# Claims

1. A grading discharge module, comprising a grading mesh plate and a grading wheel, wherein the grading mesh plate is sleeved outside the grading wheel;

   wherein the grading mesh plate has a cylinder structure, with a top cover arranged at a top end of the grading mesh plate and fixedly connected to a first rotating shaft; a cylinder wall of the grading mesh plate is provided with a plurality of first slits or holes; and the grading wheel has a cylinder structure, and the cylinder wall of the grading wheel is provided with a plurality of second slits or holes;

   wherein a width or diameter of the second slits or holes is increased from an inner side to an outer side of the cylinder wall.

2. The grading discharge module of claim 1, wherein the width or diameter of the second slits or holes at the inner side of the cylinder wall is 0.2-0.9 times that at the outer side of the cylinder wall.

3. The grading discharge module of claim 1, wherein a discharging outlet is arranged at a bottom of the grading wheel.

4. The grading discharge module of claim 1, wherein an area of the grading mesh plate where the first slits or holes are arranged is staggered from an area of the grading wheel where the second slits or holes are arranged in an axial direction.

5. The grading discharge module of claim 1, wherein the cylinder structure of the grading mesh plate comprises a feeding section of the grading mesh plate, a grading section of the grading mesh plate and a discharging section of the grading mesh plate, which are arranged from top to bottom sequentially, wherein the cylinder wall of the feeding section of the grading mesh plate and the cylinder wall of the discharging section of the grading mesh plate are provided with the first slits or holes, while the cylinder wall of the grading section of the grading mesh plate is not provided with the first slits or holes.

6. The grading discharge module of claim 5, wherein the grading wheel is divided into three sections from top to bottom, namely, an upper section of the grading wheel, a grading section and a lower section of the grading wheel; the cylinder wall of the upper section of the grading wheel and the cylinder wall of the lower section of the grading wheel are not provided with the second slits or holes, while the cylinder wall of the grading section is provided with the second slits or holes.

7. The grading discharge module of claim 5, wherein the three sections of the grading mesh plate correspond to the three sections of the grading wheel in the vertical direction respectively.

8. A continuous wet ball-milling separation device, comprising a cylinder, which comprises a feeding section, a shearing section and a crushing section arranged from top to bottom sequentially therein, and the grading discharge module of any of claims 1-7 is arranged inside the crushing section;

   the feeding section is located at an upper part of the ball-milling separation device;

   the feeding section is provided with a liquid inlet, a material inlet and a material distributor;

   the shearing section is located at a middle part of the ball-milling separation device and

provided with shearing blades therein; and

the crushing section is located at a lower part of the ball-milling separation device and provided with stirring rods and crushing balls therein, and the grading discharge module is arranged at a bottom of the crushing section.

9. The continuous wet ball-milling separation device of claim 8, wherein the ball-milling separation device has a cylinder structure.

10. The continuous wet ball-milling separation device of claim 8, wherein the liquid inlet and the material inlet are located in a top or upper cylinder wall of the ball-milling separation device, the material distributor is located inside the cylinder, and the material inlet is in communication with an inlet of the material distributor through a pipeline.

11. The continuous wet ball-milling separation device of claim 8, wherein a motor is arranged outside a top of the cylinder, and the first rotating shaft is arranged along a central axis of the cylinder structure of the ball-milling separation device and extends through the feeding section, the shearing section and the crushing section.

12. The continuous wet ball-milling separation device of claim 11, wherein the shearing blades and the stirring rods are evenly distributed on the first rotating shaft and fixedly connected to the first rotating shaft; the crushing balls are loaded in bulk in the crushing section, and the grading discharge module is located along the central axis of the crushing section.

13. The continuous wet ball-milling separation device of claim 11, wherein both the grading mesh plate and the grading wheel are coaxial with the first rotating shaft.

14. The continuous wet ball-milling separation device of claim 13, wherein a width or diameter of the first slits or holes is smaller than a diameter of the crushing balls.

15. The continuous wet ball-milling separation device of claim 13, wherein the grading mesh plate forms a rotating shaft of the crushing section, and the stirring rods are evenly distributed on the outer wall of the cylinder structure of the grading mesh plate.

16. The continuous wet ball-milling separation device of claim 12, wherein the discharging outlet serves as a second rotating shaft.

17. The continuous wet ball-milling separation device of claim 14, wherein the grading mesh plate and the grading wheel are driven by the first rotating shaft and a second rotating shaft to rotate respectively.

18. The continuous wet ball-milling separation device of claim 8, wherein a gap is formed between a lower edge of the discharging section of the grading mesh plate and a bottom plate of the device, and a height of the gap is smaller than a diameter of the crushing balls.

19. The continuous wet ball-milling separation device of claim 18, wherein the width or diameter of the slits or holes in the cylinder wall of the grading mesh plate is 0.5 - 0.8 times the diameter of the crushing balls.

20. A continuous wet ball-milling separation method utilizing the continuous wet ball-milling separation device of any of claims 8-19.

21. The continuous wet ball-milling separation method of claim 20, comprising the following steps:

(1) feeding a liquid continuously into the ball-milling separation device through the liquid inlet, controlling the liquid level in the ball-milling separation device, while discharging the liquid continuously from the ball-milling separation device through a discharging outlet;

(2) after the liquid level in the ball-milling separation device is controlled into a stable state, introducing a material into the material distributor through the material inlet and then into the ball-milling separation device, cooling or mixing the bulk material dispersed in the liquid, shearing the cooled or mixed bulk material in the shearing section of the ball-milling separation device, and milling the cooled or mixed bulk material in the crushing section of the ball-milling separation device;

(3) in the milling process of the material, screening a material powder in size smaller than a width or diameter of the first slits or holes of the grading mesh plate into the grading mesh plate through the mesh plate, controlling the material powder and liquid in a particle size smaller than a target particle size to enter the grading wheel through the second slits or holes, and discharging an obtained material from the ball-milling separation device through the discharging outlet under an action of a rotating grading of the grading wheel;

(4) in a grading process, throwing the material powder in a particle size greater than the target particle size out of the grading wheel under the action of rotation of the grading wheel, wherein the material powder thrown out of the grading wheel collides with an inner wall of the grading section of the grading mesh plate; and the material powder in the particle size greater than the target particle size is discharged under the action of gravity through the grading mesh plate to an interior of the ball-milling separation device for further ball-milling.