relative to the descending force; detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending; and detecting an abnormal contact of the electronic component during the descending upon detection of the floating of the rod.

[0011] The abnormal contact detecting method may further include: descending the holder unit holding the electronic component toward a pocket of a carrier tape; detecting a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component is descending while being in contact with the carrier tape; and detecting a contact to the carrier tape during the descending upon detecting of the floating of the rod.

[0012] The abnormal contact detecting method may further include: ~~taking out the electronic component from the pocket by~~ terminating ~~an insertion of~~ the descending, ~~electronic component into the pocket~~ and ascending the holder unit when the floating of the rod occurs.

[0013] The abnormal contact detecting method may further include: alerting a contact of the electronic component during the descending ~~toward the carrier tape~~ when the floating of the rod occurs.

[0014] An electronic component holding apparatus according to the present disclosure transfers an electronic component, and the apparatus includes: a holder unit capable of ascending and descending to and from a transfer position by external force while holding the electronic component; an ascending and descending motor generating descending force to the holder unit; a rod provided so as to be capable of ascending and descending to and from the holder unit, abutting the holder unit, and transferring the descending force generated by the ascending and descending motor to the holder unit; a voice coil motor applying, to the rod, opposing thrust force equivalent to counteracting

force to the rod caused by the descending force applied to the holder unit; and a detector detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending.

[0015] The holder unit may descend toward a pocket of a carrier tape that is the transfer position while holding the electronic component, and the detector may detect a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component descends while contacting the carrier tape.

[0016] The holder unit may terminate ~~an insertion of~~ the descending~~electronic component into the pocket~~ and the holder unit may be ascended ~~again to take out the electronic component from the pocket~~ when the detector detects the floating of the rod.

[0017] An electronic component carrying apparatus according to the present disclosure carries an electronic component to various process units disposed on a carrying route, and transfers the electronic component to the process units, and, the apparatus includes: a holder unit capable of ascending and descending by external force while holding the electronic component; a carrying motor turning the holder unit along the carrying route, and stopping the holder unit above a transfer position to the process unit; an ascending and descending motor generating descending force to the holder unit; a rod provided above the holder unit stopping above the transfer position so as to be capable of ascending and descending, abutting the holder unit, and transferring the descending force generated by the ascending and descending motor to the holder unit; a voice coil motor applying, to the rod, opposing thrust force equivalent to counteracting force to the rod caused by the descending force applied to the holder unit; and a detector detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending.

[0018] The holder unit may descend toward a pocket of a carrier tape that is the transfer position while holding the electronic component, and the detector may detect a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component descends while contacting the carrier tape.

[0019] The electronic component carrying apparatus may further include a rejecting device of the electronic component, in which the holder unit terminates ~~an insertion of~~ the descending~~electronic component into the pocket~~ and the holder unit is ascended ~~again to take out the electronic component from the pocket,~~ and the holder unit transfers the electronic component to the rejecting device when the detector detects the floating of the rod.

[0020] The electronic component carrying apparatus may further include alerting means that alerts a contact of the electronic component during the descending ~~toward the carrier tape~~ when the floating of the rod occurs.

ADVANTAGEOUS EFFECTS OF INVENTION

[0021] According to the present disclosure, an abnormal contact that is a cause of a defective electronic component can be detected while the electronic component is being transferred, and the electronic component possibly defective due to an abnormal contact can be surely taken out.

BRIEF DESCRIPTION OF DRAWINGS

[0022] FIG. 1 is a side view illustrating the whole structure of an electronic component holding apparatus according to an embodiment;

FIG. 2 is a side view illustrating an internal structure of a voice coil motor;

FIG. 3 is an enlarged side view illustrating an external structure of a detector of the electronic component holding apparatus;

CLAIMS

1. An abnormal contact detecting method of an electronic component by an electronic component holding apparatus including an ascending and descending motor descending, together with a rod supported by a voice coil motor, a holder unit of the electronic component through the rod, the method comprising:

applying descending force to the holder unit through the rod by the ascending and descending motor;

applying, to the rod by the voice coil motor, opposing thrust force equivalent to counteracting force applied to the rod relative to the descending force;

detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending; and

detecting an abnormal contact of the electronic component during the descending upon detection of the floating of the rod.

2. The abnormal contact detecting method according to claim 1, further comprising:

descending the holder unit holding the electronic component toward a pocket of a carrier tape;

detecting a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component is descending while being in contact with the carrier tape; and

detecting a contact to the carrier tape during the descending upon detecting of the floating of the rod.

3. The abnormal contact detecting method according to claim 1 or 2, further comprising:

~~taking out the electronic component from the pocket by~~ terminating ~~an insertion of~~ the descending, ~~electronic component into the pocket~~ and ascending the holder unit when the floating of the rod occurs.

4. The abnormal contact detecting method according to any one of claims 1~~2~~ to~~or~~ 3, further comprising:

alerting a contact of the electronic component during the descending ~~toward the carrier tape~~ when the floating of the rod occurs.

5. An electronic component holding apparatus transferring an electronic component, the apparatus comprising:

a holder unit capable of ascending and descending to and from a transfer position by external force while holding the electronic component;

an ascending and descending motor generating descending force to the holder unit;

a rod provided so as to be capable of ascending and descending to and from the holder unit, abutting the holder unit, and transferring the descending force generated by the ascending and descending motor to the holder unit;

a voice coil motor applying, to the rod, opposing thrust force equivalent to counteracting force to the rod caused by the descending force applied to the holder unit; and

a detector detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending.

6. The electronic component holding apparatus according to claim 5, wherein:

the holder unit descends toward a pocket of a carrier tape that is the transfer position while holding the electronic component; and

the detector detects a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component descends while contacting the carrier tape.

7. The electronic component holding apparatus according to claim 5 or 6, wherein the holder unit terminates ~~an insertion of~~ the descending~~electronic component into the pocket~~ and the holder unit is ascended ~~again to take out the electronic component from the pocket~~ when the detector detects the floating of the rod.

8. An electronic component carrying apparatus carrying an electronic component to various process units disposed on a carrying route, and transferring the electronic component to the process units, the apparatus comprising:

a holder unit capable of ascending and descending by external force while holding the electronic component;

a carrying motor turning the holder unit along the carrying route, and stopping the holder unit above a transfer position to the process unit;

an ascending and descending motor generating descending force to the holder unit;

a rod provided above the holder unit stopping above the transfer position so as to be capable of ascending and descending, abutting the holder unit, and transferring the descending force generated by the ascending and descending motor to the holder unit;

a voice coil motor applying, to the rod, opposing thrust force equivalent to counteracting force to the rod caused by the descending force applied to the holder unit; and

a detector detecting a relative floating of the rod to the voice coil motor in accordance with abnormal resistive force caused while the holder unit is descending.

9. The electronic component carrying apparatus according to claim 8, wherein:

the holder unit descends toward a pocket of a carrier tape that is the transfer position while holding the electronic component; and

the detector detects a relative floating of the rod to the voice coil motor in accordance with resistive force caused when the electronic component descends while contacting the carrier tape.

10. The electronic component carrying apparatus according to claim 8 or 9, further comprising a rejecting device of the electronic component,

wherein the holder unit terminates ~~an insertion of~~ the descending~~electronic component into the pocket~~ and the holder unit is ascended ~~again to take out the electronic component from the pocket~~, and the holder unit transfers the electronic component to the rejecting device when the detector detects the floating of the rod.

11. The electronic component carrying apparatus according to any one of claims 8~~9~~ to~~or~~ 10, further comprising alerting means that alerts a contact of the electronic component during the descending ~~toward the carrier tape~~ when the floating of the rod occurs.