Technical science

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EFFECT OF VERTICAL SCREW LOAD CONDITIONS ON ITS EFFICIENCY

Loading is performed through vertical auger bottom of the window in the casing which is necessary to the transported material fed from the hopper at the screw spiral. Their size and location in the housing directly depends on the efficiency of the screw [1, p.52]. The study was carried out to prove the question experimentally. In the experiments, the screw has an outer diameter of 56 mm, 35 mm core diameter, the spiral winding pitch is 40 mm, the helix lead angle of 12 ° 42 '. The inner diameter of the casing was 58 mm, in the magnitude of the gap between the screw and the housing is equal to one millimeter. At the bottom of the casing, where the loading of the material on the screw was successively cut in the form of rectangular windows with a size of 30 mm in width and 40 mm in height, where the first one at an arbitrary position on the casing perimeter and then two are opposite to each other, then three 120 ° and four 90 ° (Fig. 1).

Figure 1 - Experimental short covers

For the assumed size of windows in the housing area the recesses had respectively 1200, 2400, 3600, 4800 mm2, and the ratio of this area in compare to the total area of the housing in the loading area will be equal to 0.17; 0.34; 0.51; 0.68. The mixed materials were used as millet and peas in the ratio 1: 1.

Increasing the height of cut is 40 mm, ie greater winding pitch spiral will lead to the fact that the material of the screw helix is ejected back into the hopper.

Before experiments, the material was poured into a feeder, and then it was switched to the work screw occurring within one minute of overload material feed zone in a volumetric capacity (Fig. 2), the number of the material in which the screw judged performance. Is very effective as screw rotation rate was 150, 200, 250, 300 min-1.

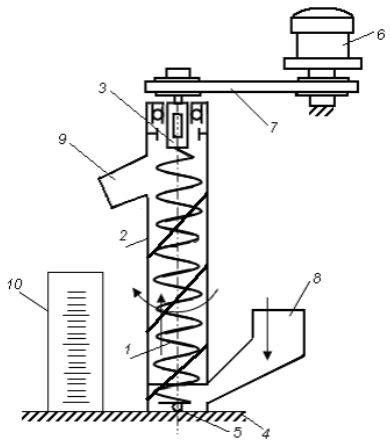

Figure 2 - Schematic of the experimental setup

1 - screw 2 - casing 3 - spindle,

4 - the base, 5 - ball bearing,

6 - motor, 7 - belt drive,

8 - loading device

The results of experiments to determine the performance or efficiency of the screw depends on the loading area in the housing windows shown in Fig. 3.

From the data presented in Fig. 3, we can see that for optimum performance of the screw is necessary if the ratio of the recesses in the housing area were not less than 50% of the total area of the housing of the screw feed zone.

Further increase of the ratio leads to no noticeable increase in the screw efficiency. This conclusion is confirmed by the results of experiments to determine the performance of a screw according to the frequency of rotation (fig. 4).

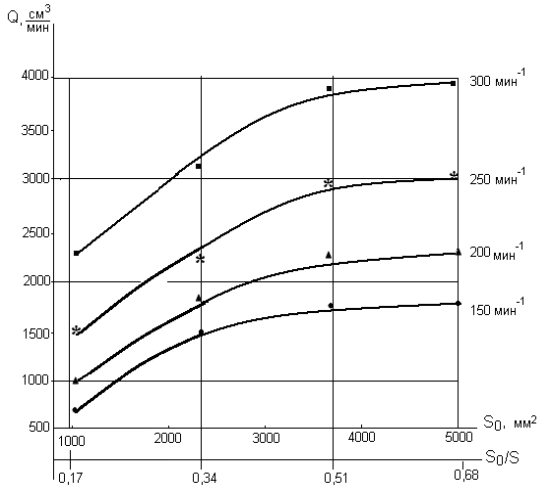

Figure 3 - Dependence
auger performance from boot
area of windows in the housing

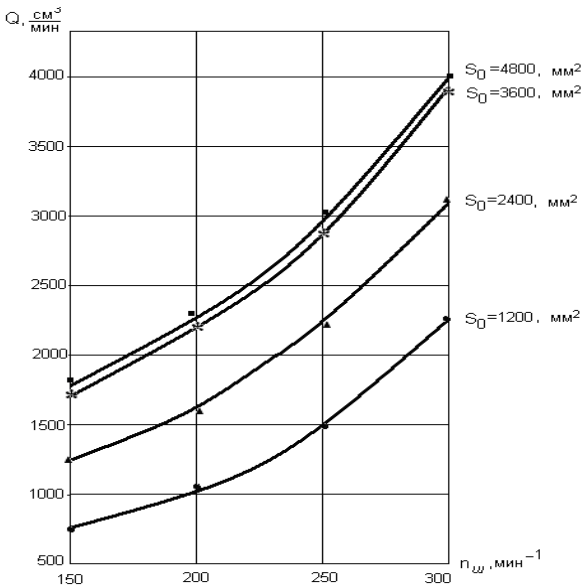

Figure 4 - Dependence performance screw from the frequency of its rotation

The data presented in Fig. 4 shows that with the increase of the screw speed its performance increases, and the shape of the curves is almost the same for all sizes made bootable windows. Noteworthy it is the fact that an increase from 1200 mm2 to

2400 mm2, ie 2 times, screw productivity grew by 1.7 times, while increasing the area of the boot windows 3600 mm2 to 4800 mm2, ie 1.33 times, screw productivity growth was 5.7%. To explain this result we can refer to the fact that at = 4800 mm2 screw with accepted design parameters can reach its maximum performance. When applied as a screw mixer of the working body, which is a cylindrical-conical hopper shaped we can use grip screw material in the conical part and therefore to eliminate dead zones and smooth receipt to the auger, it is necessary that the ratio was close to unity.

Practically it is necessary that the entire housing space in the loading zone of the screw is to be open except for those sections which serve as (Fig. 5) supports the housing on the lower part of the hopper, while the support may be in the form of cylindrical rods of small diameter. In this case, the materials will be mixed continuous flow supplied to the auger.

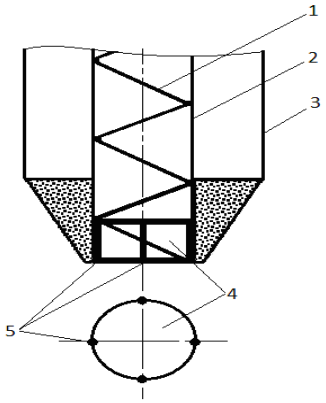

Figure 5 - Arrangement of loading windows in the casing screw mixer:

1 - screw the cover 2,

- bunker 3, 4 - boot windows,

5- support rods

List reference

1. Adigamov, KA Screw mixer bulk materials [Text]: // KA Adigamov, SS Petrenko // - Math. Universities North-Kavko. region. tehn. science. 2012, p. 52-53