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Description

[0001] The present invention relates to power tools and more specifically to a clamp arrangement for releasably securing an accessory to an oscillating handheld power tool.

[0002] Handheld power tools are provided in many examples for performing a wide range of tasks. For example, some power hand tools can include an output member that is driven by a motor and that couples with an accessory to perform a working operation onto a work piece. For example, some power tools can provide various configurations for attaching cutting accessories, grinding accessories, sanding accessories and the like. Some power tools are configured as oscillating tools that are operable to transmit an oscillating motion onto the accessory.

[0003] During the course of performing a working operation, a user may want to exchange one accessory for another accessory. For example, a user may want to exchange one grinding accessory with another grinding accessory or one sanding platen with another sanding platen. Alternatively, a user may wish to replace a cutting accessory with another cutting accessory. It is also contemplated that a user may want to replace a given accessory dedicated to one task (such as sanding) with another accessory dedicated toward another task (such as cutting for example). In any event, many power hand tools require the use of a secondary tool in order to swap accessories. For example, many power hand tools require the use of a hand screw driver that can be used to retract a fastener that may lock the accessory to the output member of the power hand tool. In other examples, a wrench or other hand tool may be required to remove or unlock a given accessory from the power hand tool and subsequently lock another accessory back to the power hand tool.

[0004] DE 202011050164 U1 discloses an adaptor for adapting a working element to an end of a power tool shaft. The adaptor includes a central hole passing through the adaptor and has a longitudinal axis, a driving end facing the end of the shaft, and a tool end facing the working element and having a protruding portion. The driving end is provided with grooves, the grooves and bosses formed between the grooves are alternately arranged around the circumference of the driving end, and the bosses have side faces each facing the central hole and located on a plane passing through an edge of a regular polygon and parallel with the longitudinal axis. The adaptor can be used to adapt different kinds of working elements to various kinds of driving shafts having different shapes of shaft end.

[0005] EP 2382929 A1 discloses a clamp arrangement according to the preamble of claim 1.

[0006] A first aspect of the present invention provides a clamp arrangement according to claim 1.

[0007] Preferred features of the clamp arrangement according to the first aspect of the invention are described

below and in the claims dependent upon Claim 1, and shown in the drawings.

[0008] A second aspect of the invention provides a kit of parts according to Claim 11, and preferably a kit of parts according to the claims dependent upon Claim 11.

[0009] A clamp arrangement for securing an accessory to an oscillating power tool can include a clamp assembly including a first clamp member that moves relative to the accessory. The first clamp member can move between a closed position wherein the clamp assembly retains the accessory and an open position wherein the first clamp member is offset from the accessory permitting removal of the first accessory from the clamp assembly while the first clamp member remains coupled to the clamp assembly. The clamp assembly can further comprise a second clamp member having a first portion that opposes the first clamp member and cooperates with the first clamp member to clamp the accessory between the first and second clamp members. An attachment plate can carry the clamp assembly. The attachment plate can have a first mating detail formed thereon that is configured to selectively and removably mate with a complementary second mating detail on the power tool in an assembled position.

[0010] According to preferred additional features, the clamp arrangement can further include a fastener that is configured to selectively and removably extend through a portion of the attachment plate and rotationally fix the attachment plate to the output member of the power tool. The fastener can comprise a threaded fastener that threadably mates with a complementary threaded bore defined in the output member. The clamp assembly and the attachment plate can be rotationally fixed with the output member in the assembled position.

[0011] The first mating detail can collectively comprise a first mating geometry and a second distinct mating geometry that are configured to selectively and alternatively mate with the complementary second mating detail. The second mating detail can comprise a first tool geometry on a first oscillating tool and a second tool geometry, distinct from the first tool geometry on a second oscillating tool. The first mating geometry can be configured to mate with the first tool geometry of the first oscillating tool in a first configuration. The second mating geometry can be configured to mate with the second tool geometry of the second oscillating tool in a second configuration. The first mating geometry can comprise a keyed recess formed into the attachment plate. The second mating geometry can comprise a plurality of recesses formed around the keyed recess. According to one configuration, the keyed recess comprises a twelve point star. The plurality of recesses can comprise a plurality of oval recesses arranged around the keyed recess.

[0012] According to one configuration, the clamp arrangement can comprise a lever having a user engagement portion and a pivot portion including a pivot axle. The lever can be pivotally coupled relative to the attachment plate about the pivot axle between a first position,

wherein the clamp assembly is in the closed position and a second position wherein movement of the user engagement portion of the lever causes the clamp assembly to be moved to the open position. In other configurations, a first clamp member body can have a user engagement portion including a flange, e.g. a circumferential flange, extending therefrom. The user engagement portion can be movably coupled relative to the tool body along an axis of the fastener between a first position, wherein the clamp assembly is in the closed position and a second position wherein movement of the user engagement portion causes the clamp assembly to be moved to the open position.

[0013] The clamp arrangement may preferably further comprise a button movably coupled to the first clamp member body between a first position where a gripping detail associated with the button engages a complementary gripping detail associated with the second clamp member and a second position where the gripping detail disengages the complementary gripping detail.

[0014] A clamp arrangement for securing an accessory to an oscillating power tool can thus be provided, the clamp arrangement comprising a clamp assembly including a first clamp member that moves relative to the accessory between a closed position wherein the clamp assembly retains the accessory and an open position wherein the first clamp member of the clamp assembly is offset from the accessory permitting removal of the accessory from the clamp assembly while the first clamp member remains coupled to the clamp assembly, the clamp assembly further comprising a second clamp member having a first portion that opposes the first clamp member and cooperates with the first clamp member to clamp the accessory between the first and second clamp members; and an attachment plate that carries the clamp assembly, the attachment plate having a first mating geometry and a second mating geometry distinct from the first mating geometry formed thereon, wherein the attachment plate is configured to selectively and alternatively mate to a first power tool with the first mating geometry in a first configuration and mate with a second power tool with the second mating geometry in a second configuration.

[0015] Also, a clamp arrangement for securing an accessory to an oscillating power tool can be provided, the clamp arrangement comprising a clamp assembly including a first clamp member that moves relative to a first accessory between a closed position wherein the clamp assembly retains the first accessory and an open position wherein the first clamp member of the clamp assembly is offset from the first accessory permitting removal of the first accessory from the clamp assembly while the first clamp member remains coupled to the clamp assembly, the clamp assembly further comprising a second clamp member having a first portion that opposes the first clamp member and cooperates with the first clamp member to clamp the first accessory between the first and second clamp members; a plate having an opening

that is selectively keyed to a boss extending from the second clamp member in an installed position; and a fastener that threadably mates with the clamp assembly operatively coupling a second accessory against the plate in an installed position.

[0016] A washer may advantageously be interposed between the second accessory and a portion of the fastener in the installed position, for example.

[0017] It is to be understood that any feature, including any preferred feature, of any aspect of the invention may be a feature, including a preferred feature, of any other aspect of the invention.

[0018] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only.

[0019] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations.

Fig. 1 is an exploded perspective view of a clamp assembly constructed in accordance with an example of the present invention and shown with a fastener for selectively and alternatively coupling the clamp assembly to one of a first power tool or a second power tool;

Fig. 2 is a sectional view of the clamp assembly of Fig. 1 shown coupled to a first tool mating detail of the first power tool;

Fig. 3 is a cross-sectional view of the clamp assembly of Fig. 2 and shown with the clamp assembly in the open position resulting from the lever being rotated about a pivot axle into a second position wherein an accessory may be inserted for clamping;

Fig. 4 is a cross-sectional view of the clamp assembly of Fig. 3 and shown with the clamp assembly in a closed position wherein the accessory is clamped between the first and second clamp members;

Fig. 5 is a front perspective view of a clamp assembly constructed in accordance with another example of the present invention;

Fig. 6 is an exploded perspective view of the clamp assembly of Fig. 5 and shown operatively associated with the first power tool and a fastener;

Fig. 7 is a cross-sectional view of the clamp assembly of Fig. 6 shown in an installed position wherein the fastener threadably mates with an output member of the first power tool;

Fig. 8 is a cross-sectional view of the clamp assembly of Fig. 7 and shown with the clamp assembly in the open position for receipt of an accessory;

Fig. 9 is a cross-sectional view of the clamp assembly of Fig. 8 and shown with the clamp assembly in the closed position and clamping the accessory between a first and second clamp member;

Fig. 10 is an exploded perspective view of a clamp assembly constructed not in accordance with the present invention;

Fig. 11 is an exploded cross-sectional view of the clamp assembly of Fig. 10;

Fig. 12 is a cross-sectional view of the clamp assembly of Fig. 11 and shown with an accessory coupled to an outboard face of a clamp member with an adapter plate, a clamp plate, and a fastener;

Fig. 13 is a front perspective view of a clamp assembly constructed in accordance with another example of the present invention;

Fig. 14 is an exploded perspective view of the clamp assembly of Fig. 13;

Fig. 15 is a cross-sectional view of the clamp assembly of Fig. 13 and shown with the clamp assembly in the open position for receipt of an accessory;

Fig. 16 is a cross-sectional view of the clamp assembly of Fig. 15 and shown with the clamp assembly in the closed position and clamping the accessory between the first and second clamp member;

Fig. 17 is a front perspective view of a clamp assembly constructed in accordance with yet another example of the present invention;

Fig. 18 is an exploded perspective view of the clamp assembly of Fig. 17;

Fig. 19 is a cross-sectional view of the clamp assembly of Fig. 17 and shown with the clamp assembly in the open position for receipt of an accessory;

Fig. 20 is a cross-sectional view of the clamp assembly of Fig. 19 and shown with the clamp assembly in the closed position for clamping the accessory between the first and second clamp member;

Fig. 21 is a cross-sectional view of clamp assembly constructed in accordance with other examples of the present invention and shown in an open position for receipt of an accessory in the form of a sanding platen; and

Fig. 22 is a cross-sectional view of the clamp assembly of Fig. 21 and shown with the clamp assembly in the closed position and clamping the accessory between the first and second clamp member.

[0020] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

[0021] Example embodiments will now be described more fully with reference to the accompanying drawings.

[0022] With reference now to Figs. 1-2, a clamp arrangement constructed in accordance to another example of the present disclosure is shown and generally identified at reference numeral 410. The clamp arrangement 410 is shown operatively associated with a first power tool 412a and a second power tool 412b. As will be described in detail herein, the clamp arrangement 410 includes a clamp assembly 414 that is configured to be selectively and alternatively coupled to either of the first power tool 412a or the second power tool 412b. The clamp assembly 414 is configured to selectively and alternatively retain various accessories such as a seventh accessory 14g (Fig. 3). As will become appreciated

from the following discussion, the clamp assembly 414 is configured to suitably couple with an output member 416a provided on the first power tool 412a or an output member 416b provided on the second power tool 412b. In this regard, the output member 416a may include a first tool mating detail 418a having a first mating geometry 420a. The output member 416b may incorporate a second tool mating detail 418b having a second mating geometry 420b. In the example shown, the first mating geometry 420a provided on the output member 416a includes twelve circular shaped protrusions 422a. The second mating geometry 420b provided on the output member 416b includes a male protrusion 422b. The male protrusion 422b may alternatively comprise either of a four point star or a hexagonal protrusion. As will become appreciated herein, the clamp assembly 414 includes complementary geometry suitable to selectively and alternatively mate with an output member 416a having a male protrusion 422b in the form of a four point star or a hexagon.

[0023] The first power tool 412a generally includes a tool body 430a having a housing 432a that generally contains a motor 434a that drives the output member 416a. Similarly, the second power tool 412b includes a tool body 430b having a housing 432b that contains a motor 434b that drives the output member 416b. The output members 416a and 416b of the respective first and second power tools 412a and 412b can be configured to provide an oscillating motion.

[0024] The clamp assembly 414 generally includes an attachment plate 440 having a lever 442 pivotally coupled thereto. The clamp assembly 414 can generally include a first clamp member 446 and a second clamp member 448 (Fig. 2). The lever 442 can include a lever arm 450 that includes a user engagement portion 452. The lever 442 can further include a pivot portion 454 having a pivot axle 456.

[0025] The second clamp member 448 can include a second clamp body 460 generally in the form of a ring having a central opening 462. The second clamp body 460 can generally comprise a second clamping surface 464 having a plurality of mounting features 466 formed thereon. In one example, the second clamp body 460 and the plurality of mounting features 466 can be formed as a unitary, monolithic part, such as by precision cast steel. In other examples, the plurality of mounting features 466 may be separately formed and coupled to the clamp body 460. The second clamp member 448 may be configured similarly to the second clamp member 238 described above. In this regard, the second clamp member 448 may comprise eight protrusions or male conical portions that are configured to each have a tapered body portion that generally tapers from the second clamping surface 464 toward a tip.

[0026] The first clamp member 446 can generally include a first clamp member body 474 having an annular flange 476. The first clamp member body 474 can include a clamping surface 478 that has a mounting feature 480

that is in the form of an annular recess that cooperatively receive the corresponding plurality of mounting features 466 of the second clamp member 448. The mounting feature 480 can have any configuration that may cooperatively accept at least portions of the mounting features 466. The annular flange 476 can generally extend radially from an outer hub 490 of the first clamp member body 474. The annular flange 476 can have a lever opposing surface 492. The first clamp member body 474 can further include an inner hub 494 that defines a first clamp member opening 496. The first clamp member opening 496 can be configured to receive a fastener 500. The fastener 500 can generally include a fastener head 502 and threads 504 formed on a distal end 506. The head 502 may incorporate an optional flange 508. The threads 504 can be configured to threadably mate with a threaded bore 510a defined in the output member 416a (or a threaded bore 510b formed in the output member 416b). In some examples, a cannulated sleeve 512 having a cannulation 514 may be positioned between the fastener 500 and the first clamp member opening 496 of the inner hub 494. The cannulated sleeve 512 can be fixed between the attachment plate 440 and the second clamp member body 460. An annular channel 516 can be formed between the outer hub 490 and the inner hub 494. The annular channel 516 can have a terminal surface 518. A biasing member 520 can be partially received by the annular channel 516.

[0027] In general, the lever 442, first clamp member 446, and second clamp member 448 may function similar to the configurations described above. However, with the clamp assembly 414 as described with respect to Figs. 1-4, the attachment plate 440 can be selectively secured to various power tools including the first power tool 412a and the second power tool 412b. The attachment plate 440 can generally include an attachment plate body 530 that provides an attachment plate mating detail 532. The attachment plate mating detail 532 can generally comprise a central recess 534 and a plurality of receiving portions 536 formed thereon. In the example provided, the central recess 534 can be generally defined by a keyed sidewall 540 defined into the body 530. Similarly, the plurality of receiving portions 536 can be generally defined into the body 530 as oval recesses 544. The keyed sidewall 540 can generally be in the form of a twelve point star. As can be appreciated, the oval recesses 544 can be configured to selectively receive the protrusions 422a provided on the first mating geometry 420a of the first power tool 412a. Notably, the oval recesses 544 are configured to suitably receive circular shaped protrusions 422a of multiple tools having various diameters. Similarly, the central recess 534 can be configured to cooperatively receive the male protrusion 422b (either the four point star in one configuration, or the hexagon in another configuration) provided by the second mating geometry 420b. In this regard, the attachment plate 440 may offer a user a variety of distinct mounting configurations for suitably coupling the clamp assembly 414 to

a wide range of power tools including the first and second power tools 412a and 412b shown in Fig. 1. It will be further appreciated that the interlocking geometries of the mating detail 532 of the attachment plate 440 and the first and second tool mating details 418a and 418b of the first and second power tools 412a and 412b, respectively may take other shapes.

[0028] In one example of coupling the clamp assembly 414 to the first power tool 412a, a user may initially align the attachment plate mating detail 532 with the first tool mating detail 418a. In the example provided, the user may align the oval recesses 544 defined in the body 530 of the attachment plate 440 for receipt of the complementary circular protrusions 422a extending from the first mating geometry 420a of the output member 416a. As can be appreciated, once the protrusions 422a are selectively received by the oval recesses 544 in the attachment plate 440, the clamp assembly 414 is rotationally fixed with the output member 416a. Next, a user may advance the fastener 500 through the cannulation 514 of the cannulated sleeve 512 and threadably advance the threads 504 into the threaded bore 510a defined in the output member 416a. In the example provided, the head 502 can engage an outer surface 548 of the second clamp member 448. As can be appreciated, in the assembled position (Figs. 2-4), the clamp assembly 414 will be fixed for oscillating motion with the output member 416a of the first power tool 412a. As shown in Figs. 3-4, the clamp assembly 414 may selectively accept the accessory 14g.

[0029] With reference now to Figs. 5-9, a clamp arrangement constructed in accordance to another example of the present disclosure is shown and generally identified at reference numeral 610. The clamp arrangement 610 is shown generally associated with the first power tool 412a (Fig. 6). As will be described in detail herein, the clamp arrangement 610 includes a clamp assembly 614 that is configured to be selectively coupled to the first or second power tools 412a and 412b. Again, it will be appreciated that the clamp assembly 614 may incorporate additional or alternative geometry for mating with other power tools such as those described herein. The clamp assembly 614 is configured to selectively and alternatively retain various accessories such as the seventh accessory 14g (Fig. 9). The clamp assembly 614 is configured to suitably couple with either of the output member 416a provided on the first power tool 412a or the output member 416b provided on the second power tool 412b.

[0030] The clamp assembly 614 generally includes an attachment plate 640 having a first clamp member 646 and a second clamp member 648. The first clamp member 646 is configured to translate relative to the second clamp member 648. The first clamp member 646 can generally include a first clamp member body 674 having an annular flange 676. The clamp assembly 614 is configured to operate similar to the clamp assembly 414 described above but without the incorporation of a lever. In

this regard, a user may engage the annular flange 676 and translate the first clamp member body 674 toward the attachment plate 640 against the bias of a biasing member 680 to move the first clamp member 646 from a clamped position (Fig. 9) to an unclamped position (Fig. 10).

[0031] The second clamp member 648 can include a second clamp body 682. The second clamp body 682 can be generally formed similar to the second clamp body 460 described above and will not be repeated here. The attachment plate 640 can generally include an attachment plate body 684 that provides an attachment plate mating detail 686. The attachment plate mating detail 686 can generally comprise a raised annular rim 688 having a central recess 689 and a plurality of receiving portions 690 formed thereon. In the example provided, the raised rim 688 incorporates twelve receiving portions 690 in the form of oval recesses 692. As can be appreciated, the oval recesses 692 can be configured to selectively receive the protrusions 422a provided on the first mating geometry 420a of the first power tool 412a. The central recess 689 can be a keyed sidewall 693 defined into the attachment plate body 684. The keyed sidewall 693 can generally be in the form of a twelve point star.

[0032] In one example of coupling the clamp assembly 614 to the first power tool 612a, a user may initially align the attachment plate mating detail 686 defined in the body 684 of the attachment plate 640 for receipt of the complementary circular protrusions 422a extending from the first mating geometry 420a of the output member 416a. Once the protrusions 422a are selectively received by the oval recesses 692 in the attachment plate 640, the clamp assembly 614 is rotationally fixed with the output member 616a. Next, a user may advance the fastener 500 through a cannulation 694 of a cannulated sleeve 696 and threadably advance the threads 504 into the threaded bore 510a defined in the output member 416a.

[0033] With reference now to Figs. 10-12, an attachment assembly constructed in accordance to additional features of the present disclosure is shown and generally identified at reference numeral 710. In general, the attachment assembly 710 generally includes an adapter plate 712, a clamp plate 714, and a fastener 716. As will become appreciated from the following discussion, the attachment assembly 710 may be configured to cooperate with any of the clamping arrangements discussed above for coupling an accessory, such as an accessory 14f to the clamp assembly 720 provided on a power tool 722. Specifically, the attachment assembly 710 may be configured to suitably connect to a second clamp member 726 of the clamp assembly 720 that may additionally include a first clamp member 728.

[0034] The second clamp member 726 can generally include a raised central boss 730 that can define flats 732 and 734 thereon. An opening 736 can also be formed through the second clamp member 726. The first clamp member 728 may define a threaded aperture 740 therein. The adapter plate 712 can generally define an adapter

plate body 742 having a central opening 744. The central opening 744 may be defined in part by a radial sidewall 746 having diametrically opposed flats 748. The body 742 can additionally include a plurality of outwardly extending protrusions 750 thereon. The clamp plate 714 can generally include a clamp plate body 754 that defines a central opening 756 therein. The fastener 716 may generally include a threaded shank 758 and a proximal head 760. The head 760 can define a gripping detail 762. The exemplary gripping detail 762 is in the form of a hex recess, however other details may be incorporated.

[0035] In one example of coupling the attachment assembly 710 to the power tool 722, the adapter plate 712 may be located onto the second clamp member 726. In this regard, the opposing flats 748 of the adapter plate 712 can be rotationally aligned with the corresponding flats 732 and 734 provided on the raised central boss 730 of the second clamp member 726. The fastener 716 may then be inserted through the opening 756 of the clamp plate 714 and through an opening 770 in the accessory 14f. The threaded shank 758 can then be threadably advanced into the threaded aperture 740 defined in the first clamp member 728 until the clamp plate 714 clamps the accessory 14f against the adapter plate 712 (Fig. 14). As can be appreciated, the protrusions 750 extending from the adapter plate body 742 can provide additional gripping onto the accessory 14f.

[0036] With reference now to Figs. 13-16, a clamp arrangement constructed in accordance to another example of the present disclosure is shown and generally identified at reference numeral 810. The clamp arrangement 810 is shown generally associated with a first output member 416a (Fig. 15) of the first power tool 412a (Fig. 6). As will be described in detail herein, the clamp arrangement 810 includes a clamp assembly 814 that is configured to be selectively coupled to the first or second power tools 412a and 412b. Again, it will be appreciated that the clamp assembly 814 may incorporate additional or alternative geometry for mating with other power tools such as those described herein. The clamp assembly 814 is configured to selectively and alternatively retain various accessories such as the seventh accessory 14g (Figs. 15-16). In this regard, the clamp assembly 814 is configured to suitably couple with either of the output member 416a provided on the first power tool 412a or the output member 416b provided on the second power tool 412b.

[0037] The clamp assembly 814 generally includes an attachment plate 820 having a first clamp member 822 movably coupled thereto. The first clamp member 822 can generally include a first clamp member body 824 that defines a through bore 826 (Fig. 14), an inset 828, a blind bore 830, and a radial channel 832 (Fig. 15). A fastener 500 can include threads 504 that threadably mate with corresponding threads defined in the output member 416a. The fastener 500 can therefore capture the clamp assembly 814 to the identified power tool.

[0038] The first clamp member 822 is configured to

translate relative to a second clamp member 838 as will become appreciated from the following discussion. The second clamp member 838 can include a second clamp body 840. The second clamp body 840 can be generally formed similar to the second clamp body 460 described above and will not be repeated here. The attachment plate 820 can generally include an attachment plate body 844 that provides an attachment plate mating detail 846. The attachment plate mating detail 846 can generally comprise a raised annular rim 848 having a central recess 850 and a plurality of receiving portions 852 formed thereon. In the example provided, the raised rim 848 incorporates twelve receiving portions 852 in the form of oval recesses 854. The oval recesses 854 can be configured to selectively receive the protrusions 422a provided on the first mating geometry 420a of the first power tool 412a. Again, the oval recesses 854 can cooperatively mate with protrusions 422a having various diameters.

[0039] The central recess 850 can be a keyed sidewall 858 defined into the attachment plate body 844. The keyed sidewall 858 can generally be in the form of a twelve point star. In the example provided, the attachment plate 820 further comprises a stem 860 extending therefrom. The stem 860 can be integrally formed or coupled to the attachment plate 820 and to the second clamp member 838. The stem 860 defines a longitudinal axis 862. A first series of ridges 864 can be formed around the stem 860. The first series of ridges 864 can collectively define a first gripping detail 866. The first gripping detail 866 can therefore be associated with, or fixed relative to, the second clamp member 838.

[0040] With particular reference now to Figs. 14 and 15, additional features of the clamp assembly 814 will be described. A first biasing member 870 can be located generally around the stem 860 and configured for engaging the clamp member body 824 at the inset 828 on one end and the attachment plate 820 on an opposite end. In this regard, the first biasing member 870 can provide a biasing force onto the clamp member body 824 in the direction of the second clamp member 838 or downwardly along the longitudinal axis 862. A button 872 defines a button axis 873 and can be at least partially received into the blind bore 830 of the clamp member body 824 against a bias of a second biasing member 874. The button 872 includes a second series of ridges 878 that collectively define a second gripping detail 880. In the example provided, the first and second series of ridges 864, 878 comprise discontinuous, stepped radial ridges.

[0041] With reference now to Figs. 15 and 16, operation of the clamp assembly 814 according to one example of the present teachings will be described. At the outset, it will be appreciated that the first series of ridges 864 can cooperate with the second series of ridges 878 for locating the button 872 at a desired location along the stem 860. Explained in greater detail, the second biasing member 874 can provide a bias against the button 872 forcing the button 872 in a direction rightward as viewed in Fig. 15 along the button axis 873. In this regard, the

second gripping detail 880 of the second series of ridges 878 on the button 872 are caused to mate and therefore cooperatively lock with the first gripping detail 866 of the first series of ridges 864 on the stem 860. When an operator wishes to change the location of the clamp member body 824, the button 872 can be depressed or translated in a direction leftward along the button axis 873 against the bias of the second biasing member 874. In this regard, the first series of ridges 864 and the second series of ridges 878 are caused to disengage whereby the operator can subsequently translate the clamp member body 824 in a direction along the axis 862 of the stem 860.

[0042] Once the desired elevation has been achieved, the operator can release the button 872 causing the respective first and second ridges 864 and 878 to lock. At this time, the user can place the desired accessory between the first and second clamp members 822 and 838. Next, the user can again depress the button 872 allowing the first biasing member 870 to direct the clamp member body 824 in a direction toward the accessory 14g until the accessory 14g is suitably clamped between the first and second clamp members 822 and 838. It will be appreciated that the operator is not required to release the button 872 to lock the clamp member body 824 at a displaced position from the second clamp member 838 while inserting the accessory 14g.

[0043] With reference now to Figs. 17-20, a clamp arrangement constructed in accordance to another example of the present disclosure is shown and generally identified at reference numeral 910. The clamp arrangement 910 is shown generally associated with a first output member 416a (Fig. 19) of the first power tool 412a (Fig. 6). As will become understood from the following discussion, the clamp assembly 910 includes a clamp assembly 914 that is configured to be selectively coupled to the first or second power tools 412a and 412b. Again, it will be appreciated that the clamp assembly 914 may incorporate additional or alternative geometry for mating with other power tools such as those described herein. The clamp assembly 914 is configured to selectively and alternatively retain various accessories such as the seventh accessory 14g (Figs. 19-20). In this regard, the clamp assembly 914 is configured to be suitably coupled with either of the output member 416a provided on the first power tool 412a or the output member 416b provided on the second power tool 412b.

[0044] The clamp assembly 914 generally includes an attachment plate 920 having a first clamp member 922 movably coupled thereto. The first clamp member 922 can generally include a first clamp member body 924 that defines a through bore 926 (Fig. 18), an inset 928, a blind bore 930, and a radial channel 932. The first clamp member body 924 includes an annular flange 934. As will be described herein, the annular flange 934 can facilitate a gripping of the user onto the clamp member body 924. A fastener 500' can include threads 504' that threadably mate with corresponding threads defined in the output member 416a. The fastener 500' can therefore capture

the clamp assembly 914 to the identified power tool.

[0045] The first clamp member 922 is configured to translate relative to a second clamp member 938 as will become appreciated from the following discussion. The second clamp member 938 can include a second clamp member body 940. The second clamp body 940 can be generally formed similar to the second clamp body 460 described above and will not be repeated. The attachment plate 920 can generally include an attachment plate body 944 that provides an attachment plate mating detail 946. The attachment plate mating detail 946 can generally comprise a raised annular rim 948 having a central recess 950 and a plurality of receiving portions 952 formed thereon. In the example shown, the raised rim 948 incorporates twelve receiving portions 952 in the form of oval recesses 954. The oval recesses 954 can be configured to selectively receive the protrusions 422a provided on the first mating geometry 420a of the first power tool 412a. Again, the oval recesses 954 can cooperatively mate with protrusions 422a having various diameters.

[0046] The central recess 950 can be a keyed sidewall 958 defined into the attachment plate body 944. The keyed sidewall 958 can generally be in the form of a twelve point star. In the example provided, the attachment plate 920 further comprises a stem 960 extending therefrom. The stem 960 is shown separately formed from the attachment plate 920 and to the second clamp member 938. However, it is contemplated that the stem 960 can be integrally formed with the attachment plate 920. The stem 960 defines a longitudinal axis 962. A first series of threads 964 can be formed around the stem 960. The first series of threads 964 can collectively define a first gripping detail 966. The first gripping detail 966 can therefore be associated with, or fixed relative to, the second clamp member 938.

[0047] With particular reference now to Fig. 18, additional features of the clamp assembly 914 will be described. A first biasing member 970 can be located generally around the stem 960 and configured for engaging the clamp member body 924 at the inset 928 on one end and the attachment plate 920 on an opposite end. In this regard, the first biasing member 970 can provide a biasing force onto the clamp member body 924 and the direction of the second clamp member 938 or downwardly along the longitudinal axis 962. A button 972 defines a button axis 973 and can be at least partially received into the blind bore 930 of the clamp member body 924 against a bias of a second biasing member 974. The button 972 includes a second series of threads 978 that collectively define a second gripping detail 980.

[0048] With particular reference now to Figs. 19 and 20, operation of the clamp assembly 914 according to one example of the present teachings will be described. At the outset, it will be appreciated that the first series of threads 964 can threadably mate with the second series of threads 978 for locating the button 972 at the desired location along the stem 960. Explained in greater detail,

the second biasing member 974 can provide a bias against the button 972 forcing the button 972 in a direction rightward as viewed in Fig. 19 along the button axis 973. In this regard, the second gripping detail 980 of the second series of threads 978 are caused to mate and therefore cooperatively lock with the first gripping detail 966 of the first series of threads 964 on the stem 960. When an operator wishes to change the location of the clamp member body 924, the button 972 can be translated in a direction leftward (as viewed in Fig. 18) along the button axis 973 against the bias of the second biasing member 974. In this regard, the first series of threads 964 and the second series of threads 978 are caused to disengage whereby the operator can subsequently translate the clamp member body 924 in a direction along the axis 962 of the stem 960. Once the desired elevation has been achieved, the operator can release the button 972 causing the respective first and second series of threads 964 and 978 to lock. Alternatively, an operator may rotate the first clamp member body 924 in a direction generally around the longitudinal axis 962 causing the first clamp member 922 to threadably advance along the first series of threads 964 to a desired position.

[0049] At this time, the user can place the desired accessory between the first and second clamp members 922 and 938. Next, the user can again depress the button 972 allowing the first biasing member 970 to direct the clamp member body 924 in a direction toward the accessory 14g until the accessory 14g is suitably clamped between the first and second clamp members 822 and 838. Again, a user may alternatively rotate the first clamp member body 924 to move the first clamp member 922 into a position that suitably clamps the accessory 14g between the first and second clamp members 922 and 938, respectively. Notably, in the configuration of the clamp assembly 914, a user can optionally further rotate the clamp member body 924 in a direction around the axis 962 causing the first and second series of thread portions 964 and 978 to engage whereby the user can further translate the first clamp member body 924 toward the second clamp member 938. Such a configuration may be particularly advantageous for aggressive applications where it may be desired to provide an increased clamping force onto an accessory.

[0050] With reference now to Figs. 21 and 22, the clamp arrangement 910 is shown operatively clamping an accessory 14b in the form of a sanding platen. The accessory 14b can be suitably clamped between the first and second clamp members 922 and 938. Again, the first clamp member body 924 can be rotated around the stem 960 to provide a tighter clamping force onto the accessory 14b.

[0051] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used

in a selected embodiment, even if not specifically shown or described.

Claims

1. A clamp arrangement (410, 610, 810, 910) for securing an accessory tool (14) to a power tool (412), the clamp arrangement comprising:
a clamp assembly (414, 614, 814, 914) comprising a first clamp member (446, 646, 822, 922) and a second clamp member (448, 648, 838, 938), the first clamp member arranged to move relative to the second clamp member between a closed position of the clamp assembly wherein the clamp assembly is arranged to retain an accessory tool (14), and an open position of the clamp assembly wherein the first clamp member is spaced apart from the second clamp member and thus the clamp assembly is arranged to permit removal of the accessory tool while the first clamp member remains coupled to the remainder of the clamp assembly; and **characterized by** further comprising:
an attachment plate (440, 640, 820, 920) that carries the clamp assembly (414, 614, 814, 914), the attachment plate having a first mating configuration detail formed thereon for mating with an output member (416) of a power tool (412) to fix the clamp arrangement (410, 610, 810, 910) to the output member of the power tool.
2. The clamp arrangement (410, 610, 810, 910) of Claim 1, further comprising a fastener (500) arranged to extend through at least a portion of the attachment plate (440, 640, 820, 920) and for fixing the attachment plate to the output member (416) of the power tool (412).
3. The clamp arrangement (410, 610, 810, 910) of Claim 2, wherein the fastener (500) comprises a threaded fastener.
4. The clamp arrangement (410, 610, 810, 910) of any preceding claim, wherein the first mating configuration detail comprises a first mating geometry and a second mating geometry, for mating with different respective power tool output members (416a, 416b).
5. The clamp arrangement (410, 610, 810, 910) of Claim 4, wherein the first mating geometry comprises a keying recess in the attachment plate (440, 640, 820, 920) and wherein the second mating geometry comprises a plurality of recesses in the attachment plate arranged around the keying recess.
6. The clamp arrangement (410, 610, 810, 910) of Claim 5, wherein the keying recess has a star-shaped outline preferably comprising a twelve-point-

ed star.

7. The clamp arrangement (410, 610, 810, 910) of Claim 5 or Claim 6, wherein the plurality of recesses comprises a plurality of oval recesses (544, 692, 854, 954).
8. The clamp arrangement (410) of any preceding claim, further comprising a pivoting lever (442) arranged to move the first clamp member (446), the lever being pivotable between a first position wherein the clamp assembly (414) is in the closed position and a second position wherein the clamp assembly is in the open position.
9. The clamp arrangement (410, 610, 810, 910) of any preceding claim, further comprising a first clamp member body (474, 674, 824, 924) having a flange member (476, 676, 934) extending therefrom to enable a user to move the first clamp member (446, 646, 822, 922) between the open and closed positions.
10. The clamp arrangement (410, 610, 810, 910) of Claim 9, further comprising a button (872, 972) movably coupled to the first clamp member body (824, 924) between a first position where a gripping portion associated with the button engages a complementary gripping portion associated with the second clamp member (446, 646, 822, 922), and a second position where the gripping portion disengages the complementary gripping portion.
11. A kit of parts comprising a clamp arrangement (410, 610, 810, 910) according to any one of Claims 1-10, and a power tool (412) including an output member (416) having a second mating configuration detail formed thereon, with which the first mating configuration detail of the attachment plate (440, 640, 820, 920) of the clamp arrangement is arranged to be mated.
12. A kit of parts according to Claim 11, wherein the power tool (412) is an oscillating power tool in which the output member (416) is arranged to perform an oscillating motion.
13. A kit of parts according to Claim 11, wherein the output member (416) of the power tool (412) is arranged to perform a rotary motion.

Patentansprüche

1. Klemmanordnung (410, 610, 810, 910) zum Sichern eines Zubehörwerkzeugs (14) an einem Elektrowerkzeug (412), wobei die Klemmanordnung umfasst:

- eine Klemmbaugruppe (414, 614, 814, 914), die ein erstes Klemmelement (446, 646, 822, 922) und ein zweites Klemmelement (448, 648, 838, 938) umfasst, wobei das erste Klemmelement dafür angeordnet ist, sich relativ zu dem zweiten Klemmelement zwischen einer geschlossenen Position der Klemmbaugruppe, in der die Klemmbaugruppe dafür angeordnet ist, ein Zubehörwerkzeug (14) zu halten, und einer offenen Position der Klemmbaugruppe, in der das erste Klemmelement von dem zweiten Klemmelement beabstandet ist und somit die Klemmbaugruppe dafür angeordnet ist, Entfernung des Zubehörwerkzeugs zuzulassen, während das erste Klemmelement mit dem Übrigen der Klemmbaugruppe gekoppelt bleibt; und **dadurch gekennzeichnet, dass** sie weiter umfasst: eine Befestigungsplatte (440, 640, 820, 920), die die Klemmbaugruppe (414, 614, 814, 914) trägt, wobei die Befestigungsplatte ein erstes Andockkonfigurationsdetail, das darauf zum Andocken an ein Ausgangselement (416) eines Elektrowerkzeugs (412) gebildet ist, hat, um die Klemmanordnung (410, 610, 810, 910) an dem Ausgangselement des Elektrowerkzeugs zu befestigen.
2. Klemmanordnung (410, 610, 810, 910) nach Anspruch 1, weiter umfassend ein Befestigungselement (500), das dafür angeordnet ist, sich durch mindestens einen Abschnitt der Befestigungsplatte (440, 640, 820, 920) hindurch zu erstrecken und zum Befestigen der Befestigungsplatte an dem Ausgangselement (416) des Elektrowerkzeugs (412).
 3. Klemmanordnung (410, 610, 810, 910) nach Anspruch 2, wobei das Befestigungselement (500) ein Gewindebefestigungselement umfasst.
 4. Klemmanordnung (410, 610, 810, 910) nach einem der vorstehenden Ansprüche, wobei das erste Andockkonfigurationsdetail eine erste Andockgeometrie und eine zweite Andockgeometrie umfasst, zum Andocken an verschiedene jeweilige Elektrowerkzeugausgangselemente (416a, 416b).
 5. Klemmanordnung (410, 610, 810, 910) nach Anspruch 4, wobei die erste Andockgeometrie eine Kodieraussparung in der Befestigungsplatte (440, 640, 820, 920) umfasst und wobei die zweite Andockgeometrie eine Vielzahl von Aussparungen in der Befestigungsplatte umfasst, die um die Kodieraussparung herum angeordnet sind.
 6. Klemmanordnung (410, 610, 810, 910) nach Anspruch 5, wobei die Kodieraussparung eine sternförmige Außenlinie hat, die vorzugsweise einen zwölfzackigen Stern umfasst.
 7. Klemmanordnung (410, 610, 810, 910) nach An-
- spruch 5 oder Anspruch 6, wobei die Vielzahl von Aussparungen eine Vielzahl von ovalen Aussparungen (544, 692, 854, 954) umfasst.
8. Klemmanordnung (410) nach einem der vorstehenden Ansprüche, weiter umfassend einen Schwenkhebel (442), der dafür angeordnet ist, das erste Klemmelement (446) zu bewegen, wobei der Hebel zwischen einer ersten Position, in der die Klemmbaugruppe (414) in der geschlossenen Position ist, und einer zweiten Position, in der die Klemmbaugruppe in der offenen Position ist, verschwenkbar ist.
 9. Klemmanordnung (410, 610, 810, 910) nach einem der vorstehenden Ansprüche, weiter umfassend einen ersten Klemmelementkörper (474, 674, 824, 924), der ein Flanschelement (476, 676, 934) hat, das sich davon erstreckt, um einem Benutzer zu ermöglichen, das erste Klemmelement (446, 646, 822, 922) zwischen den offenen und geschlossenen Positionen zu bewegen.
 10. Klemmanordnung (410, 610, 810, 910) nach Anspruch 9, weiter umfassend einen Knopf (872, 972), der beweglich zwischen einer ersten Position, in der ein Greifabschnitt, der dem Knopf zugeordnet ist, einen komplementären Greifabschnitt, der dem zweiten Klemmelement (446, 646, 822, 922) zugeordnet ist, ergreift, und einer zweiten Position, in der der Greifabschnitt den komplementären Greifabschnitt freigibt, an den ersten Klemmelementkörper (824, 924) gekoppelt ist.
 11. Kit-of-parts umfassend eine Klemmanordnung (410, 610, 810, 910) nach einem der Ansprüche 1-10 und ein Elektrowerkzeug (412), das ein Ausgangselement (416) einschließt, das auf sich ein zweites Andockkonfigurationsdetail gebildet hat, mit dem das erste Andockkonfigurationsdetail der Befestigungsplatte (440, 640, 820, 920) der Klemmanordnung angeordnet ist, daran angedockt zu werden.
 12. Kit-of-parts nach Anspruch 11, wobei das Elektrowerkzeug (412) ein oszillierendes Elektrowerkzeug ist, in dem das Ausgangselement (416) dafür angeordnet ist, eine oszillierende Bewegung durchzuführen.
 13. Kit-of-parts nach Anspruch 11, wobei das Ausgangselement (416) des Elektrowerkzeugs (412) dafür angeordnet ist, eine Drehbewegung durchzuführen.

Revendications

1. Agencement de serrage (410, 610, 810, 910) pour fixer un outil annexe (14) à un outil électrique (412), l'agencement de serrage comprenant :

- un ensemble de serrage (414, 614, 814, 914) comprenant un premier élément de serrage (446, 646, 822, 922) et un second élément de serrage (448, 648, 838, 938), le premier élément de serrage étant agencé pour se déplacer par rapport au second élément de serrage entre une position fermée de l'ensemble de serrage dans laquelle l'ensemble de serrage est agencé pour retenir un outil annexe (14), et une position ouverte de l'ensemble de serrage dans laquelle le premier élément de serrage est espacé du second élément de serrage et ainsi l'ensemble de serrage est agencé pour permettre l'enlèvement de l'outil annexe tandis que le premier élément de serrage reste couplé au restant de l'ensemble de serrage ; et **caractérisé en ce qu'il** comprend en outre :
- une plaque accessoire (440, 640, 820, 920) qui porte l'ensemble de serrage (414, 614, 814, 914), la plaque accessoire ayant un premier détail de configuration d'accouplement formé dessus pour s'accoupler à un élément de sortie (416) d'un outil électrique (412) pour attacher l'agencement de serrage (410, 610, 810, 910) à l'élément de sortie de l'outil électrique.
2. Agencement de serrage (410, 610, 810, 910) selon la revendication 1, comprenant en outre un dispositif de fixation (500) agencé pour s'étendre à travers au moins une portion de la plaque accessoire (440, 640, 820, 920) et pour attacher la plaque accessoire à l'élément de sortie (416) de l'outil électrique (412).
 3. Agencement de serrage (410, 610, 810, 910) selon la revendication 2, dans lequel le dispositif de fixation (500) comprend un dispositif de fixation fileté.
 4. Agencement de serrage (410, 610, 810, 910) selon l'une quelconque des revendications précédentes, dans lequel le premier détail de configuration d'accouplement comprend une première géométrie d'accouplement et une seconde géométrie d'accouplement, pour s'accoupler avec différents éléments de sortie d'outil électrique respectifs (416a, 416b).
 5. Agencement de serrage (410, 610, 810, 910) selon la revendication 4, dans lequel la première géométrie d'accouplement comprend une partie en retrait de verrouillage dans la plaque accessoire (440, 640, 820, 920) et dans lequel la seconde géométrie d'accouplement comprend une pluralité de parties en retrait dans la plaque accessoire agencée autour de la partie en retrait de verrouillage.
 6. Agencement de serrage (410, 610, 810, 910) selon la revendication 5, dans lequel la partie en retrait de verrouillage a un contour en forme d'étoile comprenant de préférence une étoile à douze pointes.
 7. Agencement de serrage (410, 610, 810, 910) selon la revendication 5 ou la revendication 6, dans lequel la pluralité de parties en retrait comprend une pluralité de parties en retrait ovales (544, 692, 854, 954).
 8. Agencement de serrage (410) selon l'une quelconque des revendications précédentes, comprenant en outre un levier pivotant (442) agencé pour déplacer le premier élément de serrage (446), le levier pouvant pivoter entre une première position dans laquelle l'ensemble de serrage (414) est dans la position fermée et une seconde position dans laquelle l'ensemble de serrage est dans la position ouverte.
 9. Agencement de serrage (410, 610, 810, 910) selon l'une quelconque des revendications précédentes, comprenant en outre un premier corps d'élément de serrage (474, 674, 824, 924) ayant un élément formant bride (476, 676, 934) s'étendant à partir de là pour permettre à un utilisateur de déplacer le premier élément de serrage (446, 646, 822, 922) entre les positions ouverte et fermée.
 10. Agencement de serrage (410, 610, 810, 910) selon la revendication 9, comprenant en outre un bouton (872, 972) couplé de façon mobile au premier corps d'élément de serrage (824, 924) entre une première position où une portion de saisie associée au bouton met en prise une portion de prise complémentaire associée au second élément de serrage (446, 646, 822, 922), et une seconde position où la portion de saisie se dégage de la portion de saisie complémentaire.
 11. Kit de pièces comprenant un agencement de serrage (410, 610, 810, 910) selon l'une quelconque des revendications 1 à 10 et un outil électrique (412) incluant un élément de sortie (416) ayant un second détail de configuration d'accouplement formé dessus, avec lequel le premier détail de configuration d'accouplement de la plaque accessoire (440, 640, 820, 920) de l'agencement de serrage est agencé pour être accouplé.
 12. Kit de pièces selon la revendication 11, dans lequel l'outil électrique (412) est un outil électrique oscillant dans lequel l'élément de sortie (416) est agencé pour effectuer un mouvement oscillant.
 13. Kit de pièces selon la revendication 11, dans lequel l'élément de sortie (416) de l'outil électrique (412) est agencé pour effectuer un mouvement rotatif.

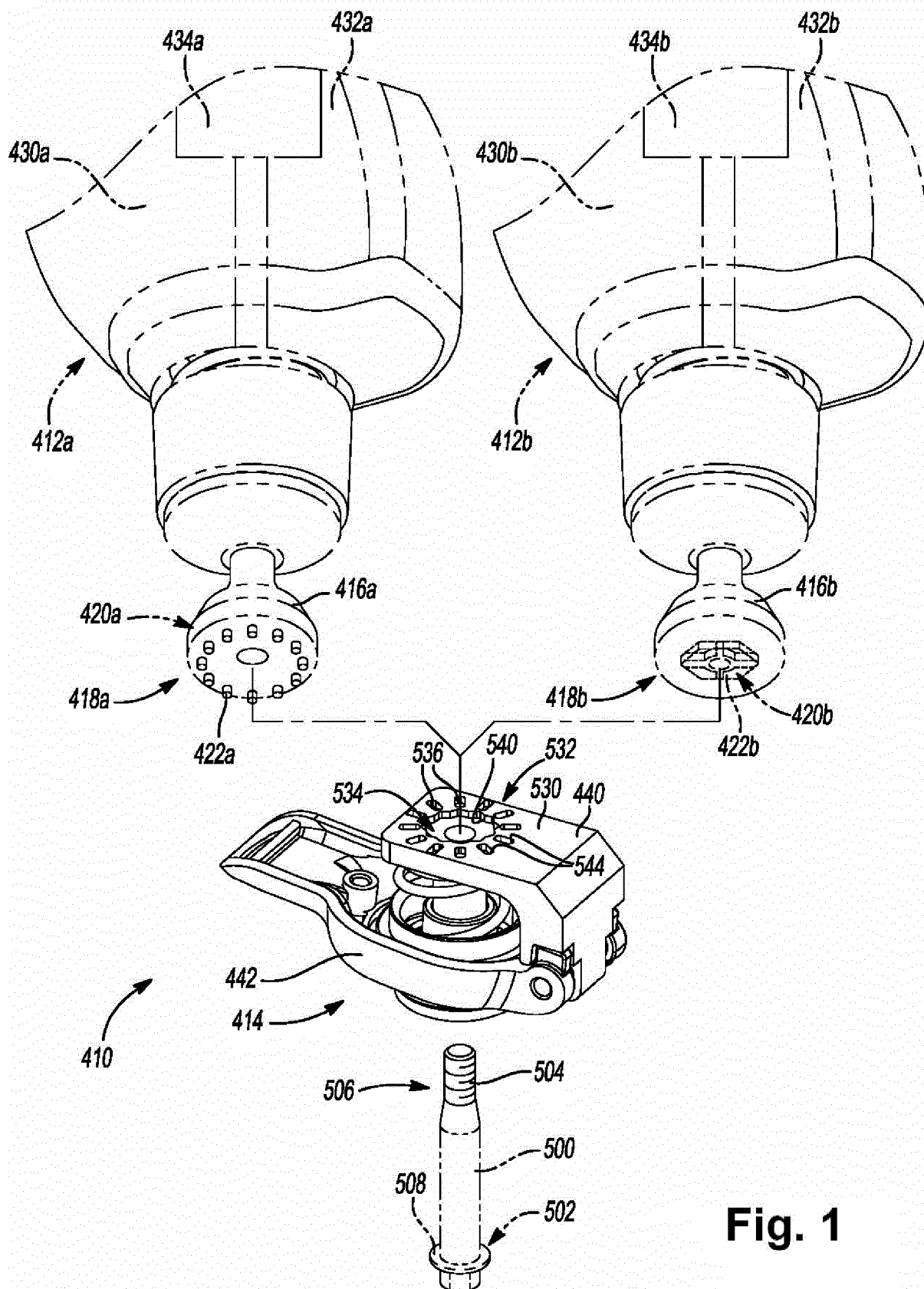
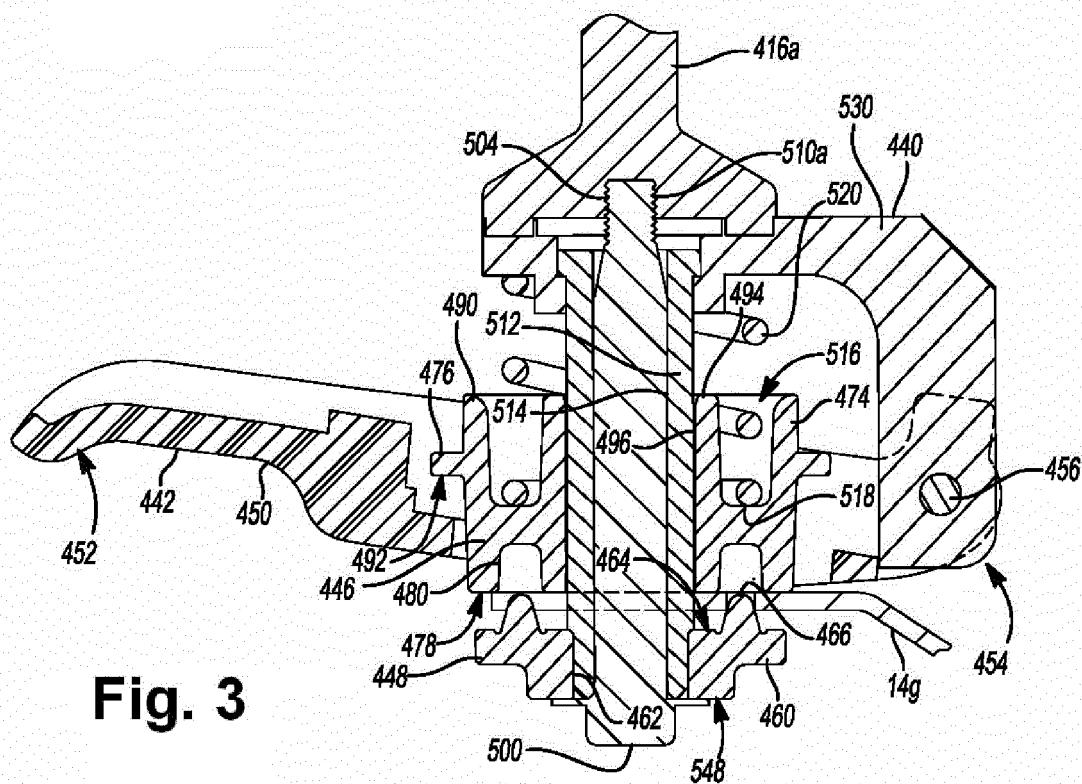
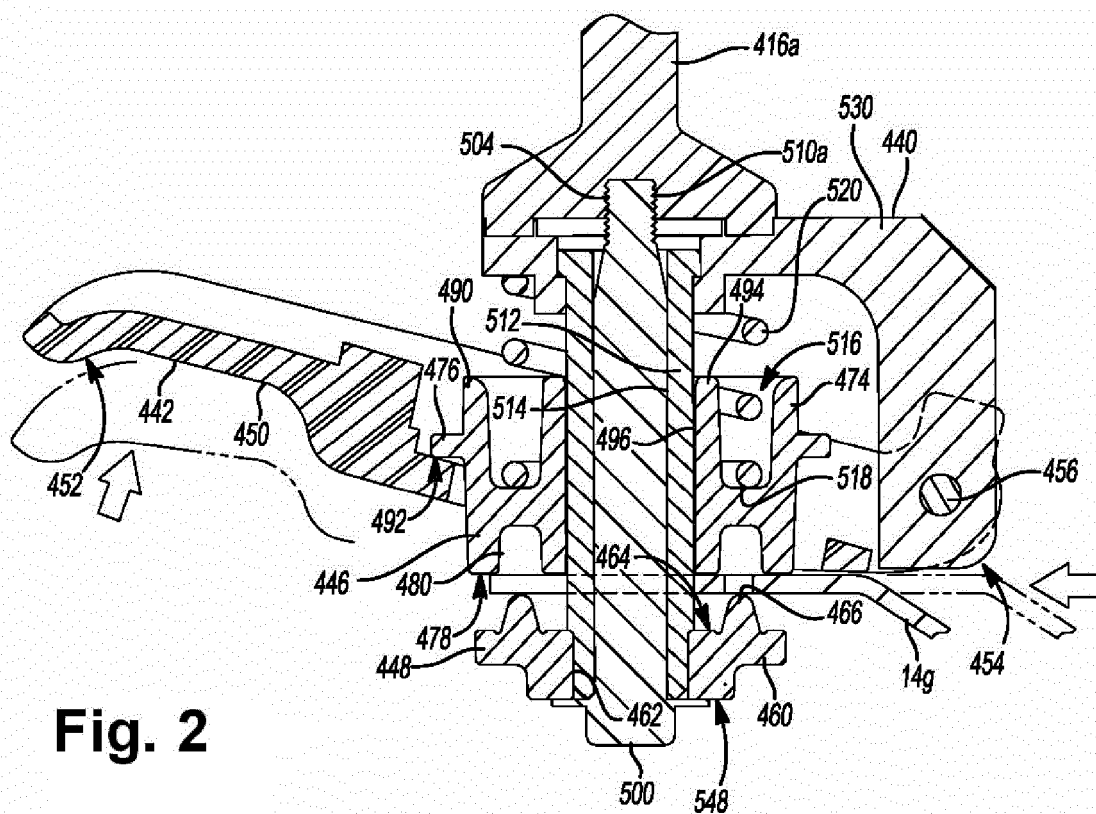


Fig. 1



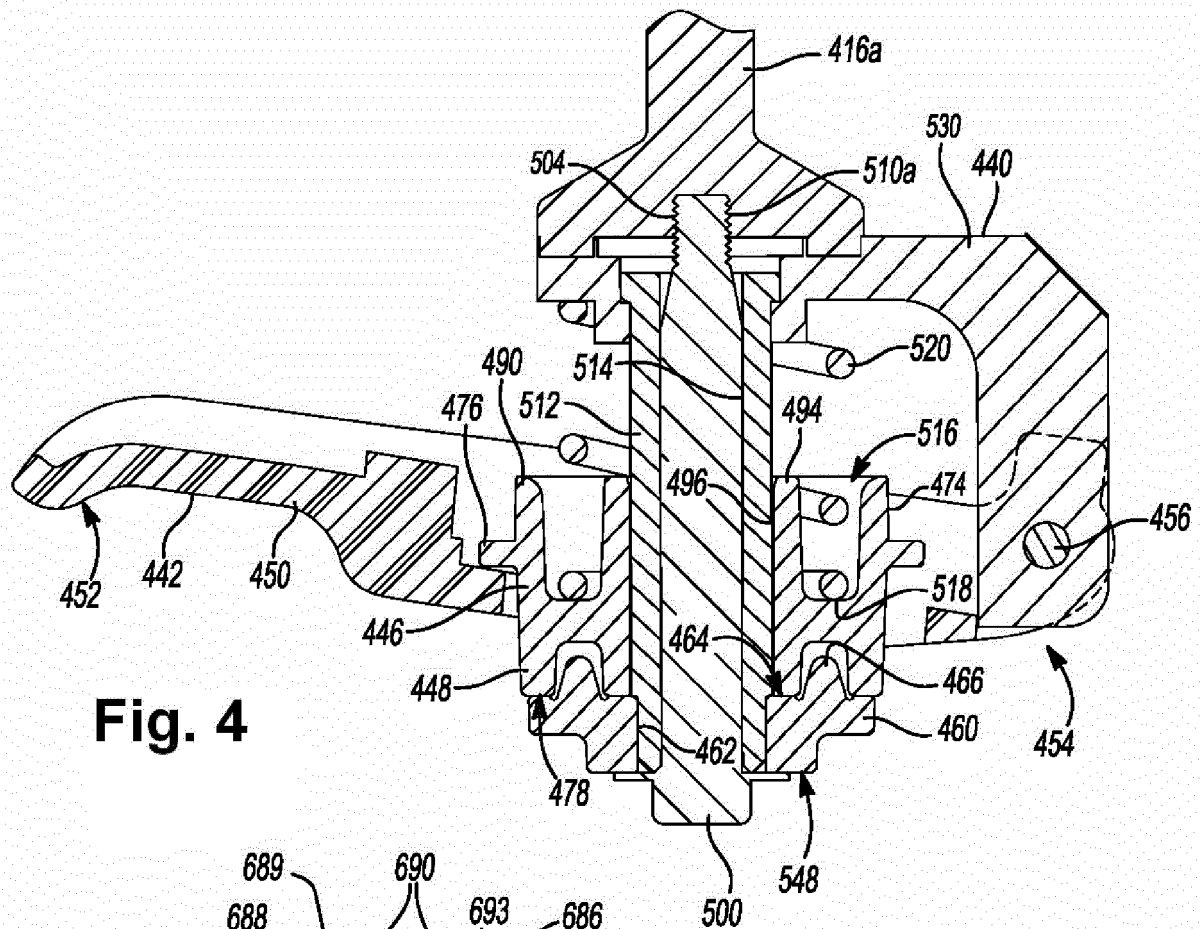


Fig. 4

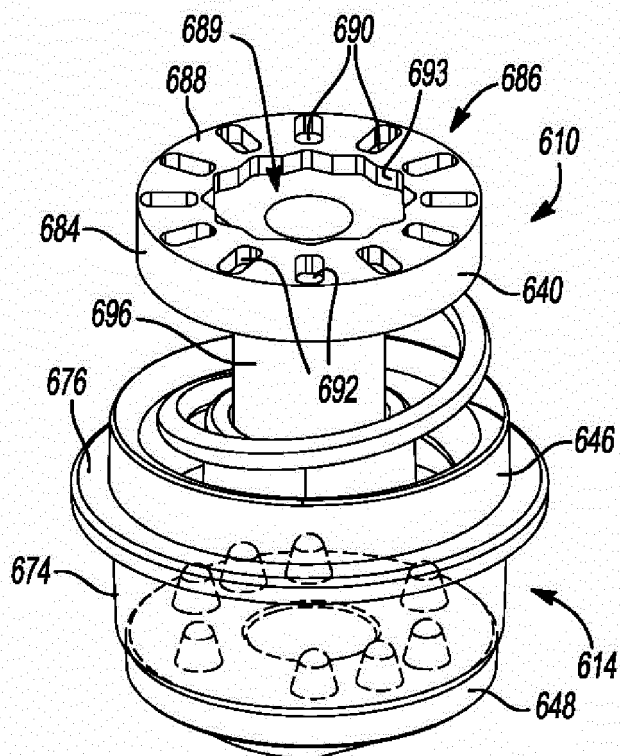


Fig. 5

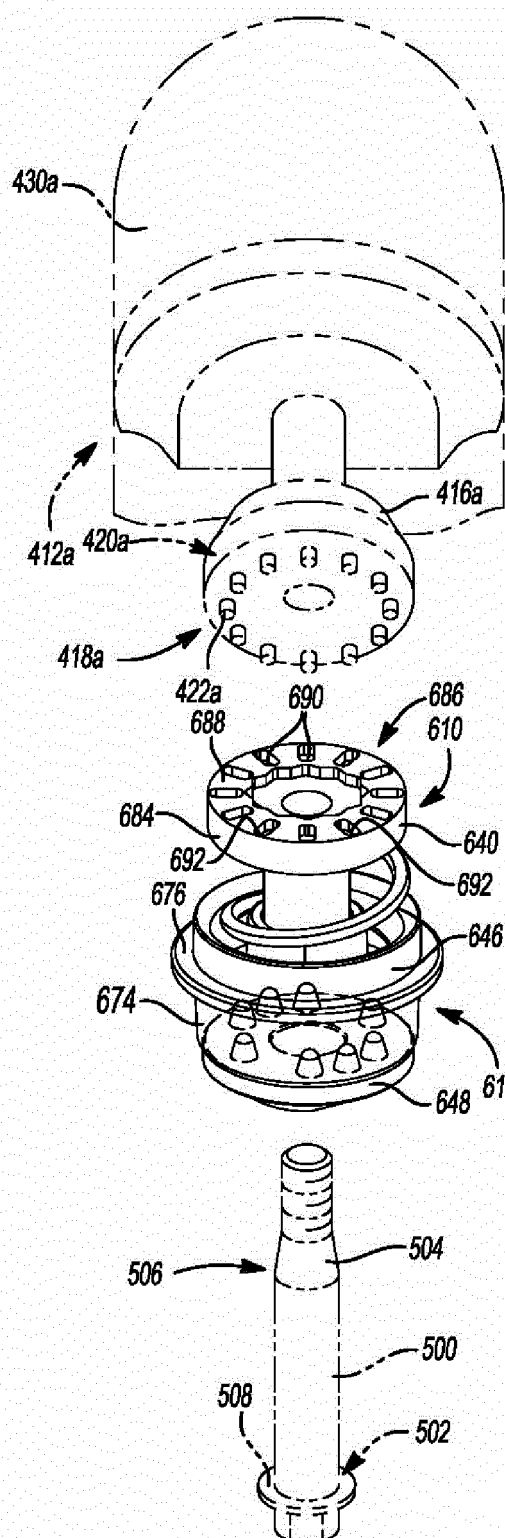


Fig. 6

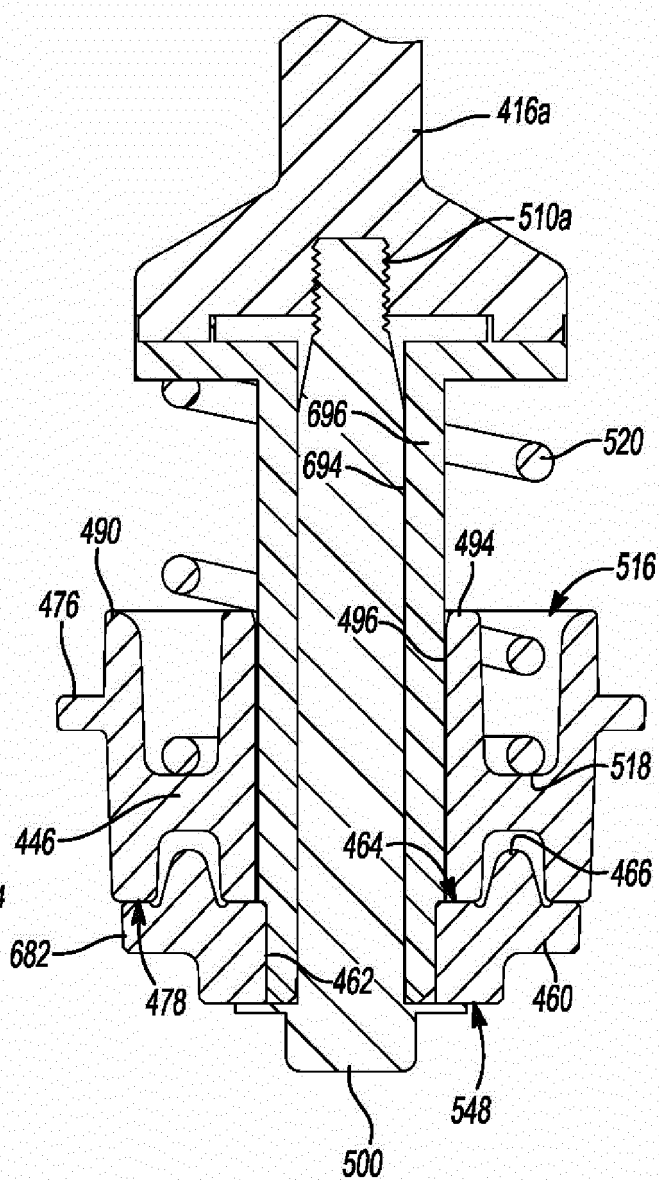


Fig. 7

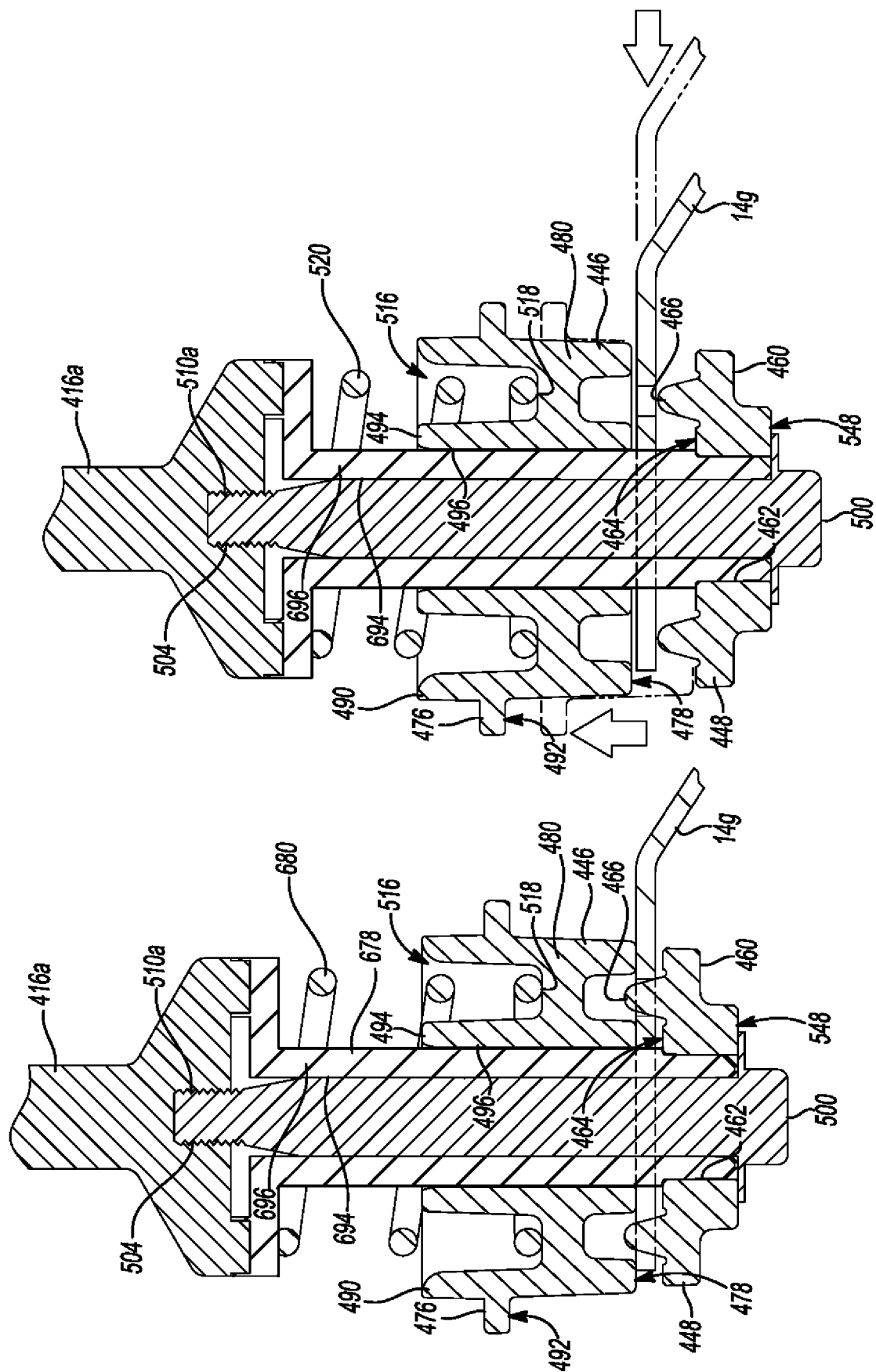


Fig. 9

Fig. 8

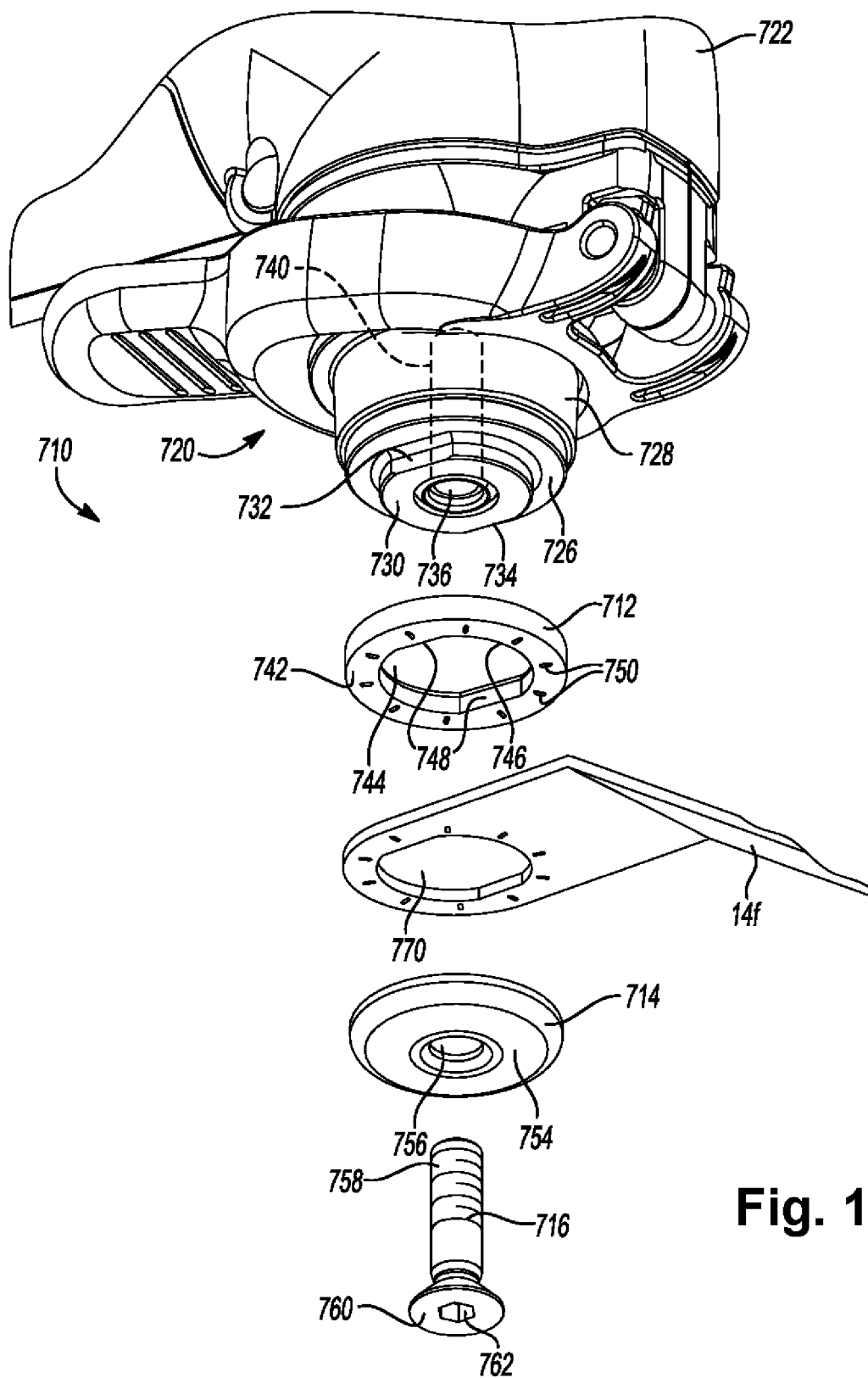


Fig. 10

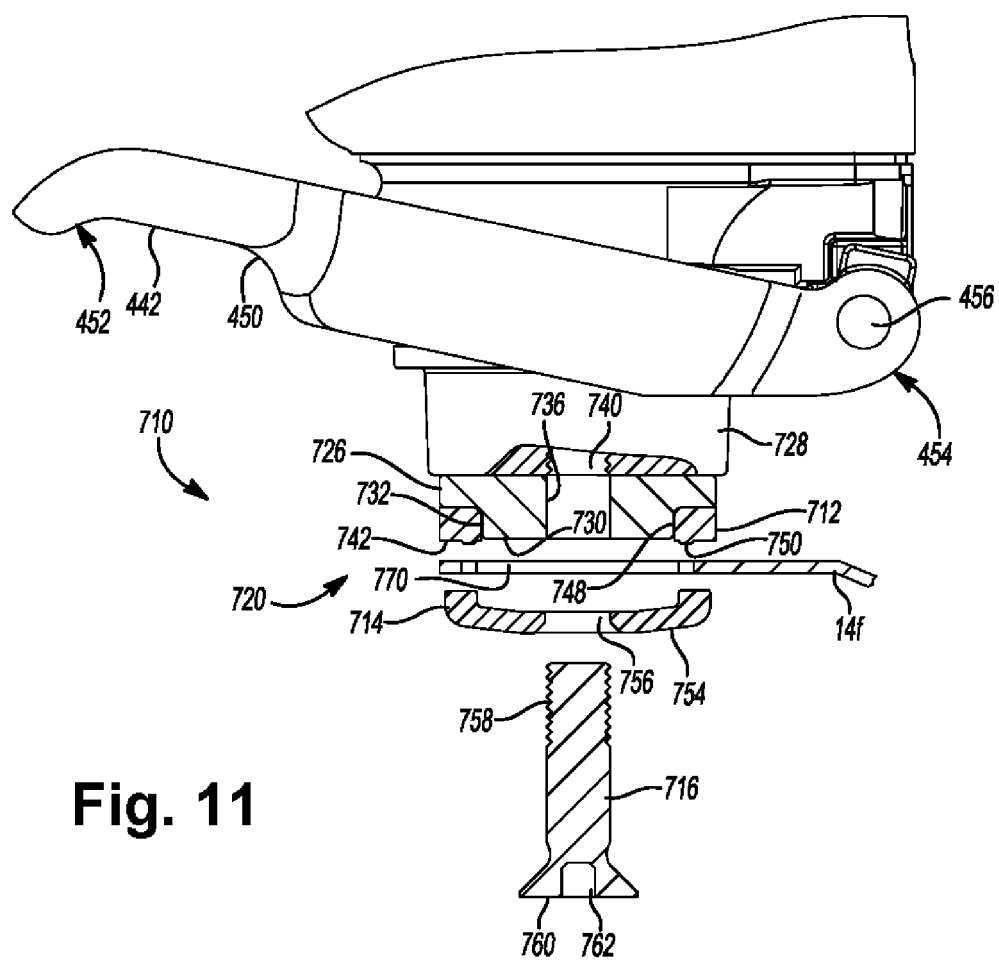


Fig. 11

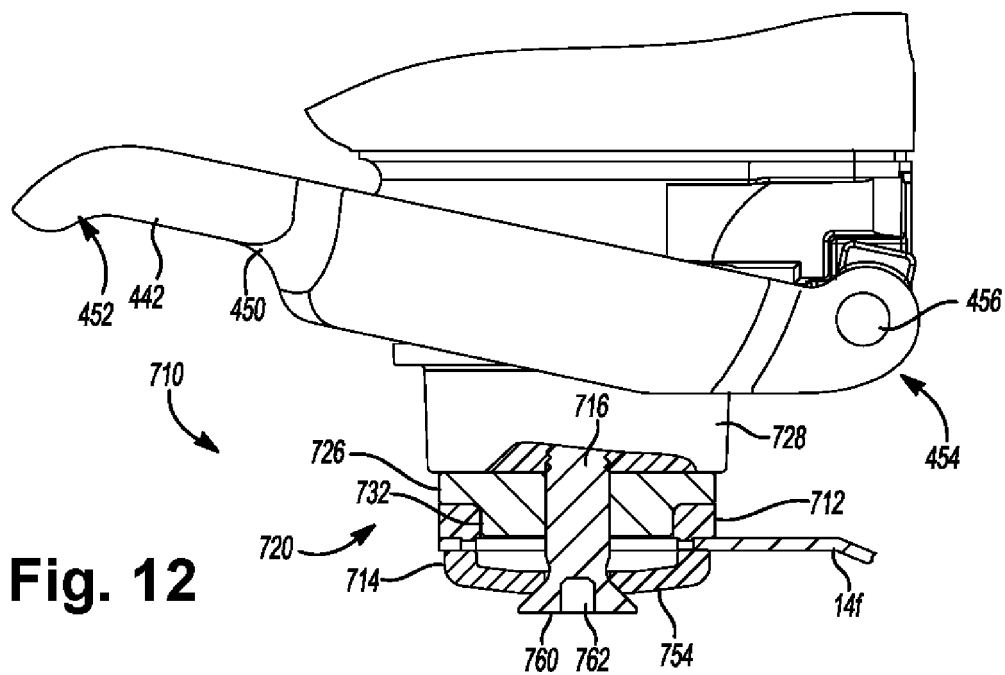


Fig. 12

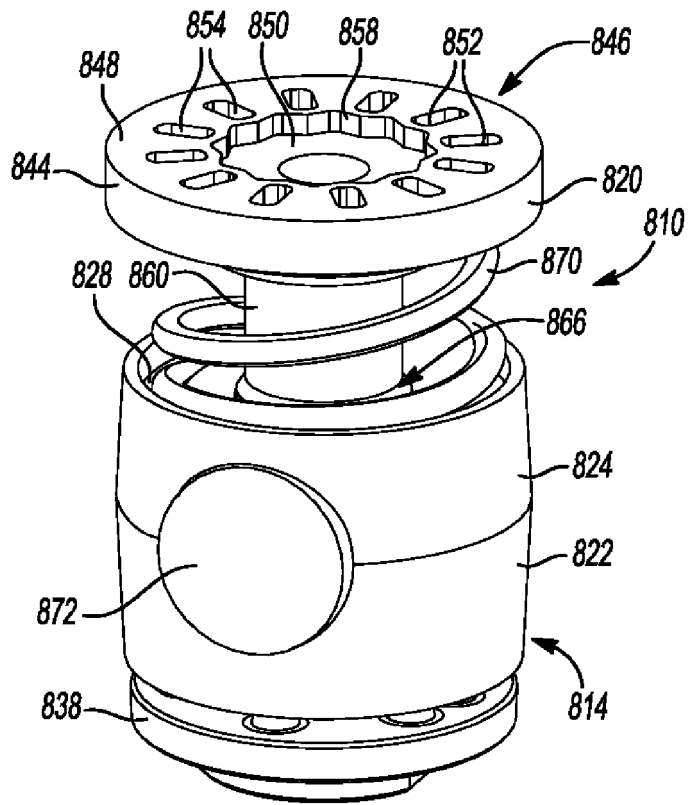


Fig. 13

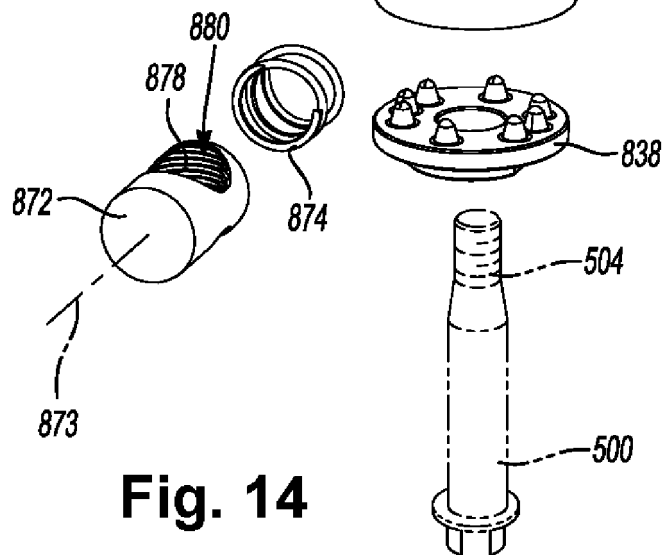
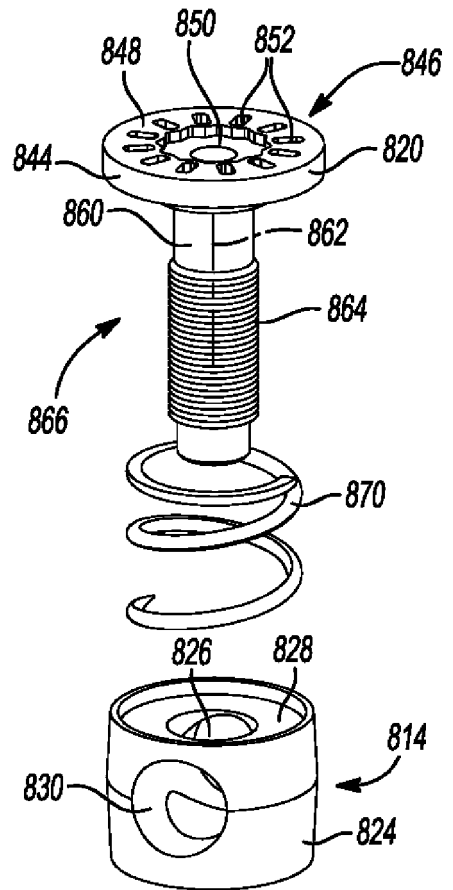


Fig. 14

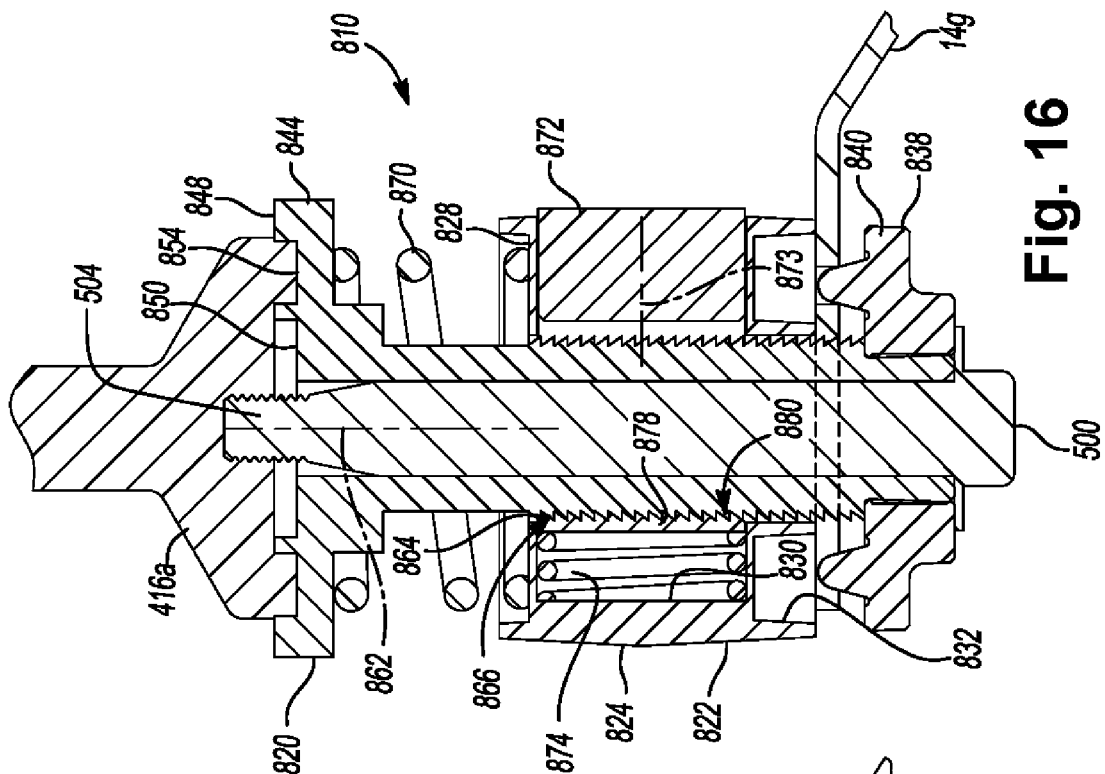


Fig. 15

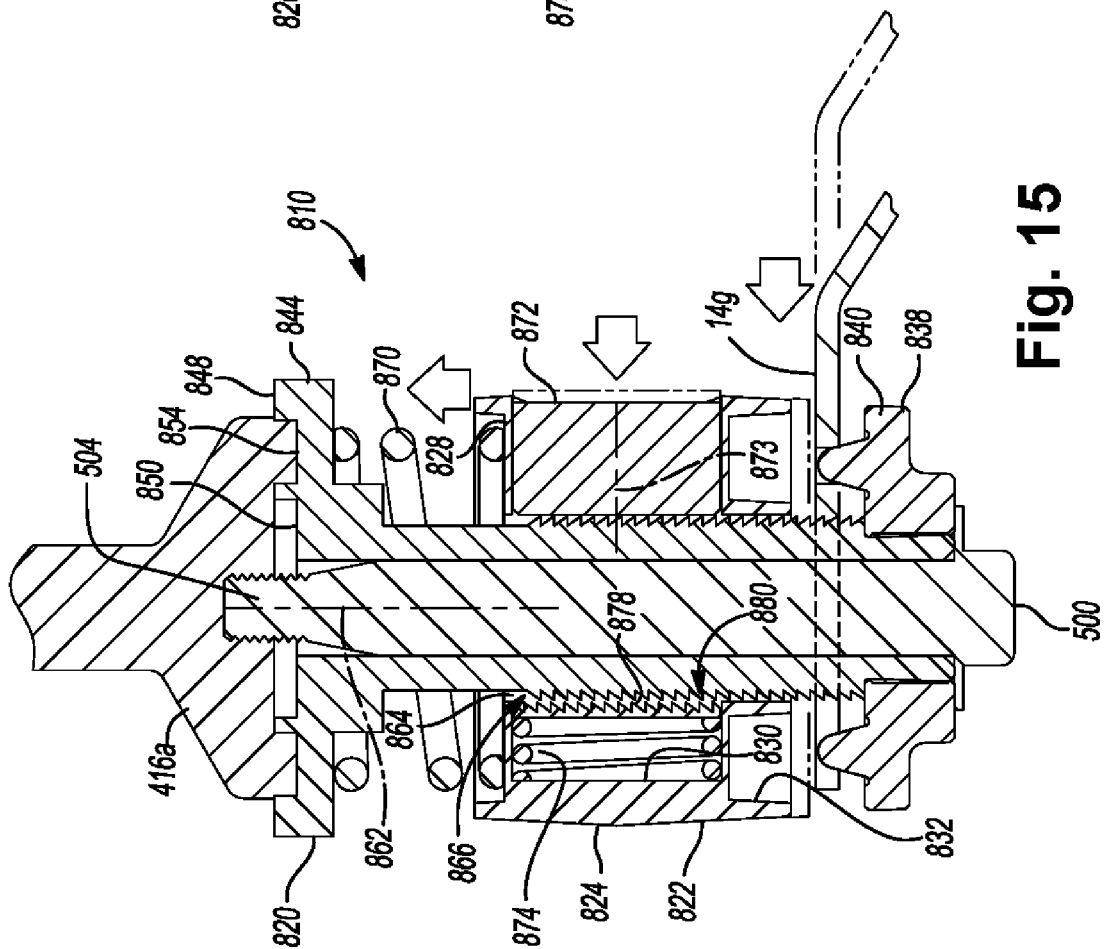


Fig. 16

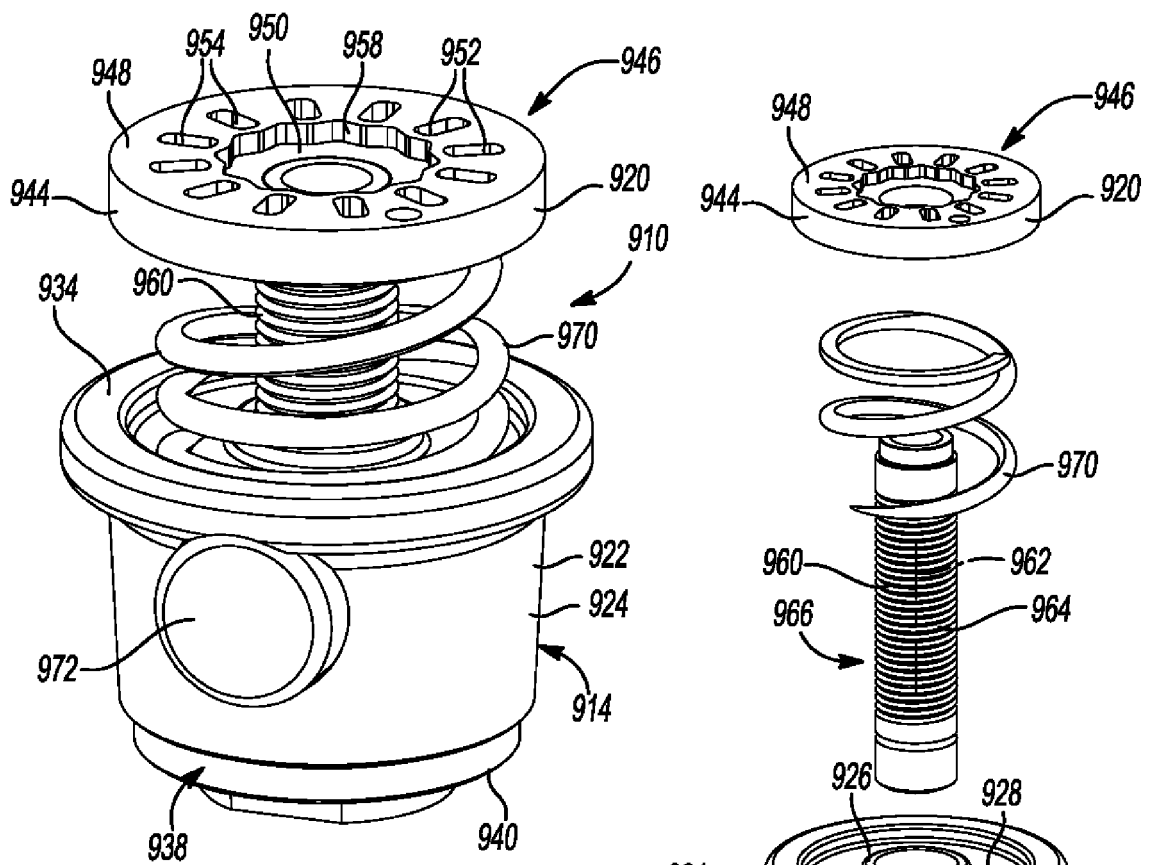


Fig. 17

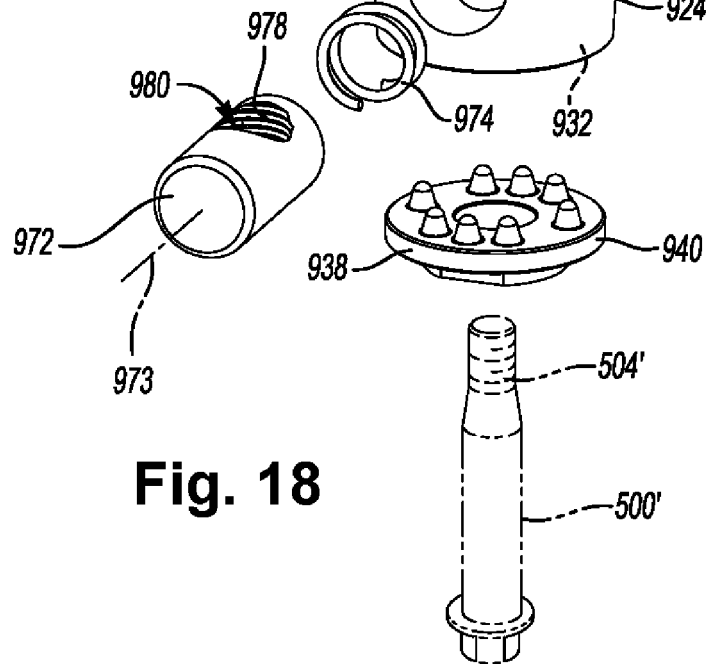


Fig. 18

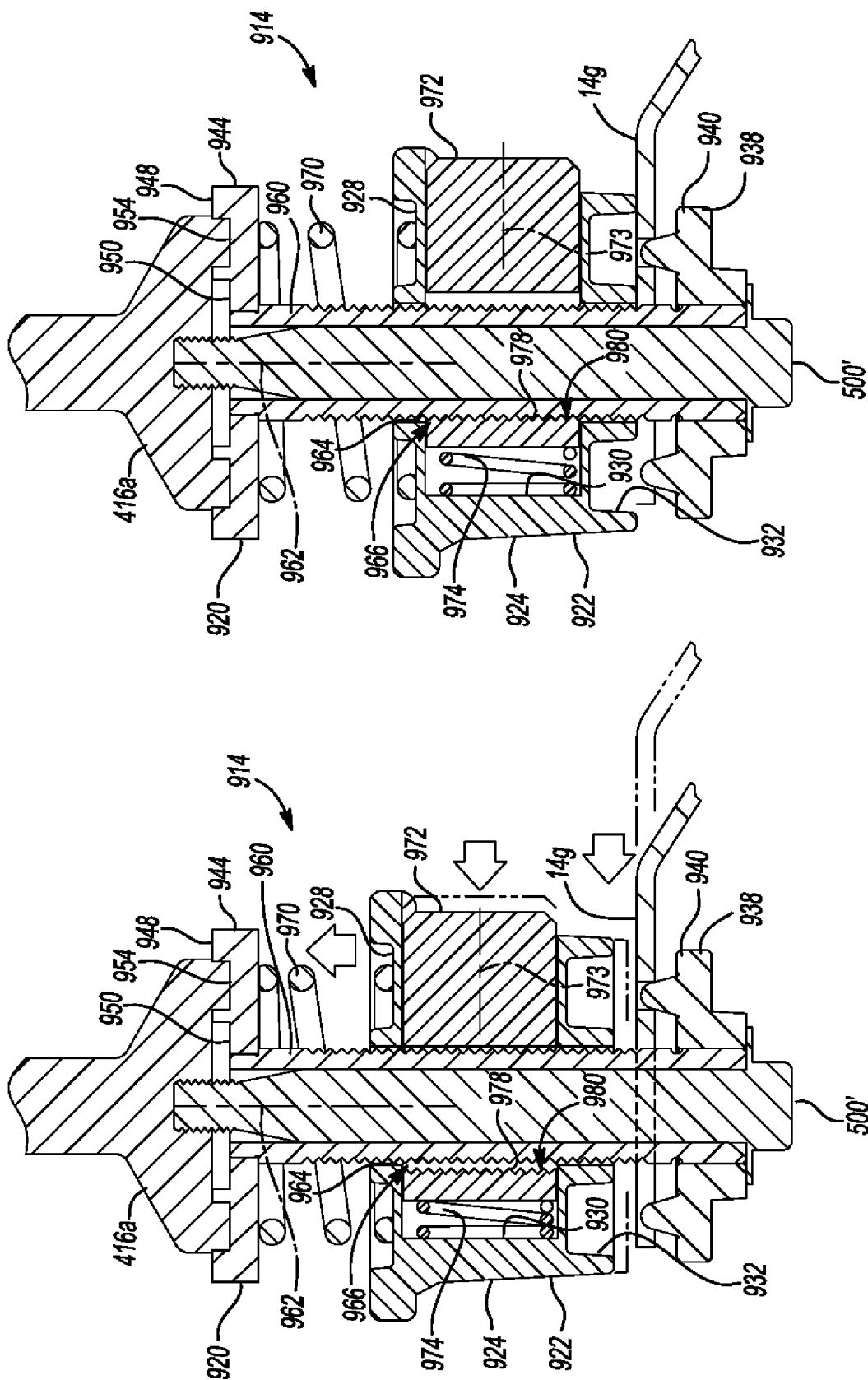


Fig. 20

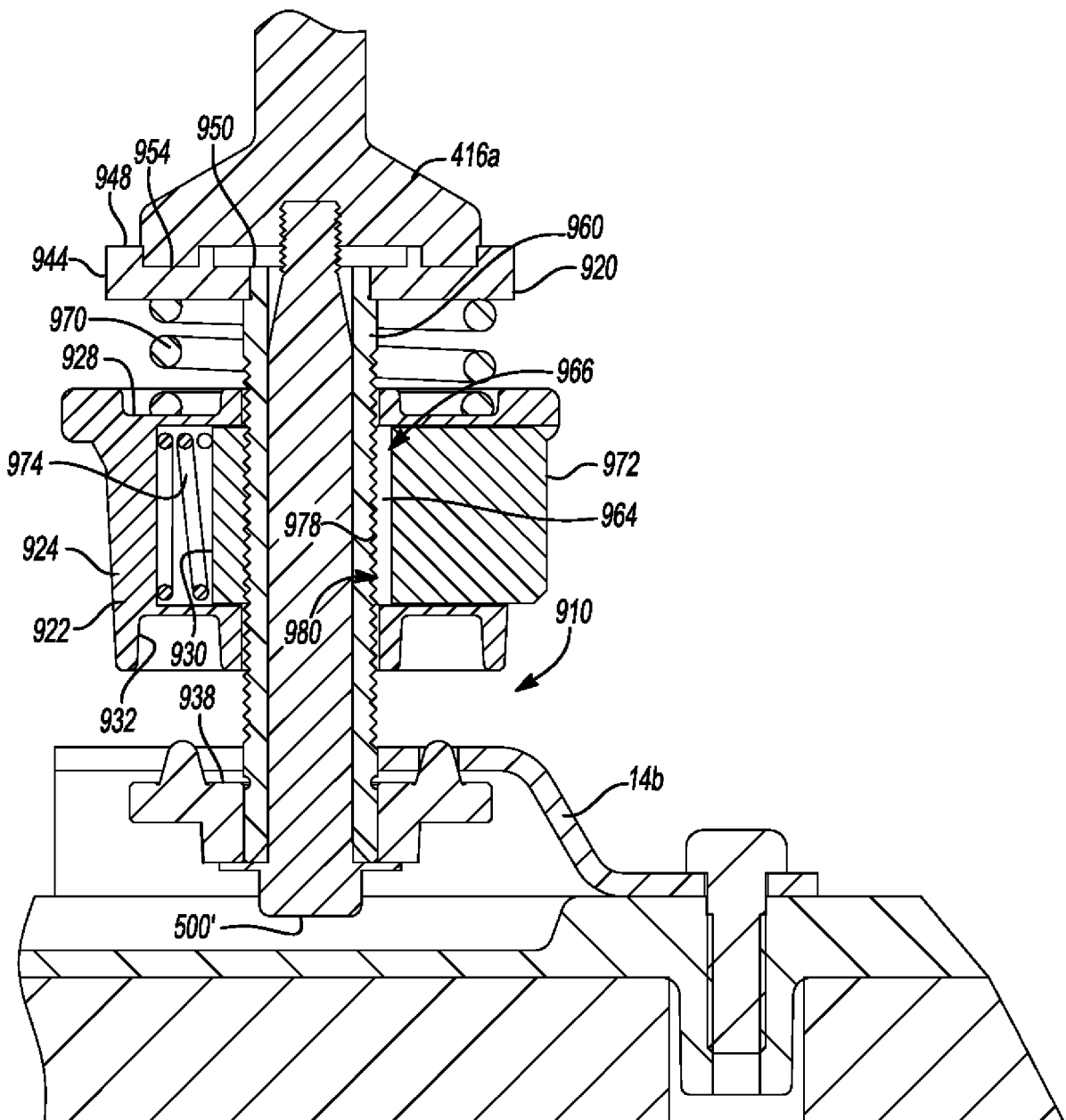


Fig. 21

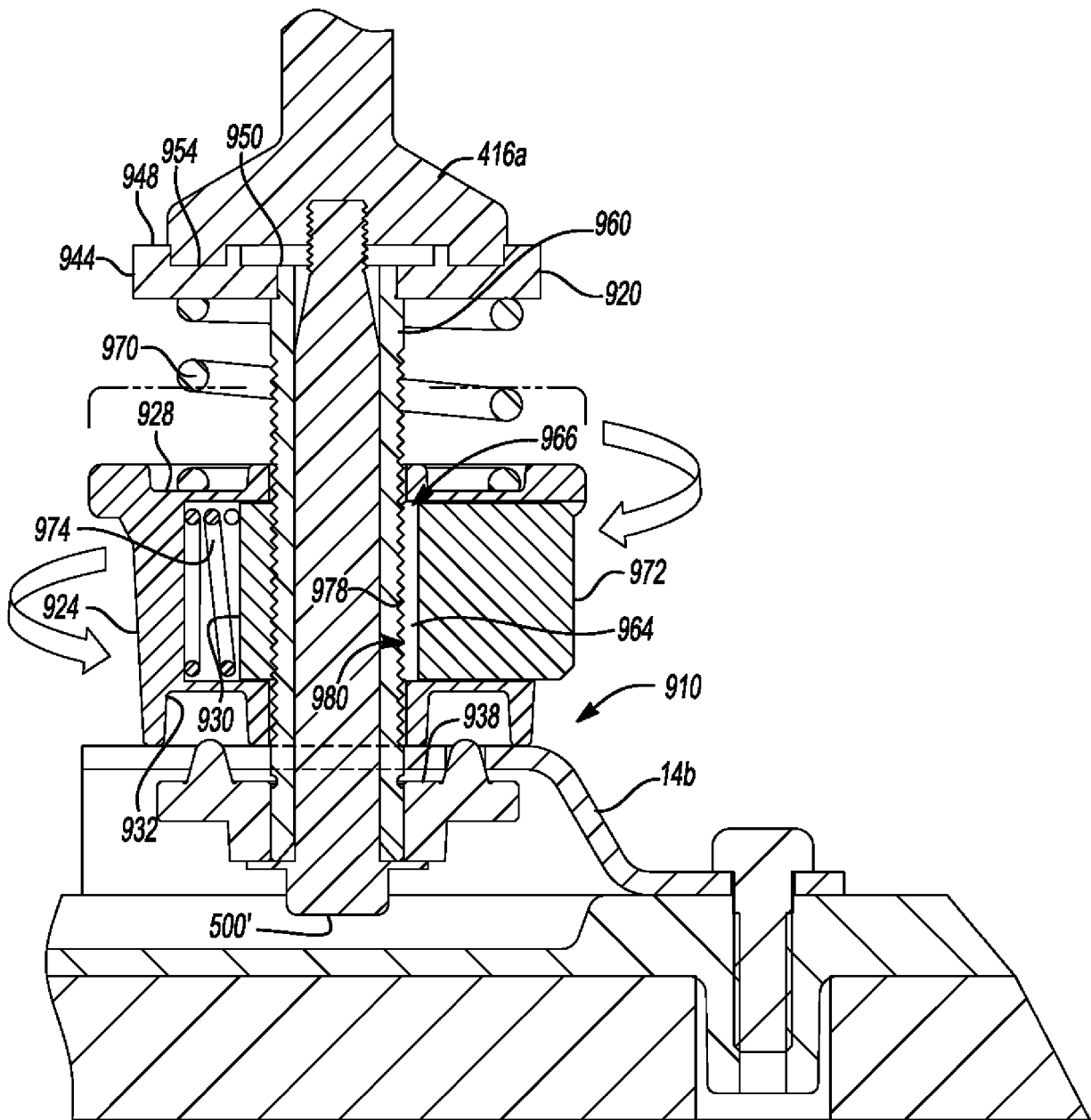


Fig. 22

REFERENCES CITED IN THE DESCRIPTION

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