

DEVELOPMENT OF A NEW SEED COTTON REGENERATOR

R.A. Gulyaev, P.N. Borodin, E.B. Kurbanbaev

Joint Stock Company "Pakhtasanoat Ilmiy Markazi" (Scientific Research Center of Cotton Industry), Tashkent, Uzbekistan

A.E. Lugachev, Sh.Sh. Khakimov

Tashkent institute of textile and light industry, Tashkent, Uzbekistan

ABSTRACT

The content of seed cotton flyings in the wastes depending from the moisture and trash content of the seed cotton to be cleaned, as well as from the degree of wear of the doffing brushes, teeth of saw channel cylinders, heel brushes and the size of the gaps between the saw channel cylinder and grid bar. The average content of flyings in the wastes is 1-2% from cleaned seed cotton. Content of seed cotton in the wastes increases while cleaning seed cotton with high moisture and trash content.

INTRODUCTION

The high level of competition on the world cotton market, the emergence of a modern, technologically advanced and high-speed textile machinery, the need for high quality and competitive textile products leads to a tightening of requirements for the quality of cotton fiber. In this regard, the enhancement of primary processing of seed cotton and the improvement of consumer properties of cotton fiber is the most actual problem. Improvement of the quality characteristics of the cotton fiber, reduction of production costs of seed cotton processing is being provided due to the measures taken to optimize production processes, introduction of the new effective technological devices [1].

Regenerators RX (1RX), which were developed in Uzbekistan in the early 80s of the last century to extract flyings from the wastes of cleaners, were used to prevent the losses of seed cotton with wastes and were included in the pneumatic transport system of the PLPH production lines and worked under vacuum. The wastes of the cleaners contained mainly large trash and flyings of seed cotton. With this waste composition, the regenerator RX provided reliable operation with a capacity up to 1 ton/h, its regenerative effect was 95% and the cleaning efficiency, depending on the contamination of the wastes, reached 80%.

In the 90s of the last century, instead of the production lines of the PLPH type, cotton ginneries were equipped with cotton-cleaning aggregates UHK, consisting of sections where the separated fine and large trash particles fall into the common bunker and are withdrawn from it by a screw. Due to the combination of fine and large trash, the load on the regenerators increased by 2-3 times, and under the influence of the screw, fine trash particles began to penetrate into the flyings of seed cotton and become difficult to remove. As a result of this, the cleaning effect of the regenerators of RX has decreased to 50%, and the contamination of regenerated flyings during the cleaning of seed cotton of hard-to-clean varieties has reached 70%. Consequently, when they were mixed with seed cotton, the quality of the produced fiber began to decrease by one or two classes.

A promising solution to the problem is the development of a new complex of equipment with a separate withdrawal of fine and large trash particles. Currently, it is advisable to develop a new more efficient regenerator of seed cotton from wastes.

RESULTS AND DISCUSSION

The work of the new seed cotton regenerator (Fig. 1) from cleaner's wastes will be carried out as follows. The air outlet created by the fan through the condenser or separator through a pipe (not shown in the figure) connected to the outlet branch pipe 17 extends through the channel formed by trays 18, 19 and 20 and also by parts of the upper cover 11 and the front sidewall 12 (hereinafter referred to as the channel), distributed in the case of the regenerator and in the tube connected to the inlet branch pipe 16 (not shown in the figure), into the open end of which the external air is sucked in.

From the branch pipe 16, air and the wastes, transported through the inlet hole 14, enters to the channel and are affected by the barrel 1 which rotates in the same direction with the saw cylinders 2 and 3 (in the counter clockwise direction). The barrel 1 loosens the incoming wastes and throws them on saw cylinder 2, the teeth of which grab the seed cotton flyings in the waste, and also transfer the entire mass of waste to the grid bar zone 4 and 6. The seed cotton flyings are fixed to the saw teeth of the cylinder 2 with fixing bars 4, the gaps between them are smaller than the linear dimensions of the flyings, which prevents them from separating from the saw teeth, and then, in collisions with the bar 6, they are cleaned from the trashed impurities adhering to them. The free trash particles are separated from the saw cylinder 2 under the action of centrifugal forces and are released through the gaps between the bars 6.

Partially cleaned regenerated seed cotton flyings and remaining impurities on the saw cylinder after passing through the bar zone 6 are removed from it by a paddle-wheel cylinder 8 and are thrown into the channel in which air moves from the inlet 14 to the outlet 15 hole and under the influence of the barrel 1 axially, that is, along a helix. Thus, the barrel 1 prevents the direct movement of air from the inlet 14 to the outlet hole 15 and therefore practically eliminates wastes transit without being supplied to the saw cylinder 2. The regenerated flyings and trash particles entrained by the air flow are displaced to the outlet 15 and are repeatedly pounced on the saw cylinder 2, in which the above-described cleaning process is repeated. The multiplicity of the supply of waste and regenerated flyings to the saw cylinder 2, i.e. the multiplicity of their cleaning, depends on the air flow through the channel and on the linear speed of barrel rotation.

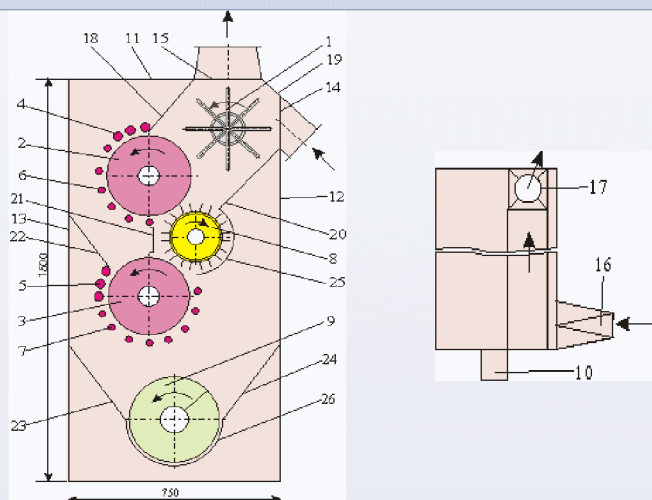


Fig.1 Scheme of a new seed cotton regenerator from cleaner's wastes

1 - barrel, 2,3 - main and regenerative saw cylinders, 4,5 - fixing bars, 6,7 - grid bars, 8 - paddle-wheel cylinder, 9 - trash removing screw, 10 - tube with valve, 11 - upper cover, 12,13 - front and rear walls, 14,15 - inlet and outlet holes, 16,17 - inlet and outlet branch pipes, 18,19,20 - fencing trays, 21 - flap, 22,23,24 - guide trays, 25 - enclosing case, 26 - tray

The impurities and part of the regenerated cotton flyings, dropped through the gaps between the bar 6, fall or slide down the tray 22 to the regenerating saw cylinder 3. The cleaning process on saw cylinder 3 is similar to the one described above on the main saw cylinder 2. The seed cotton flyings that have been cleaned on the regeneration saw cylinder 3 are removed from it by the paddle-wheel cylinder 8, slide along the wall 21 and mix with the flyings removed from the main saw cylinder 2. The flyings fed together into the channel. Impurities dropped through the gaps between the bars 7 fall onto the screw 9 or through the guide trays 23 and 24 fall into tray 26, after which the screw 9 is unloaded them from the regenerator through the tube 10 with the valve.

The regenerated seed cotton flyings that move in the channel along the helical line and when reaching the outlet 15 are sucked together with air into the outlet branch pipe 17 and then transported through a connected pipe to a separator or condenser (not shown in the figure).

The regenerative effect of the new regenerator will be roughly the same as for the 95% as in the RX regenerator, and the cleaning effects, due to the exclusion of transit of trash impurities and the increase in the cleaning rate, will be much higher: a total of 85-90%, by large trash 90-95 %, by fine trash 80-85%, by motes 50-70%. At the same time, the content of seed cotton in the waste of the new regenerator will be no more than 2-4%, which corresponds to a similar indicator of a serial regenerator RX, and the contamination of the regenerated flyings should not exceed 10-15%.

CONCLUSIONS

The specialists of the Scientific Center «Paxtasanoat Ilmiy Markazi», Tashkent institute of textile and light industry work together on creating a new technology for regeneration of seed cotton from wastes of cleaning equipment.

On the basis of the developed scheme and above selected parameters of working parts, drawings of a pilot industrial sample of a new regenerator have been prepared. Device received a patent of the Republic of Uzbekistan for useful models [2]. In the cotton season 2017-2018 is supposed to carry out the manufacture of pilot sample of new regenerator and test them at cotton ginnery of the Republic of Uzbekistan.

REFERENCES

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CONTACT

Joint Stock Company "Pakhtasanoat Ilmiy Markazi" (Scientific Research Center of Cotton Industry),

8, Sh. Rustavelli street, 100070, Tashkent

Tel: (+99890) 937-20-90, (+99971) 256-04-21

e-mail: direktor@paxtasanoatilm.uz web: paxtasanoatilm.uz