Nov. 7, 1939. V. LOUGHEED 2,178,669

HAIR CLIPPER

Filed Feb. 26, 1936

Fig. 1.

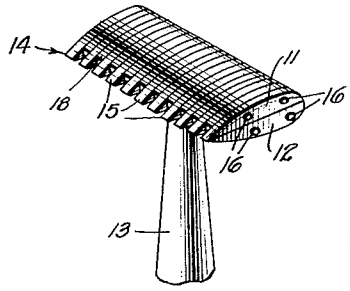


Fig. 2.

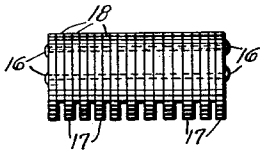


Fig. 3.

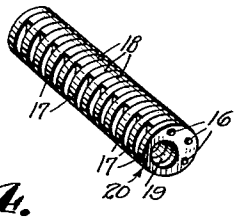


Fig. 4.

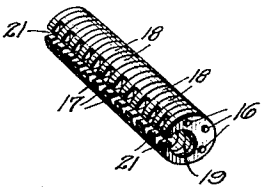


Fig. 5.

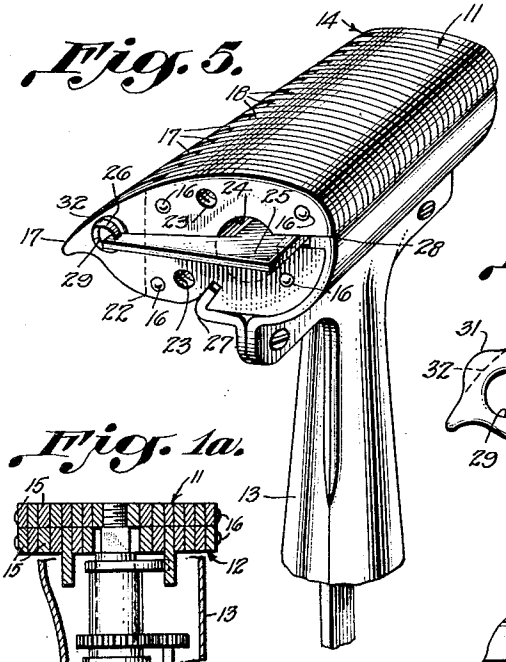


Fig. 6.

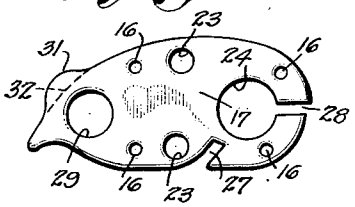


Fig. 7.

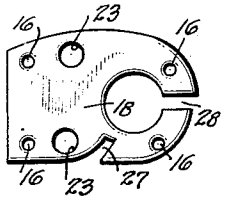
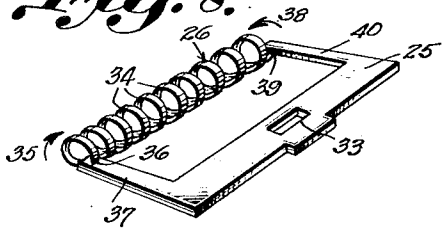


Fig. 1a.

Fig. 9.

Fig. 8.



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2,178,669

HAIR CLIPPER

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Application February 26, 1936, Serial No. 65,845

6 Claims. (Cl. 30—43)

This invention relates to hair clippers, and particularly to hair-clipping devices which are power driven and are designed for use by inexperienced users without danger of cutting the skin.

The invention has for its object generally an improved hair-clipping apparatus which will quickly clip the hair of the beard substantially as close as it can be removed by ordinary shaving.

More specifically the invention has for its objects the clipping at a single pass over the skin of all the hairs under the clipper, instead of leaving bands of uncut hair due to excessive separation of the teeth and ineffective means for engaging all the hairs, in hair clippers such as have been designed heretofore.

Other objects of this invention are to produce a design that is light, compact, and convenient and easy to operate, and which lends itself to very economical fabrication with simple production facilities and without any special difficulties due to a need for excessively fine workmanship, and which can be run with very little power.

Still other objects will in part be obvious and in part will appear hereinafter.

The invention accordingly comprises any embodiment of an article possessing any of the features, properties, and the relation of elements which are set forth in the following detailed disclosure, and the scope of the application of which is exactly exemplified in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 shows in perspective a simple embodiment of the present invention, involving two similar cutting elements assembled together in an operative relationship.

Fig. 1*a* is a diagrammatic sectional view illustrating the operation of the Fig. 1 form of invention.

Fig. 2 shows a plan view of one of the cutters of the embodiment of the present invention which is shown in Fig. 1.

Fig. 3 shows in perspective an embodiment of the present invention consisting of a stationary cutting element adapted to surround a moveable cutting element, the latter not being shown.

Fig. 4 shows in perspective an embodiment of the present invention in the form of a stationary cutting element somewhat similar to that shown in Fig. 3.

Fig. 5 shows perspectively in a preferred embodiment, the complete cutting head of a hair clipper built in accordance with this invention.

Fig. 6 is a plan view of one of the toothed laminae of the builtup cutting element of Fig. 5.

Fig. 7 is a plan view of one of the spacer laminae of the built up cutting element of Fig. 5.

Fig. 8 is a perspective view of the moving cutting element of Fig. 5, with its actuating yoke.

Fig. 9 is a partly sectional view of the moving cutting element of Fig. 5.

In accordance with the accompanying invention a hair-clipping cutting element with exceedingly thin teeth having exceedingly narrow spaces between them is produced by piling up a group of thin laminae having extended tooth portions thereon, in alternation with laminae otherwise exactly similar but lacking the extended tooth portions, and riveting or otherwise fastening solidly together such a group of laminae, while it is held rigidly in place in an assembling form.

The laminae thickness in such a cutting element preferably is such that the teeth thereon aggregate to form a fine comb, of a tooth spacing and thickness bearing such relationships to the average spacing on the skin of the hair of the human beard and to the diameter of such hairs, that passing such a system of such fine teeth over the skin and through the hair assures the picking up, combing out, and passing into the tooth spaces of all of the hairs in the area of skin that the cutting element is drawn over. Therefore, with a pair of such cutting elements in close coacting relationship, or with one in coating relationship with any other type of suitable cutter, it is possible to make a hair clipper that will cut all the hairs it passes over, without missing any that may grow transversely to or away from the general directing of movement of the cutter, or that may be bent down close to the skin, or that might, with thicker comb teeth, pass under a tooth instead of being guided into the interspaces between the teeth.

Since the diameter of a hair in the average beard is probably not greater than .004 inch, and the spacing of the hairs, while somewhat irregular, is often at least as close as .010 inch, with perhaps as many as 5000 hairs to the square inch in the case of some areas of the skin in some individuals, tooth spacings greater than .016 inch become progressively more certain to miss drawing some of the hairs into the tooth interspaces on a single traverse of the comb. A less spacing is better; .012 inch has been found quite satisfactory. But since so fine a spacing allows only

.006 inch for the thickness of each tooth, and .006 inch per tooth interspace—if the two be made equal—the problems of machining such fine and closely-spaced slots, by any known production means, to a reasonable depth into any suitable material, have so far proved quite insuperable, with the consequence that all hair clippers heretofore designed have undesirably-wide teeth and undesirably-wide tooth interspaces.

A common procedure, in the effort to minimize this defect, has been to taper the teeth laterally to points as well as in the plane at right angles to the skin. This improves the combing effect and allows the slots to be relatively narrow at their closed ends, but does not afford a close tooth interval, with the result that the pointed, widely-spaced teeth tips, if the clipper be hurriedly or unskillfully handled, or pressed against the skin sufficiently to clip the hairs close, inevitably cuts and irritates the skin.

A partial solution of this problem has appeared in many recently designed clippers, in which swedging schemes and other expedients have been employed to produce narrower slots than it is practicable to machine—in recognition of the fact that narrowness of the spaces between the teeth is the only road to close clipping without skin injury. But this line of development unfortunately has entailed tooth width excessively great in proportion to the slot width, with the result that clippers thus built miss a major proportion of the hairs that they pass over on each stroke, by failing to pick them up and bring them into the slots and so are exceedingly slow and tiresome to operate.

Obviously, this invention, by providing a novel means of fabricating an aggregation of thin teeth, closely-spaced, without having to attempt to produce such a structure by machining, yields a complete solution of what heretofore has presented itself as an unsolved and most difficult problem.

It is preferable to make the toothed laminae of high-grade alloy steel or beryllium-copper, or of other metal capable of being rolled thin, readily blanked accurately with suitable dies, resistant to corrosion, and easy to harden without warping.

The requirements for the spacing laminae are less severe; a considerable range of metals are suitable; and even non-metals, such as vulcanized-fiber sheet, may be employed. A certain degree of yield or softness in the spacer elements is desirable in that it allows the toothed laminae to superimpose or register more accurately in assembling, and allows the assembled pack to be compressed into a unit not curved or warped in any plane at right angles to that of the laminae.

Regardless of what thickness is determined upon for the teeth, it is obvious that the spaces between the teeth may be made less or more than this—in the latter case by using thicker or more than one spacing laminae between each pair of extended laminae.

For the fixed cutting element that normally contacts the skin, thin teeth and narrow spacing are essential for the best results, but for the moving cutting element, if this is of any reciprocating type, wider faces may be used, and wider interspaces are definitely desirable, because these minimize a clogging action that occurs with teeth spacing the same on moving as on the fixed cutting element—an action that is due to the too-short period that the slots in the two relatively-moving cutters are in registry for the entry of hairs, when the pair cutters are alike. This condition is accentuated when the fixed-cutter tooth spacings are so fine as to be nearly down to the hair diameter, so the very close spacing allowed by this invention for the fixed-cutter teeth makes it especially necessary that the teeth of the coacting cutter be more widely-spaced, even though this demand a greater amplitude of movement.

While in the generality of cases a comb-like series of pointed teeth is the most-desirable structure there may be cases in which the required teeth, though separated, can hardly be termed comb-like. In these cases, round disk-like laminae, for example, may be assembled in alternation with similar disks cut away at one side by the removal of a segment. With an eccentrically-located round hole through all the laminae, an advantage of this structure is that it can be cheaply and easily finished to high accuracy by circular external and internal grinding. By cutting a communication slot from the periphery to the eccentric hole, in such disks, a true toothed condition is produced, in which paired teeth on each disk curve around the movable element until they nearly contact each other.

While both or all cutting elements of a hair-clipper may be made of such built-up laminar structures as this invention provides, it does not necessarily follow that all coacting elements in a hair clipper be of this type. They may be all such, or they may be of mixed type, involving a use of the new element with an element old in the art, or of a different kind of new element.

A non-laminar new cutting element of a design conferring special suitability for coacting with the laminar cutting element hereof is therefore a part of this invention, and is herein described.

Referring specifically to Fig. 1, 11 and 12 show like coacting elements of a clipper head, each of the two elements of which is built up of laminae in accordance with this invention. The stationary element is 11, while element 12 is reciprocated transversely of 11 by mechanism, not shown, working through handle 13. Engaging hairs in the sharp contacting comb-like edges 14, the relative movement of the teeth 15—15—etc., of the upper element across the similar teeth of the lower element, cuts off the hairs. At 16—16—16—16 are rivets by which the two groups of laminae are held together.

In Fig. 2 is shown a plan view of cutter 11 of Fig. 1, the toothed laminae being 17—17—etc., and the spacer laminae 18—18—etc., the rivets on which they are strung together being indicated at 16—16.

Fig. 3 illustrates in perspective a cylindrical cutting element built up of the full laminae 17—17 and the spacer laminae 18—18. With a coacting cutter working in the eccentric hole 19, and the wall of the assembly at 20 very thin, it is obvious that the closeness of the hair clipping is related to the thinness of the wall at 20. The fact that the exterior of the cutter can be finished by cylindrical grinding, and that the hole 19 is a round job of internal-grinding, renders it easy to work these surfaces to high accuracy with reasonable production economy. The rivets 16—16—16 hold the assembly together. Fig. 4 is quite similar to Fig. 3, except that the slot 21, into the hole 19, may facilitate the entry of the hairs into the cutting apertures. In neither Fig. 3 nor Fig. 4 is the movable cutting element, which accupies the hole 19, shown.

In Fig. 5 is shown a substantially-complete cutting head in a preferred embodiment of this invention. In this, the fixed or stationary cutting element 11 is built of laminae such as are shown more clearly, to a different scale, in the plan views of Figs. 6 and 7. The toothed laminae 17—17—etc., terminate in the sharp edge 14, while the shorter spacer elements 18—18—etc., may extend towards this edge only to the plane 22, or they may approach the teeth points more closely. Both long and short laminae have in common the four holes for rivets 16—16—16—16; the two holes 23—23 for through screws (not shown) which hold cover plates (not shown) on the ends of 11; the large hole 24, which affords working space for the yoke 25 which reciprocates the movable cutter 26; and the two slots 27 and 28, with which the handle 13 engages. The latter slot, 28, also serves for the introduction of, and as a guide for the yoke 25. The holes 29, which receive the movable cutter 26, are only in the toothed laminae 17, as shown in Fig. 6, or they may be partially in the spacer laminae also. A hole, not shown, drilled from the underside, at the transverse center, through the assembled group of laminae 11, into communication with the hole 24, allows the lever 30, in the handle 13, to engage with and actuate the yoke 25.

As blanked, the toothed laminae 17, Fig. 6, carry the projecting portion 31, around the hole 29, so as to add enough strength to the laminae to allow them to be blanked, handled, heat treated, and assembled, without breakage. After assembly, this hump, across the whole stationary cutter unit 11, is accurately ground off, so that the hole 29 comes exceedingly close to the surface 32, Fig. 5, with the result that the hairs from a skin surface can be clipped exceedingly close.

Fig. 8 shows in perspective the novel movable cutter 26, with the yoke 25, through the hole 33, in the center of which, the lever 30, Fig. 5, engages, and thereby allows actuation of the cutter by rapid reciprocation back and forth. This unique cutter, designed specially for the quality of effectively coacting with the fixed cutter element of Fig. 5, is made simply by coiling an open helix of strong wire, and after coiling, grinding away something more than half of the thickness of the wire, if it be round wire, by a centerless-grinder operation. The fabrication thus is exceedingly economical and effective. The resulting element, as shown, presents the sharp cutting edges 34—34, which are better shown in the sectional view of Fig. 9, and which coact with the sides of the holes 29, in the teeth of the laminae 17, of Fig. 5, or in the holes through the laminae 17 and 17, and 18 and 18, of Figs. 3 and 4, to cut hairs off clean, without catching, crushing, or pulling, and with a minimum energy. With ordinary good fabrication of the holes 29, in shearing dies, and no more than usual accuracy of centerless grinding, the fit of the cutter in the holes can be so close, while still perfectly free, that no friction-adding pressure between the elements is necessary to insure clean cutting, a feature which greatly reduces the power demand. The pitch slant of the helix makes it impossible for the cutter edges to catch upon the hole edges, and renders the action one of true shearing rather than of mere chopping. The flexibility of the helix takes care of any possible lack of straightness in the hole 29, as it runs from end to end of the group of laminae 11. Its extreme lightness imposes a minimum load due to acceleration of mass, upon the actuating mechanism. Having an open core instead of any center shaft, the free entry of hairs into the cutting system is greatly facilitated. Continuous rotation of the helix in one direction, whereby it might screw itself through the yoke and out of place is prevented by the fact that as it may rotate in the direction of the arrow 35, Fig. 8, a limit is set by the contacting of the coil end 36 with the top of the yoke arm 37, while opposite rotation, in the direction of the arrow 38, similarly must come to a stop when the coil end 39 contacts with the bottom of the yoke arm 40. Obviously, by suitable angular positioning of the two coil ends with respect to the yoke arms, all angular movement can be prevented, but a reasonable number of degrees of angular freedom introduces the advantage of bringing into most effective use a greater total length of cutting edge.

Instead of by reciprocation, such a helical cutter can be actuated by continuous rotation.

Instead of from round wire such a helical cutter can be wound from wire of triangular, square or other special section, with the result of eliminating or greatly minimizing the amount of stock removal necessary by grinding, to sharpen and size.

It will be obvious that other means of mounting and combining the elements described, into a great variety of embodiments, may be employed.

Since such embodiments of this invention can be made without departing from the scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be construed as illustrative rather than limiting.

It also is to be understood that the following claims are intended to cover 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, may be said to fall therebetween.

I claim as new, and desire to secure Letters Patent on:

1. In a hair-clipping device, a stationary cutter-head element built up of laminae or plates of suitable material, certain of such plates at regular intervals being extended into very-thin teeth separated by very-narrow interspaces, a coacting movable cutter element, said cutter element comprising a helical member freely movable intermediate its ends, and means for reciprocating said helical member axially thereof.

2. In combination, a hair-clipper cutting element comprising an open helix of coiled wire of suitable cross-section whereby to present sharp cutting edges, and a reciprocatable yoke, said helix being connected only at the opposite ends thereof to said yoke for movement therewith.

3. In combination, a hair-clipper cutting element consisting of a helix of coiled wire, and a reciprocatable holder therefor, the ends of said helix being fixed to said holder whereby resilient movement of said helix intermediate its ends is permitted.

4. In combination, a hair-clipper cutting element consisting of a helix of coiled wire of non-circular cross section, and a reciprocatable holder therefor, the ends of said helix being fixed to said holder whereby resilient movement of said helix intermediate its ends is permitted.

5. In a hair clipping device of the character described, a cutting element comprising a helix of wire, coiled with open spaces between the adjacent turns, and of a cross section presenting

sharp cutting edges in the direction of the axis of the helix, said cutting element having its ends fixed to a reciprocatable holder for movement therewith.

6. In a hair clipping device, a substantially-cylindrical stationary cutting element built up of disklike round plates alternating with similar plates reduced in area by the elimination of a segment, the whole assembly traversed longitudinally by an eccentrically-placed round hole adapted to receive therein a movable cutting element, said assembly having a narrow longitudinal slot cut through the narrowest side of each full disk, between its circumference and the said eccentric round hole.

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