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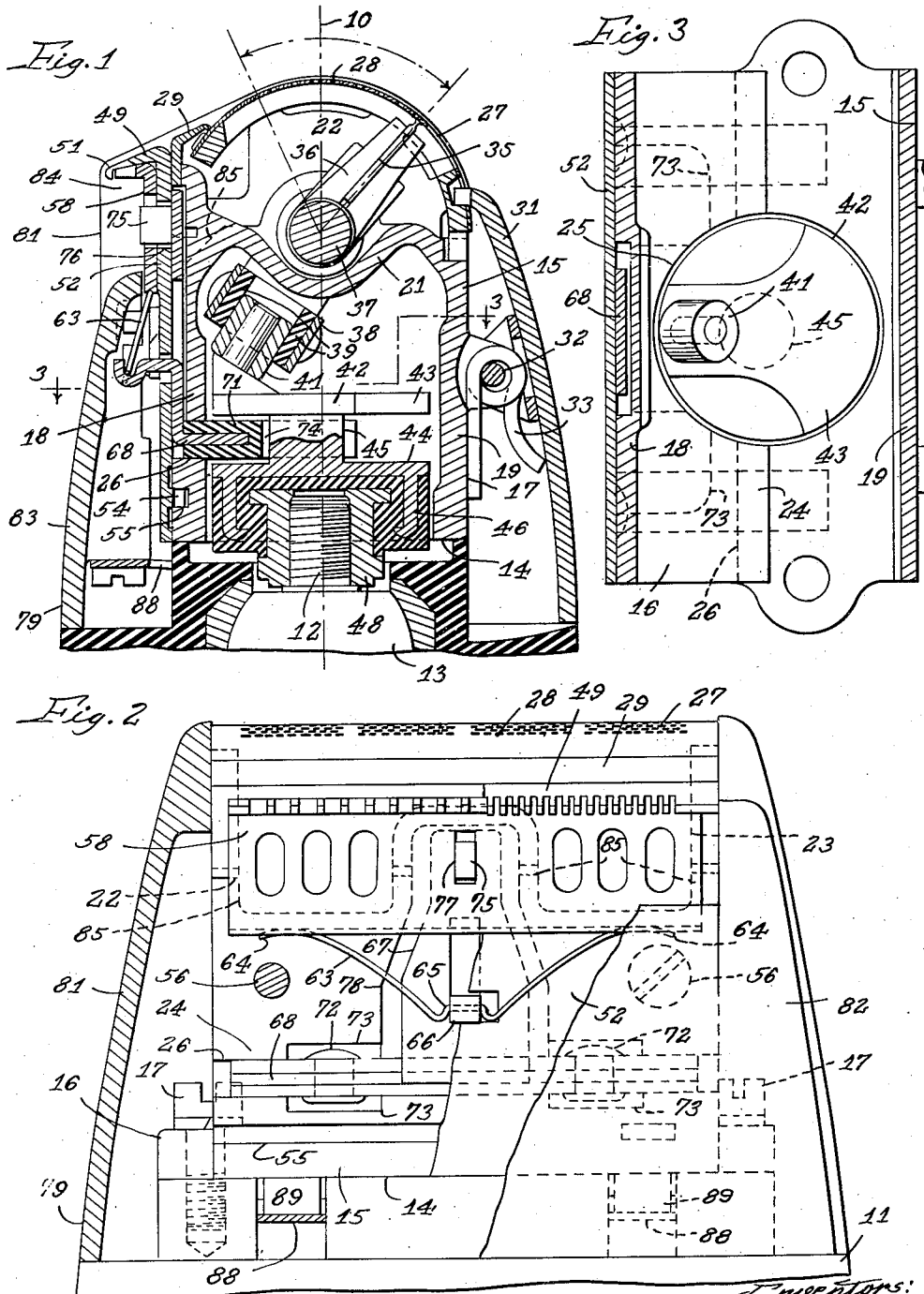
I. JEPSON ET AL

2,370,544

SHAVING IMPLEMENT

Filed June 16, 1941

2 Sheets-Sheet 1



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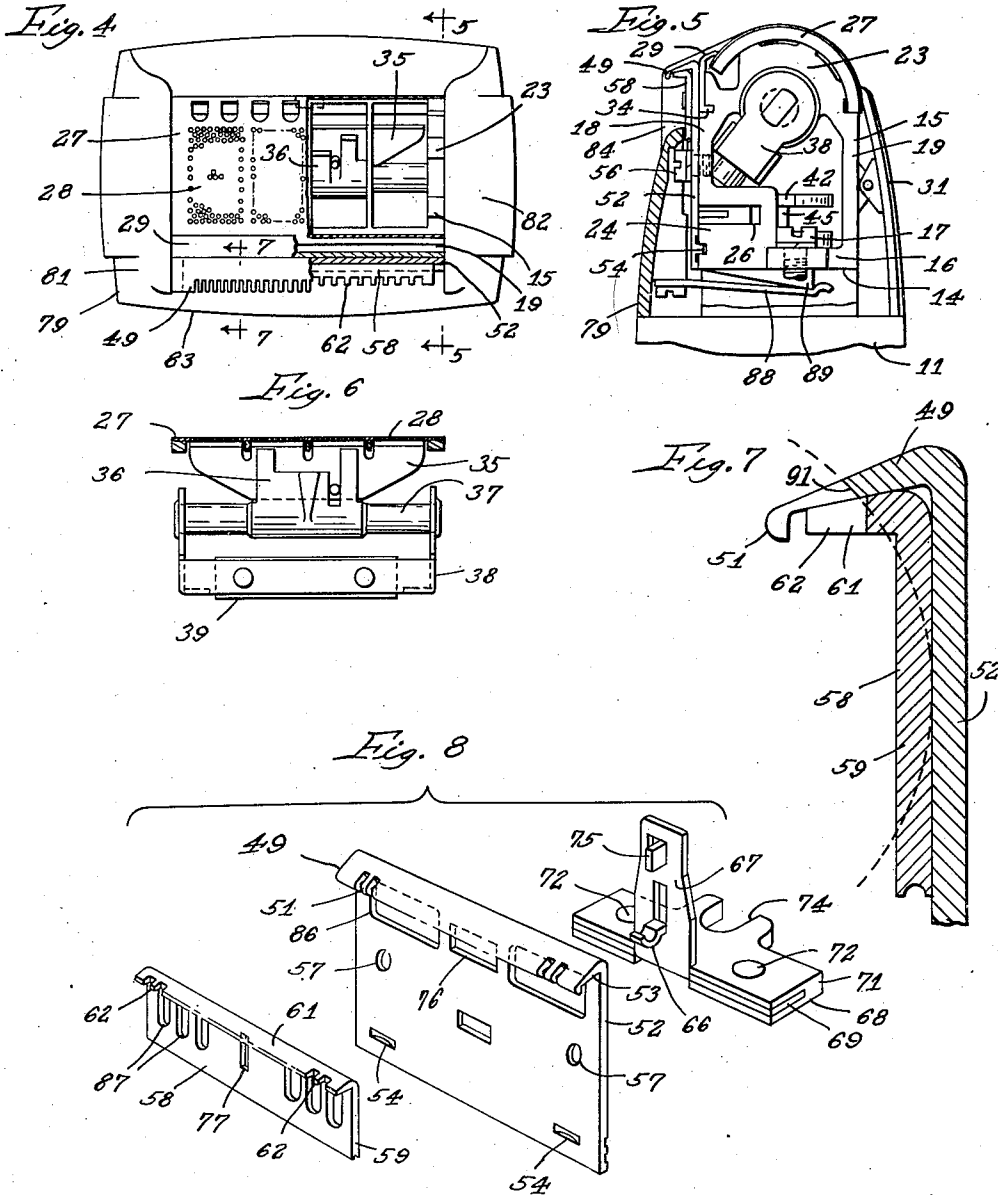
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UNITED STATES PATENT OFFICE

2,370,544

SHAVING IMPLEMENT

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Application June 16, 1941, Serial No. 398,218

18 Claims. (Cl. 30—34)

This invention relates to shaving implements of the kind known as dry shavers. It also relates in certain respects to the clipping of hair either in combination with a close shaving means or independently thereof.

One of the objects of our invention is to provide an improved shaving implement of the type having a comb and cutter adapted for close shaving and a separate comb and cutter in correlation therewith adapted for cutting long hairs.

Another object of our invention is to provide an improved cutter driving mechanism whereby the cutters of both the long and short hair cutting assemblies are driven through separate drive-transmitting means from individual eccentric means in turn driven from a single rotary drive member or suitable source of power such as an electric motor which usually constitutes the handle of the implement.

Another object of our invention consists in a novel organization of parts in a dry shaver of the type described in which the close shaving cutter is oscillated transversely of the cutter head and the long hair cutter is reciprocated lengthwise of the cutter head.

Another object of our invention consists in organizing the cutter parts and the cutter driving parts in a shaver of the type described so that they will be compactly arranged in coacting relation and the drive-transmitting parts will operate with a comparatively small amount of friction and will be capable of high speed operation for comparatively long periods.

Another object is to provide an instrument for cutting hair, characterized by a comb member having a row of teeth and a movable cutter in coaction with the comb teeth, including improved shape characteristics in the comb member for the purpose of definitely picking up loose or long hairs and guiding them into the cutting area, whereby to facilitate the clipping or shearing of hair.

Another object is to provide an improved hair clipper and driving mechanism therefor.

Still another object is to generally improve the structure of a dry shaver of the type described.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which:

Figure 1 is a cross section lengthwise through a cutter head end of a shaving implement embodying our invention, on a scale approximately four times actual size;

Fig. 2 is a fragmentary side elevation of the implement looking at the left hand side of Fig. 1;

Fig. 3 is a plan section through the head casing taken substantially on the section line 3—3 of Fig. 1, with the head casing removed from the implement and showing drive member in full top view;

Fig. 4 is a fragmentary top view of the implement on a scale approximately twice full size;

Fig. 5 is a cross section taken substantially on the section line 5—5 of Fig. 4;

Fig. 6 is a fragmentary section lengthwise through the close shaving comb, together with a side elevation of the cutter, these parts being removed from the implement;

Fig. 7 is an enlarged detail section of the clipper comb and cutter on the section line 7—7 of Fig. 4; and

Fig. 8 is a perspective view of the clipper comb, its cutter, and the cutter driving slide in spaced relation.

In the embodiment of our invention here shown for purpose of illustration we have provided separate comb and cutter assemblies for close shaving and long hair cutting respectively, arranged in cooperative relation and operated from a single rotary drive member. This embodiment has the advantage that the comb and cutter set for each assembly is individually replaceable and the cutting elements of each set are independently mounted and maintained in the desired coaction without dependence on the other set. The respective comb and cutter sets are however, arranged in juxtaposition and in cooperative relation for clipping and shaving. Our invention, however, in its broader aspect, insofar as the drive mechanism is concerned, contemplates the use of both combs on a single comb unit such, for example, as disclosed in the application of Ivar Jepson, Serial No. 311,969, filed January 2, 1940, for Shaving implement. Also, in its broader phase our invention is not limited to the use of a transversely oscillating cutter for close shaving but contemplates any preferred or desired arrangement of the two types of combs and cutters. It should be noted, however, that a particular problem is presented in the objective of a satisfactory drive mechanism for a reciprocating type cutter for long hair cutting when combined with an oscillating type cutter for close shaving, where it is desired to drive both cutters from a single rotary drive member such as from one end of an armature shaft as used in electric dry shavers. This problem is complicated by the desire to keep the structure compact and within certain size

limits, also by the problem of providing electrical insulation between the armature shaft and the driven parts, the problems of friction, wear and lubrication, particularly in view of the comparatively high speed at which the parts operate, the desire for minimum load on the motor, and the avoidance of service troubles by reason of the tendency of users to disregard directions for oiling and cleaning. Our invention, therefore, contemplates the provision of a single rotary drive member provided with two eccentric means, one for transmitting drive to the close shaving cutter and the other to the long hair cutter. In the embodiment shown the eccentric means are arranged one at the terminal end of the drive member for oscillating the close shaving cutter transversely of the shaving head and the other eccentric means at an intermediate position for reciprocating the long hair cutter lengthwise of the head.

Referring now to the drawings, 11 indicates a main housing (only a portion of which is shown) which constitutes a handle, as is well known in this art, and in the present embodiment also constitutes the housing for an electric motor which drives the cutters. In this form the armature shaft of the motor has an end 12 journaled in a bearing 13 supported in the main housing. On the flat end 14 of the main housing is mounted a head casing designated generally by 15 which may be in the form of a die casting, or otherwise formed, to provide support for the comb and cutter parts, as will be presently described. In this form the head casing has a base portion 16 which seats on the surface 14 and is held thereon by bolts 17, vertical side walls 18 and 19, a transverse partition wall 21, and vertical end walls 22 and 23. The head casing is further shaped to provide a body portion 24 integral with the base portion 16 and the side wall 18 as shown in Fig. 5 and extending from end to end of the casing head except for a cut-away 25 for the rotary driving member best shown in Fig. 3, this body portion being machined to provide a bearing slot 26 for a cutter driving slide which will be presently described.

In this embodiment a replaceable comb unit designated generally by 27 of the general type disclosed in Patent No. 2,234,891, granted March 11, 1941, is supported on the end walls 22-23, this unit having a comparatively thin skin-engaging comb plate 28 provided with small hair-receiving openings with cutting edges at the inner end thereof, these openings being arranged in a shaving area substantially from end to end of the comb. The thinness of this comb plate and the size and shape of the openings making it adapted for close shaving, as such term and function is known in this art. This comb unit is normally held in position by engaging at one side beneath a retaining plate 29 and being clamped at opposite side against the small supporting lugs on the walls 22-23. This clamping is here effected by means of a presser plate 31 which is pivotally supported at 32 on the head casing 15 and yieldingly urged into the clamping position by a spring 33 similar to the disclosure in said Patent No. 2,234,891. The retaining plate 29 is in this instance held in position by having an inwardly turned end 34 fitting in a retaining slot in the wall 18 of the head casing as shown in Fig. 5. A cutter blade 35 is adapted to be rapidly oscillated in coaction with the inner side of the comb plate 28 in a manner known in this art, the cutter being carried by a holder 36 hav-

ing a rock shaft 37 journaled at its ends in suitable bearings in the head casing and having a depending yoke-shaped bracket 38 which carries spaced parallel bearing faces 39 of suitable bearing material. A cylindrical bearing pin or crank 41 fits between the bearing faces 39 in driving engagement therewith and is supported on an oblique axis eccentrically on a rotary drive member designated generally by 42. This drive member is attached to the end 12 of the armature shaft, concentric therewith, preferably through means of an electrical insulating connection. In this embodiment we have provided a drive member comprising axially spaced members 43 and 44 joined by a cylindrical eccentric 45, the member 43 carrying the eccentric drive pin or crank 41 and the member 44 having extensions 46 fixed in an insulation coupling 47 which in turn is fixed to a metal hub 48 threadingly engaged on the shaft end 12. In the preferred embodiment the parts 46 and 48 are metal inserts in a molded coupling 47 such as Bakelite or any suitable electrical insulation material.

The comb and cutter assembly adapted for long hair cutting is in this embodiment mounted in coaction with the close shaving comb and cutter so as to be separately removable and replaceable, although as above stated our invention in its broader conception contemplates also the association of this type of clipper comb directly with the close shaving comb either as a component part of the close shaving comb unit as disclosed in said Patent No. 2,234,891, or as a replaceable unit mounted directly on a close shaving comb unit. In the form shown the long hair cutting comb, or clipper comb, designated generally by 49, has a row of teeth 51 the profile shape of which is best shown in Fig. 7. In this embodiment the comb member is formed from flat sheet steel to provide a main body portion 52 which fits flat against the outer face of the side wall 18 and covers substantially the entire wall, and to also provide a laterally turned portion 53 in which the teeth 51 are cut. In this instance the comb plate has locating lugs 54 fitting in a slot 55 in the head casing for locating the comb plate vertically. Screws 56 passing through openings 57 in the comb portion 52 and threaded into the head casing clamp the comb plate fixedly in working position. The cutter blade for this comb, designated generally by 58, is also formed from a flat sheet of steel to provide a main body portion 59 and a laterally turned portion 61 in which the teeth 62 are cut. This cutter blade is constantly urged into coaction with the stationary comb by means of a spring 63, best shown in Figs. 1 and 2, which has resilient arms 64 pressed upwardly against the bottom edge of this cutter blade near the opposite ends thereof and an intermediate portion 65 seated and retained against a hook-shaped lug 66 formed from the upright portion 67 of a slide member designated generally by 68. This slide 68 fits in the bearing slot 26 and may be substantially coextensive with the length of the head casing, as shown in Fig. 2. In this embodiment of the slide the upright portion 67 is integral with a horizontal portion 69 which is covered by a body 71 of self-lubricating material such as woven fabric impregnated with a wear-resisting material and graphite, this body being fixed to the member 69 by rivets 72. The opposite bearing faces formed by the slot 26 in the head casing are cut away at 73, as shown in Fig. 2, for clearance of the rivets. The body portion

71 of the slide is shaped at 74 to receive the eccentric 45, whereby rotating motion of the drive member 42 is translated to reciprocate the slide 68. The upstanding portion 67 of this slide has a driving lug 75 extending through a slot 76 in the comb plate portion 52 and fitting in an opening 77 in the cutter blade 58, whereby this cutter is reciprocated by the slide. The upright portion 67 of the slide is disposed in a recessed area 78, Fig. 2, in the side wall 18 of the head casing and the comb plate serves to hold the slide 68 and also the retaining plate 20 in position.

Viewing Fig. 1, it will be noted that the face of the long hair cutting comb is in a plane substantially tangential to the face of the close shaving comb 28 and that this plane is disposed substantially below the highest point of the comb 28 on the longitudinal centerline 10 of the shaving implement, this plane being in substantial angular relation to said centerline so that the comb 49 is set back from the high point of the comb 28. This is of particular advantage in certain shaving operations as, for example, when shaving the upper lip, for the reason that it permits the close shaving comb to be used to the highest point of the lip without interference on the other comb. At the same time this relationship of the two combs permits of their simultaneous use with the stroke in the other direction wherein the comb 49 functions for cutting long hairs and the comb 48 simultaneously functions for close shaving. In these operations it will be manifest that the single rotating driving member transmits oscillating motion to the cutter 35 transversely of the head and reciprocating motion to the cutter 58 lengthwise of the head, through the intermediary of the eccentric means 41 and the eccentric means 45, respectively. It will also be noted that the cutter 58 is held under tension in shearing coaction with the comb 49 by means of the spring 63 which is carried by the slide which in turn imparts the reciprocating motion, this coaction being further obtained by the wedging action between the angular faces of the cutter and the complementary faces of the comb.

A removable housing 79 is provided to enclose the ends of the shaving head and the side opposite from the presser plate 31. This housing comprises end walls 81 and 82 joined by a side wall 83, the end walls being shaped to conform with the contour of the comb structure and the side wall 83 terminating at its upper end short of the clipper comb and cutter so as to provide in effect an opening 84 to expose this comb for the free entrance of hair at the open end of the teeth and also for the purpose of allowing free discharge of the cut hair. This opening 84 also communicates with the interior of the compartment between the wall 21 and the shaving comb 28 through means of passages 85 in the side wall 18 of the head casing, the outline of which passages is shown by the dotted lines 85 in Figs. 1 and 2 and also by passages 86 in the comb plate 49 and passages 87 in the cutter 58. The casing section 79 may be slid horizontally to the left, viewing Fig. 1, to remove it from the implement, the casing having sliding engagement along its end walls with the ends of the head casing. Suitable means is provided for releasably retaining this housing section in the closed position, in this instance comprising a pair of spring blades 88 bolted to the casing and each shaped to snap over a retaining lug 89 fixed to the underside of the head casing.

Referring to Fig. 7 it will be noted that the portion 53 of the clipper comb is undercut at 91, this being at the inner end or bottom of the slot which defines the side walls of adjoining teeth 51'. This undercut is at an acute angle with respect to the outer face of these teeth, that is, the top face in the position of the comb shown in Fig. 7, so as to provide individual sharp edges and inclined faces leading inwardly to the cutting plane. These sharp edges serve to pick up loose or long hairs by motion of the clipper over the skin. Such edges and undercut faces also serve to guide the hairs to the cutting edges and thereby facilitate the cutting of hairs which are otherwise difficult to engage in clipping devices, particularly in devices used for shaving. In this instance the undercut is made by a milling cutter the outer diameter of which is indicated by dotted lines in Fig. 7. This feature of the invention is not, however, limited to use with a close shaving comb and cutter as herein shown, but it is adapted for independent use in hair clippers.

The term "eccentric means" is used in the claims to mean any motion transmitting means having eccentricity with respect to a shaft center about which such means revolves for translating rotary motion to oscillatory motion or reciprocatory motion; and illustrative forms of such means are shown herein consisting of the eccentric 45 which translates rotary motion from the driven shaft into reciprocatory motion as applied to the cutter slide 68, and the crank 41 which translates rotary motion from said shaft into oscillatory motion as applied to the cutter carrier 36.

While we have shown a particular embodiment of our invention, it will be understood that we do not wish to be limited thereto since many modifications may be made, and we therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

We claim:

1. A shaving implement having a comb structure provided with small hair-receiving openings and a cutter in coaction therewith adapted for close shaving, a body structure supporting said comb and cutter, power drive mechanism on the body structure for operating said cutter, a comparatively flat comb body supported on one side of said body structure and having a row of clipper teeth extending along one side of the first mentioned comb, a cutter reciprocable on the outer side of said comb body and having cutter teeth in coaction with said clipper teeth, said drive mechanism including an eccentric drive member, and a slide member mounted for reciprocation on the body structure adapted to be reciprocated by said eccentric drive member and having a drive transmitting part extending through the body part of the second mentioned comb member into driving engagement with the second mentioned cutter.

2. A shaving implement as set forth in claim 1, including resilient means carried by the slide member and coacting with the second mentioned cutter for urging it into coaction with the clipper teeth of the second mentioned comb.

3. A shaving implement having an arcuate comb adapted for close shaving and a cutter in coaction therewith, a comb extending along one side of the first mentioned comb having a row of clipper teeth, a cutter adapted to be reciprocated in shearing coaction with the clipper teeth

of the second mentioned comb, and mechanism for simultaneously operating the cutters including a rotary drive having an eccentric means at its extremity and a second eccentric means spaced inwardly from the first mentioned eccentric means, and separate drive transmitting connections between the first mentioned eccentric means and the first mentioned cutter and between the second mentioned eccentric means and the second mentioned cutter, said first and second mentioned eccentric means arranged to rotate about an axis extending longitudinally of the shaving implement, the drive transmitting connection for the second mentioned cutter including a slide member reciprocable in a direction at right angles to said axis of rotation, and a spring mounted on and moving with the slide and arranged to urge the second mentioned cutter into coaction with the second mentioned comb.

4. A shaving implement having a head casing, a close shaving comb removably mounted on the head casing, a cutter coacting with said comb, a clipper comb of flat material providing a main body portion which fits against an outer side wall of the head casing and has a laterally turned upper end provided with clipper teeth at its outer edge, a cutter blade slideable on the outer side of said comb plate and having clipper teeth adapted for coaction with the clipper teeth of said plate, a slide member having a flat portion slideable lengthwise in a bearing slot in the side wall portion of the head casing, the slide extending through the outer end of said slot and having an upturned portion provided with means coacting with the clipper cutter blade for reciprocating the same, and means coacting between the slide and the clipper cutter blade for yieldingly urging the latter into coaction with the clipper comb.

5. A shaving implement as set forth in claim 4, in which the upturned portion of the slide is disposed at the inner side of the clipper comb plate and its means for reciprocating the clipper cutter blade extends through an opening in the clipper comb plate.

6. A shaving implement as set forth in claim 4, in which the means for yieldingly urging the clipper cutter blade against the clipper comb includes a slide part extending through an opening in the clipper comb plate and a spring element acting between said slide part and the clipper cutter blade to urge the latter upwardly into coaction with the clipper comb.

7. A shaving implement as set forth in claim 4, including an eccentric drive means for operating the clipper cutter blade, in which that portion of the slide member which fits in the bearing slot has bearing faces of self-lubricating and wear-resisting material, and in which said slide portion is recessed at its side opposite from its upright portion adapted to receive and coast with said eccentric means whereby the slide member is reciprocated by rotation of said eccentric means.

8. A shaving implement as set forth in claim 4, in which the main body of the clipper comb plate and the main body of the clipper cutter blade are provided with registering openings communicating with the inner side of the close shaving comb for the discharge of cut hair particles.

9. A shaving implement having a main housing provided with driving means, a head casing mounted on one end of the main housing and provided with a close shaving comb and a clipper

comb, the latter comb having an outwardly projecting row of clipper teeth, cutting means coacting with said combs and operated by said driving means, and a housing member having end walls joined by a side wall shaped to enclose the opposite ends of the head casing and the parts assembled thereon and also to enclose the clipper side of the head casing except for an opening adjacent to the clipper comb and cutter in which opening the clipper comb and cutter are disposed, the upper end of said side wall being normally disposed within the outer end of the projecting clipper comb, the housing member being mounted so as to be slideable transversely of the major axis of the shaver into and out of an operative position in which its end and side walls are disposed as described, and means releasably retaining the housing member in said operative position.

10. A shaving implement having a head casing, a clipper type cutter comprising a substantially flat main body portion adapted to be seated against one side of the head casing and having at one end a laterally turned portion provided at its outer end with cutter teeth, a cutter blade mounted to slide against the outer face of the comb plate body portion and having cutter teeth coacting with the clipper teeth of said body portion, a slide member mounted to reciprocate in the head casing and having a lateral portion extending through an opening in the main body portion of the clipper plate, and resilient means acting between the cutter and the extending portion of the slide member for yieldingly urging the cutter into coaction with the comb teeth, and means for reciprocating the slide member.

11. A shaving implement having a coacting comb and cutter of a type adapted for close shaving, a coacting comb and cutter of a type adapted for long hair cutting, a supporting structure therefor, a slide member mounted for reciprocation on the supporting structure and connected with the second mentioned cutter for imparting reciprocatory motion thereto, a rotary drive member composed of axially spaced members joined by an eccentric portion, said slide shaped for coaction with said eccentric portion and adapted to be reciprocated thereby upon rotation of the drive member, and eccentric means on one of the axially spaced members connected with the first mentioned cutter for imparting cutting movement thereto upon rotation of the drive member.

12. In a shaving implement characterized by a main motor housing, a head casing removably attached to the main housing at one end thereof, a close shaving comb and a clipper comb mounted on the outer end of the head casing, cutting means coacting with said combs, mechanism driven by the motor for operating the cutting means including means mounted on the head casing, a presser plate at one side of the head casing, the close shaving comb constituting a unit removable from the head casing acting to normally lock the close shaving comb in operative relation and being movable to a comb releasing position, the combination with the described structure of a housing having end walls shaped to enclose the opposite ends of the head casing and a side wall shaped to enclose the side of the head casing opposite from the presser plate, said housing being shaped to provide an opening exposing the close shaving comb and the clipper comb for use and being mounted for movement with respect to the head casing to and from an operative position

thereon, the housing being movable crosswise of the head casing to and from its operative position, and means including spring elements coacting between the housing and the head casing to releasably retain the housing in said operative position.

13. In a shaving implement characterized by a main motor housing having a head casing at one end, a close shaving comb and a clipper comb on the outer end of the head casing, a cutter coacting with each said comb, drive mechanism for operating the cutters, part of which mechanism is within the head casing, a presser plate at one side of the head casing coacting with the close shaving comb to lock it in operative position and being operable to release said comb, the improvement in which the head casing is provided with a partition dividing the casing into an upper compartment in which the cutter for the close shaving comb operates and a lower compartment in which a part of said cutter operating mechanism operates, a housing having end walls shaped to enclose the opposite ends of the head casing and a side wall shaped to enclose the side of the head casing opposite from the presser plate, said housing being further shaped to provide an opening exposing the clipper comb for use and being mounted for movement with respect to the head casing to and from an operative position thereon, means releasably retaining the housing in said operative position, and the head casing at its side opposite from the presser plate being provided with an opening connecting the upper compartment in the head casing with the opening provided by the side wall of the movable housing.

14. A shaving implement as set forth in claim 13, in which the clipper comb comprises a plate having a main body portion covering substantially the entire side of the head casing at the side opposite from the presser plate and having at its upper end a laterally turned portion terminating in clipper teeth, the main body portion of the clipper plate being disposed intermediate the head casing and the adjacent side wall of the movable housing, and said main body portion of the clipper plate having an opening providing communication between said opening to the upper compartment in the head casing and said opening provided by the movable housing.

15. In a shaving implement characterized by a close shaving comb and a clipper comb and a separate cutter coacting with each comb, together with power driven means for simultaneously operating said cutters including a rotary drive member having an eccentric means connected for operating the close shaving comb cutter and a second eccentric means connected for operating the clipper comb cutter, the improvement in which the rotary drive member comprises a metal hub member having a central bore for connection to a power drive member, a metal member having axially spaced annular members

coaxial with said hub member and joined by a cylindrical member eccentric with respect to said hub member, the annular member adjacent to the hub member having extensions in overlapping relation to the hub member, and a body of insulation material into which said hub and said extensions are inserted so as to provide an electrical insulation coupling between said metal members, the first mentioned eccentric means being mounted on the upper annular member and the second mentioned eccentric means being the cylindrical eccentric member.

16. In a shaving implement characterized by a close shaving comb and a clipper comb and a separate cutter coacting with each comb, said combs being arranged in close relation one with respect to the other at the outer end of a shaving head, a rotary drive member at the inner end of said shaving head, and a separate operative connection between the rotary drive member and each of the cutters, the improvement in which the drive for the clipper comb cutter comprises a cylindrical member on the drive member eccentric with respect to the axis of rotation of said drive member, a slide member of electrical insulation material mounted for reciprocation on the shaver head in a plane normal to said axis of the rotary drive member and coacting with said eccentric member so as to be reciprocated by rotation of the drive member, and means operating between said insulation slide member and the clipper comb cutter for reciprocating the latter.

17. A shaving implement as set forth in claim 16, including resilient means carried by the means for reciprocating the clipper comb cutter and serving to yieldingly urge the teeth of the clipper comb cutter into engagement with the teeth of the clipper comb.

18. In a shaving implement characterized by a head casing equipped at its outer end with a close shaving arcuate comb and a clipper comb extending along one of the longitudinal edges of the close shaving comb, an oscillating cutter coacting with the close shaving comb, a reciprocating cutter coacting with the clipper comb, and a presser plate releasably engaging the close shaving comb at the side thereof opposite from the clipper comb for holding the close shaving comb in operative position, the improvement consisting in means fixed with respect to the head casing arranged to overreach the close shaving comb at the side thereof adjacent to the clipper comb, and means on the close shaver comb coacting with said fixed means for locking the close shaving comb in operative position on the head casing when the presser plate is in the operative clamping position and permitting removal of the close shaving comb from said operative position when the presser plate is withdrawn.

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