reference voltage at the end of closing is calculated by subtracting the reference voltage at the end of closing when clamping nothing registered in step S46 from the reference voltage at the end of closing when clamping the calibration jig registered in step S52.

[0102] Next, at the end of closing of the pair of arm units 72a and 72b, the rate of change of the opening/closing amount of the pair of arm units 72a and 72b with respect to the applied voltage is calculated (S54). Step S54 is similar to step S34.

[0103] Next, the rate of change of the opening/closing amount of the pair of arm units 72a and 72b at the end of closing is registered (S55). Step S55 is similar to step S35.

[0104] Finally, the operating voltage is calibrated (S56). Based on the registered reference voltage and rate of change of the opening/closing amount at the start of opening, and the reference voltage and rate of change of the opening/closing amount at the end of closing of the pair of arm units 72a and 72b, the operating voltage is calibrated. By executing the wire bonding process using the wire clamp device 70 with the calibrated operating voltage, the opening/closing operation of the pair of arm units 72a and 72b of the wire clamp device 70 corresponding to the operating voltage can be accurately grasped. Therefore, a high-precision and stable wire bonding process can be performed.

[0105] The calibration method is preferably performed each time the aspect of the wire bonding process differs, for example, when performing wire bonding with wires of different diameters, or when performing wire bonding in different temperature environments. This is particularly effective because the calibration method allows calibration according to the ease of opening of the wire clamp device 70 corresponding to each of situations.

[0106] Moreover, in steps S31 to S35 and steps S51 to S55, instead of the calibration jig, the wire 42 that is scheduled to be used for wire bonding after calibration may be used.

[0107] The following describes part or all of the embodiments of the present invention. It should be noted that the present invention is not limited to the following notes.

[0108] [Note 1]

A clamp device 70 includes: a pair of arm units 72a and 72b for clamping a wire 42; a drive unit 76 having a piezoelectric element 80 for opening and closing the pair of arm units 72a and 72b; a supply unit 90a which is configured to generate a drive voltage in which an AC component with a variable frequency and a DC component with a variable voltage are superimposed, and to supply the drive voltage to the piezoelectric element 80, and in which the supply unit 90a increases or lowers the voltage of the DC component while setting the frequency of the AC component to a resonant frequency of the pair of arm units 72a and 72b; a detection unit 90b for detecting an output signal output from the driven piezoelectric element 80; and a determination unit 90c for determining an open/close state of the pair of arm units 72a and 72b based on an occurrence situation of a harmonic component of the resonant frequency in the output signal.

[0109] According to [Note 1], the open/close state of the pair of arm units 72a and 72b is determined based on the occurrence situation of the harmonic component in the output signal, therefore, in the determination of the open/close state, the influence of machine differences such as ease of vibration, ease of vibration transmission, and ease of output signal detection can be reduced.

[0110] [Note 2]

The clamp device 70 according to [Note 1] further includes a registration unit 90d that registers a voltage of the DC component when the pair of arm units 72a and 72b switch between an open state and a closed state as a reference voltage, and a calibration unit 90e that calibrates an operating voltage to be applied to the piezoelectric element 80 based on the reference voltage.

[0111] According to the aspect of [Note 2], based on the determination result of the open/close state with high accuracy, calibration with high accuracy may be performed, therefore, accuracy improvement and stabilization of the opening/closing operation of the clamp device 70 can be attempted.

[0112] [Note 3]

The detection unit 90b detects an output current output from the piezoelectric element 80 as