May 30, 1961 S. RIZZA 2,985,959

HAIR CLIPPER

Filed Aug. 26, 1959 2 Sheets-Sheet 1

Fig. 2.

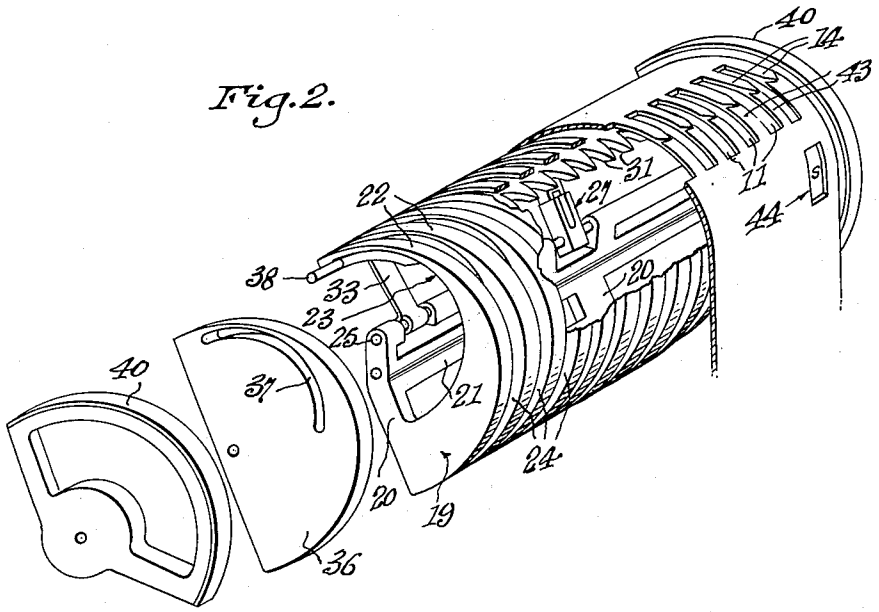


Fig. 3.

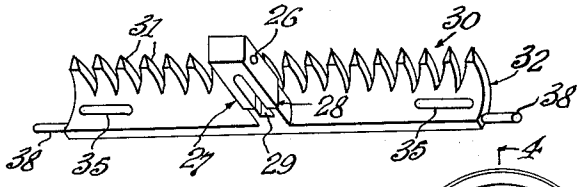
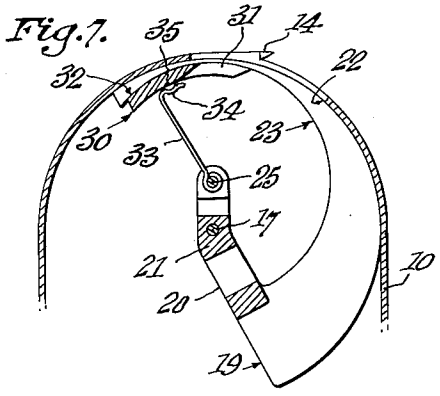


Fig. 7.



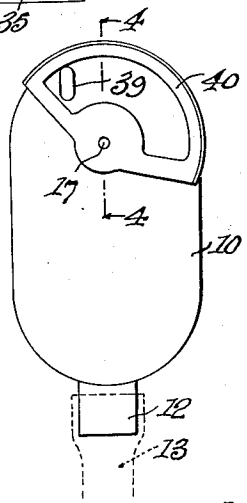


Fig. 1.

INVENTOR.
Salvo Rizza
BY Willard G. Hodges Jr.
Bonifant Hamilton
ATTORNEYS

May 30, 1961 S. RIZZA 2,985,959

HAIR CLIPPER

Filed Aug. 26, 1959 2 Sheets-Sheet 2

Fig. 5.

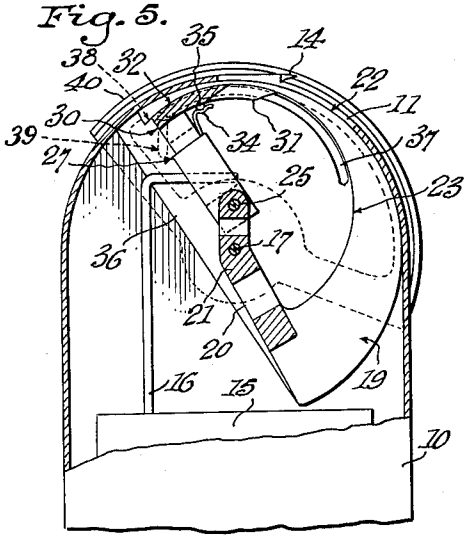
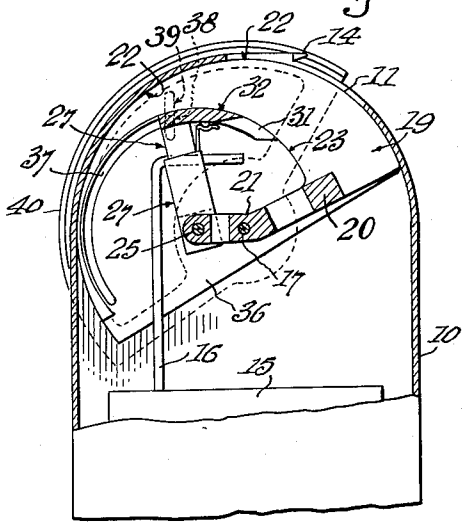


Fig. 6.



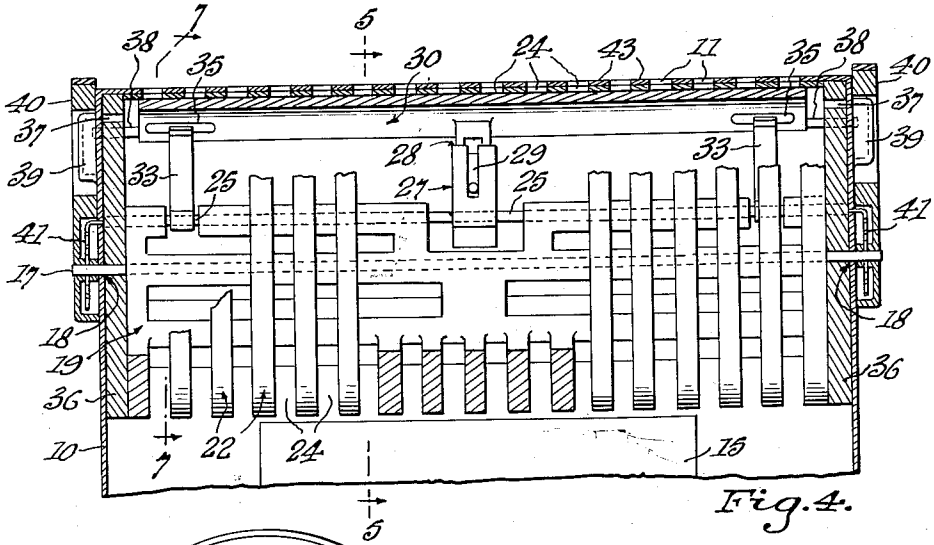


Fig. 4.

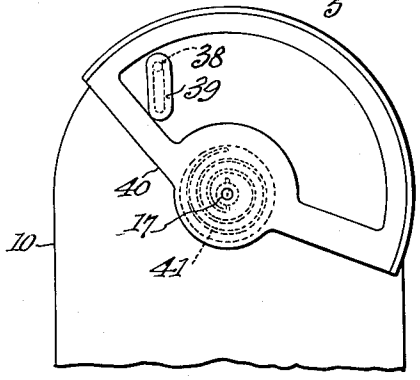


Fig. 8.

INVENTOR.
Salvo Rizza
BY Willard & Hayes Jr
Bonifant Hamilton
ATTORNEYS

United States Patent Office 2,985,959 Patented May 30, 1961

2,985,959

HAIR CLIPPER

Salvo Rizza, Brussels, Belgium (% Mrs. Al. Billian, 3228 Glencairn Drive, Fort Wayne, Ind.)

Filed Aug. 26, 1959, Ser. No. 836,312

7 Claims. (Cl. 30—202)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described and illustrated herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to cutting devices which cut elongated material at varying lengths and in particular relates to hair clippers which automatically adjust the position of the cutting elements relative to the head thereby cutting the hair at uniformly increasing or decreasing lengths.

Many types of clippers and clipper attachments have heretofore been devised with a view to automatically cutting hair around the edges of the hairline at uniformly increasing lengths, such as is customarily done when giving a male person a haircut. These devices have proved generally unsatisfactory because they are too bulky to be used over and around the ears. Frequently the devices do not maintain sufficient control of the upstanding individual hairs in the zone between the cutting elements and the head to efficiently cut all of the individual hairs. Ideally, each hair should be rigidly supported perpendicular to the head. Since the hair around the sides of the head generally lies flat and extends downwardly, a comb pressed close to the head and moved upwardly will force the hairs into a substantially perpendicular position. When making a short cut this is all that is required. However, as the length of the cut increases, the flexibility of the hairs causes them to bend to one side and to bow at the middle, which results in an inefficient, irregular cut. A substantial measure of lateral control can be obtained and the cutting efficiency thereby increased by using a fine-toothed comb which is as thick as the length of cut desired.

One of the inconveniences resulting from the hair cutters presently in use is that the severed hair falls freely where it may and must later be cleaned up. This is a particularly objectionable feature for a device intended for home use by the unskilled. Perhaps the most annoying feature of receiving a haircut is the fact that minute lengths of cut hair invariably fall down the shirt collar, resulting in a discomfort known to all men.

Therefore, the primary object of the present invention is to provide a cutting device for cutting elongated material at variable lengths.

A further object of the present invention is to provide a hair clipper which automatically adjusts the position of the cutting elements to provide a tapered cut, yet which is of compact construction so that it can be efficiently used around the ears by an unskilled person to cut his own or another's hair.

A further object of the present invention is to provide a hair clipper of the type described which has increased cutting efficiency due to improved control of the individual hairs.

A still further object of the present invention is to provide a hair clipper of the type described which does not require any appreciable cleaning and which effectively collects and disposes of all the hair cut without allowing any of the hair to fall on the person or the surroundings.

Additional objects and advantages will be apparent to those skilled in the art from the following detailed description and drawings wherein:

Fig. 1 is a side view of a hair clipper constructed in accordance with the present invention;

Fig. 2 is an exploded isometric view of the cutting head of the clipper of Fig. 1 partially broken away to better show details of construction;

Fig. 3 is an isometric view of one of the cutting elements of the hair clipper of Fig. 1;

Fig. 4 is a cross-sectional elevation taken on line 4—4 of Fig. 1;

Fig. 5 is a cross-sectional elevation taken on line 5—5 of Fig. 4;

Fig. 6 is the same as Fig. 5 except that the various parts are in a different position;

Fig. 7 is a cross-sectional elevation taken on line 7—7 of Fig. 4; and

Fig. 8 is a side view of the device of Fig. 1 showing details of construction in dotted lines.

Referring now to the drawings, a housing **10** is substantially airtight except for elongated apertures or slots **11** which are spaced apart by ribs **43**. The housing is provided with a collar **12** which is suitably adapted to connect to the intake line **13** of any conventional vacuum cleaner air pump (not shown). Air is drawn in through slots **11**, passes through the housing and out through the collar **12**. Integral with the housing at the upper end of each rib **43** are a plurality of comb teeth **14**. The combination of slots, ribs, and teeth comprises, in substance, a housing comb which effectively forces the individual hairs into erect position with the hairs protruding through the slots **11** into the interior of the housing. It is desirable to make the slots and ribs narrow to simulate a fine-toothed comb. Also within the housing **10** is an electrically powered, reciprocating drive mechanism **15** of the type which is well known in the art. Arm **16** oscillates from side to side and thereby reciprocates a cutting element in a manner hereafter described in detail.

Housing **10** supports a primary axle **17** which oscillates in bearing apertures **18**. Connected to oscillate about the primary axle is a comb member provided with cutting teeth indicated generally at **19**. The oscillatory comb **19** does not travel through a full 360 degree arc, but the arcuately turning movement of the oscillatory comb **19** is limited in the present embodiment to an arc of approximately 90 degrees as will become apparent as the description proceeds. This limited circularly arcuately turning movement of the oscillatory comb **19** is actuated and controlled by corresponding movements of end wheels which are designated at **40** on the drawings and which will be referred to in greater detail hereinafter, when the complete or assembled cutter structure is in cutting engagement with the head of a subject whose hair is being cut. The oscillatory comb **19** is connected to the primary axle **17** by arms **20** and reinforcing body **21**. As illustrated in the drawings, the outer surface **22** of the oscillatory comb **19** is cylindrical in shape, having a radius of curvature equal to the distance from the primary axle **17** to any point on the surface. In other words, the axis of curvature of the outer surface **22** of the oscillatory comb **19** is coincident with the primary axle **17**. While this configuration is desirable, as will be explained hereafter, it will be obvious to those skilled in the art that it is not essential, from an operability standpoint, that the outer surface **22** be cylindrical with the axis coincident to the primary axle. The oscillatory comb **19** also has a cylindrical inner surface **23**, but the axis of the inner surface is offset from the primary axle **17** which makes the oscillatory comb **19** thicker at one edge than at the other. Thus, the oscillatory comb **19** can generi-

cally be described as an arcuate wedge-shaped cylindrical segment. The oscillatory comb 19 has a plurality of circumferentially extending slots 24 which penetrate the oscillatory comb 19 in the radial direction. The slots 24 should be equal in number and of the same size as the slots 11 and the individual slots 24 should register with the individual slots 11, as shown in Fig. 4, so that the hair projecting through the housing slots 11 will also extend through the oscillatory comb slots 24.

Also connected to the primary axle 17 and oscillatory comb 19 by means of the aforesaid arms 20 is a secondary axle 25 which is disposed coincident with the axis of the inner surface 23 of the oscillatory comb 19, the secondary axle 25 being oscillated about the primary axle 17 by means of these arms 20 responsive to the oscillatory movements of the oscillatory comb 19. Connected to the secondary axle 25 in a manner to both oscillate relative to the axle 25 and to slide along the axle 25 is a reciprocating cutter element 30 shown as a complete unit in Fig. 3. The secondary axle 25 passes through a bearing aperture 26 in a radial arm 27 on which the reciprocating cutter element 30 is carried and which is disposed approximately midway between the opposite ends of the reciprocating cutter element 30, as shown most plainly in Fig. 3. The radial arm 27 has two telescoping joints 28 which make the arm extensible. The telescoping joints 28 are spaced apart to provide a radially extending slot 29. Attached to the other ends of the radial arms 27 is the reciprocating cutter element 30 mentioned above, which has comb-like serrations or teeth 31 and is similar to the conventional reciprocating cutters commonly in use except that it has a cylindrically-shaped outer surface 32. The outer surface 32 is in close-fitting, sliding engagement with the inner surface 23 of the oscillatory comb 19. The oscillating arm 16 is operatively connected to, and is oscillated by the reciprocating drive mechanism 15 and is received in the slot 29 in the radial arm 27, and reciprocates the cutter element 30 along or longitudinally of the secondary axle as the arm 16 oscillates. When the reciprocating cutter element 30 moves longitudinally relative to the oscillatory comb 19, any hair protruding through the slots 11 in the housing and through the oscillatory comb slots 24 will be sheared in the conventional manner.

A pair of springs 33 are also pivotally mounted on the secondary axle 25 on opposite sides of radial arm 27 and have grooves 34 at the end opposite the axle 25. These grooves receive ridges 35 on the reciprocating cutter element 30 and insure that the springs 33 always engage the reciprocating cutter element 30. The purpose of the springs is to bias the reciprocating comb-toothed cutter element 30 into operative cutting engagement with the oscillatory comb 19 at all times. Due to the expansible telescoping joints 28 in the radial arm 27, the springs 33 will effectively compensate for normal wear of the contacting cutting surfaces and for erosion of the surfaces caused by sharpening compounds used in the conventional manner.

End plates 36 are attached to each end of the oscillatory comb 19 and serve to reinforce the oscillatory comb 19 which is weak at the thin side. Each reinforcing end plate 36 has an arcuate slot 37 passing through the plate. Aligned one with the other at opposite ends of the reciprocating cutter element 30 are dowels 38 which project from the cutter element 30 and extend through the arcuate slots 37. The dowels 38 are received in guide sleeves 39 which have an elongated cross section and which are embedded in each end of the housing 10. The guide sleeves 39 are deeper than the length of the stroke of the reciprocating cutter element 30 so that each dowel 38 is always retained within its respective sleeve 39 during reciprocation of the cutter element 30. As best seen in Fig. 8, the guide sleeves 39 are elongated sufficiently to permit the dowels 38 to travel generally toward and away from the primary axle 17 to the extent required, as hereafter explained. The guide sleeves 39 are capped to maintain the housing airtight.

Connected to each end of the primary axle 17 are control wheels 40. Each control wheel has a large space between the hub and rim to receive the sleeves 39. Within the hub of each control wheel is a coil spring 41 which is keyed at one end to the wheel and primary axle and at the other end to the housing 10. The coil springs 41 are tensioned in a manner to bias the control wheels and oscillatory comb 19 to the position shown in Fig. 5. Each control wheel 40 is provided with a rim of rubber or other suitable material to grip the head.

At the beginning of the cutting operation, the oscillatory comb 19, the control wheels 40, and reciprocating cutter element 30 are as a result of coil springs 41 in the positions shown in Fig. 5. In these positions, it will be noted that the cutting surfaces 23 and 32 are as close to the housing comb as possible and therefore will provide the shortest cut. The drive mechanism 15 is energized and the radial arm 16 oscillates and reciprocates the reciprocating cutter element 30 which slides along secondary axle 25. The vacuum cleaner pump (not shown) is energized so that a stream of air is drawn in through the housing slots 11 and passes through the housing 10 and out the connection 12.

The control wheels 40 are then pressed against the head at the edge of the hairline so that the housing comb is flat against the head. As the cutter is moved upward, the housing comb will force the hairs into erect position and the hairs will project through the housing slots 11 and through the oscillatory comb slots 24. The reciprocating cutter element 30 shears the hair at the cutting surfaces 23 and 32 in the conventional manner. Also as the entire cutter structure is moved upwardly, the control wheels 40 roll on the head of the subject whose hair is being cut thereby oscillating the oscillatory comb 19 counterclockwise with the primary axle 17 so that the increasingly thicker portion of the oscillatory comb 19 is positioned between the reciprocating cutter element 30 and the housing comb, as shown in Fig. 6, which results in an increasingly longer cut, the cut being slightly longer than the thickness of the oscillatory comb 19 at all times. While the oscillatory comb 19 is oscillating about the primary axle 17, the reciprocating cutter element 30 is maintained generally in the same radial position relative to the primary axle 17, as will be noted from a comparison of Figs. 5 and 6. The reciprocating cutter element 30 is maintained in the same radial position by means of the dowels 38 which are retained in the elongated sleeves 39. As the control wheels and oscillatory comb 19 are moved counterclockwise, the dowels move downward from the position in the sleeves 39 in Fig. 5 to the position shown in Fig. 6. Obviously, the sleeves must be sufficiently elongated to permit the full downward travel which is equal to the difference in thickness between the thick and thin sides of the oscillatory comb 19. At the same time, the oscillating arm 16 moves upwardly in the radial slot 29 of the radial arm 27. Since the reciprocating cutter element 30 is pivotally connected by radial arm 27 to the secondary axle 25 which is coincident with the axis of the inner surface 23, the outer surface 32 of the reciprocating cutter element 30 remains in operative cutting engagement with the inner surface 23 as the reciprocating cutter element 30 moves clockwise relative to the secondary axle 25 from the position shown in Fig. 5 to that shown in Fig. 6. In this manner, a uniformly tapered cut is provided from the shortest length resulting from the position in Fig. 5 to the longer length resulting from the position of Fig. 6. At the top of the upward stroke of the cutting device, the control wheels 40 are disengaged from the head and the coil springs 41 automatically return the oscillatory comb 19 to the position

shown in Fig. 5, and the device is immediately ready for the next cutting stroke.

It may be desirable to provide the device with a brake so that the oscillatory comb **19** can be locked at any desired position thereby giving one desired length of cut. The provision of such a brake is considered to be within the purview of those skilled in the art. It will be obvious to those familiar with geometry that the length of the tapered cut and the degree or grade of the tapered cut can be altered by varying the overall dimensions and the relative dimensions of the control wheel **40** and the inner and outer surfaces of the oscillatory comb **19**. Further, it is believed to be within the purview of those skilled in the art to provide a gear mechanism, either toothed or friction, by which the rate of turn ratio between the control wheels **40** and the oscillatory comb **19** can be altered at will to compensate for various types of haircuts which, for example, may require a long, close taper or a short, steep taper.

As previously stated, the present device provides increased lateral control of the individual hairs. This is accomplished by containing the hairs in a continuous walled channel or slot in the zone extending from the head whose hair is being cut to the cutting surfaces **23** and **32**. The portion of the housing **10** which jackets the cutter head is cylindrical in shape with the primary axle **17** as its axis. Likewise, the outer surface of the oscillatory comb **19** is cylindrical and has the same axis and moves with minimum clearance from the housing. The individual slots **11** of the housing and the individual slots **24** of the oscillatory comb **19** register and thereby form continuously walled slots extending from the head of the subject to the cutting surfaces. By making the slots narrow to simulate a fine-toothed comb, the narrow channels effectively eliminate all lateral bending and bowing of the individual hairs. By maintaining good lateral control of the individual hairs, cutting efficiency is increased.

Since all cutting action takes place wholly within the housing and since a steady stream of air is being drawn in through the housing slots **11**, it is impossible for any particles of cut hair to fall outside the housing. The air stream then passes out of the housing with the shorn hair entrained therein. Since all hair cut will be deposited within the housing, frequent cleanings would be required to remove the hair from the housing. Thus the vacuum cleaner attachment not only serves to provide a cleaner haircut, but also provides a method of continually cleaning the device by removing the cut hair from within the housing.

Since the cutting elements are wholly within the housing, the position of the elements is obscured from view. Therefore, it is desirable to provide the device with a length of cut indicator, such as that shown at **44**. The device shown is merely a window in the housing **10** which is positioned over one of the ribs of the oscillatory comb **19**. As the oscillatory comb **19** moves, appropriate calibrations on the ribs become visible through the window and thereby indicate the length of cut which will be provided, the length of cut being controlled by the position of the oscillatory comb **19** as described above. Of course this is but one of the many indicating devices which could be used.

Although a specific embodiment of the invention has been described, it is apparent that modifications thereof may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A cutting device comprising in combination, a housing, a primary axle mounted in the housing and extending therethrough and through opposite ends of the housing, an oscillatory comb on the primary axle having an outer cylindrical surface and an inner cylindrical surface, a pair of mounting arms extending inwardly with respect to the housing from opposite ends of the oscillatory comb and having free end members offset from remaining portions of the arms, a secondary axle mounted in the free end members of the arms, the outer cylindrical surface of the oscillatory comb having its axis of curvature coincident with the primary axle while the inner cylindrical surface of the oscillatory comb has its axis of curvature coincident with the secondary axle and offset with respect to the primary axle, the oscillatory comb thereby being of progressively increasing thickness from a relatively thin inner edge to a relatively thick outer side, the said arms constituting connecting means between the primary axle and the secondary axle and producing oscillation of the secondary axle with oscillation of the oscillatory comb, a second cutter mounted on the secondary axle and having both pivotal and linear reciprocatory movements with respect to the secondary axle and in reverse directions longitudinally relatively thereto, the second cutter having a curved outer surface in cooperative cutting engagement with the inner cylindrical surface of the oscillatory comb and mechanism for producing the linear reciprocatory movements of the second cutter, the said linear reciprocatory movements of the second cutter producing a cutting action between the oscillatory comb and the second cutter.

2. A cutting device as claimed in claim 1, wherein the second cutter includes a radial arm, the radial arm including a bifurcated base rigidly attached to the second cutter and a covering cap slidably mounted on the base, the cap having a bearing opening therethrough for receiving the secondary shaft, the base and the cap having registering openings therein, a reciprocatory arm extending into the openings and reciprocatory mechanism operatively connected with the reciprocatory arm for imparting linear reciprocatory movements to the second cutter.

3. A hair clipper adapted to give a tapering cut which comprises a housing, a primary axle mounted in the housing and extending therethrough and also through opposite ends of the housing, an oscillatory comb on the primary axle and having an outer cylindrical surface and an inner cylindrical surface, mounting means extending inwardly relative to the housing from opposite ends of the oscillatory comb and having free end portions offset from remaining portions of the arms, a secondary axle mounted in the free end portions of the arms, the outer cylindrical surface of the oscillatory comb having its axis of curvature coincident with the primary axle, the inner cylindrical surface of the oscillatory comb having its axis of curvature coincident with the secondary axle and offset with respect to the primary axle, the oscillatory comb thereby being of progressively increasing thickness from a relatively thin inner side of the oscillatory comb to a relatively thick outer side thereof, the aforesaid mounting means constituting connecting means between the primary axle and the secondary axle and producing oscillation of the secondary axle responsively to oscillation of the oscillatory comb, a second cutter mounted on the secondary axle and having both pivotal and linear reciprocatory movement with respect to the secondary axle and in reverse directions longitudinally relative thereto, the second cutter having a convex outer surface in cooperative cutting engagement with the inner cylindrical surface of the oscillatory comb, mechanism for linearly reciprocating the second cutter, spaced comb-like cutting serrations on the second cutter along an outer cutting side thereof, the said housing and the oscillatory comb being provided with narrow spaced and registering slots simulating a fine toothed comb for receiving hairs being cut, the registering slots in the housing and in the oscillatory comb forming continuously walled slots extending from the head of a subject whose hair is being cut to the cutting surface of the second cutter.

4. A hair clipper as defined in claim 3, further includ-

ing spring elements mounted on the secondary axle, and bearing against the second cutter adjacent to the serrations along the outer cutting side for continually urging the serrations against the inner surface of the oscillatory comb.

5. A hair clipper as defined in claim 3, further including dowels on each end of the second cutter, end plates attached to each end of the oscillatory comb, each of the end plates having an arcuate slot therein for receiving an adjacent dowel of the second cutter, and guide sleeves receiving the dowels, the guide sleeves being embedded in each end of the housing, the said guide sleeves having an elongated cross section and are deeper than the length of strokes of the second cutter.

6. A hair clipper as defined in claim 5, further including control wheels rigidly mounted on opposite ends of the primary axle, the control wheels contacting a subject's head during hair clipping, actuation of the control wheels producing movement of the oscillatory comb by

oscillating the primary axle, oscillation of the primary axle oscillating the secondary axle and the second cutter thereon, said oscillating mechanism actuating said second cutter longitudinally with respect to said secondary axle.

7. A hair clipper having the structure defined in claim 3, wherein the slots in the housing are spaced apart to define intervening ribs and comb-teeth carried by the housing on upper portions of the ribs, the slots, ribs, and teeth defining a housing comb which forces individual hairs into erect position with the hairs protruding through the slots into the interior of the housing.

References Cited in the file of this patent

UNITED STATES PATENTS

512,009	Chaney	Jan. 2, 1894
1,079,799	Parker	Nov. 25, 1913
1,211,273	Ard	Jan. 2, 1917
1,730,889	Hoberecht	Oct. 8, 1929