

IMPROVING THE EFFICIENCY OF THE TECHNOLOGY OF CLEANING SEED COTTON FROM LARGE IMPURITIES

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Abstract

One of the main economic efficiency of the new UXK machine for cleaning seeded cotton from small and large impurities, which is described in this article, is the reduction of electricity consumption and the level of damage to seeded cotton. Mainly, instead of the mesh surface on the lower part of the first pile drum of the UXK working part, the columns moving through the belt transmission were used, that is, the column under the pile drum also moves together.

Keywords: Saw drum, colosnik grid, supply drum, fixed brush, brush drum.

Introduction

Taking into account that the main cotton raw materials grown in our republic correspond to high varieties, and they contain 8-9% moisture, they are dried using cold air or are not passed through drying drums at all. When moisture is 9-10%, raw cotton is processed in drying drums to remove 1-2% moisture. Cotton drying with this method is very expensive. Currently, cotton drying in this way does not meet the requirements for production. Therefore, it is urgent to carry out the process of drying cotton raw materials with such humidity in other ways.

At present, in the drying and cleaning departments of cotton ginning enterprises, "Flow direction" equipment complexes are used, and it is considered the only convenient and modern technology for cleaning seed cotton from dirty impurities. In fact, the "flow direction" equipment complex consists of several sections of the "UXK" model, and the use of auxiliary means: transportation, transfer and collection of raw materials, transport is completely canceled. Therefore, it reduces the types of forces that negatively affect the physical and technological properties of seed cotton. This, in turn, makes it possible to maintain the quality of

the fiber, which is the main product of the cotton gin, and to reduce the injury or crushing of the seed.

UXK aggregate sections can be of three types: UXK.01-initial section, UXK.02-middle section, UXK.03-last section.

They differ from each other: in the UXK.01 section, supply rollers are installed, while in the UXK.03 section, a closed bar is installed at the point where the cleaned cotton exits the machine.

Section UXK.02 is adapted to connect additional sections from both sides, and the number of sections in the unit can be increased or decreased due to this middle section. When cleaning selective varieties of cotton that are difficult to clean, the number of sections in the unit is increased to 6-7. For example: KOGT-complex is used for these hard-to-clean cotton varieties.

Picking seeded cotton with a machine increases the amount of impurities in it. It should also be taken into account that in the USA, about 30% of cotton is picked with high contamination - 45%.

This made it necessary to improve the technique and technology of cleaning seed cotton before ginning. Mainly, individual structural elements of working bodies and machines, as well as the placement of cleaners in the general technological process, are being modernized.

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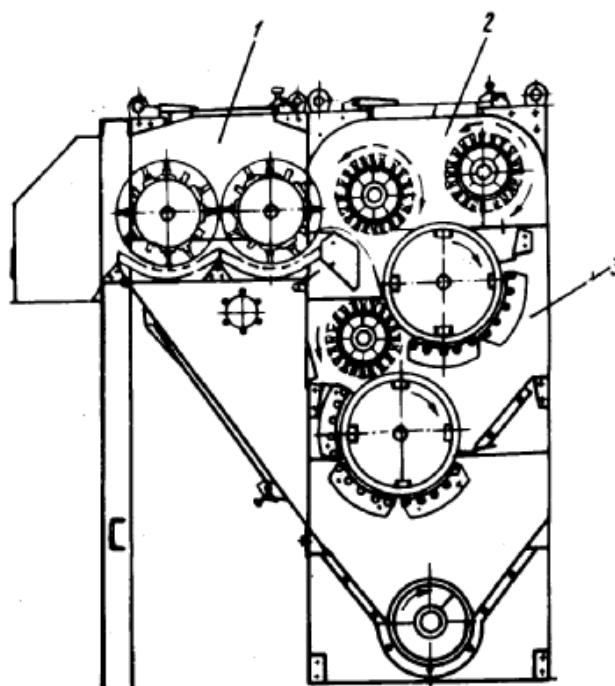


Figure 1 Technological diagram of the last section of the UXK.03 unit.

1-piled block part; 2-brush block part; 3-sawed section part;
4-screw conveyor (auger); 5. Cotton seed with cleaned seed.

The process of cleaning seed cotton involves cleaning from small impurities after drying, and then cleaning from large impurities. Pile drum cleaners are used for cleaning small dirt, and saw drum cleaners for large dirt.

Table 1. Technical characteristics of the UXK cleaner

Productivity, t/h	5-7
Decontamination effect, %	95
Distance between pile drum and mesh, mm	12...14
The distance between the saw drum and the brush, mm	0-2
The distance between the saw drum and the colossus, mm	12...14
Frequency of rotation of the supply drum, min ⁻¹	14
Saw drum rotation frequency, min ⁻¹	300
Rotational frequency of pile drum, min ⁻¹	480
Brush drum rotation frequency, min ⁻¹	945

Taking into account that mechanical cleaning causes fiber and fiber damage, great attention is paid to choosing the optimal number of seed cotton and fiber cleaning (the number of cleaning refers to the number of saw drums participating in the cleaning of seed cotton).

At the factories of "Platt-Lyummus", "Hardwick-Etter" and "Murray" companies, the maximum number of sawing of seed cotton is 3. Only the Continental/Moss-Gordin company uses four-fold sawing.

As for pile drum cleaners, according to American experts, the optimal number of working bodies is 12-14 drums, and an increase of more than this will not increase the cleaning efficiency. In this case, the pile drum cleaner, which is the first cleaner in the technological chain, has no more than 7 drums.

"Platt-Lummus" and "Hardwick-Etter" companies installed 20 pile drums in the technological process of cleaning, "Continental/Moss-Gordin" company installed 21, and "Murray" company installed 12.

This can be explained as follows. Graphs of dependence of fiber classes (varieties) and yarn appearance changes in the processing of manually and machine-picked seed cotton on the number of cleaning drums were obtained by American experts. The class (type) of fiber increases significantly when the number of cleaning drums increases from 1 to 7; When increasing from 7 to 20, the intensity decreases, but at a high level. Further increase in the number of drums does not lead to improvement of fiber quality.

At the same time, with the increase in the number of cleaning drums, the quality of the thread deteriorates as a result of the negative effect of the mechanical processing of the fiber. For machine-harvested ginned cotton, the deterioration of the appearance of the fiber will not be noticeable if the number of cleaning drums used does not exceed 13. As the number of cleaning drums increases, the appearance of the fiber deteriorates.

Experts recommend the optimal number of drums to be 13. But, taking into account the peculiarity of fiber quality assessment in America, that is, it is evaluated based on its appearance, companies are increasing the number of cleaning drums until the appearance of the fiber improves.

The technological process of processing seeded cotton is filled with working bodies to the maximum, and at the same time, companies are trying to reduce mechanical effects in the processes as much as possible by rational placement of

cleaners and reducing the number of transport devices. Due to the original design of the drum dryer of the company "Murray", the cleaning of seed cotton is carried out along with drying, without introducing special cleaning working bodies into the dryer.

Some companies use pile-drum cleaners for industrial pneumatic transport as separators. Seed cotton is removed from the separator through a vacuum valve. Due to the special configuration of the inlet diffuser and its location in the cleaner, uniform distribution along the length of the seeded cotton cleaning drum and passage of processed air through the cotton is achieved. Thus, the cleaning of seed cotton and its transportation are carried out at the same time.

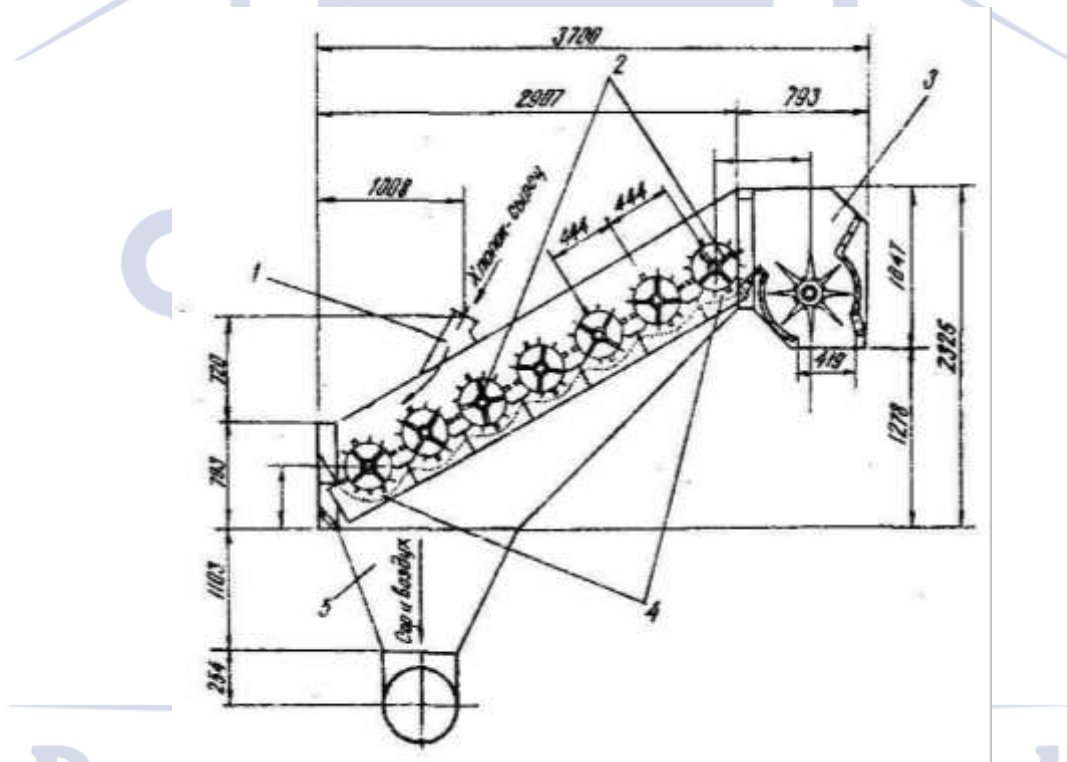


Figure 2. A seven-drum separator-cleaner of the "Continental/Moss-Gordin" company.

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Table 2.

Indicator	Firms			
	"Platt-Lummus"	"Continental/Moss-Gordin"	Hardwick-Etter	"Murray"
Number of pile drums	6.	7	7	7
Diameter, mm	356	279	419	406
Rotational speed, rpm	500	400	400	470
Bubble surface	Colossal fence	Disc drums	Woven netting	Colossal fence
Productivity, t/h	9	7	18	13

One of the main economic efficiency of the new UXK machine for cleaning seeded cotton from small and large impurities, which is described in this article, is the reduction of electricity consumption and the level of damage to seeded cotton. In this case, instead of the mesh surface on the lower part of the first pile drum of the UXK working part, the columns moving through the belt transmission were used, that is, the column under the pile drum also moves together. Because this drum with a saw performs the task of separating the seeded cotton, which is part of large impurities, which causes damage to the cotton. (Figure 3). Offer In the UHK, the cotton passes through a drum with piles and hits the sintering columns, and small impurities in the cotton, which have not been separated, are cleaned of impurities in the process of passing over the surface of the moving column, and the impurities fall into the dirt pipe between the columns.

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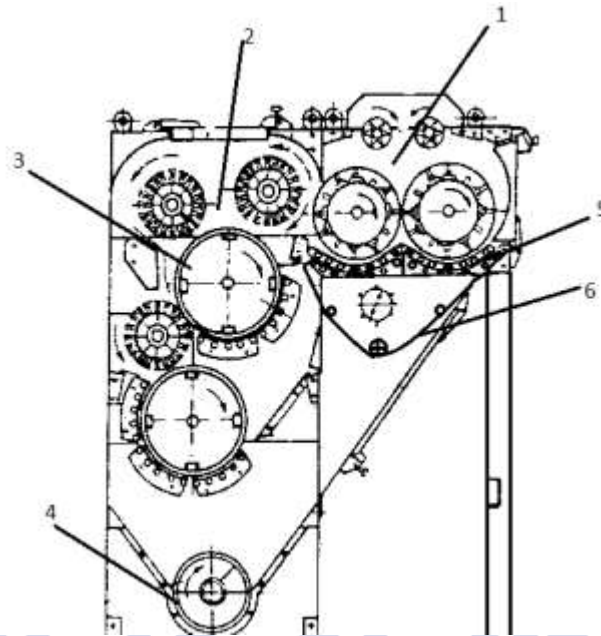


Figure 4. Technological scheme of improved UXK.agregti.
*1-Pile block part, 2-Brush block part, 3-Saw section part,
4-screw conveyor (auger), 5-moving columns, 6-belt drive .*

Another advantage is that the mineral compounds contained in cotton get stuck in the holes of the mesh surface or cause the surface of the holes to expand over time. As a result, it is expected to increase the productivity of the UXK unit, because the movement speed of the drum with piles and moving colosniks, in turn, serves to clean the cotton quickly and efficiently, at the same time, the natural properties of the fiber and seed are preserved.

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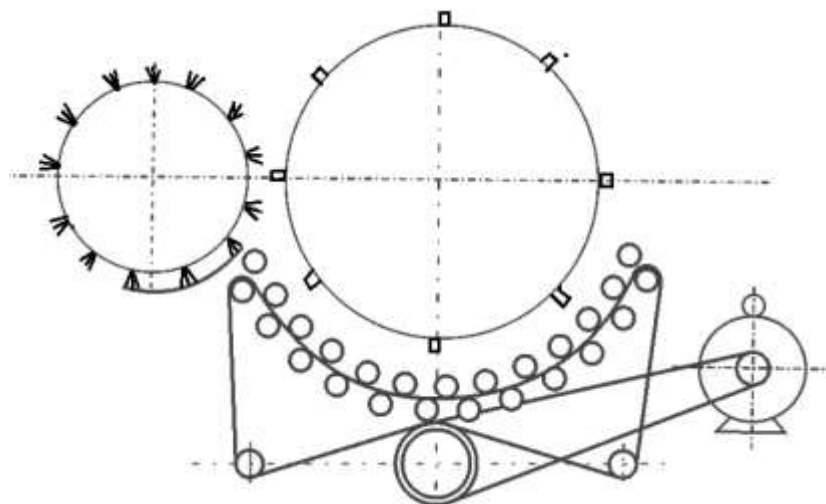


Figure 5. Main view of the proposed device

Conclusion

Offer in the UHK, the cotton passes through a drum with piles and hits the sintering columns, and small impurities in the cotton, which have not been separated, are cleaned of impurities in the process of passing over the surface of the moving column, and the impurities fall into the dirt pipe between the columns.

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