

July 14, 1942.

A. P. MILLER

2,289,447

SHAVING DEVICE

Filed Aug. 5, 1938

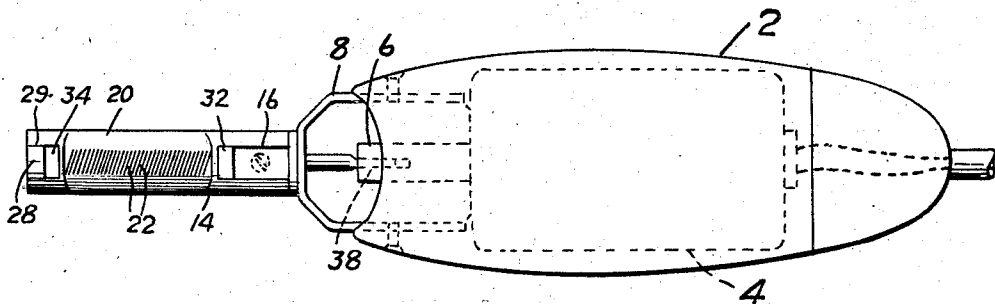


FIG. 1.

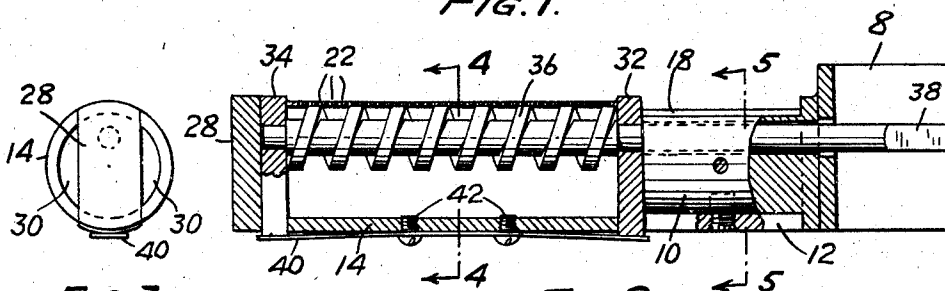


FIG. 2.

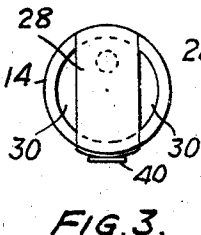


FIG. 3.

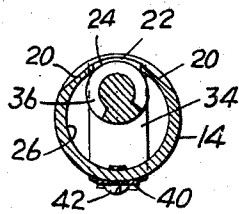


FIG. 4.

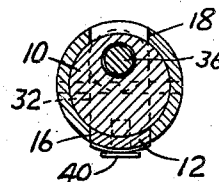


FIG. 5.

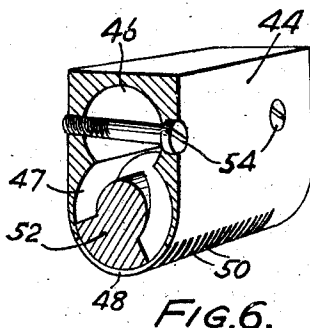


FIG. 6.

INVENTOR

WITNESS:

Robert Mitchell

Anthony P. Miller

BY

Bussell & Harding
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,289,447

SHAVING DEVICE

Anthony P. Miller, Atlantic City, N. J.

Application August 5, 1938, Serial No. 223,152

3 Claims. (Cl. 30-43)

This invention relates to a shaving device, and more particularly to a so-called electric shaver in which a driving motor for a cutter is located within a housing adapted to be grasped in the hand of the user.

Shaving devices of the general character just indicated have been provided with reciprocating cutters which must of necessity be driven from a rotary motor through some means capable of transforming the rotary motion of the motor shaft into the reciprocatory motion of the cutter. Inasmuch as a shaving device of this type must of necessity be small and have a motor incapable of supplying any large amount of driving power, and inasmuch as such a device is subject to considerable abuse through non-oiling and the accumulation of dirt, primarily the clippings of hair, it is obvious that any additional elements in the mechanism only serve to increase the tendency toward failure of operation. A considerable load is, furthermore, imposed in reciprocatory devices due to several causes. First, the relatively movable and stationary blades must be in contact to provide proper cutting and, in general, the arrangements have been such that all of the pairs of cutting elements produce their cuts simultaneously. Thus in operation sudden loads are placed on the reciprocating mechanism which, in conjunction with friction, tend to prevent its proper operation. In reciprocating devices, furthermore, dirt entering between the relatively moving cutting elements tends to remain there since there is no cleaning sweep serving to dislodge it, with the result that it may not be dislodged for considerable periods during which friction is greatly increased. It is difficult, furthermore, to provide relatively reciprocating surfaces which remain in sufficiently close contact to provide an effective shearing action.

In accordance with the present invention, there is provided a shaving device in which the moving cutter element is rotated directly by the motor shaft with which it is preferably aligned. The rotary cutter, furthermore, is so arranged that it provides progressive cutting with a better equalization of the load on the cutter and, furthermore, has a substantial fly wheel effect tending to keep the motor rotating at a uniform rate. Accumulation of dirt is effectively avoided by reason of the continuous rotation of the cutter whereby it tends to clean the cooperating cutter surfaces. The rotary action further facilitates shaving when perspiration is occurring since the rapidly rotating screw tends to keep the face dry and cool.

I have discovered, furthermore, that greatly improved operation may be provided if the cutting surfaces, which are necessarily of hardened steel, do not in themselves provide the bearing for a cutter. In accordance with the preferred embodiment of the present invention, the rotary cutter is provided with bearing elements of suitable bearing metal which, under the urging of a spring, serve to maintain the cutting surfaces in proper contact without producing any binding.

The above and other objects of the invention, primarily relating to details of construction, will be apparent from the following description, read in conjunction with the accompanying drawing, in which:

Figure 1 is a plan view partially broken away illustrating a preferred embodiment of the invention;

Figure 2 is a lengthwise section through the cutting elements thereof;

Figure 3 is an end view of the cutting elements;

Figure 4 is a transverse section taken on the plane the trace of which is indicated at 4-4 in Figure 2;

Figure 5 is a transverse section taken on the plane the trace of which is indicated at 5-5 in Figure 2; and

Figure 6 is a perspective sectional view showing a modified arrangement of cutter.

Referring first to Figures 1 to 5, inclusive, the improved shaving device comprises a housing 2 which may be of plastic material and which is exteriorly shaped to be gripped by the hand of a user of the device. A driving electric motor 4, preferably of the universal type commonly used in shaving devices of this nature is enclosed within the housing 2 with its shaft 6 extending lengthwise of the housing. Alternatively, a spring motor may be used, or the cutter may be driven from a remote motor through a flexible shaft. Secured to one end of the housing, and preferably covered by portions thereof, broken away in Figure 1, is a supporting frame 8 for the cutting elements. Secured to the frame 8 there is a projecting portion 10 provided with a key 12 adapted to be embraced by one of a pair of opposite slots 16 and 18 provided in a tubular member 14, which embraces the projecting portion 10 and may be secured thereto in suitable fashion by screws. A portion of the tubular member 14 is desirably exteriorly thinned, as indicated at 20, and the thin portion thus provided is slotted, as indicated at 22, for the reception of hairs. The inner portion of the thin wall adjacent the slots is cylindrically

formed, as indicated at 24, to closely embrace a screw type cutter, hereafter described, which is of substantially smaller diameter than the interior 26 of the tubular member 14. At the end the tubular member is preferably slotted as indicated at 29 and closed by a transverse wall 28 which may be brazed or otherwise secured in place and which leaves openings 30 for the exit of cuttings accumulating within the member 14.

Within the slots 16 and 18 there is located a transverse bearing member 32, preferably formed of some material such as bronze or the like, which will provide with a hardened steel shaft a proper bearing. A similar bearing 34 extends through the slots 29 inwardly of the closure element 28. Mounted in these bearing members 32 and 34 is a hardened screw 36, the shaft 38 of which extends inwardly to engage the shaft 6 of the motor. The screw cutter 36 thus provided is urged into engagement with the cylindrical portion 24 of the thin wall carrying the slots by means of a spring 40 held to the tubular member 14 by screws 42 and yieldingly urging the bearing members 32 and 34 in a direction to cause the screw to bear upon the thin wall adjacent the slots. The screw 36 is provided with one or more threads providing cutting edges designed to cooperate with the edges of the slots 22 for shearing purposes and also providing conveying means for moving cuttings lengthwise of the barrel to the discharge. The thread or threads of the screw 36 may be square in cross-section or slightly hollow ground at their edges to provide for a better cutting action. The outside diameter of the threads is made such as to provide a good fit with a cylindrical surface 24. The slots may extend directly across the axis of the screw, but preferably the slots are so arranged as to extend in the direction of the helix angle of the screw at its periphery. Under such circumstances there is a greater opportunity for the entrance of hair into the slots, particularly if the screw has a large pitch, and consequently more rapid cutting action. This is in contrast to the little opportunity afforded for entrance of hairs in the usual reciprocating cutter. The slots 22 are preferably as narrow as they may be consistent with the proper entrance of hair, and should be sufficiently long to receive long hairs as well as short stubble.

While it is possible to have a cutter screw of the type described located within the cutter cylinder fitting it relatively tightly and provided with the cutting slots, and therefore hardened, I have found that such an arrangement is more likely to produce overheating and cause the accumulation of dirt and impede action than an arrangement such as that described in which the contact of the hardened steel parts is limited to the portions necessary for cutting purposes. This will be evident from Figure 4, in which it will be noted that the contact occurs substantially only over that area which is slotted. With such an arrangement, the bearing for the rotating screw may be made of proper bearing material such as bronze and, furthermore, the dirt is swept from between the cutting surfaces into the open portion 26 of the tubular member wherein it may accumulate and ultimately fall out through the openings 30. A spring such as 40 may be readily adjusted to secure the proper bearing tension between the cutting surfaces.

The operation of the device just described is substantially superior to that of reciprocating devices heretofore known. Though the cutter is

light in weight, its weight is to some extent comparable with the weight of the rotating parts of the motor, and consequently it contributes to maintaining the speed of the motor substantially constant so as to overcome the irregular loads imposed by the cutting. Without a rotary action there can, of course be no such effect, and the tendency of reciprocating devices is to stop under conditions of maximum load. A self-cleaning action also results from the use of the rotary cutter.

In Figure 6 there is illustrated an alternative arrangement for the tubular carrier of the rotating cutter. In this arrangement the carrier is indicated at 44 and comprises a block having intersecting bores 46 and 47, the latter providing a thin wall 48 provided with slots 50. Within the cylindrical bore 47 there rotates the screw cutter 52. By means of adjusting screws such as 54 the block may be sprung so that the clearance between the screw 52 and the cooperating cylindrical walls may be adjusted so as to properly maintain the running clearances in such condition as to provide proper cutting. The bore 46 permits the escape of cuttings. The device of this figure may be used either without or with separate bearings of the type described in connection with the previous modification. Instead of having a bore 46, the block may be open on the upper side of the bore 47, i. e., of U-shaped form.

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

1. A shaving device comprising a member having a thin wall provided with slots for the entrance of hairs, a screw engaging said thin wall with its axis extending transversely of said slots, said screw having a thread provided with a cutting edge forming a shearing arrangement in conjunction with edges of the slots, each slot having at least one edge arranged for shearing cooperation with said cutting edge of the screw and extending in the direction of the threads at an angle to the direction of the screw axis substantially corresponding to the helix angle of the screw, and each slot extending through a substantial circumferential extent of said thin wall, and means for rotating said screw, said arrangement being such that the cutting edge of said thread meets all parts of the cooperating edge of a slot substantially simultaneously during rotation of the screw.

2. A shaving device comprising a member having a thin wall provided with slots for the entrance of hairs, a screw engaging said thin wall with its axis extending transversely of said slots, said screw having a thread provided with a cutting edge forming a shearing arrangement in conjunction with edges of the slots, each slot having at least one edge arranged for shearing cooperation with said cutting edge of the screw and extending in the direction of the threads at an angle to the direction of the screw axis substantially corresponding to the helix angle of the screw, and each slot extending through a substantial circumferential extent of said thin wall, the portion of said thin wall having the slots having a cylindrical surface to conform to, and have extended engagement with, said screw, means for yieldingly urging said screw into continuous engagement with the cylindrical surface of said thin wall, and means for rotating said screw, said arrangement being such that the cutting edge of said thread meets all parts of the

cooperating edge of a slot substantially simultaneously during rotation of the screw.

3. A shaving device comprising a member having a thin wall provided with slots for the entrance of hairs, a screw engaging said thin wall with its axis extending transversely of said slots, said screw having a thread provided with a cutting edge forming a shearing arrangement in conjunction with edges of the slots, each slot having at least one edge arranged for shearing cooperation with said cutting edge of the screw and extending in the direction of the threads at an angle to the direction of the screw axis sub-

stantially corresponding to the helix angle of the screw, and each slot extending through a substantial circumferential extent of said thin wall, bearings for said screw movable independently of each other relatively to said thin wall, resilient means acting upon said bearings to urge said screw yieldingly into continuous engagement with said thin wall, and means for rotating said screw, said arrangement being such that the cutting edge of said thread meets all parts of the cooperating edge of a slot substantially simultaneously during rotation of the screw.

ANTHONY P. MILLER.