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Частина 2

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4. Improvement of the separation device of the bead mill

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Introduction. Innovative continuous bead mills needs the device for separating of suspension from the beads. The centrifugal bead separator is the most effective compared with a gap or cartridge separator.

Materials and methods. The design of a centrifugal separator for a bead mill and the justification of its operation were developed based on the analysis of samples of innovative equipment and the theory of sedimentation of suspension particles in a centrifugal field.

Results and discussion. The separator is made in the form of a wheel mounted on a hollow rotor of a bead mill. Windows are cut out on the outer cylindrical surface of the wheel, into which the suspension with grinded product or disrupted microorganisms enters and is discharged through the hollow rotor.

The rate of particle sedimentation in gravitational and centrifugal fields depends on the size – smaller particles settle more slowly. The diameter of the beads is 0.3–2 mm, and the suspension particles are less than 0.05 mm, so the beads under the action of centrifugal forces move to the walls of the bead mill at a speed much higher than the particles.

The operating condition of the centrifugal separator: the flow rate of the suspension must be selected so that the speed of its movement into the separator is greater than the speed of movement of the particles outward under the action of centrifugal forces. The beads under the action of centrifugal forces move outward faster than the suspension particles and are thrown out of the separator, and the particles together with the liquid are discharged through a hollow rotor. The design in which the separator receives movement from own drive is more rational, because it allows you to set the optimal grinding modes and separation of the beads.

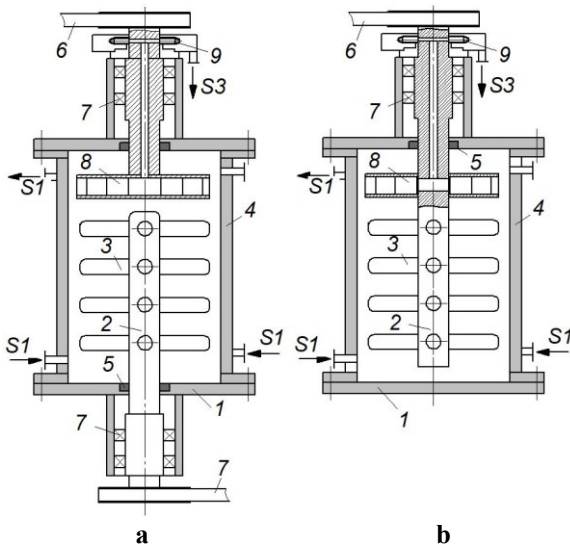


Fig. 1. Designs of working chambers of bead mills:

a – with a own drive of the centrifugal separator;

b – with a common drive of the rotor and centrifugal separator.

1 – cup;

2 – rotor;

3 – working elements (fingers or discs);

4 – cooling jacket;

5 – seal;

6 – drive;

7 – bearing assembly;

8 – centrifugal separator;

9 – suspension discharge device

Conclusion. The centrifugal separator of the bead mill allows for high-quality separation of the suspension from the beads, provided that the rotation speed is rationally chosen.