**Claim rejection under 35 USC 112**

**The following is a quotation of the first paragraph of 35 U.S.C. 112(a):**

(a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains,or with which it is most nearly connected, to make and use the same,and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

**The following is a quotation of 35 U.S.C. 112(b):**

(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly   
claiming the subject matter which the inventor or a joint inventor regards as the invention.  
The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-19 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA),second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor,

**Regarding claim 1**. An AC signal generator for an ultrasonic handpiece including a driver and a tip coupled to the at least one driver that vibrates upon actuation of the driver, the AC signal generator comprising:  
a transformer including a primary winding with opposed ends and a center tap to which a DC voltage is applied; and a secondary winding across which an AC drive signal is induced for actuating the driver of the handpiece; and  
a linear amplifier including:  
first and second transistors that function as first and second active resistors respectively that are each connected to a separate end of the opposed ends of said primary winding of said transformer and ground, wherein said linear transformer is configured to set the resistances of said first and second active resistors implemented by the first and second transistors to set the voltage at each opposed end of the primary winding between a ground state voltage and an open state voltage that so as to causes an AC voltage to develop across the primary winding that causes the AC drive signal to develop across said secondary winding;  
a differential amplifier to which the voltages present at the opposed ends of the transformer primary winding are applied and that produces as a feedback signal a signal based on the differences between the voltages present at the opposed ends of the transformer primary winding for causing, responsive to receipt of an external control signal, a substantially linear response of the AC voltage developed across the primary winding that causes desired vibrations of the tip of the handpiece upon actuation of the driver by the AC drive signal developed across the secondary winding according to the external control signal; and  
a control circuit that receives the feedback signal and the external control signal and that, based on the feedback signal and the external control signal, sets the resistances of said first and second active resistors implemented by said first and second transistors for generating the substantially linear response.   
   
**Regarding claim 2**. The AC signal generator of claim 1, wherein said control circuit of said linear amplifier is configured to combine the feedback signal from said differential amplifier with the external control signal to produce a combined signal that regulates the resistances of said first and second active resistors implemented by said first and second transistors.   
   
**Regarding claim 3**. The AC signal generator of claim 2, wherein said linear amplifier control circuit includes a rectifier and splitter to which the combined signal is applied, said rectifier and splitter being configured to split the combined signal into positive and negative components wherein the negative component of the combined signal is used to set the resistance of said first active resistor implemented by said first transistor and the positive component of the combined signal is used to set the resistance of said second active resistor implemented by said second transistor.   
   
**Regarding claim 4**. The AC signal generator of claim 1, wherein said control circuit of said linear amplifier includes a first voltage controlled current source and a second voltage controlled current source that, based on the feedback signal from said differential amplifier and the external control signal, produce a current that sets the resistance of said first active resistor implemented by said first transistor and a current that sets the resistance of said second active resistor implemented by said second transistor respectively.   
   
**Regarding claim 5**. The AC signal generator of claim 4, wherein said control circuit of said linear amplifier:  
is configured to combine the feedback signal from said differential amplifier with the external control signal to produce a feedback adjusted external control signal, the feedback adjusted external control signal having both positive and negative components; and  
said control circuit includes a rectifier and splitter that receives the feedback adjusted external control signal and that provides a negative component of the feedback adjusted external control signal as a control signal to said first voltage controlled current source and a positive component of the feedback adjusted external control signal as a control signal to said second voltage controlled current source.   
   
**Regarding claim 6**. The AC signal generator of claim 1, further comprising:  
a power supply for supplying a variable DC voltage to the center tap of said transformer primary winding;  
a headroom monitor that monitors the voltage across said first and second transistors and that produces a signal representative of the voltage across said first and second transistors; and  
a power supply controller that receives from said headroom monitor the signal representative of the voltage across said first transistor and the voltage across said second transistor, that is connected to said power supply for regulating the DC voltage supplied by said power supply, and that is configured to, based on the voltage across said first and second transistors indicated by said headroom monitor, set the level of the DC voltage said power supply supplies to the transformer primary winding.   
   
**Regarding claim 7**. The AC signal generator of claim 6, wherein said headroom monitor is configured to receive as inputs, if said first and second transistors are FETs, the voltages present at the drains and sources of the FETs and, if said first and second transistors are bipolar transistors, the voltages present at the collectors and emitters of the bipolar transistors.   
   
**Regarding claim 8**. The AC signal generator of claim 6, wherein said DC power supply includes a constant DC voltage supply and a boost converter to which DC voltage from said constant DC voltage supply is applied and that is configured to, in response to a control signal from said power supply controller, apply a varying DC voltage to the center tap of said transformer primary winding.   
   
**Regarding claim 9**. The AC signal generator of claim 1, wherein said first and second transistors of said linear amplifier that function as said first and second active resistors respectively are MOSFETs.   
   
**Regarding claim 10**. The AC signal generator of claim 1, wherein said linear amplifier is configured to, independent of the feedback signal and the external control signal, apply a signal to each of said first and second transistors so each of said first and second transistors is continually in a saturation mode.   
   
**Regarding claim 11**. An ultrasonic surgical tool system comprising:  
an AC signal generator including:  
a transformer with: a primary winding with opposed ends and a center tap to which a DC voltage is applied; and a secondary winding across which an AC drive signal is induced for application to a power generating unit of a surgical tool; and  
a linear amplifier, said linear amplifier including:  
first and second transistors that function as first and second active resistors respectively that are each connected to a separate end of the opposed ends of said primary winding of said transformer and ground, wherein said linear transformer is configured to set the resistances of said first and second active resistors to set the voltage at each opposed end of the primary winding between a ground state voltage and an open state voltage that causes an AC voltage to develop across the primary winding that causes the AC drive signal to develop across said secondary winding;  
a differential amplifier to which the voltages present at the opposed ends of the transformer primary winding are applied and that said differential amplifier produces as a feedback signal a signal based on the differences between the voltages present at the opposed ends of the transformer primary winding; and  
a control circuit that receives the feedback signal and an external control signal and that, based on the feedback signal and the external control signal, sets the resistances of said first and second active resistors for generating a substantially linear response responsive to the external control signal;  
  
a power supply for supplying a variable DC voltage to the center tap of said transformer primary winding;  
a headroom monitor that monitors the voltage across said first and second transistors and that produces a signal representative of the voltage across said first and second transistors;  
a power supply controller that receives from said headroom monitor the signal representative of the voltage across said first transistor and the voltage across said second transistor, that is connected to said power supply for regulating the DC voltage supplied by said power supply, and that is configured to, based on the voltage across said first and second transistors, set the level of the DC voltage said power supply supplies to the transformer primary winding; and  
a handpiece including at least one driver that is connected to said secondary winding of said transformer and is actuated upon the application of the AC drive signal to said driver, and a tip that is connected to said at least one driver and vibrates upon actuation of said at least one driver.   
   
**Regarding claim 12**. An AC signal generator for an ultrasonic handpiece including a driver and a tip coupled to the driver that vibrates upon actuation of the driver, the AC signal generator comprising:  
a transformer including a primary winding with opposed ends and a center tap to which a DC voltage is applied; and a secondary winding across which an AC drive signal is induced for actuating the driver of the handpiece;  
a first transistor connected between a first end of said primary winding and ground and a second transistor connected between a second end of said primary winding and ground, wherein said first and second transistors operate as first and second active resistors respectively between the first and second ends of the primary winding respectively and ground to set the voltage across each of the first and second ends of said primary winding to cause an AC voltage to develop across the primary winding that causes the AC drive signal to develop across said secondary winding;  
a variable DC power supply assembly regulating the level of the DC voltage applied to the center tap of the transformer primary winding; and  
a headroom monitor connected to ends of said first transistor and said second transistor that are connected to the first and second ends of said primary winding of said transformer respectively, wherein said headroom monitor is configured to, based on the voltages present at the ends of the first and second transistors, generate a headroom signal representative of the headroom voltages at the first and second transistors,  
wherein said variable DC power supply is configured to, based on the headroom signal received from said headroom monitor, set the level of the DC voltage applied to the center tap of the transformer primary winding to cause saturation voltages to be applied to said first transistor and said second transistor for causing, responsive to receipt of an external control signal, a proportional change in the AC voltage developed across said primary winding that causes desired vibrations of the handpiece upon actuation of the driver by the AC drive signal developed across the secondary winding according to the external control signal.   
   
**Regarding claim 13**. The AC signal generator of claim 12, wherein said headroom monitor is further configured to receive as inputs the voltages present at the opposed ends of said first and second transistors and to generate the signal representative of headroom voltage based on a difference between the voltages present at the opposed ends of said first and second transistors.   
   
**Regarding claim 14**. The AC signal generator of claim 12, further comprising:  
a controller for regulating the currents applied to said first and second transistors to regulate the level of the voltages that develop across said primary winding of said transformer, said controller being configured to:  
determine voltages to be developed across the transformer primary winding;  
prior to the controller causing the determined voltages to develop across the transformer primary winding, calculate an anticipated headroom voltage based on the determined voltages and the level of the DC voltage currently applied to the center tap; and  
adjust the level of the DC voltage applied to the center tap of the transformer primary winding based on the anticipated headroom voltage.   
   
**Regarding claim 15**. The AC signal generator of claim 14, wherein said controller is further configured to, responsive to the determined voltages to be developed across said primary winding of said transformer being a decrease in the voltages across said primary winding of said transformer, lower the level of the DC voltage applied to the center tap of the transformer primary winding at a rate that is slower than the rate at which the voltages across said primary winding is to be decreased.   
   
**Regarding claim 16**. The AC signal generator of claim 12, wherein:  
said first and second transistors are FETs; and  
said headroom monitor is configured to generate a signal representative of headroom voltage based on the difference between the lower of the two drain voltages of said first and second transistors and the higher of the two peak voltages at the sources of said first and second transistors.   
   
**Regarding claim 17**. The AC signal generator of claim 12, wherein said headroom monitor is constructed so that:  
the voltages present at each junction between said first transistor and said second transistor and said primary winding of said transformer is applied to a reverse biased diode;  
the anodes of said diodes are connected together; and  
a constant voltage is applied to the junction of the anodes so that the voltage present at the junction of the anodes of said diodes is the lower of the two voltages present between the transistors and the transformer primary winding and this voltage is used as the voltage present at first ends of the transistors.   
   
**Regarding claim 18**. The AC signal generator of claim 12, wherein said headroom monitor is constructed so that the voltages present at ends of said first and second transistors distal to the transformer primary winding are applied to separate forward biased diodes, the cathodes of said diodes are connected at a junction and the voltage present at the junction of the diodes is used as the voltage present at first ends of the first and second transistors.   
   
**Regarding claim 19**. An AC signal generator for an ultrasonic handpiece including a driver and a tip coupled to the driver that vibrates upon actuation of the driver, the AC signal generator comprising:  
a transformer including a primary winding with opposed ends and a center tap to which a DC voltage is applied; and a secondary winding across which an AC drive signal is induced for actuating the driver of the handpiece;  
a first transistor tied to a first end of the opposed ends of said primary winding of said transformer and a second transistor tied to a second end of the opposed ends of said primary winding, wherein the first and second transistors are selectively turned on/off to cause an AC voltage to develop across said primary winding;  
a control assembly that varies the signal applied to the bases or gates of the first and second transistors to cause the first and second transistors to function as first and second active resistors respectively; and  
an inductor connected between at one end a junction of said first transistor and the first end of said primary winding of said transformer and at an opposed end to a junction of said second transistor and the second end of said primary winding for reducing an extent to which voltage across and current through the first and second transistors are out of phase, wherein said inductor has an inductance such that a circuit including said inductor in parallel with said at least one driver of said handpiece has a resonant frequency within 50% of the resonant frequency of said handpiece.   
   
**Regarding claim 20**. An AC signal generator for an ultrasonic handpiece including a driver and a tip coupled to the driver that vibrates upon actuation of the driver, the AC signal generator comprising:  
a transformer including a primary winding with opposed ends and a center tap to which a DC voltage is applied; and a secondary winding across which an AC drive signal is induced for actuating the driver of the handpiece;  
a first transistor connected between a first end of the opposed ends of said primary winding of said transformer and ground and a second transistor tied to a second end of the opposed ends of said primary winding and ground, wherein each of said first transistor and said second transistor is selectively turned on/off to cause an AC voltage to develop across the primary winding;  
a variable DC power supply assembly regulating the level of the DC voltage applied to the center tap of the transformer primary winding;  
a headroom monitor connected to a junction of said first transistor and the first end of said primary winding of said transformer and to a junction of said second transistor and the second end of said primary winding, wherein said headroom monitor is configured to, based on the voltages present at the first and second ends of said primary winding, generate a signal representative of the headroom voltages at the transistors; and  
a control circuit that applies variable currents to the first and second transistors so that the first and second transistors function as first and second active resistors respectively, wherein said control circuit receives from said headroom monitor the headroom signal and is further configured to, based on the headroom signal, regulate the currents applied to said first and second transistors to selectively limit the voltage that appears across the transformer primary winding for causing, responsive to receipt of an external control signal, a proportional change in the AC voltage developed across the primary winding that causes desired vibrations of the tip of the handpiece upon actuation of the driver by the AC drive signal developed across the secondary winding according to the external control signal.   
   
**Regarding claim 21**. The AC signal generator of claim 20, wherein said headroom monitor is further configured to receive as inputs the voltages present at opposed ends of said first and second transistors and to generate the signal representative of headroom voltage based on a difference between the voltages present at first ends of the first and second transistors and the voltages present at second ends of the first and second transistors, the second ends opposite the first ends.   
   
**Regarding claim 22**. The AC signal generator of claim 20, wherein:  
said first and second transistors are FETs; and  
said headroom monitor is configured to generate a signal representative of headroom voltage based on the difference between the lower of the two drain voltages of the first and second transistors and the higher of the two peak voltages at the sources of the first and second transistors.   
   
**Regarding claim 23**. The AC signal generator of claim 20, wherein: said headroom monitor is constructed so that the voltages present at each junction between said first and second transistors and said primary winding of said transformer is applied to a reverse biased diode; the anodes of said diodes are connected together; and a constant voltage is applied to the junction of the anodes so that the voltage present at the junction of the anodes of said diodes is the lower of the two voltages present between the first and second transistors and the transformer primary winding and this voltage is used as the voltage present at first ends of said first and second transistors.   
   
**Regarding claim 24**. The AC signal generator of claim 20, wherein said headroom monitor is constructed so that the voltages present at the ends of said first and second transistors distal to said transformer primary winding are applied to separate forward biased diodes, the cathodes of said diodes are connected at a junction and the voltage present at the junction of said diodes is used as the voltage present at first ends of said firsts and second transistors.