high-voltage coil and the winding body and is wrapped around two ends of the winding body, and the high-voltage insulating layer is injection-molded silicone rubber.

[0020] In an embodiment, the injection-molded silicone rubber is high-temperature vulcanized silicone rubber or liquid silicone rubber for injection.

[0021] In an embodiment, the high-voltage coil includes a plurality of coil sections, the wire is wound in the winding grooves to cause the plurality of coil sections to be spaced apart along an axial direction of the high-voltage winding, and at least one of the coil sections is arranged between two adjacent comb teeth on the winding plate.

[0022] In an embodiment, each of the coil sections is reciprocally wound in layers along the axial direction of the high-voltage winding and is densely arranged on an outer peripheral surface of the winding body.

[0023] In an embodiment, the coil section is provided with at least one interlayer insulating layer along the axial direction of the high-voltage winding, and the interlayer insulating layer is an insulating long strip with wavy edges.

[0024] According to another aspect of the present disclosure, a dry-type transformer is provided, the dry-type transformer includes: a core, a low-voltage winding, and the high-voltage winding according to any one of the foregoing embodiments, the low-voltage winding is sleeved outside the core, and the high-voltage winding is sleeved outside the low-voltage winding.

[0025] In an embodiment, the core is provided with four core clamps at an outer side of the core, and the core clamps are made of fiber-reinforced composite materials.

[0026] In an embodiment, the core clamps are compression-molded or pultruded from fiber materials impregnated with epoxy resin.

[0027] In an embodiment, the low-voltage winding includes a copper coil and a low-voltage insulating layer, the copper coil and the low-voltage insulating layer are alternately arranged.

[0028] In an embodiment, the low-voltage insulating layer is made of a SHS-P diphenyl ether prepreg material or a silicone rubber film.

[0029] In an embodiment, the low-voltage winding is provided with at least one heat dissipation air duct, and the heat dissipation air duct is located between the copper coil and

process, which has a fast molding-speed, high production efficiency, no cracks and air gaps, and small partial discharge of the dry-type transformer 10. Moreover, since it is a silicone rubber elastomer, after assembly, elastic vibration reduction can be realized at parts where the high-voltage winding 130 is connected to various components, which greatly reduces noise during the operation of the dry-type transformer 10. In an example that the high-voltage insulating layer 1330 is made of high-temperature vulcanized silicone rubber, firstly, the wire is wound on the winding body 1310 to form the high-voltage coil 1320, the winding body 1310 and the high-voltage coil 1320 are used as a to-be-injected body, and the to-be-injected body is put into a mold of an injection molding machine; and by adding silicone rubber raw materials, the high-temperature vulcanized silicone rubber is integrally injected around a periphery of the to-be-injected body to obtain the high-voltage winding 130. The high-voltage insulating layer 1330 is made of the high-temperature vulcanized silicone rubber, which improves insulation and mechanical properties of the high-voltage winding 130.

[0105] The high-temperature vulcanized silicone rubber according to the embodiment of the present disclosure is a high-temperature vulcanized silicone rubber material system, specifically including raw rubber, reinforcing agent, flame retardant, heat resistant agent, and other auxiliary materials.

[0106] After the high-temperature vulcanized silicone rubber is wrapped around the high-voltage coil 1320 and the winding body 1310 by integral vacuum injection, the high-temperature vulcanized silicone rubber fills the gaps between the high-voltage coil 1320 and the winding body 1310 and is wrapped around the two ends of the winding body 1310, and the high-temperature vulcanized silicone rubber is not wrapped around an inner wall of the supporting barrel 1311, so that the high-voltage winding 130 is in the shape of a hollow column as a whole. Alternatively, the high-voltage winding 130 may be a hollow cylinder, a hollow elliptical column, or other hollow columns.

[0107] Prior to the integral injection of the high-temperature vulcanized silicone rubber, the six taps are connected by arranging a tooling connector 101 to avoid that the six taps are also wrapped with the silicone rubber during the injection and cannot be used for wiring. As shown in FIG. 14, the tooling connector 101 is an aluminum alloy sheet. A

component high-temperature resistant epoxy adhesive, which may also be other adhesives, but there is a need to ensured that the adhesive enables a firm bonding between the winding plate 7311 and the auxiliary member 7312. Besides, the adhesive is required to be high-temperature resistant, so as to adapt to the wrapping of the high-voltage insulating layer around the winding plate 7311 and the auxiliary member 7312 by high-temperature injection.

[0128] In other embodiments, the slot may also be arranged on side faces of the winding plate close to the auxiliary member, and the auxiliary member is clamped in the slot of the winding plate, so that the winding plate is fixedly connected to the auxiliary member. Preferably, as in the foregoing embodiment, the auxiliary member 7312 is provided with the third slot 73121, which prevents weakening of the mechanical strength of the winding plate due to the arrangement of the slot on the winding plate.

[0129] Still referring to FIG. 24, the winding plate 7311 is a comb-tooth plate 7311. The winding plate 7311 is similar to the foregoing winding plate 1313 in structure, and a difference is that each end of the winding plate 7311 is provided with a flow groove 73111, which allows injected silicone rubber raw materials to flow from an end portion of the winding portion 7310 into an inner side of the winding portion 7310 during injection molding of the high-voltage insulating layer, and then causes the high-voltage insulating layer to fully fill a gap between the winding portion 7310 and the high-voltage coil and to be wrapped around two ends of the winding portion 7310.

[0130] The winding plate 7311 and the auxiliary member 7312 are both made of glass fibers impregnated with epoxy resin. Several layers of glass fiber cloth impregnated with epoxy resin are superimposed to a certain thickness, and molded and cured to form glass steel. In this embodiment, the winding plate 7311 and the auxiliary member 7312 are separately formed and then bonded and fixed. In other embodiments, the winding plate and the auxiliary member may also be integrally formed.

[0131] In another embodiment, referring to FIGS. 26 and 27, a high-voltage winding 830 includes a winding portion 8312, a high-voltage coil 8320, and a high-voltage insulating layer 8330. The winding portion 8312 is arranged circumferentially inside the high-voltage winding 830, and a wire is wound on an outer side of the winding portion

Claims

1. A winding body for a high-voltage winding, comprising:

a plurality of winding plates, each of the winding plates being provided with a plurality of winding grooves to form a plurality of comb teeth on the winding plate; and

at least one auxiliary member, the auxiliary member being ring-shaped, the winding plates being arranged along a circumferential direction of the auxiliary member, and the auxiliary member being fixedly connected to the winding plates.

2. The winding body according to claim 1,

wherein a height of the comb tooth along a length direction of the winding plate is defined as a tooth height, and tooth heights of the comb teeth in the middle of the winding plate and tooth heights of the comb teeth at two ends of the winding plate are both greater than tooth heights of the comb teeth in other parts of the winding plate.

3. The winding body according to claim 1,

wherein the winding body further comprises a supporting barrel, the supporting barrel being a hollow column, the winding plates are circumferentially evenly distributed on an outer peripheral surface of the supporting barrel, and a length direction of each of the winding plates is arranged along an axial direction of the supporting barrel.

4. The winding body according to claim 2,

wherein a first high comb-tooth region, a first low comb-tooth region, a second high comb-tooth region, a second low comb-tooth region, and a third high comb-tooth region are sequentially formed on the winding plate from an end of the winding plate to the other end of the winding plate in the length direction of the winding plate, the first high comb-tooth region and the third high comb-tooth region are arranged symmetrically with respect to the second

high comb-tooth region, and the first low comb-tooth region and the second low comb-tooth region are arranged symmetrically with respect to the second high comb-tooth region.

5. The winding body according to claim 3,

wherein the auxiliary member is located on the outer peripheral surface of the supporting barrel, and the auxiliary member extends outward along a radial direction of the supporting barrel and surrounds the supporting barrel to form a ring-shaped.

6. The winding body according to claim 1,

wherein the plurality of winding plates or the auxiliary member is provided with a slot, and the winding plates and the auxiliary member are clamped and connected through the slot.

7. The winding body according to claim 1,

wherein the auxiliary member comprises a middle auxiliary member, and the middle auxiliary member is arranged on inner walls of the winding plates.

8. The winding body according to claim 1,

wherein the auxiliary member comprises an end-portion auxiliary member, and the end-portion auxiliary member is arranged on an outer side of an end portion of the winding plate.

9. The winding body according to claim 1,

wherein the winding body is made of a fiber-reinforced composite material.

10. The winding body according to claim 1,

wherein a plurality of auxiliary members is provided, the auxiliary members are spaced apart in an axial direction of the auxiliary member.

11. A high-voltage winding, comprising: the winding body according to claim 1; a high-voltage coil; and a high-voltage insulating layer,

wherein a wire is wound on the winding body to form the high-voltage coil, and the high-voltage coil is wholly wrapped with the high-voltage insulating layer.

12. The high-voltage winding according to claim 11,

wherein the wire comprises a first wire and a second wire, the first wire is wound from an end of the winding body to a middle of the winding body along a length direction of the winding plate, and the second wire is wound from the middle of the winding body to the other end of the winding body along the length direction of the winding plate.

13. The high-voltage winding according to claim 11,

wherein the high-voltage insulating layer fills a gap between the high-voltage coil and the winding body and is wrapped around two ends of the winding body, and the high-voltage insulating layer is injection-molded silicone rubber.

14. The high-voltage winding according to claim 13,

wherein the injection-molded silicone rubber is high-temperature vulcanized silicone rubber or liquid silicone rubber for injection.

15. The high-voltage winding according to claim 11,

wherein the high-voltage coil comprises a plurality of coil sections, the wire is wound in the winding grooves to cause the plurality of coil sections to be spaced apart along an axial direction of the high-voltage winding, and at least one of the coil sections is arranged between two adjacent comb teeth on the winding plate.

16. The high-voltage winding according to claim 15,

wherein each of the coil sections is reciprocally wound in layers along the axial direction of the high-voltage winding and is densely arranged on an outer peripheral surface of the winding body.

17. A dry-type transformer, comprising a core, a low-voltage winding, and the high-voltage winding according to claim 12, the low-voltage winding being sleeved outside the core, and the high-voltage winding being sleeved outside the low-voltage winding.

18. The dry-type transformer according to claim 17,

wherein the core is provided with four core clamps at an outer side of the core, and the core clamps are made of fiber-reinforced composite materials.

19. The dry-type transformer according to claim 18,

wherein the core clamps are compression-molded or pultruded from fiber materials impregnated with epoxy resin.

20. The dry-type transformer according to claim 17,

wherein the low-voltage winding comprises a copper coil and a low-voltage insulating layer, and the copper coil and the low-voltage insulating layer are alternately arranged, and the low-voltage insulating layer is made of a SHS-P diphenyl ether prepreg material or a silicone rubber film.