Oct. 15, 1940. C. GARDNER 2,218,312

SHAVING DEVICE

Filed Oct. 14, 1937

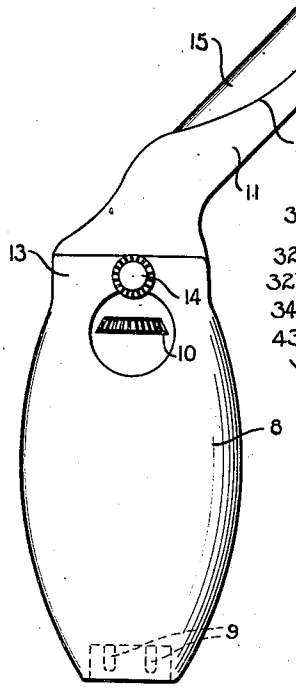


Fig 1

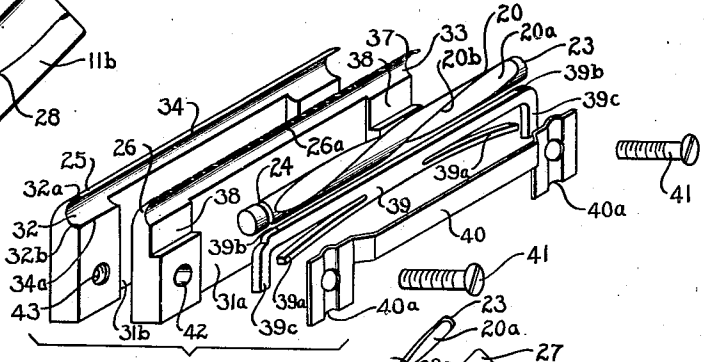


Fig 4

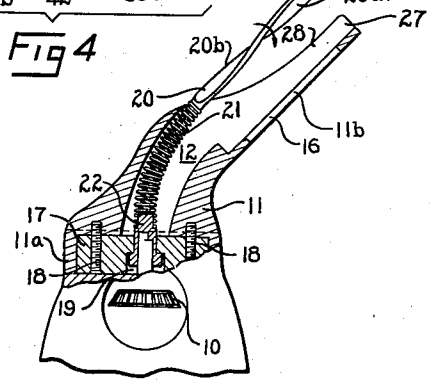


Fig 5

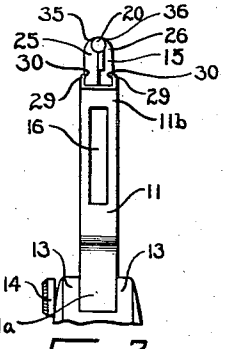


Fig 2

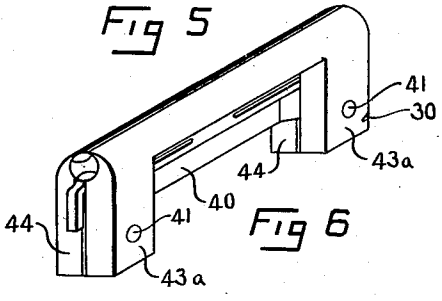


Fig 6

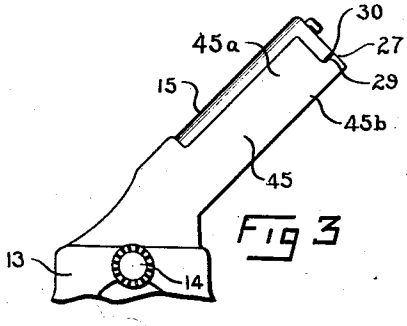


Fig 3

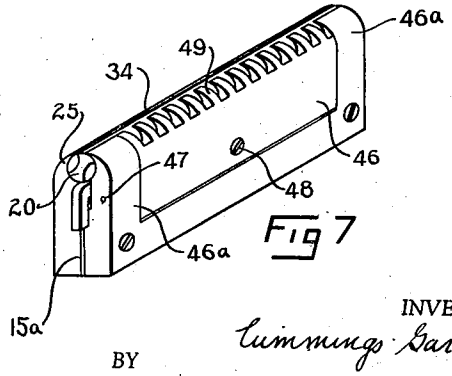


Fig 7

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SHAVING DEVICE

Cummings Gardner, Los Angeles, Calif.

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10 Claims. (Cl. 30—43)

This invention relates to hair cutting apparatus and more particularly to a dry shaver or the like.

One of the objects of the present invention is to provide a device of the above character embodying novel cutting means comprising a power driven rotary element.

Another object of the invention is to provide a power driven rotary shaver so constructed that cut hair may be either retained therein or readily and continuously discharged from the cutting apparatus during operation, according to the desire of the user.

A further object of this invention is to provide novel cutting means with cutting parts which may be easily adjusted for maximum cutting efficiency and which do not require manufacture to extremely low tolerances.

Still another object is to provide a shaving device of the rotary cutter type which is light in weight, easily manipulated, and with a cutting edge readily adapted to the surface upon which hair is to be cut.

Another object of this invention is to provide a novel dry shaving apparatus of the rotary cutter type which comprises a small number of parts which may be readily disassembled and assembled for cleaning and repair.

A further object of this invention is to provide a shaving device of the rotary cutter type employing cutting means which readily cuts hair lying flat against the surface of the skin.

The above and further objects and novel features of the invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawing. It is to be expressly understood, however, that the drawings are for purposes of illustration only and are not intended to define the limits of the invention, reference being had for this latter purpose to the appended claims.

In the drawing, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a side elevation approximately to full scale illustrating one embodiment of the invention;

Fig. 2 is a front elevation of the adapter and cutting head employed in the invention;

Fig. 3 is a side elevation of the parts shown in Fig. 2;

Fig. 4 is an isometric sketch of the component parts of the cutting head;

Fig. 5 is a side elevation partly in section of the adapter and cutter in position upon the handle;

Fig. 6 is an isometric sketch of a second embodiment of the cutting head; and,

Fig. 7 is an isometric sketch of a third embodiment of the cutting head.

One embodiment of the present invention is illustrated in the accompanying drawing, by way of example, in the form of a shaving device comprising power means, such as an electric motor for driving a rotatable cutting element which is associated with a two-part cutting head. One part of said head constitutes a blade member and is provided with a semi-bore of substantially semi-elliptical cross-section, to be described hereinafter, of such dimensions that, in effect, a hollow ground cutting edge is formed to cooperate with the said rotating cutter. The other part of said head constitutes the comb member and is provided with a semi-bore cooperating with that of the blade member but which may be semi-circular in cross-section and have a radius substantially equal to that of the rotatable cutter. The comb member is transversely slotted and resilient means may be associated therewith to allow an adjustment of said member to form a satisfactory clearance or fit for an operable engagement of the cutter with the two parts of the cutting head.

In the form shown in Fig. 1, the power means are constituted by an electric motor 8 of the usual type now used with reciprocating power shavers, said motor being enclosed in a housing in the shape of a handle. A socket having a pair of contacts 9 which are electrically connected to said motor is provided for the reception of a plug (not shown) which may be connected through suitable leads to a source of electric energy for energizing the motor. Conventional control means whereby the user is enabled to start or arrest rotation of the motor at will are provided and, in the form shown, include a small knurled wheel 10 which is attached to the driving shaft of the motor and is effective to control suitable switch means in the motor field. Since motors of the above type and control means therefor are old and well known in the art, and, since they do not, per se, constitute any part of the present invention, further detailed description thereof is unnecessary.

Novel means are provided for supporting and housing the novel cutting means compehended by the invention, in a desirable position relative to handle 8 whereby the user is enabled to conveniently hold the cutting parts in operative contact with the surface to be shaved. In the form shown, said supporting means comprises an

adapter or supporting portion 11 which may be a single casting and which consists of a base portion 11a with a curved passage 12 therethrough and adapted to be detachably secured to the handle 8 between extending portions 13 thereon, and held therein by a knurled nut 14. Disposed angularly to base portion 11a is a tongue 11b which is constructed to support a cutting head 15 to be hereinafter described. A longitudinal opening 16 is provided in the bottom of said tongue portion registering with an opening in the said cutting head for the discharge of the cut hair or other matter in a manner to appear hereinafter. A removable cover (not shown) may be provided for opening 16 to prevent material such as hair from escaping from the cutting head during use. The base portion of the adapter 11 is provided with a recess for the reception of a plate 17 which is secured therein by screws 18 and which is provided with an opening 19 which registers with passage 12.

Means are provided for operatively connecting the shaft of the electric motor within housing 8 to a rotatable cutting element 20 which is preferably held at an angle of approximately 45° to said shaft and adapted to coact with the cutting head 15 in a manner to appear hereafter. As illustrated, said connecting means are constituted by a resilient coupling which consists of a coil spring 21 and a coupling member 22, said coupling member extending through opening 19 in plate 17 and being provided with a counter-sunk bore, the inner portion of which is eccentric to the axis of rotation and adapted to drivably receive an eccentric portion on the end of the motor shaft. Coil spring 21 is frictionally attached to the inner end of coupling member 22 such that upon the rotation thereof the torque causes the coils of said spring to form a tight grip upon the same member and upon the cutter 20.

Rotating cutter 20 is preferably of the spiral type and may have either one or a plurality of helical flutes or furrows. In the form illustrated, said cutter is of the double flute type having two helical grooves 20a. The forward edges 20b of the lands of cutter 20 are sharpened to form cutting edges which cooperate in a manner to appear hereafter with the cutting head 15. In the double flute type illustrated, the pitch is equal to one-half the lead and the lead preferably is approximately twice the length of the cutter. It has been found by experiment that this type of cutter coacts more efficiently with a fixed cutting edge to cut long hair and hair lying flat against the surface of the skin. The rotating cutting edges of cutters with shorter leads, on the other hand, have a tendency to thrust flat lying hair out of the shearing path of the razor. The flutes of the cutter do not necessarily extend to the outer end thereof but, in the form shown, die out a short distance therefrom forming an ungrooved portion 23 which acts to prevent cut hair from being ejected from the outer end of the cutting head 15 and also provides an annular bearing surface for the said cutter.

Means are provided to insure that the coil spring 21 holds cutter 20 in the proper axial position, said means comprising an annular groove 24 at the inner end of the said cutter which is adapted to receive the first of the torsionally gripping coils of the said spring.

Novel means constituting a cutting head are provided in combination with the rotary cutter 20 whereby the cutting parts may be adjusted to a desired clearance for the most satisfactory operation. Said cutting head comprises a blade member 25 and a comb member 26 transversely slotted to form teeth 26a at the top thereof. Each of said members cooperates with a cutter in a manner to appear hereinafter. The said blade and comb members constituting the cutting head are removably secured in a groove 27 in the tongue portion 11b of the adapter 11. The walls 28 of said groove are of progressively diminishing height but hold the said cutting head in an operable and steady position. Said cutting head is removably held in the said groove by the rigid inwardly extending lips 29 which are adapted to cooperate with short recesses 30 in the blade and comb members. In order to remove the cutting head 15 from the adapter 11, it is necessary to disengage the said lip portions 29 from the said recesses by thrusting the cutting head inwardly, compressing spring 21 and lifting out said cutting head.

In the illustrated embodiment of Fig. 4, an opening is provided in the cutting head 15 beneath the rotatable cutter 20 to allow the escape of cut hair. Said opening is formed by two cooperating slots 31a and 31b milled in the comb and blade members respectively, in the manner shown, and registering with the opening 16 of similar size in the tongue portion 11b of the adapter. Means are thus provided for a continuous discharge of the cut substance. A removable cover (not shown) may be provided for opening 16 in order to prevent cut hair from escaping onto the clothing while shaving.

In order to provide a cutting edge or blade which is adapted to cooperate with the cutter 20 and to provide means for guiding the hair to the blade and holding the same in position for cutting, cooperating semi-bores 32 and 33 of arcuate cross-section are milled, one in each of the members 25 and 26, respectively, adjacent the top surfaces thereof. The semi-bore of the blade member is of semi-elliptical cross-section such that its minor axis is the distance between points 32a and 32b is smaller than the diameter of the cutter 20, thus forming a blade 34 which, in effect, is hollow ground so that the sharpness thereof and the line contact between the same and cutter 20 is not materially affected by wear. The semi-bore of the comb member is not necessarily of elliptical nature but, as in the form shown, may be circular and equal in radius to said cutter. The outer surfaces of members 25 and 26 are rounded as at 35 and 36 to thereby minimize the surface which must contact the face and to form thin edges 34 and 37, the former of which constitutes the blade or cutting edge. Line contact is thus assured between the cutting edge 34, lower edge 34a and the cutter 20; however, a longitudinal bearing surface may be formed in the place of edge 34a, which may reduce the wearing action of the rotating cutter upon the said edge.

In the form shown, comb member 26 is longitudinally grooved beneath the bore 33 as at 38 for the reception of a spring member 39 which resiliently urges the rotating cutter 20 upward against the cutting edge 34 in a manner to more fully appear hereafter. Groove 38, however, may be formed in the blade member 25 or partly in both the comb and blade members without altering the effectiveness of spring member 39. Member 39 is preferably of some material suitable for acting as a bearing for the cutter 20 and comprises resilient fingers 39a which may be formed from spring wire, the bearing portion 39b, and

the downwardly extending retaining fingers 39c at either end thereof.

Novel means are provided for mounting the blade and comb member for yielding lateral adjustment. Said means comprises a yielding spacing member 40 interposed between the said comb and blade member. Adjusting screws 41 extend through unthreaded bores 42 at either end of the comb member 26, through the spacing member 40 and into threaded bores 43 of the blade member. Spacing member 40 is fashioned from spring material in the form shown in Fig. 4, such that at either end thereof are raised portions 40a which provide resilient means for adjusting the bore to the cutter to satisfy the desire of the user and to obviate the necessity of closely machining the said bore, and to compensate for wear. Said raised portions also provide a means to bring tension against the screws 41 to prevent them from becoming loose. The spring member 40 is shaped to conform to the side of the opening 31b in the cutting head in order to prevent interference with the discharge of cut hair from the said opening.

A second embodiment of the cutting head is illustrated in Fig. 6 which is similar to the previous embodiment except for the cutting away of the sides of the blade and comb member in the manner shown. Downwardly extending arms 43a of the blade member, and arms 44 of the comb member remain to support the said members and to receive the adjusting screws 41 at either end thereof.

A second form of adapter 45 is shown in Fig. 3 to be used with the second form of cutting head. The walls 45a of the groove 27 of the said adapter instead of diminishing progressively as in the first embodiment extend at a constant height to within a short distance from the end of the tongue 45b to provide a covering for the cut-away sides of the cutting head.

In operation, motor 8 may be energized by connecting the same to a suitable source of energy through an extension (not shown) plugged in at 9 and then actuating switch members 10. Said motor is effective to rotatably drive cutter 20 through the yielding coupling 21, 22 in the direction of the arrow whereby the rotating cutting edge 20b coacts with stationary cutting edge 34 to cut the hair brought between the same, the coaction of said edges being similar to that between the blades of hollow ground scissors or shears. The relative lateral position of the members of the cutting head may be yieldingly adjusted by controlling screws 41 and 41 which compress or allow extension of the resilient spring portion 40 interposed between the cooperating members of the said head. Thus, the bore may be adjusted to the cutter 20 to compensate for wear and to eliminate the necessity for close machining of said bore in manufacture. When a hair comes between blade 34 and cutting edge 20b, the reaction between the said blade and cutter causes the latter to move to the right, as viewed in Fig. 2. This reaction in prior razors of this type has resulted, after slight wear of the cutting edges, in an improper cutting action and in a pulling of the hair. In the present invention, this difficulty is eliminated by the continuous upward thrust of spring member 39 which, in the embodiment shown, is located in the groove 38 of the comb member 26 in such a manner that the resultant of the upward thrust tends to hold the cutter in constant engagement with said cutting edge while the cooperating members of the cutting head are separated within the limits of the adjustment screws 41 and 41. The closing of the aperture between the comb and blade members against the yielding lateral pressure of the separating spring 40 will also tend to hold the cutter in constant engagement with the cutting edge 34. The thrust of spring member 39 is comparatively light which reduces the pressure by which the cutting edges are held together. The wear of the said edges is accordingly reduced and because of decreased friction between said edges, motor 8 is able to rotate cutter 20 at a higher rate of speed.

In order to compensate for wear of the cutter and blade an adjustment is provided by means of screws 41 which extend through the comb member 26 and into blade member 25. The cam action of the coacting threads of the screw and blade member in combination with the action of the spacer spring 40 will vary the aperture between said comb and blade member.

A third embodiment of the cutting head is illustrated in Fig. 7 and is similar in construction and operation to the first embodiment with the exception that a section of the comb member has been removed and replaced by a flange portion 46 in the manner shown which is pivoted at 47 and 47 and held in an adjusted position relative to the blade member 25 by means of a screw 48 adjacent the lower edge thereof which extends beneath the cutter 20 into a suitable threaded bore in the blade member. Pivoted portion 46 is supported at either end thereof by two upwardly extending arms 46a and 46a which also support the cuter 20. Portion 46 is preferably a thin plate shaped to curve over the cutter 20 in the manner shown. Said pivoted portion is transversely slotted to form teeth 49 which function has been hereinbefore described. The portion of the semi-bore of the comb member as comprised by the upwardly extending arms 46a and 46a serves as the bearing surface for the cutter and may be laterally adjusted as before.

In order to simplify construction of the device and to secure a permanent relationship between the two parts of the cutting head, a master mandrel, which corresponds accurately to the size of the cutter, may be placed in the bore formed by said parts which then may be soldered or welded together as at 15a (Fig. 7). Thus, for the spring spacer 40 and adjusting screws 41 is substituted a fixed metal connection.

It is the purpose of the pivoted portion 46 to make it possible to adjust the position of the comb member relative to the cutter and thus to adjust the longitudinal opening between the cutter and the toothed portion of the comb member. In this embodiment, the cutter will be held against the blade by arms 46a regardless of the adjustment of pivoted portion 46. Hence, the cutter will not change position on the blade and the cutting angle will remain constant. The cutting angle is described as that angle formed by the intersection of a tangent to the circle described by a point of the rotating cutting edge 20b with a tangent to the arcuate cross-section of bore 32, both lines being tangent at the point of contact of the blade 34 with said cutter and in a plane perpendicular to the axis of the cutter.

There is thus provided a novel cutting device which may be used as a shaver and which may be adjusted so that it will not pull the hair and will cut hair of varying texture with equal facility with a close or course shave as desired by the user and is so constructed that it also may be

adjusted to the proper clearance between cutter and cutter bore, thus simplifying manufacturing by eliminating the necessity of closely machined parts. The apparatus is of light weight and easily manipulated. The cutting parts are so constructed and yieldingly urged together that line contact between the rotating blade and the cutting edge is maintained at all times and wear is automatically compensated. Novel means are provided for varying the engagement of the coacting blades for a close or coarse shave.

Although only one embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the same is not limited thereto. For example, in the form shown in the third embodiment of the cutting head, the pivoted portion is held in adjusted position by a screw; however, this may be changed to a yielding means to resiliently urge the said portion against the rotating cutter. Also, the plate spacer spring interposed between the two cooperating members of the cutting head may be replaced by two coil springs, one at either end of the said head. Various changes may also be made in the design and arrangement of parts illustrated, without departing from the spirit and scope of the invention, as the same will now be understood by those skilled in the art. For a definition of the limits of the invention, reference will be had to the appended claims.

What is claimed is:

1. In apparatus of the class described, an adapter, a two-part cutting head having a longitudinal bore therethrough, a rotatable cutter in said bore, a resilient spacing member interposed between the two parts of said cutting head, and means to variably compress said resilient spacing member whereby the relative lateral position of the parts of said cutting head is varied.

2. In apparatus of the class described, a two-part cutting head comprising a blade member and a comb member, said head having a bore therethrough, a rotary cutter in said bore, a fixed blade upon said blade member, and yielding means interposed between said comb member and said cutter to urge said cutter against said fixed blade.

3. In apparatus of the class described, a two-part cutting head comprising a comb member and a blade member, said cutting head having a longitudinal bore therethrough, a rotatable cutter in said bore, yielding means interposed between said comb and blade members, and adjustment screws extending through said cutting head at either end thereof whereby the angle between the longitudinal axes of said comb and blade members can be varied.

4. In a device of the class described, a two-part cutting head, resilient means interposed between the two parts of said cutting head, and adjustment means at both ends of said cutting head for varying the lateral position of the two parts of said cutting head.

5. In a device of the class described, an adapter with a grooved tongue extension, a two-part cutting head supported in said groove, a rigid lip portion on said tongue extension adapted to cooperate with a recess in one extremity of said cutting head, the opposite extremity of said head being surrounded by a portion of the adapter for retaining the head.

6. In apparatus of the class described, an adapter, a two-part cutting head, a longitudinal bore through said head, a rotatable cutter in said bore, a spring spacing member interposed between the parts of said cutting head for variable compression therebetween, adjusting means for producing said variable compression, a bar adapted to bear longitudinally upon the lower surface of the cutter, and resilient arms extending centrally from the lower side of said bar and adapted to bear upon a ledge portion of the cutting head.

7. In apparatus of the class described, a two-part cutting head, a longitudinal bore therethrough, a cutter in said bore, a slot adapted to carry a bar beneath said cutter, resilient means beneath said bar to urge said cutter upwardly, means for varying the lateral relative position of the parts of said head whereby said parts may be adjusted to the proper yielding frictional engagement with said cutter.

8. In apparatus of the class described, a two-part cutting head comprising a blade and a comb member, a cutter in a longitudinal bore therethrough, said comb member having beneath said cutter bore a central portion cut away for the escape of cut hair, a bar resiliently urged upwardly against said cutter by yielding arms attached centrally to said bar and resting upon ledges at either end of said comb member.

9. In apparatus of the class described, a two-part cutting head comprising a comb member and a blade member, a cooperating longitudinal semi-bore in each of said members forming a bore, a rotatable cutter extending therethrough, the arcuate cross-section of the semi-bore of the blade member being substantially semi-elliptical with a minor axis smaller than the diameter of said cutter, and means for mounting said cutting head parts for relative lateral movement.

10. In apparatus of the class described, a two-part cutting head comprising a comb member and a member having a longitudinal blade, a longitudinal semi-bore in both parts of said head, a rotatable cutter in the bore formed by said semi-bores, the arcuate cross section of the semi-bore of the blade member being substantially semi-elliptical with a minor axis smaller than the diameter of said cutter, a spring member carried by the cutting head and adapted to yieldingly urge said cutter against said blade, a spring spacing member interposed between the parts of said head adapted for variable compression therebetween, and adjusting means to produce said variable compression.

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