



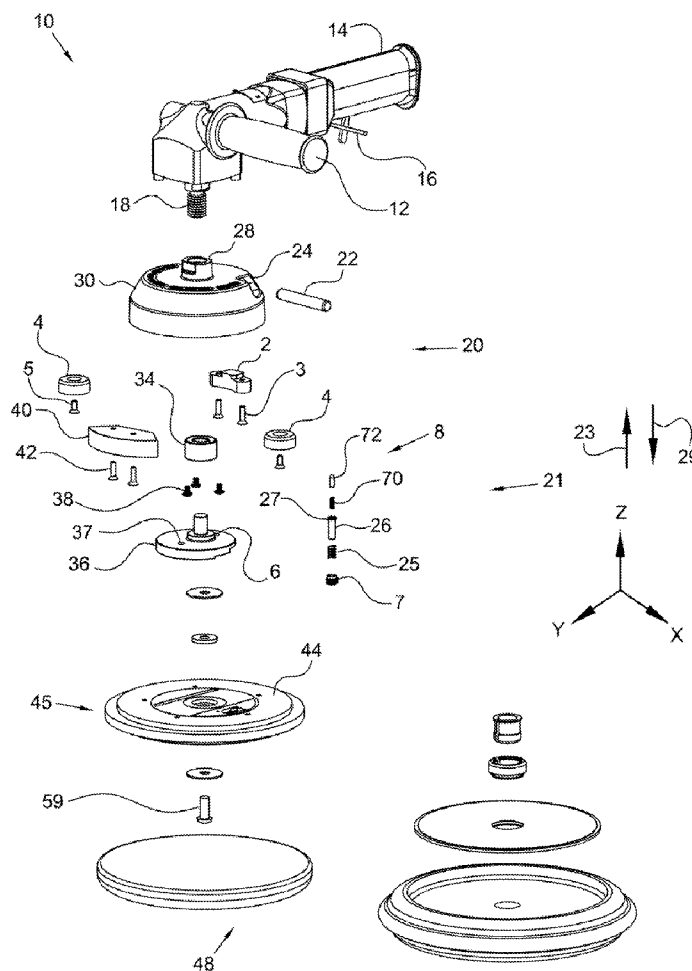
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(19) **United States**(12) **Patent Application Publication**  
**Lampka et al.**(10) **Pub. No.: US 2010/0151775 A1**(43) **Pub. Date: Jun. 17, 2010**(54) **LOCKING RANDOM ORBITAL  
DUAL-ACTION HEAD ASSEMBLY WITH  
CENTERING****Publication Classification**(51) **Int. Cl.**  
**B24B 23/03** (2006.01)(52) **U.S. Cl.** ..... **451/357; 451/271**(75) **Inventors:** **Mark Lampka**, East Amherst, NY  
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(US)(21) **Appl. No.:** **12/712,710**(22) **Filed:** **Feb. 25, 2010****Related U.S. Application Data**(63) Continuation-in-part of application No. 12/429,520,  
filed on Apr. 24, 2009, Continuation-in-part of appli-  
cation No. 11/516,003, filed on Sep. 5, 2006.(57) **ABSTRACT**

A removable head assembly for a combination rotary, including: a body; a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and a locking assembly including first and second elements. The body is connectable to a combination rotary tool and is rotatable about a first axis; the rotatable element is rotatable about a second axis; the indentation or protrusion is aligned with a third axis substantially parallel to the second axis; and the first element is displaceable to displace the second element to rotationally fix the rotatable element with respect to the body so that the first and third axes are co-linear, and the second axis is out of alignment with the first and third axes.



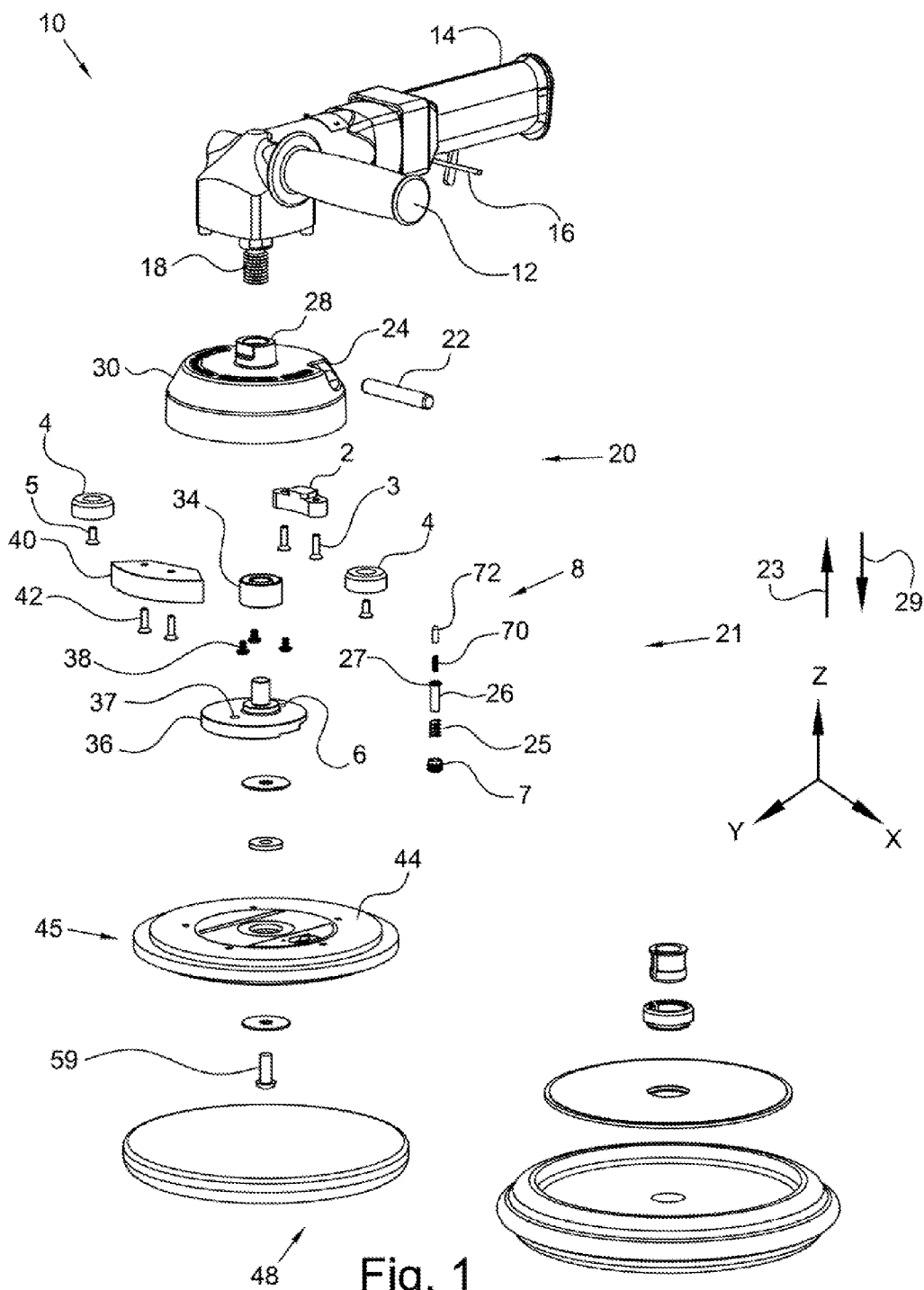


Fig. 2

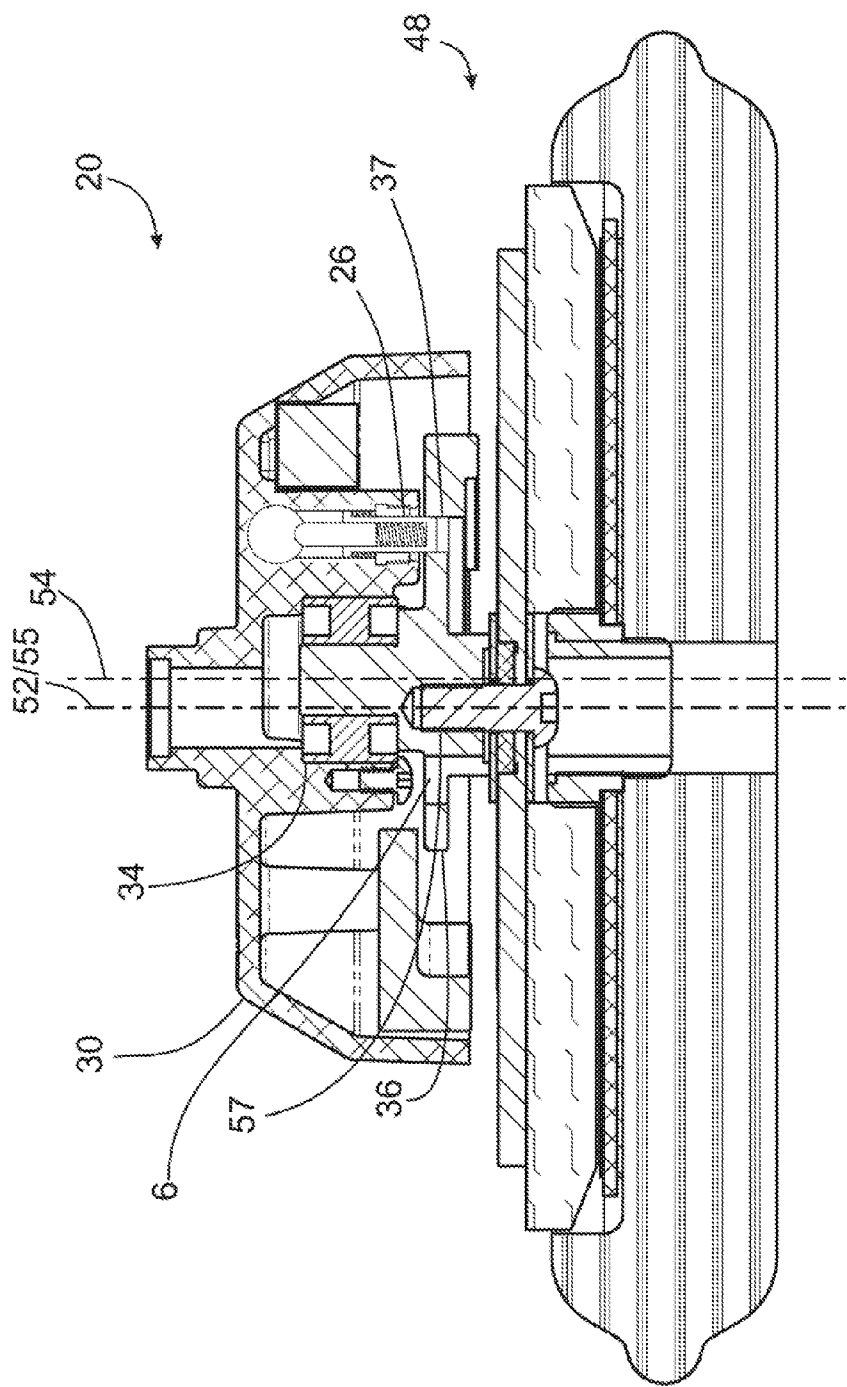
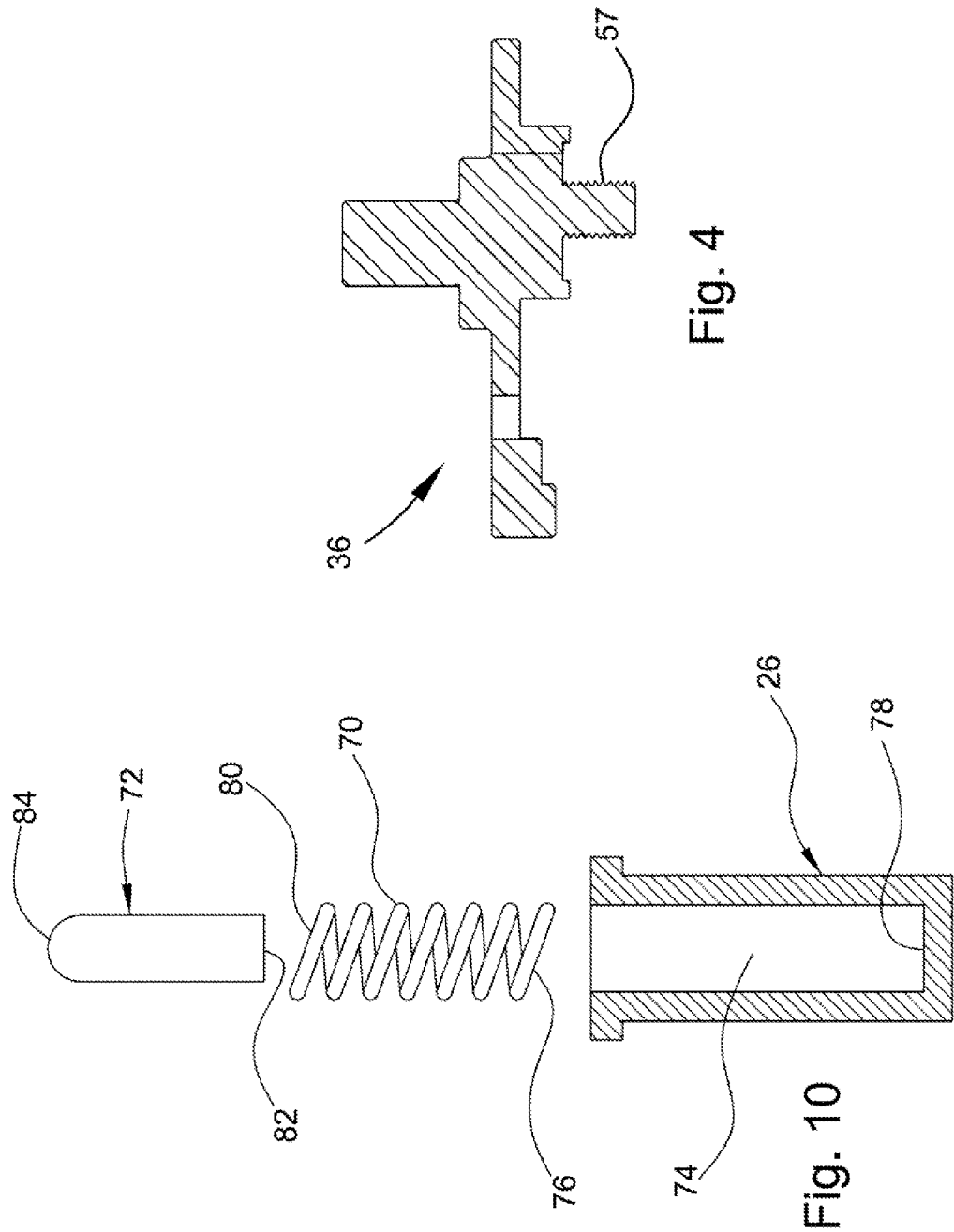


Fig. 3



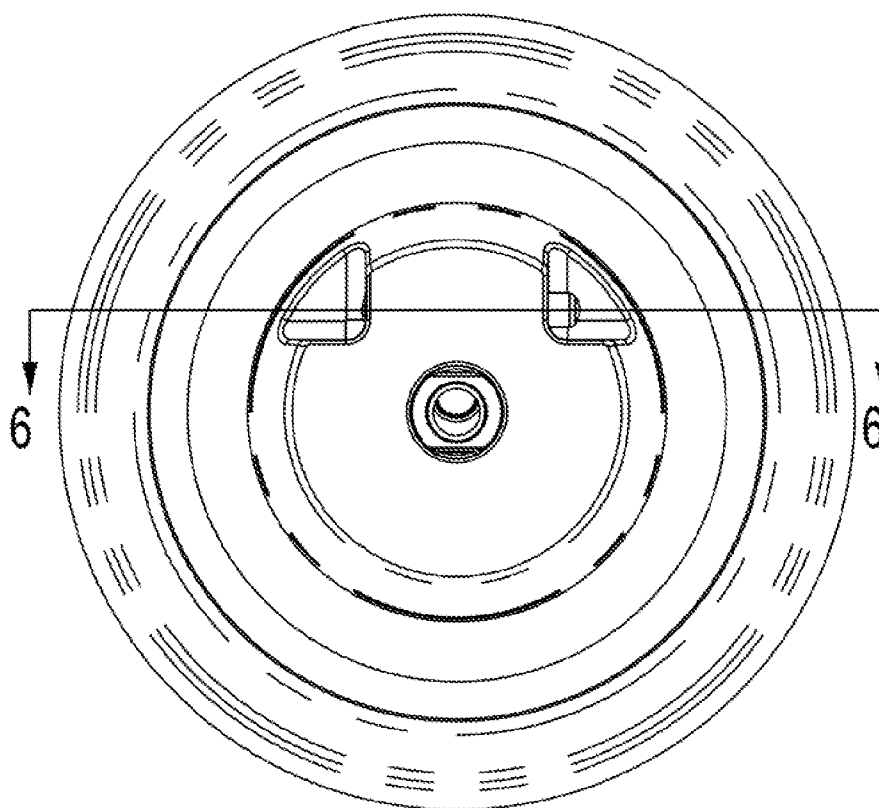


Fig. 5

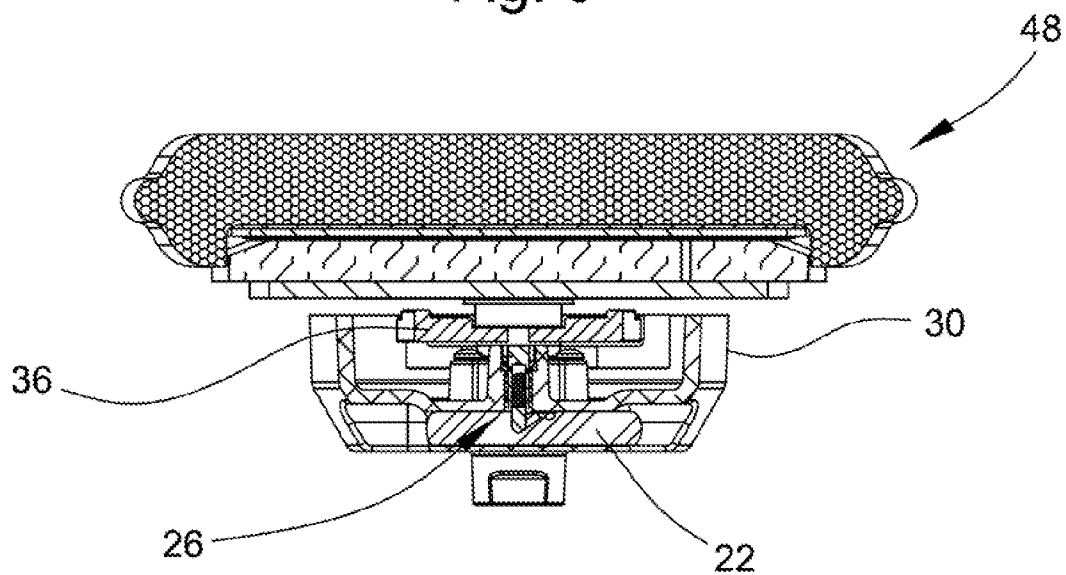


Fig. 6



Fig. 7

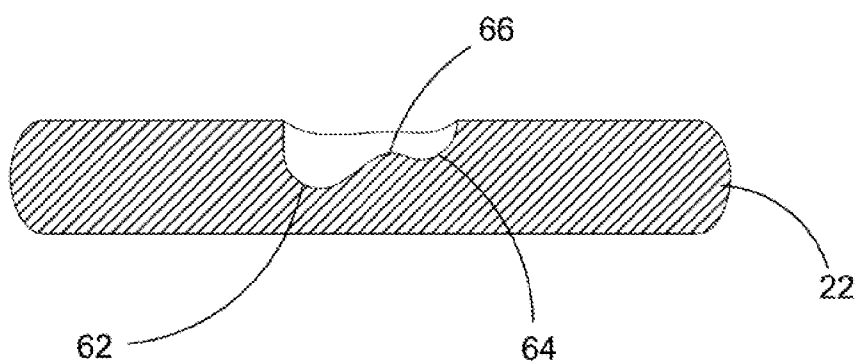


Fig. 8

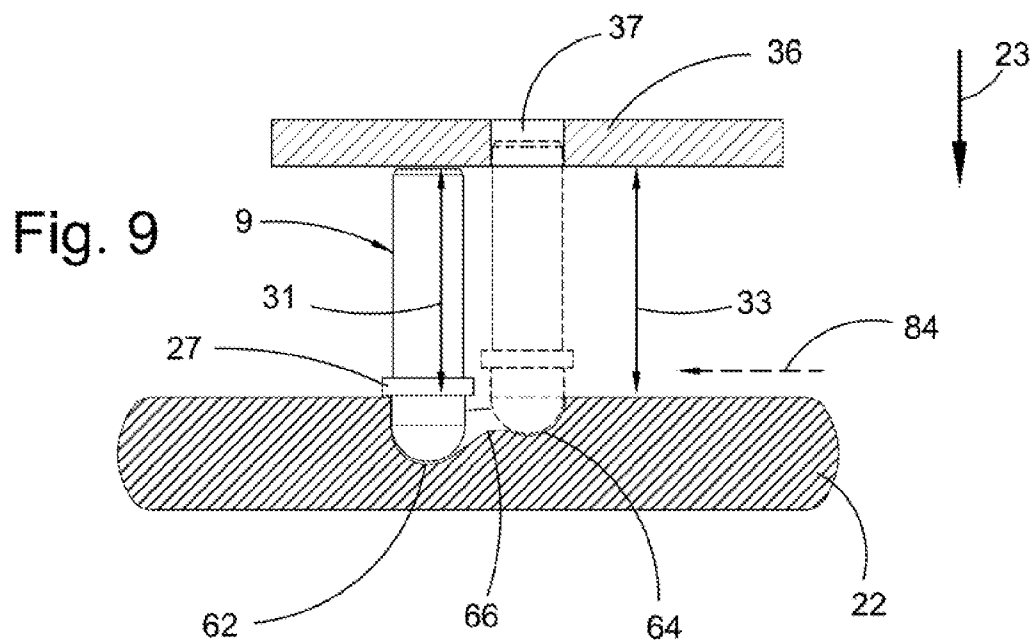


Fig. 9

# LOCKING RANDOM ORBITAL DUAL-ACTION HEAD ASSEMBLY WITH CENTERING

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This is a continuation-in-part patent application under 35 USC 120 of U.S. patent application Ser. No. 12/429,520, filed Apr. 24, 2009 and entitled "LOCKING RANDOM ORBITAL DUAL-ACTION HEAD ASSEMBLY," which is a continuation-in-part application under 35 USC 120 of U.S. patent application Ser. No. 11/516,003, filed Sep. 5, 2006 and entitled "LOCKING RANDOM ORBITAL DUAL-ACTION HEAD ASSEMBLY," which applications are incorporated herein by reference.

## FIELD OF THE INVENTION

**[0002]** The present invention relates generally to a lockable random orbital dual-action head assembly with centering. More particularly, the present invention relates to a locking assembly arranged to lock a rotatable element to prevent rotation of the rotatable element relative to the head assembly about an axis of rotation. Even more particularly, the present invention relates to a locking assembly arranged to lock a rotatable element to prevent rotation of the rotatable element relative to the head assembly while the pad assembly is concentric with the head assembly.

## BACKGROUND OF THE INVENTION

**[0003]** Orbital abrading tools are well-known and generally comprise a portable, manually manipulatable housing, a motor supported by the housing and having or being coupled to a drive shaft driven for rotation about a first axis, and an assembly for mounting a pad for abrading or polishing a work surface for orbital movement about the first axis. In a random orbital abrading tool, the assembly serves to additionally mount the pad for free rotational movement about a second axis, which is disposed parallel to the first axis.

**[0004]** The assembly typically includes a head portion coupled for driven rotation with the drive shaft about the first axis and defining a mounting recess having an axis arranged coincident with the second axis, a bearing supported within the mounting recess, and means for connecting the pad to the bearing for rotation about the second axis.

**[0005]** Locking mechanisms for orbital abrading tools are known in the art and described in U.S. Pat. No. 6,749,493 (Wuensch); U.S. Pat. No. 6,974,370 (Hutchins); U.S. Pat. No. 6,485,360 (Hutchins); and, U.S. Pat. No. 5,823,862 (Heidelberg). The locking mechanisms are also known as spindle locks in the art.

**[0006]** U.S. Pat. No. 6,749,493 (Wuensch) discloses a spindle-lock using a circumferential slider to engage at least one pin to lock the mechanism. By moving the slider circumferentially, a spring retained pin will be forced to vertically engage a hole in a gear wheel, locking the spindle. Wuensch shows a one-piece design for both the motor assembly and the head assembly. Thus, a new tool would be necessary for use with a different head assembly (such as a non-orbital head or a grinder wheel). Furthermore, the circumferential slider comprises many components, increasing the cost of manufacturing and overall weight of the tool.

**[0007]** The same deficiency is present in both U.S. Pat. No. 6,485,360 (Hutchins), and U.S. Pat. No. 5,823,862 (Heidelberg). Although they have different forms of locking mechanisms, the locking mechanism, head assembly, and rotatable means about a second axis are permanently affixed to the abrading tool housing. This broad incorporation restricts the capabilities of the tool. Thus, a new tool would be necessary for use with a different head assembly (such as a non-orbital head or a grinder wheel).

**[0008]** U.S. Pat. No. 6,974,370 (Hutchins '370) presents a similar deficiency. Hutchins '370 shows a spindle lock for an orbital abrading or polishing tool. The head assembly is removable from the abrading tool, but the locking mechanism and means for orbital motion are structural components of the abrading tool housing. Thus, a new tool would still be necessary for a non-orbital head or a grinder wheel.

**[0009]** U.S. Pat. No. 3,482,362 (Bangerter et al.) discloses a random orbital sander in which the pad assembly is free to rotate in an orbital manner with respect to a main body of the sander or can be locked to prevent rotation of the pad assembly with respect to the main body. In the locked position, the pad assembly is centered with respect to the main body. Bangerter does not teach locking the pad assembly so that the pad assembly is non-concentric with the main body.

**[0010]** Furthermore, the locking mechanisms, or spindle locks, described in the references above can be awkward to manipulate by a user wearing work gloves. Also, the locking mechanisms can be engaged accidentally by the user while the tool is in operation, resulting in excessive wear of the locking mechanism components and reducing the lifetime of the rotary tool and its components.

## SUMMARY OF THE INVENTION

**[0011]** According to aspects illustrated herein, there is provided a removable head assembly for a rotary tool, including: a body arranged for connection to a drive means for a rotary tool and including first and second openings; a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and a locking assembly with first and second elements. The body is rotatable about a first axis with respect to the drive means; the rotatable element is rotatable about a second axis substantially parallel to the first axis; the indentation or protrusion is aligned with a third axis substantially parallel to the first axis; the second element includes first and second longitudinal ends extendable beyond an outer surface for the body; the second element is displaceable through the first and second openings in the body; the second element is displaceable to displace the first element; and the displacement of the first element is along a straight line to rotationally lock the rotatable element with respect to the body so that the first and third axes are co-linear.

**[0012]** According to aspects illustrated herein, there is provided a combination rotary tool and removable head assembly, including: a rotary tool having a handle and a drive shaft; and a head assembly detachably secured to the rotary tool. The head assembly includes: a body connected to the drive means and including a bore through the body, the drive shaft rotatable about a first axis; a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element, the rotatable element rotatable about a second axis disposed substantially parallel to the first axis; and a locking assembly including first and second elements. The second element is disposed in the bore;

the second element includes first and second longitudinal ends extendable beyond an outer surface of the body; the second element is displaceable in the bore to displace the first element; the indentation or protrusion is aligned with a third axis substantially parallel to the first axis; and the displacement of the first element is along a straight line to rotationally lock the rotatable element with respect to the body so that the first and third axes are co-linear.

**[0013]** According to aspects illustrated herein, there is provided a removable head assembly for a combination rotary, including: a body; a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and a locking assembly including first and second elements. The body is connectable to a combination rotary tool and is rotatable about a first axis; the rotatable element is rotatable about a second axis; the indentation or protrusion is aligned with a third axis substantially parallel to the second axis; and the first element is displaceable to displace the second element to rotationally fix the rotatable element with respect to the body so that the first and third axes are co-linear, and the second axis is out of alignment with the first and third axes.

**[0014]** According to aspects illustrated herein, there is provided a removable head assembly for a combination rotary tool, including: a body including a through-bore and a channel connected to the through-bore, the channel substantially orthogonal to the through-bore; a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and a locking assembly including a first element at least partly disposed in the through-bore and a second element at least partly disposed in the channel. The body is connectable to a combination rotary tool and is rotatable about a first axis; the rotatable element is rotatable about a second axis; the indentation or protrusion is aligned with a third axis substantially parallel to the first axis; and the first element is displaceable in the through-bore to displace the second element in the channel to rotationally fix the rotatable element with respect to the body so that the first and third axes are co-linear, and the second axis is out of alignment with the first and third axes.

**[0015]** A general objective of the present invention is to provide a removable head assembly with a means for restricting orbital rotation with a pad assembly in a concentric configuration.

**[0016]** These and other objects, features and advantages of the present invention will become readily apparent to those having ordinary skill in the art upon a reading of the following detailed description of the invention in view of the drawings and claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** Various embodiments are disclosed, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, in which:

**[0018]** FIG. 1 is an exploded view of a removable locking random orbital dual action head assembly and a rotary tool;

**[0019]** FIG. 2 is a cross sectional view of the removable locking random orbital dual action head assembly shown in FIG. 1 in unlocked configuration;

**[0020]** FIG. 3 is a cross sectional view of the removable locking random orbital dual action head assembly shown in FIG. 1 in a concentric locked configuration;

**[0021]** FIG. 4 is a detail of the rotatable element of FIG. 1 with a protrusion;

**[0022]** FIG. 5 is a top view of the removable locking random orbital dual action head assembly shown in FIG. 1;

**[0023]** FIG. 6 is a cross sectional view of the removable locking random orbital dual action head assembly shown in FIG. 5, taken generally along Line 6-6 in FIG. 5, in an unlocked configuration;

**[0024]** FIG. 7 is a top view of the sliding pin shown in FIG. 1;

**[0025]** FIG. 8 is a side view of the sliding pin shown in FIG. 7 taken generally along Line 8-8 in FIG. 7;

**[0026]** FIG. 9 is an illustrative view of the sliding pin and pin of FIG. 1 in unlocked and locked configurations; and

**[0027]** FIG. 10 is an exploded view of the pin and elastically deformable elements shown in FIG. 1 for engaging the rotatable element, with one pin shown in cross-section.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0028]** At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or functionally similar, structural elements of the invention. It is to be understood that the invention as claimed is not limited to the disclosed aspects.

**[0029]** Furthermore, it is understood that this invention is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only, and is not intended to limit the scope of the present invention, which is limited only by the appended claims.

**[0030]** Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this invention belongs.

**[0031]** FIG. 1 is an exploded view of rotary tool 10 and removable locking random orbital dual action head assembly 20 (hereinafter "head assembly 20"). In one embodiment, rotary tool 10 is a compressed air powered tool, but it should be appreciated that any type of rotary tool could be used. For example, an electrically powered rotary tool could be used. In one embodiment, rotary tool 10 comprises handle 12, handle 14, and trigger 16, which triggers air flow to provide power to rotary tool 10.

**[0032]** FIG. 2 is a cross sectional view of removable locking random orbital dual action head assembly 20 shown in FIG. 1 in an unlocked configuration.

**[0033]** FIG. 3 is a cross sectional view of removable locking random orbital dual action head assembly 20 shown in FIG. 1 in a concentric locked configuration. The following should be viewed in light of FIGS. 1 through 3. Rotary tool 10 includes threaded screw 18 for attachment to head assembly 20 at threaded port 28. The connection at threaded screw 18 and threaded port 28 provides axis of rotation 52 for orbital motion. Axis of rotation 52 is most clearly shown in FIGS. 2 and 3. Referring back to FIG. 1, it should be appreciated that any connection means between rotary tool 10 and head assembly 20 could be used. A threaded connection is shown, but a socket connection (such as a connection used for socket wrenches as known in the art) or any other form of coupling known in the art used in rotation applications could be used.

**[0034]** The following is a broad overview of assembly 20, further details are provided below. Assembly 20 includes body, or casing 30, rotatable element, or spindle, 36, and

locking assembly 21. Casing 30 is arranged for connection to a drive means, for example, screw 18, rotatable about axis 52, and in turn is rotatable about axis 52. Element 36 is connected to the body, is rotatable about axis of rotation 54, disposed substantially parallel to axis 52, and is arranged for connection to a pad assembly, for example pad assembly 45. Locking assembly 21 is arranged to lock rotatable element 36 to body 30 to prevent rotation of element 36 about axis 54.

[0035] Locking assembly 21 includes element 8 displaceable to rotationally lock rotatable element 36. Assembly 21 also includes element, or pin, 22, engageable with element 8 and displaceable to control the displacement of element 8. In one embodiment, element 8 includes pins 26 and 72 and elastically deformable element 70. In one embodiment, for example, as shown in FIG. 9, element 8 includes a single pin 9 instead of an assembly of spring 70 and pins 26 and 72. In one embodiment, element 8 includes elastically deformable element 25 arranged to urge pin 26 or pin 9 in direction 23. In one embodiment, one or both of elements 25 and 70 are respective springs. However it should be understood that any elastically deformable element known in the art can be used. As further described below, element 22 engages and displaces element 8 to urge element 8 in direction 29 to lock element 36 with body 30. Rotatable element 36 includes at least one receiving feature 37 engageable with element 8. In one embodiment, the receiving feature is an opening or an indentation. It should be understood that element 8 is not limited to the configuration and parts described and that other configurations and parts are possible.

[0036] Casing 30 of assembly 20 includes threaded port 28, through-bore 24, and channel 63, substantially orthogonal to the through-bore. Elements 22 and 8 are at least partially disposed in the through-bore and channel, respectively. Retention spring 25 retains element 8 in a disengaged position, with respect to element 36, until sliding pin 22 is engaged for a locking mode. In one embodiment, fastener 7 is used to hold pin 26 in channel 63, for example, the fastener is threaded into the end of channel 63.

[0037] In one embodiment, pins 26 and 9 includes rib, or flange, 27, upon which retention spring 25 rests. In one embodiment, sliding pin 22 protrudes through both sides of through-bore 24 so that an operator can access both ends of slide sliding pin 22 to move the pin from an engaged to a disengaged position. In one embodiment, sliding pin 22 protrudes through one side substantially more so that the other side dependent upon whether sliding pin 22 is in the engaged or disengaged position. Sliding pin 22 protrudes through to a first side substantially more than a second side in the engaged position, and protrudes through the second side substantially more than the first side in the disengaged position. The engaged and disengaged positions are further described below. The preceding configuration enables easy engagement or disengagement of the sliding pin 22 when the operator is wearing work gloves.

[0038] Sliding pin 22 rotates with head assembly 20 when rotary tool 10 is engaged. This rotation inhibits a user from accidentally engaging sliding pin 22 while the tool is being used and causing unnecessary wear on the components.

[0039] Casing 30 acts as a shell and structural support for ball bearing assembly 34, spindle 36, and counterbalances 40 and 2 and bushings 4. Ball bearing assembly 34 provides for rotation, about axis 54, of spindle 36, base support 44, pad base 45 and pad assembly 48 independent of casing 30. It should be appreciated that any ball bearing means known in

the art can be used for ball bearing assembly 34. It also should be appreciated that any rotation support means known in the art can be used for rotation about axis 54, for example a bushing arrangement (not shown).

[0040] Element 36 includes means 57 by which pad assembly 48 can be connected to element 36. In one embodiment, for example, as shown in FIGS. 2 and 3, means 57 is an indentation, for example, a threaded indentation, for receiving a fastener, such as fastener 59, for connecting the pad assembly to element 36. Means 57 is aligned with axis 55, which is substantially parallel to axes 52 and 54. Axis 55 is out of alignment with, or misaligned with, axis 54. Thus, pad assembly 48, when connected to spindle 36, is non-concentric with axis 54.

[0041] FIG. 4 is a detail of rotatable element 36 of FIG. 1 with a protrusion. The following should be viewed in light of FIGS. 1 through 4. In one embodiment, for example, as shown in FIG. 4, means 57 is a protrusion, for example, a threaded protrusion, for receiving a fastener, such as a nut, for connecting the pad assembly to element 36.

[0042] Casing 30 and spindle 36 can be locked together, specifically with respect to rotation about axis 52 by the action of element 8 and the spindle. FIG. 3 shows the locked position, hereafter referred to as the concentric locked mode or the concentric mode, in which the casing and spindle are locked such that axes 52 and 55 are co-linear and pad assembly 48 is symmetrical or concentric with respect to body 30 and axis 52. Axes 52 and 55 and not aligned with axis 54 in the concentric mode.

[0043] At least one hole 37 in the spindle is used for the concentric mode, such that the insertion of element 8 in hole 37 causes the casing and spindle to be locked such that axes 52 and 55 are aligned, or co-linear. Although one hole is shown for 37, it should be understood that other numbers of holes are possible. Operation of element 8 and hole 37 is further described below.

[0044] In one embodiment (not shown), casing 30 and spindle 36 can be locked together, specifically with respect to rotation about axis 52, in another configuration by the action of element 8 and the spindle. In this other configuration, hereafter referred to as the non-concentric mode, the casing and spindle are locked such that each of axes 52, 54, and 55 are misaligned with the remaining axes. That is, the axes are not co-linear and pad assembly 48 is non-symmetrical or non-concentric with respect to body 30 and axis 52. At least one hole or indentation (not shown) in the spindle can be used for the non-concentric mode, such that the insertion of element 8 in the hole causes the casing and spindle to be locked such each of axes 52, 54, and 55 are misaligned with the remaining axes. In general, the radial distance from axis 55 to the hole or indentation is less than the radial distance from axis 55 to hole 37.

[0045] Balancing is very important in rotary tools in order to minimize undesirable vibration. Engagement holes 37 are about the same size as the diameter of pin 26 or pin 9 and are operatively arranged to accept pin 26 or pin 9. Retention screws 38 hold ball bearing assembly 34 to casing 30. It should be appreciated that any means of attachment known in the art can be used. In some aspects, retention screws 38 in a set of three are used for balancing and ease of manufacturing and openings 37 are used to access the screws. One or more openings 6 in the spindle are used to access screws 38.

[0046] In one embodiment, counterbalances 40 and 2 are attached to casing 30 by means of bolts 42 and 3, respectively, to provide a balanced rotation of both orbital and rotational motion and thereby reduce vibrations. In one embodiment, bushings 4, attached to the body by fasteners 5, are disposed between the body and counterbalances 40 and 2, respectively. The counterbalances primarily counteract forces in the X and Y directions with respect to vibration of assembly 20. The bushings primarily counteract forces in the Z direction with respect to vibration of assembly 20. Therefore, the height and diameter of the bushings are determined to address the Z direction forces in conjunction with the counterbalance weights.

[0047] FIG. 5 is a top view of the removable locking random orbital dual action head assembly shown in FIG. 1.

[0048] FIG. 6 is a cross sectional view of the removable locking random orbital dual action head assembly shown in FIG. 5, taken generally along line 6-6 in FIG. 5, in an unlocked configuration.

[0049] FIG. 7 is a top view of the sliding pin shown in FIG. 1.

[0050] FIG. 8 is a side view of the sliding pin shown in FIG. 7 taken along Line 8-8 in FIG. 7.

[0051] FIG. 9 is an illustrative view illustrating the sliding pin and pin of FIG. 1 in unlocked and locked configurations.

[0052] FIG. 10 is an exploded view of the pin and an elastically deformable elements shown in FIG. 1 for engaging the rotatable element, with one pin shown in cross-section. The following should be viewed in light of FIGS. 1 through 10. The operation of locking assembly 21 is now described in further detail. Although pin 9 is shown for element 8 in FIG. 9, it should be understood that the discussion is applicable to element 8 with pins 26 and 72, specifically; pin 72 would be in contact with slots 62 and 64. In one embodiment, sliding pin 22 has two graduated slots, slot 62 for a disengaged position of element 8, and slot 64 for an engaged position of element 8. In one embodiment, ridge 66 is disposed between slots 62 and 64, thereby helping to prevent sliding pin 22 from sliding element 8 between engaged slot 64 and disengaged slot 62 without direct user manipulation to overcome the spring force created by retention spring 25. In FIG. 6, sliding pin 22 is in a disengaged position with element 8 in slot 62. Slots 62 and 64, with ridge 66 between them, has been previously presented in U.S. Pat. No. 5,823,862 (Heidelberg), which is incorporated by reference herein.

[0053] Referring to FIG. 10, element 70 is located in space 74 within pin 26. End 76 of element 70 is engageable with end 78 of the space and end 80 of element 70 is engageable with end 82 of pin 72. End 84 of pin 72 is engaged with pin 22. Elastically deformable element, or spring, 25 applies constant force to pin 26 or pin 9 to urge the pin in direction 23. This force tends to keep element 8 engaged with which ever of slots 62 or 64 in which the element is disposed. Element 70 and pin 72 counter the force of element 25 to urge pin 26 in direction 29. In an unlocked mode (element 8 is not engaged with hole 37), pin 22 is positioned so that element 8 is disposed in slot 62. In one embodiment, length 31 of element 8 is less than or equal to axial length 33 between pin 22 and element 36, so that in the unlocked mode, element 8 does not extend far enough in direction 29 to engage element 36 and element 36 is able to rotate without substantive interference from element 8.

[0054] To switch to a locking mode, for example, the concentric mode, pin 22 is laterally displaced so that element 8 shifts to slot 64, displacing element 8 in direction 29 and into opening 37, for example, as shown in FIG. 3. For example, in one embodiment, length 31 is sufficient to enable pin 26 or pin 9 to extend through opening 37 once element 8 and opening 37 are aligned. To attain the concentric locking mode, lateral pressure is applied to the appropriate end of pin 22, for example, in direction 84 in FIG. 9 and assembly 20 (and subsequently element 36) is rotated about axis 54 until opening 37 aligns with element 8. At that point, the lateral pressure causes pin 22 to slide so that element 8 displaces to slot 64 and is pushed into opening 37, locking element 36 with respect to casing 30 through which element 8 passes. Thus, by rotating head assembly 20 around second axis 54, element 8 will eventually align with hole 37.

[0055] As noted supra, axes 52 and 54 are out of alignment, that is, the axes are not co-linear and axis 55 is out of alignment with axis 54. Thus, axis 55 orbits about axis 54, and axis 54 orbits about axis 52. Hole 37 and element 8 are equidistant from axis 54. However, the misalignment of axes 54 and 55 causes axis 55 to align with axis 52 in the concentric locking mode (when element 8 engages hole 37). That is, the non-symmetrical configuration of axes 54 and 55 causes axis 55 to "orbit" around axis 54 to attain the alignment of the concentric locking mode (axis 55 is aligned with axis 52).

[0056] The locking mechanism herein described locks the rotation of the pad assembly about 54. Thus, the pad assembly will only rotate about axis 52 with casing 30. In the concentric mode, the pad assembly is centered with respect to axis 52.

[0057] In one embodiment, components of head assembly 20 are machined from metal. In some aspects, other material including, but not limited to composites, plastics, and combinations thereof are used to make the components. In some aspects both metal and one or more of the other materials are used to form the components. It should also be appreciated that any form of metal processing could be used, including casting, pressing, welding, machining, and combinations thereof. In some aspects, machining is used to increase precision.

[0058] It should be appreciated that any type of pad assembly 48 could be used. Pad assembly 48 could include a piece of sand paper of any grit size. Alternatively, pad assembly 48 could include a polishing pad, buffing pad, or any other pad known in the art.

[0059] It will be appreciated that various of the above-disclosed and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations, or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

What is claimed is:

1. A removable head assembly for a rotary tool, comprising:
  - a body arranged for connection to a drive means for a rotary tool and including first and second openings;
  - a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and,
  - a locking assembly with first and second elements, wherein:
    - the body is rotatable about a first axis with respect to the drive means;

the rotatable element is rotatable about a second axis substantially parallel to the first axis;  
 the indentation or protrusion is aligned with a third axis substantially parallel to the first axis;  
 the second element includes first and second longitudinal ends extendable beyond an outer surface for the body;  
 the second element is displaceable through the first and second openings in the body;  
 the second element is displaceable to displace the first element; and,  
 the displacement of the first element is along a straight line to rotationally lock the rotatable element with respect to the body so that the first and third axes are co-linear.

2. The removable head assembly as recited in claim 1, wherein:  
 The locking assembly further comprises an elastically deformable element arranged to urge said first element in a first direction; and,  
 said second element is engageable with said first element to urge said first element in a second direction, opposite said first direction, to lock said rotatable element with said body.

3. The removable head assembly as recited in claim 1, wherein said rotatable element further comprises at least one receiving feature engageable with said first element.

4. The removable head assembly as recited in claim 1, further comprising a coupling for detachably securing said head assembly to a rotary tool.

5. The removable head assembly as recited in claim 1, further comprising a counterbalance secured to said body.

6. A combination rotary tool and removable head assembly, comprising:  
 a rotary tool having a handle and a drive shaft; and,  
 a head assembly detachably secured to said rotary tool, comprising:  
 a body connected to said drive means and including a bore through the body, said drive shaft rotatable about a first axis;  
 a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element, said rotatable element rotatable about a second axis disposed substantially parallel to said first axis; and,  
 a locking assembly including first and second elements, wherein:  
 the second element is disposed in the bore;  
 the second element includes first and second longitudinal ends extendable beyond an outer surface of the body;  
 the second element is displaceable in the bore to displace the first element;  
 the indentation or protrusion is aligned with a third axis substantially parallel to the first axis; and,

the displacement of the first element is along a straight line to rotationally lock the rotatable element with respect to the body so that the first and third axes are co-linear.

7. A removable head assembly for a combination rotary, comprising:  
 a body;  
 a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and,  
 a locking assembly including first and second elements, wherein:  
 the body is connectable to a combination rotary tool and is rotatable about a first axis;  
 the rotatable element is rotatable about a second axis;  
 the indentation or protrusion is aligned with a third axis substantially parallel to the second axis; and,  
 the first element is displaceable to displace the second element to rotationally fix the rotatable element with respect to the body so that the first and third axes are co-linear, and the second axis is out of alignment with the first and third axes.

8. The head assembly of claim 7 further comprising:  
 at least one bushing counterweight attached to the body for counteracting vibration forces parallel to the first axis; and,  
 a respective counterweight attached to each of the at least one bushing counterweights for counteracting vibration forces orthogonal to the first axis.

9. A removable head assembly for a combination rotary tool, comprising:  
 a body including a through-bore and a channel connected to the through-bore, the channel substantially orthogonal to the through-bore;  
 a rotatable element connected to the body and including an indentation or protrusion for fixing a pad assembly to the rotatable element; and,  
 a locking assembly including a first element at least partly disposed in the through-bore and a second element at least partly disposed in the channel, wherein:  
 the body is connectable to a combination rotary tool and is rotatable about a first axis;  
 the rotatable element is rotatable about a second axis;  
 the indentation or protrusion is aligned with a third axis substantially parallel to the first axis; and,  
 the first element is displaceable in the through-bore to displace the second element in the channel to rotationally fix the rotatable element with respect to the body so that the first and third axes are co-linear, and the second axis is out of alignment with the first and third axes.

10. The head assembly of claim 9 wherein:  
 the rotatable element includes at least one opening;  
 the at least one opening is for engaging the second element to rotationally fix the body and the rotating element with respect to each other.

\* \* \* \* \*