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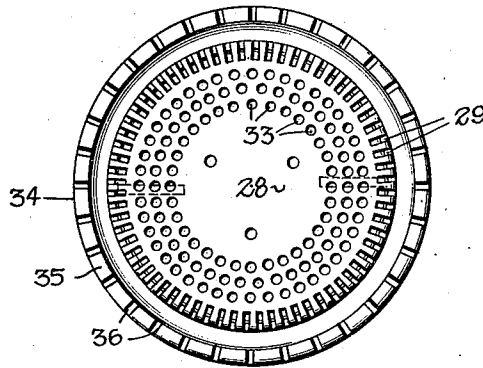
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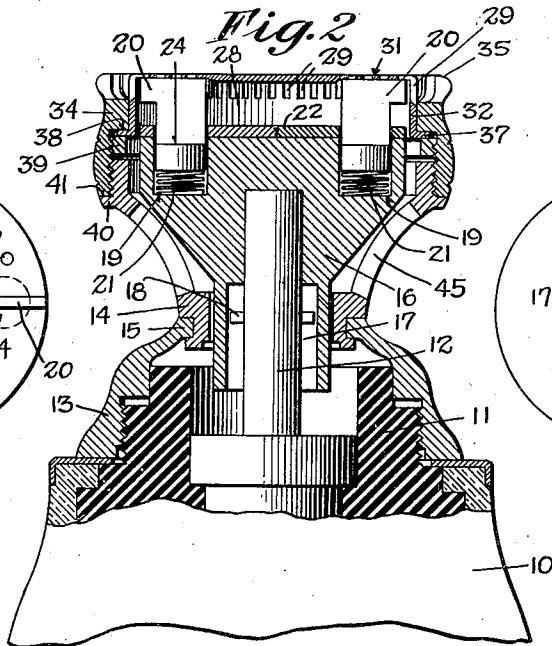
SHAVING MACHINE

Filed March 7, 1940

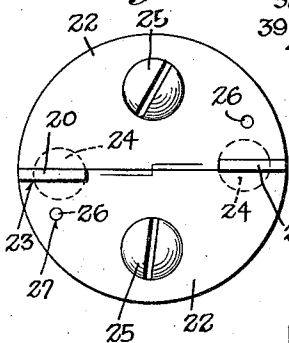
*Fig. 1*



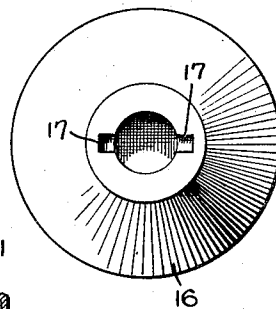
*Fig. 2*



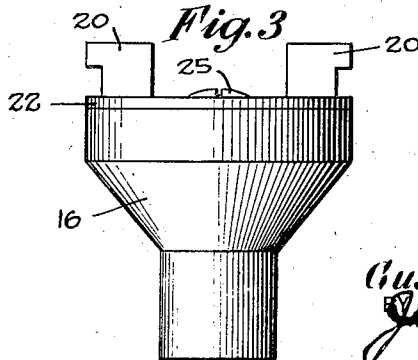
*Fig. 4*



*Fig. 5*



*Fig. 3*



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## UNITED STATES PATENT OFFICE

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## SHAVING MACHINE

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11 Claims. (Cl. 30—43)

This invention relates to dry shavers for personal use and, more particularly, to the cutter member and skin-contacting assembly used therein.

The dry shaver of the present invention is of the rotary type, in which the cutting surfaces move in an arc or circular path while held in engagement with an apertured skin-contacting plate to sever hairs projecting through the apertures of the skin-contacting member.

In the previously proposed shavers of this type, a single blade generally was used which had a cutting surface urged into engagement with the undersurface of the skin-contacting plate by a spring carried by the shaft of the motor. In those constructions, the blade was free to move outwardly under the action of the spring so that when the skin-contacting plate or head was removed for the purpose of cleaning the blade and interior of the head, the blade, many times, became separated from the drive shaft and was many times lost.

In the dry shaver of the present invention, a plurality of blade members are used, each having a cutting surface cooperating with the apertured skin-contacting plate to sever hair projecting therethrough. Each blade is independently urged into engagement with the undersurface of the plate and a feature of this invention is the means employed to prevent the blade members from separating from the coupler member coupling the blades to the drive shaft for rotation therewith when the head is removed, but yet allow each blade member a limited movement so that the same may be urged into engagement with the cutter head.

According to the present invention, the cutter assembly comprises a sleeve coupled to the drive shaft for rotation therewith and a plurality of blades carried by the sleeve presenting radially extending cutting surfaces which are independently urged into engagement with the undersurface of the apertured cutter head. Each blade is permitted a limited movement with respect to the sleeve, but yet is so mounted on the same that they cannot become separated therefrom even though the shaver is dismantled and the cutter sleeve removed from its position on the end of the drive shaft.

The blades of the present invention, as they are independently mounted, may move independently of each other so that one blade may move out of engagement with the undersurface of the cutter head should some unusual obstruction protrude through the apertured head without affecting the position of the cutting surface of the other blade. This construction obviates a difficulty in previously proposed shavers of the rotary type, in which a single blade was pivotally mounted to the end of the drive shaft so as to

allow the portion of the blade lying wholly on one side of the pivotal connection to move downwardly should an unusual obstruction protrude through the apertured plate which caused the cutting surface of the blade, lying on the opposite side of the pivotal connection, to be moved into tighter engagement with the undersurface of the cutter head.

The cutter head of the present invention is provided with a plurality of narrow closely spaced radial hair-receiving slots extending through the annular marginal portion of the skin-contacting face of the head and the adjacent peripheral wall as well as a plurality of concentrically arranged rows of circular apertures having a diameter greater than the width of the radial slots. This construction permits relatively long hair to enter the slots formed in the peripheral wall of the head as the same is moved over the face and be severed as they move into the slots formed in the skin-contacting face of the head. Hair which is not received in the slots, or hair which is not completely severed while in the slots, is received into the larger circular apertures and there cleanly severed.

To prevent loose skin from entering the slots formed in the peripheral wall of the head, the present invention provides a protector band surrounding the peripheral wall but spaced therefrom a distance sufficient to allow hair which might be bent over by the protector band to become erect and enter the slots in the head, but not spaced from the peripheral wall of the head a distance sufficient to allow loose skin to enter the slots formed therein.

Other features and advantages will hereinafter appear.

In the accompanying drawing:

Figure 1 is a top plan view of the cutter head of the present invention.

Fig. 2 is a longitudinal sectional view of the cutter head and blade assembly with a portion of the casing of the device being broken away.

Fig. 3 is a side elevational view of the coupling member with the blade secured thereto.

Fig. 4 is a top plan view of the coupling member shown in Fig. 3.

Fig. 5 is a bottom plan view of the coupling member.

The preferred embodiment of the razor of the present invention comprises, as illustrated in the drawing, a casing or body 10 surrounding a subframe 11 in which is mounted a drive shaft 12, usually driven by an electric motor or other suitable power means, not shown, housed within the body 10. The subframe has threaded thereto a substantially conical shaped collar 13 having an outwardly flared casing 14 secured thereto at the reduced portion 15 of the collar. The hollow casing surrounds the drive shaft to which a cutter

blade assembly is coupled for rotation therewith.

The cutter blade assembly is coupled to the drive shaft for rotation therewith by means of a coupler comprising a sleeve 16 of insulating material having a bore therein to receive the end of the drive shaft 12. The sleeve is provided with a transverse flat walled slot 17 adapted to receive the opposite ends of a transverse pin 18 carried by the end of the drive shaft 12 to insure a positive drive connection between the shaft and the coupling member.

The coupler sleeve, at its outer end, is enlarged and at diametrically opposite spaced points on the end face thereof is provided with a pair of wells 19, each adapted to receive a substantially L-shaped blade 20 provided with a tubular shank received within the well 19. Interposed between the tubular shank of each blade and the bottom of the well, within which it is received, is a coil spring 21 normally urging the blade outwardly of the well. Each blade is held within the well by means of two semicircular plates 22, each having a part of its base cut away to provide, when the two plates are placed together as shown in Fig. 4, a pair of slots each receiving a blade 20.

The plates 22, when placed with their edges juxtaposed, form a keeper for preventing the cutter blades 20 from being urged out of the wells 19 by the springs 21, for the enlarged tubular shanks of the blades form shoulders 24 which engage the underneath side of the keeper formed by the two semicircular plates 22. Each semicircular plate is fastened to the top surface of the sleeve 16 by suitable screws 25 or the like which are threaded into apertures formed in the top face of the sleeve.

To prevent each plate 22 from pivotally moving about the screws 25, the top face of the sleeve 16 is provided with a pair of small bosses 26 which are received in apertures 27 formed in each plate 22 when the same are secured to the top face of the sleeve by the screws 25.

The casing 14 has a thin circular cutting head 28 mounted thereon so as to enclose the cutter blade. The head is made of thin metal or the like, and is provided with a plurality of hair-receiving apertures through which hairs project to be severed by the cutting surfaces which engage the inner surface of the cutter head.

The apertures may be of any desired shape, but, in the preferred form of the invention, however, are illustrated as radially extending slots 29 opening in the face-engaging portion 31 of the head and in the side walls 32 thereof. The cutting surface of each cutter member engages only the slots in the face-engaging portion of the head 28, the side edges thereof being spaced from the side walls 32 of the same. The portions of the slots formed in the side wall of the head permit the hairs to pass radially into the slots in the face-engaging portion and into the path of the cutting surface of the cutter member where they are severed by the action of the rotating cutting member against the inner edge of the slots of the face-engaging portion.

To increase action of the blades, the face-engaging portion 31 of the head is provided with a plurality of annular rows of apertures 33. When the cutting head 28 is moved over the face, long hair will enter the slots and be severed by that portion of the cutting surface of each blade which is in contact with the inner edge of the slots and the hair, if not completely severed, will, as the head is moved further in its path of move-

ment over the face, enter one of the apertures 33 and be completely severed from the face.

The apertures 33 preferably are circular, as shown in Fig. 1 of the drawing, and have a diameter larger than the width of the slots 29. The apertures are arranged in concentric rows and the apertures of one row are displaced from the apertures of the adjacent row so that there is no likelihood of a hair not entering either the slots 29 or one of the apertures 33 as the head is moved over the face in shaving. The apertures 33, although they have a diameter greater than the width of the slots 29, are not of a size sufficient to allow skin to project therethrough and be cut or irritated by the blades.

While the slots in the side walls of the head readily permit hairs to enter, they will also permit loose skin, such as is to be found on the neck and under the chin of the face, to enter and become pinched or cut by the rapidly rotating blade members. To prevent the skin from entering the slots and from being pinched or cut, the present invention provides improved means for spacing the skin from the side walls of the cutter head while permitting the hairs to pass into the slots 29.

This means, in the preferred form of the invention, comprises a ring or band 34 of metal or other suitable material which is adapted, as shown in Fig. 2, to surround the side walls of the cutter head. The band or ring is provided with a smooth face-engaging surface 35, which can be readily moved over the skin without irritating or chafing the same.

According to the present invention, the ring is provided with hair passages or openings 36, preferably slots, spaced at intervals therearound. The slots 36 are fewer in number than the slots 29 and are of a width greater than the width of the latter as shown in Fig. 1, but may be equal in number and width if such construction is desirable.

The ring, although it surrounds the side walls of the cutter head, is spaced therefrom so that an annular space separates the adjacent walls of the cutter head and ring to allow hairs, which might otherwise be held close to the skin, to become erect and pass into the slots 30. The annular space separating the side wall of the head and ring is not, however, of a width sufficient to allow loose skin to enter between the adjacent walls and be pinched or cut by the blades.

The ring and head are clamped together to form a unit, and preferably, this is done by providing the bottom of the side walls of the head with an outwardly projecting flange 37, and forming the ring 34 with a shoulder 38 which abuts one face of the flange 37 and locates the ring with respect to the face-engaging portion of the cutter head. The ring or band projects downwardly of the head and is internally threaded as shown in Fig. 2. A locking ring 39 is threaded into the band and into engagement with the other face of the flange 37 to clamp it against the shoulder 38 of the band. Thus, the protecting ring and head become locked together as a unit to be mounted on the casing so as to cooperate with the rotating blade member.

While the ring and head can be mounted on the casing in any desired manner, the preferred form of the invention utilizes the downwardly extending portion of the ring for this purpose. As clearly shown in Fig. 2, the internally threaded ring is threaded on the open end of the outwardly

flared casing 14 so as to enclose and cooperate with the rotating blade member.

To properly position the head with respect to the blade, the casing is provided with an outwardly projecting flange 40 which engages an annular internal shoulder 41 formed in the end of the ring to limit the relative movement therebetween. When the flange is seated on the shoulder, the head will have been moved into the proper cutting relation with the blade member. With the head and ring surrounding the blade member and secured to the casing, the shaver can be moved over any part of the face and the protecting ring will hold the skin away from the sharp edge and slots in the side wall and thus prevent the skin from passing through the slots and being pinched or cut by the surfaces of the blade member. The slots or hair-receiving passages in the ring will permit the hair, however, to pass into the slots in the face-engaging portion through the slots in the side wall where they will be engaged by the rotating cutting surfaces and severed.

In the now preferred form of the invention, the springs 21 are slightly compressed between the bottom walls of the wells and the tubular shanks of the cutter member when the head is properly mounted on the casing. In this construction, the springs urge the cutter member upwardly and hold the cutting surfaces of the cutter members against the undersurface of the face-engaging portion of the head.

It will be seen that each cutter member, as it is mounted on the sleeve 16 independently of the other, may move downwardly in the well and out of engagement with the undersurface of the head should an unusual obstruction project through either the apertures 33 or the slots 30 of the head.

As shown in Fig. 2, the outwardly flared casing 14 is provided with openings 45 in its undersurface through which the severed hairs can pass and be disposed of without clogging the cutting blade.

If, however, it is desired to remove the head for the purpose of cleaning the blade and dislodging long hairs which might accumulate within the head, the same can be easily removed by unscrewing the band from the casing 14 and lifting out the coupler sleeve 16.

When it is desired to reassemble the head, the sleeve, if removed from the end of the drive shaft, may be returned to its proper position onto the end of the drive shaft with the projecting ends of the pin riding in the slots 17. The head, as a unit, may then be reassembled by threading the band 34 onto the threads of the casing compressing the springs 21 as the head is returned to the proper assembled position. The sleeve with the cutter members carried thereby is now mounted on the drive shaft with the cutting surfaces of the cutter members in good shearing engagement with the undersurface of the cutting head.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blade members each having a cutting surface adapted to cooperate with the undersurface of said head to sever hair extending therethrough; means for coupling said

blade members to said shaft for rotation therewith; a plurality of resilient means carried by said coupling means for independently urging the cutting surface of said blade members into engagement with the undersurface of said head; and means secured to said coupling means for preventing the blade members from separating from the latter means when the head is removed.

2. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blades each having a cutting surface; a coupler sleeving an end of said shaft for rotation therewith having a plurality of sockets formed adjacent the periphery of an end face thereof, each socket receiving a blade; means in each socket tending to urge the blade out of said socket; and means carried by said coupler for limiting the movement of said blades outwardly of the sockets to prevent the separation of said blades from said coupler when the head is removed.

3. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blades each having a cutting surface; a coupler sleeving an end of said shaft for rotation therewith having a plurality of sockets formed adjacent the periphery of an end face thereof, each socket receiving a blade; means in each socket tending to urge the blade out of said socket; and means carried by said coupler for limiting the movement of said blades to prevent the separation of said blades from said coupler when the head is removed, said means holding each blade against rotational movement in its socket and with the cutting surface thereof radially disposed relative to said head.

4. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blade members, each having a cutting surface adapted to cooperate with the undersurface of said head to sever hair extending therethrough; mounting means for said blade members; means associated with said mounting means for holding said blade members with the cutting surfaces thereof radially disposed relative to said cutter head; means carried by said mounting means for urging said cutting surface into engagement with the undersurface of said head, said holding means limiting the action of said last-named means and preventing the blade members from separating from said mounting means when the head is removed; and means for coupling said mounting means to said drive shaft for rotation therewith.

5. In a dry shaving device, a casing; a removable circular skin-contacting plate having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blades, each having a cutting surface at one end and terminating at the opposite end in a tubular shank; a coupler sleeving an end of said shaft and connected thereto for rotation therewith, said coupler having a flared end and presenting at one end thereof a relatively wide end face having a plurality of sockets formed adjacent the periphery thereof, each socket receiving the tubular shank of a blade; means in each socket tending to urge the shank of the blade outwardly thereof; and means carried by said coupler for limiting the movement of said blades, said means being secured to said end face of said coupler.

6. In a dry shaving device, a casing; a removable circular skin-contacting plate having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blades, each having a cutting surface at one end terminating at the opposite end in a tubular shank; a coupler sleeving an end of said shaft and connected thereto for rotation therewith, said coupler having a flared end and presenting at the free end thereof a relatively wide end face having a plurality of sockets formed adjacent the periphery thereof, each socket receiving the tubular shank of a blade; means in each socket tending to urge the shank of the blade outwardly thereof; and means carried by said coupler for limiting the movement of said blades, said means being secured to said end face of said coupler and holding said blades with the cutting surfaces thereof radially disposed relative to said drive shaft.

7. In a dry shaving device, a casing; a removable circular skin-contacting plate having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of blades, each having a cutting surface at one end and terminating at the opposite end in a tubular shank; means for coupling said blades to the drive shaft for rotation therewith, said means including a sleeve connected to the drive shaft for rotation therewith, said sleeve merging into an enlarged portion presenting a substantially circular end face having a plurality of sockets formed adjacent the periphery thereof, each socket receiving the tubular shank of a blade; means in each socket tending to urge the blade outwardly thereof; and plate means secured to the end face of said sleeve for limiting the movement of said blades outwardly of the sockets.

8. In a dry shaving device, a casing; a removable circular skin-contacting plate having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a plurality of flat blades, each having a cutting surface at one end and terminating at the opposite end in a tubular shank, said shank forming shoulders on opposite faces of said blades; a coupler sleeving an end of said shaft and connected thereto for rotation therewith, said coupler having an enlarged end portion presenting a substantially circular end face having a pair of sockets formed at diametrically opposite points adjacent the periphery thereof, each socket receiving the tubular shank of a blade; a coil spring in each socket tending to urge the shank of the blade outwardly thereof; a pair of semicircular plates having cutaway portions which form diametrically opposite slots when the straight sides of the two plates are placed juxtaposed, said plates being secured to the end face of said coupler with the slots formed thereby receiving the blade members, the shoulder of each blade engaging the undersurface of the plates whereby the movement of the blades outwardly of the sockets is limited.

9. In a dry shaving device, a casing; a removable circular skin-contacting head having narrow closely spaced radial hair-receiving slots in the annular marginal and peripheral wall portions thereof, said head having a plurality of concentrically arranged rows of circular apertures formed in the skin-contacting wall portion thereof, the diameter of said apertures being greater than the width of the radial slots; a

cutter member having a plurality of cutting surfaces cooperating with the undersurface of the skin-contacting wall for severing hair extending through the slots and apertures formed therein; and a ring surrounding the peripheral wall of the head to prevent loose skin from extending into the portions of the slots in the peripheral wall of the head, said ring being spaced from the peripheral wall of the head a distance sufficient to allow hair to become erect and pass into the portion of the slots in the peripheral wall of the head.

10. In a dry shaver, a casing; a hollow circular head having narrow closely spaced radial hair-receiving slots extending through the annular marginal portion of the skin-contacting face of the head and the adjacent peripheral wall of the same, said head having a plurality of concentrically arranged circular apertures formed in the skin-contacting face of the head having a diameter greater than the width of the radial slots; a rotatable blade within the head having shearing edges cooperating with the undersurface of the skin-contacting face of the head to shear off hair extending through the slots and apertures formed therein; a band disposed about the peripheral wall of the head to hold the skin of the user from entering the slots formed in said wall and having openings therein adapted to be positioned in alignment with the slots in the side walls of the head; and means for locking the head and protector band in assembled relation, said band in assembled position being spaced from the peripheral wall of the head and forming with said wall an annular groove of a width sufficient to allow hair to become erect and enter the slots formed in the peripheral wall of the head and less than a width which would permit loose skin of the user to enter the slots formed in the peripheral wall of the head.

11. In a dry shaver, a casing; a hollow circular head having narrow closely spaced radial hair-receiving slots extending through the annular marginal portion of the skin-contacting face of the head and the adjacent peripheral wall of the same, said head having a plurality of concentrically arranged circular apertures formed in the skin-contacting face of the head having a diameter greater than the width of the radial slots; a rotatable blade within the head having shearing edges cooperating with the undersurface of the skin-contacting face of the head to shear off hair extending through the slots and apertures formed therein; a band disposed about the peripheral wall of the head to hold the skin of the user from entering the slots formed in said wall and having openings therein adapted to be positioned in alignment with the slots in the side walls of the head; means for locking the head and protector band in assembled relation, said band in assembled position being spaced from the peripheral wall of the head and forming with said wall an annular groove of a width sufficient to allow hair received within the openings in the protector band to become erect and enter the slots formed in the peripheral wall of the head and less than a width which would permit such skin of the user to enter the slots formed in the peripheral wall of the head; and means formed integrally with the protector band for securing the so-assembled head and band to the casing.

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