thereof, in particular the resulting undulation of the sliced slices.

Object

The object of the present invention is to specify an apparatus and a method for simultaneously slicing a multiplicity of slices from a workpiece with which the rapid and high temperature fluctuations during the slicing lapping of the workpiece are compensated for as much as possible and deviations of the actual cut surface from that of an ideal cutting plane are avoided as much as possible.

The abrasive (slurry) is depleted in the slicing gap over the length of the engagement from wire entry to wire exit on account of displacement, dripping away and consumption and is distributed non-uniformly there. Its concentration and composition change over the length of wire engagement on account of grain wear and grain fracture. In particular, the decreasing quantity of abrasive from wire entry to wire exit leads to a decreasing width of the slicing gap and thus to a thickness of the sliced slices that increases in a wedge-shaped manner in the wire running direction.

The object furthermore consists in specifying an apparatus and a method which counteract depletion of the abrasive in the sawing gap over the wire engagement length, such that slices having a thickness that increases in the wire running direction do not arise.

Achievement

According to an embodiment of the invention, there is provided~~The object is achieved by means of~~ an apparatus for simultaneously slicing a multiplicity of slices from a workpiece, comprising wire, at least two cylindrical wire guide rolls arranged horizontally and parallel with respect to one another and mounted rotatably about their respective axes and

having grooves, and a feed device, wherein the wire is guided in the grooves around the wire guide rolls such that a horizontal web composed of a multiplicity of wire sections running parallel to one another and in one plane is present between the wire guide rolls, furthermore comprising first nozzles, which are arranged above the wire guide rolls, for spraying an abrasive onto the wire sections and second nozzles, which are arranged below the web parallel to the axes of the wire guide rolls, for spraying a coolant into slicing gaps of the workpiece from the side and from below.

According to an aspect of the invention, there is provided~~The object is also achieved by means of~~ a method for simultaneously slicing a multiplicity of slices from a workpiece, comprising holding the workpiece with an axis of the workpiece parallel to axes of wire guide rolls of a wire saw by means of a feed device of the wire saw; moving the workpiece by means of the feed device perpendicularly from above through the web of the wire saw, wherein the web is formed from a multiplicity of wire sections running parallel to one another and in one plane; supplying a slurry of hard substances in a carrier liquid as abrasive to the wire sections while the wire sections describe a relative movement with respect to the workpiece as a result of rotation of the wire guide rolls with a continual change in the direction of rotation, which relative movement guides the wire sections from an entry side to an exit side through the workpiece; spraying a coolant from the side and from below into slicing gaps that arise during the movement of the workpiece through the web, wherein the coolant is sprayed through nozzles into the slicing gaps, which are arranged below the web parallel to the axes of the wire guide rolls, and wherein the coolant is sprayed into the slicing gaps only through the nozzle situated opposite the entry side of the wire sections.

Claims:

~~1. An apparatus for simultaneously slicing a multiplicity of slices from a workpiece, comprising wire, at least two cylindrical wire guide rolls arranged horizontally and parallel with respect to one another and mounted rotatably about their respective axes and having grooves, and a feed device, wherein the wire is guided in the grooves around the wire guide rolls such that a horizontal web composed of a multiplicity of wire sections running parallel to one another and in one plane is present between the wire guide rolls, furthermore comprising first nozzles, which are arranged above the wire guide rolls, for spraying an abrasive onto the wire sections and second nozzles, which are arranged below the web parallel to the axes of the wire guide rolls, for spraying a coolant into slicing gaps of the workpiece from the side and from below.~~

~~21~~. A method for simultaneously slicing a multiplicity of slices from a workpiece, comprising

holding the workpiece with an axis of the workpiece parallel to axes of wire guide rolls of a wire saw by means of a feed device of the wire saw;

moving the workpiece by means of the feed device perpendicularly from above through a web of the wire saw, wherein the web is formed from a multiplicity of wire sections running parallel to one another and in one plane;

supplying a slurry of hard substances in a carrier liquid as abrasive to the wire sections while the wire sections describe a relative movement with respect to the workpiece as a result of rotation of the wire guide rolls with a continual change in the direction of rotation, which relative movement guides the wire sections from an entry side to an exit side through the workpiece;

spraying a coolant from the side and from below into slicing gaps that arise during the movement of the workpiece through

the web, wherein the coolant is sprayed through nozzles into the slicing gaps, which are arranged below the web parallel to the axes of the wire guide rolls, and wherein the coolant is sprayed into the slicing gaps only through the nozzle situated opposite the entry side of the wire sections.

~~3~~2. The method as claimed in claim ~~2~~1, wherein a further slurry of hard substances in a carrier liquid is used as the coolant.

~~4~~3. The method as claimed in claim ~~3~~2, wherein the abrasive used and the coolant used have identical properties with the exception of the temperature.

~~5~~4. The method as claimed in claim ~~2~~1 or claim ~~3~~2, wherein the abrasive used and the coolant used have the same temperature.

~~6~~5. The method as claimed in claim ~~2~~1 or claim ~~3~~2, wherein the abrasive used and the coolant used have different temperatures.

~~7~~6. The method as claimed in claim ~~2~~1 or claim ~~3~~2, wherein the temperature of the coolant is altered during the movement of the workpiece through the web.

~~8~~7. The method as claimed in claim ~~7~~6, wherein the temperature of the coolant is altered in a manner dependent on an engagement length of the wire sections in the workpiece.

~~9~~8. The method as claimed in claim ~~8~~7, wherein the temperature of the coolant is increased as the wire engagement length increases, and is reduced as the wire engagement length decreases.

~~10~~9. The method as claimed in any of claims ~~2~~1 to ~~9~~8, wherein a volumetric flow rate of the coolant sprayed in is kept constant during the movement of the workpiece through the web.

~~11~~10. The method as claimed in any of claims ~~2~~ 1 to ~~9~~8, wherein a volumetric flow rate of the coolant sprayed in is altered during the movement of the workpiece through the web.

~~12~~11. The method as claimed in claim ~~11~~10, wherein the volumetric flow rate of the coolant sprayed in is altered in a manner dependent on the wire engagement length in the workpiece.

~~13~~12. The method as claimed in claim ~~12~~11, wherein the volumetric flow rate of the coolant sprayed in is increased as the wire engagement length increases, and is reduced as the wire engagement length decreases.

~~14~~13. The method as claimed in any of claims ~~2~~ 1 to ~~13~~12, wherein a single crystal having a diameter of at least 450 mm is used as the workpiece.