end against said collar, to press said collar against the cutter, and the cutting edges of said cutter against said guard plate.

3. A shaving appliance according to claim 1 in which said pin means comprises two pins in spaced relationship, each of said pins having in addition to said conical surface a cylindrical part, and further comprising a collar slidably mounted on the cylindrical surface of each pin above said cutter, a spring bearing at one end against said handle and at the other end against said collar, to press said collar against the cutter, and the cutting edges of said cutter against said guard plate and further, in which said cutter is suitably apertured to engage said pins, the diameters of the apertures being such as to provide some play between the cutter and the conical parts of said pins, for the purpose described.

4. In a shaving appliance comprising a handle, an arcuate perforated guard rockably mounted on said handle intermediate the ends thereof, a cutter of shallow V-shape in cross section, and pin means secured to and projecting from the inner end of said handle, said cutter being apically mounted on said pin means for movement over the inner surface of said guard plate, said pin means having a conical surface on which said cutter bears, the apex angle of the cutter and the conicity of said conical surface being such that each of the two sides of the cutter extends from said conical surface at an angle of approximately 90°.

HARRY BECKHAM RANDOLPH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,283,038	Breitenstein	May 12, 1942
2,318,351	Alexay	May 4, 1943
2,341,833	Volz	Feb. 15, 1944

FOREIGN PATENTS

Number	Country	Date
558,703	Great Britain	Jan. 17, 1944