[CLAIMS]

[Claim 1]

A wire bonding apparatus that includes an ultrasonic horn in which a bonding tool having a wire inserted therethrough is attached to a tip thereof and a bonding arm to which the ultrasonic horn is attached and which performs bonding of the wire to a bonding target by bringing the bonding tool into contact with or separating the bonding tool from the bonding target, the wire bonding apparatus further comprising:

a wire clamper that has clamping arms protruding in a longitudinal direction from the bonding arm and clamping the wire, and a base body part attached to an upper side of the bonding arm and accommodating an actuator for performing an opening/closing operation of the clamping arms; and

a control unit that adjusts the opening/closing operation of the actuator of the wire clamper,

wherein the control unit causes the clamping arms to vibrate in an opening/closing direction in an open state using the actuator of the wire clamper during bonding.

[Claim 2]

The wire bonding apparatus according to claim 1,

wherein the control unit drives the clamping arms in the opening/closing direction at a frequency within a range of 80% to 120% of a resonant frequency of the clamping arms using the actuator of the wire clamper during bonding.

[Claim 3]

The wire bonding apparatus according to claim 1,

wherein lengths of the clamping arms of the wire clamper correspond to a length within a range of 80% to 120% of a length of the ultrasonic horn.

[Claim 4]

The wire bonding apparatus according to claim 2,

wherein lengths of the clamping arms of the wire clamper correspond to lengths within a range of 80% to 120% of a length of the ultrasonic horn.

[Claim 5]

The wire bonding apparatus according to any one of claims 1 to 4,

wherein in the wire clamper, the clamping arms are in an open state when a predetermined open voltage is applied to the actuator and the clamping arms are in a closed state when no voltage is applied to the actuator, and

wherein the control unit causes the clamping arms to vibrate in the opening/closing direction in an open state by applying a fluctuation voltage fluctuating within a predetermined voltage range centering on a base voltage that is the same as the predetermined open voltage or lower than the predetermined open voltage to the actuator.

[Claim 6]

The wire bonding apparatus according to claim 5,

wherein the base voltage corresponds to a voltage within a range of 80% to 100% of the predetermined open voltage, and

wherein the predetermined voltage range includes a voltage within a range of 8% to 30% of the predetermined open voltage.

[Claim 7]

The wire bonding apparatus according to any one of claims 1 to 4 further comprising:

an ultrasonic vibrator that causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction,

wherein the control unit adjusts driving of the ultrasonic vibrator, causes the clamping

arms to vibrate in the opening/closing direction in an open state using the actuator of the wire clamper during bonding, and at the same time, causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction by causing the ultrasonic vibrator to perform ultrasonic vibration.

[Claim 8]

The wire bonding apparatus according to claim 5 comprising:

an ultrasonic vibrator that causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction,

wherein the control unit adjusts driving of the ultrasonic vibrator, causes the clamping arms to vibrate in the opening/closing direction in an open state using the actuator of the wire clamper during bonding, and causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction at the same time by causing the ultrasonic vibrator to perform ultrasonic vibration.

[Claim 9]

The wire bonding apparatus according to claim 6 comprising:

an ultrasonic vibrator that causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction,

wherein the control unit adjusts driving of the ultrasonic vibrator, causes the clamping arms to vibrate in the opening/closing direction in an open state using the actuator of the wire clamper during bonding, and causes the ultrasonic horn to perform ultrasonic vibration in the longitudinal direction at the same time by causing the ultrasonic vibrator to perform ultrasonic vibration.