My invention, a dry shaver with a rotateable outer shaving member and a stationary inner cutter, is related to that variety of dry shaver wherein a perforated cylindrical grid is rolled and rotated on the surface to be shaved and the hairs trapped in the perforations are sheared off by the action of the sharp-edged perforations and the cutting edges of blades which are in contact with the interior surface of the grid.

However, this general character are not new to the art. My invention is distinguishable, however, in that the cylindrical grid is internally-reinforced, therefore rigid; it will retain its cylindrical configuration in use. Thus, it is possible to dispense with discs and wheels, conventionally positioned in the grid bases, on which the grid is usually seated and which are relied on for the traction needed to rotate the grid cylinder.

My invention, in dispensing with such discs and instead relying on concentrically-spaced annular members which are affixed circumferentially about the interior grid surface, thereby provides a number of significant advantages, all combining to give a faster, smoother and less irritating shave. Traction, achieved by the involvement of the entire outer surface of the rigid grid and the hairs trapped in the perforations, is certain and more positive than that which could be derived from wheels or discs. Nor does such traction, as compared to that emanating from narrow wheel or disc treads, tend to press into and irritate the skin. Furthermore, the shaving area of a grid encumbered by end wheels or discs may be transversely widened so as to make available the optimum grid area useful for shaving. Finally, a very thin but rigid grid is capable of more intimately and positively engaging the skin surface. My improved shaver, in short, is capable of functioning in a manner which compares very favorably with its electric-powered rivals.

There are other advantages. One object of my invention, in avoiding the need to harness electric or other artificial power, is to make shaving more convenient. In addition, the heat and noise of the conventional electric motor and the static induced in radio circuits as the shaver operates are all eliminated. The cost of motor and power cord is saved. And the space conserved in the shaver case may be utilized, a further convenience, for storing the debris of shaving for weeks at a time. Other advantages will become apparent to persons skilled in the art.

The preferred form of my invention and, in general, the modified versions of it are illustrated by FIGURES 1–8 inclusive. FIGURE 1 shows a front view of the completely assembled instrument. FIGURE 2 depicts an enlarged longitudinal section of the shaver. FIGURE 3 is an enlarged section of the shaver drawn on the line 1–1 of FIGURE 2. FIGURE 4 is an inside view of one of the narrow walls of the casting and of a section of the rectangular end of a stub shaft, and illustrates the mechanism by which the stub shaft end is secured and maintained in the required stationary position. FIGURE 5 indicates a base of the cylindrical grid with a seated beam inserted removably into the annular reinforcing member by means of sprockets. FIGURE 6 is similar to FIGURE 5 except that inserted into the grid cylinder base reinforcement is a combined beam and cylindrical debris shield, only a section of the debris shield being indicated. FIGURE 7 is an enlarged view of the shaft, the stub shafts as they are related to it, and one of the means by which a cutting edge base frame can be resiliently pointed in a radial direction away from the shafts. FIGURE 8 is a cylindrical perforated grid with a section of grid cut away to expose the affixed annular reinforcing members. FIGURE 9 illustrates a cutting edge base frame with a single cutting edge affixed, a splined projection attached to the undercarriage being the means of relating the assembly to the shaft. FIGURE 10, applicable to modified versions of my invention, indicates a splined projection as it would seat in a similarly shaped hollow standard, each adjustably threaded into a position for recess, the standard and the recesses being sectioned. And FIGURE 11, related to both the preferred and modified forms of my invention, illustrates the two types of dividers used in making the reinforced cylindrical grid, each revealing an accurate surface and a transverse row of tiny projections along and slightly overlapping an edge.

It is expedient at this point to describe more fully certain of the structures already alluded to in the drawings and the text.

A cutting edge base frame 41 comprises at least one cutting edge base 20 and, if more than one cutting edge base 20, connecting means such as the props 42 in supporting and firmly attaching the cutting edge bases 20 to each other. The cutting edge bases 20 in such a structure must be capable, if cutting edges 19 appear on them, of permitting the cutting edges 19 to be aligned so that they will be brought simultaneously into transverse abutment on a radial inclination with the interior surface of the cylindrical grid 1 when the supporting member related to the shaft 27, whether a splined projection 29 or 42 or a hollow standard 30 or 45, is brought into the cooperating position with its mate. Similarly, the cutting edge bases 20 which lack cutting edges 19 must be transversely and radially inclined toward the interior surface of the cylindrical grid 1 so that, depending on the precise type of structure used, will cooperate with the grid 1, exerting at most a minor braking action on the aforementioned grid 1 surface or on the spaced concentric annular members 18 which are affixed circumferentially about the interior surface of the grid 1. Though the cutting edge bases 20 which lack cutting edges 19 may actually contact the interior surface of the grid 1, this is not recommended for it will only serve to multiply the braking action. They may be recessed to conform, as must the cutting edges 19, to the interior configuration of the cylindrical grid 1 as modified by the annular members 18. Thereby they can, without actually abutting the grid 1 surface, make grooved contact with the annular members 18; and this, though not essential, will assist in maintaining the grid 1 properly positioned when the shaver is in use. They need not be grooved, however, merely contacting the annular members 18 on their interior and smaller circumferences. Some of these cutting edge bases 20 may, indeed, be entirely inoperative; they may actually fall short of both the interior surface of the grid 1 and the annular members 18.

From the foregoing it is apparent that a cutting edge base frame 41 may consist of a single cutting edge base 20 or of many joined together. Cutting edges 19, with recesses 64, may be located on one or more of the cutting edge bases 20; they may be ground out of the same stock as the cutting edge bases 20 and be an integral part of them or sharpened to material superimposed on them. Indeed, a combination structure comprising a cutting edge base frame 41 and its component cutting edge bases 20 and props 42, cutting edges 19, and a supporting member (whether a splined projection 29 or 42 or a hollow standard 30 or 45) may be ground or cut out of the same piece of stock instead of comprising separate members fitted and joined together. Finally, there need
actually be no apertures between the cutting edge bases 20, one or more cutting edges 19 projecting correctly directed out of a single platformlike structure.

Variations of my invention may utilize different numbers of cutting edge base frames 41, individually supported and capable of cooperating with each other and with the grid 1 within the limits defined by the interior of the grid 1. And attached to them may be as many cutting edges 19, with recesses 64 to bridge the annular members 18, as may seem desirable. A single cutting edge 19 coating with the perforations 2 of the grid 1 is capable of performing creditably.

The cutting edge base frames 41 need not, in all forms of my invention, be resiliently impelled toward the interior surface of the grid 1. For instance, the non-resilient supporting construction depicted in FIGURE 10 may be utilized. There the splined projection 42 and the hollow standard 45 with its conforming interior 46, the first adjustable threaded by means of its base 44 into the conforming recess 43 and the second by its base 46 indexed into the conforming recess 47, cooperate to provide correct directioning. And whether the splined projection 42 emanates from the shaft 27 and the hollow standard 45 from the undercarriage of the cutting edge base frame 41, as in FIGURE 10, is immaterial; they may be interchangeably positioned. It is important only that they be reciprocated into the shaft 27 and the undercarriage of the cutting edge base frame 41 in such fashion as to permit them to cooperate with each other in performing their common function. The threading feature allows minute adjustments to be made in the combined supporting height of the splined projection 42 and the hollow standard 45 to the end that the cutting edges 19, in a completed assembly, will correctly and barely contact the interior surface of the grid 1. Naturally, as wear occurs further compensating adjustments can be made. Actually, since adjustment is possible by threading only one of the two members, the splined projection 42 or the hollow standard 45, it is mandatory only that one be of threaded construction, the other being inflexibly mounted to its related structure. Incidentally, in the resilient type of construction depicted in detail in FIGURE 7, it is possible to alter the relative positions of the splined projection 29 and the hollow standard 30 by mounting the hollow standard 30 to the undercarriage of the cutting edge base frame 41 and the splined projection 29 to the shaft 27 (provision being made, of course, for the splined projection 29 to be received in the conforming interior of the hollow standard 30).

The cylindrical grid 1 is internally-reinforced by concentric annular members 18 of equal diameter when measured to their outer circumferences. These annular members 18 are permanently affixed so that they circumferentially abut the interior surface of the grid 1. This may be done by a series of steps which I shall now describe.

The annular members 18 are firmly engaged about their internal circumferences and the adjoining sides in the interstices of a vise which, tightened, will maintain them suitably spaced with their accessible outer circumferences on the same cylindrical level. While thus secured, tiny borings 49 are drilled at regular intervals around their outer circumferences, each annular member 18 having its borings 49 in transverse alignment with those of the other annular members 18. This latter step could, of course, have been performed prior to seating the annular members 18 in the vise; for instance, a grid of cylindrical members 18 could have been drilled with suitable borings 49 and subsequently segmented into annular members 18 which could thereafter be aligned in the aforementioned vise.

The grid 1 blank meanwhile has been properly prepared: it has been perforated in two ways, i.e. it has been perforated with minute perforations 2 for engaging the hairs to be shaved and it has also been perforated with larger openings 50 designed to precisely match the borings 49 on the annular members 18; irregularities on its two surfaces have been ground and polished off; and it has been dimensioned so that, stretched and wrapped around the annular members 18, it will be flush with the outer sides of the end annular members 18 while transversely its edges are flush with those of the other in what will eventually become the bonded seam 51.

A simple instrument, which I will call a divider A, is now utilized. It is, in essence, no more than a strong block of material capable of transversely engaging a section of about a quarter of an inch of the outer surface of the grid 1. The side 52 is accurately shaped to conform to the cylindrical contours of the positioned annular members 18 and of the grid 1 blank which will be wrapped around them; tiny projections 53, in a carefully spaced transverse row along and overlapping the edge 56, are fashioned to seat entirely and firmly in the unions of the openings 50 of the grid 1 imposed directly over the borings 49 of the annular members 18. A transverse row of openings 50 of the grid 1 blank adjacent to the intended seam 51 is now engaged by the projections 53 of the divider A, the arcuate side 52 and the outer surface of the grid 1 blank being in contact and the edge 56 facing the remaining transverse rows of openings 50. With the divider A and the grid 1 blank thus related to each other, the projections 53 are next pressed into a transverse row of borings 49 of the annular members 18 with the result that the grid 1 blank is affixed thereon with opposite sides in the affected area flush with the outer sides of the end annular members 18. This combination is temporarily maintained by pressure independently applied to the divider A.

The projections 53 of a second divider A are now inserted into another transverse row of openings 50 of the grid 1 blank, this being done so that the edges 56 of the dividers A face each other with a half inch or so of grid 1 surface intervening. It will now be possible to bring the projections 53 of the second divider A into line with the corresponding borings 49 of the annular members 18. However, the projections 53 will seat in the borings 49 only if pressure is exerted on the second divider A and its projections 53 which will draw taut the grid 1 surface located between the two dividers A. This is done, the projections 53 are seated in borings 49, and the second divider A in its turn is clamped down firmly.

The grid 1 surface flexed between the two dividers A is now accurately taut against the outer circumferences of the annular members 18, the openings 50 are exactly over the borings 49. The combinations of the openings 50 and the borings 49 are now filled with solder or some other suitable bonding material.

When the bonding material has hardened and set, the two dividers A may be disengaged. One of them, however, will thereafter be successively utilized in the second until all of the grid 1 surface except that adjacent to the two final transverse rows of openings 50 closest to the seam 51 is bonded to the annular members 18.

A divider B is now employed on each of the final transverse rows of openings 50. This is utilized in a manner similar to the divider A. The arcuate surface 54 is placed in contact with the surface of the grid 1 so that the projections 53 of the cylindrical members 18 are seated against the borings 49 of the annular members 18. Since alternate openings 50 and the matching borings 49 are left exposed by the recesses 58 in the divider B edge 57, it is possible now to fill these with bonding material. This done, and the grid 1 surface ends properly flexed thereby, the bonding of the remaining openings 50 and the matching borings 49 will present no problem. Nor, thereafter,
should the bonding together of the juxtaposed edges of the grid 1 blank to form the seam 51.

After the bonding material which may project above the openings 50 and the excess above the seam 51 is ground off and the remaining surfaces polished, a smooth cylindrical surface will remain marred only by the slightly projecting seam 51. The remaining cylindrical grid 1 may now be given a thin coat of plating material in order to enhance its appearance.

In assembling the shaver, it is best to begin with the cutting edge base frames 41. The preferred form of my invention will have two counterpoised resiliently-mounted cutting edge bases 41, each designed to be impelled toward transverse abutment with somewhat less than half of the interior surface of the grid 1. This may be accomplished by utilizing hollow standards 30 affixed to and projecting on a radial inclination from opposing sides of the midpoint of the shaft 27 receiving into their conforming interiors splined projections 29, also radially inclined, from centered points in the undercarriages of the cutting edge base frames 41, spiral springs 28 coiled about the unions of the hollow standards 30 and the splined projections 29 thrusting the aforesaid cutting edge base frames 41 away from the shaft 27 and toward opposite areas of the interior surface of the grid 1. As indicated earlier, the positions of the hollow standards 30 and the splined projections 29 may be interchanged without in any way impairing the efficiency of the shaving instrument.

Favor one of the cutting edge base frames 41 having multiple cutting edges 19, with recesses 64 to bridge the annular members 18 of the grid 1 and appearing as integral parts of the cutting edge bases 41. The other cutting edge base frame 41, devoid of cutting edges 19, might have cutting edge bases 20 recessed to conform to the annular members 18 without contact of the interior surface of the grid 1. With the indicated parts thus related to each other it is possible, because of the resilient construction, to press the cutting edge base frames 41 back toward the shaft 27. While maintained in this position, the cutting edge base frames 41-shaft 27 assembly is carefully pushed 36 or threaded into the outer sides of the end annular members 18, the inner sides of the end annular members 18, or in the alternative, if beams 36 are to be avoided, non-resiliently mounted cutting edge base frames 41 must be assisted by counterpoised resiliently mounted cutting edge base frames 41 in order successfully to carry and position the grid 1.

I must here emphasize that the aforesaid substitute assemblies, as is true of the preferred assembly, are complete instruments in their own right; that each of them is capable, without additional elements, of functioning as a shaving apparatus. Nevertheless, to augment their usefulness it is possible and desirable to associate other contributing members with them.

The preferred form of my invention, in conformity with this and other indicated objectives, will have supplementing the counterpoised and resiliently mounted cutting edge base frames 41 combined beams 36 and debris shields 32 seated in the grid 1 end annular members 18, sprockets 38 being utilized as positioning aids. The stub shafts 22, the splined projections 24 and their exposed sections 31, the shaft 27 and its conforming recesses 26, and the hub apertures 37 of the beams 36 will—when related in the manner already described—cooperate with the sprockets 38 in maintaining the combined beams 36 and debris shields 32 seated in the end annular members 18. Finally, these correctly grouped elements may thereafter be seated and secured in the detachable upper section 3 of the two-sectioned casing 61.

Regardless of the difference alluded to above, all of the assemblies mentioned are capable of being housed in the same type of casing 61. In each instance, the stub shaft 22 extends 23 of the assembly are secured in abutment with the narrow inner walls of the upper section 3 of the casing 61 by pressing the generally rectangular ends 23 into the tri-walled conforming enclosures 25, the said enclosures.
25 being in line with and adjacent to the positions which the grid 1 ends must assume. This will automatically locate an approximate semi-cylinder of the grid 1, against whose inner surface cutting edges 19 must abut, in an exposed condition loosely filling the large transverse opening provided for the purpose in the upper section 3 of the casing 61. The exposed semi-cylinder of the grid 1 will rise slightly above the narrow outer opposing walls 59 of the upper section 3 of the casing 61, the walls 59 being adjacent to the grid 1 ends; while the debris shields 32 (if included in the particular assembly) will be lapped but not contacted by the inner surfaces of the walls 59. Cotter pins 33, inserted through the boarings 60 of the enclosure 25 walls and the aligned boarings 39 of the stub shaft 22 ends 23, will maintain and secure these members and their associated elements in the required stationary position in relation to the grid 1 which is free to rotate. Manifestly, we have here again a operative shaving apparatus albeit one susceptible to further refinement.

The hitherto separated sections 3 and 4 of the casing 61 may now be joined together. The arcuate transverse recess 35 in the block 13, which transversely extends completely across the upper portion of the lower section 4 of the casing 61 except for the openings 14 at each end which lead into the chamber 10 directly below, will loosely receive the remaining portion of the cylindrical grid 1. In this arcuate recess 35 are, however, other smaller transverse arcuate recesses 21 which loosely seat rollers 17 suspended on pins 16, one of each pair of pins 16 being retractable so that the pins 16 may be journaled into the bearing material 15 which is bonded to the block 13. These rollers 17 will barely contact the outer surface of the grid 1; and thereby they provide for its support and additional means of traction. Incidentally, the edge of the opposing narrow wall 34 of the lower section 4 of the casing 61 now abuts the opening sides of the enclosures 25 of the upper section 3 of the casing 61; thus, they assist in keeping the stub shaft 22 ends 23 in position. Indeed, the cotter pins 33 are included merely to guard the grid 1 and the members related to it against injury if the sections 3 and 4 of the casing 61 are carelessly separated. Finally, the bolts 5 are positioned to firmly secure the sections 3 and 4 of the casing 61 to each other.

We now have a shaving instrument which will afford the possessor all of the advantages I earlier claimed for it. With the casing 61 grasped between the fingers of one hand, the exposed transverse portion of the cylindrical grid 1 may be pressed against and rolled along the surface to be shaved. The traction thereby generated by the combination of the large and right grid 1 surface intimately contacting the skin, the hairs trapped in the perforations 2 of the grid 1 surface, and the support of the rollers 17 will cause the grid 1 to revolve. The stationary cutting edges 19, located below the exposed portion of grid 1 surface, will coat with the perforations 2 to clip off the trapped hairs. These hairs and the other debris of shaving will, because of the debris shields 32, eventually be guided over the lower section 4 openings 14 through which they will fall into the lower section 4 chamber 10. When the sliding wall 7, positioned in the recesses 8 of the inner walls of the lower section 4, is withdrawn through the opening 9 in one of the side walls of the lower section 4 by grasping and pulling at the handle 6, the refuse of shaving will fall into the chamber 11 (an extension of the chamber 10) of the lower section 4. After the sliding wall 7 is restored to its former position, the debris may remain isolated in the chamber 11 until it is convenient to remove it. This may be done through the trapdoor 12.

Having now described and illustrated my invention, I wish it to be understood that my invention is not to be limited to the specific forms or arrangements of parts herein described and shown.

I claim:

1. A shaving apparatus consisting of: a very thin perforated cylindrical grid flexed taut over and internally reinforced by spaced concentric annular members affixed circumferentially abutting the interior grid surface, at least one of the said annular members positioned between the grid ends; a shaft traversing the grid interior; at least one pair of counterpoised cutting edge base frames mounted on the shaft, at least one of them resiliently impelled toward the interior surface of the grid; and at least one counterpoising cutting edge located on a cutting edge base frame of a cutting edge base frame, radially inclined and retracted to bridge the annular members and transversely abutting the interior grid surface, the cutting edge base frames and their associated components carrying and positively positioning the grid as it rotates subject to traction induced when manually pressed against and rolled on a surface to be shaved.

2. A shaving apparatus according to claim further characterized by a cutting edge base frame with at least one cutting edge base recessed to conform with, to bridge, and to loosely seat on the inner circumferences and the adjacent sides of the annular members reinforcing the grid.

3. In a shaving apparatus of the type characterized by a rotatable perforated cylindrical grid on supporting members and at least one counter cutting edge on its own supporting members contacting the interior surface of the grid, a roller maintained by means of retracting the outer surface of the grid by a casing housing and supporting both.

4. In a shaving apparatus of the type characterized by at least one counter cutting edge on supporting members contacting the interior surface of a very thin perforated rotatable cylindrical grid, the combination of a grid reinforced in at least one end by an annular member affixed circumferentially abutting the interior grid surface; a debris shield protruding from the reinforced grid end consisting of a cylindrical section concentric with the grid but of smaller diameter seated and secured in the said annular member; a block extending transversely across the lower section of a casing housing the apparatus with an opening at an end adjacent to the debris shield; a chamber in the casing, the debris shield and the opening in the block guiding the release of shaving as it leaves the grid end into the said chamber; and a sliding wall between the chamber and an extension of it which may be withdrawn and then restored to its former position so as to isolate the refuse of shaving in the chamber extension until convenient to remove it through a trapdoor.

5. In a shaving apparatus of the type characterized by at least one counter cutting edge on supporting members contacting the interior surface of a very thin perforated rotatable cylindrical grid, the combination of a grid flexed taut over and reinforced at each end by an annular member affixed circumferentially abutting the interior grid surface; a shaft consisting of a central section supplemented by two stub shafts traversing the grid interior on which is mounted the structure supporting the cutting edge; a beam with a hub aperture seated and secured on the line of a diameter in each annular member; and a split projection from each stub shaft loosely encircled by the beam aperture in a beam mating with a conforming recess in an end of the central section of the shaft thereby allowing an end of each stub shaft to come into close contact with the exposed side of a beam while overlapping the hub aperture of the said beam, the stub shafts maintained so engaged by other ends abutting and secured against the opposed walls of a casing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,234,929
Lynch
Mar. 11, 1941

(Other references on following page)
| UNITED STATES PATENTS | | FOREIGN PATENTS |
|----------------------|------------------|
| 2,265,281 Hale Dec. 9, 1941 | 2,839,829 Knapp June 24, 1958 |
| 2,296,095 Dalkowitz Sept. 15, 1942 | 2,858,607 Kane Nov. 4, 1958 |
| 2,331,646 Arey Oct. 12, 1943 | 2,890,522 Bulova et al. June 16, 1959 |
| 2,332,379 Harris Oct. 19, 1943 | | |
| 2,346,489 Horner Apr. 11, 1944 | 621,156 Great Britain Apr. 24, 1949 |
| 2,363,849 Bailey Nov. 28, 1944 | 1,050,751 France Sept. 9, 1953 |
| 2,423,177 Cuniffe July 1, 1947 | 1,052,570 France Sept. 23, 1953 |
| 2,547,104 Whitton Apr. 3, 1951 | 1,237,450 France June 20, 1960 |
| 2,803,874 Obolensky Aug. 27, 1957 | |
