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(54) Title: OSCILLATING SURGICAL SAW BLADE ASSEMBLY INCLUDING A BLADE WITH AN ASSYMETRICALLY
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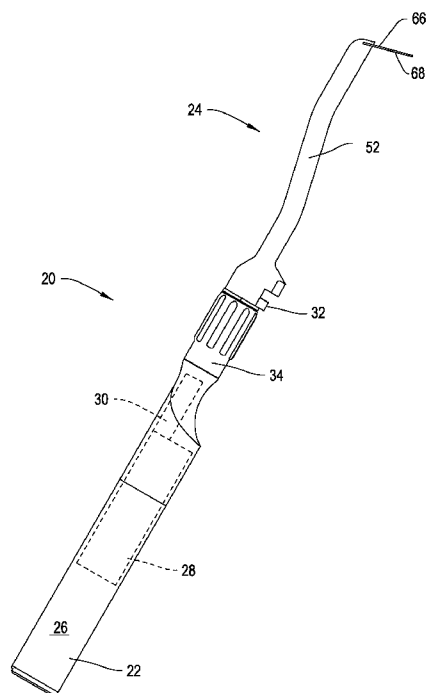


FIG. 1

(57) Abstract: A surgical saw blade (24) including a blade mount (42), a shaft (52) that extends forward from the blade mount and a blade head (66) that extends radially outwardly from the shaft. The shaft has a mass that is asymmetric relative to the mechanical axis of oscillation (61) around which the blade mount oscillates. The shaft may have one or more sections (56, 58) that are asymmetric to the axis of oscillation that function as the asymmetric mass.





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**OSCILLATING SURGICAL SAW BLADE ASSEMBLY INCLUDING
A BLADE WITH AN ASYMMETRICALLY LOADED DRIVE SHAFT**

Field of the Invention

[0001] This invention is related to an oscillating surgical saw assembly. More particularly, this invention is related to an oscillating surgical saw assembly with a blade that is actuated by an asymmetric drive shaft.

Background of the Invention

[0002] The powered surgical saw blade is an important powered tool that a surgeon employs to perform certain surgical procedures. A typical powered surgical saw blade is part of an assembly that includes a handpiece in which is housed either an electrically or pneumatically driven motor. Also internal to the housing is some type of drive assembly that typically converts the rotational energy output by the motor shaft into some sort of oscillating or reciprocating motion. The saw blade is a planar structure that has an edge surface from which teeth extend. A linking member sometimes connects the handpiece drive assembly to the saw blade. When the motor is actuated, the mechanical energy output by the motor is applied through the drive assembly and linking member to the saw blade. This causes the saw blade to oscillate or reciprocate. This movement of the saw blade gives the blade the power to cut through the tissue the blade is employed to separate. Powered surgical saws cut through both hard and soft tissue much faster, and with greater accuracy, than the manually operated saws they replace. Also, the physical effort a surgeon employs to operate a powered surgical saw blade is much less than that used when cutting tissue with manual saws.

[0003] Saw blades vary in size and shape depending on the tissue the blade is designed to cut and the location of the

tissue. Some blade assemblies, in addition to the actual blade, include a shaft to which the blade is rigidly attached. The shaft functions as the linking member for transferring energy output by the handpiece to the blade. The shaft also serves as a stand-off that allows the blade to be positioned in locations in which it could not otherwise be positioned if the blade was directly coupled to the handpiece.

[0004] One example of such a blade is an intra-oral blade. This type of blade has a shaft with a length that is often between 5 and 20 cm in length. At one end of the shaft are features for removably coupling the blade to the handpiece drive assembly. More specifically, the shaft is coupled to a handpiece capable of oscillating the shaft back and forth, around the longitudinal axis of the shaft. This blade includes a blade head that extends generally perpendicularly away from the distal end of the shaft. Often the blade head is generally in the shape of slice section of a circle wherein the teeth protrude from the outer arcuate edge. The blade head may have a radius of curvature between 0.5 and 5 cm. As the name implies, this blade is designed for oral surgery. This blade is used to cut into the mandible, the lower jaw bone, from the inside of the mouth. The shaft allows the practitioner to, while holding the handpiece away from the patient, position the blade head inside the mouth. The relatively small sized blade limits the depth of the cut the can be made with blade. The limiting of cut depth substantially eliminates the likelihood that the blade can be applied in such a manner that it will cut deeper into the tissue than is necessary to perform the procedure.

[0005] As with most surgical saw blades, as the head of an intra-oral blade is pressed deeper into the bone, the blade teeth are exposed to more resistance. Owing to the

relatively small size of the blade head, this resistance is known to appreciably reduce the cutting efficiency of an intra-oral blade. Analysis has shown that sometimes the resistance the bone imposes on the teeth is so great that it appreciably reduces the blade head oscillation that results in bone cutting. Instead, the mechanical energy output by the handpiece motor goes into pivoting the shaft and handpiece around the blade head.

Summary of the Invention

[0006] This invention is directed to a new and useful surgical saw blade assembly. The saw blade assembly of this invention includes features designed to, in comparison to a conventional blade assembly, increase the amount of rotational energy output by an oscillating blade head.

[0007] The saw blade assembly of this invention includes a handpiece to which a blade unit is removably attached. The blade unit includes at one end a mount. The mount has features that engage complementary features for removably holding the blade assembly to the handpiece. A shaft extends forward from the mount. A blade head is attached to the forward end of the shaft. The blade head extends laterally away from the shaft, laterally away from the axis around which the blade unit is oscillated.

[0008] The blade unit of this invention is further designed so that the shaft has a mass that is asymmetrically located relative to the axis around which the blade unit oscillates. Often, this load is positioned to be diametrically opposed to the blade head relative to the axis of oscillation. In some versions of the invention, this load is formed by shaping the shaft so that it has sections that, instead of being coaxial with the axis of oscillation, are axially offset from this axis. In some versions of this invention, this load is established by providing a shaft

that is coaxial with the axis of oscillation and adding supplemental mass to one side of the shaft.

[0009] Owing to the presence of the asymmetric mass, the blade unit of this invention has a larger mass moment of inertia than a conventional shaft. Moreover, the blade teeth are believed to travel at a higher linear velocity than the teeth of a conventional blade. Consequently, when oscillated, the kinetic rotational energy output by the shaft is greater than that output by a conventional shaft. This increased kinetic energy is output to the blade head. The blade head has more energy available to overcome the resistance of the bone.

Brief Description of the Drawings

[00010] The invention is pointed out with particularity in the claims. The above and further features and advantages of this invention are better understood from the following Detailed Description taken in conjunction with the accompanying drawings in which:

[00011] Figure 1 is a side view of a surgical saw blade assembly of this assembly including the blade unit and the powered handpiece to which the blade unit is attached;

[00012] Figure 2 is a side plan view of the blade unit of this invention;

[00013] Figure 3 is a bottom plan view of the blade unit of this invention;

[00014] Figure 4 is an enlarged view of the distal end of the assembly of Figure 1 illustrating the relationships of the mechanical axis of oscillation, the center of mass and the dynamic axis of oscillation of the blade unit;

[00015] Figure 5 is a view of the distal end of the blade unit depicting the different radial lengths around which the blade unit of this invention oscillates;

[00016] Figure 6 is a geometric illustration of the difference in linear distances a tooth of the blade unit of this invention oscillates when the tooth oscillates between when the tooth oscillates around the mechanical axis of oscillation and when the tooth oscillates around the dynamic axis of oscillation; and

[00017] Figures 7A and 7B are, respectively, top and side plan views of an alternative blade of this invention with an asymmetrically located mass.

Detailed Description

[00018] Figure 1 illustrates a surgical saw assembly 20 having the features of this invention. Saw assembly 20 includes a handpiece 22 to which a blade unit 24 is removably attached.

[00019] Handpiece 22 includes a body 26. Internal to body 26 is a motor 28 represented by a dashed rectangle. Motor 28 may be any appropriate electrical, pneumatic or hydraulic motor. A drive assembly 30, also disposed inside body 26 and represented by a dashed rectangle, converts the rotational energy output from the motor shaft (not illustrated) into energy that oscillates a drive head 32 (seen partially within the blade unit 24) back and forth. A coupling assembly 34, represented by a ring, releasably holds the blade unit 24 to the drive head 32 so that the blade unit moves with the drive head. Often a number of, if not all of, the features of coupling assembly are built into the drive head 32. One suitable handpiece 22 of this invention is the CORE(TM) Micro Oscillating Saw, Part No. 5400-31, manufactured by Stryker Corporation of Kalamazoo, Michigan. It should be understood that the specific structure of the handpiece 22 is not relevant to the structure of this invention.

[00020] As seen in Figures 2 and 3, blade unit 24 is a single piece assembly. Blade unit 24 includes at the proximal end a mount 42. ("Proximal" is understood to be towards the practitioner using assembly 20; away from the surgical site to which the blade unit 24 is applied. "Distal" is understood to mean away from the practitioner, towards the surgical site.) Mount 42 includes features designed to engage features of coupling assembly 34 so as to enable the coupling assembly to releasably hold the mount to the drive head 32. In the depicted version of the invention, mount 42 includes, at the most proximal end a semi-circular plate 44. Plate 44 has a number of openings 45 that allow the plate to be seated over drive members integral with the drive head 32. A semi-circular side wall 46 extends upwardly from the outer curved edge of plate 44. Mount 42 also includes a cap 48 that extends distally forward from side wall 46. Cap 48 extends over and is spaced distally forward from plate 44. Cap 48 thus has along one outer edge, an arcuate profile.

[00021] The separation between plate 44 and cap 48 allows components of the handpiece coupling assembly 34 to be disposed between these two elements of the mount 42. Also, in the illustrated version of the invention, plate 44, side wall 46 and cap 48 each subtend an arc greater than 180°. The diameter of the inner surface of side wall 46 is greater than the diameter of the disk like head of the handpiece drive head 32. This allows the mount 42 to be slipped over the distal most disk of the drive head-coupling assembly.

[00022] In the illustrated version of the invention, cap 48 has a frusto-conical shape. Cap 48, in addition to the main section with a shape close to that of a semi-circle, has an extension 49. Extension 49 has a semi-circular shape that is centered on the center of the cap. Here the "center" of the cap 48 is the center point around

which the mount side wall 46 and the outer edges of the associated mount plate 44 and cap 48 are curved. Extension 49 extends from the outer straight edge of the main body of the cap 48.

[00023] Again, it should be understood that the structure of the mount 42 is based on the structure of the handpiece coupling assembly 34 to which the blade unit 24 is attached. Mounts for use with handpieces that have other coupling assemblies will have alternative geometric features to facilitate their removable attachment to the complementary handpieces.

[00024] A shaft 52, also part of blade unit 24, extends forward from mount cap 48. Shaft 52 is not a straight structure. Instead, the shaft is formed to have three sections, a proximal section 54, a middle section 56 and a distal section 58. Shaft sections 54, 56 and 58 are further each formed to have circular cross-sectional shapes. In the illustrated version of the invention, the proximal section 54 is the shortest of the three sections; the middle section 56 is longest section. The shaft distal 58 section has a length that is closer to that of the proximal section 54 than the middle section 56. Shaft proximal section 54 extends forward from the center of mount cap 48. The axis around which shaft proximal section 54 extends extends from the center of mount cap 48, represented as a dashed line 61 in Figure 2. This is the axis around which the shaft of a conventional, prior art, blade unit oscillates when no load applied to the blade head. This axis is referred to as the mechanical axis of oscillation 61.

[00025] Shaft middle section 56 extends forward from proximal section 54. The shaft proximal and middle sections 54 and 56, respectively, are not coaxial. Instead, the longitudinal axis of middle section 56 angles approximately

5 to 20° degree away from the mechanical axis of oscillation 61. Shaft distal section 58 extends forward from middle section 56. More particularly, the shaft 52 is shaped so that distal section 58 is centered on a longitudinal axis that is parallel to and laterally offset from the blade unit mechanical axis of oscillation 61.

[00026] A slot 59 is formed in shaft distal section 58 immediately proximal to the distal end of the shaft 52. The slot 59 extends longitudinally partially through the shaft 52. In the illustrated versions of the invention, slot 59 is not in a plane perpendicular to the longitudinal axis of shaft distal section 58. Instead, relative to the outer surface of the shaft section 58, slot 59 angles distally forward. It should further be appreciated that slot 59 opens from the arcuate outer face of the shaft distal section 58 that is directed toward the blade unit mechanical axis of oscillation 61.

[00027] Blade unit 24 also includes a blade head 66. Generally, blade head 66 is in the shape of a slice section of a circle. The outer arcuate edge of the blade head is formed to have teeth 68 seen in Figure 5. In versions of the invention in which blade unit 24 is designed for use in an intra-oral procedure, teeth 68 define an arc that typically has a radius of curvature of almost always 5 cm or less, typically 3 cm or less and often 1.5 cm or less.

[00028] Blade head 66 is seated in shaft slot 59. The blade head 66 is positioned so that the narrow end of the head, the end opposite teeth 68, is disposed in the slot 59. In some versions of the invention blade head 59 is welded in slot 59. Thus, the blade head 66 intersects the distal extension of the blade unit mechanical axis of oscillation 61. The blade teeth 68 are located in an arc that extends partially around the mechanical axis of oscillation. Depending of the structure of the particular

blade unit 24 the arc around which teeth 68 extend may or may not be of constant radius.

[00029] Surgical saw assembly 20 of this invention is prepared for use by coupling the blade unit 24 to the handpiece 22. In the described version of the invention, this involves seating the blade mount plate 44 between opposed disks integral with the handpiece coupling assembly 34 (disks not illustrated). Coupling assembly 34 is then set so the mount plate 44 is clamped between the disks. As a consequence of this coupling of the blade unit 24 to the handpiece 22, blade unit mount 42 and shaft proximal section 54 are centered over the center of the handpiece drive head 32. The blade unit mechanical axis of oscillation 61 extends forward from the center of the drive head 32 and through the blade mount 42 and shaft proximal section 54.

[00030] It should be appreciated that, after the coupling assembly 34 clamps the blade unit 24 to the drive head 32, the blade unit is able to move slightly relative to the drive head. This tolerance, compliance, is due to the fact that if the coupling assembly 34 rigidly holds the blade unit 24 to the handpiece drive unit 24, it might be difficult to use unaided manual force to overcome the latching force the components of the coupling assembly provide in order to hold the components forming the assembly 30 together.

[00031] Assembly 20 is then used by actuating motor 28. The uni-directional rotational energy output by the motor is, by drive assembly 30, converted into rotational energy that oscillates the drive head 32 back and forth. The coupling of the blade unit 24 to the drive head results in this rotational energy being transferred to the blade unit 24 so that the blade unit undergoes a like oscillation.

[00032] To perform a procedure, the blade unit 24 is positioned so that the blade head teeth 68 are disposed against the tissue, typically bone, the practitioner wants to cut. The oscillation of the blade head 66 and the pressing of the teeth 68 against the tissue cause the teeth to cut the tissue. As the blade head 66 cuts deeper into the tissue, the amount of resistance to which the teeth 68 as well as the rest of the blade head are exposed increases. In the assembly of this invention, blade unit 24 has a center of mass located on the side of the axis of oscillation opposite the side of this axis opposite teeth 68. This off-center, asymmetric, location of the center of mass is due to the fact that an appreciable portion of the shaft middle section 56 and the shaft proximal section 58 and a portion of the blade head 66 are off center from the mechanical axis of oscillation 61. Consequently, the mass moment of inertia blade head 66 has as it rotates is greater than if the center of mass is essentially centered on the mechanical axis of oscillation 61. This relatively high mass moment of inertia means that the angular kinetic energy the blade unit 24 outputs when in an oscillation cycle is greater than that for a blade unit with a conventional shaft. This increase in angular kinetic energy means that the blade head 66 has more energy available for overcoming the resistance imposed by the tissue being cut. The blade head is therefore better able to cut the tissue as opposed to becoming stuck in the tissue.

[00033] It is further believed that, when oscillated, the axis of oscillation of blade unit 24 of this invention shifts radially away from the mechanical axis of oscillation 61. This is understood to be another reason why the blade unit of this invention offers improved cutting over a conventional blade unit. More specifically,

empirical analysis indicates that, when the blade of this invention is actuated, the axis of oscillation shifts away from the mechanical axis of oscillation 61 towards the center of mass, point 72 in Figure 4. When the blade head 66 is pressed against tissue, this shift is believed due to the inherent compliance, looseness, of the features pressing the blade head against the tissue. One of these "features" is the hand of the practitioner holding the handpiece 22. The actual portion of the hand gripping the handpiece is skin and muscle. These are soft tissues that are flexible. Consequently, even when in the hand of a practitioner with a very strong grip, the handpiece 22 will move a little relative to the hand. A second one of these compliance-inducing features is the above discussed compliance between the blade unit 24 and the drive head 32. Further it is believed that the blade unit shaft 52 has some inherent flexibility that, while minor, contributes to the compliance of the blade unit 24 relative to handpiece 22.

[00034] Consequently, when the blade unit 24 is oscillated, owing to the compliant nature of the components holding the blade head 66 to the tissue, the axis of oscillation tends to shift from the mechanical axis of oscillation 61 towards the center of mass of the blade unit. This shifted axis of oscillation, called out as the dynamic axis of oscillation 74 in Figure 4, is located between the mechanical axis of oscillation 61 and the center of mass 72.

[00035] Blade head 66 thus shifts from oscillating around the mechanical axis of oscillation, represented by point 76 in Figure 5 to around the dynamic axis of oscillation, represented by point 78 in the same Figure. From Figure 5 it can be seen that adjacent where the dynamic axis of oscillation intersects the blade and the shaft, it does so at a location between the mechanical axis of oscillation and the center of the asymmetrically located mass. As a result

of the shift of the dynamic axis of oscillation away from the mechanical axis of oscillation, the length of the arcuate path of the blade teeth increases. Diagrammatically, this is represented in Figures 5 and 6 wherein line segment 82 represents the radius from which tooth 68a rotates when the blade oscillates around the mechanical axis of oscillation. Line segment 92, which includes segment 82, is the radius from which tooth rotates when the blade oscillates around the dynamic axis of oscillation. The degree of oscillation and radial velocity of the blade head are identical when the head oscillates around either axes of oscillation, angle α in Figure 6. (In Figure 6 the angle around which the tooth rotates is exaggerated for purposes of illustration.) Consequently, in a given unit of time, the blade tooth 68a travels along arc 84, the arc of tooth travel, when the blade oscillates around the mechanical axis of oscillation. In contrast, when the blade oscillates around the dynamic axis of oscillation, in the same amount of time, tooth 88a travels along arc 94. While arcs 84 and 94 are of a common angle, owing to its larger radius, arc 94 is longer in linear distance. This means that tooth 68a moves at a faster speed when oscillating around the dynamic axis of oscillation than when oscillating around the mechanical axis of oscillation. This means that when the tooth oscillates around the dynamic axis of oscillation, in comparison to an oscillation around the mechanical axis of oscillation, the momentum of the tooth 68a increases. This increase in momentum further increases the rotational kinetic energy the teeth 68 of the blade unit 24 of this invention have available for overcoming the resistance of the tissue to which the teeth are applied.

[00036] Thus, it is believed that, when a tooth of the blade unit 24 of this invention strikes tissue, it does so

with both a relatively large amount of kinetic energy from two sources (1) the energy of the mass located opposite the axis around which the tooth oscillates and (2) from the increased inertial moment of the tooth owing to an increase in tooth velocity. This increase in energy provides the blade with more force to cut tissue than the teeth of a conventional blade. This increase in available force results in a like increase in the ability of the blade head 66 to cut through tissue.

[00037] Also, it is believed that a further consequence of the linear speed of the blade teeth 68 increasing is that the teeth on the opposed ends of the blade head 66 are able to kick out debris in the kerf of the cut tissue with more force than these debris are discharged by a conventional blade unit. These debris are the bone chips formed as a result of the cutting process. At the end of each sweep of the blade head 66 of this invention, more bone chips are forced out of the kerf than are forced out with a conventional blade wherein the teeth move at a slower speed. These bone chips, if allowed to stay in kerf, interfere with the action of the blade teeth against the uncut bone. Since, in the present invention, an appreciable fraction of these chips are forced out of the blade with each sweep of the blade head, in comparison to the sweep of a conventional blade, there are less chips in the kerf to interfere with the cutting process.

[00038] It should be appreciated that another feature of this invention, is that handpiece 22 can be used to oscillate blade units that have a conventional geometry; one in which the shaft from which the blade extends is symmetric with respect to the axis of oscillation; the center of mass is essentially located on the mechanical axis of oscillation. Handpiece 22 can also be used with blade units that do not include shafts.

[00039] The above is directed to one specific version of this invention. Other versions of the invention may have features different from what has been described. For example, the blade unit may have different geometries so as to have a mass that is asymmetric relative to the axis around which the blade unit oscillates. Thus, as seen in Figures 7A and 7B, in some versions of the invention a blade 82 may have a shaft 84 that, rather than being angled, may be coaxial with the axis of oscillation 61. In these versions of the invention, the shaft may have a fin 86. The fin 86 protrudes away from the mechanical axis of oscillation opposite the side of the axis from which the blade head 66 extends. Fin 86 may be a distinct object or in the form of a bulge that emerges from the shaft.

[00040] Alternatively, instead of having distinct sections that are angled from each other, the shaft may have a single longitudinal axis along the length of the shaft. This axis, instead of being straight, is curved so as to curve away from the axis of oscillation.

[00041] Furthermore, in some versions of the invention, the shaft may be linear along the mechanical axis of oscillation along the length of the shaft. In these versions of the invention, the shaft includes features that allow masses to be removably attached to shaft. These features allow masses of different weights to be removably attached to the shaft. In some versions of the invention, these masses can be fitted to the shaft at different locations along the length of the shaft. This selective setting of the mass allows the practitioner to control the extent to which the added mass changes the rotational energy of the assembly.

[00042] Further, there is no requirement that in all versions of the invention the blade unit be constructed so that the asymmetrically located mass is located so as to be

diametrically opposed to the longitudinal center of the blade head relative to the mechanical axis of oscillation 61. Typically, the mass is located at least 90° from the center axis of the blade head. (The axis from the center of the blade teeth back to where the head is attached to shaft.) This means that, relative to the mechanical axis of oscillation 61, the blade teeth 68 and the asymmetrically located mass are arcuately spaced apart from each other. In some versions of the invention, the blade unit may have plural masses. These masses are centered along a line that represents the extension of the longitudinal axis of the blade head through the axis of oscillation of the blade unit. Consequently, the center of mass is located opposite the center line of the blade relative to the mechanical axis of oscillation 61 of the blade unit.

[00043] Accordingly, it is an object of the appended claims to cover all such variations and modifications that come within the true spirit and scope of this invention.

What is claimed is:

1. A surgical saw assembly, said assembly comprising:
a handpiece (22), the handpiece including: a
motor (28); a drive head (32); and a drive assembly (30)
that converts the rotational energy output by the motor into
energy that oscillates the drive head around a mechanical
axis of oscillation; and

a blade (24), the blade including:

blade mount (42) having features that cooperate
with complementary features associated with the handpiece
drive head (32) for releasably holding the blade mount to
the drive head so that the blade mount oscillates with the
drive head wherein a mechanical axis of oscillation (61)
around which the blade mount oscillates that extends from
the blade mount;

a shaft (52, 84) that extends forward from the
blade mount, the shaft having a distal end; and

a blade head (66) that extends radially outwardly
from the distal end of the shaft, the blade head having an
outer surface from which teeth (68) for performing a medical
procedure extend outwardly;

characterized in that:

the blade shaft (52) has a mass (56, 58, 86) that is
asymmetrically located relative to the mechanical axis of
oscillation (61); and

the blade head (66) extends radially outwardly from the
shaft so as that the teeth (68) are arcuately spaced from
said asymmetrically located (56, 58, 86) mass relative to
the mechanical axis of oscillation (61).

2. The surgical saw assembly of Claim 1, wherein the blade head (66) and said mass (56, 58) are arranged so that said mass and a center of the teeth are, relative to the mechanical axis of oscillation (61) diametrically opposed to each other.

3. The surgical saw assembly of either Claims 1 or 2, wherein the blade shaft (52) has at least one section (56, 58) that is axial offset from the mechanical axis of oscillation (61), the at least one axially offset section forming said mass that is asymmetric to the mechanical axis of oscillation

4. The surgical saw assembly of Claim 3, wherein the shaft is shaped to have: a proximal section (54) that extends from the blade mount that is centered on the mechanical axis of oscillation; a middle section (56) that is angled relative to the proximal section so as to have a longitudinal axis that is angled relative to the mechanical axis of oscillation; and a distal section (58) that defines the shaft distal end that is angled relative to the middle section.

5. The surgical saw assembly of any one of Claims 1 through 4, wherein:

the shaft (52) has a distal section (58) that defines the distal end of the shaft, the shaft distal section having a longitudinal axis that is laterally spaced from the mechanical axis of oscillation; and

the blade head (66) extends outwardly from the distal end of the shaft to intersect the mechanical axis of oscillation (61).

6. The surgical saw assembly of either Claims 1 or 2, wherein a fin (86) projects radially outwardly from the shaft (82) so as to function as said the mass that is asymmetric to the mechanical axis of oscillation (61).

7. The surgical saw assembly of any one of Claims 1 through 6, wherein the blade mount features for releasably holding the blade mount to the handpiece drive head (32) include a plate (44) with notches (45).

8. A surgical saw blade (24) for use with a powered surgical handpiece (22) that has an oscillating drive head (32) that rotates back and forth, the saw blade including:

- a blade mount (42) having features that cooperate with complementary features associated with the handpiece drive head (32) for releasably holding the blade mount to the drive head so that the blade mount oscillates with the drive head wherein a mechanical axis of oscillation (61) around which the blade mount oscillates that extends from the blade mount;

- a shaft (52, 84) that extends forward from the blade mount, the shaft having a distal end; and

- a blade head (66) that extends radially outwardly from the distal end of the shaft, the blade head having an outer surface from which teeth (68) for performing a medical procedure extend outwardly;

- characterized in that:

- the shaft has a mass (56, 58, 86) that is asymmetrically arranged relative to the mechanical axis of oscillation (61); and

- the blade head (66) extends radially outwardly from the shaft so that the teeth (68) are arcuately spaced from said

asymmetrically located mass (56, 58, 86) relative to the mechanical axis of oscillation (61).

9. The surgical saw blade of Claim 8, wherein the blade head (66) and said mass (56, 58) are arranged so that said mass and a center of the teeth are, relative to the mechanical axis of oscillation (61) diametrically opposed to each other.

10. The surgical saw blade of either Claims 8 or 9, wherein said shaft has at least one section (56, 58) that is axial offset from the mechanical axis of oscillation (61), the at least one axially offset section forming said mass that is asymmetric to the mechanical axis of oscillation.

11. The surgical saw blade of Claim 10, wherein the shaft is shaped to have: a proximal section (54) that extends from the blade mount that is centered on the mechanical axis of oscillation; a middle section (56) that is angled relative to the proximal section so as to have a longitudinal axis that is angled relative to the mechanical axis of oscillation; and a distal section (58) that defines the shaft distal end that is angled relative to the middle section.

12. The surgical saw blade of Claim 11, wherein the shaft distal section (58) has a longitudinal axis that is spaced from and parallel with the mechanical axis of oscillation (61).

13. The surgical saw blade of Claim 10, wherein:
the shaft (52) has a distal section (58) that defines the distal end of the shaft, the shaft distal section having a longitudinal axis that is laterally spaced from the mechanical axis of oscillation; and
the blade head (66) extends outwardly from the distal end of the shaft to intersect the mechanical axis of oscillation (61).

14. The surgical saw blade of either Claims 8 or 9, wherein a fin (86) projects radially outwardly from the shaft (84) so as to function as said the mass that is asymmetric to the mechanical axis of oscillation (61).

15. The surgical saw blade of any one of Claims 8 through 14, wherein the blade mount features for releasably holding the blade mount to the handpiece drive head (32) include a plate (44) with notches (45).

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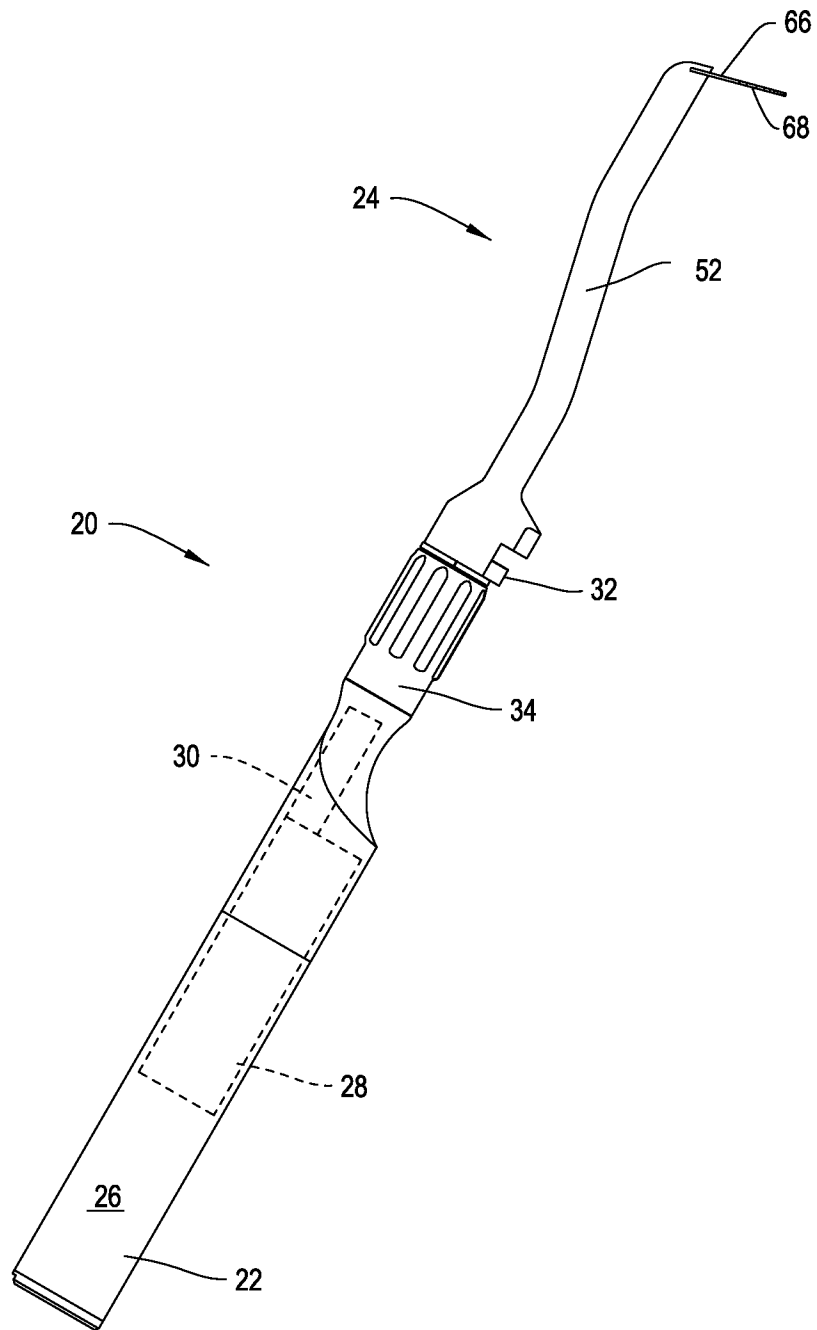


FIG. 1

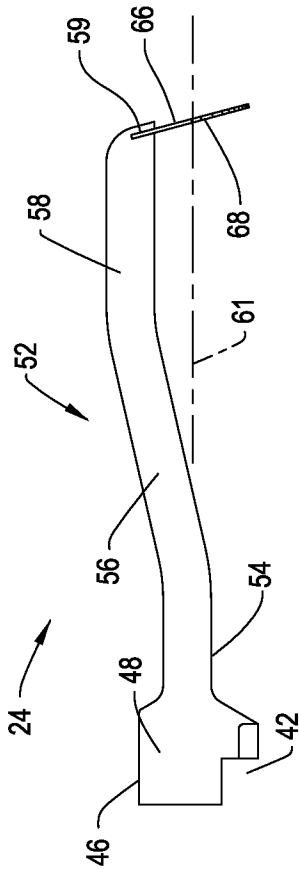


FIG. 2

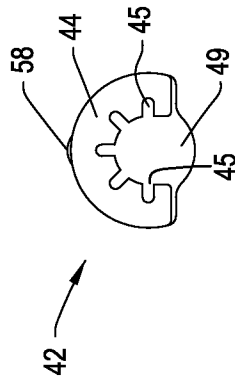


FIG. 3

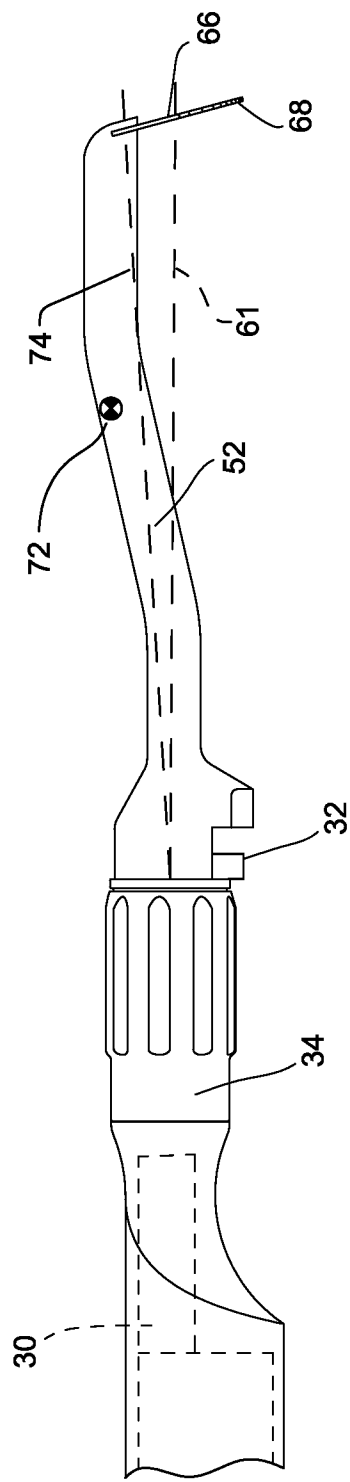


FIG. 4

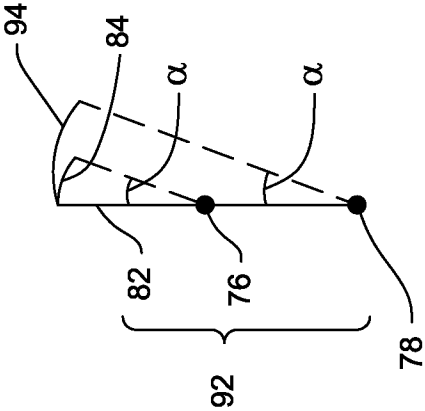


FIG. 6

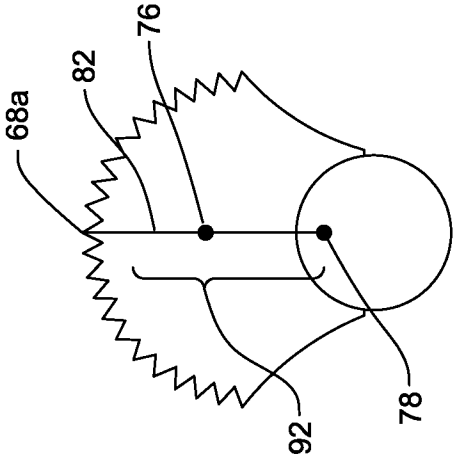


FIG. 5

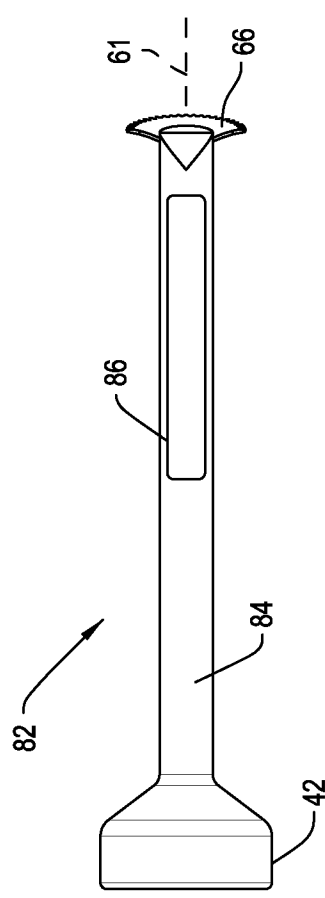


FIG. 7A

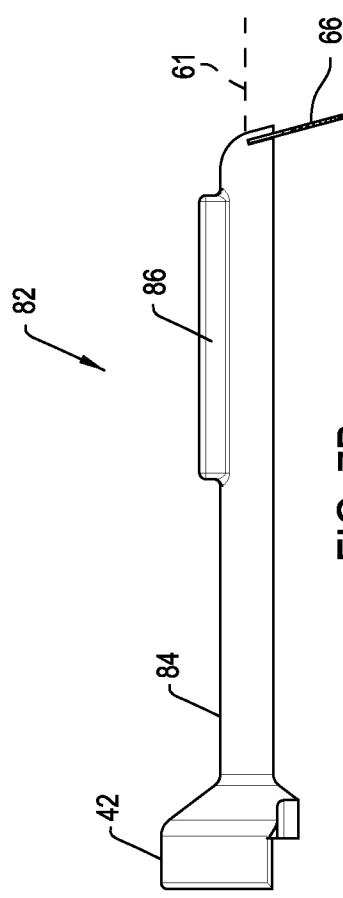


FIG. 7B