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To the Question of Cleaning Air of Industrial Premises

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ABSTRACT: In this paper, the problem of air purification of an industrial enterprise is considered, an installation and a method have been proposed to reduce dust emission into the atmosphere.

KEYWORDS: ecology, dust, cleaner, cotton, ellipsoid motion.

I. INTRODUCTION

The ecology of industrial production, the creation of favorable conditions for workers, in particular the purification of the air in the working area of industrial premises, remains relevant to this day. One can cite a number of scientific works devoted to this topic.

II. LITERATURE REVIEW

So, the researchers E.A. Vasilyeva and others [1] considered the main production, the air of the working area of which is contaminated with organic acetates. The work contains regulatory documents regulating the concentration of ethyl and butyl acetate in the air of the production room, described and analyzed methods of air purification from ethyl acetate and butyl acetate vapors.

The researchers OA Onorin and others [2] critically analyzing existing devices for air purification of the production area, allowing to increase the degree of its purification from gaseous components, and also ennobling the atmosphere of the production area, suggested your option. The technical effect is achieved by the fact that the supply device afterburner unit increases the degree of purification of gaseous components, the supply of deodorization unit creates favorable atmosphere of the production area. Perform all device blocks in the shape of the honeycomb structure makes it possible to evenly distribute the Khalgaroilmiy - amaliaanzhuman heat 6 purified air throughout the volume of the device. Afterburner block from ceramics, in the cells of which nichrome wire is placed, for example in the form of a helix, allows for reburning harmful gases, such as CO, NO, to less harmful. Technological process of cotton preprocessing accompanied by a significant release of dust from the technological and transporting vehicles to the production premises and the atmosphere. For creating normal sanitary conditions is necessary dedusting of industrial premises and individual dust extraction installations.

The technological process of cotton preprocessing is accompanied by a significant release of dust from technological and transporting machines to the production premises and the atmosphere. In order to create normal sanitary and hygienic conditions, it is necessary to dedust the production rooms and separate dust-removing installations, [3].

At the beginning of the technological process, during transportation and cleaning of raw cotton from weed impurities, mineral dust is mainly released and pollutes the air, and at the end of the technological process, especially when casting and ramming, dust of organic origin is emitted. Depending on the initial mass, the base rate of weediness is: for I - raw cotton varieties - 0.5%; II - varieties - 1%; III - grade 1.9%; IV - 3.6%, [4].

According to the health standards in each cubic meter of air, the saw content should be no higher than $10 \text{ mg} / \text{m}^3$ and the dust content of the air expelled into the atmosphere should be no higher than $150 \text{ mg} / \text{m}^3$. To fulfill this condition in the cotton ginneries on each machine the air is cleaned. Most occupational diseases at cotton plants and cotton

harvesting centers are associated with the entry of cotton dust containing free silica into the upper respiratory tract, [5]. The dust content of cotton can be relatively low - 10-30 mg / m³, however, this dust can contain up to 40-50% of mineral substances. When processing low grades of cotton, the dustiness of the air in the room can reach 400 mg / m³, but the mineral content of the dust is reduced to 13-16%. Studies have shown that with the use of the fibrous material purifier design developed by us, the dustiness of the atmosphere rises and amounts to -160 mg / m³ when processing Grade I; Grade II - -170 mg / m³; III and IV grades - 190 mg / m³; V - and VI-grades 200-210 mg / m³.

III. WORKING OPERATIONS

For air purification, we offer the following installation. The design of the device we developed is simple; a fan sucking in air flow helps separate the debris from fibrous materials and the injection fan cleans polluted air from waste and releases clean air to the atmosphere through the filter. (See figure 1.).

IV. METHODOLOGY

The device works as follows: a suction fan 3, built into a pipe with a diameter of 400 mm, a wall thickness of 3 mm, a height of 300 mm, connected to a pipe 2, draws dust from the cleaners at an air speed of 5 meters per second, mixed with air through the inlet 1, and transfers it to a horizontal pipe 4, the wall thickness of which is 2 mm. On the right side of the pipe, an injection fan 5 is mounted, which blows air into the horizontal pipe at a discharge rate of 5 meters per second. At the end of the horizontal pipe there is a mesh filter cover 7, filled with a bucket, which, catching particles of fiber, leaves, stems, cinnamon, releases clean air into the atmosphere, fine dust (dust, sand ..) falls through hole 6, which is located from the edge of the cover at a distance of 50 mm where the canvas bag is placed. The filter cover is hinged, so that it can be conveniently opened and closed.

Studies have shown that particles of pigs, sucked by the fan along with the air, fall in the flow, injected by the second fan in a horizontal direction.

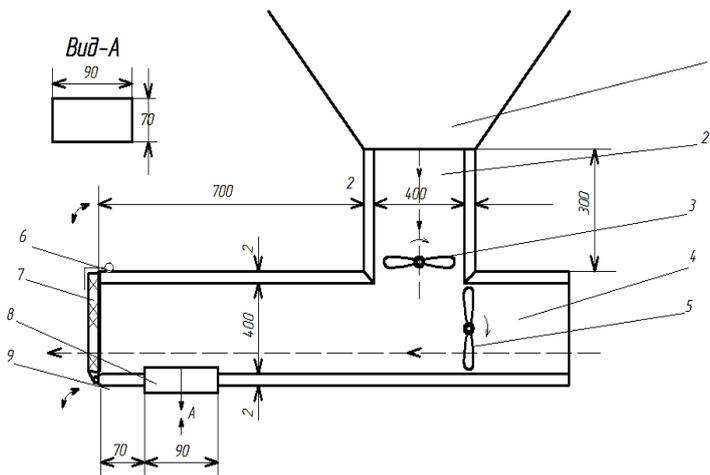


Fig.1. Air purifier for cotton ginning and processing machines.

1-inlet, 2-pipe, 3 – intake fan, 4– pressure pipe, 5-forcing fan, 6 – pressure wrench, 7-filter, 8-hole for heavy impurities exit waste, 9-hinge.

According to mathematical calculations, when two currents of air meet, an ellipsoid motion is formed in two seconds, then, after completing a second circular motion, under the action of a forcing fan, it turns into a horizontal motion.

V. RESULTS OF RESEARCH

When applying to the production of our proposed air purifier, several times reduced air debris released into the atmosphere from cleaning machines. Experiments show that during the processing of the I-grade, the dustiness of the air is 10 mg / m³; Grade II - 15 mg / m³; III - varieties - 17 mg / m³; IV - varieties - 21 mg / m³; V - grades - 23 mg /

m³; VI - varieties - 25 mg / m³; VII - varieties - 27 mg / m³. Figure 2 shows a comparative analysis of the dust content of the air.

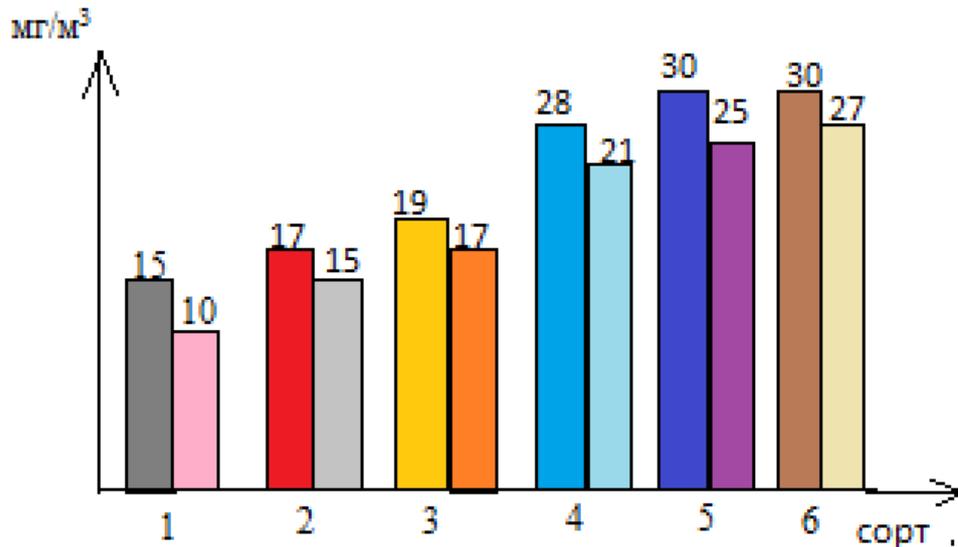


Fig.2. Comparative analysis of dustiness of air.

From the analysis it can be seen that the proposed cleaning method helps to improve the purification of the atmosphere of air in an industrial room...

VI.FINDINGS

Based on the above research, the following conclusions can be drawn:

- there are a number of ways to purify the air of industrial enterprises, allowing to a certain extent to solve environmental problems;
- despite the work done, the problem is still relevant;
- the proposed method and installation for cleaning industrial premises from industrial dust, allowing you to create favorable working conditions.

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