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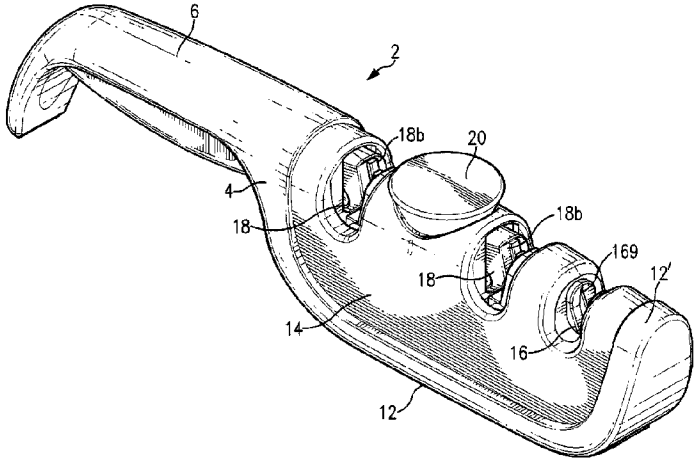
(54) **Titre : AFFUTEUR ABRASIF REGLABLE**
(54) **Title: ADJUSTABLE ABRASIVE SHARPENER**



(57) **Abrégé/Abstract:**
An adjustable manual abrasive sharpener having a pair of sharpening slots formed in a frame with opposing abrasive arms being pivotally mounted in each of the sharpening slots. A rod is mounted on the frame for rotatable motion and for linear motion long its axis of rotation from a position at which the rod is locked against rotation to a depressed position whereby the rod may be rotated. The bottom end portion of the rod includes a pinion gear which engages a pair of gear racks which are mounted for movement laterally relative to the axis of rotation of the rod. The pair of gear racks respectively engage slots formed on the bottom of the abrasive arms in each sharpening slot. Rotation of the rod causes movement of the gear racks to adjust each pair of abrasive arms with respect to each other to vary the sharpening angle of the abrasive elements.

Abstract

An adjustable manual abrasive sharpener having a pair of sharpening slots formed in a frame with opposing abrasive arms being pivotally mounted in each of the sharpening slots. A rod is mounted on the frame for rotatable motion and for linear motion long its axis of rotation from a position at which the rod is locked against rotation to a depressed position whereby the rod may be rotated. The bottom end portion of the rod includes a pinion gear which engages a pair of gear racks which are mounted for movement laterally relative to the axis of rotation of the rod. The pair of gear racks respectively engage slots formed on the bottom of the abrasive arms in each sharpening slot. Rotation of the rod causes movement of the gear racks to adjust each pair of abrasive arms with respect to each other to vary the sharpening angle of the abrasive elements.

Adjustable Abrasive Sharpener

This application is a division of application no. 2,802,382 that was filed in Canada on January 15, 2013.

BACKGROUND OF THE INVENTION

This application claims priority to provisional application; s.n. 61/632,038 filed January 17, 2012.

Field of the Invention

This invention relates to sharpening knives and the like, and more particularly, to an improved adjustable abrasive sharpener.

Summary of the Prior Art

In the prior art numerous abrasive sharpeners for knives and the like exist having fixed abrasive elements forming a V-shaped sharpening slot. Such known fixed abrasive elements are oriented at a fixed angle to sharpen a blade at an angle as desired for a range of different knife types. Most sharpeners are set at either a standard angle and/or an Asian angle that is preset and static. All manufacturers use blades that produce set knife angles that may vary from knife style to another. These varying set angles may not match the standard or santoku angle of prior fixed angle sharpeners. Accordingly, it is desirable in the prior art to provide an adjustable V-shaped sharpener by which the sharpening angle may be varied to range of sharpening angles to more closely match the prescribed sharpening angle of the knife edge from the original blade manufacture.

SUMMARY OF THE INVENTION

It is therefore an objective of the invention to provide an improved abrasive knife sharpener having adjustable abrasive elements to selectively vary the sharpening angle of a blade. The sharpener includes a pair of pivotally mounted abrasive elements forming a sharpening slot whereby the abrasive elements can selectively be moved toward and away from each other to vary their orientation and sharpening angle. Such adjustability is achieved by a rotary adjustment mechanism for each of use and significant control of the angle between a respective pair of abrasive elements. By varying the angle between the abrasive elements the user may select a sharpening angle that more closely matches the prescribed manufacture specifications.

In a broad aspect, the invention pertains to an adjustable sharpener comprising a frame having an open sharpening slot, and a pair of abrasive elements being mounted in the slot. At least one of the pair of abrasive elements is pivotally mounted in the slot to form a generally V-shaped sharpening angle in conjunction with the other of the pair of abrasive elements. An adjustment actuator is mounted on the frame, the adjustment actuator having an outward position and an inward position, wherein the adjustment actuator is capable of rotating when in the inward position and substantially incapable of rotating when in the outward position. A connecting assembly is operatively connected between the adjustment actuator and the pair of abrasive elements, whereby the actuator causes pivotal movement of the at least one abrasive element with respect to the other of the pair of abrasive elements to adjust the sharpening angle of the pair of abrasive elements.

In a further aspect, the invention provides an adjustable sharpener comprising a frame having a sharpening slot, and a pair of mounted arms having an abrasive element and mounted in the sharpening slot to form a generally V-shaped sharpening angle with respect to each other. At least one of the mounted arms is moveable, with respect to the other of the pair of mounted arms, to adjust the sharpening angle, and a rod is operatively mounted for rotatable movement about an axis and is connected to the at least one of the mounted arms to cause pivotal movement of the at least one of the arms, upon rotation of the rod to adjust the sharpening angle. The rod has a range of rotation from a first position to a second position, and is adapted to be locked against further rotation throughout an entirety of the range of rotation.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front perspective view of the adjustable abrasive sharpener of the invention;

Fig. 2 is a top plan view of the adjustable abrasive sharpener of Fig. 1;

Fig. 3 is a front elevational view of the adjustable abrasive sharpener of Fig. 1;

Fig. 4 is a front elevational view, with the cover removed, of the adjustable abrasive sharpener of Fig. 1;

Fig. 5 is a front elevational view, with parts in section, taken along lines 5-5 of Fig. 2.

Fig. 6 is a top plan view, with parts in section, taken along lines 6-6 of Fig. 4;

Fig. 7 is a top partial plan view of the adjustable arms of the adjustable abrasive sharpener of Fig. 1;

Fig. 8 is a front partial elevational view of the adjustable arms of the adjustable abrasive sharpener of Fig. 1;

Fig. 9 is a bottom partial plan view of the rack and pinion of the adjustable abrasive sharpener of Fig. 1;

Fig. 10 is a partial front elevational view, with parts removed, of the adjustable mounting of the abrasive elements of the invention of Fig.1.;

Fig. 11 is a partial top plan view, with parts removed, of the adjustable mounting of the abrasive elements of the invention of Fig.1.;

Fig.12 is a bottom partial plan view, taken along lines 12-12 of Fig.10, of the adjustable arms of the adjustable abrasive sharpener of Fig. 1; and

Fig. 13 is bottom perspective view of the angle locking bracket of the adjustable abrasive sharpener of Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Figs. 1-13, there is illustrated the adjustable abrasive sharpener of the invention for sharpening knife blades and the like, generally designated by reference numeral 2. Although the sharpener 2 discloses a manual adjustment of the sharpening angle, it is within the scope of the invention to employ other techniques

employing the invention, such as an electro-mechanical mechanism (not shown) and the like. As best seen in Figs 1-3, the abrasive sharpener 2 includes an elongated frame 4 forming a handle portion 6 at one end. The end 8 of handle 6 curves downward and includes a flat bottom surface 10 which serves as a support area during sharpening. The frame 4 further includes upwardly opening U-shaped section 12 forming a bottom support surface 12a and a curve upward extending portion 12b (Figs 3). A housing 14 is positioned within the U-sharped section 12. A sharpening slot 16 having abrasive elements 16a which are oriented to each other at a generally fixed V-angle is provided on the top of housing 14. A pair of additional slots 18 are formed on the top of housing 14 and each include a pair of pivotally mounted abrasive elements 18a, 18b forming an adjustable generally V-angle to be capable of varying the sharpening angle of the blade of a knife dependent on desired results. As will be apparent from the following description, the abrasive elements 18a, 18b can simultaneously be adjusted toward and away from each other through rotation of exterior adjustment actuator, such as knob 20, which is shown being situated between the two respective slots 18. It is within the scope of the invention, however, to situate the knob 20 on either side of one of the adjustable slots 18 or other desired position where convenient.

As previously described, the abrasive elements 18a and 18b in each slot 18 are arranged with respect to each other to form a cutting slot having a generally V-configuration to sharpen an inserted blade edge (not shown) through its movement through the slots 18. The abrasive elements 18a are affixed to a removable support 22a mounted on pivotal arm 23a by a threaded member 24a as seen in Figs. 4, 5, 8, and 10. The opposing abrasive elements 18b are affixed to a removable support 22b mounted on

a removable arm 23b by a threaded member 24b. The pivot arms 22a, 22b of both adjustable slots are pivotally mounted on pivot pin 26. As seen in Figs 7, 8, and 11, the arms 23a and 23b are offset from other in a lateral direction relative to the frame 4 and extend downward.

The hub 20a of the adjustment knob 20 is suitably secured to a downwardly extending rod 28 having a lower open ended reduced end portion 28a and acting as part of the adjustment actuator of the invention. A lower elongated pinion 30 is secured end portion 28a (Figs. 5, 6 and 8-10). A spring 32 is disposed between the lower end 30a of pinion 30 and a portion of frame 4 (Fig. 5, 8, 9 and 10) A circular plate 34 having a plurality of open engagement slots 36 arranged on its periphery for an extent of 360° is rigidly mounted on rod 28 (Figs. 4, 8, 9, and 12). The rod 28, pinion 30, and plate 34 are mounted on frame 4 to be rotated for a predetermined range and be vertical moved a limited degree through use of knob 20 as will be apparent.

As best seen in Figs 8, 9, 10, 11 and 13, an angle locking bracket 40 is mounted in fixed relationship on frame 4. As seen in Fig. 13, the angle locking bracket 40 has an upper plate 42 supported on opposed pairs of spaced legs 44 which are interconnected by an opposed based members 46. A modified circular opening 48 is formed in plate 42. A cut-out area 48a exceeding the radius of opening 48 extends from a stop surface 50 to a second stop surface 52 (Fig. 11) limits the amount of rotation of shaft 28 by knob 20. To accomplish the foregoing result, vertical keys 54 exteriorly projecting on rod 28 rotates in cut-out area 48a for maximum angle of rotation as established between stop surfaces 50, 52 (Fig 11 and 13). Four engagement pins 60 extend downward from plate 42 of the angle locking bracket 40. In the uppermost position of knob 20 and rod 28 the pins 60

extend into four respective engagement slots 36 of circular plate 34 and lock rod 28 and pinion 30 against rotation. By pressing knob 20 downward to compress spring 32, the locked engagement slots 36 move away from the engagement pins 60 and the rod 28 and pinion 30 can be rotated to the extent determined by stops 50, 52 as they contact keys 54. The extent of rotation determines the adjustment of the sharpening angle between abrasive elements 18a and 18b of both adjustable sharpening slots.

A pair of connecting members 60,62 in the form of adjustment gear racks are mounted by suitable means on frame 4 for relative reciprocal movement in a direction perpendicular to the axis of rotation of rod 28 as seen in Figs 6, 8, 9, and 10. The rack 60 includes linear rack gear section 64 which engages pinion 30 at all position vertical positions of rod 28. The rack 62 includes linear rack gear section 66 and engages pinion 30 at all suitable vertical positions of rod 28. The pinion 30 moves the adjustment racks in opposite directions in either direction of rotation of rod 28 when the engagement pins are released. The end portions 60a of adjustment racks 60 include a plurality of upwardly opening slots 62a. The end portions 62a of adjustment racks 62 include a plurality of upwardly opening slots 62b (Fig. 5).

As seen in Figs. 8 and 10, the bottom of pivot arm 23b is formed in a curvature from which four projections 70 project into corresponding slots 62a for an extent dependent on the rotational position of the pivot arm 23a as established by the relative position of the adjustment rack 60. As seen in Fig. 5, the bottom of pivot arm 23b is formed with a curvature from which four projections 72 extend into a corresponding slots 62a for an extent on the rotational position of the pivot arm 23b as established by the relative position of the adjustment rack 62. From the foregoing it should apparent that

rotation of knob 20 in a clockwise direction moves rack 60 left to the right viewing Figs. 8 and 9 to pivot arm 23a toward pivot arm 23b. Similarly, clockwise rotation of knob 20 will move adjustment rack 62 from right to left through pinion 30 to pivot arm 23b toward pivot arm 23a. Thus, the angle between abrasive elements 18a and 18b in both slots are varied. To move the pivot arms 23a, 23b away from each other the knob 20 may rotate in a counter clockwise direction viewing Fig.7. As stated previously, the knob 20 must be depressed to release the engagement in order to permit adjustment rotation of the knob 20. Indicia elements (not shown) may be provided exteriorly adjacent the knob 20 to indicate a range of sharpening angles dependent on the extent of rotation of knob 20 and pinion gear 30. After an angle of sharpening is selected dependent on desired results, the knob is released and spring 32 urges automatic upward movement of the rod 28 and circular plate 34 so as the four engagement pins 60 are inserted into four engaging slots 36 which are in alignment with the engagement pins 60 as established by the angular relationship of pivot arms 23a, 23b in a particular adjusted position. The abrasive elements 18a, 18b in the two sharpening slots may have different abrasive properties, such as a coarser and finer abrasive quality.

WHAT IS CLAIMED IS:

1. An adjustable sharpener comprising:

a frame having an open sharpening slot;

a pair of abrasive elements being mounted in said slot, at least one of said pair of abrasive elements being pivotally mounted in said slot to form a generally V-shaped sharpening angle in conjunction with the other of said pair of abrasive elements;

an adjustment actuator being mounted on said frame, wherein said adjustment actuator has an outward position and an inward position, wherein said adjustment actuator is capable of rotating when in said inward position and substantially incapable of rotating when in said outward position; and

a connecting assembly being operatively connected between said adjustment actuator and said pair of abrasive elements whereby said actuator causes pivotal movement of said at least one abrasive element with respect to the other of said pair of abrasive elements to adjust the sharpening angle of said pair of abrasive elements.

2. The adjustable sharpener according to Claim **1** wherein both of said pair of abrasive elements are pivotally mounted in said open sharpening slot and are operatively connected to said connecting assembly to cause pivotal movement of said pair of abrasive elements to adjust the sharpening angle of said pair of abrasive elements.

3. The adjustable sharpener according to Claim **1** wherein said adjustment actuator includes a rotatable rod mounted on said frame and being operatively connected to said connecting assembly.

4. The adjustable sharpener according to Claim **3** wherein said connecting assembly includes at least one gear rack engaging said rotatable rod and said at least one pivotally mounted abrasive element.

5. The adjustable sharpener according to Claim **4** wherein said rotatable rod includes a fixed gear engaging said at least one gear rack.

6. The adjustable sharpener according to Claim **4** wherein said at least one pivotally mounted abrasive element is mounted on an arm assembly, said arm assembly includes a plurality of slots for respectively engaging said at least one rack.

7. The adjustable sharpener according to Claim **5** wherein said at least one gear rack is moveable generally perpendicular to an axis of rotation of said rotatable rod.

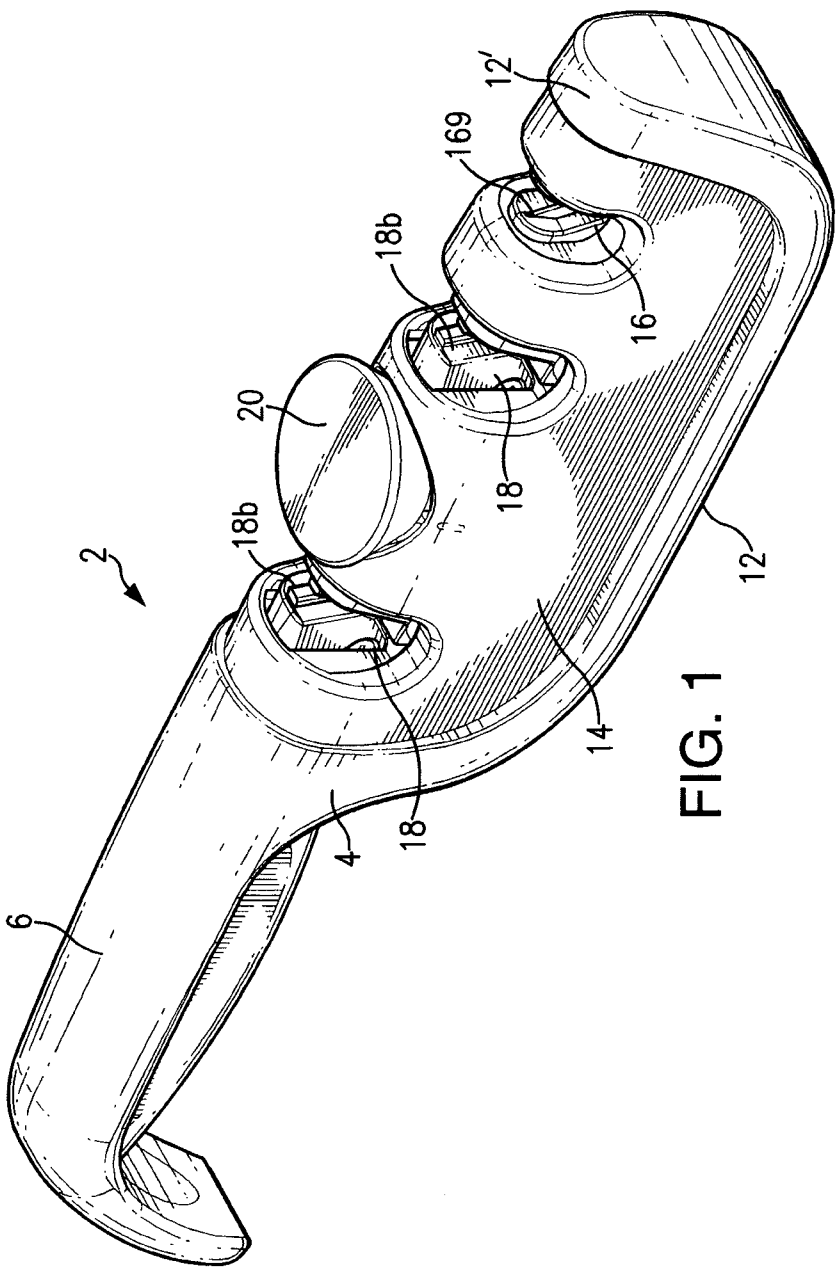
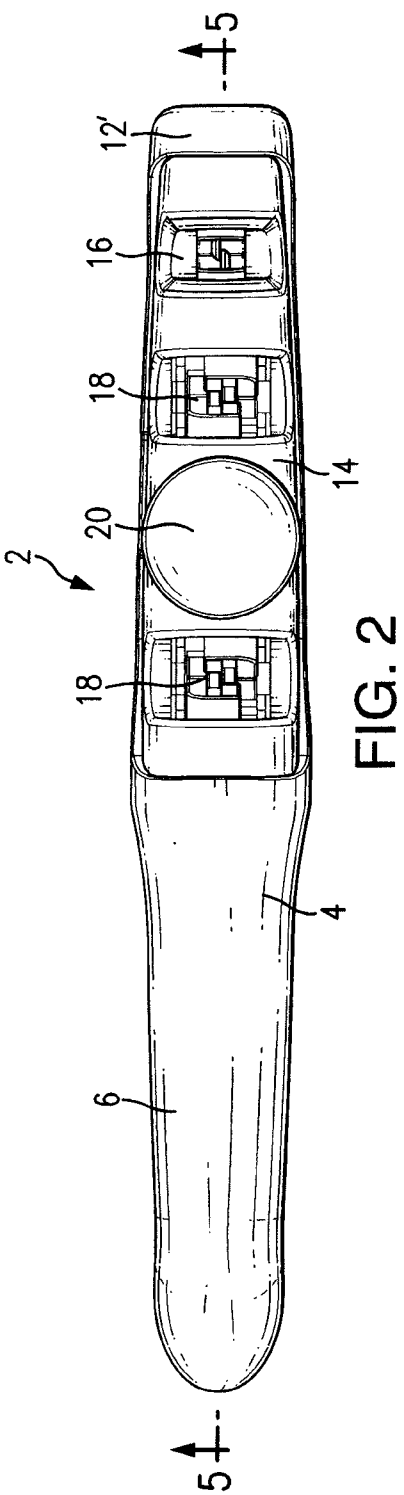


FIG. 1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12'
16
18
20
2
18
14
4
6
5

FIG. 2

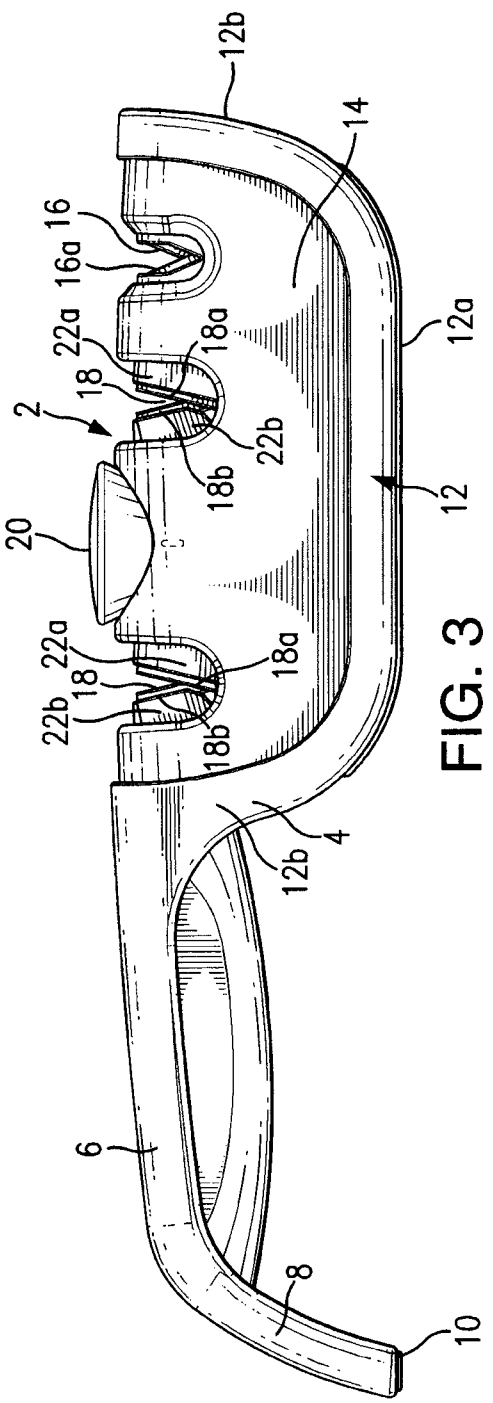

12b
14
16
16a
22a
18
18a
2
22b
18b
12a
12
20
22a
18
18a
22b
18b
4
12b
6
8
10

FIG. 3

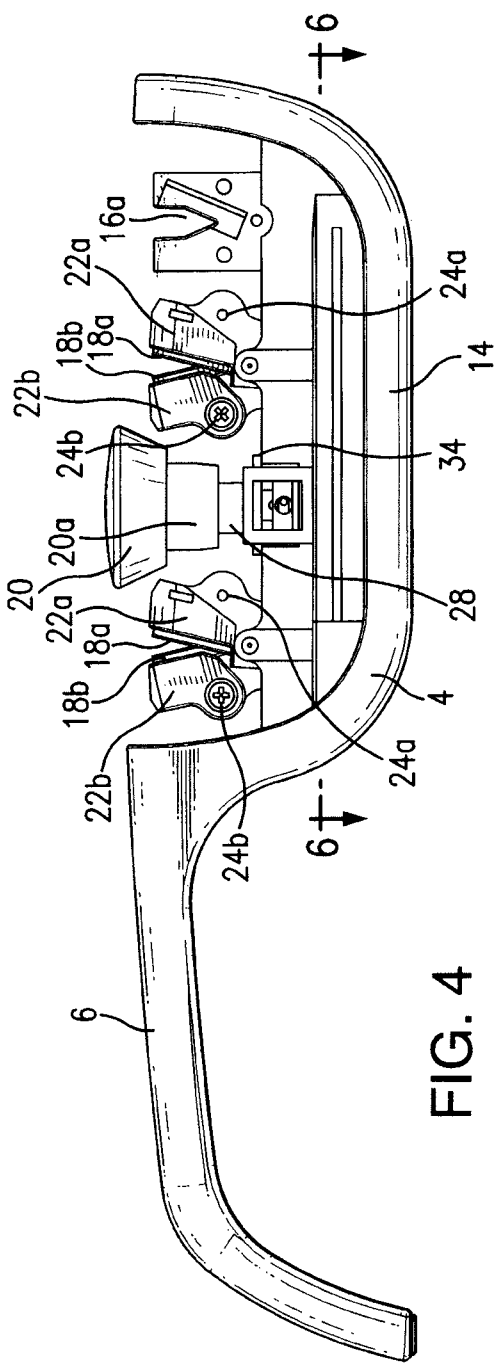
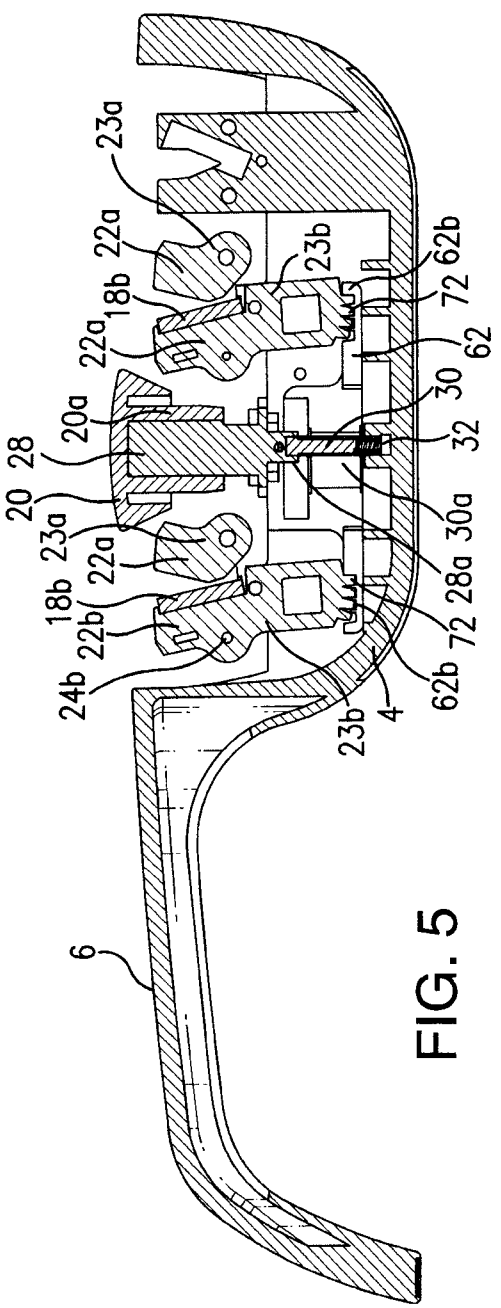

6
16a
22a
18b
18a
22b
24b
20
20a
22a
18a
18b
22b
24b
6
24a
14
34
28
4
24a
6

FIG. 4


23a
22a
23b
62b
72
18b
22a
62
30
20a
32
28
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30a
23a
22a
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22b
72
24b
62b
4
23b
6

FIG. 5

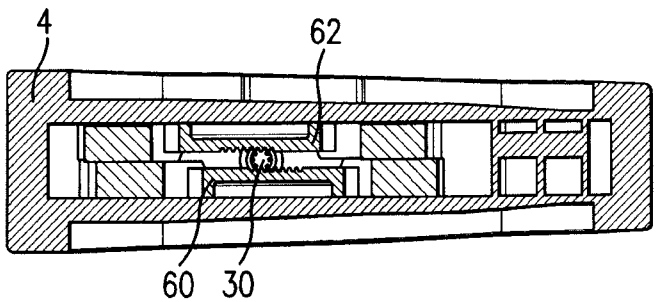


FIG. 6

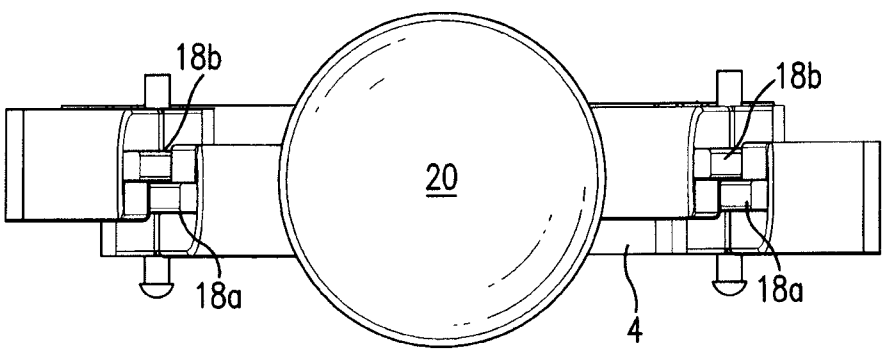


FIG. 7

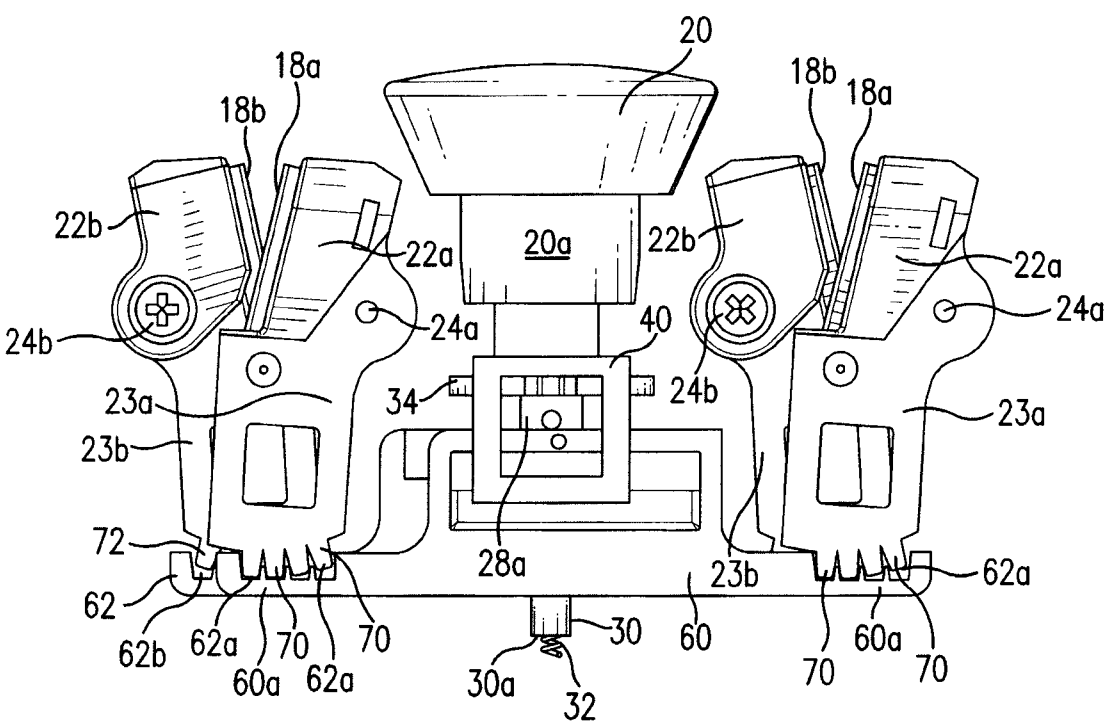


FIG. 8

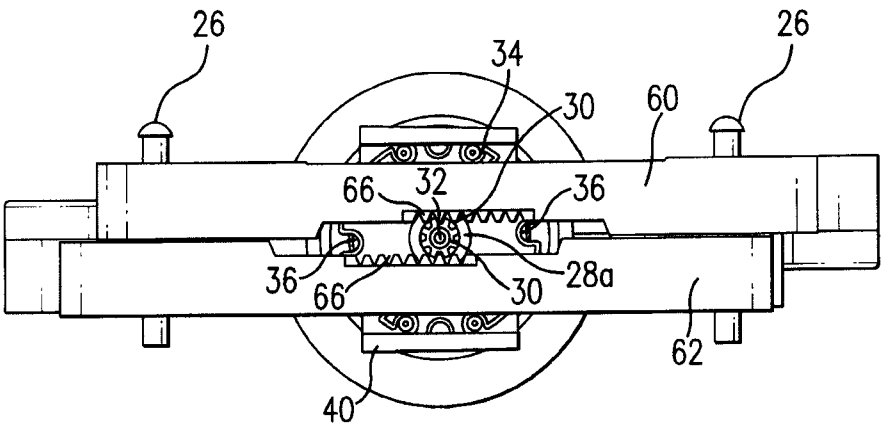

26
34
26
30
60
66
32
36
36
66
30
28a
62
40

FIG. 9

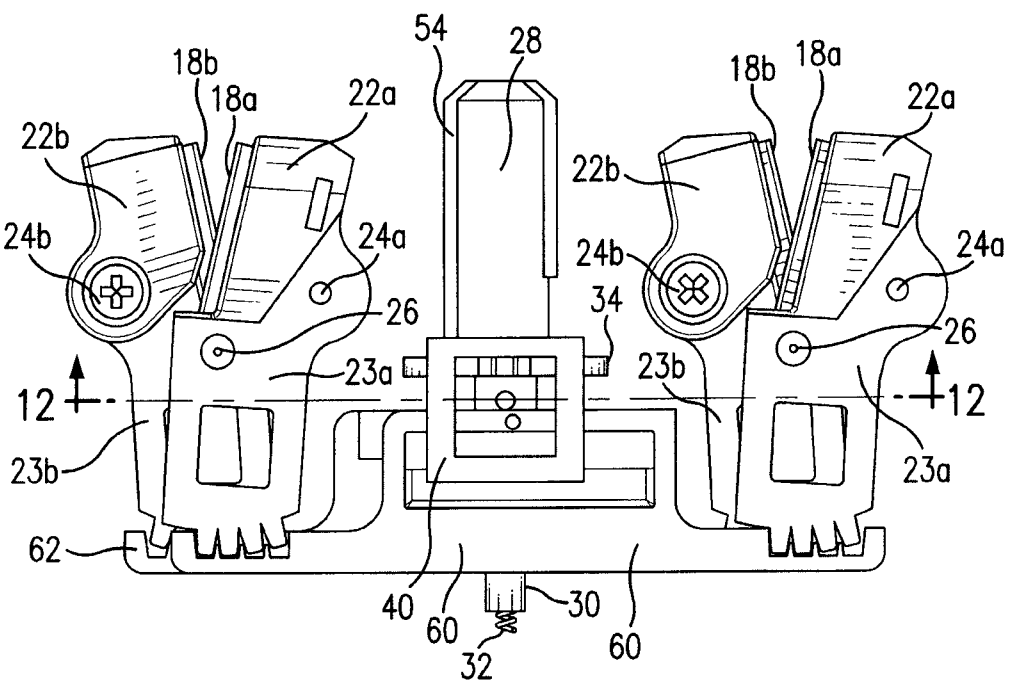

54
28
18b
18a
22a
18b
18a
22a
22b
22b
24b
24a
24b
24a
26
34
26
12
23a
23b
12
23b
23a
62
40
60
30
60
32

FIG. 10

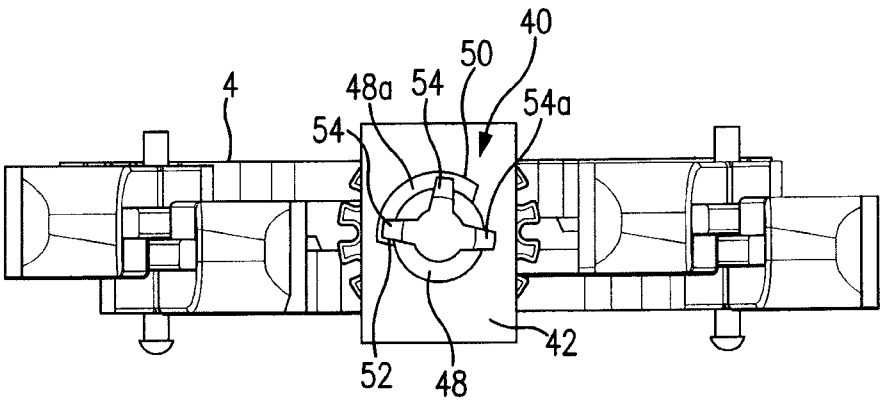


FIG. 11

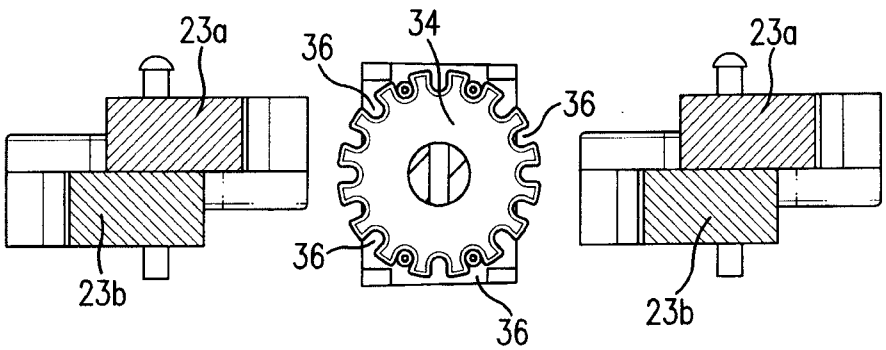


FIG. 12

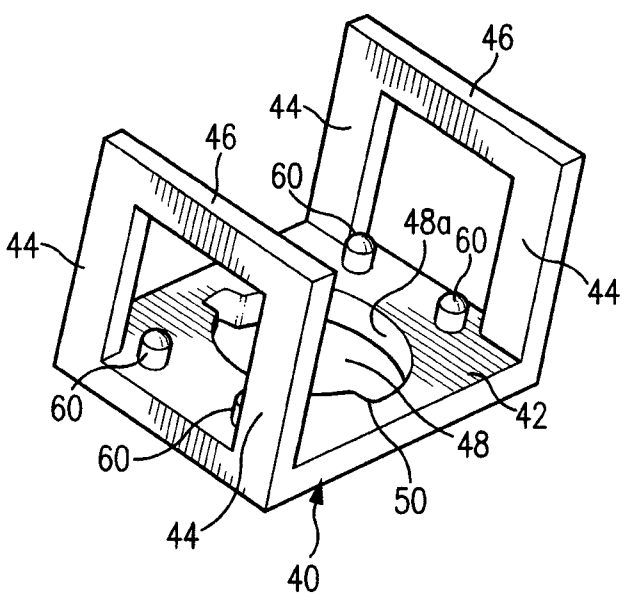
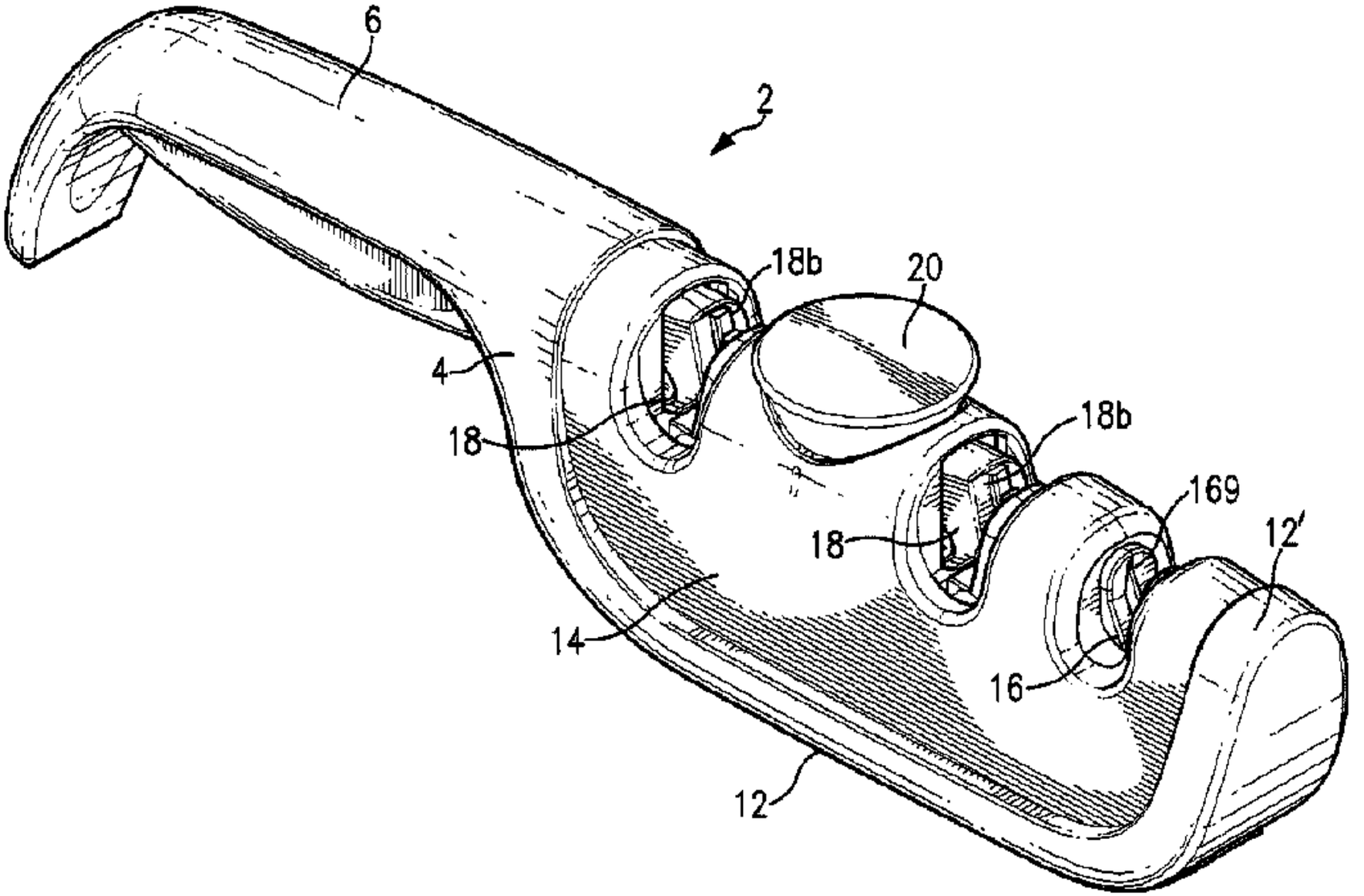


FIG. 13


6
2
18b
20
4
18
18b
169
18
12'
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16
12