Oct. 8, 1940. F. MEYER 2,217,519

SHAVING MECHANISM

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Fig. 1.

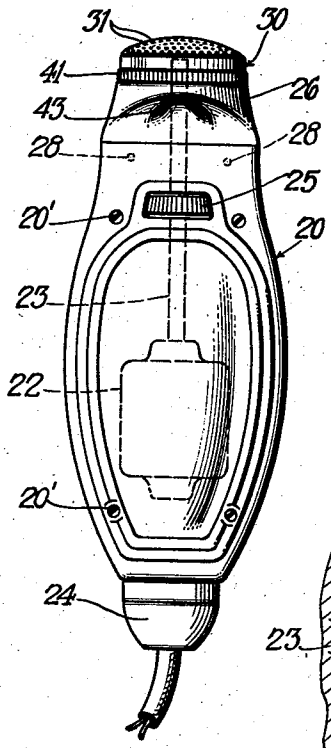


Fig. 2.

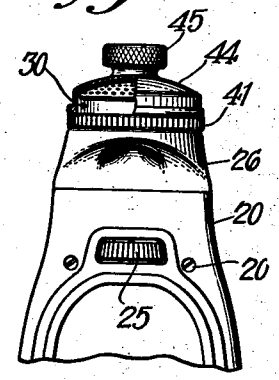


Fig. 3.

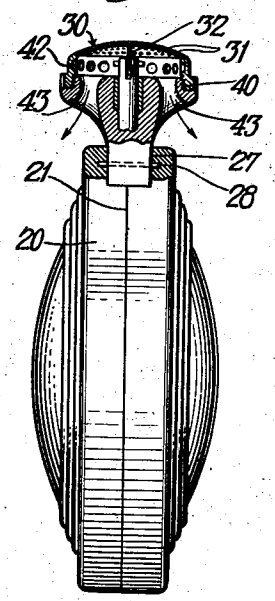


Fig. 4.

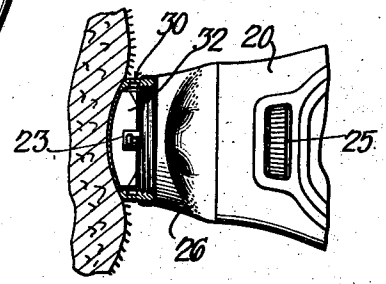


Fig. 5.

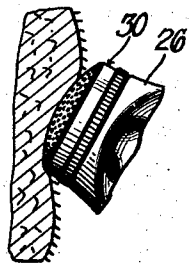


Fig. 6.

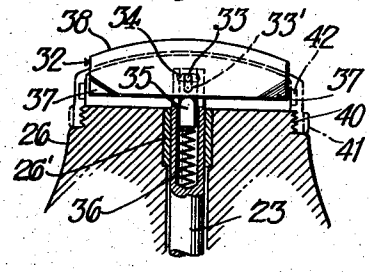


Fig. 8.

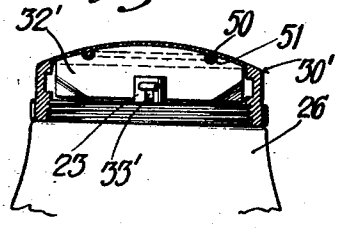
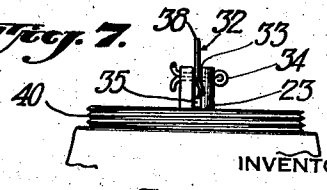


Fig. 7.



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Fig. 10.

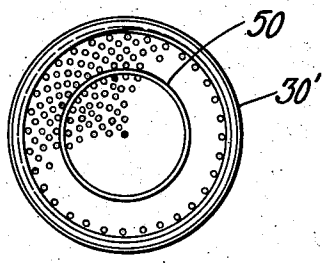


Fig. 11.

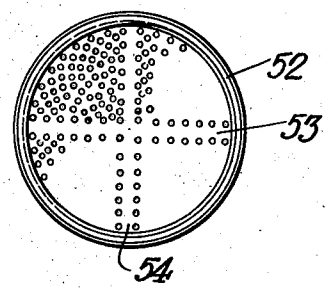


Fig. 9.

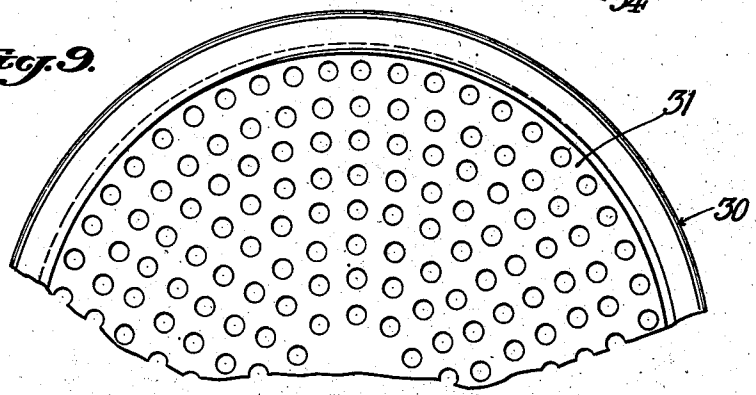
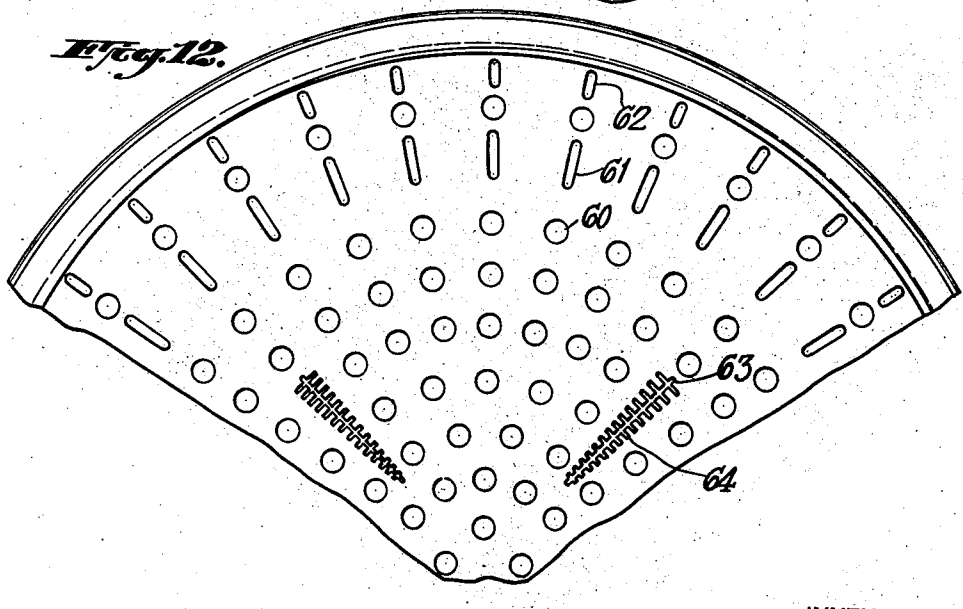


Fig. 12.



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2,217,519

SHAVING MECHANISM

Frederick Meyer, Union, N. J., assignor to Art Metal Works, Inc., Newark, N. J., a corporation of New Jersey

Application February 9, 1938, Serial No. 189,554

2 Claims. (Cl. 30—43)

This invention relates to shaving mechanisms, more particularly of a type wherein an apertured guard member is pressed against and moved over the surface to be shaved, with a power-driven cutting element operating within or beneath such guard to shave off the stubble as it protrudes through the apertures.

While a shaving mechanism was proposed many years ago of a type having a circular apertured guard to be pressed into contact with the face, and having a rotary cutting element bearing against the interior surface of such guard, such devices have not enjoyed any substantial practical use. The present invention in its preferred form, while relating more particularly to mechanisms of this general character, has for its objects the elimination of the difficulties heretofore encountered with this type of device, and the provision of a simple, durable shaving mechanism with which one may very quickly obtain an unusually smooth shave without danger of abrasion or injury to the skin.

Various further and more specific objects, features and advantages will clearly appear from the detailed description given below, taken in connection with the accompanying drawings which form a part of this specification and illustrate merely by way of example, certain preferred forms of the invention. The invention consists in such novel features, arrangements and combinations of parts as may be shown and described in connection with the devices herein disclosed.

In the drawings,

Fig. 1 is a side view of one form of shaving device embodying the invention;

Fig. 2 shows a portion of the device of Fig. 1 with a protective cap applied to the apertured guard member;

Fig. 3 is another side view partly in section of a device such as of Fig. 1;

Figs. 4 and 5 show the head portion of the device as applied in two different positions to the surface being shaved;

Fig. 6 is an enlarged detail sectional view of portions of the head of the device;

Fig. 7 is an enlarged side view of the head of the device with the apertured guard removed;

Fig. 8 is a sectional view showing the head of the device equipped with modified forms of guard and cutter elements;

Fig. 9 is a view greatly enlarged of a portion of the guard surface with a preferred arrangement of the perforations therein;

Fig. 10 is a view showing the inside surface of a guard member of the type shown in Fig. 8;

Fig. 11 is a view showing an alternative arrangement of the perforations in the guard member; and

Fig. 12 is a view greatly enlarged showing a further alternative arrangement and form of the guard apertures.

Referring now to the drawings in further detail, the device may comprise a handle and casing portion 20 preferably formed of suitable rigid insulation material such as a phenol-formaldehyde condensation product. This handle may be split along a longitudinally extending plane as at 21 (Fig. 3) and may be made hollow for receiving a suitable electrical motor as indicated at 22, having a shaft 23 extending axially of the handle and upwardly into the head portion of the device. Suitable plug and socket electrical power connecting means as at 24 for the motor, may be provided at the lower end of the handle.

The shaft 23 may be provided with a knurled wheel as at 25 protruding through an aperture formed in one of the halves of the casing portion near the head of the device, whereby in case the motor is not self-starting, it may be readily started by moving one's finger over such knurled wheel.

The head portion of the device may comprise a rigid casting 26 serving as an enclosure for the upper end of the shaft 23, and support for the guard, as hereinafter described. This casting may have a lower portion of generally rectangular shape as 27 terminating in a tongue portion adapted to be received within a corresponding groove formed in the upper ends of the adjoining complementary halves of the handle. Two or more small pins as at 28 may extend through the portion 27 and for a short distance into the adjacent portions of the handles for securing the casting 26 against removal, except when the halves of the handle are separated. The handle portions may be removably secured together with the motor and shaft therein as by the use of suitable screws as at 20'.

A circular guard member 30 may be secured to the upper end of the support 26. The outer surface 31 of this guard member which bears against the skin or other surface to be shaved is preferably made with a smoothly curved dome-like contour, for example, so as to conform to the surface of a segment of a sphere, for reasons hereinafter explained.

A rotatable cutting member 32 may be mounted within said guard member so as to be concealed, covered and protected thereby. The cut-

ter member may be apertured as at 33 at its midportion so as to be pivotally mounted on a cotter pin or the like 34, extending transversely through a slot 33' in the upper end of the shaft 23 (Figs. 6 and 7). The upper end of the shaft 23 may be split as shown to receive the cutter member 32, and also provided with a small longitudinally extending cylindrical aperture for slidably receiving a small pin 35 having a rounded upper end bearing against the cutter member and having its lower end yieldably supported as by a spiral spring 36. This arrangement is such that the cutter member is yieldably pressed against the inside surface of the guard with a substantially uniform pressure throughout the length of the arcuate cutting edge 38. The spring 36 is preferably received within the end of the shaft 23 (Fig. 6) so that the spring which may preferably be quite delicate and highly yieldable, is housed and protected by the walls of the shaft against being interfered with by the cuttings. Also the spring in this position permits of a compact arrangement of a longer spring than would be possible if the spring were outside the shaft where it would interfere with the shaft bearings unless the device were unduly elongated. As shown, the upper end of the shaft 23 may be mounted within a small cylindrical brass or bronze bearing piece as at 26', fixed within the casting 26.

The cutting element 32 may be suitably shaped to provide a fan action for purposes hereinafter more fully explained, as well as to strengthen the construction. For example, the lower outer corners 37 of the cutting element may be bent in opposite directions respectively from the plane of the remainder of the cutting element, i. e., in a direction so as to produce a downward draft of air.

The guard member may be detachably secured to the casting 26 with a threaded engagement as indicated at 40. The outer lower edge of the guard member may be knurled as at 41 to facilitate screwing the guard member into place or removal thereof.

While the dome-shaped active portion of the guard member is preferably made as thin as possible, of sheet-like material comprising for example hard tool steel of preferably uniform thickness, the outer peripheral edges of the guard member are preferably considerably thicker so as to form a rigid outer ring for the dome-like area, strengthening the latter against flexure or breakage. The inner surface of this ring-like outer portion of the guard member may be partly cut away as by use of perforations as at 42 enabling the cuttings to more freely pass from the upper edge of the cutter downwardly and out through apertures as at 43, formed at the base of the cylindrical portion at the head of the device and adjacent the sides of the rectangular portion 27.

When not in use, the guard may be covered and protected by a cap member 44 having a frictional fit with the peripheral portion of the guard, and formed with a knurled knob or handle portion 45.

The smoothly curved dome shape of the guard member has a number of important advantages, especially when the apertures are in the form of small closely spaced circular perforations arranged in the staggered relationship as shown. The continuous dome-like curvature provides an arch construction, effective in all radial directions for greatly strengthening the guard so that it may be readily made of substantial area and yet of unusually thin sheet-like material, as is necessary for rapid and close shaving, for example, in the neighborhood of .004 inch. Also the domed shape presents a substantially rigid surface of revolution against which the cutter may press uniformly during its revolution, thereby avoiding such losses of energy due to flexure of the guard plate as occur with many prior power-driven shaving devices.

Where the guard is provided with the perforation type of apertures, it is particularly advantageous to have such perforations occupy a substantial proportion of the surface of the guard so that all of the stubble will have opportunity to freely enter perforations without the necessity of repeatedly moving the guard over the same surface to be shaved. However, if such a large proportion of the guard surface is occupied by perforations in a flat guard plate or of a plate made up of plane surfaces, the plate being necessarily very thin will not have available enough metal around the perforations to provide the necessary degree of rigidity against flexure, interfering with the free rotation of the cutter, or against bending or breakage. The same difficulties are present with a cylindrical thin apertured guard member so far as concerns the possibility of flexure or prohibitive bending in directions transverse to the axis of the cylinder. However, with the above described dome or spherical shape, these difficulties are satisfactorily overcome.

With the dome-shaped guard having the apertures in the form of small perforations distributed over its surface, it will be noted that the guard surface may be readily made substantially symmetrical in all radial directions from its axis, so that regardless of the direction the user moves the guard over the surface to be shaved, the action will be the same. Thus, a shave may be obtained more quickly, even by one inexperienced in the use of the device, than with shaving mechanisms with which the direction of movement must bear a predetermined relationship to the direction of the slots in the usual slotted guard.

The spherical or dome shape as applied to the surface to be shaved, causes a smoothly convex depression in such surface, free of abrupt ridges, and therefore pleasing to the user, minimizing possibilities of abrasion of the skin, and also enabling the device to be used to shave sensitive or injured areas. As a result of the symmetrical form of the guard and the smoothly convexed depression caused thereby in the surface to be shaved, the device will still operate efficiently to shave a considerable area even though it may be tilted from the vertical in any direction to a considerable extent, as indicated in Fig. 5. This further facilitates rapid and effective use of the device even without prior experience therewith.

The generally circular perforations distributed in staggered relationship on the guard surface, insure that each small area of stubble will quickly be brought into a position to project through one or more perforations, regardless of the direction of movement of the guard over the skin. Thus it is in general unnecessary to pass the guard over a given area to be shaved more than once. On the other hand, with the usual form of slotted guard, when moved in a direction lengthwise of the slots, there will be narrow bands of stubble which have no opportunity to

pass through an aperture unless the device is repeatedly passed over the same surface. Furthermore, the use of the small circular perforation type of aperture insures that the aperture will be completely encircled by portions of the guard. Hence the diameter of such perforations may be made in general somewhat greater than the width of the usual slot, thus permitting each tiny area of stubble to bulge further into the aperture for smooth shaving, yet without possibility that a long strip of the skin will enter and be cut, as would be the case if relatively wide slotted apertures were used.

Careful tests of the dome-shaped perforated guard also indicate that such a surface causes the stubble to approach the perforations at such an angle that the hair more readily protrudes into the perforations or is more effectively deflected therein, than is the case with flat guard surfaces. Such a rounded guard construction also affords a close shave in recesses as well as on flat or protruding areas.

The rotary form of cutter in the preferred form of this invention eliminates the necessity for any reciprocating, vibratory or oscillating parts, as well as avoiding cam mechanisms and the like. Hence unpleasant chattering or vibration of the device against the hand and face of the user are avoided, as are also troubles due to friction, heating and wearing of cam surfaces and the like. In short, the construction provides a compact smoothly rotating shaft and cutter structure of exceptional simplicity and durability.

While the revolving cutting element as shown may comprise a rigid element of hardened steel insuring long wear with efficient cutting, the pivotal and yieldable support by which it is affixed to the shaft, insures that both arms of the cutter will uniformly bear against the inside guard surface even though the cutter edges and guard may not be perfectly machined or in exact axial alignment as assembled. At the same time, if one of the arms of the cutter should encounter an unusual obstruction projecting through an aperture, such arm will be free to yield somewhat due to the spring support of the cutter without jamming or unduly slowing the motor.

The formation of the cutter arms with angular or bent lower corner portions, gives to the cutter a fan action for expelling the cuttings through apertures **43**, thus preventing the cuttings from passing back through the apertures and smearing over the skin. This is particularly advantageous in case the skin is covered with perspiration, which would otherwise cause the cut hair to adhere to a troublesome degree. The fan action also provides a draft of cooling air through the head of the mechanism at such times as the guard perforations or portions thereof are uncovered. When substantially all of the perforations are covered by the skin, the fan action tends to provide a suction effect promoting the entrance of the stubble areas into the perforations.

The guard perforations are preferably made of such dimensions and so spaced in staggered arrangements that the distance between adjacent perforations in less than the diameter thereof. The most advantageous diameter for the perforations will depend somewhat upon the character of the surface to be shaved—persons with a rough firm beard may find it more desirable to use a guard with somewhat larger perforations than desirable for more delicate skin. A perforation diameter of about .028 inch with spacing between peripheries of perforations of about .02 inch is satisfactory in most cases. At the time of purchase of the device the user may conveniently try several guards with perforations of varying sizes, since the guards are quickly interchangeable. The perforations are preferably so formed as to taper outwardly (to such extent as is possible considering the thinness of the guard), to facilitate entry of the stubble.

The embodiment of the device shown in Figs. 8 and 10 is similar to that above described except that in order to further strengthen the dome-shaped portion of the guard member, its inner surface may be provided with one or more annular ridges as at **50**, in which event the cutting edges of the cutter member **32'** are provided with correspondingly shaped notches as at **51**. Hence in this form of the device as in the form above described, the inner surface of the guard comprises a generally dome-shaped surface of revolution, against all active areas of which the cutting edge may bear, as the cutter rotates.

Fig. 11 indicates an arrangement of the apertures or perforations in a guard member **52**, such that strips of unperforated guard surface as at **53** and **54** will be provided for affording greater strength without materially reducing the symmetrical characteristics of the guard. With this arrangement, especially if combined with the construction of Figs. 8 and 10, the guard may be made relatively more thin if desired, while still retaining adequate strength.

In Fig. 12 a somewhat different arrangement of apertures is indicated wherein use is made of small circular perforations as at **60** in conjunction with series of narrow slots as at **61** and **62**. If desired also certain areas as shown may be provided with apertures comprising radially extending slots as at **63** crossed by closely spaced generally circumferentially extending slots as at **64** providing a comb-like area. In some cases aperture arrangements as of Fig. 12 may prove more effective in permitting access of fine long hairs to the cutter.

In my copending application Ser. No. 198,734, filed March 29, 1938 (Patent No. 2,119,284, granted May 31, 1938), certain features of the above described invention are disclosed and claimed, as may be noted by reference to said patent.

While the invention has been described in detail with respect to particular preferred examples, it will be understood by those skilled in the art after understanding the invention, that various changes and further modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

1. Shaving mechanism comprising a guard member of extremely thin material conforming to a smoothly curved outwardly convex surface of revolution having an axis normally substantially perpendicular to the surface to be shaved and adapted to engage the skin and form a corresponding depression therein, said member having numerous perforations distributed thereover at numerous different distances radially from its axis, for admitting short hairs, said member also being formed adjacent its periphery with radially extending slots for admitting longer hairs, rigid annular supporting means for said guard member integrally formed therewith at its

periphery, said thin perforated material being resistant to deformation because of its dome-like shape as encircled by said integrally formed rigid supporting means, a power-driven shaft coaxial with said guard member, and cutter means extending radially from the end of said shaft adjacent the inner surface of the guard, said cutter means having an edge which upon revolution of the shaft, conforms to said surface of revolution and bears against the inner surface of the perforated and slotted areas of said guard member.

2. Shaving mechanism comprising a guard member of extremely thin material conforming to a smoothly curved outwardly convex surface of revolution having an axis normally substantially perpendicular to the surface to be shaved and adapted to engage the skin and form a corresponding depression therein, said member having numerous small circular hair-admitting perforations distributed thereover at numerous different distances radially from its axis, rigid annular supporting means for said guard member surrounding its periphery, said thin perforated material being resistant to deformation because of its dome-like shape as encircled by said rigid supporting means, a power-driven shaft coaxial with said guard member, and cutter means extending radially from the end of said shaft adjacent the inner surface of the guard, said cutter means having an edge which upon revolution of the shaft, conforms to said surface of revolution and bears against the inner surface of the perforated areas of said guard member.

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