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REVIEW OF RESEARCH ON CLEANING OF RAW COTTON FROM SMALL WEED IMPURITIES

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Abstract
This paper studies the technological scheme of the drying system used for the removal of fine residues in the cotton cleaning process, the principle of its operation and efficiency. The process of sequential cleaning of cotton raw material in two cleaning sections consisting of saw drums and grids is analyzed. At the same time, new designs of this device are proposed.

Keywords: technological scheme, drying system, cotton raw material, mechanical impact, saw cylinder.

The reforms implemented during the years of independence by the Government of the Republic of Uzbekistan allowed to significantly improve the quality of cotton fiber and increase the profitability of the cotton industry, but the technology of raw cotton cleaning has not undergone significant changes for several decades.
The removal of fine weed impurities from raw cotton is an important technological process in the primary treatment of raw cotton, which has a significant impact on subsequent processes such as ginning and fiber ginning. In case of poor quality cleaning of fine weed impurities, they turn from passive weeds into active ones, which in turn complicates the fiber ginning process.
In fine sap cleaners for separation of fine weed impurities from raw cotton, devices consisting of stake drums (or stake screws) working in combination with mesh surfaces or grates are used.
Fine sap cleaners are axial and direct-acting, depending on the way of impact of the working bodies on the processed raw cotton. In cleaners of axial method of action raw cotton is fed from one narrow section of the machine and moving along the entire length of the working body (auger), due to repeated impact on it, the process

of moving along the axis of the working body, cleaning and unloading in the final section of the machine.

In direct-acting raw cotton cleaners the raw cotton is fed into the working zone along its entire length simultaneously and is moved in a plane perpendicular to the longitudinal axis of the drums. At the same time, the raw cotton to be cleaned is subjected to a single impact by the same working elements (pick drum).

An example of fine sorghum cleaners of axial action is the screw fine sorghum cleaner 6A-12M. (Fig.1), previously widely used for cleaning raw cotton from small weed impurities in the cleaning shops of cotton mills. It is characterized by a high cleaning effect, very simple in its design and reliable in operation. The disadvantage of this cleaning machine is the repeated rotational impact on raw cotton, which leads to fiber burning, and further to the appearance of defects in the fiber.

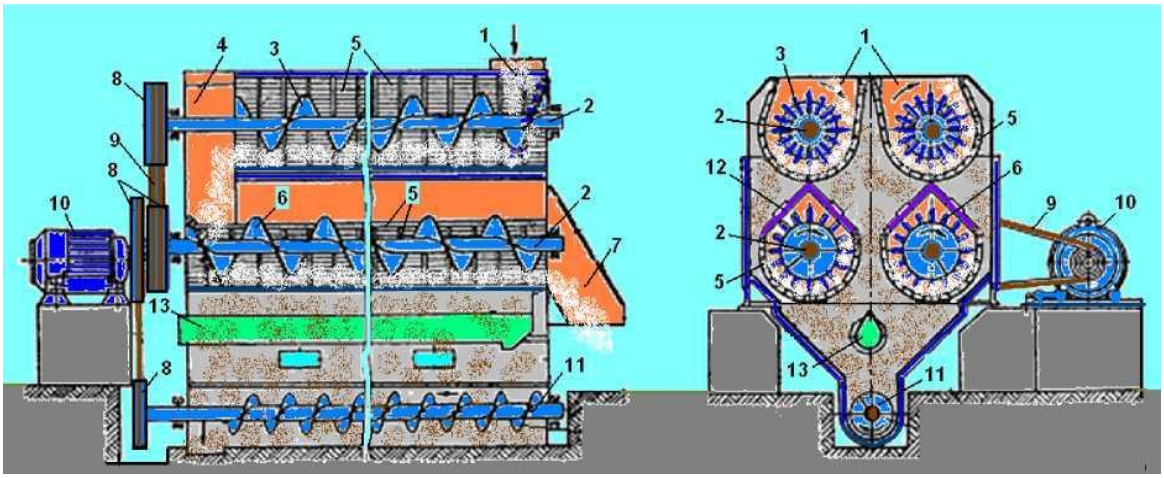

Fig.1. Technological scheme of screw cleaner 6A-12M

Where, 1. Mine; 2. Screw shaft; 3. Upper auger; 4. Connecting shaft; 5. Spike (mesh) surface; 6. Lower auger; 7. Unloading holes (chutes); 8. Pulleys; 9. V-belt; 10. Electric motor; 11. Grinding auger; 12. Inclined plane; 13. Pipeline for dusty air suction.

Each raw cotton lobule is in the machine for an average of 30-35 seconds. During this time, it is repeatedly exposed to the auger stakes. All weed that has fallen through the perforated nets is transported through the sloping walls of the weed hopper into the weed auger and out of the machine.

Technologically all models of fine picking cleaners work identically, at influence of ripping cleaning drums, lobes and bales of raw cotton are repeatedly exposed to blows against the mesh surface, thus there is a preliminary loosening of raw cotton, thus creating conditions for separation of weed impurities, which are gradually sifted and removed through the holes of the mesh surface. For cleaning of raw cotton of manual and machine picking from small weed impurities with humidity not more than 14%, in the cleaning shops installed cleaning machines direct flow method of action mark 1HK or SCh-02. These cotton cleaning machines are also used as part of flow lines in the cleaning and drying and cleaning shops of cotton cleaning plants (Fig.2). With a cleaning effect of 45-50%, the 1HK cleaner has an installed power of 12 kWt and a mass of 3100 kg.

Cleaner of raw cotton from fine debris СЧ-02 (Fig.1.18) is installed in flow lines of raw cotton processing in cleaning shops of cotton ginning plants. The technological scheme of the cleaner SCh-02 is identical to the cleaners of 1XK brand.

The disadvantage of these cleaning machines is their high metal intensity and high damage to raw cotton during cleaning due to the horizontal arrangement of the stake sections.

In direct-flow cleaners, the ripping drum can be staked, slatted, toothed, stakedslatted, and the sub-drum screens can be woven with cells 10x10 mm, stamped with oval holes 6x30 mm, or 6x50 mm, stamped with round holes with a diameter of 10 mm to create the necessary area of the living section of the grid.

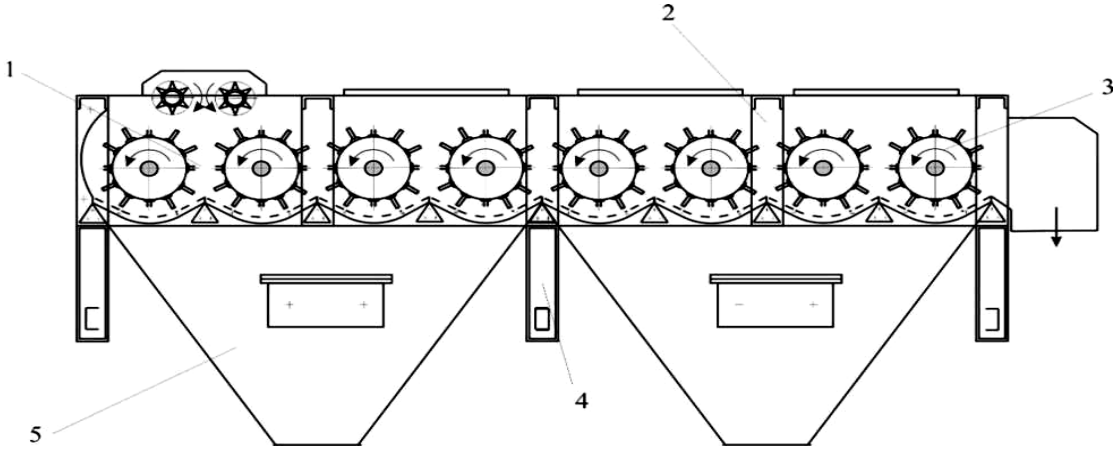

Fig.2. General view and schematic diagram of the 1XK fine scum cleaner

The study found that along with the design of the drum, the cleaning effect is influenced by the design of the mesh surface. In cotton mills, perforated sub-drum mesh is used on fine sorghum cleaners. In modern designs of fine sorghum cleaners are used stamped mesh surfaces with the size of holes 5x50 mm and the location of the large axis of holes perpendicular to the movement of cotton in the cleaner.

REFERENCES

1. Tillaev M.T., Babadzhanov M.A., Gappapova M.A. Methodological manual on "Technology and equipment of preliminary processing of cotton". Tashkent. "TTESI". 2011 (in Uzbek)
2. Phengsavan T. Increase of efficiency of saw gin feeder. PhD Thesis. TITLP, Tashkent, 1991, 174 pp.
3. Obidov A.A., Khudayberdiev N.B., Akhmadalieva D.A. Analysis of new scientific and technological research in the process of cleaning cotton from impurities. NamMQI scientific and technical conference, 2023, pp. 245-251 (in Uzbek).
4. Khudaiberdiev N.B., Akhmadalieva D. Analysis of the scientific research conducted in the process of cleaning cotton from various impurities. NamTSI Science and Technology Journal. 2023. 1(1): 57-61.
5. Sh. Korabayev, J. Soloxiddinov, N. Odilkhonova, R. Rakhimov, A. Jabborov, A.Qosimov. A study of cotton fiber movement in pneumomechanical spinning machine adapter. E3S Web of Conferences. 2024. 538: 04009
6. R.G. Rakhimov. Clean the cotton from small impurities and establish optimal parameters. The Peerian Journal. 2023. 17: 57-63.
7. R.G. Rakhimov. The advantages of innovative and pedagogical approaches in the education system. Scientific-technical journal of NamIET. 2020. 5(3): 292-296
8. R.G. Rakhimov. Raw cotton cleaner from small debris. Scientific Journal of Mechanics and Technology. 2023 2(5): 293-297 (in Russian)
9. Malkov E.B. Test results of roller gins with a needle drum and a serrated cylinder with a new mesh profile. Cotton Industry. 1976, 4 : 16-17.