Nov. 13, 1934. G. HOFMANN 1,980,202

SAFETY RAZOR

Filed Sept. 16, 1932

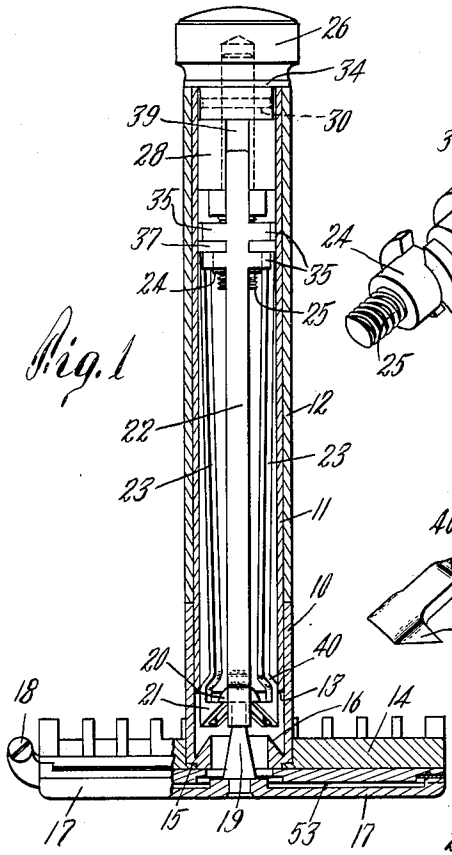


Fig. 1

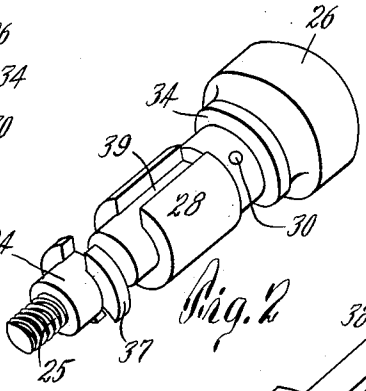


Fig. 2

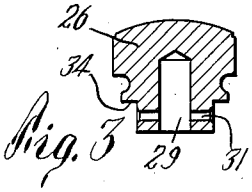


Fig. 3



Fig. 4

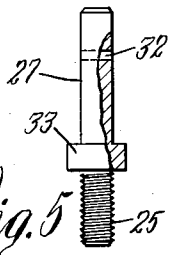


Fig. 5

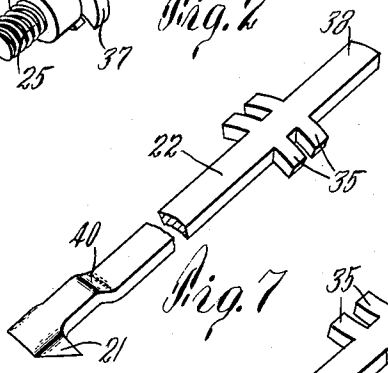


Fig. 7

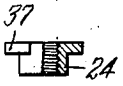


Fig. 6

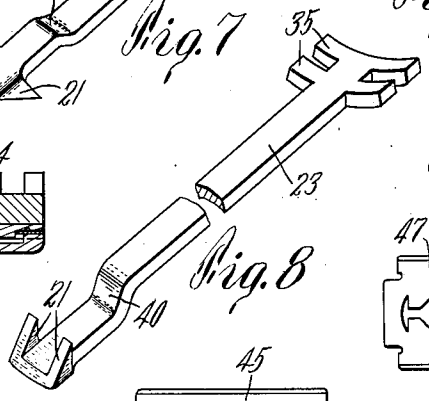


Fig. 8

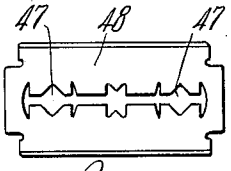


Fig. 13

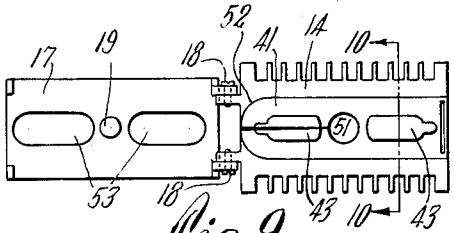


Fig. 9

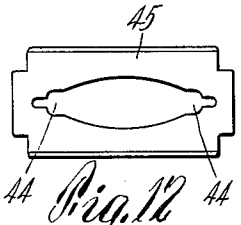


Fig. 12

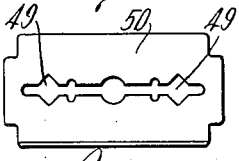


Fig. 14

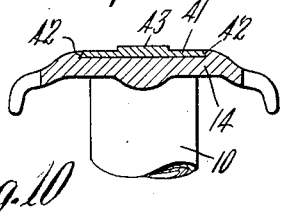


Fig. 10

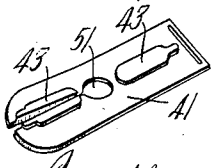


Fig. 11

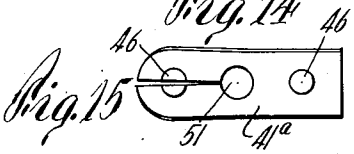


Fig. 15

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Patented Nov. 13, 1934 1,980,202

UNITED STATES PATENT OFFICE

1,980,202

SAFETY RAZOR

George Hofmann, Boston, Mass.

Application September 16, 1932, Serial No. 633,446

11 Claims. (Cl. 30—12)

This invention relates to razors of the type in which separate blades are used, and more particularly to that class of such razors in which the handle, the guard, and the cooperative blade holding clamp are all permanently connected together.

Its objects is to provide a razor of this type of simplified construction, capable of being manufactured and assembled in quantities at low cost, and having provisions for adapting it to use blades of a wide variety of designs. In the embodiment here illustrated it is similar in principle to the razor disclosed in my prior Patent No. 1,879,900, granted September 27, 1932; with respect to which it comprises structural improvements of the character above referred to.

In the drawing,—

Fig. 1 is a sectional view on an enlarged scale of the preferred form of razor embodying all the improvements of this invention;

Fig. 2 is a perspective view on a still larger scale of the screw and nut assemblage by which the clutch jaws for securing the blade clamp are operated;

Figs. 3, 4, 5 and 6 are respectively sectional views, and an elevation, of the parts of this assemblage;

Figs. 7 and 8 are perspective views of two of the clutch jaws;

Fig. 9 is an end view of the guard plate with a blade adapter thereon, showing the blade clamp swung aside in open position;

Fig. 10 is a detail section of the guard plate and adapter taken on line 10—10 of Fig. 9;

Fig. 11 is a perspecive view of the adapter shown in Fig. 9;

Fig. 12 is a plan view of one of the designs of detachable blades which may be positioned by the aid of the adapter shown in Figs. 9 and 11;

Figs. 13 and 14 are similar views of other forms of blade;

Fig. 15 is an adapter for the blades shown in Figs. 13 and 14.

Like reference characters designate the same parts wherever they appear in all the figures.

I will now describe in complete detail the specific razor, and the parts thereof, depicted in the foregoing drawings, but with the understanding that, whereas all novel details are claimed as features of the invention, nevertheless the novel features and characteristics of more generic scope are not restricted to these details.

The handle is a composite sleeve or tube consisting of a relatively short tube section 10, a tube section 11 extending and fitting at one end within the section 10, in which it is immovably secured, and an outer sleeve 12 surrounding the tube 11 and abutting against the end of tube 10. This construction provides an internal shoulder 13 within the tube section 10, which has a mechanical function later described, and is constituted by the extremity of tube 11. The same construction enables the outer sleeve 12 to be made of some material which has ornamental qualities, but need not have any substantial mechanical strength or durability. Tube sections 10 and 11 provide the necessary mechanical strength of the handle and the mechanical reaction for operating the clutch jaws later described.

The end of the handle constituted by the tube section 10 is fitted and tightly secured in a hole in a guard plate 14, and is made with a rabbeted shoulder 15 which limits its penetration into such hole from the back or upper side of the guard plate. Within the tube section 10 near its inner end (the end next to the guard plate) is an internal shoulder 16 having an outer cam or wedge face.

The guard plate 14 is or may be of similar character to those provided with the familiar safety razors in common use; and, besides its function of protecting the face from being cut by the blade, cooperates with a clamp plate 17 in positioning and securing the blade for shaving. The clamp plate is permanently connected to the guard by a hinge consisting of pivot screws 18 seated in overlapping lugs which project from the guard and clamp respectively.

The clamp plate is of suitable design to cooperate with the guard plate in securing the blade, and carries a headed stud 19 which, when the clamp is in blade securing position, as shown in Fig. 1, projects into the tubular handle beyond the shoulder 16 thereof.

The head 20 of stud 19 provides an abrupt shoulder adapted to be underlapped by clutch jaws 21 which are formed on the extremities of strips or bars 22 and 23. Said bars in turn are coupled with a nut 24 which meshes with, and is propelled endwise, by a screw 25, to which a knob 26 at the outer end of the handle is secured.

Screw 25 has a relatively long non threaded shank 27 fitted rotatably in a sleeve or bushing 28 and protruding at one end therefrom into a socket 29 in the knob. A pin 30 passes through registering holes 31 and 32 in the knob and screw shank to secure them together. A shoulder 33 surrounds shank 27 at a distance from the nearer end of the knob (when the latter is thus pinned to the screw) approximately equal to the length of the sleeve 28; such shoulder and the knob providing end thrust bearings for the screw.

The outside diameter of bearing sleeve 28 is so related to the inside diameter of the handle tube 11 that it can be passed into the tube from the open outer end of the latter, but only with the exertion of force against substantial frictional resistance. In other words, the bearing sleeve has a forced, or friction tight, fit in the handle

whereby it is held immovable after having once been forced into place. It is inserted to the extent that a shoulder 34 on the knob comes to bear on the end of the handle tube and, by overlapping the outer sleeve 12 thereof, holds the latter in place.

The three, more or less, clutch bars are loosely interlocked with the nut 24 by laterally projecting lugs 35, on one or both sides of each bar, and segments 37, or parts of an interrupted flange, on the nut which embrace the bars and are embraced in turn by the lugs 35. One of the clutch bars, as 22, (or more than one if desired, but one is enough), has an extension 38 which slidingly occupies a longitudinal groove 39 in the outside of the bearing sleeve 28, whereby the clutch bars and nut are prevented from rotating when the screw is turned. In other words, the extension 38 is a key or spline which resolves rotation of the knob into endwise movement of the nut. Such movement is transmitted to the clutch bars by the sectors 37 and lugs 35. The parts last described are adapted to be put together in a unit assemblage, and as such inserted into the handle at the open end thereof remote from the guard.

The jaws 21 are located at the extremities of the bars by which they are respectively carried, and are substantially square to the axis of stud 19 whereby to interlock with the head of the stud, while at their other side they are inclined or beveled so as to cooperate with the cam face of abutment 16. Adjacent to these jaws, the bars are provided with inclined cam or wedge surfaces 40 to cooperate with the abutment shoulder 13. The space between abutments 13 and 16 is wide enough to receive the clutch jaws and the cam faces 40 between them; and the inner circumference of the abutment 16 is nearer to the axis of the handle than the outer extremities of the wedge faces of the jaws. Thus when the jaws are advanced toward the clamp plate they are intercepted and spread apart by the shoulder 16, thereby releasing the stud of the clamp plate; and when they are withdrawn, the cam faces 40 react on the abutments 13 and crowd them toward the axis of the handle so that they underlap the head of the stud, provided the stud has first been inserted into the handle by closing of the clamp plate 17 against the guard. The stud is of such length that its head passes within the projected position of the jaws before the clamp is brought tightly against a blade, and is arrested short of the withdrawal limit of the jaws when the clamp comes to bear against the guard plate. There is enough looseness in the connection between the nut and the jaw carrying bars, having regard to the length of the latter, to permit swinging of the jaws between their stud holding and stud releasing positions, without necessity of flexing the bars; although the bars may be sufficiently flexible to spring between these positions in the absence of such looseness.

An important advantage of the jaw operating means thus described is that such means are positive for both opening or spreading the jaws and closing them inward; which obviates necessity of relying on any property of resilience which the jaws or their carrying bars may possess for performing either of these actions; and avoids liability of failure to function properly due to loss of resilience.

The type of razor here shown is adapted to take flexible double edged blades. Many blades of this character are on the market, having different designs of interior openings to cooperate with complemental locating or positioning projections on either the guard or the clamp, or both. Three of such different blades are shown in Figs. 12, 13 and 14. It is a part of my invention to provide interchangeable adapters by which all these, and a great many more diverse designs of blade, may be used in the same razor. I have made such adapters as thin plates 41, 41*a* (Fig. 15) fitted to slide in a shallow longitudinal groove, having parallel undercut sides 42 in the outer face of the guard. The adapted 41 shown in Figs. 9 and 11 has protuberances 43 complemental to the end configurations 44 of the slot in blade 45; while the adapter 41*a* has different protuberances 46 suitable to engage the boundaries of slot enlargements 47 in the blade 48, and corresponding enlargements 49 in blade 50, at a sufficient number of points to centralize and position either blade. Other adapters have equivalent projections suited to the slot or hole configurations of still other blades. I deem it unnecessary to show herein all the adapters which I have designed to accommodate substantially all of the double edged razor blades now on the market, as the principle is sufficiently illustrated by the two specific adapters here shown. Different adapters have projections complemental to holes or slots of different blade designs at a sufficient number of points to position such blades; all are fitted to the same undercut groove of the guard plate; and all have a hole 51 for passage of the stud 19 on the clamp plate. In order to hold adapters with a firm resilient friction, they are preferably split inward from one end and spread to a width slightly greater than the width between the edges 42 of the receiving groove, whereby they are caused to exert an outward spring pressure against such edges. The adapters are of course made with appropriate length to bring their blade-locating abutments 43, 46, etc. in the right locations; and the adapter-receiving groove in the guard plate has a corresponding length, preferably with a limit stop or stops 52 at one end. The clamp plate 17 has recesses 53 of dimensions and depth great enough to accommodate the blade positioning abutments of all the interchangeable adapters.

The design of the operating parts herein described is such that they may be made by methods of quantity production at minimum cost. Thus the clutch bars 22 and 23 may be stamped from sheet metal, the jaws proper or latch elements 21 being originally cut as tabs protruding from the opposite sides of the bar, and afterwards bent up into planes parallel to one another. This bending operation may be performed in a press, conveniently in the same press which offsets the bar to form the cam surface 40, and in the same operation. The tube section 10 of the handle with its internal cam shoulder 16 and its external stop shoulder 15 may be formed in an automatic screw machine from solid bar stock or thick walled tubing. So also may the operating screw, the operating nut, the bearing for the shaft of the screw, and the operating knob, all be made by automatic screw machines. In making the nut by this means it is first turned down externally from a rod of approximately the diameter of the sectors 37, leaving a continuous flange, which is then notched by a punch to provide the spaces between sectors in which the clutch bars are received. However, although these details are preferred and useful features of the invention, they are not limiting factors, for the operating elements may be made in other ways. For example, the cam

shown at 16 need not be a continuous conical shoulder made by counterboring the interior of the tube, but may comprise a series of discontinuous cam elements, one for each of the jaw members, made in other ways.

What I claim and desire to secure by Letters Patent is:

1. In a safety razor comprising a handle, a guard secured to the handle, a clamp hinged to the guard, a stud connected to the clamp so arranged as to protrude into or toward the adjacent end of the handle when the clamp is in blade gripping position, clutch jaws within the handle constructed for releasable interlocking engagement with the stud, and means for moving said jaws endwise; abutments spaced apart from one another longitudinally in the handle and cooperative cam elements on the jaws arranged to react with said abutments so as to engage the jaws with the stud when they are moved endwise in one direction and to release them from the stud when so moved in the opposite direction.

2. In a safety razor comprising a handle, a guard secured to the handle, a clamp hinged to the guard, a stud connected to the clamp so arranged as to protrude into or toward the adjacent end of the handle when the clamp is in blade gripping position, laterally separable clutch jaws longitudinally movable in the handle arranged to receive the stud between them, and means for moving the jaws endwise; cooperative abutments on the handle and cam elements on the jaws organized to spread the jaws apart clear of the stud when moved toward the clamp, and other abutments and cam elements on handle and jaws respectively organized to close the jaws into engagement with the stud when moved away from the clamp.

3. In a safety razor having a hollow handle, a blade guard, and a cooperating blade clamp equipped with a stud insertable into such handle, a screw rotatably mounted in the handle, a nut threaded upon said screw, clutch jaws cooperative with said stud having bars or shanks detachably coupled to the nut to permit inward and outward displacement of the jaws with respect to the axis of the handle, cam faces on the jaws and complemental abutments in the handle for positively crowding the jaws inward when transported by the nut in one direction, and other complemental cam faces and abutments for positively moving the jaws outward when transported in the opposite direction.

4. In a safety razor as set forth in claim 3, the construction in which the last named cam faces and abutments are longitudinally spaced apart from the first named cams and abutments and are located nearer to the clamp.

5. The combination consisting of a tube having an internal bearing, a screw shaft rotatably mounted in said bearing and prevented from endwise movement with respect thereto, a nut threaded on said screw having outstanding flange sections with intermediate spaces, clutch bars contained in the spaces between said sections and having outstanding lugs embracing the sections and having inwardly extending clutch jaws, and cooperating cam means on the clutch jaws and within the tube respectively for moving the jaws radially inward and outward with displacement of the jaws longitudinally in respectively opposite directions.

6. A safety razor comprising a tubular handle, a guard secured to one end of said handle, a bearing sleeve fitted friction tight in the handle near the opposite end thereof, a shaft rotatable in said bearing having an external knob beyond the end of the handle and including end thrust shoulders and a screw projecting from the bearing sleeve toward the guard end of the handle, a nut threaded on said screw, bars engaged with the nut at different sides thereof with means to prevent relative tangential and axial movement, one of said bars having longitudinally slidable, rotation preventing engagement with the bearing sleeve, clutch jaws on the bars at points remote from the nut, and means in the handle for effecting a positive radial movement of said jaws, both outward and inward, with longitudinal movement of the bars in respectively opposite directions.

7. In a safety razor as set forth in claim 6, the means for so moving the clutch jaws radially which comprises wedge abutments arranged to engage the jaws with outward wedging effect when the nut is moved away from the bearing sleeve, and complemental edging abutments spaced longitudinally away from the first named abutments arranged to crowd the jaws inwardly when propelled toward the bearing sleeve.

8. An assemblage of clutch jaws and operating means for use with a razor of the character described comprising longitudinal bars having clutch jaws adjacent to one end and laterally projecting lugs adjacent to the opposite end, a nut having projecting sectors with spaces between them adapted to be interlocked with said bars by receiving the latter in the spaces between said sectors with the lugs embracing the respectively adjacent sectors, a shaft having a screw portion fitting said nut, a bearing sleeve in which said shaft is rotatably confined with means to prevent relative endwise movement, said bearing sleeve being tightly fitted to the interior of the razor handle.

9. The assemblage as set forth in claim 8 and comprising further an extension from one of said bars and a longitudinal slot or groove in the exterior of said bearing sleeve in which such extension is received, whereby rotation of the nut and bars relative to the sleeve is prevented.

10. A safety razor comprising a handle, a guard and a clamp, said guard and clamp being cooperable to grip and release a detachable blade and one of them having a guideway with undercut opposite sides, and a slide fitted to said guideway having edges complemental to said opposite sides for interlocking engagement therewith, said slide having centering means for a blade and being split for a portion of its length between said edges, and spread apart at the split, whereby to exert resilient frictional holding pressure against the sides of the guideway.

11. In a safety razor, a guard and means for holding a detachable blade against one face of the guard, a portion of said face being made as a separable slide and the body of the guard having a guideway with undercut opposite sides complemental to such slide and the opposite edges thereof; the slide having centering means for a blade and being split at one end longitudinally between said opposite edges and being spread apart at the split whereby to exert frictional retaining pressure against the sides of the guideway.

GEORGE HOFMANN.