SEED TREATMENT EQUIPMENT AND THEIR ANALYSIS

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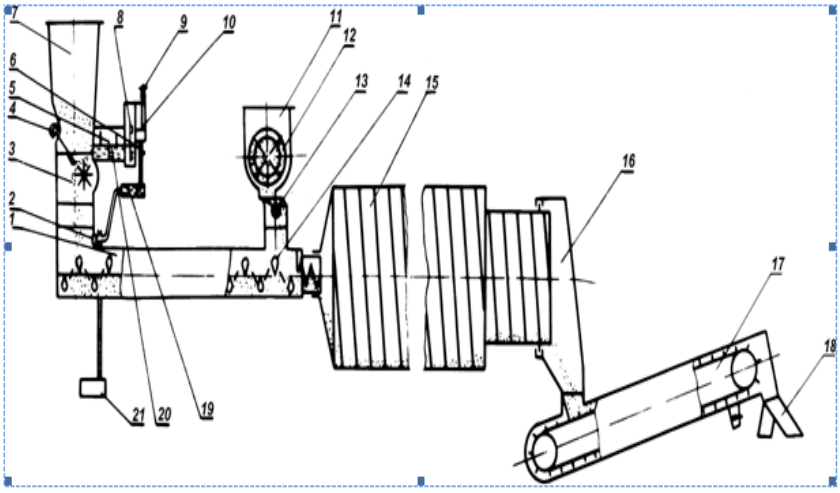
Abstract

The quality of the prepared seed is of great importance in increasing cotton yield. Before sowing, seed treatment with chemical preparations against diseases and pests should be carried out in accordance with established regulatory and standard requirements.

Currently, machines and units of various designs have been developed for the effective and high-quality treatment of seed. These machines should meet the requirements of uniform distribution of the drug on the surface of the seed while preserving the natural properties of the seed and resource-saving.

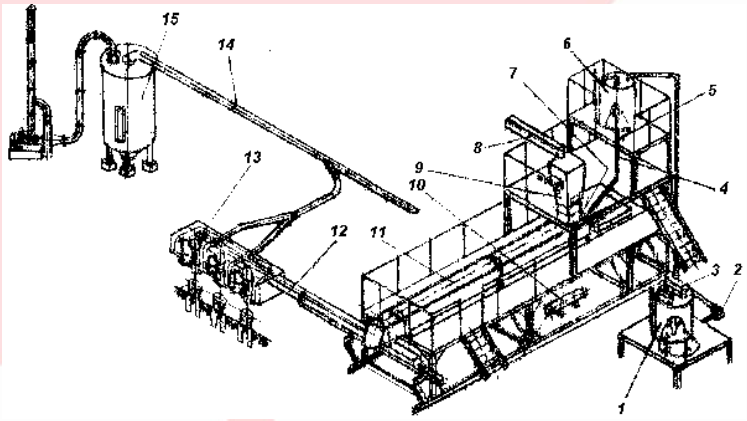
The 2-OSH and SP-3M drug applicators, which were prepared by hand in the mechanical workshops of cotton ginning enterprises, are intended for moistening the seed, sprinkling and mixing the drug in powder form, and the use of the drug has been reduced due to the harmful effects of the spread of drug dust on the environment and human health during work [1, 2].

Based on the fact that the use of dissolved suspensions of the drug has a low harmful effect on human health and the environment, a UOHS-6 type drug dispenser with a drug powder dissolution system was developed. The main disadvantages of this dosing equipment are that the mixer is screw-type, that is, the completeness of dosing is not ensured in a screw mixer, and the mechanical damage to the treated seeds is relatively high. The technological process of the Y-shaped and “vibrating barrel” mixers manufactured in foreign countries is not continuous. Therefore, their productivity in seed treatment is very low.



1-screw; 2-sprayer (nozzle), 3-seed feeder; 4-barrier; 5-glue or water tank; 6-liquid dispenser; 7-seed hopper; 8-buckets; 9-electromagnetic valve; 10-permanent surface pocket; 11-drug hopper; 12-mixer; 13-drug dispenser; 14-screw pusher; 15-drum; 16-chamber; 17-conveyor; 18-spindle; 19-vessel; 20-mixer; 21-compressor.

Figure 1. General view of the seed treatment device of type 2-OSX



1-suspension preparation tank; 2-pump; 3-poison (drug) bag discharge device; 4-liquid (suspension) dispenser; 5-electromagnetic valve; 6-consumption tank; 7-sprayer; 8-screw; 9-seed dispenser; 10-compressor; 11-mixing screw; 12-removal conveyor; 13-seed bag placement device; 14-aspiration system pipe; 15-wet air purification device.

Figure 2. Overview of the UOSX-6 seed treatment device

The advantage of the I-JS-8/L seed treatment machine of the Yubus company, which is currently in use, is that the seed treatment process is continuous, the mechanical damage to the seed is reduced compared to the screw mixer, the treatment efficiency is increased to 4000 kg/h, which is up to the requirements of seed processing workshops, but the disadvantage is that the mixing efficiency of the treated hairy seed is low, and it does not meet the requirements

for completeness of treatment. The working principle of the seed dispenser of this I-JS-8/L hairy seed treatment machine is to throw the seed in portions and transfer the suspension in proportion to its amount.

The extended suspension is sprayed onto the hairy seeds thrown into the sieve, and when the seeds fall into the mixing drum due to rapid absorption at the place of spraying, the uniformity of the seeds is disturbed. It was concluded that the only solution to this problem can be eliminated by spraying the working suspension according to the amount of seeds falling from the dosing sieve during continuous feeding of seeds, and scientists of the Cotton Industry Scientific Center developed a dosing machine with a device that adjusts the standard flow rate of the drug liquid to the productivity of the seed dosing unit [3, 4].

The structural structure of the dosing machine is shown in Figure 3, and the machine consists of a frame 1, a hopper 2, a seed dosing unit 3, a vibrating sieve with an adjusting mechanism 4, a nozzle 5, a crane 6, a stabilizer 7, a mixing device 8, a suspension feeding tank 9 and a suspension preparation tank 10.

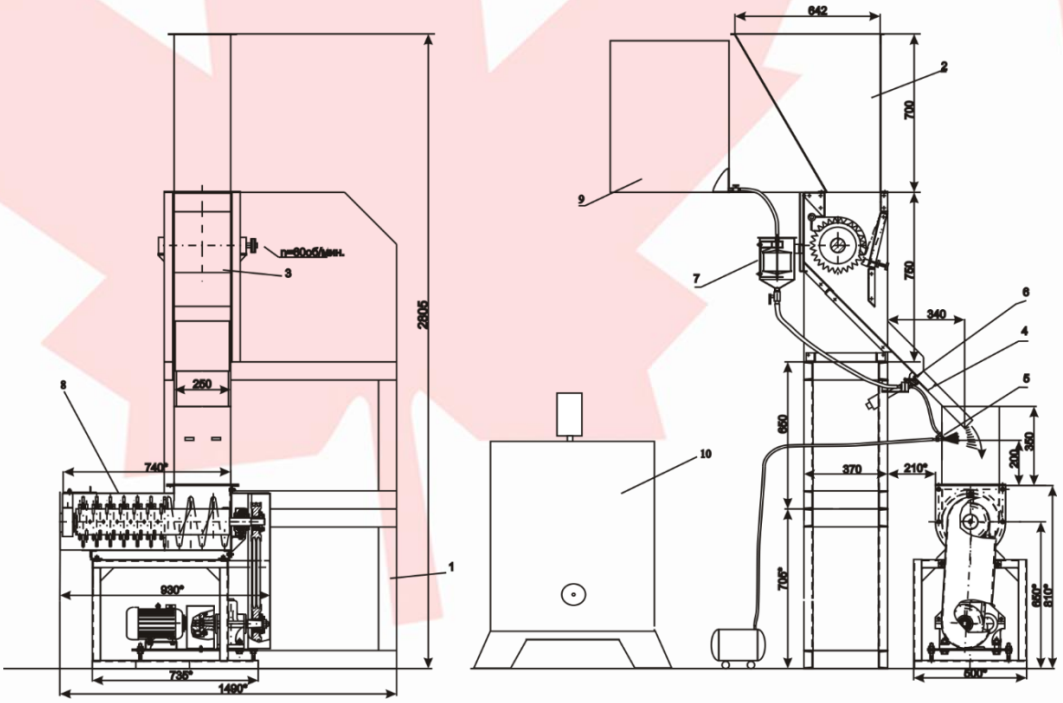


Figure 3. Hairy seed treatment machine

The device works as follows: The grain is transferred to the hopper of the seed treatment machine 2 through the elevator. From the hopper, the seed is transferred to the hopper 4 through the seed dispenser 3. The seed dispenser consists of a star-shaped cylinder, a regulating wall 5 and a grating comb regulating mechanism 10. The weight of the seed passing through the hopper 7 presses the hopper, and the pressed hopper opens the valve 6, and thus the suspension passes. A stabilizing device 3 is installed to maintain the same liquid pressure when

the level of the transferred suspension changes in the tank 2. The stabilizing device consists of a filter that opens and closes the hole in the suspension supply pipe. When the valve 6 is opened, the suspension is sprayed onto the seeds through two nozzles 8 installed at the bottom of the hopper 7. The seeds fall into the auger-shear mixing drum, where the drug suspension is quickly mixed before it is absorbed into the body of the hairy seeds. The mixed seeds fall into the six-sided "Yubus" drum, where they are additionally mixed and packed into paper bags using a measuring and packaging device.

The developed hairy seed treatment machine with a mechanism for adjusting the drug suspension to the seed doser's productivity has achieved an increase in the completeness of seed treatment to 90%.

While continuing scientific research, it was set a goal to increase the completeness of treatment to 90-95% by using the drug suspension at the specified rate, i.e., 25-30 liters per 1 ton of hairy seeds. It is known that since the residual moisture content of hairy seeds is 8-9%, it is important to increase the activity of the mixing drum to evenly distribute the drug suspension over the surface of the seeds. As a result of the analysis of scientific and technical solutions carried out in the direction of improving the mixing drum, a scheme of a new design of the mixing drum was developed and an application for a patent was submitted to the Intellectual Property Agency.

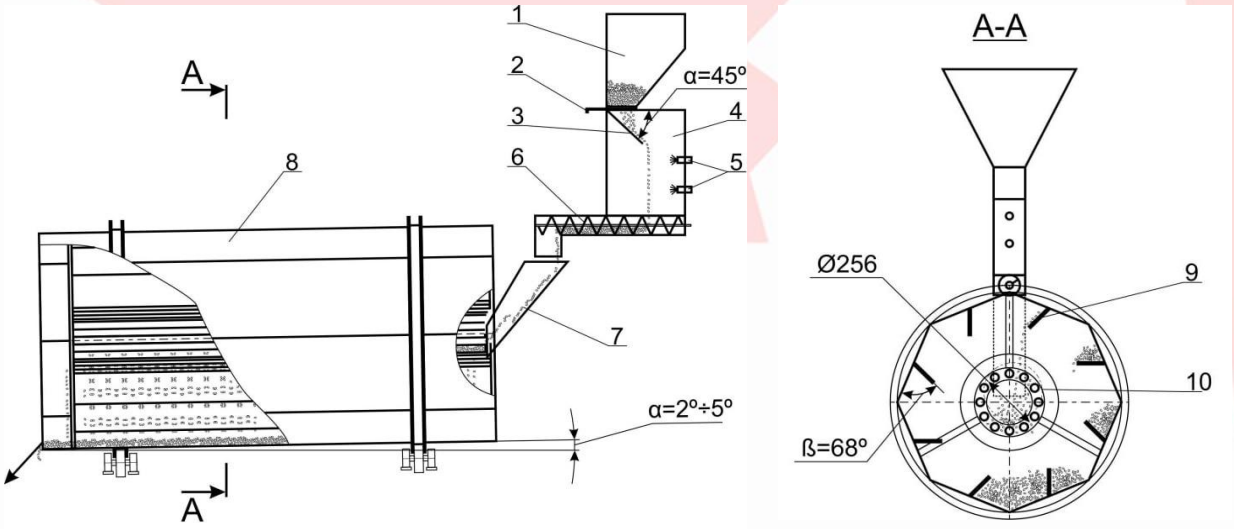


Figure 4. Feather seed with improved mixing drum seed treatment equipment

The advantage of the developed spraying equipment is that it improves the efficiency of the spraying process of hairy seeds by increasing the intensity of the movement of the mixed seeds inside the drum. To achieve this task, the mixing working body is made in the form of an octagonal cylinder and slats are installed on its inner wall at an angle of β = 68°. In the center

of the drum, 12 pipes with a diameter of 240 mm and a diameter of Ø32 mm are placed around the circumference (Fig. 4). Currently, working drawings of the developed octagonal spraying drum have been prepared. Research work is ongoing to produce an experimental sample of the spraying drum, as well as to substantiate the main parameters of the round pipes installed inside the drum.

References

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