

Preparation enrichment process

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RESEARCH OF GRATING EFFICIENCY DEPENDENCE ON THE SIFTING SURFACE FORM

In order to justify the selection and use of arc surfaces screening was performed a series of experiments that revealed that the separation efficiency dribnofraktsiynyh materials arc surfaces higher than similar screening inclined surfaces. This suggests the feasibility of their application in industry.

One of ways of loose material division on fraction is the grating on devices with a curvilinear sifting surface. Widely applied in the industry trammels with curved sifting surfaces (arc, screw and others), differ by reliability, high efficiency and profitability.

The carried-out analysis of designs trammels with curvilinear sifting surfaces showed that arc trammels possess the best characteristics [1]. Such qualities trammels as design simplicity, reliability, high productivity, efficiency form the basis for their use at dry grating.

For the purpose of a preliminary dry grating process studying the special arc trammel stand (fig. 1) was developed and produced. The stand consists of the following basic elements: arc sifting surface which is fixed on the vertical strut, the feeding hopper from which the material moves along a directing surface on a sifting one. Adjustment of stream initial thickness is carried out by the gate which at the same time is carrying out deflector functions. Initial stream speed changes depending on installation height of the feeding hopper from 1 to 4 m/s. At stream division on a sifting surface, under grate product gathers in a receiving box cells corresponding to predetermined sites of the sifting surface.

For experiment materials there was taken anthracite with fraction 0-10 mm.

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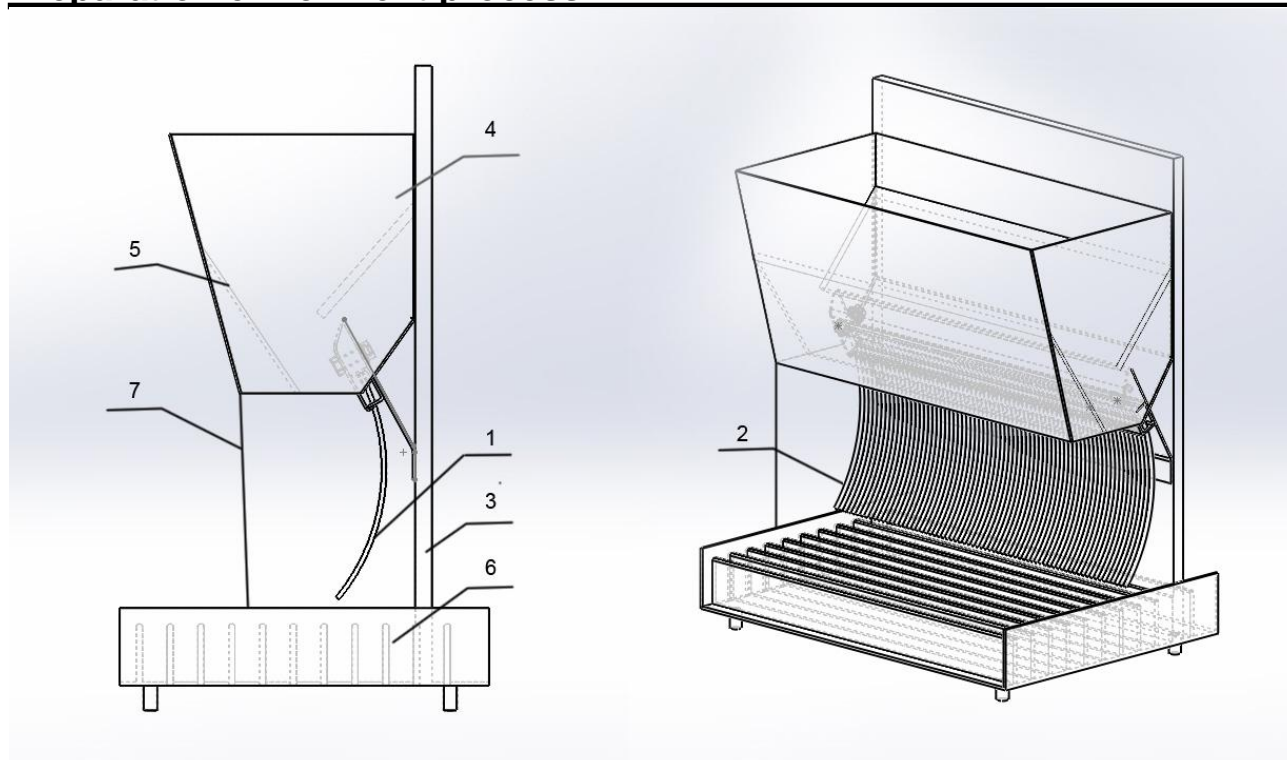


Fig. 1. Model of the experimental stand:

- 1 – arc sifting surface; 2 – special profile sifting surface;
- 3 – vertical plate on which sifting surface and the feeding bunker are fixed;
- 4 – feeding hopper; 5 – bumper surface; 6 – receiving box with cells; 7 – the lateral directing

There was accepted the following sequence of carrying out experimental studies. The fine fraction material with predefined fractional structure and weight was loaded into feeding hopper. Charging material humidity didn't exceed 2%. When sliding shutter opens, the material stream of the determined thickness loads a tray. Then the material moves along the tray on sifting surface 150 mm wide. Initial speed of material movement was defined depending on setting level height of the feeding hopper over a sifting surface. The material stream moving time on a sifting surface was measured by stop-watch. During moving on a sifting surface the material was sifted and got to cells with number corresponding to this site of the sifting surface. The under grate product passing by a sifting surface has got into the corresponding separate cell. Further by means of a standard sieving stack [2] it was carried out size grading of each cells separately, and the remains on each sieves were weighed. The fractional structure of a disseminated material is determined previously by a method of the screen fractionation by rules [2], and the hinge plate mass was defined depending on the maximum size of a material particle in an initial product. In every certain experiment according to screen fractionation data grating efficiency for each separate sifting surface site and for whole sifting surface in general was defined. The fraction with the particle sizes close to 10 mm was defined like boundary fraction. For carrying out a number of experiments the inclined sifting surface established at an angle of sixty degrees to the horizon was used. The received results were compared to test results on an arc sifting surface. For technological grating process assessment was allo-

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cated such a main technological index characterizing quality of a trammel work, as grating efficiency which is determined by a formula [3]:

$$E = \frac{(\alpha - \nu)(\beta - \alpha)}{(\beta - \nu)(100 - \alpha) \cdot \alpha} 10^4$$

where α – the maintenance of -10 mm class in an initial material, %;
 β – the maintenance of -10 mm class in an under grate product;
 ν – the maintenance of -10 mm class in an over grate product.

The anthracite distribution curve received as this research result is given in fig. 2, depending on type of a sifting surface.

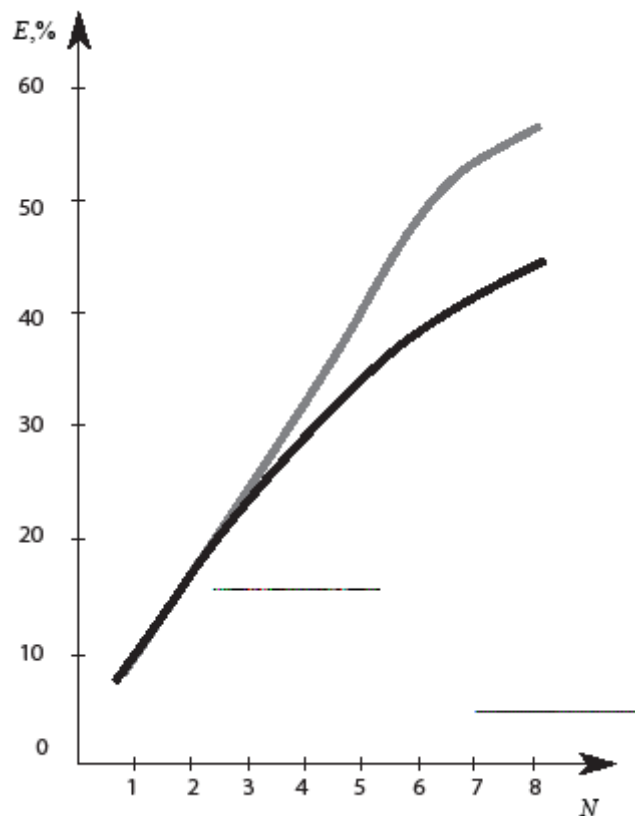


Fig. 2. Dependence of grating efficiency on a sifting surface length for fraction of 5-10 mm, where (-----) an inclined sifting surface, (----) a curvilinear sifting surface

The carried out experiments proved that efficiency of fine fraction material division on arc sifting surfaces is higher, than on similar inclined sifting surfaces that allowed making a conclusion on their industrial application expediency. Such arc trammel qualities as design simplicity, reliability, high productivity, efficiency form the basis for their dry grating use.

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