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COMBINATION SAFETY RAZOR AND HONING DEVICE

3 Sheets-Sheet 1



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3,101,536

COMBINATION SAFETY RAZOR AND HONING DEVICE

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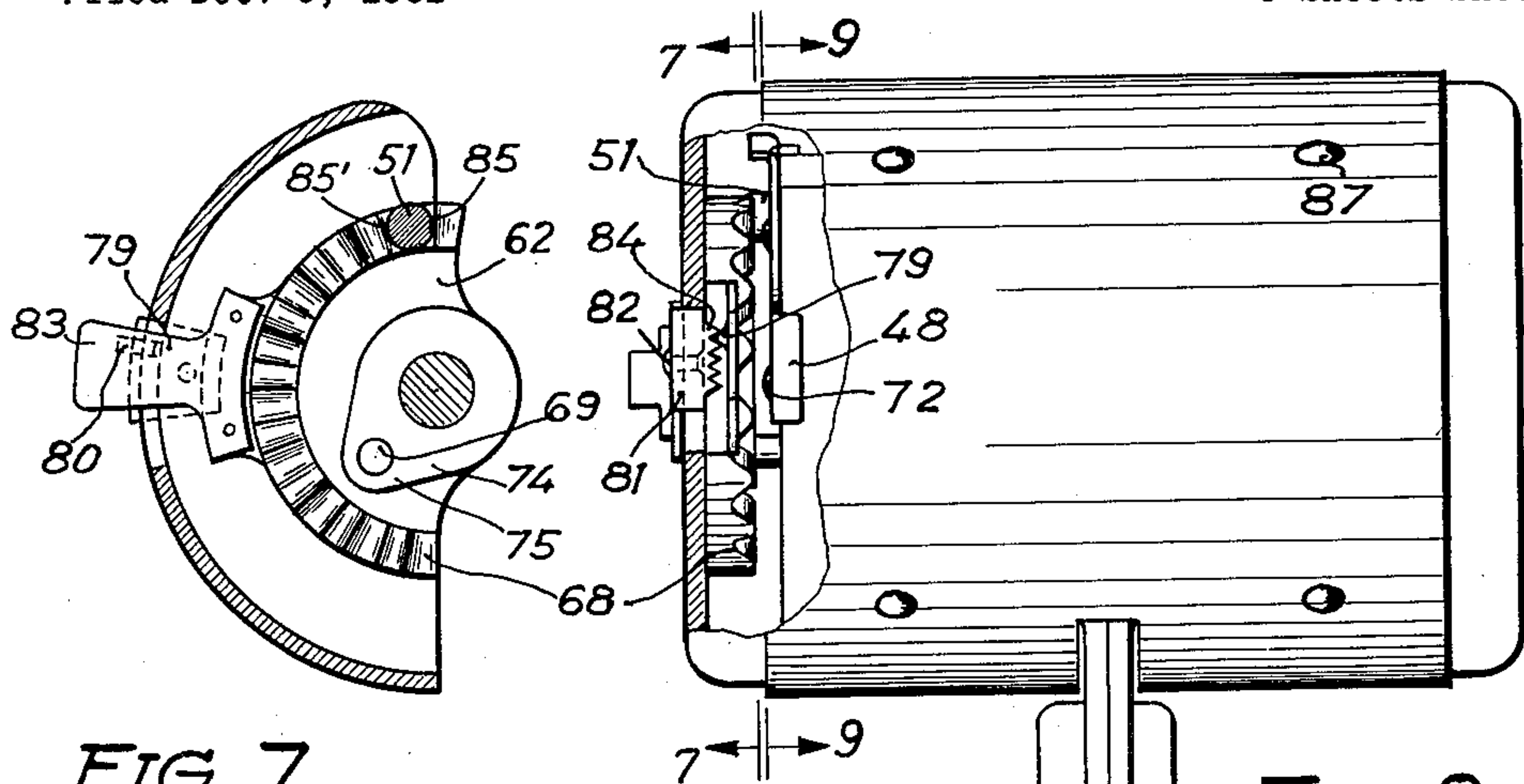


FIG. 7.

FIG. 8.

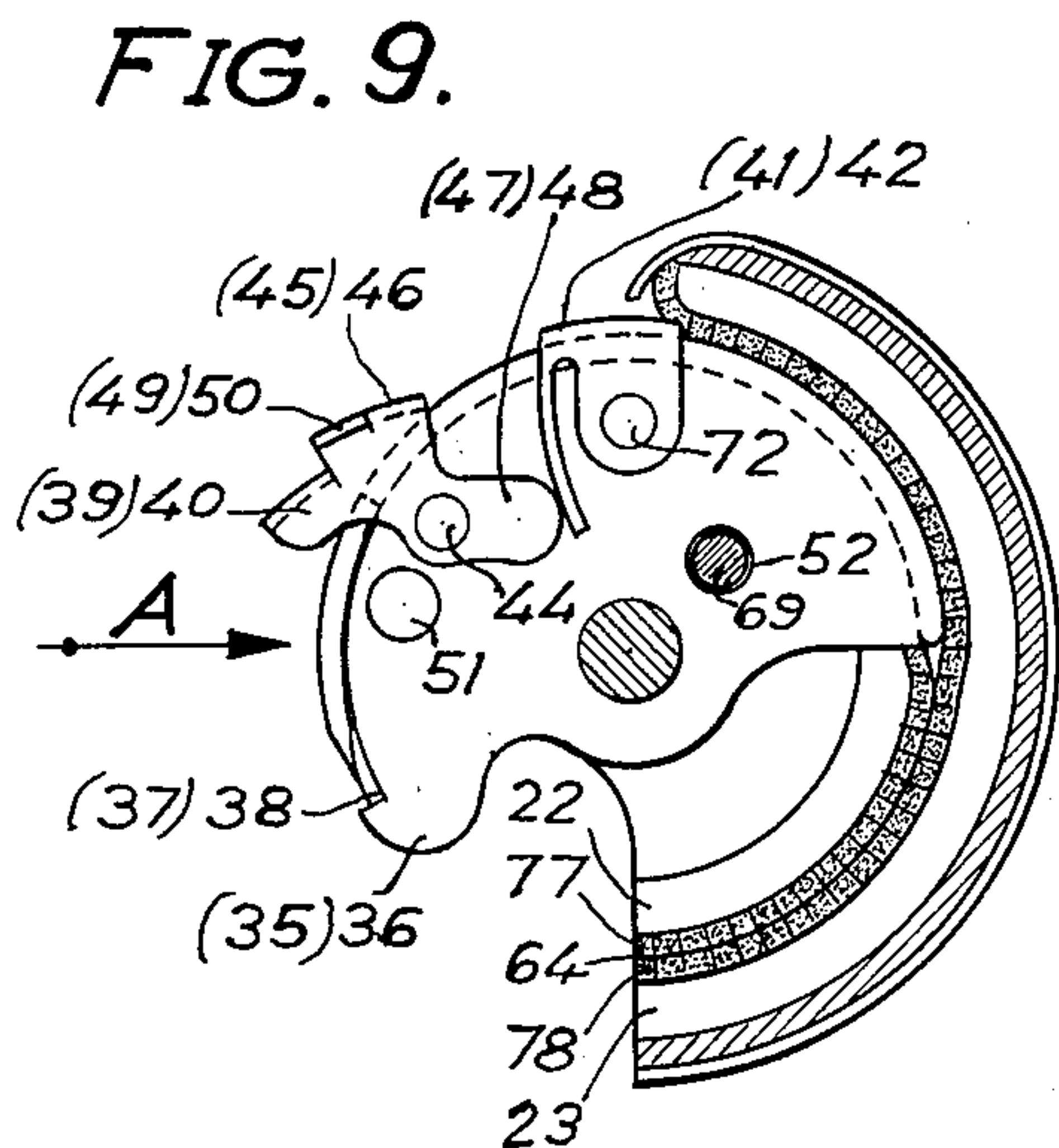


FIG. 9.

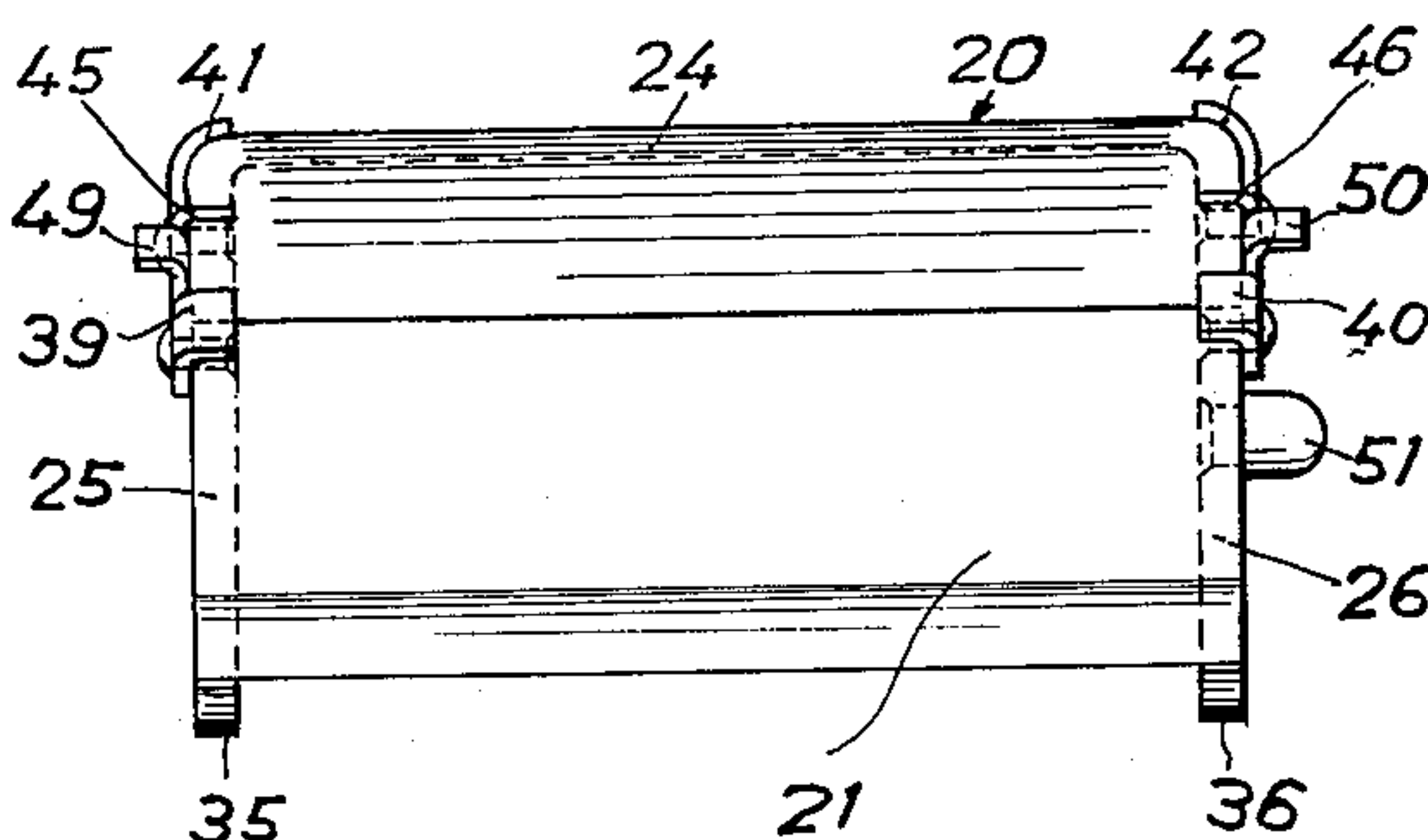


FIG. 11

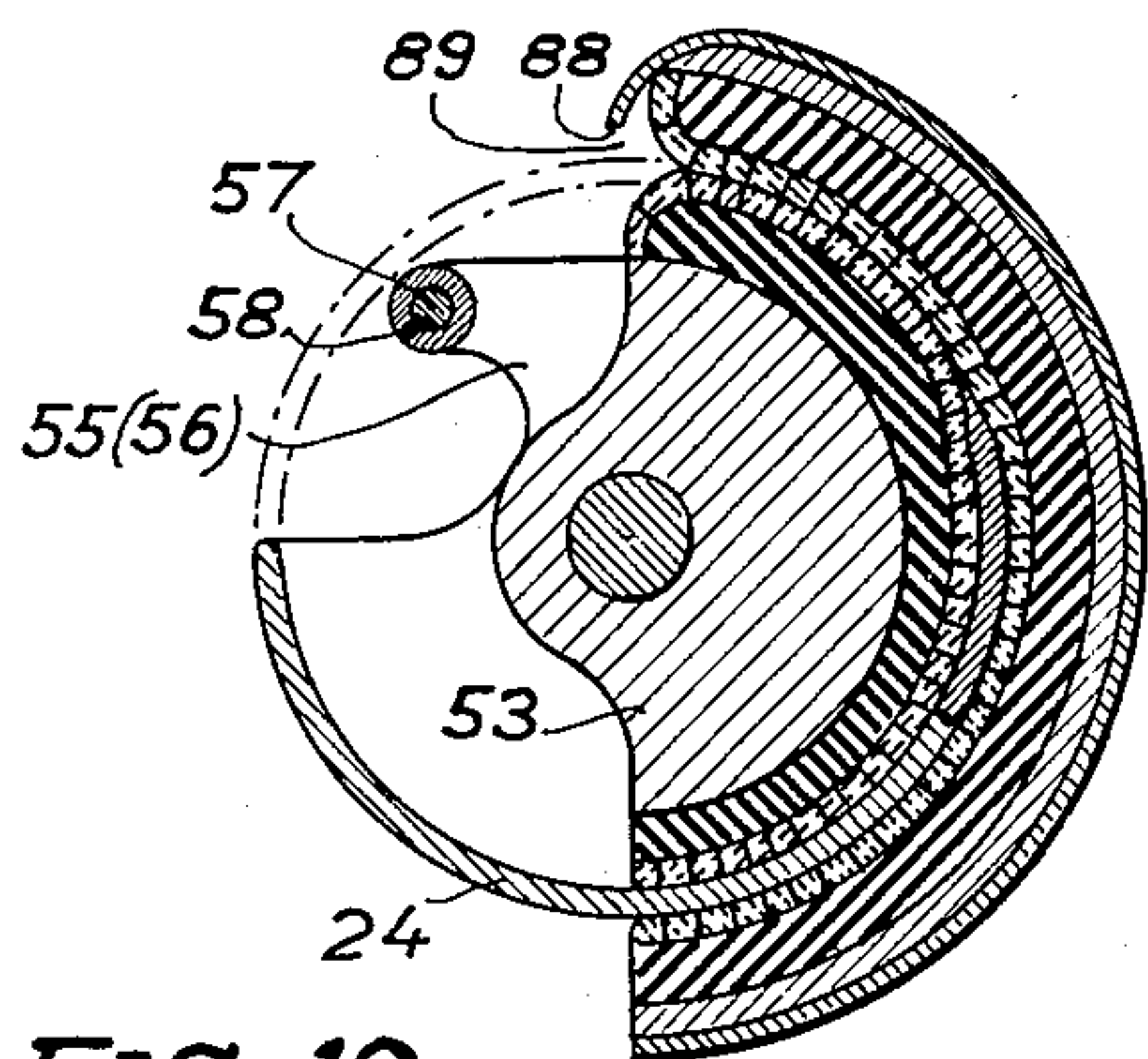


FIG. 10.

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COMBINATION SAFETY RAZOR AND HONING DEVICE

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3 Sheets-Sheet 3

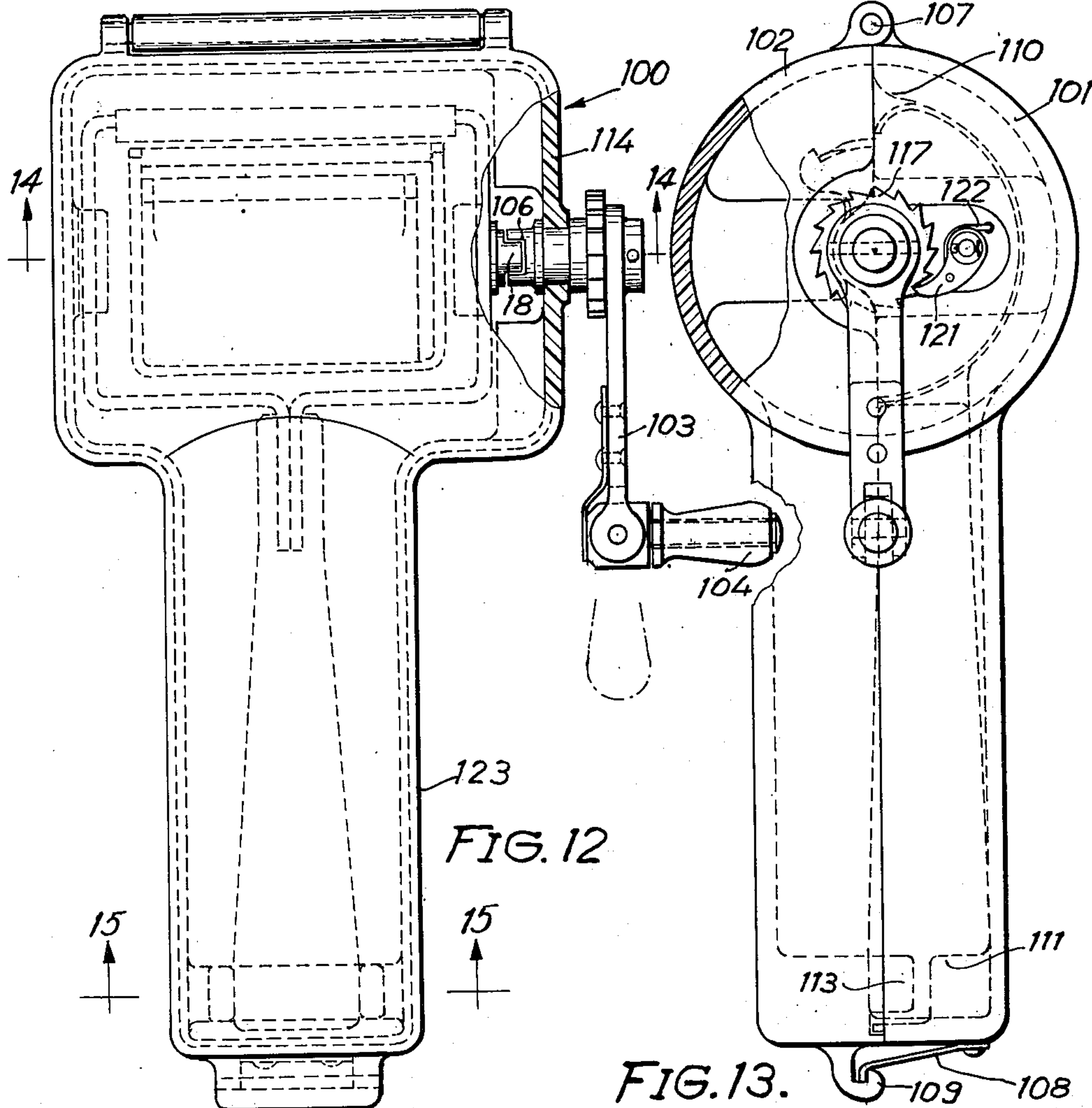


FIG. 14.

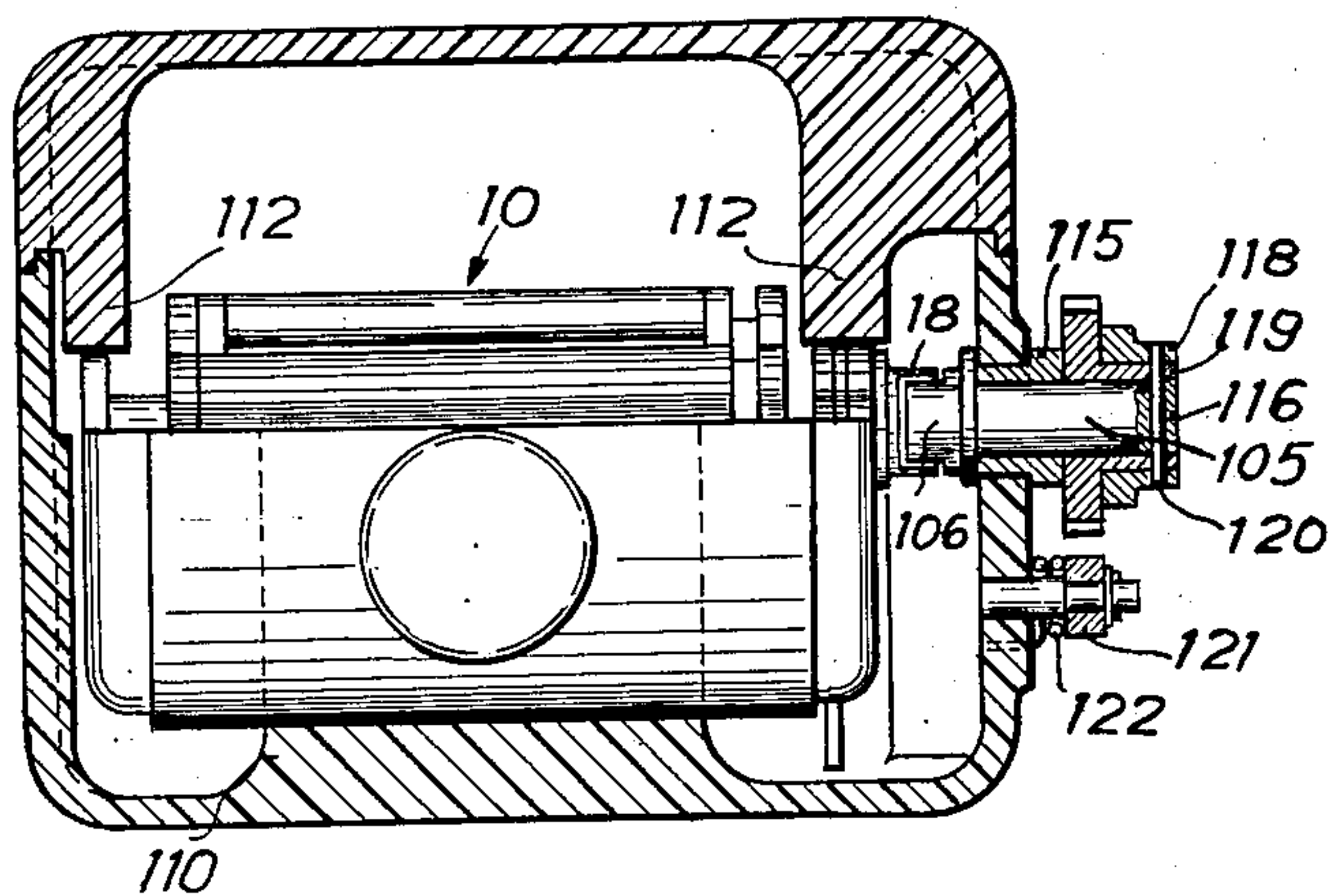
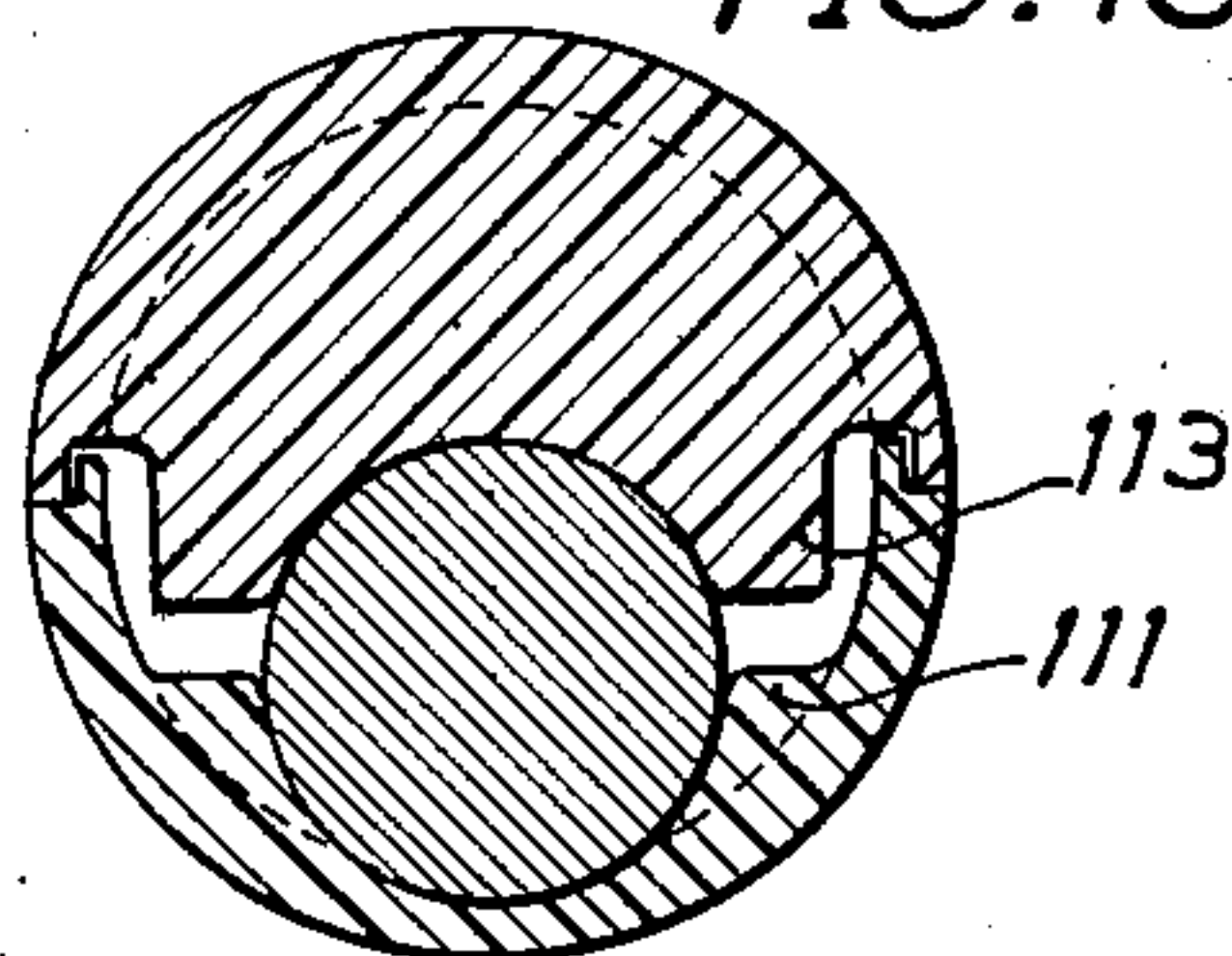


FIG. 15



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## 3,101,536 COMBINATION SAFETY RAZOR AND HONING DEVICE

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9 Claims. (Cl. 30—36)

This invention relates to safety razors and is particularly designed to provide in its head the combination of a blade, and means to resharpen said blade in the razor as often as desired.

The usual type of safety razor in common use today requires a new blade every time the one in use becomes dull. Not only is the blade changing procedure inconvenient and time consuming but the disposal of the dulled blade is also very uneconomical.

It is therefore, the principal object of the present invention to provide a novel form of a safety razor incorporating in its head the combination of a blade, and a blade honing device.

Another object of the present invention is to provide a concavely shaped single-edged or double-edged razor blade adapted to be re-sharpened while it is in the razor.

Another object to the present invention is to provide a new and improved safety razor having a device to adjust the blade position to the desired shaving angle.

Another object to the present invention is to provide a novel form of razor incorporating in its head a blade honing device, designed for engagement with a rotary crank provided on the razor itself or on the storage case of the razor.

Another object of the present invention is in combination with the novel form of a safety razor, to provide a razor storage case having a rotary crank designed for engagement with the honing device of said novel form of a razor.

Another object of the present invention is to provide a novel form of a razor adapted for most economical manufacture on a quantity base.

With the above and related objects in view, this invention consists in the details of construction and combination of parts as will be more fully understood from the following description, when read in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevational view of a safety razor embodying the present invention, showing a fragmentary view of the handle.

FIG. 2 is a front elevational view of the head portion of the razor shown in FIG. 1, showing a fragmentary view of the handle.

FIG. 3 is a top elevational view of the razor head shown in FIG. 2.

FIG. 4 is a sectional view through the head of the razor taken on line 4—4 of FIG. 2.

FIG. 5 is a transverse sectional view through the head of the razor in shaving position, taken on line 5—5 of FIG. 2.

FIG. 6 is a transverse sectional view through the head of the razor in shaving position, taken on line 6—6 of FIG. 2.

FIG. 7 is a transverse sectional view through the head of the razor taken on line 7—7 of FIG. 8.

FIG. 8 is a rear view of the razor, the head partly in section and showing a fragmentary view of the handle.

FIG. 9 is a transverse sectional view through the head of line 9—9 of FIG. 8 showing the position of the blade carrier in blade assembly position with the blade clamping device still open.

FIG. 10 is like FIG. 5, a transverse sectional view through the head on line 5—5 of FIG. 2 however showing the blade in the process of being honed. Phantom

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lines indicate the circular path of the blade carrier with blade during the blade honing procedure.

FIG. 11 is a side view of FIG. 9 in direction "A" showing only the blade carrier with its details and the blade, omitting the rest of the view.

FIG. 12 is a front view of the storage case, partly in section, with the safety razor in place, engaged for the honing procedure.

FIG. 13 is a side elevational view of the storage case, partly in section, with the safety razor in place.

FIG. 14 is a section of the case on line 14—14 of FIG. 12 showing the safety razor stored and engaged for the honing procedure, in bottom elevational view.

FIG. 15 is a section of the storage case and safety razor handle taken on line 15—15 of FIG. 12.

Referring now in greater detail to the drawings, wherein similar reference characters refer to similar parts, there is shown a razor generally designated 10, comprising a head 11 which is mounted on a handle 12. The head 11 includes a semi-circular trough-shaped housing 13, which is defined by the base wall 14, and the side walls 15 and 16 to provide a semi-tubular chamber 19 for substantially receiving the following parts: the shaft 27, the square end 28 of which is supported in the side wall 15 of housing 13 in fixed position; the clutch 33 supported for rotation in the side wall 16 of housing 13, and provided with the bore 32 to receive and support the opposite round end 31 of the shaft 27; the blade carrier 20 mounted for rotation and restricted axial oscillating motion on shaft 27; the permanent blade 21 mounted on the blade carrier 20; the cam plate 62 supported on hub 43 of the clutch 33; the support 53 for the lower honing pad 22 mounted and secured on shaft 27; the upper honing pad 23 fastened to the inner surface 61 of the base wall 14 of housing 13, and the compression spring 65 positioned in recess 71 of the support 53. Transversely seen, both honing pads are semi-circular and arranged within the semi-tubular chamber 19, concentrically about the axis of rotation of the blade carrier 20, the lower pad 22 encircled by the upper pad 23, the radius of the parting line 64 of the pads coinciding with the mean radius in which the concavely shaped blade 21 is mounted on the blade carrier 20, as best seen in FIGS. 5, 6 and 9.

From the foregoing it is manifest that the trough-shaped housing 13 defines a semi-tubular chamber 19 in which a blade carrier 20, provided with the permanent blade 21, is mounted for rotation and restricted axial oscillating motion on shaft 27, and in which a lower honing pad 22, and an upper honing pad 23 is provided to facilitate the honing process, as will be presently described.

The blade carrier 20, also trough-shaped, is defined by the semi-tubular base wall 24, and side walls 25 and 26, both said side walls having bearing holes 67 in which said blade carrier is supported for rotation and restricted axial oscillating motion on shaft 27 between the side walls 15 and 16 of housing 13. The side wall 26 of the blade carrier 20 is provided with the tracer pin 51 and the opening 52, the tracer pin to coact with the cam 68 of cam plate 62, and the opening 52 to coact slidingly with the arresting pin 69 of the clutch 33 to facilitate the axial oscillating motion of said blade carrier for the purpose as will be seen.

On its upper part the blade carrier 20 is provided with a pair of frontwardly projected arms 35 and 36 integral with side walls 25 and 26 respectively, having on their upper edges, in front of the front edge 70 of the semi-tubular base wall 24 recess 37 and 38, concavely curved to conform with the transverse sectional shape of the blade 21.



The blade 21 in its transverse view is concavely curved and secured in the recess 37 of the blade carrier 20 by a pair of clamps 39 and 40 which are supported for rotation by rivets 44 on the side walls 25 and 26. The rotation of clamps 39 and 40 is restricted by stops 45 and 46 respectively, integral with said clamps as shown in FIGS. 9 and 11. Rod springs 41 and 42, fastened to the side walls 25 and 26 by rivets 72, are providing clamping action for clamps 39 and 40 by acting against the lever arms 47 and 48 of said clamps as best shown in FIGS. 6 and 9. The blade 21 may be released by lifting the clamps 39 and 40 on projections 49 and 50 provided thereon as best shown in FIGS. 9 and 11.

The shaft 27 on one end is provided with a square portion 28, which is received in the corresponding square opening 29 provided in side wall 15 of housing 13, and extended through said wall to be secured in fixed position by a rivet head 30. The opposite end 31 of the shaft 27 is round and supported in the bore 32 of the clutch 33.

The clutch 33, positioned within the chamber 19, is mounted for rotation on hub 43 of said clutch in the side wall 16 of the housing 13, and secured by snap ring 34 on the outside of said side wall. The externally extended male part 18 of the clutch 33 is adapted for coaction with the claw 106 of the spindle 105 provided on the storage case 100, as shown in FIG. 12. The arm 74, as an integral part of the clutch 33, on its outer end 75 is provided with the arresting pin 69, adapted to coact slidingly with the opening 52 of the side wall 26 of the blade carrier 20 in order to facilitate the rotary-oscillating motion of said blade carrier for the purpose as will be seen.

The compression spring 65 is positioned in the recess 71 of support 53 embracing shaft 27, and is provided to apply axial pressure against the inner surface 76 of the side wall 26 of the blade carrier 20 in order to maintain riding contact between tracer pin 51, provided on said side wall, and cam 68 in order to actuate the oscillating motion of said blade carrier during the honing process.

The cam plate 62 is positioned within the chamber 19 between side wall 16 of housing 13 and flange 63 of clutch 33. The cam 68, as an integral portion of the cam plate 62, consists of sine-wave-type corrugations which are arranged concentrically about the axis of rotation of the blade carrier 20, and is designed for collaboration with the tracer pin 51 of side wall 26 of said blade carrier, for the purpose as mentioned previously. A resilient lever 79, fastened to the rear portion of the cam plate 62 is provided with the tooth 80 to coact with the teeth 84 of the serration plate 81, which is secured to the rear portion of the side wall 16 of the housing 13 by rivet 82. Lever 83 is provided to enable the adjustment of the shaving angle, and to secure the desired shaving angle by arresting the tooth 80 of the lever 79 between two of the respective teeth 84 of the serration plate 81. In shaving position the tracer pin 51 of the blade carrier 20 is arrested and secured between the two corrugations 85 and 85' of cam plate 62.

The support 53 for the lower housing pad 22 is semi-barrel shaped positioned and mounted between the side walls 25 and 26 of the blade carrier 20 on shaft 27, and secured by pin 54. The arms 55 and 56 are projected frontwardly as integral members of the upper side portion of the support 53 to provide support for rod 57 which is provided, to carry and position the tubular front guard 58 between said arms in front of, and below the blade edge 17.

The lower honing pad 22 and the upper honing pad 23, having approximately the length of the razor blade, are provided with layers 77 and 78 of abrasive material. The lower pad 22 is located between the side walls 25 and 26 of the blade carrier 20, and is mounted on support 53. The upper honing pad 23 is positioned between the side walls 15 and 16 of housing 13 in common plan with the lower pad 22, and is mounted on the inner surface

61 of base wall 14 of said housing. Both honing pads may be fastened to their respective support by adhesive bonding or any other applicable means. The layers 77 and 78 are arranged to touch each other under a predetermined pressure in order to facilitate the honing procedure.

The materials for both pads may be leather or other suitable materials, preferably rubber. The abrasive layers may be made from aluminum oxide or other materials suitable for the honing process.

The rear guard 86, having about the length of the blade 21, is positioned, and secured by rivets 87 on top of the housing 13, and is providing a slot 89 between the front edge 88 of said rear guard and the blade 21 to facilitate free rotary movement of said blade. In its transverse view the guard 86 is shaped to conform with the semi-circular upper portion of the housing 13.

The storage case 100 consists essentially of the receptacle 101 and the cover 102, the latter pivotally connected to the rear portion of said receptacle by means of pin 107. A resilient latch 108 is provided at the front portion of the receptacle 101 to coact with the hook 109 as an integral part of the cover 102, to secure the latter in closed position. The cover 102 may be released by simply depressing the latch 108.

Internally the receptacle 101 is provided with supports 110 and 111, and the cover 102 with the supports 112 and 113, all said supports conforming to the respective external configuration of the razor 10 giving said razor a firm position when it is placed in said receptacle and said cover closed.

The side wall 114 of the receptacle 101 is provided with the bushing 115 to support the spindle 105 for rotation. One end of the spindle 105 is extending to the inside of the receptacle 101 and is provided with a fork or claw 106, adapted to coact with the male part 18 of the clutch 33 of the razor 10. The opposite end 116 of the spindle 105 is projected externally, and is provided with the ratchet wheel 117 and crank 103, the hub 118 of which is slid over the hub 119 of said ratchet wheel, and said ratchet wheel and said crank are fastened together with pin 120 to the spindle 105. A pawl 121 shown in FIG. 13, is positioned on the external face of the side wall 114, and by the action of the helical spring 122 is coacting with the ratchet wheel 117 to permit rotation of the crank 103 in only one direction, i.e. clockwise relative to the storage case. Handle 104, serving to operate the crank 103, for storage reason, may be turned into the position as indicated by the phantom lines shown in FIG. 12.

The external configuration of the storage case 100 is roughly simulating the shape of the razor 10, and is provided with handle 123 for holding said storage case conveniently during the honing procedure.

When it is desired to sharpen the blade 21 in the razor 10, it is merely necessary to place said razor properly into the receptacle 101 of the storage case 100, automatically engage the male part 18 of the clutch 33 of said razor with the claw 106 of the spindle 105, which is supported in the side wall 114 of said receptacle, close the cover 102 of said storage case, and to turn the crank 103 of said receptacle a few times. By turning the crank 103, the arresting pin 69 of the clutch 33, coacting slidingly with the opening 52 of the side wall 26 of the blade carrier 20, rotates said blade carrier with the blade 21 mounted on it, and the tracer pin 51, secured to said side wall, under the effect of the compression spring 65, rides on the sine-wave-type corrugated cam 68, forcing said blade carrier with said blade into axially oscillating motions, thereby achieving a combined rotary-axially oscillating movement of the blade 21 between the abrasive layers 77 and 78 of the resilient honing pads 22 and 23, the cutting edge 17 trailing the motion of said blade to produce a honing effect on said cutting edge, known by the trade as superfinishing process. By selecting the correct abrasive materials for this process



5 no material removal will take place during the honing process, justifying to refer to the blade 21 as a permanent blade.

Although this invention has been described in considerable detail, such description is intended as being illustrative rather than limiting, since the invention may be variously embodied and the scope of the invention is to be determined as claimed.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. In a safety razor the combination of: a head; a blade carrier supported for rotation on a shaft positioned and secured in fixed position within said head; a blade, concavely shaped in its transverse view, mounted and secured on said blade carrier and adapted to be honed in the razor; a stationary honing device, consisting of a lower honing pad and an upper honing pad, both pads pads arranged within said head circular about the axis of rotation of said blade carrier, the lower said honing pad encircled by the upper said honing pad, said honing pads touching each other at their common parting-line, the radius of said parting-line coinciding with the mean radius on which said concave blade is mounted on said blade carrier; and means to rotate said blade, mounted on said blade carrier, between said honing pads.

2. In a safety razor the combination of: a head; a blade carrier supported for rotation and oscillating motions parallel to the axis of rotation of said blade carrier on a shaft positioned and secured in fixed position within said head; a blade, concave in its transverse view, adapted for permanent use and therefore mounted on said blade carrier to be re-honed or re-sharpened in the razor; a stationary honing device, consisting of a lower honing pad and an upper honing pad, both pads having about the length of said blade, are made from resilient material mixed with abrasive oxide, and arranged circular about said axis of rotation, said upper pad encircling said lower pad, both said honing pads touching each other at their common parting-line under a predetermined pressure, said parting-line coinciding with the mean radius in which said blade is mounted on said blade carrier; and means to rotate and oscillate said blade between said honing pads.

3. In a safety razor the combination of: a head; a blade carrier supported for rotation and oscillating motions parallel to the axis of rotation of said blade carrier on a shaft, positioned and secured in fixed position within said head, said oscillating motions of said blade carrier facilitated by the co-operation of: a clutch, supported for rotation in said head, having an arm provided with an arresting pin slidably coacting with said blade carrier, a corrugated cam, the corrugations of said cam arranged concentrically about the axis of rotation, a tracer pin, coacting with said corrugations, said tracer pin secured to said blade carrier, and a compression spring positioned to embrace said shaft and adapted to maintain pressure against said blade carrier parallel to said axis of rotation, and riding contact between said tracer pin and said corrugations; a blade, concave in its transverse view adapted to be honed in said head as often as desired for permanent use, said blade mounted and secured on said blade carrier; a honing device, consisting of a lower honing pad and an upper honing pad, both said honing pads having approximately the length of said blade, arranged circular about said axis of rotation, said upper honing pad encircling said lower honing pad, both said honing pads touching each other under a predetermined pressure at the common parting-line, said parting-line coinciding with the mean radius in which said blade is mounted on said blade carrier; means to adjust the razor blade to the desired shaving angle, said means consisting of a resilient lever fastened to the rear portion of said cam plate and provided with a tooth coacting with a number of teeth of a serration plate positioned and se-

cured on the rear of said housing; and means to rotate said blade carrier.

4. In a safety razor the combination of: a head; a blade carrier incorporating a blade adapted to be honed in the razor; a honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about a common axis of rotation of said blade carrier and said honing device, said lower honing pad encircled by said upper honing pad; and means including a clutch member to accomplish the honing procedure of said blade between said honing pads by rotary motion.

5. In a safety razor the combination of: a head; a blade carrier incorporating a blade adapted to be honed in the razor; a honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about a common axis of rotation of said blade carrier and said honing device, said lower honing pad encircled by said upper honing pad; and means including a clutch member to accomplish the honing procedure of said blade between said honing pads by rotary motion, and oscillating motion parallel with respect to said axis of rotation.

6. In a safety razor the combination of: a head; a trough-shaped blade carrier supported for rotation on a shaft positioned and secured in fixed position within said head; a blade mounted on and secured to said blade carrier by a clamping device, said blade adapted to be honed in the razor; a stationary honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about the axis of rotation of said blade carrier, said lower honing pad encircled by said upper honing pad, and mounted on a support secured to said shaft in fixed position, and located within the semi-tubular chamber provided by said trough-shaped blade carrier, said support in its upper portion provided with one arm on each end projected forwardly to support a lower guard located between said arms below and in front of the cutting edge of said blade relative to its shaving position; means to rotate said blade between said honing pads; and means to arrest said blade carrier with said blade in the desired shaving position.

7. In a safety razor the combination of: a head; a trough-shaped blade carrier supported for rotation and oscillating motion parallel to the axis of rotation of said blade carrier on a shaft positioned and secured in fixed position within said head; a blade mounted on and secured to said blade carrier by clamping device, said blade adapted to be honed in the razor; a stationary honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about the axis of rotation of said blade carrier, said lower honing pad encircled by said upper honing pad, and mounted on a support secured to said shaft in fixed position, and located within the semi-tubular chamber provided by said trough-shaped blade carrier, said support in its upper portion provided with one arm on each end projected forwardly to support a lower guard located between said arms below and in front of the cutting edge of said blade relative to its shaving position; means to rotate and oscillate said blade between said honing pads; and means to arrest said blade carrier with said blade in the desired shaving position.

8. In a safety razor the combination of: a head; a blade carrier incorporating a blade adapted to be honed in the razor; a honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about a common axis of rotation of said blade carrier and said honing device, said lower honing pad encircled by said upper honing pad; means including a clutch member to accomplish the honing procedure of said blade between said honing pads by rotary motion; and a storage case internally pro-



vided with a complementary clutch member to be engaged with said clutch member of said razor, said complementary clutch member fastened to a spindle supported for rotation on said storage case, said spindle projected externally and provided with a rotary crank and a ratchet wheel coacting with a pawl restricting the rotation of said crank to the desired direction.

9. In a safety razor the combination of: a head; a blade carrier incorporating a blade adapted to be honed in the razor; a honing device consisting of a lower honing pad and an upper honing pad, both said honing pads arranged within said head circular about a common axis of rotation of said blade carrier and said honing device, said lower honing pad encircled by said upper honing pad; means including a clutch member to accomplish the honing procedure of said blade between said honing pads by combined rotary motion and oscillating motion

parallel with respect to said axis of rotation; and a storage case internally provided with a complementary clutch member to be engaged with said clutch member of said razor, said complementary clutch member fastened to a spindle supported for rotation on said storage case, said spindle projected externally and provided with a rotary crank and a ratchet wheel coacting with a pawl restricting the rotation of said crank to the desired direction.

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