

BUNKER DOZER DEVICE IMPROVEMENT OF PILE SEED TRANSMISSION SYSTEM

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Abstract

This paper presents improvements to the pile seed transmission system of a bunker dozer device, aiming to enhance its efficiency, reliability, and operational longevity. The proposed enhancements include the integration of an advanced conveyor system, the incorporation of state-of-the-art sensors, and the optimization of the auger design. Upgrading the conveyor system with durable, wear-resistant materials and implementing variable speed controls can provide precise seed flow management. Advanced sensors, such as optical, laser, and weight sensors, are proposed to monitor seed flow and detect blockages or irregularities in real-time. Additionally, optimizing the helix angle of the auger can significantly increase the efficiency of seed transportation. These improvements are expected to reduce maintenance requirements, increase operational efficiency, and ensure consistent seeding rates, thereby enhancing the overall performance of bunker dozer devices in agricultural and industrial applications.

Keywords : pneumo-mechanical, pile seed drill, medicated, seed comb, seed auger, hopper, productivity, BDOS, sorting.

Due to the climatic conditions of our country, mainly pile and hairless seeds are planted. Pile seed seed preparation technology consists of pneumo-mechanical cleaning and weight sorting of pile seed, sorting by geometric dimensions, treatment and packaging processes. In order to ensure the uninterrupted operation of this technological system and the completeness of treatment of treated pile seed at the standard level, bunker-doser devices are installed in the middle of the technological process of sorting and treatment [1].

The general view and scheme of the BDOS type hopper dosing device, which collects and distributes the seed in a technological system for the preparation of pile seed, is presented in Figure 1 below.

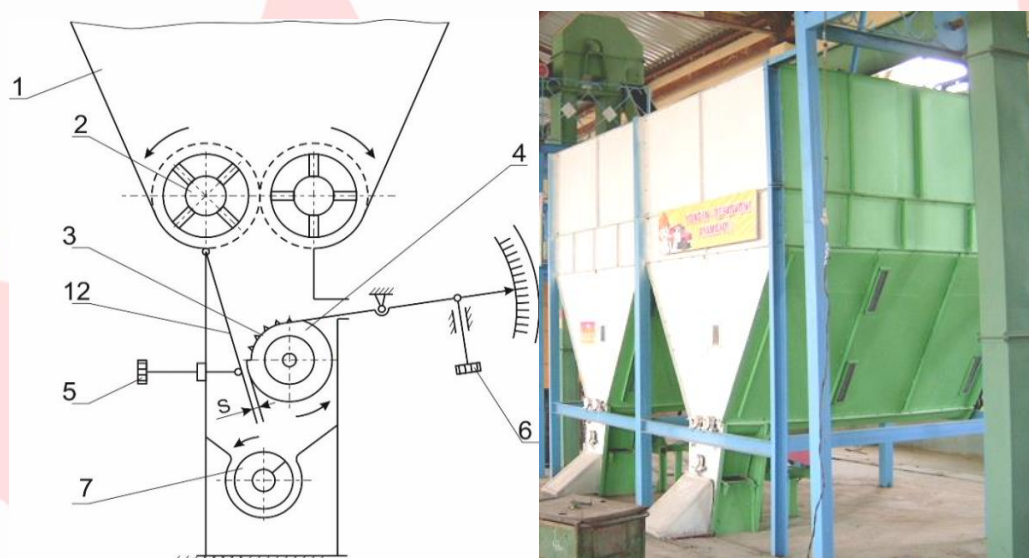


Figure 1. Schematic and overview of the bunker dispenser device

1- bunker; 2-screw-pin shaft; 3-seed comb; 4-saw disk;
5-movable wall adjustment mechanism; 6-seed comb adjustment mechanism; 7-pin auger.

The BDOS hopper-doser device is designed to temporarily collect pile seed with a hairiness of 8.0-9.0% and to supply it to production at a rate of up to 6 tons per hour [2].

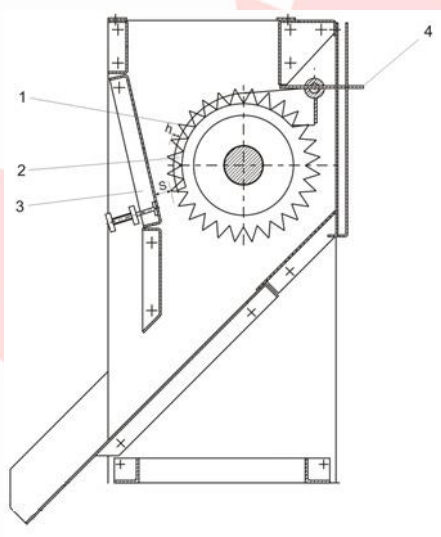
The scheme and overview of the bunker-doser is shown in Fig. 1. It includes combined shafts 2 that rotate in opposite directions at the bottom, a seed collecting hopper 1 and a dispenser 6 located under it. Each 2- and 3-shaft screw bearing has 4 parts and 5 parts with studs. The dispenser consists of a saw cylinder 4 and a comb 3. With the help of screw supports, the seed is delivered to the last part of the hopper, where it is transferred to the saw cylinder with the help of piles. Here, the seed is pulled down by saw teeth and transferred to the next technological process according to the movement of the seed.

The adjustment of the seed transfer efficiency is carried out with the doser in two modes, i.e. coarse and fine mode, respectively, using the screw mechanism 5, which sets the slot "S"

between the saw cylinder and the movable wall, and the screw mechanism 6, which provides adjustment of the height of the saw leaving the comb.

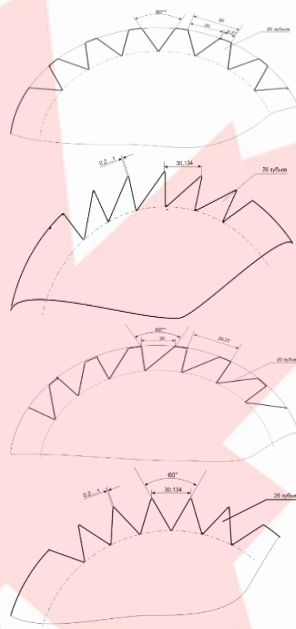
When studying the processes of technological equipment in seed preparation workshops, it was found that blockages are observed in the dispenser part of this device. It was concluded that the main reason for this is the bending of the seed combs and the low efficiency of the saw disc tooth profile, due to the fact that seeds fall into the dispenser in the free state, in addition to the seed that is transferred from the hopper to the saw cylinder by the auger-pile shaft.

In order to eliminate the above-mentioned shortcomings, in order to determine the optimal dimensions of the profile of the teeth of the saw cylinder of the hopper dispenser, the laboratory stand of the hopper-doser was developed and prepared in the "RIM Workshop" LLC of the joint-stock company system of the "Pakhtasanoat Scientific Center" (Fig. 2).



1-saw disc; 2-seed comb; 3-variable wall; 4th seed comb adjustment mechanism

a)



b)



c)

a-dispenser device scheme; b-options of the tooth profile for the saw cylinder of the dosing device; v- overview of the dispenser device.

Figure 2. General view of the dispenser stand

The following main questions are asked in the pilot tests conducted to determine the optimal dimensions of the bunker dispenser device:

- ensuring that the dosing device works without clogging;
- study of accurate dosage of pile seeds;
- to study the smooth adjustment of the device's performance;
- to ensure uniform transfer of pile seed from the device.

Currently, the preparation of the working drawings of sawing discs of the above-mentioned profile has been completed, and the preparation and assembly of sawing cylinders of four different profiles is underway.

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