ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

Theoretical Study Of The Movement Of New Impurities And Heavy Impurities

Fayzullo Rakhimov
Master,Namangan Engineering-Technological Institute, Uzbekistan

Khusanboy Kasymov
Researcher, Namangan Engineering-Technological Institute, Uzbekistan

Abdusamat Karimov
Associate Professor,Namangan Engineering-Technological Institute, Uzbekistan

Rustam Muradov
Professor Namangan Engineering-Technological Institute, Uzbekistan

OPEN ACCESS

The American Journal of Engineering And Technology

JULY 2020

Page No.: 18-29

Volume-II Issue-VII

PUBLISHED: 30 JULY 2020

www.usajournalshub.com/index.php/tajet

Copyright: Original content from this work may be used under the terms of the Creative Commons Attribution 4.0 licence.

Abstract

In the paper the new scaffolding scheme for effective separation of heavy impurities in the raw material of the raw material is presented and the working principle is presented. Differential equations of movement of heavy mixtures are made and corresponding graphs are obtained.

Key words: cotton, pipe, stack, pneumatic, ventilator, air.

1. INTRODUCTION

Cotton products occupy a leading position in the global textile market. $ 25 million is invested in these products annually. tonnes of cotton fiber, which is growing year after year and is expected to reach 26.7 million tonnes in 2018. “Fiber production has been lower than consumption in recent years, reaching 25.68 million tonnes in the 2017-2018 season. This situation preserves high prices for cotton fiber on the world market and stabilizes the

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

prestige of cotton-producing countries on the world cotton market. ” Due to the increase in the consumption of cotton fiber, the change in demand for its particular type and grade, quality indicators, in recent years, special attention has been paid to the production of certain products. Accordingly, improving the quality and cost of products to ensure global cotton production efficiency, identifying and eliminating the adverse impacts on product quality at all stages of cotton production, including the separation of cotton fiber, and the use of resource-saving technologies that reduce production costs. creation remains one of the most important tasks in the field.

Wide-scale research is being conducted around the world aimed at improving the technology of primary cotton processing, including the process of weeding (insulating) cotton, its techniques and technology. In this direction, in particular, the scientific basis for improving the efficiency of the cotton harvesting process is being developed. At the same time it is necessary to maintain the initial quality characteristics of the fiber and seeds in the process of separation of cotton fiber, to create compact technology to control product quality, low material and energy-efficient structures of cotton fiber separation equipment.

In the Republic, special attention is paid to increasing the production of high value-added finished products on the basis of deep processing of raw cotton, improving the structure of the cotton industry of the country, reducing the cost of production and improving the quality indicators on the basis of technical and technological reconstruction. The strategy of actions for further development of the Republic of Uzbekistan for 2017-2021 includes the following tasks: "Increasing the competitiveness of the national economy, reducing energy and resource consumption in the economy, and introducing energy-saving technologies into production". In this task, it is important to increase the efficiency of the insulation process by improving the working chamber of the gin machine in separating the cotton seeds.

2. MATERIALS AND METHODS

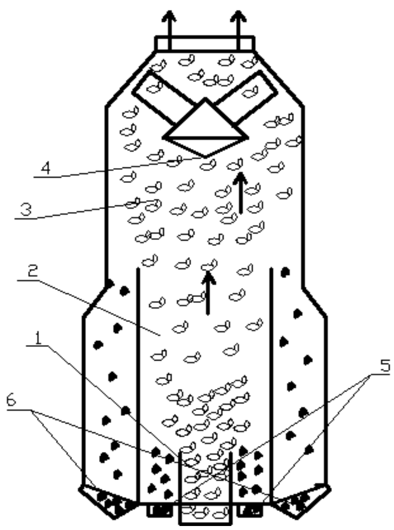
The composition of the cotton will have a significant impact on the smooth and effective operation of the equipment installed in the process of the ginneries. Heavy impurities in the cotton contents during the processing will cause damage to the working parts of the machines and saw teeth of gin and linter machines. This results in damage to the seeds and fibers during the separation of the fiber from the seeds in the demon machine [1].

In addition, heavy impurities cause fires as a result of hitting machining machines on metal working bodies. That is why scientists and industry experts have always been in the spotlight to prevent heavy impurities from falling into the working chambers of the cotton processing machines, and they have always sought ways to keep heavy impurities in the air [2].

Linear impregnations are widely used in the process to produce heavy impurities at ginneries. Linear crushers have a number of advantages over other crushers: they are simple in structure, easy to use, low cost and reliable. Here is a look at the design of the gutters used in ginneries.

Shown in Figure 1.

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

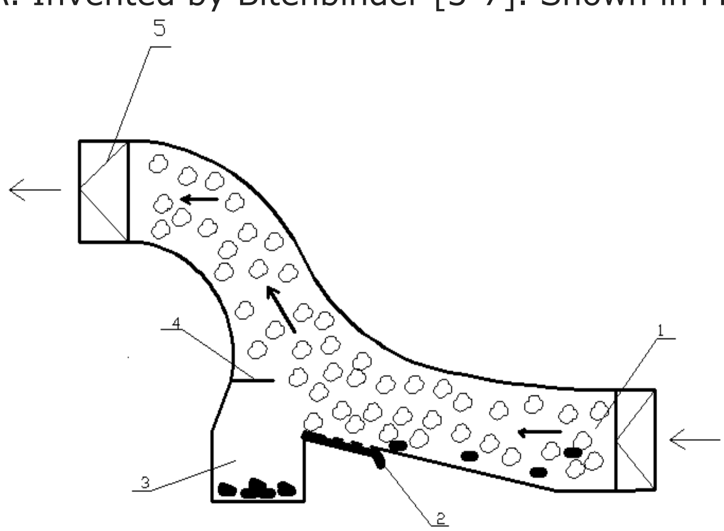


1- Figure. Stoner

1-access pipeline; 2-working camera; 3-working camera; 4-Route; 5-pocket; 6-second pocket; 7-output pipe.

This impeller is mounted on the vertical section of the pneumatic unit. The Straightened works as follows: Through the inlet pipe 1, cotton enters the 2nd chamber. The working surface of the working chamber is not so small that only the large impurities can be separated into the pocket 5 by their weight.

As the working surface of the 3rd chamber is larger than the first working chamber, the air velocity decreases and the small particles in the cotton compartment are released into pocket 6, with the cotton rising in the vertical direction to the 4th rod and shattering. Then, as a result of the crease of the small impurities in the pieces of some of the cotton, under the influence of their weight they fall down into the pocket 6. The next engineer was A. Invented by Bitenbinder [3-7]. Shown in Figure 2.

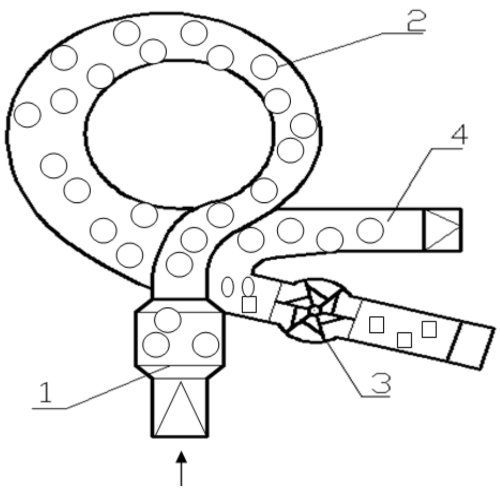


ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

2- Figure. Radial Stoning

1- inlet pipe; 2- lattice surface ; 3- pocket; 4- directional; 5- output pipe.

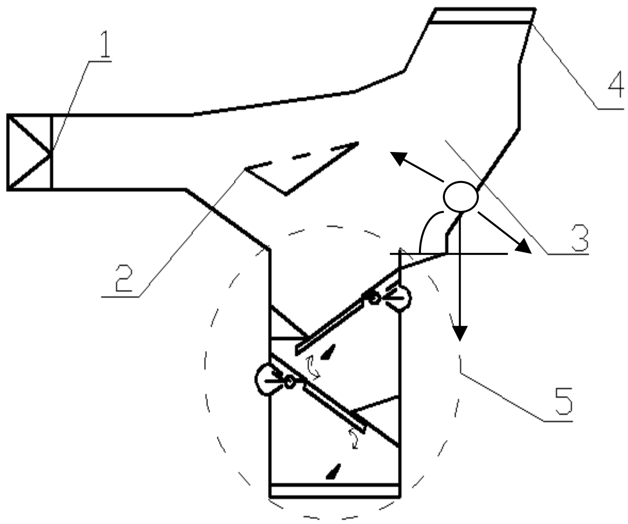
The impeller operates as follows: Cotton entering the inlet pipe is diverted to the air inlet 5 by changing its direction. Heavy blends in the cotton contents move along a straight line, hitting the router 4 and pocket 3. In order to prevent the falling of the pieces of cotton to the pocket 3, the pieces of cotton move upwards as a result of absorbing air through the lattice surface.
The next plasterer is Aristov's stonemason, shown in figure 3.



3- Figure. Aristov's stonemasonry design.
1- inlet pipe; 2- working camera; 3- vacuum valve that produces heavy impurities; 4- output pipe.

This stacker works as follows: Cotton raw material, which enters the working chamber 2 through the inlet pipe 1, begins to move through centrifugal force. Because heavy impurities are more influenced by centrifugal force, they are separated from cotton and move in three pipes. Because cotton is lighter than heavy impurities, it is transmitted to the next machine via pipe 4.
This is a major disadvantage with the loss of 10-15% pressure on the stone [8-17]. Schematic of the newly proposed stacker Shown in Figure 4

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03



4- Figure. The newly proposed stoner
1- entrance part of the cotton; 2- cotton-cutter ; 3- working camera; 4- outlet of cotton; 5- automatic system.

The proposed stripper works as follows: Cotton raw material enters the chamber 3 through the inlet to the stainless steel 1, where the heavy impurities of the cotton are lowered due to lighter weight than the cotton mass. In addition, additional changes were made to the new design to retain minor contaminants in the cotton, which is the 2nd element, which allows the cotton to be separated from the fine contaminants in it [17-19].

3. MATHEMATICAL MODEL OF THE PROBLEM

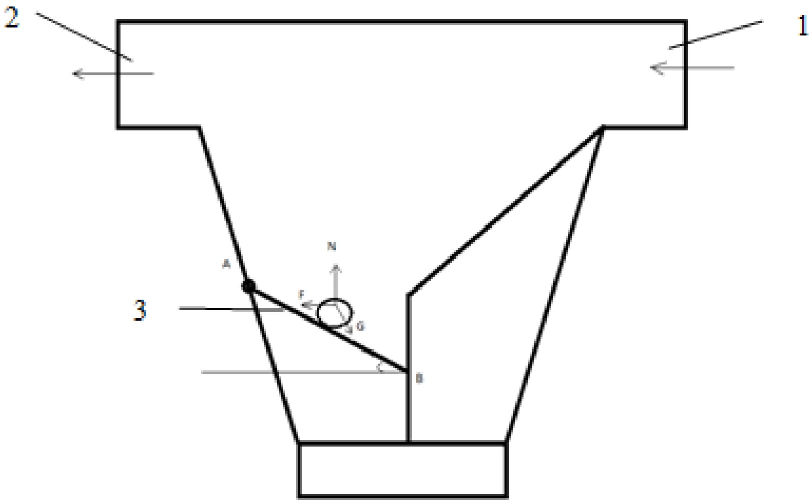
In the process of separation of heavy impurities in the cotton seeds with the help of the newly proposed impregnation equipment, sloping angles were determined to prevent heavy impurities in the working chamber.

$$G_k \sin\alpha > f G_k \cos\alpha + FK\frac{JV^2}{2g}$$

$$\tan\alpha > f + \frac{1}{G_k \cos\alpha} FK\frac{JV^2}{2g} \qquad (1)$$

At the same time, forces acting on heavy impurities were also found.

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03



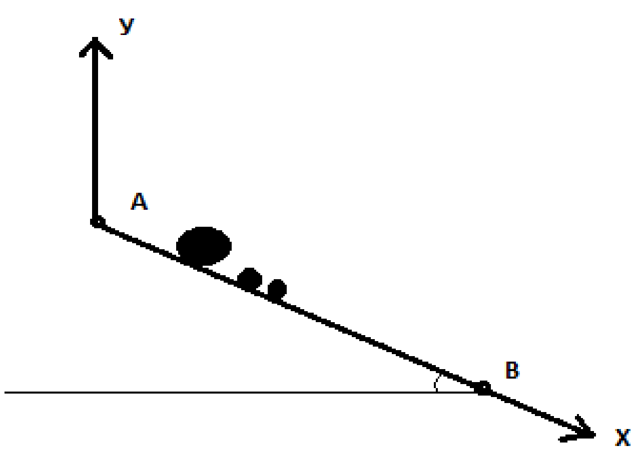
5- Figure. The forces acting on heavy impurities in the working chamber
F- force of friction ; N- reaction force; G- force of gravity
1 access pipeline; 2nd Exit Pipe; Part 3 of heavy-duty impurities

We introduce the movement of heavy impurities in the impeller working chamber using the initial values. Let the initial values be given as follows:

$V_A = 0\ \frac{M}{C}$

$\alpha_1 = 30^0$
$\alpha_2 = 45^0$
$\alpha_3 = 60^0$
L=0.5 m
f=0.5

As shown by these values, we can determine the behavior of heavy impurities in the AB section by varying the slope angles at different values, taking the coefficient of AB to L = 0.5m, and taking the coefficient of friction to 0.5.



6- Figure. Movement of heavy impurities in the AB incision

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

$$m\ddot{x}_1 = \sum x_{l1}, \qquad m\ddot{x}_1 = Gsin\alpha - F \qquad (2)$$

The force of friction

F=f *N N=G cosα

$$m\ddot{x}_1 = G\sin\alpha - f\,\mathrm{G}\cos\alpha$$

$$m\ddot{x}_1 = mg\sin\alpha - f\,\mathrm{mg}\cos\alpha \qquad (3)$$

From this formula, we can reduce the masses by the following expression:

$$\ddot{x}_1 = g\sin\alpha - f\,\mathrm{g}\cos\alpha \qquad (4)$$

$$\dot{x}_1 = g\,(\sin\alpha - f\cos\alpha)t + C_1 \qquad (5)$$

$$x_1 = [g\,(\sin\alpha - f\cos\alpha)t^2 \qquad (6)$$

4. Results

Using the above expression, we define the time it takes for heavy mixtures from point A to point B:

x(t)=AB=L=0.5 f=0.5

$$x(t) = (g(\sin\alpha_1 - f\cos\alpha_1)){t_1}^2$$

The slope of the slope in the stacking pocket of the heavy impurities first

$\alpha_1 = 30^0$

and the time of movement in the AB incision.

$$10 * (\sin 30^0 - 0.5 * \cos 30^0)t_1^2 = 0.5$$

$$10 * (0.5 - 0.5 * 0.85)t_1^2 = 0.5$$

$$t_1^2 = \frac{1}{2}$$

$$t_1 = \sqrt{0.5}$$

Angular angle

$\alpha_2 = 45^0$ Time of movement in the AB cross section, equal to

t_2 we will determine.

$$x(t) = (g(\sin\alpha_2 - f\cos\alpha_2)){t_2}^2$$

$$10 * (\sin 45^0 - 0.5 * \cos 45^0)t_2^2 = 0.5$$

$$t_2^2 = \frac{1}{7}$$

$$t_2 = \sqrt{0.14}$$

Angular angle

$\alpha_3 = 60^0$ as equal

, Time of movement in the AB crossroads

t_3 find.

$$x(t) = (g(\sin\alpha_3 - f\cos\alpha_3)){t_3}^2$$

$$10 * (\sin 60^0 - 0.5 * \cos 60^0)t_3^2 = 0.5$$

$$t_3^2 = \frac{1}{12}$$

$$t_3 = \sqrt{0.083}$$

Consequently, as a result of changing the slope angle, the time of movement of heavy impurities in the AB range changes, ie

$\alpha_1 = 30^0$ action time

$t_1 = \sqrt{0.5}$, $\alpha_2 = 45^0$ time of heavy impurities in case of $t_2 = \sqrt{0.14}$, $\alpha_3 = 60^0$ and the AB time of the heavy impurities in the case of AB $t_3 = \sqrt{0.083}$ equation.

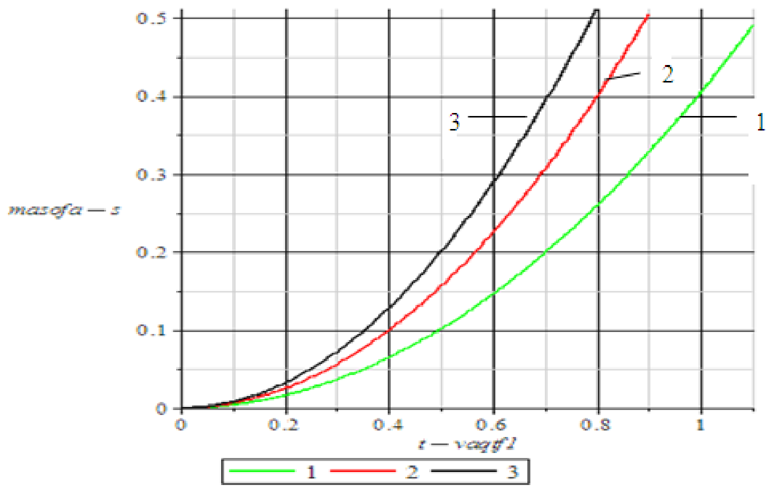
ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

It can be seen that as the slope increases, the time of movement of the heavy impurities from the raw material in the AB cutoff decreases [20-22].

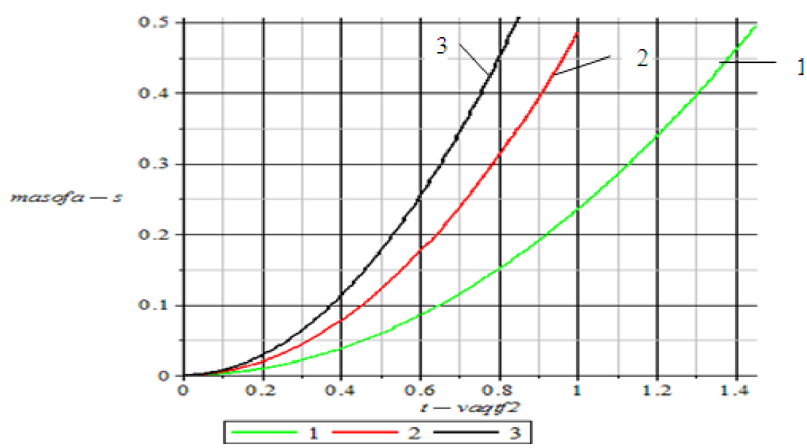
$$t_1 = \sqrt{0.5} = 0.7 \qquad t_2 = \sqrt{0.14} = 0.4 \qquad t_3 = \sqrt{0.083} = 0.3$$

5. Results and Discussion

The graphs in Figures 4-8 show the variation in time and slope angle of the heavy mixtures based on the expressions (4), (5) and (6).

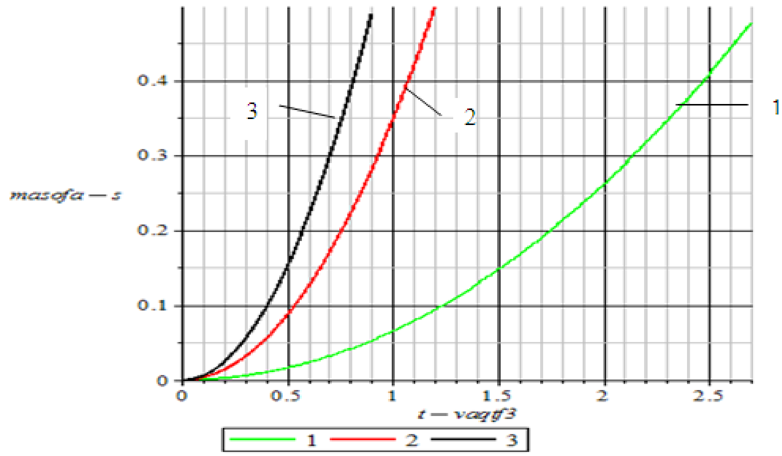


7-Figure. Changes in the movement of heavy impurities over time, depending on different angles. $f = 0.1$, **1-** $\alpha_1 = 30^0$ **2-** $\alpha_2 = 45^0$ **3-** $\alpha_3 = 60^0$.

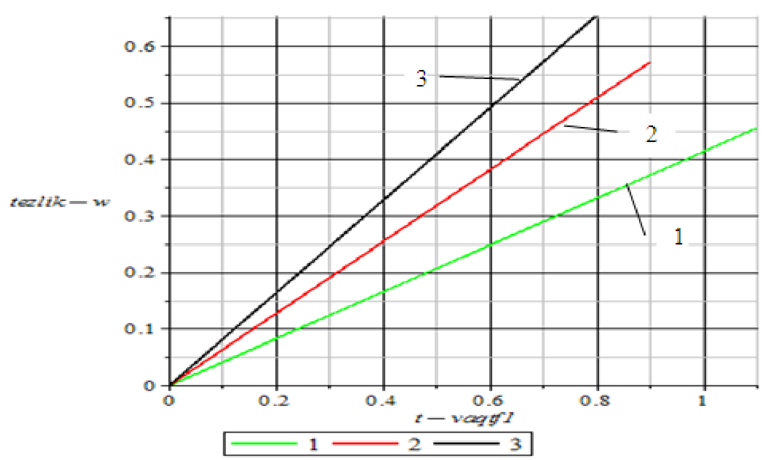


8-Figure. Changes in the movement of heavy impurities over time, depending on different angles. $f = 0.3$, 1- $\alpha_1 = 30^0$ 2- $\alpha_2 = 45^0$ .3- $\alpha_3 = 60^0$

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

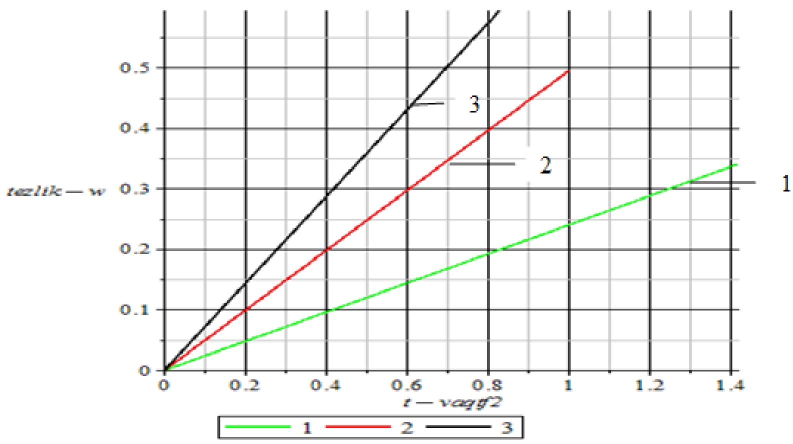


9-Figure. Changes in the speed of heavy mixtures depending on time, depending on different angles. $f = 0.1$, 1-$\alpha_1 = 30^0$ 2-$\alpha_2 = 45^0$.3- $\alpha_3 = 60^0$

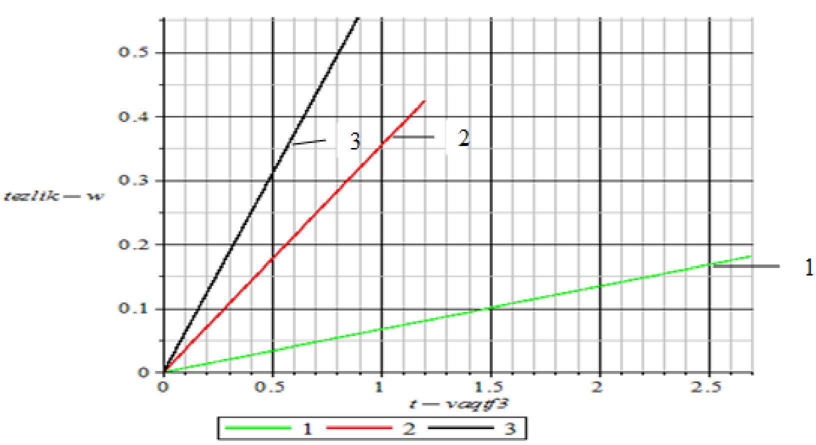


10-Figure. Changes in the speed of heavy mixtures depending on time, depending on different angles. $f = 0.1$, 1-$\alpha_1 = 30^0$ 2-$\alpha_2 = 45^0$.3- $\alpha_3 = 60^0$.

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03



11-Figure. Changes in the speed of heavy mixtures depending on time, depending on different angles. $f = 0.3$, 1- $\alpha_1 = 30^0$ 2- $\alpha_2 = 45^0$ .3- $\alpha_3 = 60^0$.



12-Figure. Changes in the speed of heavy mixtures depending on time, depending

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

on different angles. $f = 0.5$, **1-** $\alpha_1 = 30^0$ **2-** $\alpha_2 = 45^0$ **3-** $\alpha_3 = 60^0$ **.**

6. CONCLUSION

Based on the above results, it can be concluded that the time of heavy impurities in the working chamber of heavy impurities, separated by the composition of raw cotton, depends on the slope of the movement distance in the working cell. As a result of increasing the slope angle, the separation of heavy impurities in the working chamber is reduced, thus allowing the continuous removal of heavy impurities from the working chamber.

REFERENCES:

1. Decree of the President of the Republic of Uzbekistan dated February 7, 2017 N UP-4947 "On the strategy of further development of the Republic of Uzbekistan".
2. .R. Muradov, A. Karimov, E. Tadaeva. Theoretical study of mechanical (shock) release of large and small impurities in the raw cotton raw material // Fergana Scientific-Technical Journal, ITP-2015.
3. Maxametov T.D. Optional processors, customization modes, and optimization of the optical form. Dissertation Candidate Technicchnical Nauk - Tashkent, 1972.
4. R. Muradov, S.. Husanov. Karimov "Ways to increase the efficiency of devices for trapping heavy elements in cotton" monograph "Namangan", 2017. p.
5. R. Muradov, S. Khusanov "Improving its efficiency by improving the impregnating elements" Bulletin of NamSU. 2015
6. E.Z. Zikriyoev «Primary cotton processing» Textbook. Tashkent, "Mehnat" 2002
7. FBOmonov "Inventor of cotton processing", Tashkent, "Voris" Publishing Company, 2008.
8. GJ Jabbarov and others. "Technology of primary cotton processing", Tashkent, "Teacher", 1987.
9. Khmyrov V.D. Разработка сайтов и регистрации для естоществления: AutoForest. Dis… cand. technician nauk. Tashkent: TITLP, 1987. - 22 p.
10. Belyaev R.F. Очиститель-regenerator xlopka-syrtsa // Khlopkovaya promyshlennost. 1978. No. 3. S.13-14.
11. N.A.Shemshurin. Issuedovanie ostatochnoy voloknistosti semyan xlopka. Diss.kand.texn.nauk. T., 1960, 171 pp.
12. O. Maksudov, GI Boldinsky. О выделениі семян из срцового валика пилного дина. Collection of scientific works, TITLI, 1967.
13. R. Muradov, A. Makhkamov, and S. Khusanov "Separation of Cotton Crops and Foreign Substances in the Air Flow from the Centrifugal Force" Journal of the Science and Technology Development Science and Technology Journal of Bukhara Institute of Technology.
14. M. Abduvohidov, A. Pirnazarov, S. Khusanov and B. Abdusattarov "Issuance of peace in the world on gesture parameters." International confrence "Science and practice: anew level of integration in the modern world" Confrence proceedings Berlin 2018.

ISSN (e): 2689-0984 DOI: https://doi.org/10.37547/tajet/Volume02Issue07-03

15. R. Muradov, A.Makhkamov and S.Husanov International Conference "Improving the Surface of the Cotton Separator", International Conference "Prospects of Intensive Approach in Innovative Development".
16. R. Muradov, N. Rejapova and S. Khusanov International Conference on "Ways to Increase the Efficiency of the Stone Carrier", "Prospects of Intensive Approach in Innovative Development"
17. R. Muradov, M. Rayimjanov International Conference "Current Status of Cotton Extraction Facilities", International Conference NamETIS 2018
18. M. Abduvohidov, A. Makhkamov, A. And Pirnazarov. Khusanov International Conference on "The Prospects of Intensive Approach in Innovation Development" International Conference on "Innovation Development in Innovative Development".
19. O. And Mamatkulov. Khusanov "Technology transfer in the field of voluntary traffic", Sbornik report Republicansky Technical and Technical Conference "Role of Intelligent Modes and Development of Technical Information", Tashkent State Technical University 2018
20. M. Muradov, O. Sarimsakov, and S. Khusanov, "The ways to improve the transportation of raw cotton," World Journal of Engineering and Technology, http://www.aascit.org/journal/ajst, ISSN: 2375- 3846. 2016.
21. R. Muradov, O. Sarimsakov, and S. Husanov "O nekotory Reserve povysheniya effective pneumothransportirovanny xlopka syrtsa", Journal of Mechanical Issues Issue 2, 2014
22. R. Muradov, O. Sarimsakov, and S. Khusanov "Improving the efficiency of detergent elements by improving them", Collection of scientific articles TITLI 2014