

March 14, 1944.

S. LOINAZ

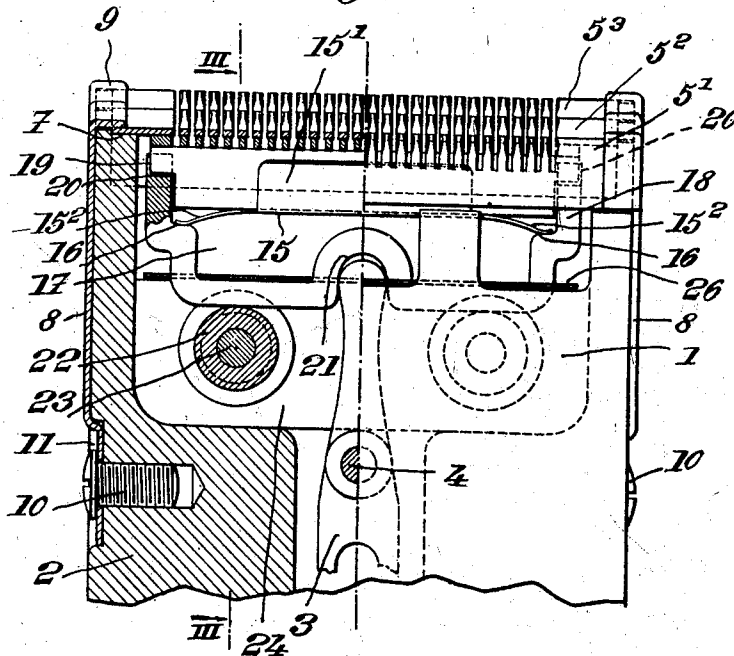
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SHAVING APPARATUS

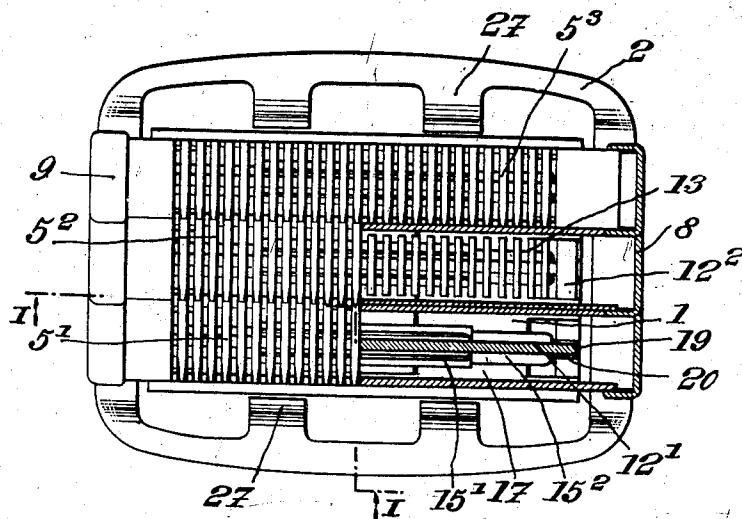
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*Fig. 1.*



*Fig. 2.*



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March 14, 1944.

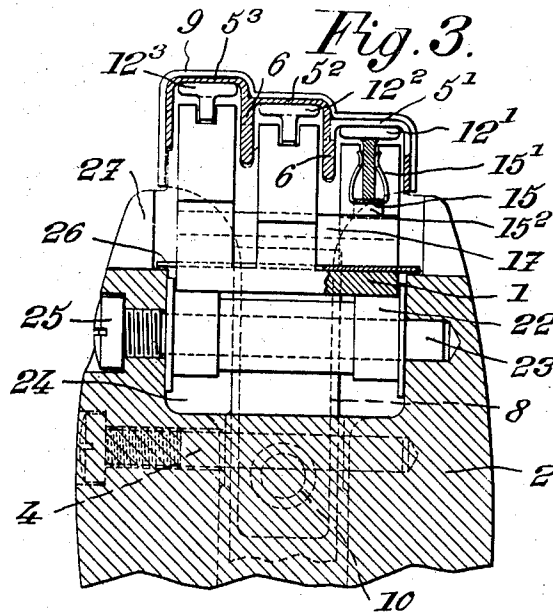
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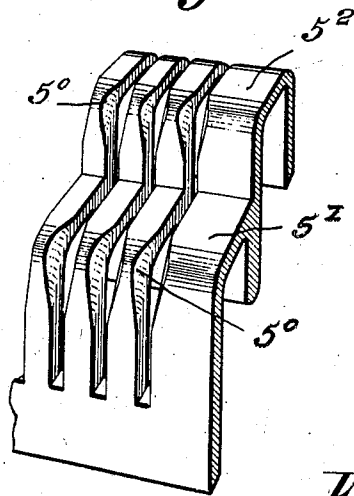
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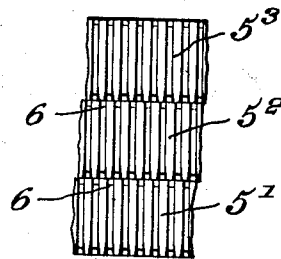
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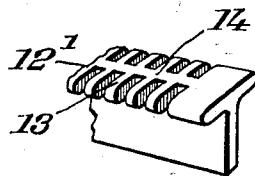
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



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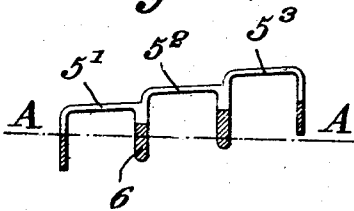
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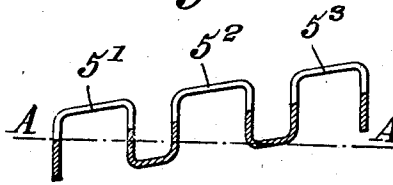
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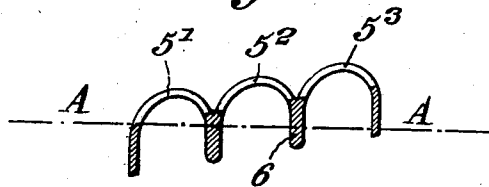
*Fig. 7.*



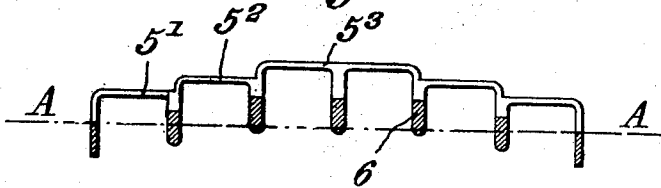
*Fig. 8.*



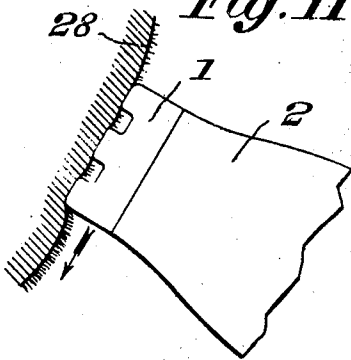
*Fig. 9.*



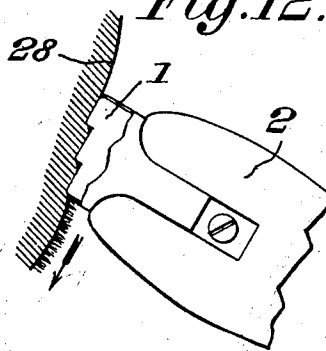
*Fig. 10.*



*Fig. 11.*



*Fig. 12.*



*Fig. 13.*

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## UNITED STATES PATENT OFFICE

2,344,360

## SHAVING APPARATUS

Salustiano Loinaz, Biarritz, France; vested in the  
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Application March 11, 1939, Serial No. 261,386  
In France December 16, 1938

18 Claims. (Cl. 30-43)

The present invention relates to apparatus, intended to be driven either electrically or mechanically, for cutting off or shaving hairs in the dry way, that is to say without making use of water, soap, or shaving creams, this apparatus being of the kind including a cutting head with one or several cutting elements comprising an external comb including parallel and narrow teeth or knives and an external comb consisting of analogous teeth or knives and which is given a reciprocating movement, in contact with the internal face of the outer comb, by electrical or mechanical driving means.

There exists apparatus of this kind which include only one cutting element, of plane or curvilinear shape, and in which the teeth and knives extend over the whole width of the cutting head, so that there is only one inlet and one outlet for the hairs. One of the chief drawbacks of apparatus of this kind is that, when the apparatus is applied against the skin, only the hairs that have penetrated between the teeth of the combs are cut off while the remainder remains bent down against the skin and can be shaved only by again passing the apparatus along the same part of the face.

In order to obviate this drawback, it has been suggested to provide the cutting head with several parallel cutting elements, located in the same plane and spaced apart from each other in such manner as to form several rows of cutting teeth.

However, in actual practice, it has been found that the cutting element which is the first in the direction of movement of the razor is the one which exerts the best shaving action because the skin forms a fold under the effect of the thrust of this first element and the hairs which cover this portion of the skin are caused to stand erect and can thus penetrate deeply between the teeth. On the contrary, the other cutting elements cannot have as efficacious a contact with the skin since the first element causes the skin to be stretched at the place where the other elements, located in the same plane, pass simultaneously.

The object of the present invention is, chiefly, to provide an apparatus of the kind above referred to which obviates the drawback above mentioned and which is designed in such manner that all the cutting elements can act in a satisfactory manner on the skin with the necessary pressure so that the hairs can penetrate deeply between the cutting teeth.

The essential feature of the present invention consists in making the cutting elements of a razor of the type above mentioned in such manner that

they are arranged in stepped relation to one another with reference to a plane parallel to the plane along which the reciprocating movement of the movable part of the cutting head of the razor takes place.

According to another feature of the present invention, the cutting elements, arranged in stepped relation to each other, are of a width such that they are juxtaposed without interval over the whole width of the cutting head.

According to a third feature of the present invention, the inner reciprocating comb of each cutting element is constituted by an independent and removable piece, which is urged toward the external comb by separate resilient means.

According to still another feature of the present invention, the inner combs of the elements of the razors are all mounted on a common support adapted to move with a reciprocating motion under the effect of the mechanical or electrical driving means of the razor, said support bearing on a plurality of rollers freely mounted on fixed axes.

According to still another feature of the present invention, the whole of the external combs of the razor is mounted in a removable manner on the handle of the razor.

Still another feature of the present invention consists in constituting the internal and/or external combs or comb of the cutting elements by means of a steel sheet suitably cut and stamped and which is given its final shape by folding it several times on itself.

Other features of the present invention will be set forth in the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a vertical section, on the line I—I of Fig. 2, the cutting head of a razor made according to the invention;

Fig. 2 is a plan view, partly in section, corresponding to Fig. 1;

Fig. 3 is a transverse section, on the line III—III of Fig. 1, of the cutting head shown by Figs. 1 and 2;

Fig. 4 is a perspective view of a portion of an outer comb for use in connection with the razor according to the invention;

Fig. 5 is a plan view of a portion of an outer comb made according to a modification;

Fig. 6 is a perspective view of a portion of

an inner comb made according to a modification of the invention;

Fig. 7 is a transverse section, on an enlarged scale, of an external comb made according to another embodiment;

Figs. 8, 9, 10 and 13 are views, similar to Fig. 7, showing four different embodiments of external combs to be used in connection with the shaving apparatus according to the invention;

Fig. 11 is a side elevational view showing a portion of a razor of the known type the cutting head of which includes several cutting elements located all in the same plane, this view being an explanatory diagram showing the shaving apparatus in its position of utilization;

Fig. 12 is a view similar to Fig. 11, but corresponding to a shaving apparatus made according to the present invention.

The following description relates to specific examples of shaving apparatus according to the invention for cutting off and shaving hairs in the dry way, without shaving soap or cream.

The shaving apparatus according to the invention includes a cutting head, designated in a general manner by reference character 1 and an elongated handle 2, advantageously made of a molded matter, for instance Bakelite, which forms a casing in which an electric motor or any other mechanism (not visible on the drawings) is housed for driving, with a reciprocating motion, a lever 3, capable of pivoting about a fixed axis 4 and through which the drive is transmitted to the moving part of the cutting head.

The cutting head 1 is provided with several rows of parallel teeth or knives forming fixed external combs mounted in a removable manner on the handle 2 of the apparatus.

According to the invention, there are two, three, or more, of these external plates, respectively designated by reference characters 5<sup>1</sup>, 5<sup>2</sup>, 5<sup>3</sup>, etc., and they are arranged in such manner as to form steps with respect to a plane A—A shown in dotted lines by Figs. 7 to 10 and parallel to the plane in which takes place the reciprocating movement of the moving part of the cutting head. The stepped arrangement can be provided only in one direction (Figs. 1 to 9 inclusive) in the case of a shaving apparatus adapted to cut only in one direction, or in both directions (Fig. 10) in the case of a razor adapted to cut in two opposed directions.

The teeth of the external combs are arranged in such manner, in the embodiment corresponding to Figs. 3 and 4, as to form steps parallel to plane A—A. In the embodiments diagrammatically illustrated by Figs. 7, 8 and 9, the teeth of the external combs are arranged to form steps oblique with respect to said plane.

Said teeth may be of rectilinear outline, as in the embodiments of Figs. 3-4, 7 and 8, of rounded outline as in the embodiment of Figs. 9 and 13, or of any other suitable shape.

Furthermore, the steps formed by the combs may be so arranged as to be juxtaposed without any space between them, as in the embodiments of Figs. 3-4, 7, and 9, or to be spaced apart from one another, as in the embodiment of Fig. 8.

The rows of teeth of the combs may be arranged in such manner that said teeth are in line with one another from one row to the next one, as in the embodiment of Fig. 2, or in such manner that said teeth are in staggered relation to one another, as in the embodiment of Fig. 5.

Furthermore, the portions 5<sup>o</sup> of the edges of

the teeth which correspond to the inlet side of each comb may be given a slightly flaring shape, so as to facilitate the penetration and erection of the hairs, as clearly shown by Fig. 4.

Advantageously, according to the present invention, the various elements of the external combs may be made from a thin steel sheet which is cut, stamped, and folded on itself, forming a double fold between two successive elements, so that the whole may be formed from a single piece which covers the whole of the area of the cutting head.

The vertical ribs 6 formed between the teeth of two successive elements constitute rigid supports for the teeth adjacent thereto and increase the rigidity of the whole, at several points intermediate along the width of the cutting head. The latter can therefore be of smaller thickness and greater area than in the former razors of this kind and it is possible to adopt a number of steps as high as it is desired, which correspondingly increases the number of inlets and outlets for the hairs. Furthermore, as there remains, as a rule, no space between two successive steps (excepting the embodiment of Fig. 8) it is possible to take advantage of the whole width of the cutting head for a satisfactory cutting of the hairs.

When the whole constituted by the external combs is fixed in position, it is freely engaged in housings 7 provided in the upper edges of handle 2 and said whole is maintained by plates 8 applied against the lateral walls of the cutting head. For instance, these plates have each a flange 9 adapted to cover the corresponding edge of the system of external combs. They are connected to handle 2 by means of screws 10 the heads of which are housed in recesses 11 provided in said handle. These plates may be of elastic structure or they may be made of two parts connected together by spring hinges, so as to permit of easily moving them away from the handle and toward it when it is desired to remove or to fit the whole of the external combs.

This system of external combs is caused to cooperate with internal combs, such as 12<sup>1</sup>, 12<sup>2</sup>, 12<sup>3</sup>, etc. which are resiliently pressed against the inner face of the external combs and which are given a reciprocating movement through the medium of lever 3, by the driving means above referred to, and in the following manner.

The inner combs, constituted by independent elements, are disposed in stepped relation to one another, and they include teeth analogous to those of the outer combs, especially concerning their shape.

Each comb element of the inner system is of such form that the transverse section thereof is T shaped (Figs. 3 to 6). The horizontal branch of the T corresponds to teeth 13, which are either continuous (Fig. 2) or provided with a central reinforcing part 14 (Fig. 6). When the teeth are continuous (Fig. 2) they extend over the whole width of the inner comb and their shape is, as a rule (except in the embodiment of Figs. 9 and 13) flat. These comb elements are preferably cut, stamped and formed from thin metal sheet.

Each inner comb element, such as 12<sup>1</sup>, is engaged in an elastic mounting constituted by a metallic blade 15 the lateral edges 15<sup>1</sup> of which are bent upwardly so as to form a housing (Fig. 3) in which the vertical portion of the T is engaged. At each of its ends, each blade 15 is prolonged by an elastic finger 15<sup>2</sup> which rests freely upon an inner edge 16 provided in a recess 17 of

a common supporting piece 18 on which all the inner combs bear through their elastic fingers 15<sup>2</sup>. The inner combs are further maintained and guided by means of lugs 19 (Fig. 1) provided at their opposed ends and which are freely engaged, with a slight play, in notches 20 provided in the upper edges of support 18. Thus the inner combs guided between said notches can move freely and independently in the longitudinal direction, with a small amplitude, with respect to said support, so that they can better adapt themselves against the inner faces of the corresponding outer combs. With such an arrangement, each inner comb is resiliently maintained in contact, by means of independent springs 15<sup>2</sup>, with the corresponding step of the external comb and it can follow the movement of support 18.

I provide in the external face of support 18 a recess 21 in which is fitted the free end of oscillating lever 3, so as to form a kind of ball and socket joint connection, whereby the support in question can be given, with the minimum of friction, a reciprocating movement through said lever. The support 18 is maintained through the medium of rollers 22 freely journaled on spindles 23 housed in a chamber 24 provided in handle 2, said spindles being, for instance, kept in position by screws 25 the heads of which are housed in corresponding recesses of the handle.

On the bottom of cavity 17, provided in support 18, I fix a small plate 26 the edges of which are prolonged as far as the walls of the chamber 24 existing in handle 2 and which prevents the hairs that are cut and collected in chamber 17 from penetrating into chamber 24 and the mechanism which serves to drive support 18.

Close to the cutting head, the handle is provided with projections 27 adapted to prevent the skin from coming into contact with the moving pieces of the cutting head. These projections are also located near chamber 17, in which the hairs that are cut off are collected, whereby the latter can drop freely out from said chamber through the intervals provided between these projections.

With this arrangement, I obtain an electrical or mechanical shaving apparatus for cutting off the hairs in the dry way, which apparatus complies with the conditions above referred to in that the cutting head includes several steps or rows of teeth with a corresponding number of series of inlets and outlets cleared and established at different levels. These steps or rows act all in the same manner on the skin, diagrammatically shown at 28 in Fig. 12, whereas, with prior devices, an example of which is illustrated by Fig. 11, the rows of teeth are all located in the same plane and only the front or first row acts in an efficient manner, as above explained. By means of the shaving apparatus according to the present invention, it is therefore possible to exert the desired or necessary pressure on the different portions of the skin to be shaved, in contact with the cutting head, in such manner as to compel the hairs to straighten and to engage deeply between the teeth of the combs, so as to obtain a closer shaving action.

In a general manner, while I have, in the above description with reference to the drawings, disclosed what I consider to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the

present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

2. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of rectilinear steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

3. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of curvilinear steps staggered along the length of said teeth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

4. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs, said cutting elements being disposed relatively to each other in respective planes parallel to the direction of reciprocal movement of said inner combs.

5. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed posi-

tion and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs, said cutting elements being disposed relatively to each other in respective planes obliquely arranged to the direction of reciprocal movement of said inner combs.

6. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs separated by free intervals adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

7. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, a single support for said inner combs, bended spring means interposed between said support and said inner combs for urging respectively said inner combs against the internal faces of said series of cutting elements of the outer comb, said spring means being in contact, by their extremities, with said support and by their middle part with the respective inner combs so that each inner comb is adapted to oscillate independently, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

8. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, said inner combs having a T-shaped transverse section, an envelope surrounding the vertical branch of said T running along

each of said inner combs, at least one support for said inner combs, the ends of said envelope forming spring finger bearing on said support for oscillatably sustaining each inner comb and for resiliently urging said inner combs against the internal faces of said series of cutting elements of the outer comb, driving means for said inner combs located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

9. A shaving apparatus as claimed in claim 8 comprising guiding means for securing each inner comb in said support with a slight play laterally with regard to the direction of movement of said comb so that each inner comb is adapted to oscillate slightly on said spring finger, laterally and longitudinally, for a closer contact with the inner face of the corresponding series of cutting elements of the outer comb.

10. A shaving apparatus as claimed in claim 1 comprising resilient clipping plates fixed to each handle for connecting said outer comb with said handle.

11. A shaving apparatus as claimed in claim 1 wherein the steps of transverse teeth of the single outer comb are all staggered with respect to one another in the same direction.

12. A shaving apparatus as claimed in claim 1 wherein the steps of transverse teeth of the single outer comb form two groups staggered with respect to one another but in opposite directions for the two groups respectively so as to form a shaving apparatus adapted to be used in two opposite directions respectively.

13. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb carried by said handle in fixed position and comprising non-interrupted transverse teeth extending from one longitudinal edge to the other of said outer comb, each tooth forming a plurality of steps staggered along the length of said tooth, said steps constituting parallel series of cutting elements, inner combs adapted to cooperate respectively with said series of cutting elements and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, a support for said inner combs, spring means interposed between said support and said inner combs for urging said combs respectively against the inner faces of the corresponding series of cutting elements of the outer comb, a cavity provided in said handle under said support, driving means for said support located in said handle, transmission means located in said cavity and adapted to be actuated by said driving means for operating said support, a pair of transverse shafts mounted on said handle and in said cavity on each side of said transmission means, a sleeve freely engaged on each of said shafts and forming a roller bearing for said support during its reciprocal movement.

14. A shaving apparatus as claimed in claim 13 wherein each sleeve is provided at its ends with upright edges in order to retain and to guide said support.

15. A shaving apparatus of the type described which comprises, in combination, a handle, an outer comb, carried by said handle in fixed position and constituted by at least two parallel and adjacent series of transverse cutting teeth, said series being staggered along the whole width of said outer comb and so closely juxtaposed that the teeth of one series begin immediately where the teeth of an adjacent series end, inner combs adapted to cooperate respectively with said series

of cutting teeth and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs, located in said handle and transmission means adapted to be actuated by said driving means for operating said inner combs.

16. A shaving apparatus of the type described comprising in combination, a handle, an outer comb carried by said handle in fixed position and constituted by at least two adjacent rows of flat cutting teeth, said teeth being parallel to each other and perpendicular to the longitudinal sides of the comb, the teeth of each row being staggered with respect to those of the adjacent row and so closely juxtaposed to the same that the teeth of one row begin immediately where the teeth of an adjacent row end, inner combs adapted to cooperate respectively with said rows of cutting teeth and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle, and transmission means adapted to be actuated by said driving means for operating said inner combs.

17. A shaving apparatus of the type described comprising, in combination, a handle, an outer comb carried by said handle in fixed position and constituted by at least two adjacent rows of curved cutting teeth, said teeth being parallel to each other and perpendicular to the longitudinal sides of the comb, the teeth of each row being

staggered with respect to those of the adjacent row and so closely juxtaposed to the same that the teeth of one row begin immediately where the teeth of an adjacent row end, inner combs adapted to cooperate respectively with said rows of cutting teeth and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs located in said handle, and transmission means adapted to be actuated by said driving means for operating said inner combs.

18. A shaving apparatus of the type described comprising, in combination, a handle, an outer comb carried by said handle in fixed position and constituted by at least two adjacent rows of slanting cutting teeth, said teeth being parallel to each other and perpendicular to the longitudinal sides of the comb, the teeth of each row being staggered with respect to those of the adjacent row and so closely juxtaposed to the same that the teeth of one row begin immediately where the teeth of an adjacent row end, inner combs adapted to cooperate respectively with said rows of cutting teeth and to reciprocate in contact therewith in a direction perpendicular to that of said teeth, driving means for said inner combs, located in said handle, and transmission means adapted to be actuated by said driving means for operating said inner combs.

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