May 27, 1952 F. P. BLAIR 2,598,212

ROTARY SHEAR

Filed April 26, 1949

FIG. 1

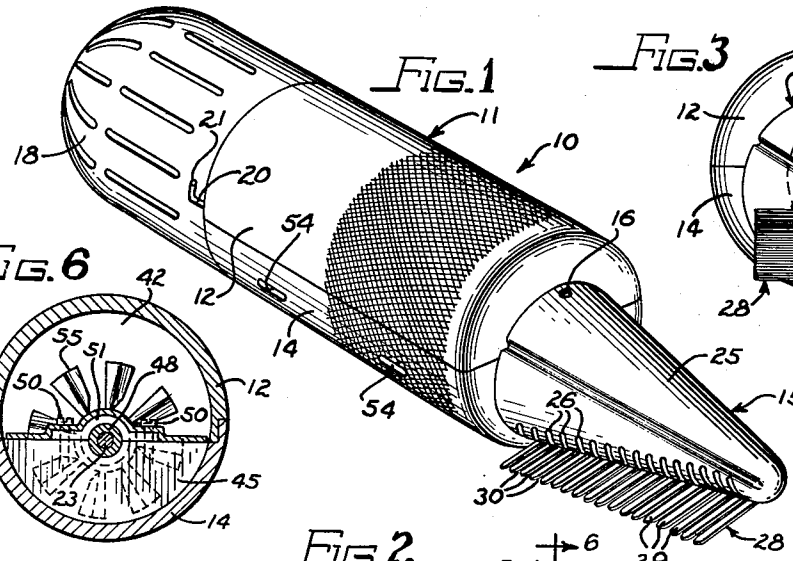


FIG. 3

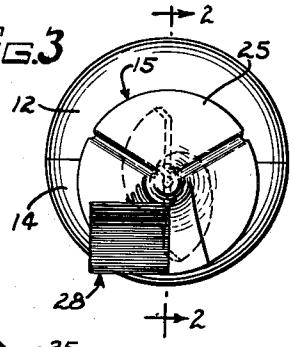


FIG. 6

FIG. 2

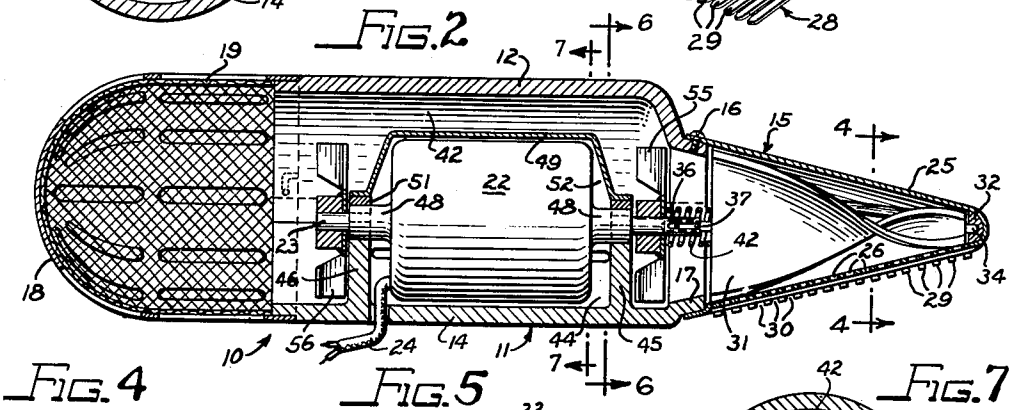


FIG. 4

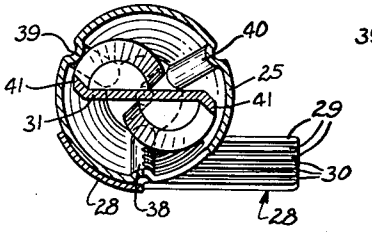


FIG. 5

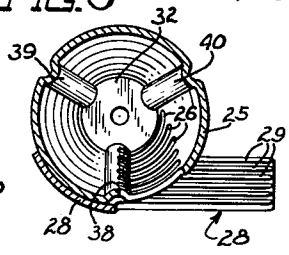


FIG. 7

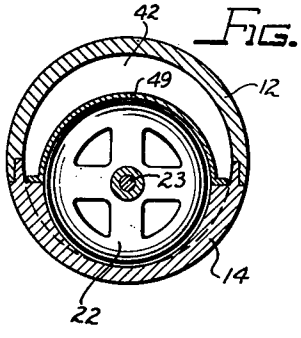
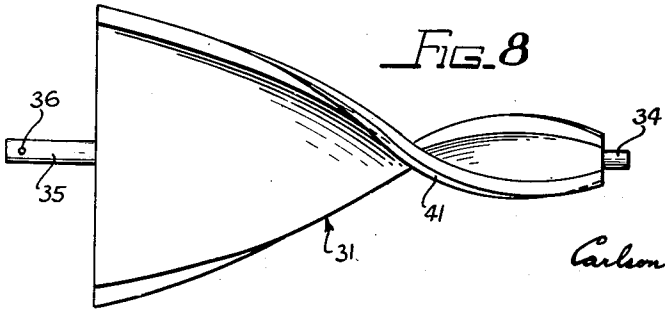


FIG. 8



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ROTARY SHEAR

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6 Claims. (Cl. 30—133)

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The present invention relates generally to a power operated instrument for tonsorial use and more specifically to a novel rotary shear which finds particular utility as a hair trimming device.

One of the objects of the invention is to provide an improved rotary shear capable of operating efficiently at high speed without producing excessive wear on the moving parts and without overheating.

Another object is to furnish a device of the foregoing type which will be capable of providing reliable service over a long period of time without the necessity for resharpening or other maintenance.

A further object is to provide a rotary shear of the above character which will be compact, light in weight, economical to manufacture, and comfortable to use.

Other objects and advantages will become apparent as the following detailed description proceeds, taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of an illustrative rotary shear embodying the present invention.

Fig. 2 is an enlarged vertical sectional view taken longitudinally through the device of Fig. 1.

Fig. 3 is an end view of the device as shown in Fig. 2.

Fig. 4 is an enlarged transverse sectional view through the device of Fig. 2 and taken in the plane of the line 4—4.

Fig. 5 is a view similar to Fig. 4 but with the movable cutter member removed.

Figs. 6 and 7 are transverse sectional views through the device as shown in Fig. 2 and taken in the planes of the lines 6—6 and 7—7, respectively.

Fig. 8 is an enlarged elevational view detailing the movable cutter member.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment has been shown in the drawings and will be described below in considerable detail. It should be understood, however, that there is no intention to limit the invention to the specific form disclosed, but on the contrary, the intention is to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more specifically to the drawings, the invention is there embodied in the form of an illustrative hair trimming instrument 10. The latter is organized upon a hollow body casing 11 of general cylindrical shape, being formed in

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the present instance in two complementary longitudinal sections 12, 14. At one end of the casing 11, there is mounted a cutting head 15 which is detachably secured as by screws 16 to an annular boss 17 integral with the casing. The opposite end of the casing terminates in a dome-shaped basket 18 which is adapted to receive and collect the hair trimmings severed by the cutting head 15. The basket 18 is formed with a number of circumferentially spaced vent slots each screened with a mesh 19 of wire, cloth, or other appropriate material. Fastening means for detachably securing the basket 18 to the casing is provided in the form of one or more bayonet slots 20 and coacting pins 21. Motive power for the illustrative shear 10 is derived from an electric motor 22 housed within the casing 11 and having a drive shaft 23 with axially extending end portions. The motor 22 may be connected to an appropriate power supply through an ordinary electric cord 24.

The improved shear 10 is constructed so as to perform efficiently while being held in cutting positions which are comfortable for the operator. This is accomplished by the two-fold expedient of tapering the cutting head 15 and by mounting the same with its base in approximate tangency with the outer periphery of the casing 11. This permits the surface of the cutting head 15 to be brought close to the scalp without interference from the marginal overlap of the end of the casing 11. Turning to Figs. 1 to 3, inclusive, it will be noted that the cutting head 15 comprises an outer or stationary cutter member 25 of general frusto-conical shape and preferably made of high grade steel. The member 25 also has formed therein a series of aligned and spaced apart slots 26 adapted to receive the ends of the hairs to be severed. To facilitate the entry of such hairs into the slots 26, a comb 28 is operatively associated with the stationary cutter member 25. The comb 28 is fixed to the stationary member 25 with its teeth 29 in substantially tangential relation therewith. By the same token, the spaces 30 between the teeth 29 register substantially with the slots 26 and thus channel the hairs into the latter as the shear 10 is moved over the scalp.

Rotatably mounted within the stationary cutter member 25 and adapted to coact therewith is a movable cutter member 31 (Figs. 2 to 4). The stationary member 25 may have mounted at its tip an appropriate guide bearing 32 for rotatably receiving an axially projecting boss 34 fixed to the smaller end of the movable cutter member 31. At

its larger end, the member 31 is provided in the present instance with a stub shaft 35 which may be drivingly connected to the motor shaft 22 in any suitable manner as, for example, by means of a pin and slot arrangement 36, 37.

Means is provided for minimizing the power required to actuate the cutting head 15 while maintaining a high degree of cutting efficiency. This is accomplished by constructing both cutter members 25, 31, in a manner which permits progressive severing of the hairs projecting into the stationary cutter and relative movement between the latter and the movable cutter with a minimum of friction. Considering first the stationary cutter member 25, it will be perceived upon reference to Figs. 4 and 5 that the member 25 is fashioned with a plurality of longitudinal ribs 38, 39, 40, arranged in circumferentially spaced relation around its inner peripheral surface. These ribs may comprise separate strips of metal secured within the cutter member 25 as by spot welding, or, on the other hand, may simply be defined by longitudinal embossments in the member 25 as shown. In either case, they are finished as by grinding so as to project above the inner peripheral surface of the cutter member 25 by a predetermined amount. The rib 38 is located immediately adjacent the far end of each of the slots 26, i. e., the end which the movable cutter passes last, thus serving as a stationary shearing element for the hairs entering the slots 26.

Turning now to the movable cutter member 31 (Figs. 2, 4 and 8), it will be noted that the same is fashioned as a relatively thin blade of generally trapezoidal shape with a longitudinal helical twist therein of approximately 180 degrees. The lateral edges 41 of the member 31 are yieldably urged into light frictional contact with the ribs 38, 39, 40, as by means of an axial spring 42 interposed between the motor shaft and the larger end of the cutter member 31. With such arrangement, the points on either of the lateral edges 41 successively pass over the rib 38 as the member 31 rotates, thus creating a progressive shearing action. The latter is enhanced by forming the movable cutter member 31 with raked or inclined marginal portions adjacent its lateral edges 41, the rake or inclination being toward the direction of cutting movement. As a result of the progressive shearing action made possible by the foregoing construction, power consumption of the motor 22 is greatly minimized during the cutting operation. Other power losses and consequent frictional heating of the cutter members 25, 31, are minimized due to the fact that frictional contact between these members is confined to the area of the ribs 38, 39, 40 rather than over the entire inner peripheral area of the member 25.

Provision is made in the shear 10 for collecting the hair trimmings in the basket 18 as an incident to cooling the cutter members 25, 31, and the motor 22. This is accomplished in the present instance by the use of an appropriate blower means in operative association with a relatively large, unobstructed cooling passage 42 communicating with the inside of the cutting head 15 and the basket 18. Thus, upon reference to Figs. 2, 6 and 7, it will be perceived that there is provided in the lower half 14 of the casing a pocket 44 which is adapted to receive the motor 22 with the drive shaft of the latter in non-concentric relation with the casing 11. The pocket 44 is defined by the inner peripheral wall of the casing together with transverse bulkheads or partitions 45, 46, the latter being spaced adjacent but slightly inward from the ends of the casing. The upper surfaces of the bulkheads 45, 46 are preferably formed with centrally located semicircular grooves for receiving axially extending bearing bosses 48 of the motor frame. Disposed in overlying relation with the pocket 44 and nesting close to the motor 22 is a sealing cap 49 which, in the present instance, happens to be a dished sheet metal stamping. The cap 49 is rigidly clamped to the partitions 45, 46 as by means of screws 50 which secure straps 51, the latter incidentally serving as the clamping means for the bearing bosses of the motor. By reason of the foregoing construction, the cap 49, together with the inner peripheral wall of the casing, defines the cooling passage 42 and imparts to the latter a relatively large, crescent-shaped cross section. As pointed out earlier herein, the passage 42 communicates with the interior of the cutting head and the collecting basket 18. By the same token, the cap 49, together with the pocket 44, defines a motor chamber 52 sealed from the cooling passage 42. The cap 49 is sufficiently thin to provide excellent heat transfer between the motor chamber 52 and the cooling passage 42, thus insuring adequate cooling of the motor 22. The chamber 52 may, however, be directly ventilated by means of one or more slots 54 in the lower half 14 of the casing and which communicate with the surrounding atmosphere.

The blower means of the shear 10 (Fig. 2) includes a plurality of elements for forcing a stream of cooling air and hair trimmings through the passage 42. Accordingly, the first blower element is the movable cutter member 31 which, due to its helical shape, draws a substantial flow of air into the cutting head 15 and forces it into the passage 42. Such flow is adequate to pick up all the hair trimmings as they are being severed. In the present instance, however, the action of the movable cutter member 31 is supplemented by one or more suction fans 55, 56 drivingly fixed to the axially extending portions of the motor shaft 24 but mounted outside the motor chamber 52. With this arrangement, the shear 10 effectively collects all the trimmings and at the same time is capable of running at high speed for prolonged periods without overheating either the cutting members or the motor 22.

In view of the foregoing, it can now be appreciated that the rotary shear 10 described herein possesses a number of practical and important commercial advantages. First of all, the device is compact, attractive, comfortable to operate, and remarkably clean in operation. It is also light in weight, rugged, and readily lends itself to economical manufacture on a mass production basis. Adequate space is provided for collection of hair trimmings so that an operator need not stop in the middle of a haircut to empty the trimming receptacle. However, when the receptacle 18 does require emptying, this can be done in very short order. Since the rotary blade is self-cooling and self-sharpening and also because there is no possibility of clogging the driving motor with trimmings, the shear 10 is capable of rendering long service without maintenance. In addition, the low inertia rotary cutter member is unaffected by centrifugal force due to its integral construction. This permits the use of a very high speed motor without excessive wear or overheating of the cutting head and also insures that the instrument will operate with a minimum of vibration throughout its entire life.

I claim as my invention:

1. In a rotary shear for tonsorial use, the com-

bination comprising a hollow and generally cylindrical casing having a pocket therein, a motor mounted within the pocket but having a shaft projecting beyond the same, a dished sealing cap mounted in overlying relation with the pocket and defining a cooling passage between itself and the inner peripheral wall of said casing, said cap also defining with said pocket a motor chamber sealed from said cooling passage, a collecting basket for cuttings fixed to one end of said casing and disposed in communication with the cooling passage therein, a tapered cutting head fixed to the opposite end of said casing and having mounted therein a plate-like cutting blade with a longitudinal helical twist of substantially 180 degrees, said blade being drivingly connected to said motor shaft, said blade also being adapted to force a stream of cooling air through said passage and at the same time to deposit all severed hair cuttings in said basket.

2. In a rotary shear for tonsorial use, the combination comprising a hollow and generally cylindrical casing, a pair of spaced transverse partitions within said casing, said partitions and the inner peripheral wall of said casing defining a pocket therein, said casing having at least one ventilating aperture providing communication between the pocket and the exterior of said casing, a motor mounted within the pocket but having a shaft projecting beyond the same, a dished sealing cap mounted in overlying relation with the pocket and defining a cooling passage between itself and the inner peripheral wall of said casing, said cap also defining with said pocket a motor chamber sealed from said cooling passage, a cutting head fixed to one end of said casing and having rotatably mounted therein an integral cutting blade of generally trapezoidal profile with a longitudinal helical twist of substantially 180 degrees, said blade being drivingly connected to said motor shaft and adapted to force cooling air over said cap and through the cooling passage.

3. In a rotary shear for tonsorial use, the combination comprising a hollow and generally cylindrical casing having a pocket therein, a motor mounted within the pocket but having a shaft projecting beyond the same, said motor shaft being disposed in non-concentric relation with respect to said casing, a dished sealing cap mounted in overlying relation with the pocket and defining a cooling passage of substantially crescent-shaped cross section between itself and the inner peripheral wall of said casing, said cap also defining with said pocket a motor chamber sealed from said cooling passage, a collecting basket for cuttings fixed to one end of said casing and disposed in communication with the cooling passage therein, a hollow frusto-conical cutter member fixed to the opposite end of said casing, an integral cutting blade of normally trapezoidal profile having a single longitudinal twist therein substantially reversing the positions of its ends relative to each other, said blade being drivingly connected to said motor shaft, said blade also being adapted to force a stream of cooling air through said passage and at the same time to deposit all severed hair cuttings in said basket, and suction fans fixed to the extremities of said motor shaft, said fans being adapted to boost the flow of air through said cooling passage.

4. In a power operated shear for trimming hair, the combination of a hollow casing having a drive

shaft journalled therein, a generally frusto-conical stationary cutter member detachably secured to said casing, said cutter member having a series of openings therein for receiving hair to be severed, said cutter member also having on its inner peripheral surface raised longitudinal ribs with one of the latter located immediately adjacent the far ends of said openings, an integral twisted blade rotatably mounted within said stationary cutter member, a driving connection between said shaft and said twisted blade, and an axial loading spring for yieldably urging said twisted blade into coacting engagement with said raised longitudinal ribs.

5. In a power operated shear for trimming hair, the combination of a hollow casing having a drive shaft journalled therein, a stationary cutter member of substantially frusto-conical shape detachably secured to said casing and having a series of openings therein for receiving hair to be severed, a plurality of raised longitudinal ribs disposed in circumferentially spaced relation along the inner peripheral surface of said stationary cutter member, one of said ribs being located immediately adjacent the ends of said aligned openings, an integral blade rotatably mounted within said stationary cutter for coaction with said one of said ribs, said blade having a helical twist running longitudinally thereof to permit progressive severing of the hairs projecting into said stationary cutter member, said blade also having the marginal portion of each of its lateral edges inclined toward the direction of rotation thereof, a driving connection between said shaft and said blade, and an axial loading spring for yieldably urging said blade into engagement with said raised longitudinal ribs.

6. In a power operated shear for trimming hair, the combination of a hollow casing, an electric motor housed within said casing, a stationary cutter of substantially frusto-conical shape detachably secured to said casing and having a series of aligned openings therein for receiving hair to be severed, said stationary cutter also having a plurality of longitudinal embossments defining raised ribs upon the inner peripheral surface of said stationary cutter, one of said ribs being located adjacent the far ends of said aligned openings, an integral movable cutter blade rotatably mounted within said stationary cutter for coaction with said one of said ribs and having a longitudinal helical twist therein to permit progressive severing of the hairs projecting into the openings of said stationary cutter, said blade also having the marginal portion of each of its lateral edges raked with respect to the inner peripheral surface of said stationary cutter, and a disengageable driving connection between said motor and said twisted blade.

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