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A Adilova
Tashkent Institute of Textile and Light Industry, azizaadilova80@gmail.com

O J. Murodov
Tashkent Institute of Textile and Light Industry.

P N. Rudovskiy
Kostroma State University

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ANALYSIS OF HARMFUL MIXTURES IN AIR FLOW DURING COTTON CLEANING

O.J. Murodov[1], A. Sh. Adilova[2], P.N. Rudovskiy[3]

[1,2]Tashkent Institute of Textile and Light Industry

Shoxjaxon st.,5 100000, Tashkent city, Republic of Uzbekistan

[3]Kostroma State University st. Dzerzhinsky, 17, Kostroma, Kostroma region., Russia, 156005

Abstract. *The article analyzes the separation of harmful impurities in the air flow from various machines during the initial processing of cotton, ways to clean the dusty air released from the dust, dusty air from the air extracted from dust extractors and pneumatic transport installations and dust and contaminants before release into the atmosphere. The causes and ways to reduce the release of large amounts of dust at all stages of the primary processing of cotton, which can reduce air pollution in production facilities and air, worsen the working conditions of workers and employees and lead them to occupational diseases, especially silicosis. The issue of decontamination of ginneries has been proven to be of paramount importance due to the increasing pollution of machine-picked cotton. Today, with the widespread introduction of machine picking, the ginning industry is urgently needed not only to improve the technological process of receiving, storing and processing cotton, its drying, cleaning and processing, but also to improve dedusting and air purification systems. theoretical and practical research on the need for measures to be implemented. Dusty air is initially coarse, moderate, and water purification percentages of cleaning efficiency are given. The results were analyzed and optimal parameters were recommended.*

Keywords: *seed cotton, dusty air, cyclone, dynamic analysis, dust particles, pneumatic transport, conical cyclone, mineral fractions, air circulation speed.*

INTRODUCTION. Large amounts of dust are released at all stages of the initial processing of cotton, which pollutes the air in the production facilities and the atmosphere, worsens the working conditions of workers and employees, and can lead them to occupational diseases, especially silicosis. The issue of decontamination of ginneries is of paramount importance due to the growing pollution of machine-picked cotton. Today, with the widespread introduction of machine picking, the ginning industry needs not only to improve the technological process of receiving, storing and processing cotton, drying, cleaning and processing, but also to improve dehumidification and air purification systems. measures should be taken.

At a time when the world is doing a lot of research to keep the environment clean, the dusty air coming out of the ginneries of the Republic also leads to a certain amount of environmental degradation. Today we need to pay serious attention to the issue of dusty air purification. To solve this problem is to choose a cleaning technology, taking into account its composition in the cleaning of dusty air entering the dust collectors, that is, firstly: to create an environmentally friendly cotton ginning plant; secondly, one of the important tasks is to carry out targeted scientific research in areas such as the development of effective technology for the treatment of residual dust by trapping fibrous waste that is emitted into the waste [1].

MATERIAL AND METHODS. In cotton mills, a certain amount of dust is released from the cotton during the initial processing of seed cotton. According to health norms, the amount of dust in each cubic meter of air should not exceed 10 mg / m^3, and the amount of dust emitted into the atmosphere from factories should not exceed 150 mg / m^3. In ginneries, this condition requires that each machine be cleaned before releasing harmful dusty air into the atmosphere [2].

Powder from seed cotton consists of these organic and mineral fractions, the organic fraction consists of crushed particles of cotton branches, leaves and stalks, and crushed fiber fragments.

The mineral fraction consists of particles of soil, sand and other bodies that are added to the cotton during harvesting.

At the beginning of the technological process scheme, ie during transportation and cleaning of seed cotton, mainly mineral dust is separated from it, and at the end of the technological scheme, ie during ginning, lintering, fiber cleaning and pressing, mainly organic fraction of dust is separated. 10 ... 20% of the dust released in the pneumatic transport system is the organic fraction, 80 ... 90% is the mineral fraction, and at the end of the technological scheme, ie 80 ... 90% of the dust from the gin and linter condensers is the organic fraction [2].

The amount of dust in the air around the process machines and in the production shops depends on the type of cotton seed being processed, its moisture and contamination. given the percentages of magnitude and quantity [3, 4, 5].

The size and percentage of dust particles

Table 1

Size mkm	0—50	50-70	70—90	90-160	160-190	190-250	250-500	500-1000	1000
The amount of dust particles,%	3	12	9	5	4	11	12	9	3

Table 2 provides information on the amount of air and dust emitted from the main process machines.

Air from the main process machines and the amount in it

Table 2

Machines	Air emitted into the atmosphere	Amount of dust in the exhaust air
Pneumatic conveying fans. …..	4,5 – 7	4000 . . .2000
Two gin capacitors. …..	3,2	500 . . . 2000
four gin capacitors.	6,4	500 . . . 1500
five linter condenser.	5,0	800 . . . 2000
six linter capacitors……..	6,0	800 . . . 2000
seven linter capacitors.	7,0	800 . . . 2000
pneumatic seed cleaner. …………...	1,5	300 . . . 800

In cotton mills, the extraction of dust directly from the outlet is called local suction.

Local absorption of dust is the main method, as dust is released from all the machines used to perform technological processes in cotton mills.

Table 3 shows the amount of dusty air that can be extracted from the process mash.

Each vacuum cleaner is characterized by a dust holding capacity (%) determined by the following formula:

$$\eta = \frac{G_1}{G_2} \cdot 100,$$

where G_1 is the amount of dust in the exhaust air; G_2 is the amount of dust held by the dust collector.

The dust holding capacity of each vacuum cleaner can also be determined by the following formula:

$$\eta = \frac{d_1 - d_2}{d_1} \cdot 100,$$

where d_1 is the dust content of the air entering the dust trap; d_2 is the dust content of the air coming out of the dust collector.

The amount of dusty air that is sucked out of process machines

Table 3

Machine name	Absorbed air volume, m^3 / s	Air dust, mg / m^3
Screw cleaner.	1,1	500...1000
Double drum-saw cleaner.	0,88	15000...400000
Four drum saw cleaners.	1,80	150000...400000
Jin's four drum supplier ...	1,8	50000...150000
12-roller demon battery	2,7	100...500
5 linter battery.	1,1	500...800
8 linter battery.	1,8	500...800
Waste cleaner battery.	0,2-0,25	30000...200000
Fiber transmitter to press box.	0,6	100...300

In order to purify the dusty air that is released into the atmosphere, the air sucked from the dust extraction machines and the dusty air from the pneumatic transport installations must be cleaned of dust and contaminants before being released into the atmosphere. Dusty air is initially coarse, moderate, and waterlogged.

During rough cleaning, particles larger than 100 mkm (10^{-6}) in size are separated from the dusty air, and more than 150 mg / m^3 of dust may remain in the cleaned air.

On average, dust particles with a size of 10 mkm (10^{-6}) and larger are separated, and the dust in the cleaned air does not exceed 150 mg / $m^{3.}$ Such air can be released into the atmosphere.

During fine cleaning, small dust particles of 10 mkm (10^{-6}) are also captured, and the particles remaining in the cleaned air do not exceed 2 ... 3 mg / m^3. Centrifugal dust traps (cyclones) are often used to clean dusty air before it is released into the atmosphere.

In cyclones, the air is cleared of large dust particles larger than 50 mkm (10^{-6}). When the air flow inside the cyclone turns in the form of an Archimedean spiral, centrifugal forces are created, under the influence of which the dust particles hit the outer wall and fall to the bottom of the cyclone.

rises rapidly from the cyclone to the atmosphere. However, it should be noted that today these cyclones, invented in the late XIX century, are obsolete, and the development and analysis of the forecast to increase the efficiency of newly modeled cyclones based on dynamic analysis of the movement of harmful compounds in the air stream during cotton ginning is very important. Although cyclone separators (later "cyclones") were manufactured in the late 19 th century and were obsolete, they are still the most popular cleaners today and have very few analogues. In fact, it is the invented cyclones that are designed for extreme temperatures, pressures, and solid particle loads due to the many capital investments and maintenance-free operation, the absence of moving parts, high reliability, and the advantages of separating existing solids from process gas streams. is an analogue, a copy [3].

A conventional cyclone consists mainly of a cylinder equipped with a tangential inlet, a dust chamber, and a vertical outlet pipe in a conical cleaning vessel, commonly referred to as a vortex finder. The flow of dusty air in the process enters the cyclone at a very high angular velocity tangentially, so that the flow begins to rotate and changes its direction downward from the top of the section of the cone. Therefore, the dust particles are collected in a dust collection chamber attached to the bottom of the section of the cone, and the dust-free air is directed upwards and exits the cyclone through a vortex trap (Fig. 1).

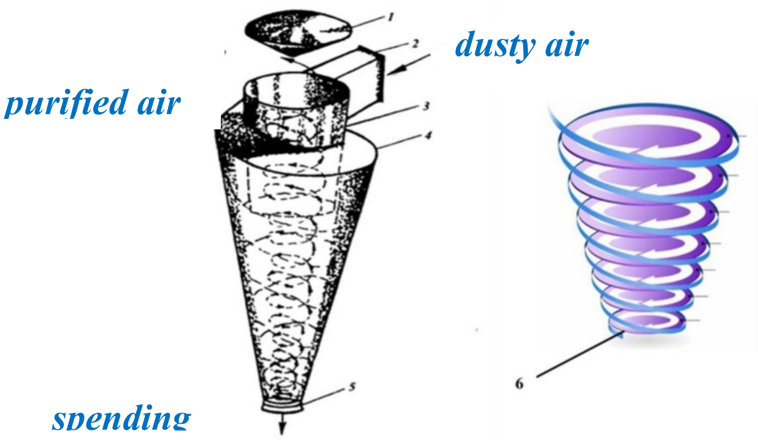


Figure 1 Diagram of a conical cyclone device:
1-rain valve; 2-inlet pipe; 3- internal full truncated cone; 4-outer full truncated cone; 5-dust collector; 6-trajectory of dusty air entering the inner surface of the cyclone.

The conical cyclone consists of the following parts (Fig. 1): air inlet tube 1, hollow cut outer cone 2, second cut inner cone 5, rain cover 4 and dust trap 5, dusty air trajectory 6 hitting the inner surface of the cyclone. The centrifugal forces generated when the dusty air enters the cyclone through the test tubes 1 reduce the speed at which the dust particles hit the outer wall. At the bottom of the cyclone, the airflow creates a thinning at the transition point to the inner cone, clearing the air of dust as the fresh air moves upwards and the dust particles move downwards.

There are many types of dust collectors available today, depending on the properties of the dust. For example: filters are used in fine-grained dust plants, when using electrostatic precipitators, they are used depending on the charging properties of the dust particles. Such dust collectors are mainly used in places where dust particles are relatively low.

ЦП-6, ЦС-6, ЦЛ-3, ЦС-3, ВЗП-1200, etc. are used to clean the air from organic, mineral and other pollutants currently used in ginneries. Different types of dust collection equipment such as are widely used. Dry dust collectors are widely used in cotton ginning plants to clean the polluted air and release it into the atmosphere. Dry dust collectors include two-flow dust collectors. Nowadays, the most common in the industry are single-flow dust collectors.

[12] stated in the study that dust collectors are based not only on the separation of dust but also on its control.

We can divide 3 types of dust traps operating on the basis of single-flow centrifugal force: cylindrical, conical, cylindrical-conical (Fig. 2).

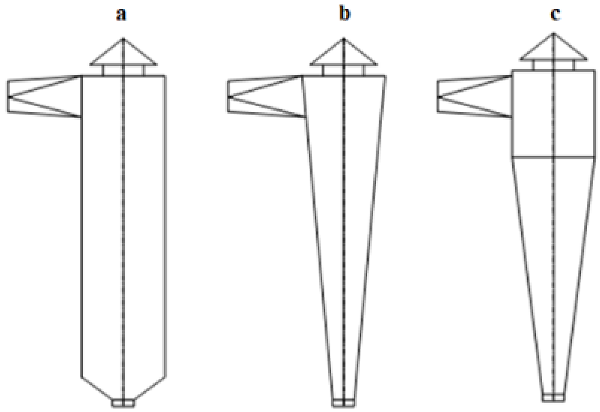


Figure 2. Schematic of a single-flow dust collectors
a) cylindrical; b) conical; c) cylindrical-conical.

Cylindrical dust collectors are not currently used. This is because the airflow that enters it begins to circulate based on the centrifugal force. As the number of rotations increases, it is unable to deliver dust particles to the wall as the airflow velocity decreases. As a result, dust particles cannot reach the dust trap wall, which reduces the cleaning efficiency.

ЦС-3 type dust collectors have high cleaning efficiency when they enter the cone dust collectors, but one of their main drawbacks is that when the dust air stream entering the dust collector vertically enters the dust separator chamber, the air flow hits the sloping side of the cone. the aspiration to the upper part occurs. This force prevents the airflow from moving in a spiral, resulting in a loss of force that spirals the separated dusty air and causes a sharp decrease in the cleaning efficiency of the dust collector.

In general, for static dust collectors to work effectively, the static drop in air pressure must be carried out in a uniform manner, a situation we can also see in the following research paper. The change in pressure definitely depends on the geometric size of the dust collector.

In addition, the speed of the air depends on the power consumption of the fan, which creates the pressure of the air entering the dust collector.

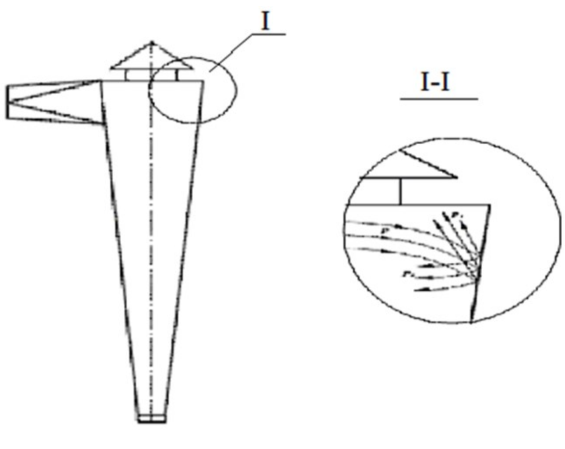


Figure 3. Pressure loss in the conical dust holder

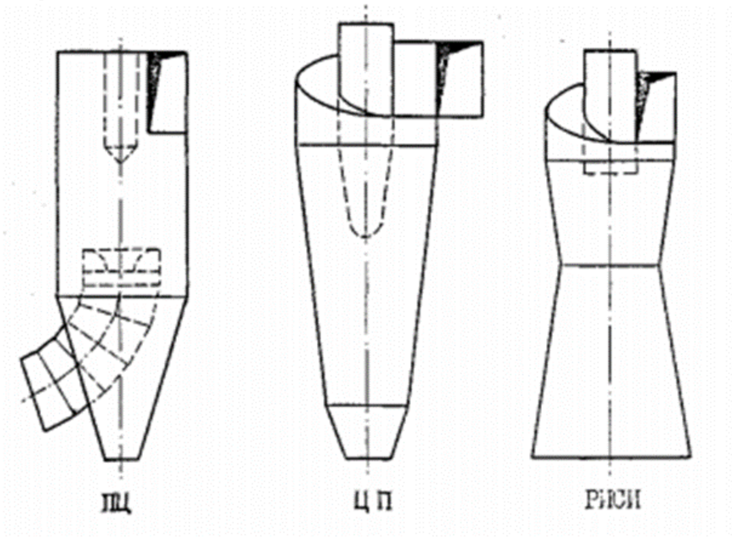


Figure 4. Dust collectors used in foreign and domestic ginneries

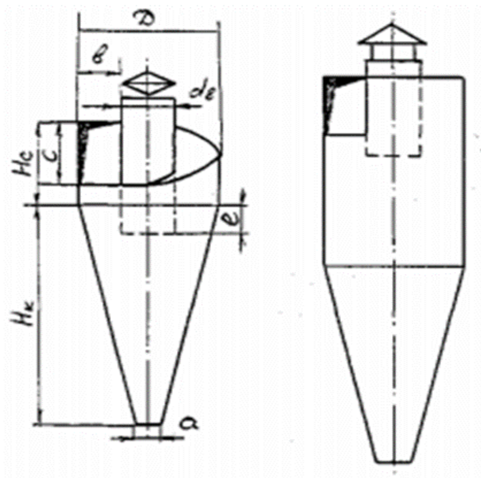
As can be seen from Figure 3, the airflow coming with force P is divided into two forces P_1 and P_2, which leads to a decrease in airflow force.

As a result, the cleaning efficiency is reduced when dust particles in the dust trap cannot reach the wall.

$$P = P_1 + P_2$$

A study of dust collectors shows that their cleaning efficiency increases when the pressure of the air flow entering the dust collector is spent in the same direction. With this in mind, cylindrical-conical dust traps that move the air pressure in the dust trap in one direction have been developed and introduced into production.

The effectiveness of individual cotton dust collectors also depends on factors such as its diameter, location, operating mode. Dust released into the atmosphere from dust collectors is often 8-10 times higher than PVD. The construction of some dust collectors abroad and at our own ginneries is



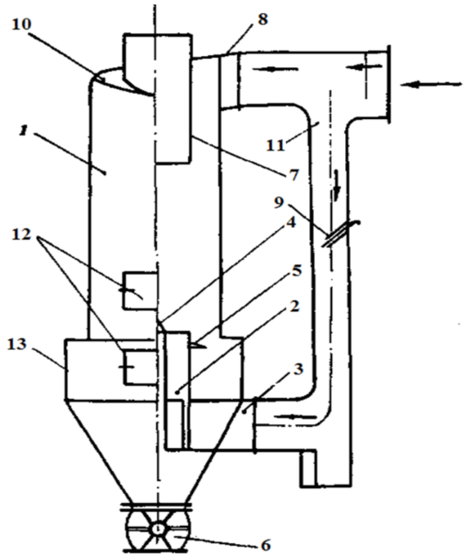
shown in Figure 4.

UD_v = 0.55D; C = 0.45D
B = 0.225D; Hs = 0.6 D Hk = 2.5 D; d = 130mm e = 0.1D

"Continental Moss Gordian", "Platt

SP-3 dust collector has the lowest (520 Pascal) US dust collector has the highest (1100-1300 Pascal) hydraulic resistance. The clearance rate is high in the УЦ-1.5 dust trap (90%) and low in the ЦП-3 dust trap (75%). Due to the fact that recommendations have been developed for the introduction of floating dust collectors in the cotton ginning industry.

Sliding dust collectors are also dry type dust collectors with circulating flow. The VZP dust collector, manufactured by scientists of the Moscow Textile Academy, is also successfully used in the chemical and other industries. One of their main features when compared to other dust collectors is their high efficiency (Figure 5). The ВЗП -800 and ВЗП -1200 dust collectors consist of a cylindrical body, at the bottom of which is placed a tangential coil 2, an inlet pipes 3, and work to transmit the primary flow of dusty air. A cylindrical suction cup is placed on the axial boundary of the rotator [6].



1 - separation chamber; 2 downstream vortexes; 3 - tube; 4 - squeezer; 5 return washer; 6 - vacuum-valve. 7 - air outlet pipe; 8 - tube; 9 - shiber; 10 - high flow vortex; 11 - supply air duct; 12 - observation cover; 13 - bunker;

Figure 5. Sliding ВЗП dust collector.

ВЗП dust collectors operate as follows: Two one-way rotating dust air stream enters the mixer or separation zone located at the top of the suction pipe and the primary criterion. Particles held under centrifugal force are separated (separated) into a wall and flowed downstream from the bunker. From there it is discharged through a non-stop vacuum valve. As the downward secondary current flows in a spiral (rotation) direction along the wall of the equipment, the return washer pushes it upwards and joins the primary current. It goes out of the suction tube with it [7, 8, 9, 10, 11, 12, 13, 14].

RESULTS. High humidity in the system and humidity of dust particles moving in it increase the likelihood of clogging of air purifiers and can lead to a loss of reliability of its use. According to the principle of operation of cyclones, as the speed of the air entering it increases, the dust holding capacity of the cyclone increases, and at the same time the resistance of the cyclone increases. The circulation speed of the air inside the cyclone is normal when it is 14 ... 18 m / sec, and the dust holding capacity is 94 ... 97%.

Based on the conducted analytical analyzes, it is necessary to pay great attention to the issue of separation of their constituents in the cleaning process today with an in-depth study of the dust content. In particular, to date, the analysis of existing dust air purification technology and the operation of existing equipment shows that no scientific and practical research has been conducted on the process of cleaning dusty air, taking into account the fractional composition.

CONCLUSION. Based on these issues, it is necessary to point out the following:

1. The effect of the dust particles transferred to the dust collectors currently in use on the cleaning process and its composition have not been studied;
2. Theoretical and practical research on the geometric dimensions of dust particles entering the dust collectors and their fractional composition has not been conducted;
3. Although the laws of motion of particles in the dusty air stream emitted in ginneries have been studied, the laws of motion of dusty air streams as a multi-component mass have not been studied;
4. Regular cleaning of dusty air and retention of fibrous wastes remains one of the main problems today.

Although the basic design of cyclones is very simple, their flow physics is very complex due to the three-dimensional nature of the flow, high turbulence, strong anisotropy and interaction between liquid, dust particles and the surrounding wall, and has not been fully studied even after decades of research.

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PROTECTION OF TRANSPORT STRUCTURES FROM NATURAL EMERGENCIES

Sh.H. Abdazimov[1], R.S. Razikov[1], G.A. Kurbanov[2]

[1]Tashkent State Transport University. 100167, Tashkent, Uzbekistan.
[2]National University of Uzbekistan. 100174, Tashkent, Uzbekistan

Abstract: *In the mountainous and foothill areas of the republic in spring and late autumn, heavy rains and floods cause landslides on the slopes, landslides as a result of coagulation of most of the land. At the same time, careless grazing of livestock on the slopes, felling of trees in the foothills, as a result of strong floods, the water flow on the slopes flows downhill, washing away all the debris, rocks and sand, endangering the movement of passenger and freight trains. . This article aims to protect against the above-mentioned situations, to ensure the safety of transport facilities. At the same time, there is a discussion of natural disasters in the country and their impact on the economy. In particular, the lines of railway transport passing through mountainous and foothill areas and the stations built there, power transmission devices and all devices that organize the movement of trains, traffic lights, electric lights, tunnels, bridges and similar railway buildings and structures, as well as economic enterprises, mountains. proposals and comments on protection of settlements located on the slopes from floods and landslides.*

Keywords: *railway, brushwood, sand, stones, heavy mudflows, erosion, landslides, collapse.*

INTRODUCTION. The protection of transport facilities in the event of natural disasters will be the main basis for the uninterrupted operation of these vehicles and the safe handling of household goods. It is known that the Tashguzor-Boysun-Kumkugon railway line connecting the Republic with the south passes through mountainous areas. There are also facilities on the Angren-Pop route. There are also bridges over several cliffs in these areas. A railway line passed through the mountainous area, surrounded on both sides by mountains. This is due to the arrival of strong floods and landslides in early spring and late autumn, which closes the road, causing several trains to stand, which disrupts the entire railway traffic schedule.