

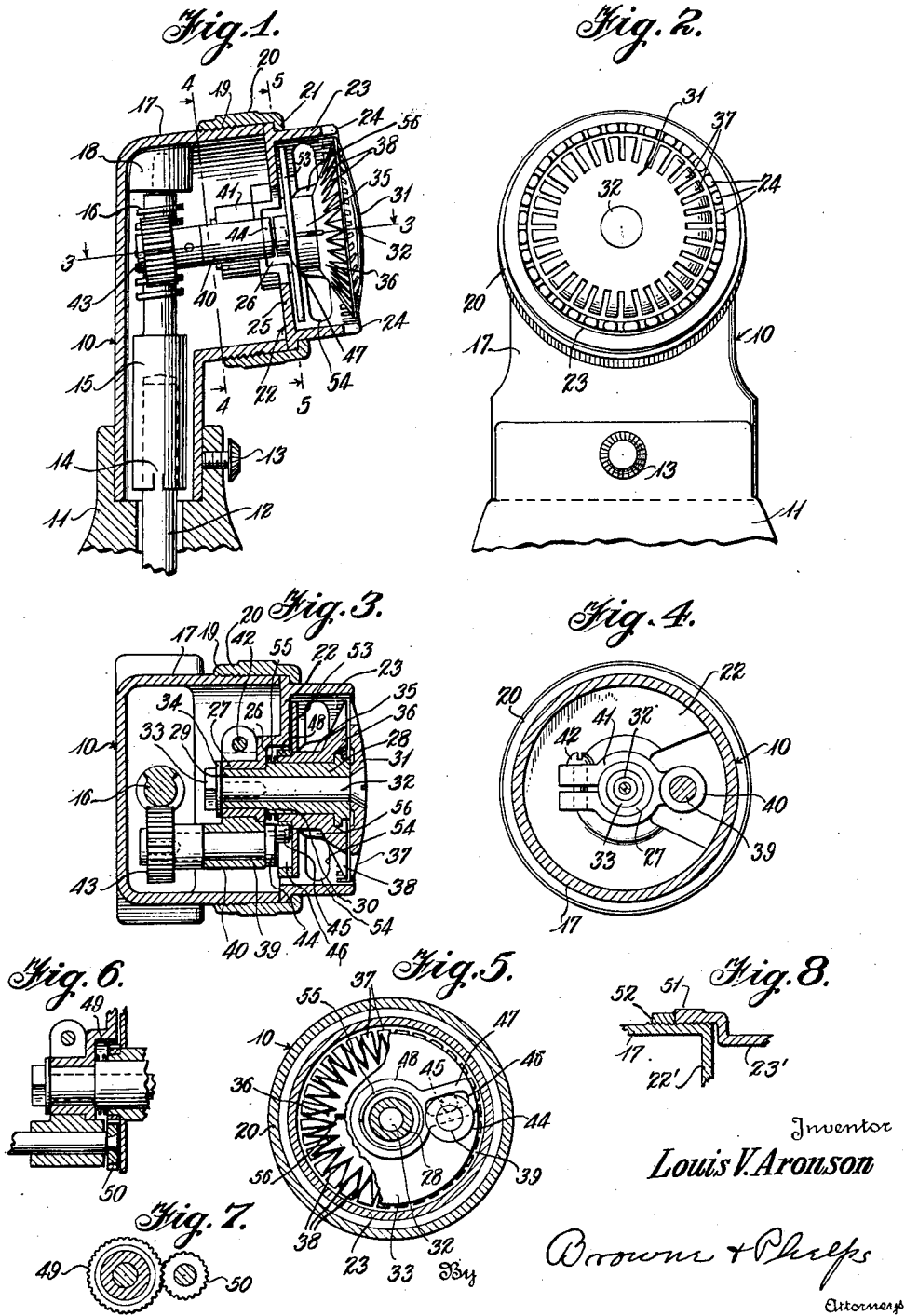
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ELECTRIC SHAVING DEVICE

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ELECTRIC SHAVING DEVICE

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8 Claims. (Cl. 30—43)

The invention relates to electric shaving devices of the type usable without lather and has as an object the provision of a device of this character that will give an exceptionally close shave.

It is a further object of the invention to provide a device of this character that can be moved in any direction relative to the cutting element upon the face of the user.

It is a further object of the invention to provide a device that will provide a desirable massaging effect in use.

It is a further object of the invention to provide a device of this character having an especially convenient angle with the handle provided without the use of universal joints in the drive shaft.

It is a further object of the invention to provide a device of this character that may be driven with an oscillatory motion or with a pure rotary motion by a slight change in mechanism.

It is a further object of the invention to provide a device of this character which is very easily cleaned, having ample escape for clipped hairs.

It is a further object of the invention to provide a shaver which may be adjusted for closeness of shave.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawing showing illustrative embodiments of the invention, and wherein:

Figure 1 is a central vertical section through the head of the shaving device;

Fig. 2 is a view from the right of Figure 1;

Figs. 3, 4, and 5 are sections on the corresponding section lines of Figure 1;

Fig. 6 is a detail section on line 3—3 of Fig. 1 showing a different form of the invention;

Fig. 7 is a detail section on line 5—5 of Fig. 1 showing the form of Figure 6;

Fig. 8 is a detail section corresponding to a portion of Figure 3 showing a still further form of a detail of the mechanism.

As shown the invention is embodied in the head 10 of a shaving device shown as removably supported by a handle 11, which handle in accordance with the usual practice, houses a motor, not shown, driving a motor shaft 12.

The head 10 may be retained in the handle 11 by means of a set screw 13 in accordance with the usual practice. Having telescopic connection with the motor shaft 12 and driven by pin 14 from said shaft, there is shown an extension shaft 15 formed with a drive worm 16.

The head 10 is shown as formed with a ring

member 17 carrying a bearing 18 for the end of the shaft 15 and screwthreaded as at 19 at its periphery for engagement with a ring 20 having an annular inwardly extending flange 21 to retain a shell 22 in engagement with the edge of the ring 17.

The shell 22 is shown as formed with an upstanding ring 23 terminating in guard posts 24. A portion of the shell 22 is also in the form of a diaphragm 25 having a recessed portion 26 and an inwardly open sleeve portion 27. A hollow stud 28 is shown having a reduced portion 29 standing within the sleeve portion 27 and a shoulder 30 seating upon the bottom of the recess 26. Retained upon the head of the stud 28, there is shown a shear plate 31 held by means of a cap screw 32 screwthreaded at its lower end for reception of a nut 33, a washer 34 being desirably provided to take the friction of rotation of the nut 33. Revolvably engaging the exterior of the hollow stud 28, there is shown a sleeve portion 35 of the cutter 36.

The shear plate 31 is shown as formed with teeth 37 upon its edge and the cutter member 36 with coating teeth 38. To provide for a shearing cut as distinguished from a pure nipping action, the teeth 37 are formed by radial slots and the teeth 38 by cuts parallel with tangents to the circle of the cutter edge, producing the sharp angles between the coating cutting edges indicated in Figure 5. The slots between the teeth 37 are shown in alignment with the spaces between the guard posts 24.

To drive the cutter 36 there is shown a drive shaft 39 mounted in a sleeve 40 carried by a split ring 41 clamped by means of a screw 42 upon the exterior of the sleeve portion 27 of the shell 22. The drive shaft 39 has pinned thereto a drive pinion 43 in mesh with the worm 16, the remaining end of the shaft 39 carrying a disk 44 eccentrically mounted upon which is a roller 45 working in a slot 46 carried by an arm 47 mounted upon a ring 48 fixed rigidly upon the sleeve 35.

As the pinion 43 is revolved carrying with it the shaft 39 and the eccentric roller 45, an oscillatory motion will be imparted to the cutter 36. It is obvious that the ring 48 may have substituted therefor a ring gear 49, Figures 6 and 7, and that in place of the disk 44 and roller 45, a pinion 50, Figures 6 and 7, may be substituted whereupon the cutter 36 will be driven by a pure rotary motion instead of by an oscillatory motion.

As shown in Figure 8, the portion 22' of the shell may be made integral with the ring 17 and the ring 23' engage the screwthreads upon mem-

ber 17, in which case a lock ring 52 is provided and with this structure the guard posts 24 may be adjusted for height relative to the teeth 37, 38 whereby the closeness of shave secured by the device may be readily varied.

To prevent dust and clippings gaining access to the mechanism, a shield disk 53 is shown as secured to ring 48 and arm 47. Openings 54 in ring 23 permit escape of clippings which may be expelled by blowing into the openings at one side.

The movable cutter plate 36 is formed with a recess at which it bears upon the flange of hollow stud 28. To press the cutter plate toward the shear plate and against said flange a spring 55 is shown. Desirably the shear and cutter plates are maintained out of actual contact, being separated less than the thickness of a hair. By this structure all wear will come upon the recess in the cutter plate and the flange of stud 28.

Since the teeth project in all directions in the preferred form of the invention, the cutter head may be moved in any direction. A circular motion in contact with the skin is found very effective and affords a desirable massaging effect.

The fact that the teeth upon the cutter plate are triangular and the sides of the teeth on the shear plate are radial provides a slight angle between the coacting cutting edges, giving a scissors action combined with a sliding cut found to be very effective.

The oscillatory form of the device divides the wear between the oppositely facing edges of the teeth. The rotary form may be driven at a higher rate of speed and should be more quiet in operation.

If desired radially projecting fins 56 may be provided on the periphery of sleeve 35 to provide a fan action to expel severed portions of the beard or hair through the openings 54. In the absence of such fins collected hairs may be readily blown out of said openings by the breath of the user.

Minor changes may be made in the physical embodiments of the invention within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. A shaving device comprising, in combination: a cutter head; a drive shaft projecting thereinto; a worm gear carried by said shaft; a countershaft mounted in said head; a pinion on said countershaft having teeth parallel with its axis and in mesh with the thread of said worm gear, whereby the axis of the countershaft is at an angle other than 90° to the axis of said drive shaft; a circular shear plate mounted on said cutter head formed with radially projecting peripheral teeth; a circular cutter plate formed with peripheral teeth underlying said first named teeth; and means to drive said cutter plate about its axis by revolution of said countershaft.

2. A shaving device comprising, in combination: a circular disk-like shear plate; means to rigidly support said plate at its central portion; said plate formed with radially projecting peripheral teeth; a cutter plate disk formed with radially projecting peripheral teeth underlying the first named teeth; means to cause movement

of said cutter plate about its axis; a ring enclosing said cutter plate and formed with spaced guard posts projecting parallel with the axis of said plates beyond the plane of coaction of the said teeth; and means to adjust said ring axially to vary the closeness of shave resulting from coaction of said teeth.

3. A shaving device comprising, in combination: a hollow casing; a supporting member spanning the interior thereof; a support rigid with said member; a circular shear plate secured upon said support; a cutter plate; a sleeve surrounding said support and secured to said cutter plate; a drive shaft projecting into said casing with its axis coplanar with the axis of said sleeve; a countershaft journaled in said casing with its axis offset from said common plane; means to drive said countershaft from said driveshaft; and means to drive said sleeve from said countershaft.

4. The combination of claim 2 with said ring provided with openings for escape of severed hairs.

5. The combination of claim 2 with said ring provided with openings; and with a sleeve supporting and driving said cutter plates with fan blades carried by the periphery of said sleeve.

6. A shaving device comprising, in combination: a cutter head casing; a drive shaft projecting thereinto; a disk spanning the interior of the casing; a bushing penetrating said disk and formed with a shoulder abutting the disk; a stationary cutter plate having teeth on its periphery; a rod passing through said plate and bushing; screw means acting through said rod and plate to bind said shoulder against said disk; a sleeve revoluble about said bushing carrying a cutter plate having teeth underlying said first named teeth; and means to drive said sleeve from said drive shaft.

7. The combination of claim 6 with said revoluble cutter plate formed with a recess; said bushing with a shoulder abutting the bottom of said recess to hold the cutter plates from actual contact; and with spring means to urge the cutter plates toward mutual contact.

8. A shaving device comprising, in combination: a cutter head casing formed with a hollow cylindrical portion; a disk spanning said portion and formed with a central recess having a collar projecting therefrom; a bushing having a reduced portion extending into said collar providing a shoulder seating in said recess; a headed rod extending through said bushing; a stationary cutter plate mounted on said rod; screw means to clamp said cutter plate through said rod and bushing to said collar; a sleeve revoluble on said bushing; a cutter plate carried by said sleeve underlying said stationary cutter plate; a shaft bearing clamped upon the exterior of said collar; a countershaft mounted in said bearing with its axis parallel with the axis of said rod; means to drive said sleeve from said countershaft; a drive shaft projecting into said casing at an angle to said countershaft; and means to drive said countershaft from said drive shaft.

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