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НАУЧНО-ТЕХНИЧЕСКИЙ ЖУРНАЛ НАМАНГАНСКОГО ИНЖЕНЕРНО-ТЕХНОЛОГИЧЕСКОГО ИНСТИТУТА

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13. Aleksikov S.V., Boldin A.I., Leskin A.I., and Gofman D.I. Feasibility study of the car parking scheme. Bulletin of the Volgograd State University of Architecture and Civil Engineering. Series: Building and architecture. 2019. Issue. 1 (74)

14. Darabov M., Mamaev G.I. Improving traffic safety in the parking area. The role of personnel in the development of the automobile and road complex // Proceedings of the scientific-practical conference of talented youth. Tashkent: TARI, 2009 pp. 371-372

15. Mamaev G.I., Ernazarova L.M. Investigating road throughput in parking lots across the street. Science, education and modernized energy and resource-saving technologies, technical means that ensure the development of sectors of the economy: problems, solutions, prospects // Proceedings of the Republican scientific-technical conference. Jizzakh April 17-18, 2015 pp. 386-387

16. Ryabkon Y.A., Xarapova S.M. Influence of street car parking on city highways loading. SibADI Bulletin, issue 2 (8), 2008

17. Road transport of Uzbekistan 2004-2005 Blue Book 2006

18. Kodranski M., German G. “A rood turn in European parking: from arrangement to limitation of parking spaces,” 2011

19. Odilov N.E. Impact of technical condition of vehicles on traffic safety. "JizPI Bulletin" Scientific and Technical Journal. Jizzakh: 2019, issue №2.

20. Adilov O.K., Odilov N.E. Assessing the traffic safety of vehicles through the collision process. *Proceedings of the Republican scientific-practical online conference "Problems of road safety" of the Ministry of Internal Affairs of the Republic of Uzbekistan. Tashkent, May 28, 2020.*

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RESEARCH OF THE PROCESS OF SEPARATION OF RAW COTTON FROM AIR IN A NET SEPARATOR DRUM

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Abstract:

Objective. *transportation of cotton to primary processing enterprises is carried out by pneumatic transport. The process of separating the transported cotton from the air is carried out in a separator device. In the separator, the cotton is separated by sucking air from the mesh surface. To improve the process of separating cotton from air, it is proposed to install a mesh drum in the working chamber of the separator. The proposed mesh drum cotton separator is designed to separate cotton from air in the working chamber without damaging it.*

Method. *Based on the conducted scientific research, the results of research on improving the separator device were studied. On the basis of the Maple-9.5 program, the movement of cotton in the working chamber of the separator was investigated.*

Results. *the article proposes a variant of installing a mesh drum, which rotates in the working chamber of the separator that separates cotton from air. The mesh drum reduces air separation and damage to cotton. Differential equations of motion of a cotton ball on the surface of a mesh drum are constructed and the corresponding graphs are obtained.*

Conclusion. *It has been established that the installation of a mesh drum in the working chamber of the separator leads to an acceleration of the process of separating a lump of* *fiber. At the same time, it was noticed that the contact of cotton with the mesh surface in the separator working chamber is reduced and the separation process is accelerated compared* to existing separators. As a result, the fiber retains the natural properties of the seeds.

Keywords: *fiber, air separator, working chamber, scraper, mesh drum, mesh surface, the vacuum valve, propeller, fine impurities, fracture rate of seeds, speed of movement.*

Introduction.

Based on the production and deep processing of cotton fiber, which is the main textile raw material, comprehensive measures are being taken to increase production and improve the competitiveness of a wide range of high-quality and inexpensive textile and light industry products.

Pneumatic transport is widely used in ginneries to transfer cotton to the production process and transport separated cotton fiber, fluff and fibrous waste. One of the key elements of the pneumatic conveying device is the separator.

The initial processing of cotton consists of a number of technological processes (storage, storage, transport, drying, cleaning, fiber separation, etc.),it creates a specific technological chain. This chain is closely linked to the quality of work of each unit and the performance of its previous machines. Considering this issue, it can be concluded that the quality of cotton raw material is influenced by technological chains [1].

Methods.

Delivery of raw materials from warehouses and stacks of cotton gardens to the workshops is mainly carried out by means of air pumps. The main reason for the spread of this method in cotton factories is the fact that raw cotton is not destroyed during the transportation of raw materials, and it is possible to install pipelines in the desired direction on the plant premises.

Separator is one of the main elements of the system, which is formed by air transport pipelines. Separator is mainly used to extract cotton from airflow and fine dust.

Results.

According to the results of research, this separator reveals a 25% of the overall cotton harvest[2].

In order to reduce the impact of this cotton, the pipe is fitted with a plate-shaped pointer. In order to increase the productivity of the separator, it is observed in practice by changing the diameter of its net surface in different sizes.

Minor dirt inside cotton is processed at different speeds because it has different masses. As a result, small contaminants are partly separated from cotton. When the cotton is pumped into the separator separation chamber, the main cotton pack will have large inertia. Accordingly, it continues to move straight to the wall of the camera.

Small contaminants do not have much weight. Therefore, they fall on the lubricant governor and create conditions for the separation of the pollutants. To solve this problem today, a new drum separator (Figure 1) with an additional diameter of 300 mm, which can be separated from the air during separation of the cotton, is proposed on the basis of a new idea. The main purpose of this machine is to prevent the cotton picking and the release of free fibers [3].

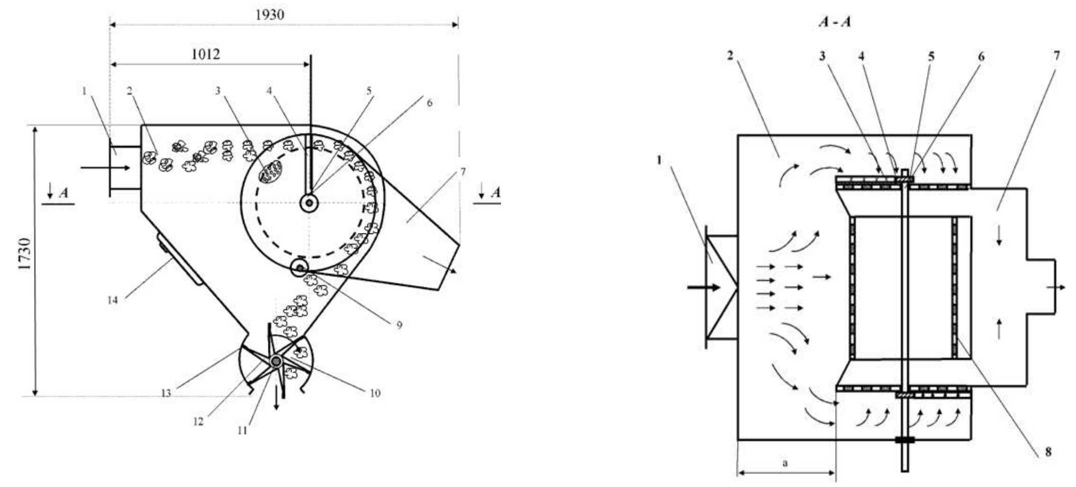


Figure.1. An interpolated cylinder separator

1-inlet pipe, 2-working cameras, 3-watt cylinder, 4-wire surface, 5-shrink, 6-valve governor, 7- air outlet, 8-drum, full drum unit, 10-vacuum valve, 11 - vacuum valve valve, 12-vacuum valve barrel, 13-vacuum valve barrel part, 14-separator hole.

Let's take a look at the movement of cotton that goes down to the drum that turns to study this process (Figure 2) [2].

Let's assume that the mass of a mass of cotton called **m** falls on the surface of the cylinder, which rotates with v_o -initial speed. We consider the zipper to be absolute noelastic, only in the particular conditions, depending on the cotton cylinder.

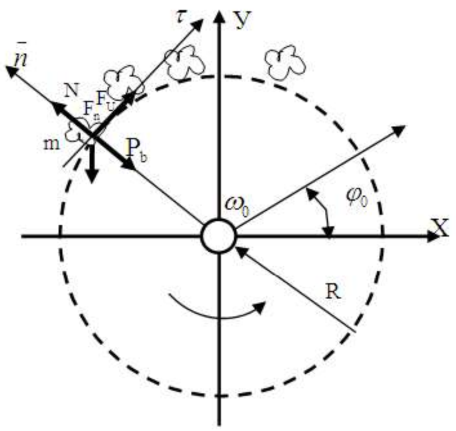


Figure.2. Studying the movement of the cotton lump on the net surface of the cylinder

We create equilibrium equation on the cylinder surface of cotton.

At the time of the cotton harvest, we will use the angle of φ_0: The following forces affect the cotton shaft:

$m\omega^2 R$ – power out of center; P_b -absorbing force; N-The normal reaction force of cylinder in cotton; $F_{uu=}$= the friction force between the cotton and the cylinder; m - mass of cotton; R is the radius of the cylinder.

The equilibrium equation for normal and run r is:

$$\frac{md^2S}{dt_2} = -F\left[g \cdot \mathrm{Sin}(\omega t + \varphi_0) + C_0(V_0 - V) - \omega^2 R\right] + g \cdot \cos(\omega t + \varphi_0) \qquad (1.1)$$

$$N = \mathrm{G} \cdot \mathrm{Sin}(\omega t + \varphi_0) + P_b - m\omega^2 R \qquad (1.2)$$

Where: S can be found from the path (1.1) which the cotton is rounded. $P_b = C(V_0 - V)$ (1.3)

P_b, air-resistance of the aerodynamic resistance
$G = mg$ - the weight of cotton
f - friction coefficient between the cotton pie and the surface
ω_0 - the angle of rotation of the drum
R - Rectangular drum radius
m - mass of cotton bullion
F_u- friction force

In order to separate the cotton shell from the surface it should be $N \le 0$ taking into account (1.3), we obtain the conditions for assessing P_b, ω, m, φ_0, R

$$\omega \ge \frac{\sqrt{P_b + mg\cos\varphi_0}}{mR} = \omega_0 \qquad (1.4)$$

When $\omega \le \omega_0$ is required, the cotton rotary cylinder surface remains constant, the frictional power is:

$$F_{ишк} = -fN \qquad (1.5)$$

f-friction coefficient between cotton fiber and cotton

$$\frac{d^2S}{dt^2} = \frac{Rd^2\varphi}{dt^2} \ge 0 \qquad (1.6)$$

This may be relative motion. The following requirement must be met for this purpose:

$$-F_{ишк} + mgsin\varphi_0 \ge 0;$$

From here we can find this :

$$\omega \ge \frac{\sqrt{fP_b + mg(f\cos\varphi_0 - \sin\varphi_0)}}{fmR} = \omega_1 \qquad (1.7).$$

If

$$fP_b + mg(f\cos\varphi_0 - f\sin\varphi_0) \le 0 \qquad (1.8)$$

$\omega_1 = 0$ can be found

If $\omega_1 \le \omega \le \omega_0$ condition is done, the cotton swabs on the surface of the cylinder when$t=0$ is made, the movements are made by law $\varphi = \varphi(t)$ in accordance with the rotary cylinder but when $\omega \ge \omega_1$ it does not move towards cotton cylinders, in that case $\varphi(t) = 0$.

Let's look at the process of removal of cotton from cylindrical surface. First of all, we need to define the condition of the cotton lining on the cylindrical surface:

$F_{ишк}$ -frictional force to cotton on the surface of the cylinder; mg- weight force; P_b - absorption effect. If cotton is inactive, equilibrium equation is as follows.

$fP_b + fmgcos\varphi - mgsin\varphi = 0$ (1.9)

From this equation we find the corner of the rope over the cylinder.

$$\varphi_c = \alpha + \arcsin\frac{f \cdot P_b}{mg\sqrt{1+f^2}}; (\alpha = arctgf) (1.10)$$

Because of this $\varphi_c \le \pi$ from last formula

$$P_b \le mg$$

In this case, on the surface of the cylinder $\varphi \le \varphi \le \pi$the branch is formed, the cotton does not stay on this surface.

When $P_b \geq mg$, this branch disappears and the all entire cotton cylinder remains on the surface.

If the cylinder is rotated at ω corner velocity, the formula is:

$$\varphi_c = \alpha + \arcsin \frac{f(P_b - m\omega^2 R)}{mg(1+f^2)} \quad (1.11)$$

Using this the value of$P_b$can be evaluated:

If $P_b \leq m\omega^2 R - mg (m\omega^2 R > mg)$does not have cotton on all surfaces (except fromφ= 0 line), that is to say, cotton falls on the surface of the cylinder.

If $m\omega^2 R - mg \leq P_b \leq m\omega^2 R$, the surface whichcotton is held in cotton cylinders, then this surface is$0 \leq \varphi \leq \varphi_c$where $\varphi_c = \alpha$.

Now $\omega_1 \leq \omega \leq \omega_0$then $\varphi(t)=0$

This movement continues until$N \leq 0$

If we assume$\omega_1 \leq \omega \leq \omega_0 \varphi' << \omega$, $\varphi << \varphi_0$ we can write the equation (1.2) in another form:

$$\frac{mRd^2\varphi}{dt^2} = mg\sin(\varphi_0 + \omega t) - f(mg\cos(\varphi_0 + \omega t) + P_b - m\omega^2 R) \qquad (1.12)$$

When $t = t_2$ we find $\varphi = \varphi_2$angle from the formula (1.12) In that case,$\varphi_2 \leq \pi$

The existence of $\varphi = \varphi_2$ angle indicates that the angular velocity of the cylinder $\omega_1 \leq \omega \leq \omega_0$ and the weight of the cotton pieces can be distinguished from the surface of the cylinder without reaching an inclined lubricant.

For example: when cotton is$\omega_1 \geq \omega_0$ all the cotton does not cling to the cylinder.

Discussions.

The theoretical researches will help to reduce the probability that the rotating cylinder will be seen in the form of a clean surface of the cotton platter entering the working cell of the separator. This, in turn, facilitates the cleaning of the surface of the surfaces in the form of cylinders. It also allows separation of smaller contaminants in the separator.

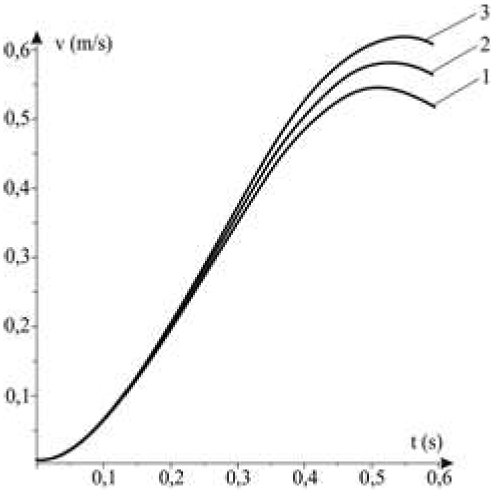
Figure 3-6 shows the change of movement of the cotton lining along the net drum surface inside the new separator device.

The graphs in Figure 3 also show the time difference between the traveling trail along the net drum surface of the cotton lining. In graphs 1, 2, and 3, the radius of the drum corresponds to the radius of R1 = 0.18 cm, R2 = 0.2 cm, R3 = 0.22 cm respectively. Increasing the drum radius will speed up the process.

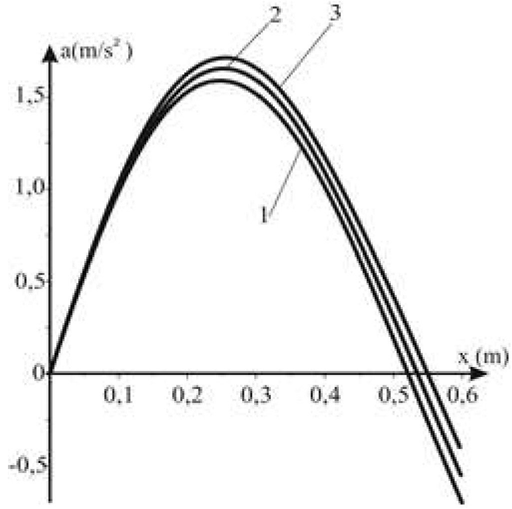
Figure 4 illustrates the change in the speed of the cotton lining on the path taken. The graphs show that the speed of the cotton bulb increases rapidly with the drum radius and reaches the maximum value when it reaches the S-point, then decreases. At the lower D-point of the drum drum it was found that the speeds were driven zero and the cotton paddle fell into the vacuum valve. This process takes place at t = 0.5-0.6, but the increase in the radius increases the time.

Analysis of the results. Figure 5 illustrates the laws of changing the speed of cotton depending on time. The order of placement of graphs corresponds to cases when R1 = 0.18 cm, R2 = 0.2 cm, R3 = 0.22 cm. The graphs show that the speed of the cotton bulb reaches the maximum level at the t1 = 0.20 sec, t2 = 0.25 sec, t3 = 0.30. This corresponds to the porous drum in BC - range.

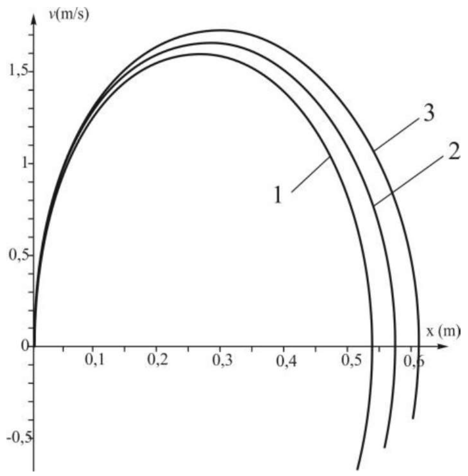
Figure 6 depicts the law of the change of the N (t) porous surface pressure of the cotton depending on different the radius of the porous drum. R1 = 0.18 cm, R2 = 0.2 cm, R3 = 0.22 cm. From the graphs, it is possible to see that pressure on the net surface of the cotton tube is around the V-dot and decreases in the CD interval.



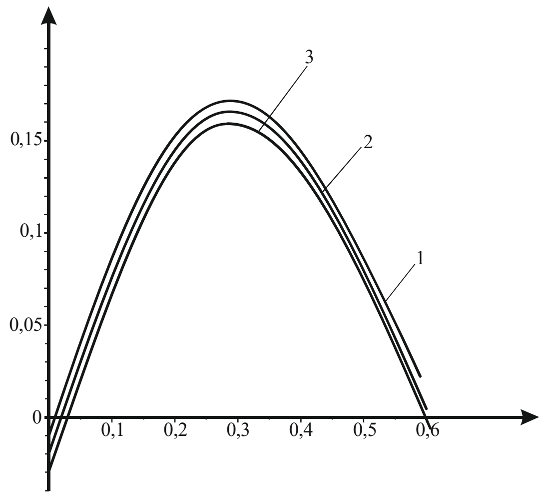
Picture.3.The change in the speed of movement of cotton piece depending on time f=5; m=2, кг; φ_0=0.1, rad; φ=0.2, rad; *w*=0.5 1/сек



Picture.4. The change of movement of cotton piece over porous surface depending on the passed path



Picture.5.The change in the speed of movement of cotton piece depending on time f=5; m=2, кг; φ_0=0.1, rad; φ=0.2, rad; *w*=0.5 1/сек



Picture.6. The change of movement of cotton piece over porous surface depending on the passed path

Conclusion.

It was found out that in the process of cotton transportation in cotton ginning enterprises, the turntable netting roller in the separator which separates cotton seed from air can cause the separation process become faster. In other words, the new separation process has a high degree of separation of cotton fiber from the air compared to other separators. As a result of this , natural properties of the fiber seeds can be presеved.

REFERENCES

1. Jabborov G.J., Otametov T.U., Hamidov A.H. Technology of processing cotton seeds. Tashkent "Teacher" 1987. The textbook is 98-100 pages.

2. Кадырходжаев С.К. Разработка сепаратора для хлопка-сырца с целью сохренения его качественных показателей и сокращения потерь волокна. Дисс.канд.тех.наук, Ташкент, 1986.

3. Muradov R. Fundamentals of increasing the efficiency of airborne equipment. Namangan. 2015y

4. Salakhiddinova M., Mamatkulov O., Muradov R. Investigation of Separating Small Impurities and HeavyCompounds Using the Cotton Separator Equipment. American Journal of Science, Engineering and Technology.

5. Anvar Makhkamov, Sadi Khusanov, Muradov Rustam Muradovich and Imomaliyeva Sh, "The Oretic Observation of the Cotton Movement in the Operating Camera of the New Separator. - International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
https://www.psychosocial.com/article/PR2020619/27391/ ISSN: 1475-7192.

6. Sadi Khusanov Makhamatjonovich, Anvar Makhkamov, Muradov Rustam Muradovich and Karimov A, "Study of the Effect of the Mobile Floor of the Separator Device on the Cotton Section". International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020

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AUTOMATION OF SMALL PIECE TRANSPORTING PROCESSES

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Abstract:

Objective. *Automation level of production processes in mechanical engineering is videly determined by the development of automatic loading of granular parts to technological equipment, because the quality of the entire technological system can be ensured by continuously delivering the required amount of properly designed parts through a reliable, efficient and economical design-loading device. In modern production processes, the use of rotary, vibrating and wave picking machines, which combine the automatic loading devices, scheduling and transportation of high-performance parts, requires a high throughput. The product manufacturing technology consists of assembling multi-element fine details in a number of mass and large-scale production conditions. The main advantages of vibrating loading devices (VLD) are the simplicity and compactness of the design, the ability to adjust them with relatively little tooling, stepless control of vibration transport speed of parts, durability and reliability.*

Methods. *Automatic loading and targeting complexity is high for parts with asymmetrical shape. The share of such parts in the industry is significant, and the process of design and transportation can be up to 15% of the labor costs for the production of the finished product.*

In order to achieve the goals mentioned above, it is necessary to solve the following:

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