

[54] MOUNTING STRUCTURE FOR COMB OF DRY SHAVER 3,440,725 4/1969 Messinger..... 30/43.91
3,660,894 5/1972 Sand..... 30/74

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[57] ABSTRACT

In a dry shaver having a moving cutter engaging a comb or reticulate foil, the comb is held against the interior of a mounting compartment in the shaver case by means of permanent magnets. The engagement between the foil and the walls of the mounting compartment is such that the foil can move over a limited excursion in a direction tangential to the wall. The engagement between the foil and the wall is such as to prevent accidental disengagement therebetween, but is not so strong as to prevent removal of the comb from the wall when such is desired.

8 Claims, 6 Drawing Figures

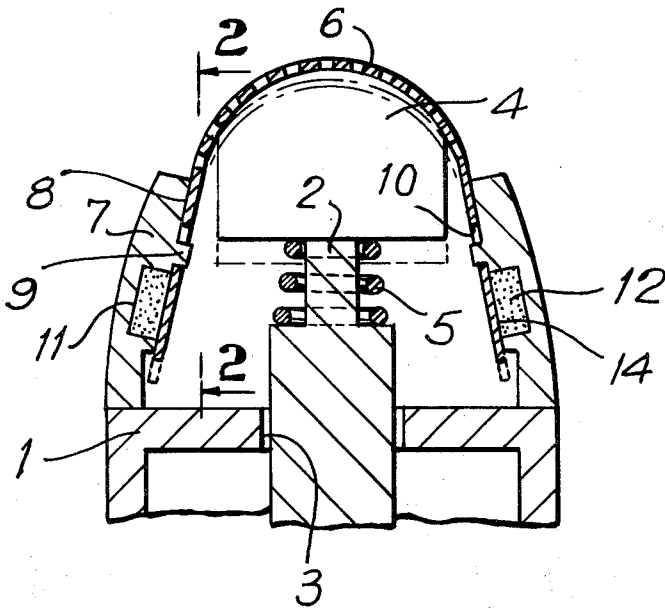


FIG. 1

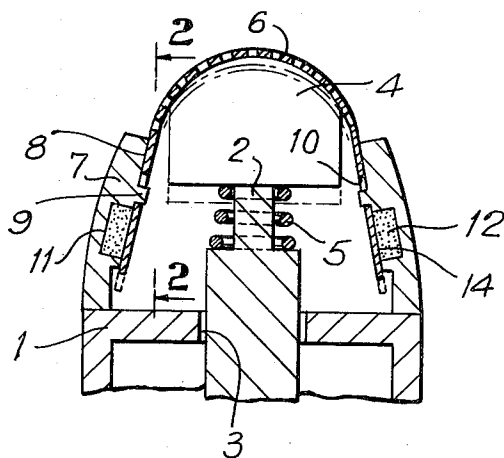
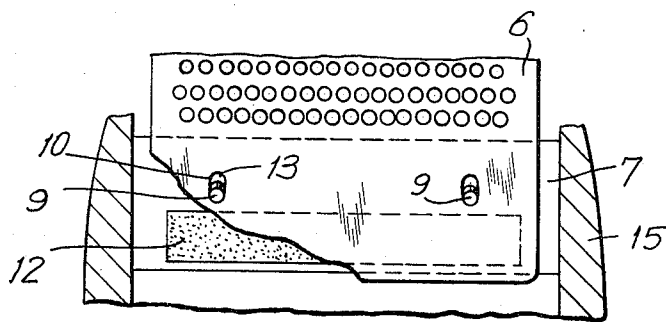


FIG. 2



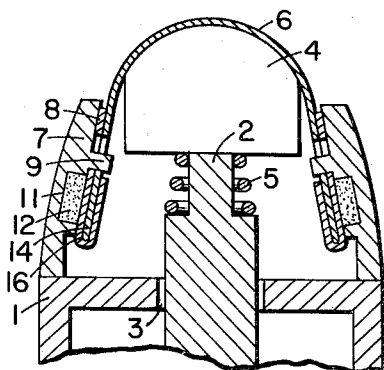


FIG. 3

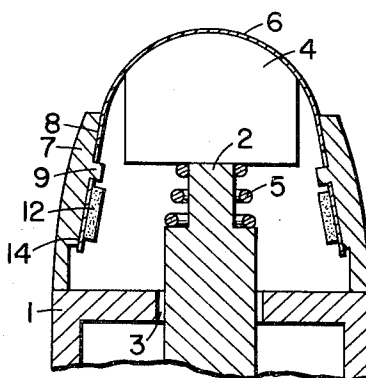


FIG. 4

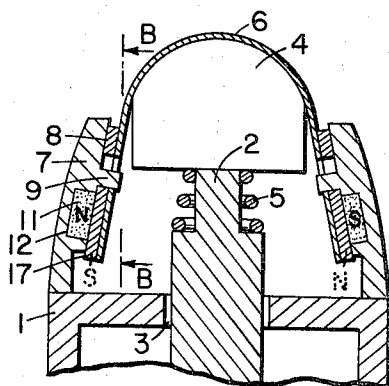


FIG. 5

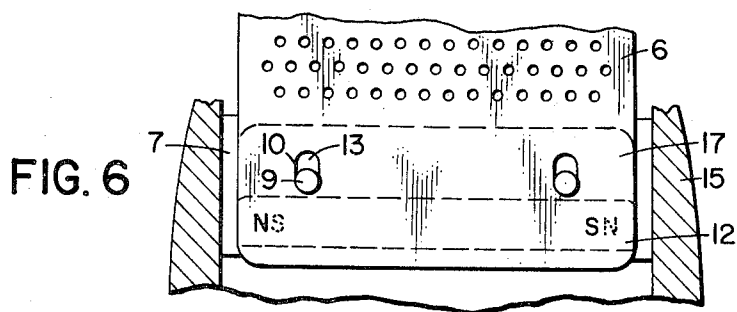


FIG. 6

MOUNTING STRUCTURE FOR COMB OF DRY SHAVER

BACKGROUND OF THE INVENTION

In the use of a dry shaver such as an electric shaver, it frequently occurs that the user varies the pressure with which he applies the shaver to his skin. Under such circumstances, it is necessary that the comb be so constructed that it can yield to a certain extent in order to ensure that a close shave is achieved without irritating the skin. In certain types of conventional dry shavers the comb itself is somewhat flexible and resilient. For the shaver to be effective, the cutter must make smooth sliding contact with the interior of the comb. If the comb is depressed at a portion thereof, the vibrating cutter may snag on the interior surface of the comb causing the comb to vibrate with the cutter. The sharpness of the cutter can be adversely affected and the quality of the shave obtained therewith degraded. Moreover, an unpleasant sound is generated and the comb itself may be damaged.

If an exterior shock is accidentally applied to the comb, it may separate from the comb holder and the entire body of the shaver may be subjected to severe vibration. Such a phenomenon is more apt to occur after the shaver has aged, at which point the spring force of the comb itself may have deteriorated.

There are also types of conventional shavers in which the comb holder is so designed that it moves with the comb. However, such a structure is generally quite complex and the number of parts involved is large, increasing the possibility of failure for one reason or another. Furthermore, with such a construction, beard fragments removed by the shaver enter the joint between the comb holder and the comb, such a location being difficult to clean unless the comb is removed from the holder. This again involves an additional operation which is both time consuming and apt to cause damage to the components involved if the user is not deft in taking the shaver apart and reassembling same.

SUMMARY OF THE INVENTION

In a dry shaver, a flexible comb engages a cutter and the ends of the foil are held against the interior surfaces of side walls of a compartment of the shaver. The comb is held slidably against the interior walls of the said compartment by means of magnets which may be secured in the side walls, the side walls being of a non-ferromagnetic material such as a plastic, while the comb is made of a ferromagnetic material. Alternatively, the side walls of the compartment may be of a ferromagnetic material and the magnet may be bonded proximate the ends of the comb. In still another embodiment the end portions of the comb are made, at least partly, of a ferromagnetic material while the rest of the comb is of a non-ferromagnetic material and the comb is held slidably against said side walls by magnets therein. Preferably, that surface of each magnet which is to hold an end portion of the comb should be flush with the inner surface of a side wall. The magnets should be of such strength as to permit sliding of the end portions of the comb across same under moderate pressure such as is applied during shaving. However, the magnets should be sufficiently strong to prevent the end portions of the comb from drawing away from same in a direction perpendicular to the surface of the magnets.

Slots within the end portions of the comb and matching pins mounted on the inner surfaces of said side walls, said pins fitting into said apertures, provide for a limited excursion of said comb with said comb ends in the direction of pressure applied to the comb during shaving.

Accordingly, an object of the present invention is to provide a dry shaver having improved means for holding a comb thereof in engagement with a cutter.

Another object of the present invention is a dry shaver having improved means of holding the comb thereof in a holding compartment in the case of the dry shaver.

Another object of the present invention is to provide an improved dry shaver wherein interference with the cutter as the result of increased pressure against the skin of the individual shaving is avoided.

Still another object of the present invention is an improved dry shaver wherein the comb can move within the holding compartment of said shaver in response to variations in pressure applied by the individual using such shaver.

Yet another object of the present invention is an improved dry shaver having a comb which is easily removed for replacement or for cleaning of said shaver and easily replaced in position.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises an article of manufacture possessing the features, properties, and the relation of elements which will be exemplified in the article hereinafter described, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a cross-sectional view of a dry shaver in accordance with the present invention; and

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a sectional view of a dry shaver including an alternate comb holding means constructed in accordance with the invention;

FIG. 4 is a sectional view of a dry shaver including another alternative comb holding means constructed in accordance with the invention;

FIG. 5 is a sectional view of a dry shaver including still another alternative comb holding means constructed in accordance with the invention; and

FIG. 6 is a sectional view of the embodiment shown in FIG. 5, taken along line B—B thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the present invention a case 1 containing driving means (not shown) has a vibrating cutter 4 supported on a vibrator 2 connected to said driving means through upper opening 3. Cutter 4 is held in close engagement with comb 6 by cutter spring 5 mounted on vibrator 2. The spring constant of spring 5 is such that while it holds cutter 4 firmly against comb 6, comb 6 is held against cutter 4 slidably.

End portions 14 of comb 6 fit within the holding compartment formed by side walls 7 and end walls 15

(FIG. 2). End portions 14 of comb 6 are held strongly but slidably and removably against the inner surfaces of magnets 12. Magnets 12 are of the permanent type and are disposed in recesses 11 so that they are preferably flush with inner surfaces 8 of side walls 7.

Movement of comb 6 in an inward and outward direction with reference to the holding compartment formed by side walls 7 and end walls 15 is provided for by means of pins 9 mounted on wide walls 7 fitting into slots 10 in comb 6. The slots in combination with the pins limit the excursion of the comb 6 to the distance between the top of pin 9 and the top of slot 10, this distance being indicated by the reference numeral 13. Since cutter 4 is also mounted on vibrator 2 for motion in a vertical direction with reference to FIGS. 1 and 2, both comb 6 and vibrator 4 can move inward and outward in response to changes in pressure against the skin applied by the individual shaving, comb 6 and cutter 4 maintaining optimum engagement therebetween so that snagging of the cutter on the comb is avoided and so that the quality of the shave provided by the dry shaver is not degraded.

In the embodiment as just described, side walls 7 are taken to be non-ferromagnetic while comb 6 is assumed to be ferromagnetic, as a result of which magnets 12 hold end portions 14 of comb 6 in slidably and removable engagement. However, FIG. 1 can just as readily represent a shaver in which side walls 7 are ferromagnetic, comb 6 is of a non-ferromagnetic material such as some of the stainless steels, and magnets 12 are bonded to end portions 14 of comb 6. Finally, in yet another embodiment, only end portions 14 are ferromagnetic while the remainder of comb 6 is non-ferromagnetic. The portion of comb 6 which is ferromagnetic could be a separate strip of steel or nickel embedded in or attached to end portions 14 of comb 6.

In the embodiment in which the side walls 7 are non-ferromagnetic and magnets 12 are embedded therein, the attraction between magnets 12 and end portions 14 of comb 6 can be increased by magnetizing end portions 14. In carrying out such magnetization of end portions 14 it would be necessary to reverse the polarities of the magnets formed therein with respect to magnets 12. In other words, each north pole in an end portion 14 should be adjacent a south pole in a magnet 12 and vice versa. This arrangement is particularly desirable in that it assists in maintaining the magnetic strength of magnets 12 at or near their original values. Needless to say, the presence of ferromagnetic material adjacent to magnets 12 helps to maintain the magnetic strength thereof.

Illustrative of the foregoing embodiments, reference is had to FIGS. 3-6. In the following description, substantially identical parts are identically numbered. Referring now to FIG. 3, side walls 7 of shaver case 1 is fabricated of molded plastic. Overlying end portions 14 of comb 6 is a ferromagnetic material which is connected to respective end portions 14. Comb 6, however, is fabricated of non-magnetic material. The embodiment operates in the manner described above.

Referring now to FIG. 4, side walls 7 of case 1 are fabricated of a ferromagnetic material. A permanent magnet 12 is connected to the interior surface of each respective end portion 14 of comb 6. This embodiment also operates in the manner described above.

Referring now to FIGS. 5 and 6, a magnetized comb reinforcing plate 17 is connected to the exterior surface

of each respective end portion 14 of comb 6. The polarity of each magnetized comb reinforcing plate 17 is shown in phantom line by the designations "S" and "N". Plates 17 enhance the attraction between comb 6 and permanent magnets 12 and also reinforce end portions 14 of comb 6. As may be observed from the Figures, permanent magnets 12 are located in respective recesses 11 so that respective N and S-poles thereof are proximate respective S and N-poles of plates 17. According to this embodiment, comb 6 may be fabricated of ferromagnetic material. The manner of operation of this embodiment is also as described above.

It will be seen that in each of the above embodiments a comb and a vibrating cutter are held in engagement with appropriate firmness to give a close and comfortable shave independent of the pressure exerted upon the skin of the individual shaving. Furthermore, the means by which said comb is held in the holding compartment of the shaver case permits sliding engagement between the inner surfaces of the side walls of said compartment, this being a type of engagement which substantially eliminates the danger of damage resulting from accidental shock to the comb or to the case. Finally, the comb can readily be removed from the case for the purpose of cleaning out beard dust or for replacing the comb. Also, as is well known, where a cutter is held continually in sliding engagement with a comb, the sharpness of the combination is not decreased in use so that an excellent shave is obtained from such a shaver throughout its life.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. An improvement in a dry shaver including a vibrating cutter, a comb engaging said cutter slidably and a case having side and end walls defining a compartment into which the end portions of said comb fit, wherein said improvement comprises magnetic means for holding said comb slidably and removably against said side walls.

2. The improvement as defined in claim 1 wherein said comb is of ferromagnetic material, said side walls are of non-ferromagnetic material and said magnetic means are permanent magnets secured to said side walls.

3. The improvement as defined in claim 2 wherein said side walls are of molded plastic and said magnets are securely embedded therein, each magnet having a surface flush with the interior surface of the corresponding side wall.

4. The improvement as defined in claim 2 wherein said side walls are of molded plastic, said magnets are securely embedded therein and only the end portions of said comb which fit within said side walls are of ferromagnetic material.

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5. The improvement as defined in claim 1 wherein said side walls are of ferromagnetic material and said magnetic means are permanent magnets secured to the end portions of said comb.

6. The improvement as defined in claim 2 wherein the strength of said magnets is such that said comb may slide across the surface of said magnets under external pressure exerted against the central portion of said comb, and holding means are provided in the areas of contact between said side walls and said end portions for limiting the excursion of said comb under said pressure.

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7. The improvement as defined in claim 6 wherein said holding means comprises pins on the interior surfaces of said side walls and walls defining slots in said comb, said pins fitting within said slots for relative motion therebetween.

8. The improvement as defined in claim 2, wherein said portions are magnetized, the polarity of each end being related to the opposed permanent magnet in said wall so that a north pole in said comb is proximate a south pole in said permanent magnet and vice versa.

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