What is claimed is:

1. A crystal ingot growth method, comprising:

dipping a seed crystal into a silicon melt contained in a crucible in a single crystal furnace used for crystal ingot growth, to form a crystal ingot, and applying a horizontal magnetic field with a magnetic field strength of a first preset value; wherein, in an axial direction of the crystal ingot, a first distance between a maximum gauss plane of the horizontal magnetic field and a liquid surface of the silicon melt is less than a second preset value;

during a body process of the crystal ingot growth, applying a cusp magnetic field with a magnetic field strength of a third preset value; wherein a zero gauss plane of the cusp magnetic field is located at an R-arc part of the crucible.

2. The crystal ingot growth method according to claim 1, further comprising:

during a shoulder process of a growth of the crystal ingot that has completed a dip process and prior to entering the body process, increasing the strength of the horizontal magnetic field from the first preset value to a fourth preset value.

3. The crystal ingot growth method according to claim 2, further comprising: during a shoulder process of a growth of the crystal ingot that has completed a dip process, and when a diameter of the crystal ingot is greater than or equal to 80% of a target constant diameter length, increasing the strength of the horizontal magnetic field to the fourth preset value.

4. The crystal ingot growth method according to claim 2, wherein the applying a cusp magnetic field with a magnetic field strength of a third preset value, comprises:

simultaneously with applying the cusp magnetic field, increasing the strength of the horizontal magnetic field from the fourth preset value to a fifth preset value.

5. The crystal ingot growth method according to claim 4, wherein the first preset value is 1100 Gauss to 1300 Gauss, the fourth preset value is 1450 Gauss to 1550 Gauss, and the fifth preset value is 2100 Gauss to 2300 Gauss.

6. The crystal ingot growth method according to claim 1, wherein the third preset value is 1400 Gauss to 1600 Gauss.

7. The crystal ingot growth method according to claim 1, further comprising:

adjusting a position of the maximum Gauss plane to ensure that the first distance remains consistently less than the first preset value during the crystal ingot growth.

8. The crystal ingot growth method according to claim 1, further comprising:

adjusting a position of the zero Gauss plane to ensure that the position of the zero Gauss plane remains consistently located at the R-arc part of the crucible during the crystal ingot growth.

9. A crystal ingot growth apparatus for performing the crystal ingot growth method according to any one of claims 1 to 8, comprising:

a furnace body;

a crucible, located within the furnace body and containing a silicon melt;

a horizontal magnetic field generating structure arranged on a periphery of the furnace body and configured to output a horizontal magnetic field to the crucible;

a cusp magnetic field generating structure arranged on the periphery of the furnace body and configured to output a cusp magnetic field to the crucible; wherein the cusp magnetic field generating structure is located at a side of the horizontal magnetic field generating structure that is away from the top of the furnace body.

10. The crystal ingot growth apparatus according to claim 9, further comprising:

a first adjustment structure configured to control a movement of the horizontal magnetic field generating structure in an axial direction of the crystal ingot, enabling a distance between a maximum Gauss plane of the horizontal magnetic field and a liquid surface of the silicon melt to be less than a first preset value during the crystal ingot growth;

a second adjustment structure configured to control a movement of the cusp magnetic field generating structure in the axial direction of the crystal ingot, enabling a zero Gauss plane of the cusp magnetic field to be always at an R-arc part of the crucible during the crystal ingot growth.