

The present invention relates to small depilating devices which can be held in the hand for carrying out the elimination of superfluous hairs.

French Patent N° 2 334 320 describes a device of this
5 kind wherein there is provided a rotary roller intended for pulling out the hairs to be eliminated. This roller is constituted by an helical spring, the windings of which are alternatively spread apart and tightened, so that hairs may become engaged between these windings while the windings are
10 spread apart, in order to be subsequently pinched between the windings and pulled out as a result of the rotation of the roller about its axis.

However, the effectiveness of this apparatus is limited. This is essentially due to the fact that the
15 hairs to be pulled out find it difficult to become engaged between the windings of the rotary spring, due to the helical conformation thereof. Moreover, again due to this configuration of the windings, the hairs become displaced

transversely by the windings during the rotation of the pulling-out roller. Now, this has the consequence that the engagement of the tips of the hairs between the windings of the spring is hindered.

5 On another hand, EP-A-147 285 describes a depilating apparatus comprising a rotary depilating roller formed of a series of pulling disks placed side-by-side and between which are provided movable pinching blades, one such blade being placed between two adjacent disks. The arrangement is such that, once during each turn of rotation, these
10 blades will pinch against one of the adjacent disks the hairs which have become engaged between the disks. Due to the fact that the rotary pulling members consist of disks having a continuous circular outline, the skin is prevented
15 from engaging itself inside the rotary roller, which avoids the risks of injuries. However, this solution does not facilitate the engagement of the hairs between the disks of the rotary roller.

 In a completely different field of the art, there
20 exist devices designed for plucking feathers from fowls, which also comprise a rotary plucking roller. Thus, FR 1 140 548 describes a device of this kind in which the rotary roller is formed of plucking disks which swivel towards each other for directly pinching between them the
25 feathers to be plucked. If, however, such a solution were to be transposed to the field of depilating devices, some difficulty would be found for the engagement of the hairs of human skin, since these are very thin and extremely flexible, contrarily to fowl feathers.

30 Also in the field of fowl plucking, FR 667 265 describes an apparatus wherein the rotary plucking drum carries on its periphery several rows of jaws which are devised for alternatively opening and closing in order to allow at first the stems of the feathers which are to be

plucked to become engaged between these jaws, and then to cause them to be pinched by the jaws. This roller is disposed at some distance over a comb intended for sliding along the surface of the skin of the fowl to be plucked, so that the stems of the feathers will then become engaged between the teeth of this comb for being subsequently gripped by the jaws of the rotary drum. This comb holds the skin back while feathers are being plucked, since the plucking action requires a relatively large pulling effort. Also, this comb is at the same time protecting the fowl skin from contacting the pinching jaws which protrude from the rotary drum. Moreover, if such a comb did not exist, these jaws would hit the skin, causing extremely deep wounds.

Taking into account the fact that the pinching jaws are disposed substantially along planes perpendicular to the rotary drum axis, the engagement of the stems of the feathers to be plucked takes place in favorable conditions. However, for depilating superfluous hairs present on a person's skin, it is not possible to use a device similar to the above-mentioned fowl plucking apparatus, owing to a certain number of reasons. The first reason lies in the fact that the comb provided over the rotary drum would need to be eliminated since it causes a too wide spacing between this drum and the skin, which would not allow the gripping of hairs having a much shorter length than feather stems. However, if this comb were suppressed, there would then be no protection whatever of the skin against the pinching jaws carried on the rotary drum. Now, since these jaws are protruding beyond the periphery of this drum, they would then hit the skin, causing extremely deep wounds.

This is why the present invention has for its object a depilating apparatus which is designed at the same time for achieving an effective engagement and pinching of the hairs between the pulling-out members and for providing a full protection of the skin against every risk of wounds

which might be caused by the passage of the pulling-out members against the skin.

For pulling out the hairs to be eliminated, this apparatus comprises a rotary drum carrying one or several rows of pinching members disposed saliently about the periphery of this drum and extending in parallel with the drum axis. This apparatus is characterized in that there are provided in the recessed intervals existing at the drum periphery, or in registry therewith between the different rows of pinching members, skin protecting blades presenting a circular external outline, the center of which coincides with the rotary drum axis, these blades being disposed in planes perpendicular to the rotary drum axis and being distributed along the whole length thereof, so as to constitute a kind of virtual protecting cylinder on the periphery of the depilating roller formed by this rotary drum and the pinching jaws carried thereon.

The present apparatus will thus make it possible to achieve an excellent protection of the skin against any risk of wounds, while presenting a maximum efficiency for gripping the hairs between the pinching members carried by the rotary drum.

In one advantageous embodiment, the depilator apparatus according to this invention comprises, for pulling out the hairs to be eliminated, a rotary drum carrying blades disposed transversely of the rotary drum axis and distributed over the whole length thereof, and thin pinching strips located between these blades and adapted for pinching the hairs against these blades.

This embodiment is characterized in that :

- the transversal blades are designed for constituting protection blades by achieving a kind of protection cylinder at the periphery of the rotary drum;

- these transversal blades present on their periphery indentations or discontinuities adapted for facilitating the combing of the hairs to be pinched.

Further advantages and features of the present apparatus will appear from the following description of a few examples of embodiments thereof. This description is given with reference to the drawings which are appended by way of indication only, and in which :

- Figure 1 is a diagrammatic perspective view of a depilator apparatus according to the invention;
- Figure 2 is a diagrammatic cross-section view of the depilator roller provided in this apparatus;
- Figure 3 is a similar view illustrating the operating conditions of a similar roller which would be lacking the protection blades existing in this roller;
- Figure 4 is a diagrammatic view in axial cross-section of the depilator roller provided in the present apparatus;
- Figures 5 and 6 are cross-sectional views, respectively along lines V-V and VI-VI of Figure 4;
- Figure 7 is a view similar to Figure 5, which illustrates another embodiment of the depilator roller;
- Figure 8 is a partial corresponding view, in axial cross-section;
- Figures 9 - 11 are diagrammatic views in axial cross-section, illustrating further possible embodiments of the depilating roller.

The apparatus shown in Figures 1 - 6 comprises a small housing 1 which may be held in the hand. On one of its ends, this housing carries a rotary depilating roller denoted by the general reference 2. This roller protrudes through an aperture 3 formed in the corresponding end of the housing. This roller can thus be moved in contact with the skin S of

a person for pulling out the superfluous hairs P present on the skin.

This depilating roller comprises a drum 6 carried on a rotary shaft 4 driven in rotation by a small electric motor 5 accommodated within the housing 1. This drum carries several rows of pinching jaws which protrude from its periphery and extend parallel to the axis of this drum. For simplifying the drawing, Figures 4 - 6 show only two rows 7 of such jaws. These jaws consist of flat strips 8a and 8b made of metal or any other suitable material, which are disposed in planes perpendicular to the axis of drum 6, while being offset in the axial direction, the ones relatively to the others. At their base, these strips are fixed, by interlocking or some other means, on two separate actuating rods 10a and 10b. These strips are grouped in pairs of two strips 8a and 8b which are intended to become periodically squeezed against each other, all the strips 8a being fixed on the same actuating rod 10a, while all the strips 8b are fixed on the other rod 10b. The ends of these rods are disposed in registry with fixed cams 11a and 11b which are intended for actuating them for alternatively causing the pinching and the spreading apart of the strips 8a, 8b during the rotation of the depilating roller.

In accordance with the essential characteristic of the apparatus of the present invention, this roller comprises a series of protection blades provided for preventing any contact of the pinching jaws with the skin, and therefore any risk of injury to the skin. These protection blades are devised and disposed in such manner as to constitute some kind of virtual cylinder around the peripheral surface of the rotary depilating roller formed by the drum 6 and the pinching jaws, the cross-section of this virtual cylinder corresponding to the circle circumscribing the pinching jaws 8a and 8b. These jaws may advantageously have a circular external outline with the same curvature, at least in part,

in such manner as to be flush with the surface of the virtual cylinder thus constituted. However, the external edge of these jaws may also be slightly retracted under the surface of this virtual cylinder.

- 5 In the example represented in Figures 1 - 6, there is provided a series of protection blades 12, each one of which has the shape of a flat washer having a circular external contour which corresponds to the curvature of the virtual protecting cylinder which is to be constituted.
- 10 These blades are grouped in pairs in which they are disposed in opposite directions, as shown in Figures 5 and 6, for constituting some kind of disk with a continuous external contour located in a plane perpendicular to the axis X-Y of the depilating roller. These blades are fixed on
- 15 the periphery of drum 6 by means of small lugs 13 or similar members engaged in recesses provided on the periphery of this drum.

- The various pairs of protection blades 12 are offset in the axial direction in respect of the position of the
- 20 pinching strips 8a and 8b. As shown in Figure 4, there may be provided one pair of such protection blades between two successive pairs of pinching jaws 8a and 8b. Owing to their disposition, the disks constituted by the blades 12 are located in registry with the recessed intervals present
- 25 between the two rows 7 of pinching jaws 8a, 8b. Since such blades are provided along the full length of the depilating roller, they form, around the roller, a kind of virtual cylinder intended for being brought into contact with the skin and adapted for preventing any penetration of the skin
- 30 inside the depilating roller. This will therefore avoid any risk of pinching or hurting the skin by the pinching jaws 8a and 8b during their rotation.

The effectiveness of this protection will appear very clearly from Figures 5 and 6, as well as from Figures 2 and 3. As it appears from Figures 5 and 6, the depilating roller may be brought into direct contact with the skin S without any risk. In this case, the protection blades 12 come into contact with the skin and will thus prevent the skin to become engaged into the intervals existing on the periphery of the drum 6 between two successive rows 7 of pinching jaws 8a and 8b. Now, if such protection blades 12 did not exist, there would be encountered the situation illustrated in Figure 3, in which the depilating roller would be constituted by a rotary drum 16 carrying several rows 17 of pinching jaws protruding from its periphery. Now, in such a case, these salient jaws would hit against the skin and would cut gashes therein. On the contrary, no such thing will happen with the depilating roller of the apparatus of the present invention. In fact, even if this roller comprises a large number of rows 17 of pinching jaws, as shown in the example illustrated in Figure 2, the protection of the skin is ensured by the previously described blades 12. As a result of this perfect protection, it is possible to omit every kind of grid or other intermediary protection element. Therefore, the pinching jaws may be placed in direct proximity to the skin, which enhances the effectiveness of the present apparatus.

The protection afforded by the blades 12 makes it possible to avoid any risk of pinching moles or beauty spots, or of pinching delicate skins and risking to pull them along. These blades 12 have a further advantage of protecting the skin against the impact of the pinching jaws during the rotation of the assembly. In fact, it is essential to avoid the skin being injured or pinched, or just merely irritated, during the high-speed passage of the pinching jaws, while the user is pressing the apparatus against the skin for achieving a better efficiency.

Taking into account the axial offset of these blades with respect to the pinching jaws, the protection blades 12 allow an empty interval to remain between two successive rows 7 of such jaws. Thus, the hairs P which are in a way
5 being combed by the protection blades 12 are driven into the empty intervals existing between two successive rows 7 of pinching jaws. As a result, these hairs will very easily become engaged between these jaws so that they will then be pinched and pulled out. This ensures therefore a very great
10 effectiveness of the present apparatus.

Concerning the engagement of the hairs between the pinching blades, it should be noted that this engagement is largely facilitated when the protection blades are constituted by disks provided with serrations, or else by spaced
15 apart circular sectors. In fact, the existence of serrations or intervals at the periphery of the virtual protection roller makes it possible to avoid the application thereof against the skin having merely the effect of flattening the hairs along the skin, as would be the case with
20 a roller formed of circular disks having no discontinuity at their periphery. In the present case, the hairs may spring up at the moment of passage of a discontinuity of the periphery of the roller and will then be combed by the protection blades, thereby ensuring their orientation in
25 the required direction for their pinching by the pinching blades.

The protection blades provided in the depilating roller of the present device may be disposed in many other different ways, as long as these blades are distributed in
30 sufficient number along the whole length of the depilating roller and over its whole periphery, over 360°.

Thus, Figures 7 and 8 illustrate an embodiment in which there is also provided a succession of protection blades 12a and 12b having the shape of arches or of circular

half-disks. However, these blades are not distributed in groups of two blades disposed facing each other for forming a complete circular disk, as it was in the case in the previous example. In fact, in the embodiment shown in
5 Figures 7 and 8, the opposed blades 12a and 12b are offset in the axial direction. Nevertheless, taking into account the number of these blades along the full length of the depilating roller, there is achieved, as previously, some kind of virtual protection cylinder.

10 In the embodiment shown in Figures 7 and 8, the design of the depilating roller presents a certain number of further differences. Thus, the protection blades 12a and 12b are fixed, by means of small lugs 13a or similar members, to an intermediary sleeve 18 surrounding a drum
15 19 which carries the pinching jaws 8a and 8b and the driving rods 10a and 10b actuating these jaws. On another hand, the number of rows of pinching jaws is larger than in the previous case. Here again, however, the number of these rows and the disposition of the protection blades
20 could be different.

Thus, instead of having the shape of circular half-disks or of arches, the protection blades may present the shape of sectors of a circle. However, these blades could also be formed of spaced apart circular segments being
25 however angularly offset from one to the next for forming a virtual protection cylinder around the pinching jaws.

Eventually, such circular segments may be disposed in the median plane of the pinching jaws in one same pair for filling, at least partly, the interval existing between
30 the different rows of pinching jaws. In this case, there would therefore be no axial offset of the protection blades with respect of the pinching jaws.

Figures 9 - 11 illustrate very diagrammatically several other possible arrangements of protection blades 12b, 12c and 12d between pinching jaws, respectively 8b, 8c and 8d. In the examples being thus illustrated, the protection blades are formed of circular segments which occupy only a part of the circumference of the depilating roller. However, these segments are offset, both axially and angularly, so as to form a kind of virtual protection cylinder at the periphery of the depilating roller.

In these several examples, the protection blades being provided are united in rotation with the drum 6b, 6c or 6d carrying the pinching jaws. However, it would also be possible to provide protection blades having a fixed position and which would then be held on a fixed support, being obviously provided that the arrangement would allow the rotation of the depilating roller and the pinching and opening motions of the pinching jaws. Eventually, the set of protection blades would be bound up with a support being mounted so as to be movable in translation, parallel with the rotation axis of the drum carrying the pinching blades. This movable support would then be driven in a reciprocating movement of translation for enabling the protection blades to sweep across the space in which the skin might become engaged between the pinching jaws. Such a protection set might also be mounted so as to be floating in translation while being subjected to the action of one or several retaining springs.

Eventually, some of the protection blades, or all of them, might be replaced by rows of semi-stiff fingers disposed in perpendicular planes with respect to the rotation axis of the drum carrying the pinching blades.

The pinching blades may also be provided in a different manner. Instead of being fixed by interlocking or by some other means on their actuating rods 10a, 10b,

these jaws could be mounted for pivoting about their base on the drum 6 which serves as their support, while the actuating rods 10a and 10b are coupled with these jaws so as to rock them alternatively from one side to the other for closing together their pinching tips or for spreading them apart.

Otherwise, instead of providing pinching jaws formed of pairs of strips disposed in several rows at the periphery of a rotating drum, it would be possible to provide these jaws in the form of disks having at their periphery a series of salient lugs forming pinching jaws. Suitable actuating means would then be provided for alternatively rocking these disks from side to side for squeezing together or for spreading apart their pinching jaws. However, there would also exist, as in all the previous cases, protection blades having a circular external contour occupying the intervals between the different pinching jaws, in order to constitute a virtual skin-protecting cylinder for avoiding any risk of pinching or injuring the skin.

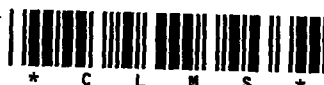
CLAIMS

1. A depilating apparatus comprising, for pulling-out hairs to be eliminated, a rotary drum (6) carrying one or several rows of pinching members (8a, 8b, 8c, 8d, 8e) arranged on the periphery of said drum and extending at
5 right angles to the axis thereof, c h a r a c t e r i z e d in that there are provided in the intervals existing at the periphery of the rotary drum (6) or in registry therewith, between the different rows of pinching members (8a, 8b, 8c, 8d, 8e), skin protecting blades (12, 12a, 12b, 12c, 12d, 12e)
10 presenting an external outline which is at least partly circular, and the center of which coincides with the axis of the rotary drum (6), said blades being disposed in planes perpendicular to the axis of the rotary drum and distributed over the whole length thereof, so as to constitute a kind of
15 virtual protecting cylinder on the periphery of the depilating roller (2) formed by the said rotary drum (6) and the pinching jaws carried thereon.

2. A depilating apparatus comprising, for pulling out hairs to be eliminated, a rotary drum (6) carrying blades
20 (12, 12a, 12b, 12c, 12d, 12e) disposed transversely of the rotary drum (6) axis and distributed over the whole length thereof, and thin pinching strips (8a, 8b, 8c, 8d, 8e) located between said blades and adapted for pinching the hairs against said blades, c h a r a c t e r i z e d in
25 that :

- the transversal blades (12, 12a, 12b, 12c, 12d, 12e) are arranged for constituting protecting blades by forming a sort of protecting cylinder at the periphery of the rotary drum (6),
- 30 - these transversal blades (12, 12a, 12b, 12c, 12d, 12e) present on their periphery indentations or discontinuities adapted for facilitating the combing of the hairs to be pinched.

.../...



* C L M S *

3. A depilating apparatus according to Claim 1 or 2, characterized in that the protection blades are constituted by flat half-discs (12) grouped in pairs while being disposed in registry with each other for forming discs with a continuous external outline, the positions of said discs being offset axially relatively to the pinching members (8a, 8b) in such manner that each disc will be placed between two successive members of a same row.
4. A depilating apparatus according to Claim 1 or 2, characterized in that the protection blades are constituted by portions of discs (12a, 12b) angularly offset from each other and disposed in planes which are offset relatively to the pinching members (8a, 8b, 8c, 8d, 8e) of the different rows, these portions of discs (12a, 12b) being simultaneously distributed over the whole length of the depilating roller (2) and over its whole periphery.
5. A depilating apparatus according to Claim 1 or 2, characterized in that the protection blades are constituted by circular segments, each one of which is disposed in the median plane of a pair of pinching members (8a, 8b, 8c, 8d, 8e) and in that each one of these segments occupies at least a part of the interval existing from one row to the next of such pinching members on the rotary drum (6).
6. A depilating apparatus according to Claim 1 or 2, characterized in that the protection blades are constituted by circular segments fixed by means of a fixed support and which are axially offset relatively to the pinching members carried by the rotary drum.
7. A depilating apparatus according to Claim 1, characterized in that the pinching members are constituted by tongues provided so as to project beyond the periphery of parallel discs forming the rotary drum of the depilating roller.

.../...



* C L M S *

8. A depilating apparatus according to Claim 1 and one of Claims 3 to 7, characterized in that the protection blades present on their periphery indentations or discontinuities adapted for facilitating the combing of the hairs to be
5 pinched.

9. A depilating apparatus according to one of the previous Claims, characterized in that the protection blades are bound up with a support which is movable in translation along a parallel to the rotation axis of the drum carrying
10 the pinching members, and in that the arrangement is such that this movable support is driven in a reciprocating motion which allows the protection blades to sweep across the space which exists between some of the pinching members.



* C L M S *