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THE ROLE OF AIR TRANSPORT USED IN TRANSPORTATION OF COTTON IN THE TECHNOLOGICAL PROCESS OF THE COTTON GINNING PLANT

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Abstract

This article provides information on dryers widely used in ginneries, modern techniques and technologies of drying raw cotton, the intensity of the drying process with a drum dryer, heat exchange between raw cotton and drying agent, the raw cotton receives heat from direct gas collisions.

Keywords: air transport, transportation, technological cotton, cotton ginning plant

INTRODUCTION

The technological system of primary processing of seed cotton consists of the process of transportation of raw materials and finished products on the territory and departments of the enterprise by various means of transport. In this case, the main type of transfer of seed cotton from the gin and closed warehouses to production, as well as the transfer from one department to another is pneumatic transport (Shodiyev, 2005)The reason for the widespread use of pneumatic transport differs from other devices by its reliability in use, lack of material transfer losses, compactness and ultimate ease of repair, which allows the pneumatic device to move material in small spaces and inconvenient conditions(Shodiyev, 2004) In addition, moving the seed cotton using an air stream will help it to shrink and release some of the moisture in the product. In the separator, the seed cotton is first cleaned of fine impurities(Shodiyev,et al. 2020)

Main part

Suction pneumatic conveyors are the main equipment for ginning cotton in ginneries. Its schematic diagram is shown in Figure 1.1.

Figure 1.1. General view of the pneumatic transport device

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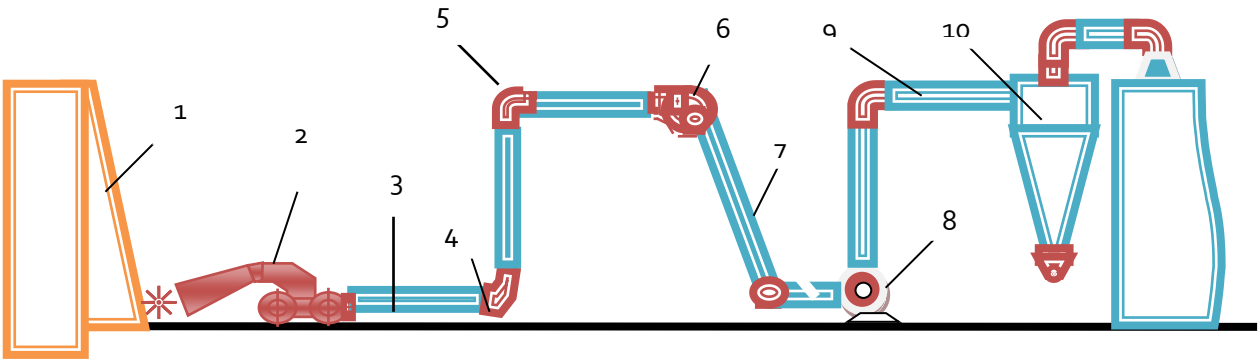

1.Riot
2. Gharam spoiler.

3. Horizontal working pipe.

4. Stone holder

5. Vertical pipe.

6.Separator.

7. Suction air duct.

8. Out-of-store fan.

9.Exhaust air duct.

10- Air purifier.

The seed cotton is transferred to the pneumatic conveyor system through a working pipe using a bulk breaker-supplier RP-1. The principle of operation of the equipment is as follows: as a result of the thinning of atmospheric air, air is absorbed into the working pipe, which is accompanied by the seed cotton. In the separator, the seed cotton is separated from the air and transferred to the required location on a screw or belt conveyor using a vacuum valve, and the dusty air is sent to the cleaning device and released into the atmosphere.

The main advantage of the suction devices is the simplicity of changing the layout of the working pipe depending on the location of the piles and closed warehouses on the territory of the preparation site at the enterprise.The efficiency of pneumatic transport equipment varies depending on the capacity of the gin. Their productivity is 12 tons of cotton per hour. The widespread use of machine harvesting and the growth of seed cotton production are putting the cotton ginning industry in need of increasing production capacity, equipment productivity and finished product quality. The solution of these problems is also multifaceted in the operation of pneumatic conveyors for seed cotton, as it is the first and foremost in the technological process of primary processing of cotton. Moisture content of machine-picked cotton, high level of pollution and increase in the volume of production lead to the expansion of the area under the enterprise. As a result, the intermediate length of in-vehicle vehicles has increased, reaching 200 m and more, depending on the volume of production. An additional serial re-transfer unit-type pneumatic device will be installed to transfer the seed cotton to production from remote hotspots(Shodiyev, et al. 2020).

However, the use of a mobile re-transmission unit is of little use because the pipes are installed at a temporary concentration and usually randomly. As a result, the operating radius of the re-transmission pneumatic device is 50-60 meters, which leads to an increase in the number of devices, increasing power consumption(Shodiyev, 2020)

Experiments have shown that the efficiency of transmission of seed cotton depends on the length of the air pneumatic transport system, which increases the moisture content of seed cotton and leads to a 10-15% decrease in productivity of raw cotton, as well as higher moisture content of seed cotton. a more rapid decrease was found.This, in turn, leads to an increase in unscheduled downtime of technological equipment of the enterprise(Shodiyev, 2020).Consideration of the work devoted to the study of the impact of pneumatic transport on the quality of seed cotton is highly effective in solving the problems of modernization of pneumatic transport equipment. Based on the analysis of differential equations obtained from a theoretical study of the movement of cotton moving from the separator working chamber to the vacuum valve, the trajectory of the cotton piece was determined and the impact area and impact forces were determined on the rear wall of the separator.

In the experiment, the critical velocity of seed damage as a result of direct impact of a piece of cotton on the metal surface was studied and it was determined that it is equal to 15.5 m / s. In the study, the effect of changes in the direction of impact of a piece of cotton on the value of the critical velocity of seed damage was studied. It was found that during the impact, the seed damage suddenly decreases as the angle of incidence increases (Shodiyev, et al. 2020). As a result, it became possible to create a fan with the wings turned back for the pneumatic transport system of the cotton picking machine(Shodiyev, et al. 2020). This is the outlet angle of the outer diameter of the fan under certain conditions $\beta = 25^0$ and does not damage the cotton seed when the rotational speed of the outer diameter of the wheel does not exceed 37 m / s. Studies on the effects of airborne movement of seeds and seed cotton on seed damage have been studied (Sultaniyazovich, et al. 2020) It has been suggested to increase the angle of impact of the particles on the outer wall of the pipe to reduce seed damage when the seed cotton moves in the pipes. It is proposed to determine the approximate value of the impact angle of the seed without damage according to the following formula:

$$\alpha = \arccos\frac{V_{кр}}{V_{м}}$$

here

α ***- the angle of impact of the cotton seed on the outer wall of the pipe***

$V_{кр}$ ***-critical velocity in the case of direct impact on the metal surface is 15.5 m / s;***

$V_{м}$ ***-speed of movement of seeds and cotton seeds.***

One of the main requirements in the transportation of seed cotton is to preserve the natural properties of seed cotton(Elmurodova, 2020).Therefore, many researchers involved in the study of seed cotton pneumatic transport have focused on the study of seed injury. This is because it affects the quality of the finished product, resulting in a deterioration in the spinning properties of the fiber, while in the transfer of seed material, it reduces the growth energy and germination of the seed(Elmurodova, 2020).Studies have shown that seed moisture increases with increasing moisture content of the seed, the number of times it is passed through the device, as well as an increase in airflow velocity and a decrease in the concentration of the aero mixture(Elmurodova, et al. 2019)

CONCLUSIONS

According to the authors, the seeds are damaged at the bends of the pipes and in the separators (Elmurodova, et al. 2019). It was found that when seed cotton is transported in metal-polymer pipes, seed damage is less than in steel pipes. For example, when the air flow rate is 23.7 m / s and the moisture content of the seed cotton is 8.5 and 30%, the seed damage is reduced to 0.11-0.35%, respectively. At a speed of 28.2 m / s, the concentration decreases by 0.20–0.47% and 0.15–1.01% at the same humidity. Many scientists have studied the effect of pneumatic transport on the formation of defects in fine-fiber cotton (Khusanov).

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