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Effective Cleaning of Cotton Waste Produced at Cotton Cleaning Factories

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This article provides information on the effective cleaning of dusty air on dust collectors, depending on the processing of raw cotton of different classes, as well as industrial grade. Analytical and experimental studies have been carried out to improve the cleaning effect of a dust collector of the type of a SS by changing the slope of the incidence of the incoming pipeline. The value of the angle of inclination in the walking pipeline with the minimum concentration of dust emerging from the dust collector.

Introduction

It is known that at present time the principle part of a volume production in Uzbekistan is cotton cleaning industry. Nowadays, the cotton cleaning factories face the problem of raising the standards of manufactured products. In order to solve this problem innovative equipment and technology for cotton processing have been installed at companies of cotton industry.

A great attention is paid to a law of "Preservation of atmosphere" adopted in December, 29 in 1996 and a work of the first president concerning ecological problems in fast terms and progress guarantee, air pollution, ecological problems in our republic world financial-economic crisis in the book "Solutions, ways and measures in terms of Uzbekistan, modernization of technological and technique reprocessing and supporting the small business subjectivities financially [1].

In recent years despite the fact that vortex dust collectors (VZP) way out from manufactures of cotton cleaning industry, they remain more effective in cleaning air than other dust collectors. The reason for getting out of production is that after a certain period of time the clogs are formed in it. To find out the cause of that the practical research of dust collectors were conducted [2].

Method

To emission dust from the center of transforming dust collectors as a result of air rotary in mounting locator are passed from used dry collectors mechanically.

Dust locator mounting might be cylindrical, cylindrical-mounting, or mounting in shape. Dust air gets into dust locator

through the pipe with the speed of 14-18 m/s and it moves along the inner part of round moving. From the center of transforming power the dust particles pushed out to the inner part, storage dust is gathered then it goes into dust pipe and goes out to dust bunker, [3], [4].

Having spun airflow loses the speed to the 2,5-3 m/s, goes into inner part and is thrown out by means of upper aperture. Usually dust collected in the bunkers of dust collectors is taken away by a screw conveyor.

There are several differences between dust waste produced by cotton cleaning industry and other industrial manufactures, for example fiber impurity tackiness, size dimension, amount of reeling degree and others. Consequently, it is complicated to conduct research of dust collectors used in cotton cleaning factories.

It is known that besides organic and mineral impurities there are fiber impurities in air composition W entering the dust collectors (figure 1)

here, $W = W_1 + W_2$

W_1 - a number of impurities taken from dust collectors, kg.

$$W_1 = C_1 + C_2 + B_o \tag{1}$$

here, C_1 - a number of organic impurities taken from foreign matters composition, kg.

C_2 - a number of mineral impurities taken from foreign matters composition, kg.

B_o - a number of fiber impurities taken from foreign matters composition, kg.

W_2 - a number of air impurities cleaned in dust collectors, kg.

$$W_2 = C_1' + C_2' + B_o' \tag{2}$$

here, C_1' - a number of organic impurities cleaned in dust collectors of air composition, kg.

C_2' - a number of mineral impurities cleaned in dust collectors of air composition, kg.

B_o' - a number of fiber impurities cleaned in dust collectors of air composition, air.

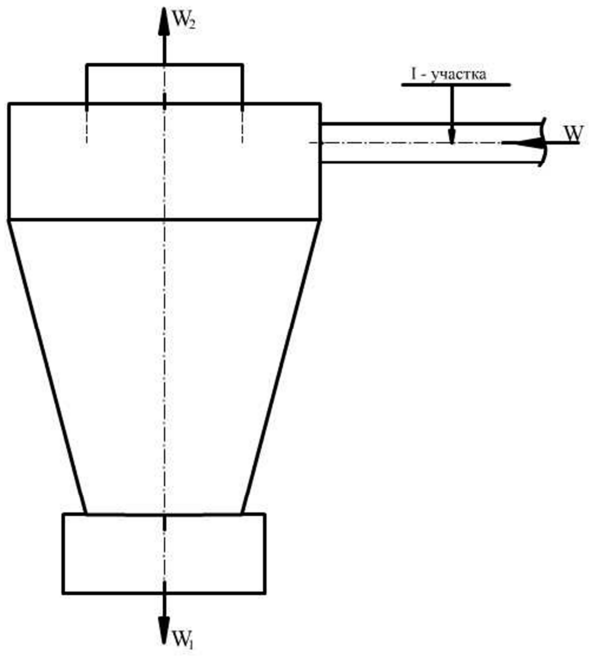


Figure 1. *Movement of entering and going out of dust collectors.*

There are several ways of determining concentration of dust going into atmosphere from cotton cleaning manufacture (color metric, netelometric titrometric, indicative optic, electro also standards or geometric and others); the most convenient and popular is a standard method. [5], [6].

Its working principle is that it transmits certain amounts of dusted air through a filter with beforehand measured weight. After transmitting the air filter's weight is measured one more time. The difference of filter's weight (mg) by means of filter moving air's ratio with measured of going out concentration to atmosphere hove determined. This dimension is measured in mg/m^3.

To take samples the filter AFA has been chosen. This filter also successfully catches the tiniest particles of dust, also aerodynamic resistance is small, that allows a big volume of air transition up to 100g/min. Besides that, AFA filter pushes the moisture from itself.

A volume of air going through the filter is measured by rotameter, rheometer or Migunov's aspirator.

There are cork section in rotameter a volume of passing air is measured by this device concerning to cork section's height.

Migunov's aspirator consists of four little rotameters and a pump and is a comfortable device to be used to measure dust concentration in conditions of factories.

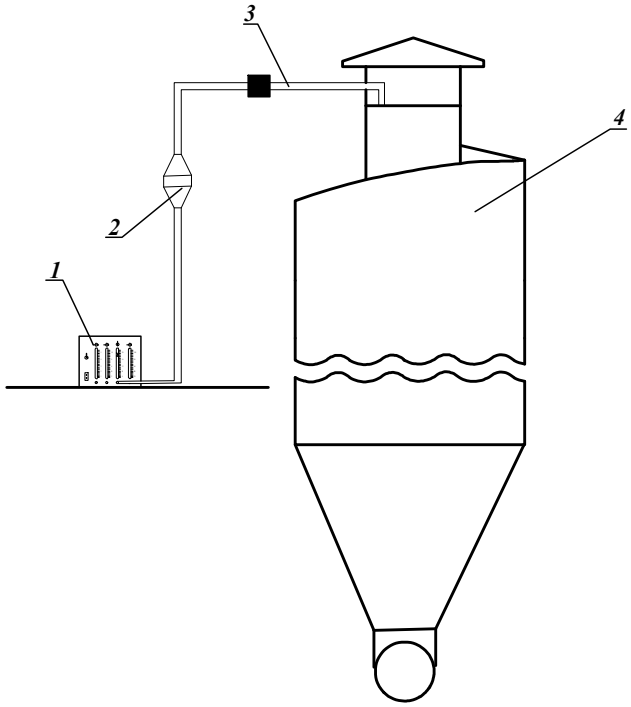
Figure 2. *The general appearance of rheometer.*

Rotameter device has four diaphragm (figure 3) absorbing the air and giving change opportunity. Each rotameter has its own registration certificate.

Jointly with "Preservation of atmosphere environment" committee a practical research was carried out to measure dust going out into atmosphere from "Korosuv" cotton cleaning factory. [4].

General view of setting the system to determine dust concentration is shown on picture 3.

Token AFA weight was measured in advance in side of filter branch (1) pipe we install evenly and fix thoroughly. Than one and of filter branch by means of hose is fixed air section-valve (3), on another end of filter branch by means of hose is fixed a rheometer (1) (figure 2). After preparing a device for practice suitability then, it is fixed on the dust locator SS-6 (4) taking accounts of its safety. Bang out from dust locator to atmosphere the tube is mounted vertically, seconds counter and rheometer are switched simultaneously and worked for 5 minutes. After stoppage both ones AFA filter is taken from inside of branch pipe, it is put in four formatted sack not to pour out the dust [7], [8].



1-reometre; 2-branch pipe; 3-air absorbing pipe, 4-SS-6 dust locator

Figure 3. *Scheme for determination of dust concentration of a device.*

Filter is measured on analytical scales and weight is written. If we note format weight g1 and than g2, a volume of air is going through by means of filter V, in this case its air concentration is found the following.

$$C = \frac{g_2 - g_1}{V}, \quad mg / m^3 \tag{3}$$

In order to find a measure of absorbing air by means of filter coefficient $k = 0,91$ a duration of practice has absorbed for a minute, and multiplying of air volume is measured with ratio of 1000 to then (t)

$$V = k \cdot \frac{Q \cdot T}{1000}, \quad m^3 / \min \tag{4}$$

It is known, Q l/min, t-minutes. To convert this dimensions m^3 it is divided into 1000 quantity. United (3) and (4) formulas, it is written the following:

$$C = \frac{(g_2 - g_1) \cdot 1000}{Q \cdot T \cdot k}, \quad мg / м^3 \tag{5}$$

Having known the speed of air flow going into dust collectors, mass of dust particles and what wear it is, when the particles rub strongly we were able to say articles separation. Therefore, it was necessary to study practical aspect of trajectory and this problem has researched.

There were researched the practical and theoretical experiences to study the cleaning efficiency in two types of VZP-1200 and SS-6 of dust collectors in case of delay of amount of dust impurities in dust collectors, according to this connection the place of cednus of pneumotransport pipe produced from “Metan” cotton cleaning manufacture unscrewing the bolt the pipes home token off. After that the principle wire which is done from screen with blue measures of 2x2 mm woven like baggy installment placing inside of pipe pneumotransport pipes were refastened.

The surface of pneumotransport pipes with the following help is determined

$$f = \frac{\pi \cdot d^2}{4} \quad м^2 \tag{6}$$

here: d - the inner diameter of pneumotransport pipe is 420 mm.

The baggy screen's length in the large particle impurities have chosen.

The diameter of different screen is also alike of inner diameter. In chasing the length of serene for 30 minutes taking into accounts maximal volume of inside release of impurities of 2 m have chosen. In this case the total air transition of pipe is less to aerodynamic resistance. The surface of different serene is expressed by formula

$$f_{tur} = h \cdot \pi \cdot d \quad \text{м}^2 \tag{7}$$

here: h - the length of serene varieties of 2 m

Results

Turning the pitch of air going into dust locator using the laforatory the air conductivity was 10 l/min bay means of determination of fiber AFA weight the dust concentration has been researched [9], [10].

As it shown in table if the entering air relatively to axis pitch corner is $\alpha = 20°$ the dust concentration is low.

Table 1. *Inclined relation of dust concentration of air pipe.*

The amount of experiments	The sort of equipment	The sloping α angle of air pipe degrees	Time, T, min	The capacity of air, Q, l/min	The weight of AFA filter before experiment, g_1 mg	The weight of AFA filter after experiment, g_1, mg	Concentration of discharging dust C mg/m^3
	SS-6	10	5	10	1,221	12,596	250,0
1	SS-6	20	5	10	1,315	8,140	150,0
	SS-6	30	5	10	1,021	10,121	200,0
	SS-6	10	5	10	1,003	11,923	240
2	SS-6	20	5	10	1,215	6,129	108,0
	SS-6	30	5	10	1,321	9,966	190,0
	SS-6	10	5	10	1,256	11,129	217,0
3	SS-6	20	5	10	1,315	6,002	103,0
	SS-6	30	5	10	1,098	6,012	180,0

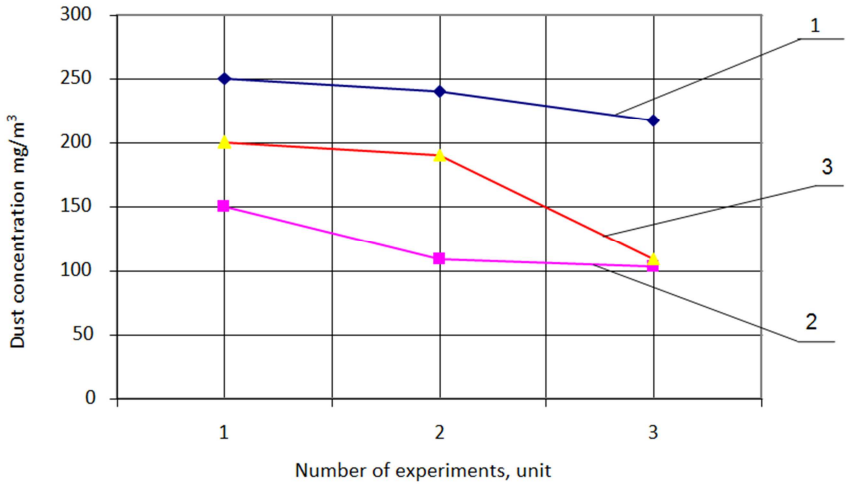


Figure 4. *Change of dust concentration 1-declinedcorner* $\alpha = 10°$ *, 2-declined corner* $\alpha = 20°$ *, 3-declined corner* $\alpha = 30°$.

The concentration relation relatively to axis of air pipe going into dust locator.

Discussion

Relatively to horizontal axis of $\alpha = 20°$ air pipe of dust locator which is going out from fiber condenser of "Korasuv" cotton cleaning manufacture turning to under corner for production analyzed in picture 4. In figure 1 there were shown the inclined connection of entering air concentration of pipe position stated.

Conclusions

In collusion we should say that the entering air into air collectors relatively to norizont, where $\alpha = 20°$, dust concentration which is going out relatively got increase till 40-60%, this principal cause was proved in practical researches, the number of dust vocation of particles is increased and as a result wear of locator barrier of dust particles has increased. This state of particle's speed tall and separate from air flow nowadays with the aim of separation of fiber impurities in cleaning process of dust collectors is not paid attention. ■

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