WHAT IS CLAIMED IS:

1. A method of grinding a plate-shaped workpiece held on a holding surface of a chuck table with an annular array of grindstones, comprising:

an in-feed grinding step of

rotating the chuck table about a table rotational axis extending through a center of the holding surface that is holding the plate-shaped workpiece,

positioning the grindstones above holding surface such that lower surfaces of the grindstones will move across the center of the holding surface and rotating the grindstones about a grindstone rotational axis extending through the center of the annular array of the grindstones, and

moving the grindstones and the chuck table relatively to each other in directions perpendicular to the holding surface to grind a face side of the plate-shaped workpiece to a first target thickness, with the lower surfaces of the grindstones; and

a creep-feed grinding step of

positioning the lower surfaces of the grindstones used in the in-feed grinding step at a position outward of an outer peripheral edge of the plate-shaped workpiece, and lower than the face side of the plate-shaped workpiece by a distance equal to a difference between the first target thickness and a

second target thickness, after the in-feed grinding step,

stopping rotating the chuck table, and

moving the plate-shaped workpiece and the grindstones relatively to each other in directions parallel to the holding surface to grind the face side of the plate-shaped workpiece to the second target thickness, with side surfaces of the rotating grindstones.

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

a pre-creep-feed grinding step to be carried out before the in-feed grinding step, wherein

the pre-creep-feed grinding step includes

positioning the lower surfaces of the grindstones to be used in the in-feed grinding step at a position outward of the outer peripheral edge of the plate-shaped workpiece and lower than the face side of the plate-shaped workpiece, and

moving the plate-shaped workpiece and the grindstones relatively to each other in directions parallel to the holding surface to grind the face side of the plate-shaped workpiece with side surfaces of the rotating grindstones.

3. The method according to claim 1, further comprising:

a tilt changing step, to be carried out after the

in-feed grinding step but before a start of the creep-feed grinding step, of tilting the grindstone rotational axis of the grindstones with respect to the holding surface from vertical directions slightly along the direction in which the plate-shaped workpiece is moved with respect to the grindstones in the creep-feed grinding step.

4. The method according to claim 1, wherein

in the creep-feed grinding step, a controller finishes the creep-feed grinding step after confirming that a measured thickness of the plate-shaped workpiece has reached the second target thickness; and

if the measured thickness of the plate-shaped workpiece has not reached the second target thickness, the controller carries out the creep-feed grinding step again.

5. The method according to claim 3, wherein

in the pre-creep-feed grinding step, a plurality of creep-feed grinding sessions are performed;

a camera is controlled by a controller to capture an image of the face side of the plate-shaped workpiece to recognize a ratio at which silicon chips and electrodes have appeared on the face side of the plate-shaped workpiece; and

if the ratio recognized has reached a predetermined ratio, then the controller finishes the pre-creep-feed

grinding step.