spring that is made from a winding of a wire.

[0015] Moreover, in the above-described connection terminal according to the present invention, the load applying unit is a tightening member that is any one of a coil spring, a C ring, an O ring, and a cylindrical shaped member that applies a load to the tongue parts in the direction bringing the tongue parts into contact with the outer circumference of the first base end portion.

[0016] Moreover, in the above-described connection terminal according to the present invention, each of the tongue parts is divided by a slit extending from an end of the tongue part toward the second tip portion in an axial direction of the second contact member, and the slit extends at least to a position of the tongue part at which the load is applied.

[0017] Moreover, in the above-described connection terminal according to the present invention, each of the tongue parts is divided by a slit extending from a tip of the tongue part in an axial direction of the second ~~connecting~~ contact member, and the slit extends at least beyond a position of the tongue part at which the load is applied.

[0018] Moreover, in the above-described connection terminal according to the present invention, a length of each of the tongue parts in the axial direction is larger than a length by which the first contact member and the second contact member are permitted to move by sliding relatively to each other in the axial direction.

[0019] Moreover, in the above-described connection terminal according to the present invention, the second tip portion has a hollow space extending from a hollow space formed between the tongue parts, and the second contact member has a substantial U-shape in a plan view.

[0020] Moreover, in the above-described connection

structure of a contact probe according to a first modification of the second embodiment. Explained in the second embodiment is an example in which the coil diameter of the winding of the wire making up the coil spring 53 is constant, but, in the first modification, the coil diameter is changed. The diameters at both ends of the coil are smaller than the diameter at the center, so that the coil can be press-fitted more strongly compared with the second embodiment described above.

[0069] A probe 5a according to the first modification includes the first plunger 51 and the second plunger 52 described above, and a coil spring 53a. The coil diameter of one end of the coil spring 53a is set equal to or smaller than the diameter of the outer perimeter of the press-fitted portion of the tongue part group 52c (the first boss 521a and a second boss ~~524a~~522a), and the coil diameter of the other end is equal to or smaller than the diameter of the base end portion 51d.

[0070] Second modification of Second Embodiment

FIG. 14 is a partial sectional view illustrating a structure of a contact probe according to a second modification of the second embodiment. FIG. 15 is a cross-sectional view illustrating a structure of the contact probe according to the second modification of the second embodiment. FIG. 15 is a cross-sectional view of the contact probe, sectioned across a plane passing through the axis N0 illustrated in FIG. 14. In the second modification, a cut-out groove is provided to the tip portion and the flange of the second plunger, in a manner corresponding to the space (slit) formed between the tongue parts.

[0071] A probe 5b according to the second modification includes the first plunger 51 and the coil spring 53 described above, and a second plunger 54. The second

plunger 54 includes a tip portion 54a having a tapered pointed shape, a flange portion 54b extending from the base end side of the tip portion 54a and having a diameter larger than that of the tip portion 54a, a tongue part group 54c including a plurality of tongue parts and extending from an end of the flange portion 54b on the opposite side of the side continuing to the tip portion 54a, all of which are coaxially positioned (axis N0).

[0072] The tongue parts extend from the flange portion 54b in the direction along the axis N0, and extend in such a manner that the distance between the facing tongue parts becomes smaller toward the tip. In other words, the diameter of the substantial circle delineated by the outer perimeter (outer circumference) of the tongue parts becomes smaller toward the tip in the extending direction. The diameter may be kept not reduced, if the second plunger 54 can be pressed by the tongue parts against the base end portion 51d.

[0073] A hollow S1 is provided in the tip portion 54a and the flange portion 54b, correspondingly to the internal space formed by the tongue parts. Also extending in the second plunger 54 from an end of the tongue part group 54c on the opposite side of the flange portion ~~52~~54b in the axial direction of the second plunger 54 is a slit by which the internal space formed by the tongue parts and the hollow S1 is communicated to the external. The tongue parts of the tongue part group 54c are defined by the slit. This slit extends from an end of the tongue part group 54c on the opposite side of the flange portion 54b to a position beyond where the tongue parts are tightened at least by the coil spring 53 (the position to which the load is applied by the coil spring 53). In other words, the slit extends into the tip portion 54a and the flange portion 54b. By

contact member 62.

[0097] The first tongue part 623 and the second tongue part 624 are press-fitted into the coil spring 63. The first tongue part 623 and the second tongue part 624 are then tightened by press-fitting, and elastically deform in the directions approaching each other. By causing the first tongue part 623 and the second tongue part 624 to approach each other, the first tongue part 623 and the second tongue part 624 become pressed against the outer circumferential surface of the extending portion 61c.

[0098] According to the fourth embodiment described above, because, in the second contact member 62, the first tongue part 623 and the second tongue part 624 are configured to slide while being pressed against the base end portion 61d by the tightening force of the coil spring 63, the pressure at which the tongue part group 62c (the first tongue part 623 and the second tongue part 624) is brought into contact with the base end portion 61d can be increased, and the contact can be stabilized, and the contact resistance can be stabilized with a simple structure.

[0099] Explained in the fourth embodiment above is an example in which the base end portion 61d and the protrusions 623a, 624a serve as the structure for preventing the disengagement of the first contact member 61 and the second contact member 62, but in a configuration in which these ~~connecting~~contact members are press-fitted into the coil spring, these elements (the base end portion and the protrusions) may be omitted.

[0100] It is also possible, in the fourth embodiment described above, to provide the tightening member according to the third embodiment, and to tighten the first tongue part 623 and the second tongue part 624 with the tightening

100 integrated semiconductor circuit
101 connecting electrode
200 circuit board
201 electrode
521, ~~632~~623 first tongue part
521a first boss
521b first extending portion
522, 624 second tongue part
522a second boss
522b second extending portion
551, 552 branch portion

CLAIMS

1. A needle-shape conductive connection terminal that is extensible and compressible in a longitudinal direction, comprising:

a first plunger including

a first tip portion configured to contact with an electrode of a contact target, and

a first base end portion extending from the first tip portion;

a second plunger including

a second tip portion configured to contact with an electrode of a contact target, and

a second base end portion extending from the second tip portion, wherein a line passing through a central axis of the second base end portion intersects with a line passing through a central axis of the second tip portion, the second base end portion having elasticity and being configured to contact with the first base end portion; and

a coil spring that is made from a winding of a wire, through which the first base end portion and the second base end portion are inserted, couples the first tip portion and the second tip portion such that the central axes of the first tip portion and the second tip portion become substantially in parallel, and is extensible and compressible in the longitudinal direction.

2. A connection terminal comprising:

a first contact member configured to contact with one of two contact targets;

a second contact member configured to contact with another one of the two contact targets; and

a coil spring through which a part of the first

contact member and a part of the second contact member are inserted, and is configured to press the first contact member and the second contact member in an axial direction, wherein

the first contact member includes a first tip portion and a first base end portion, and

the second contact member includes a second tip portion, and a tongue part with an inner circumference configured to contact with an outer circumference of the first base end portion.

3. The connection terminal according to claim 2, wherein a curvature radius of at least a tip side of the tongue part is smaller than a diameter of the first base end portion when the first base end portion and the tongue part are not in contact.

4. The connection terminal according to claim 3, wherein the tongue part is configured to elastically contact with the first base end portion.

5. The connection terminal according to claim 2, wherein a surface of the tongue part contacting with the first base end portion has a shape following an outer circumferential surface of the first base end portion.

6. A conductive connection terminal that is extensible and compressible in a longitudinal direction, comprising:

a first contact member including

a first tip portion configured to contact with one electrode of a contact target, and

a first base end portion;

a second contact member including

a second tip portion configured to contact with another electrode of the contact target, and

a plurality of tongue parts configured to contact with the first base end portion;

an elastic member configured to extend and compress the first contact member and the second contact member in the longitudinal direction; and

a load applying unit configured to apply a load to the tongue parts in a direction bringing the tongue parts into contact with an outer circumference of the first base end portion.

7. The connection terminal according to claim 6, wherein the elastic member and the load applying unit are provided as one coil spring that is made from a winding of a wire.

8. The connection terminal according to claim 6, wherein the load applying unit is a tightening member that is any one of a coil spring, a C ring, an O ring, and a cylindrical shaped member that applies a load to the tongue parts in the direction bringing the tongue parts into contact with the outer circumference of the first base end portion.

9. The connection terminal according to any one of claims 6 to 8, wherein

each of the tongue parts is divided by a slit extending from an end of the tongue part toward the second tip portion in an axial direction of the second contact member, and

the slit extends at least to a position of the tongue part at which the load is applied.

10. The connection terminal according to any one of claims 6 to 8, wherein

each of the tongue parts is divided by a slit extending from a tip of the tongue part in an axial direction of the second connecting member, and

the slit extends at least beyond a position of the tongue part at which the load is applied.

11. The connection terminal according to any one of claims 6 to 8, wherein a length of each of the tongue parts in the axial direction is larger than a length by which the first contact member and the second contact member are permitted to move by sliding relatively to each other in the axial direction.

12. The connection terminal according to any one of claims 6 to 11, wherein

the second tip portion has a hollow space extending from a hollow space formed between the tongue parts, and

the second contact member has a substantial U-shape in a plan view.

13. The connection terminal according to any one of claims 6 to 12, wherein at least one of the first contact member and the second contact member has a plate-shape.

14. The connection terminal according to claim 7 or 8, wherein a cross section of the coil spring in a direction perpendicular to the longitudinal direction of the wire has a rectangular shape.

15. The connection terminal according to claim 7 or 8, wherein the coil spring is made of an insulating material,

or a conductive material applied with insulation.

16. A conductive connection terminal that is extensible and compressible in a longitudinal direction, comprising:

a first contact member including

a first tip portion configured to contact with an electrode of a contact target, and

a first base end portion including a plurality of branch portions extending in directions separating from each other with respect to the first tip portion;

a second contact member including

a second tip portion configured to contact with an electrode of a contact target, and

a second base end portion having a cylindrical shape and configured to contact with the branch portions, and

a coil spring configured to support the first contact member and the second contact member in an extensible and compressible manner along the longitudinal direction.

CLAIMS

1. A conductive connection terminal that is extensible and compressible in a longitudinal direction, comprising:

a first contact member including

a first tip portion configured to contact with one electrode of a contact target, and

a first base end portion;

a second contact member including

a second tip portion configured to contact with another electrode of the contact target, and

a plurality of tongue parts configured to contact with the first base end portion;

an elastic member configured to extend and compress the first contact member and the second contact member in the longitudinal direction; and

a load applying unit configured to apply a load to the tongue parts in a direction bringing the tongue parts into contact with an outer circumference of the first base end portion.

2. The connection terminal according to claim 1, wherein the elastic member and the load applying unit are provided as a same member.

3. The connection terminal according to claim 2, wherein the elastic member and the load applying unit are provided as one coil spring that is made from a winding of a wire.

4. The connection terminal according to claim 1, wherein the load applying unit is a tightening member that is any one of a coil spring, a C ring, an O ring, and a cylindrical shaped member that applies a load to the tongue parts in the direction bringing the tongue parts into

contact with the outer circumference of the first base end portion.

5. The connection terminal according to any one of claims 1 to 3, wherein

each of the tongue parts is divided by a slit extending from an end of the tongue part toward the second tip portion in an axial direction of the second contact member, and

the slit extends at least to a position of the tongue part at which the load is applied.

6. The connection terminal according to any one of claims 1 to 3, wherein

each of the tongue parts is divided by a slit extending from an end of the tongue part toward the second tip portion in an axial direction of the second contact member, and

the slit extends beyond a position of the tongue part at which the load is applied.

7. The connection terminal according to any one of claims 1 to 6, wherein at least one of the first contact member and the second contact member has a plate-shape.

8. The connection terminal according to any one of claims 1 to 7, wherein the first contact member, the second contact member, the elastic member and the load applying unit are coaxially positioned along a same axis.

9. A connection terminal comprising:

a first contact member configured to contact with one of two contact targets;

a second contact member configured to contact with another one of the two contact targets; and

a coil spring through which a part of the first contact member and a part of the second contact member are inserted, and is configured to press the first contact member and the second contact member in an axial direction, wherein

the first contact member includes a first tip portion and a first base end portion, and

the second contact member includes a second tip portion, and a tongue part with an inner circumference configured to contact with an outer circumference of the first base end portion.

10. The connection terminal according to claim 9, wherein a curvature radius of at least a tip side of the tongue part is smaller than a radius of the first base end portion when the first base end portion and the tongue part are not in contact.

11. The connection terminal according to claim 10, wherein the tongue part is configured to elastically contact with the first base end portion.

12. The connection terminal according to claim 9, wherein a surface of the tongue part contacting with the first base end portion has a shape following an outer circumferential surface of the first base end portion.