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APPARATUS FOR MAKING HOLLOW GROUND RAZOR BLADES.

APPLICATION FILED FEB. 9, 1921.

1,425,798. Patented Aug. 15, 1922.

Fig. 1.

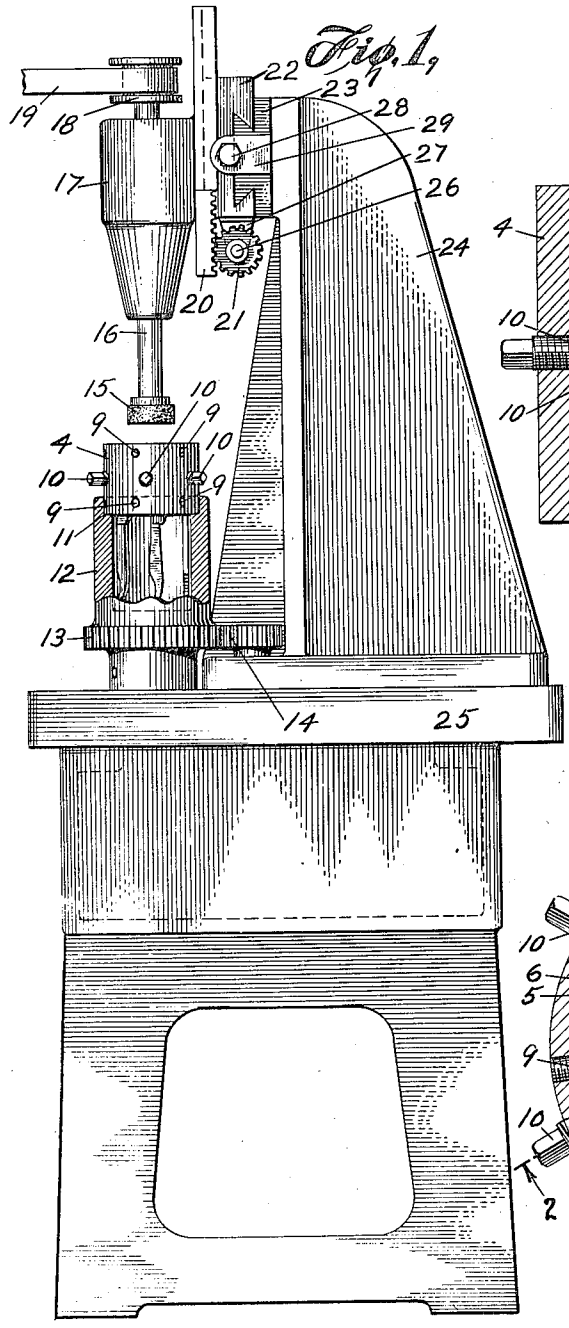


Fig. 2.

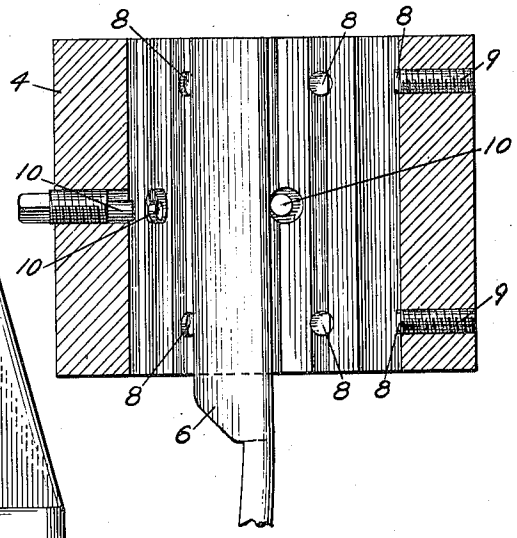
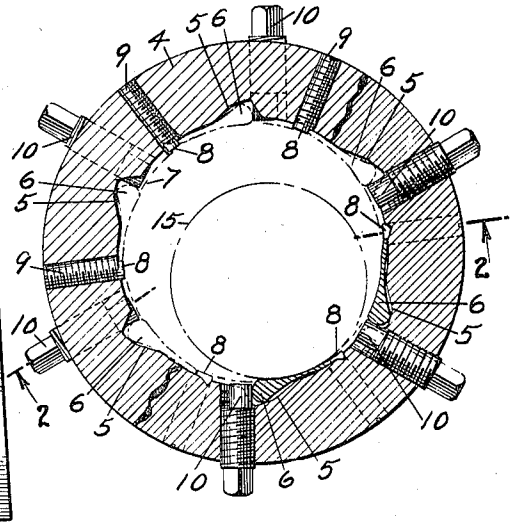


Fig. 3.



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APPARATUS FOR MAKING HOLLOW-GROUND RAZOR BLADES.

1,425,798. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed February 9, 1921. Serial No. 443,516.

To all whom it may concern:

Be it known that I, THOMAS C. SHEEHAN, a citizen of the United States, residing at Upper Montclair, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Apparatus for Making Hollow-Ground Razor Blades, of which the following is a specification.

This invention relates to an apparatus for making hollow-ground razor blades of the type and by the method disclosed in my copending application, Serial No. 443515, filed February 9th, 1921.

When other properties are equal, the efficiency of such razor blades depends upon their form, particularly their cross-sectional form; and although it has long been considered highly desirable that the form of each blade of a particular type be exactly like all others of that type, it is well known that even the most carefully made razor blades vary in efficiency and this highly desirable result has never been attained.

It has been discovered that the cause of the difficulty lies in unequal and otherwise imperfect grinding resulting from the use of the various grinding methods heretofore known. In all known methods, the inevitable wearing away of the grinding instrument affected the form of hollow-ground blades in such manner as to render impossible the manufacture of an infinite number of blades exactly alike in form. It has been further discovered that the difficulty can be overcome by positioning a blade with one surface to be ground slightly within a constant circle wholly unaffected by the wearing away of the grinding instrument, the radius of said circle being determined by and equal to the radius of said surface when ground, which radius determines the concavity of the blade, then grinding said surface to said circle, and then repeating the grinding operation on the opposite side of the blade; thus producing a razor blade the opposite surfaces of which are equally hollow-ground to a constant circle the radius of which is equal to the radius of each surface,—whereby each blade will be exactly like all others made by the same method. The underlying object of the present invention is the production of razor blades of the highly efficient type just described.

In the accompanying drawings, which form a part of this specification and in which like characters of reference indicate the same or like parts, Fig. 1 is an end elevation, partly in section, of an apparatus constructed in accordance with the invention; Fig. 2 is an enlarged longitudinal sectional view of the blade positioning chuck shown in Fig. 1, illustrating a blade locked in said chuck; and Fig. 3 is a stepped cross-sectional view of the structure shown in Fig. 2.

In carrying the invention into effect, there is provided means for positioning a razor blade with the surface to be ground slightly within a constant circle the radius of which is determined by and equal to the radius of said surface when ground, which radius determines the concavity of the blade, grinding means operative within said circle, and means for producing a relative rotating movement of said positioning means and said grinding means, whereby all blades are ground to exactly the same cross-sectional form when both sides have been ground to the same constant circle. In the best constructions, the positioning means is rotated about the grinding means, and there are further provided means for similarly grinding a series of blades in a single operation, means for moving the grinding means longitudinally within the constant circle, and means for adjusting the grinding means to the constant circle as the former wears away. All of said means may be widely varied in construction within the scope of the claims.

The apparatus selected to illustrate the invention is but one of many possible concrete embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

Referring to the drawings, 4 is a chuck provided with a series of recesses 5 cut in its inner wall and each adapted to receive a razor blade 6, the surface of each blade being positioned slightly within a constant circle 7 within the chuck and determined, as before indicated, by the designed concavity of the blade. As shown, each blade is held in position by means of ledges 8 formed on the ends of studs 9 threaded in the wall of the chuck, and coacting eccentric clamping devices 10 also threaded in the chuck wall. The chuck fits in a rabbeted seat 11 formed on a hollow support 12 adapted to receive the shanks of the blades and provided with

a gear 13 driven by a pinion 14 deriving its motion from a suitable source of power, not shown.

When the blades are positioned in the chuck and the chuck is mounted in its support 12, one surface of each blade to be ground is acted upon by a grinding wheel 15 operative within the constant circle 7 and the chuck 4. As shown in Fig. 1, this grinding wheel is in the position it occupies when about to begin the grinding operation. The wheel 15 is mounted on and rotated by a spindle 16 journaled in a grinding head 17 of a well known type. Upon the upper end of the spindle is fixed a pulley 18 which is driven by means of a belt 19 from a suitable source of power, not shown.

The head 17 is movable both longitudinally and laterally. Its longitudinal movement is produced by the co-action of a rack 20 secured to the head, and a pinion 21. The rack 20 is slidably mounted in an adjustable block 22 laterally dove-tailed on a fixed bar 23 supported by a bracket 24 rising from the main frame 25 of the apparatus. The pinion 21 is mounted on a short shaft 26 journaled in lugs 27 depending from the adjustable block 22. The block 22 is adjusted by means of two set screws 28 threaded in lugs 29 secured to the bracket 24 before referred to. Only one of these screws is shown, but it will be readily understood that the other is on the opposite side of the block 22, and that the block is adjusted by and locked between the two, in a well known manner. The pinion and rack mechanism is operated by a handle bar in the shaft 26, not shown but of the type usual in such mechanisms.

By means of the adjusting screws 28, the grinding wheel 15, shown in full lines in Fig. 1 and indicated by the broken line 15 in Fig. 3, is adjusted to the constant circle 7, and when the grinding head 17 carrying the wheel 15 is fed downward by the operation of the rack and pinion mechanism, the unground surfaces of the blades in the chuck will be engaged by the wheel. The grinding wheel rotates at high speed, while the chuck rotates at low speed. As the chuck rotates, the grinding wheel engages the blades therein successively and grinds them all exactly to the constant circle 7, in a single operation.

As the wheel wears away, the head 17, carrying the wheel with it, is adjusted laterally by means of the screws 28 until the periphery of the wheel at one point coincides with the constant circle 7. The change in the diameter of the wheel due to wear has no effect whatever upon the radius of the constant circle and consequently has no effect whatever upon the concavity of the blades, because it is the relative rotative movement of the chuck and wheel which controls the actual grinding,—and so the blades will always be ground to the same constant circle, regardless of the wearing away of the grinding wheel.

When one side of the blades have been thus ground to the constant circle, the chuck is removed from its support and the ground blades are released therefrom by manually turning the eccentric clamping devices less than half a revolution. The blades are then reintroduced into the chuck with their shanks extending in the opposite direction, and are then clamped in position by a reverse manual operation of the clamping devices 10. The chuck is then reseated in its support 12 in reverse position. As a result of this manual operation, the blade shanks lie within the support as they did before, but the opposite sides of the blades are presented to the grinding wheel. In the use of this particular apparatus, it is customary to have a spare chuck which the operator loads with a series of blades already ground on one side, while the apparatus is performing the initial grinding operation on another series of blades.

As beards vary in stiffness, so razor blades should vary in stiffness. For this reason, it is customary to make high-grade razors of three different degrees of stiffness, and this result is obtained by varying the concavity of the blades in the different types, thus varying their thickness. In the practice of the present invention, this result is attained by utilizing three constant circles of different radii associated with three chucks of different diameters, all of the blades of each type being exactly alike in form and in stiffness.

What is claimed is:

1. In an apparatus for hollow-grinding razor blades, the combination with means for positioning a blade with the surface to be ground slightly within a constant circle the radius of which is equal to the radius of said surface when ground, of grinding means operative within said circle, and means for producing a relative rotating movement of said positioning means and said grinding means.

2. In an apparatus for hollow-grinding razor blades, the combination with means for positioning a blade with the surface to be ground slightly within a constant circle the radius of which is equal to the radius of said surface when ground, of a high-speed rotating grinding wheel operative within said circle, and means for producing a low-speed relative rotating movement of said positioning means and said wheel.

3. In an apparatus for hollow-grinding razor blades, the combination with means for positioning a blade with the surface to be ground slightly within a constant circle the radius of which is equal to the radius of said surface when ground, of grinding means operative within said circle, and means for ro-

tating said positioning means about said grinding means.

4. In an apparatus for hollow-grinding razor blades, the combination with means for positioning a blade with the surface to be ground slightly within a constant circle the radius of which is equal to the radius of said surface when ground, of grinding means operative within said circle, means for producing a relative rotating movement of said positioning means and said grinding means, and means for adjusting said grinding means to said circle as said grinding means wears away.

5. In an apparatus for hollow-grinding razor blades, the combination with means for positioning a blade with the surface to be ground slightly within a constant circle the radius of which is equal to the radius of said surface when ground, of grinding means operative within said circle, means for producing a relative rotating movement of said positioning means and said grinding means, means for moving said grinding means longitudinally within said circle, and means for adjusting said grinding means to said circle as said grinding means wears away.

6. In an apparatus for hollow-grinding razor blades, the combination with a chuck provided with clamping devices for positioning a series of blades with the surfaces to be ground slightly within a constant circle within said chuck the radius of said circle being equal to the radius of each of said surfaces when ground, of grinding means operative within said circle and chuck, and means for producing a relative rotating movement of said chuck and said grinding means.

7. In an apparatus for hollow-grinding razor blades, the combination with a chuck provided with ledges and coacting eccentric clamping devices for positioning a series of blades with the surfaces to be ground slightly within a constant circle within said chuck the radius of said circle being equal to the radius of each of said surfaces when ground, of grinding means operative within said circle and said chuck, and means for rotating said chuck about said grinding means.

8. In an apparatus for hollow-grinding razor blades, the combination with a chuck provided with ledges and coacting eccentric clamping devices for positioning a series of blades with the surfaces to be ground slightly within a constant circle within said chuck the radius of said circle being equal to the radius of each of said surfaces when ground, of a high-speed rotating grinding wheel operative within said circle and said chuck, means for rotating said chuck about said wheel at low speed, means for moving said wheel longitudinally within said chuck, and means for adjusting said wheel to said circle as said wheel wears away.

In testimony whereof, I have signed my name to this specification.

THOMAS C. SHEEHAN.