

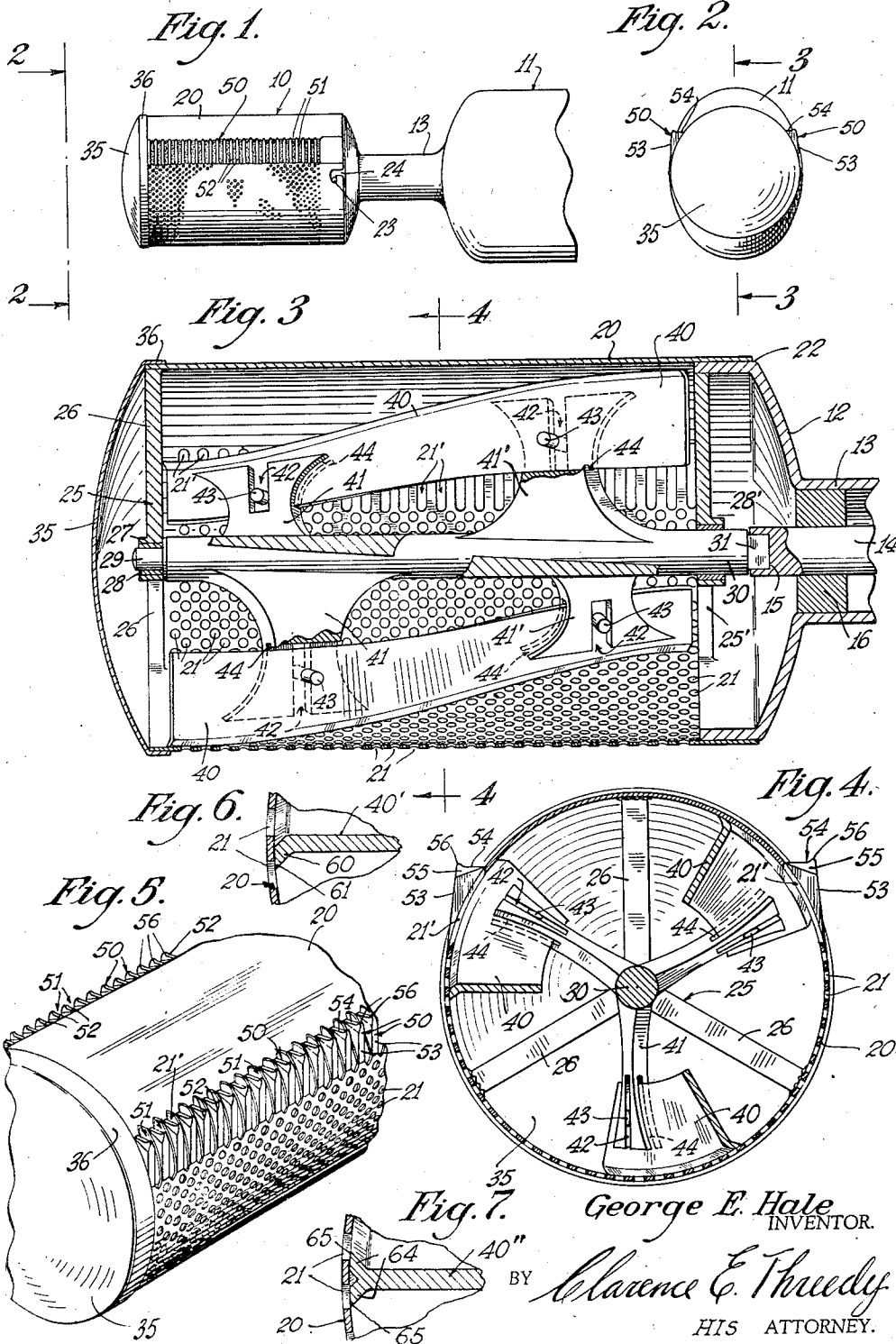
Dec. 9, 1941.

G. E. HALE

2,265,281

DRY-SHAVER

Filed Nov. 12, 1938



UNITED STATES PATENT OFFICE

2,265,281

DRY-SHAVER

George E. Hale, Chicago, Ill.

Application November 12, 1938, Serial No. 239,917

9 Claims. (Cl. 30—43)

This invention relates to improvements in shaving implements and particularly to the type popularly designated as dry shavers, one of the principal objects being the provision of a device of this class which is highly efficient in cutting long hairs as well as short.

Another object is the provision of a device of the class described having a shear plate with a multiplicity of small perforations and arranged with a curvilinear surface adapted to bear against the skin and provided with a power-driven shear/movable relative to the inner periphery of the plate to cut hairs projecting through the perforations.

Another object is the provision of an improved rotary shear adapted to use linear or curvilinear blades and including means mounting the blades for centrifugal bearing engagement with the shear plate.

A further object is the provision of blades having offset shear edges extending in opposite directions laterally of the blade so that the blades may be rotated in opposite directions.

Another object is the provision of a moving shear structure employing spirally arranged blades adapted to drive the clippings to one end of the shaving head or housing.

Another object is the provision of a removable cover means arranged at one end of the shaving head or housing for collecting the clippings disposed at that point by the improved moving or rotary shear means.

Still another and more particular object is the provision of a shaving head of substantially cylindrical contour and having a cylindrical wall provided with a multiplicity of small openings through which hairs project for engagement by a moving shear within the head, the outer periphery of the head being provided with a special form of comb arranged in a particular manner with respect to the openings for the purpose of aligning or guiding hairs for engagement in successive openings wherein the hairs are successively clipped shorter and shorter.

Yet another object is the provision in a device of the class described of a stationary shear having a curvilinear surface with a multiplicity of small, closely arranged openings therein, movable shear means cooperable with the inner peripheral portions of the stationary shear to cut hairs projected through said openings, and means projecting from the outer periphery of said stationary shear for effecting movement of hairs into successive openings responsive to advancing movement of the shaving implement over

the surface being shaved, the space between the projections being provided with elongated openings into which both long and short hairs are successively projected and clipped as the implement advances over the face.

Other objects and advantages residing in the invention pertain to certain details of construction as well as the arrangement and operation of various parts hereinafter particularly described in view of the annexed drawing, in which:

Fig. 1 is a fragmentary side elevation of the improved shaving implement;

Fig. 2 is an end elevation taken along line 2—2 of Fig. 1;

Fig. 3 is a vertical section to enlarged scale looking in the direction of line 3—3 of Fig. 2;

Fig. 4 is a vertical cross section as viewed along line 4—4 of Fig. 3;

Fig. 5 is a fragmentary perspective of the shaving head;

Fig. 6 is an enlarged fragmentary detail of a modified form of blade; and

Fig. 7 is a view similar to Fig. 6 and showing another modified form of blade.

Power-driven shaving implements commonly called dry-shavers have heretofore employed stationary shear plates with a plurality of small openings which are pressed against the shaver's skin so as to cause hairs to project through the openings for engagement by a moving shear which will accomplish the cutting with varying degrees of efficiency. A peculiarity of the devices of this class heretofore known in the art resides in the fact that their effectiveness decreases as the length of the hairs increases, the longer hairs not being able to project through the openings for various reasons and hence escaping the shearing operation altogether. For the shorter lengths of hair, the perforate plate type of stationary shear is otherwise satisfactory and has many desirable characteristics.

It is therefore a principal object of the present invention to provide means cooperable with the perforate plate type of stationary shear for rendering the device capable of cutting long hairs, as well as short hairs, with the same relative efficiency.

The power-driven or so-called dry-shaving implements, so far as is generally known, are characterized as a class by the fact that they do not cut a hair short but accomplish the ultimate cutting by a series of shears or clips depending upon the length of the hair and the number of times the implement is passed over the same group of hairs.

It is therefore another important object of the invention to provide a shaving implement utilizing a perforate plate type of stationary shear in which there is provided means for positioning as well as guiding hairs for successive penetration into successive perforations or openings in the shear plate as the implement is advanced in shaving movements.

A preferred arrangement for accomplishing the foregoing objects is shown in Fig. 1 and includes a shaving head 10 preferably of cylindrical contour and attached to a handle means 11 in which there is a motor or other driving means coupled with a moving shear arranged in the head 10. The invention is not concerned with any particular form or construction of driving means, being more particularly concerned with the shaving head or actual cutting means, and this shaving head being intended for use with any suitable driving or motor means.

As shown particularly in Fig. 3, the shaving head 10 includes a mounting member or cup 12 having a tubular shank portion 13 adapted for connection with a handle member 11 and through which extends a drive shaft 14 connected at one end with the motor means in the handle and having a keyed recess or coupling means 15 at its opposite end terminating within the mounting cup 12.

A stationary shear having a curvilinear surface portion is provided in the form of a thin cylindrical plate 20 (see also Fig. 5) having a multiplicity of relatively small perforations or openings 21 of a size adequate to admit the hairs of a beard, usually around 0.01 of an inch, and being positioned very close together throughout the peripheral extent of the cylindrical plate if desired, the present embodiment, however, omitting the perforations from the top quarter section of the cylindrical surface.

This cylindrical shear member or "plate" is of a diameter permitting it to be fitted snugly upon the cylindrical rim portion 22 (Fig. 3) of the base cup 12, there being also provided a removable securing or attaching means in the form of a bayonet prong 23 and cooperating slot 24 (Fig. 1) for locking the assembly on its mounting base.

At its opposite or outer end, the shear cylinder 20 is fitted with an annular bearing spider 25 having a plurality of webs or radial arms 26 converging in a hub 27 in which is seated a suitable bearing 28 adapted to receive the shouldered end 29 of the shaft 30 of the movable shear.

A similar bearing support or spider 25' is fitted firmly into the cup 12 and includes a bearing 28' aligned with the bearing 28 and the drive shaft 14 and in which the free end of the shaft 30 rotates opposite the keyed end portion 15 of the drive shaft, there being a keying stud 31 at the inner end of the shaft 30 and receivable in the keying formation 15 to effect driving engagement between the drive shaft and the shear shaft. Suitable bushing means 16 supports the drive shaft 14 within the tubular member 13 and also serves to prevent clippings from working back into the motor housing or handle.

At the outer or free end of the shaving head there is provided a scavenging cap or closure 35 having an annular rim portion 36 adapted for frictional engagement with the peripheral portions of the cylindrical shear adjacent its outer or left-hand end, the cap in the present instance being concave and providing, in part, a receptacle for clippings disposed at the outer end of the shaving head.

The movable shear means is preferably of a rotary type and includes a plurality of elongated blades 40 having pin and slot support for movement laterally or radially of the shaft 30. In the illustrative form of the invention, this pin and slot mounting means includes a plurality of radially projecting arms 41 formed integrally or otherwise attached to the shaft 30 in circumferentially spaced relation so that the arms near one end of the shaft are preferably offset in a direction around the shaft, two of the arms 41 and 41', spaced apart axially, constituting a pair, the arms being provided with open-ended radial slots 42 into which project mounting pins 43 on the blades 40 when the latter are fitted into open blade-receiving slots 44 formed in the arms so as to extend in a somewhat axial direction and hence transversely of the radial slots 42. Thus, the shearing blades are supported for movement laterally or radially of the axis of rotation, namely the shaft 30.

The blades 40 in the present embodiment are curved or twisted in the direction of their length so as to fit into the axially and circumferentially offset mounting arms 41 and 41' with the result that the blades are mounted spirally relative to the axis of rotation of the shaft 30.

The arms 41, slots 42, and positioning of the pins 43, is such that the blades have a limited freedom of radial movement within the housing so that as the shaft 30 rotates (at relatively high speed) the blades 40 are thrown outwardly by centrifugal force and bear against the inner periphery of the cylindrical shell or head 20, the outermost longitudinal edges of the blades passing with rapid shearing movement over the multiplicity of small openings so that any hairs projecting through the latter are quickly and effectively sheared.

If desired, the blades may be arranged to extend collaterally with the axis of rotation of shaft 30, the mounting means 41-42-43 being otherwise the same, and the centrifugal regulation of the shearing engagement with the stationary shear being likewise the same. However, as a result of the spirally offset disposition of the blades, the movable shear acts as a screw and tends to drive the clippings to the far or outer end of the shaving head for collection behind the cap 35, the cap being conveniently removable to clear the head of such clippings.

Because of the cylindrical contour of the shaving head, a relatively great shearing surface is afforded, the extent of which in no way interferes with the efficiency of the device because of the regulation or clearance take-up afforded by the centrifugal mounting of the blades.

Means for engaging, positioning and guiding longer hairs into the perforations includes a pair of combs generally indicated at 50 extending collaterally with the long axis of the cylindrical head on the outer periphery thereof (Fig. 5) and each in circumferentially spaced relation to the other. These combs are of peculiar design, as will hereinafter appear, and are so positioned as to be in advance of the normal shaving movement of the head 10 over the skin of the user.

In one preferred method of forming the combs 50, elongated bars of metal are sweated or otherwise secured on the outer periphery of the cylindrical shear plate in the positions occupied by the completed combs 50 in Fig. 5. Thereafter, circumferentially extending channels 51 are cut at uniformly spaced intervals, in an axial direction, across the bars so as to form teeth 52, the teeth be-

ing provided with a long edge 53 (see also Fig. 4) which tapers down, preferably in a substantially tangential direction, until it lies flush with the surface of the shear plate 20, this latter end tapering rearwardly and constituting a trailing extremity of the tooth relative to the advancing movement of the teeth in shaving operation, and the opposite or upper ends 54 of the teeth projecting outwardly of the periphery of the shear plate with the result that the teeth may be said to have a somewhat triangular shape. The ends 54 of the teeth are milled out as at 55 so as to taper inwardly toward an ear or finger 56 constituting the outermost point of the tooth and hence the leading extremity thereof.

The channeled portions 51 between the teeth 52 are arranged in alignment with a following circumferential series of the openings 21, the width of the channels or grooves 51 between the teeth being such that the oppositely facing sides of any pair of teeth are substantially flush with an elongated slot 21' (Figs. 3 and 4) provided between each pair of comb teeth, each slot 21' extending circumferentially a distance equivalent to the length of the flanking teeth.

The importance of the foregoing arrangement of the combs, and the teeth constituting the same, resides in its effectiveness not only in guiding long hairs for successive clipping projection into the slots 21' (Fig. 4), but also in causing the milled ear portions 56 at the points of the teeth to engage beneath hairs that are recumbent to lift the same into clipping position between adjacent teeth for movement into the several slots, the shaving implement being moved over the skin so that the ear portions 56 of the teeth are projected in advance of the remaining portions of the teeth. Assuming that relatively long hairs are thus projected first into the slots 21' and partially clipped, the same hairs will be projected thereafter into the succeeding holes 21 and again successively clipped therein and in the following openings 21 until the hairs are sheared down to a maximum shortness.

The centrifugal bearing shear blades 40 may have plain edges as illustrated in Figs. 3 and 4. However, a blade of greatly increased efficiency is shown in section in Fig. 6 wherein the modified blade 40' is provided with a laterally offset longitudinal edge 60 ground down to provide a leading edge 61 which constitutes a shearing edge movable in the direction of rotation of the blade, so that as the blade edge wears down, the shear edge 61 will nevertheless remain sharp.

Another form of blade, possessing all the advantages of the blade of Fig. 6, is shown in Fig. 7, wherein the centrifugal blade element 40'' is provided with opposite lateral offsets 64 each ground similarly to the offsets 60 so that there are oppositely facing shear edges 65.

One of the important advantages of the latter arrangement resides in the fact that the driving shaft 14 may be rotated in either direction so that it is unimportant in which direction the driving motor starts or is run. This blade is also adapted for oscillatory motion.

It will thus be apparent that the shaving implement of my invention is of a simplified yet rugged construction which permits the production of a highly efficient device which may be manufactured at relatively low cost since no complicated or delicate mechanisms or parts are employed. Moreover, the efficiency of the improved shaving implement in its intended use is greatly enhanced by the arrangement of the curvilinear

shear plate and cooperating shear means 40, 40'—60, or 40''—64, as well as the provision of the slots 21' flanked by the toothed means 50, all functioning for the purpose and substantially in the manner set forth.

The various objects, advantages and features of novelty of the specifically described embodiment, disclosed herein for purposes of illustration, may be accomplished by other forms and arrangements of the means thus described, and the invention is therefore not to be limited to any particulars of form, location or operation of parts except as may be expressly provided hereinafter in the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In a device of the class described, a shaving head including a substantially cylindrical shear plate having a plurality of perforations therethrough, means at the opposite ends of said shear plate constituting bearing supports, a power-driven shear mounted within said shear plate on said bearing supports, and closure means in the form of a removable cap fitted onto one axial end of said shear plate, said power-driven shear being adapted for connection with driving means at its end opposite said closure means, the bearing support nearest said cap being provided with openings to permit passage of clippings when the cap is removed.

2. In a power-driven shaving implement, a shaving head including a stationary tubular shear having a plurality of perforations therethrough for the admission of hairs, bearing means at the opposite ends of said stationary shear and arranged to provide a passage through at least one axial end of the latter, a removably closure cap fitted on said last-mentioned axial end of the stationary shear, a rotatable shear member mounted on said bearing means within said head and including a plurality of radially extensive arms having radially open blade-receiving slots therein and radial projection-receiving slots therein, and elongated blade members provided with projections spaced apart in the direction of their length, each fitting in the projection-receiving slots of one of said arms when said blades are seated in said blade-receiving slots, whereby said blade members are mounted for back and forth movement in a radial direction so as to be free to move by centrifugal force against the inner periphery of said stationary shear responsive to rotation of the rotatable shear member.

3. In a shaving head for a dry-shaving implement, a cylindrical head member having shear openings therein and constituting a relatively stationary shear and provided with bearing means at its opposite axial ends, the bearing means in one of said ends being arranged to provide a radial opening for the passage of clippings from within the head, a removable closure cap for said end of the head, a revoluble shear within said head and including spirally arranged blades mounted for centrifugal shearing contact against the inner periphery of said head, the spiral pitch of said blades being arranged to drive clippings toward said closure.

4. In a device of the class described, a shaving head including a thin-walled perforate tube of cylindrical contour, an annular mounting cup fitted into one end of said tube and constituting a support for the latter, bearing means arranged in said mounting cup co-axially of said tube, a

bearing spider fitted into the opposite axial end of said tube and including bearing means aligned co-axially with said first-mentioned bearing means, said spider providing an opening for passage of clippings from within said tube outwardly thereof, and a cap removably fitted onto said tube and constituting a closure for the latter at the end opposite said mounting cap, and a revolvable shear within said head and including a shaft mounted in said bearing means co-axially with the tube, said shaft having a plurality of radial arms each provided with open blade-receiving slots extending in a general axial sense, said arms being spaced apart axially as well as circumferentially, and the axially spaced arms being arranged in pairs with their blade-receiving slots in alignment, each of said arms having a radial pin-receiving slot, elongated blade members fitted into the blade-receiving slots in each pair of arms and provided with pin means movably seated in said pin-receiving slots whereby said blade members are mounted for movement radially of said shaft for centrifugal movement to bear against the inner periphery of said tube for shearing cooperation with the latter, said blade members being offset to provide a substantially spiral pitch, said shaft being rotated in a direction such that said blade members will drive clippings toward said closure cap.

5. In a device of the class described, a revolvable shear structure including a shaft having a plurality of radially extending arms spaced apart circumferentially and axially, each of said arms having an open blade-receiving slot formed in its free end portion and extending in a generally axial sense, each arm also having a radial open-ended pin slot in its free end portion, the axially spaced arms being arranged in pairs with their blade-receiving slots in alignment, and elongated blade members movably seated in the blade-receiving slots of each pair and having pin means movably engaged in the corresponding pin slots such that said blade members are free to move back and forth in a radial sense for displacement by centrifugal force to engage cooperating shear means.

6. In a device of the class described, a revolvable shear structure including a shaft having a plurality of radially extending arms spaced apart circumferentially and axially, each of said arms having an open blade-receiving slot formed in

its free end portion and extending in a generally axial sense, each arm also having a radial open-ended pin slot in its free end portion, the axially spaced arms being arranged in pairs with their blade-receiving slots in alignment, and elongated blade members movably seated in the blade-receiving slots of each pair and having pin means movably engaged in the corresponding pin slots such that said blade members are free to move back and forth in a radial sense for displacement by centrifugal force to engage cooperating shear means, the arms of each pair being so disposed with relation to each other and said shaft that the blade-receiving openings thereof are in substantially spiral alignment, said blades being curved to lie in spiral offset when mounted as aforesaid.

7. In a dry-shaver, a relatively stationary shear in the form of a perforate tube, and a moving shear including a rotating member having axially and circumferentially spaced radial arms with slotted end portions, and elongated blades each fitted movably into the slotted portions of a plurality of axially spaced arms such that each blade may move radially of said rotating member for urgency by centrifugal force against the inner periphery of said stationary shear, and pin means in each blade cooperable with slotted portions on said arms for preventing axial displacement of the blades without interfering with radial movement thereof.

8. In a dry shaver, a stationary shear in the form of a tube having shear openings therethrough, bearing inserts at opposite ends of the tube, one of said inserts being in the form of a spider, a cap removably fitted on to the end of the tube at which the spider bearing is situated, and a revolvable cutting element in the tube and pitched to drive clippings toward said spider bearing.

9. In a dry shaver, in combination, a stationary cutter in the form of a tube having a plurality of shear openings therethrough, a driving shaft within said tube and having a plurality of circumferentially off-set radial posts thereon, each post being spirally slotted at its free end to receive a blade, and circumferentially spaced spirally arranged blade members each situated in the slotted ends of at least two of said posts.

GEORGE E. HALE.