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Analytical Analysis of The Technology for Cleaning Wool Fiber from Small and Large Impurities

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Abstract

It was found that the supply mechanism of the traction-cleaning equipment used in enterprises is inconveniently made, which negatively affects the performance of the equipment, the quality of the fiber and causes a significant decrease in economic efficiency. Wool fiber traction-the most basic and complex construction of the cleaning equipment includes the supply mechanisms.

Keywords:

Introduction

The raw materials adopted for the initial processing of wool fiber are sorted and separated from light mixtures by hand. Wool fiber traction-with the help of cleaning equipment, organic and mineral waste, heavy impurities and impurities in the raw materials are cleaned.

Difficult separable plant residues in wool fiber remain indistinguishable even during the teat-cleaning and washing process. It is cleaned using acid as well as mechanically to remove plant residues. In European countries, the processes of initial processing of wool fibers have developed at a high level, and homashyo has a special place in the processing of Textiles[1]. The supply of wool was organized in an interconnected cluster system, starting from the farm where the animals were raised and ending up in the state of the finished item. (Figure 1) [2].

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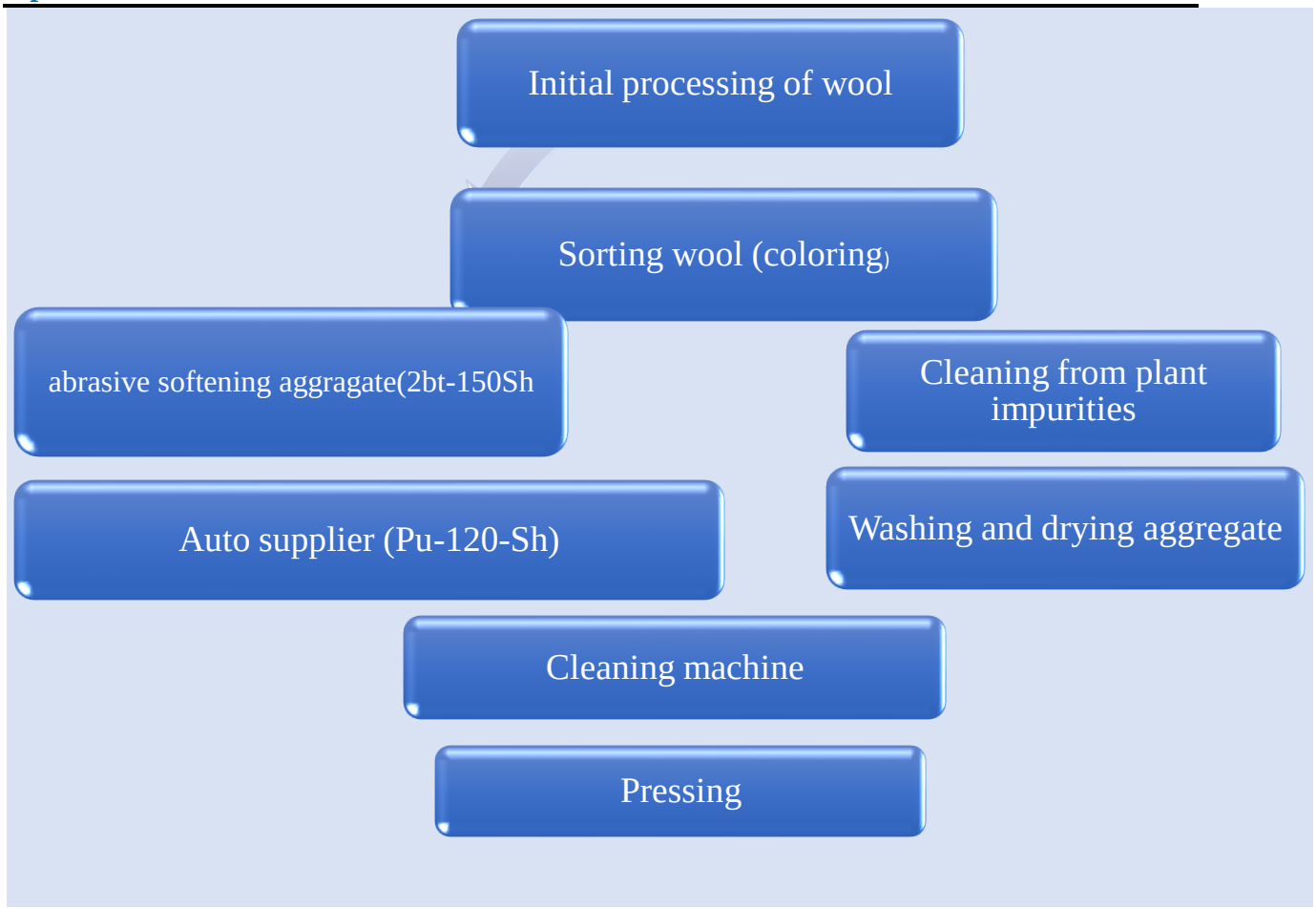

Figure 1. Technological scheme of processing wool

Wool fiber is sorted according to the first listed wool colors (runo) in the initial processing process. The sorting process is of significant importance and should be divided into types. The organization of the initial process of processing wool on the basis of regulations is associated with the preparation of quality wool fibers. The initial processing of wool fibers is carried out at the Enterprise “Hisori fine wool” LLC in the Oltinsoy district. Wool fibers are sorted by color and separated into varieties [2].

Some impurities are removed by shaking them on the grill using manual labor. This creates a number of inconveniences. Excess dust will lead to separation, complete non-separation of dirt, heavy labor consumption, reduced fiber quality, damage. The equipment for cleaning light mixtures containing wool of the brand “Aso-100”, produced by the Russian Ooo enterprise “KardMach”, was studied [33]. It is a drum made of mesh Setka, which, as a result of circular movement, is cleaned of small and large light impurities.

The separated dirt falls from the socket slits to the bottom of the drum and is removed outside using transporter tape. The wool fiber is transferred to the traction-cleaning equipment after it is cleaned of lightly mixed impurities. By properly organizing the mechanical cleaning process, it consists not only in cutting the wool fiber into pieces, but also in separating it from the coarse and short fibers in the composition. [3].

Early wool processing enterprises use traction-cleaning equipment 2BT, 2bt-150-Sh, AV-8v, "Sharpante", TP-90-Sh1. The process of grinding and sawing is carried out efficiently in the 2bt

type of grinding-cleaning equipment, with the help of equipment there is the possibility of cleaning thin and semi-thin wool fibers [3]. Not designed to clean coarse and semi-coarse wool fibers, the disadvantage is the constructive disadvantage of the supplying part. In addition, there is no possibility to replace the colosnik grilles during cleaning. The inconvenient preparation of the out of equipment parts of fiber and impurities prevents the use of equipment [3].

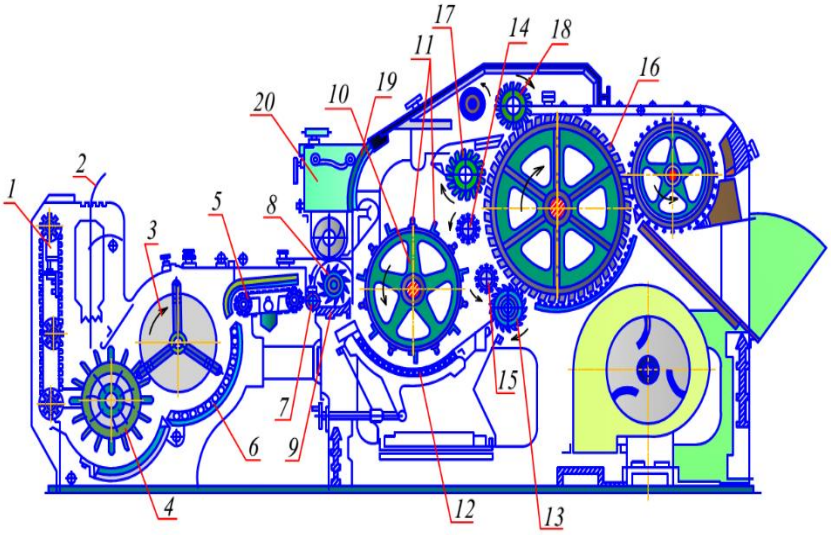

Figure 2. Technological scheme of O-120-ShM2 wool fiber cleaning aggregate from plant impurities

Wool fiber is loaded into the unit through the bunker, vertical grid 1 and barrier Formed from 2. Depending on the placement of the barrier, it is possible to change the size of the bunker and the size of the loading material. The rotating pile drum 4 snags the wool and transmits it to the three-stroke Savage 3, with a speed of 740 r/min The Spinning Savage snags the wool pieces and baskets and throws them at the supply fence 5. The waste that has been released under the influence of Savagich falls under the unit through the Prut grid 6. The trellis leads the wool fiber to the pile supply roller 8 using 5 smooth rollers.

Through the end-supplying tabletop 9, the wool fiber is transmitted to the Tish-sawash drum 10, with an angled plank and pile 11 fastened to the drum surface. When the drum rotates, the pegs and planks hit the protruding pieces of wool and hook them, and 635 r/min. with speed, the kolosnik will crawl on the 12 surface. With the help of a special mechanism, it is possible to change the crack between the colosniks and the slope of the colosniks in the direction of movement of the drum pegs, depending on the degree of contamination of the wool fiber and the character of the dirty waste.

As a result of shocks and shaking when crawling along the colosnik, the tremor of the wool pieces is accelerated, from which some large and small combing impurities separate, in which they fall under the equipment from the slit between the colosniks. With the help of a retaining roller 13 and a brush roller 14, 15, a trembling wool comb drum is transmitted to 16, on the surface of which metal planks 8 are fixed. Wide combs are hardened into each plank using a screw. Comb teeth protruding from the surface of the Planka have the property of hanging pieces of wool.

The brushes are immersed in the fiber between the comb teeth, and at this time the plant mixtures protrude on the surface of the drum. On top of the drum 16 were mounted the downing rollers 17,

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18 (their surface was made in the form of a knife). The rollers rotate clockwise with a speed of 1.6·10-5 M/s. The speed of the comb drum is 9.4 m/s, at such a speed it leads to the shoot-down of fiber and dirty dirt. This exposes the rollers and drums to impacting shocks with a force that increases the weight force several times as much as the dirty waste as a result of their large opposite velocities.

The impurities separate from the fiber attached to the comb as a result of the impact, flying down through the grid 19 to the Collector 20. The main disadvantage of this unit is metal consumption, large external dimensions, complex construction, low work productivity and high energy consumption. The woolen hanger is made with a comb, making it complex and expensive. And the low nature of the hanger negatively affects the efficiency of production [4].

V.M.Koldaev improved equipment for mechanical processing of wool fibers [4] (Figure 3). The use of this equipment ensures an increase in the efficiency of cleaning and grinding wool, while maintaining the quality of the wool fiber. The volume of wool fibers contaminated with garbage at the time of trimming can be up to 10-15% of the mass of all collected wool. The litter adhering to the fiber consists of solid pieces, the maximum size of which reaches up to 8 cm. The technical problem eliminated in this device was to improve the efficiency of cleaning and softening the wool contaminated with garbage, reducing the mass loss of wool fibers.

The disadvantage of this equipment is the significant damage to the fiber due to the strong impact of the piles during the separation of various impurities adhering to the wool fiber, which leads to a reduction in the total length of the wool fiber, a deterioration in fiber quality and an increase in weight loss.

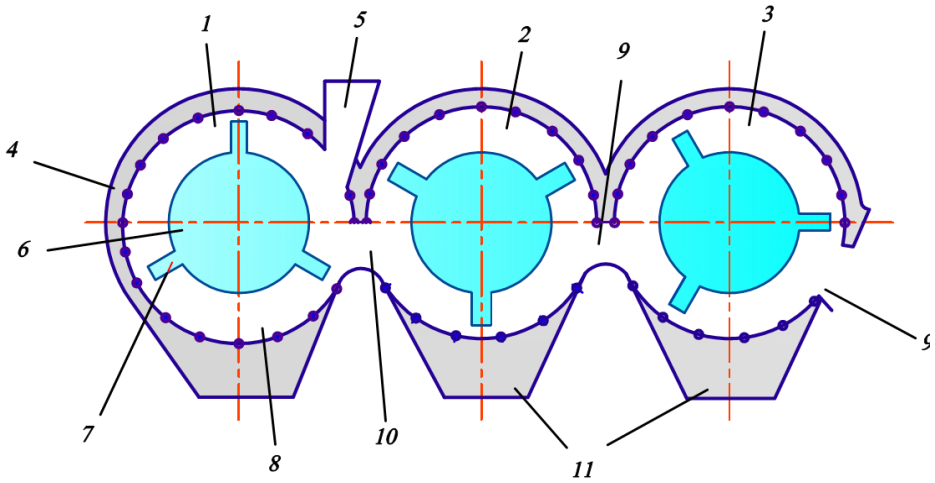

Figure 3. Technological scheme of the mechanical cleaning device of wool fiber

1,2,3-drums; 4-body; 5-fiber bunker; 6 - rotor; 7-beats; 8-grid; 9-fiber output novi; 10-fiber transition novi; 11-exhaust bunker.

N.I.Shleudyakov had proposed a new equipment in the vibration of wool fibers. Six pegs are mounted obliquely to the drum, which has been studied to vibrate when transporting the product from bottom to top using peg drum pegs [4]. Capacitors separating fiber from dust and air are installed between the cleaning equipment. There are cases of fiber damage, high energy consumption and loss of fiber in the condenser due to the disadvantage of this equipment, the large number of tipping drums.

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RESEARCH RESULTS

The wool fiber dust automatic cleaning equipment was improved, with a lifting platform and a reinforcing frame placed on the shelf [4]. The engine, boundary Button and control panel are located on the side of the equipment, moving the cylinder. The surfaces of the supply and cleaning rollers are covered with a rubber layer, and the layer is lined with comb cleaning needles, which have the property of bending. With these needles, the wool is automatically combed and cleaned of dust (Figure 4).

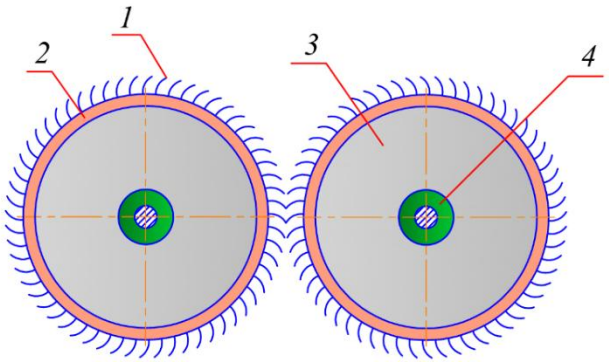

Figure 4. Automatic wool dust removal equipment rubber coated combing and cleaning cylinder appearance

1-combing and cleaning needle coating; 2-rubber layer; 3-cylinder; 4-Shaft gills.

Ni Dongping and Zeng aizhen had developed a cylinder drive shaft mounting construction with sloped gear instead of the traction and cleaning pile drum of the wool fiber cleaning device (figure 1.6). [5]. The plank cylinder cleans the wool fiber from impurities through a friction effect. During the cleaning process, the purity of the wool fiber will be the same, and the cleaning efficiency will increase.

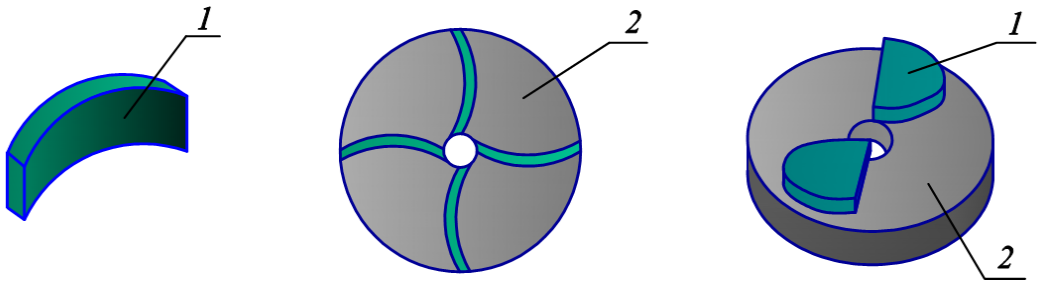

Figure 5. Wool traction-the construction of the cleaning device

1st plank; 2nd cylinder.

A. G. Pechnikova offered a one-drum equipment with twelve rows of piles in the grinding and cleaning of wool fibers. This equipment was designed with two pairs of pile supply and [4]. V.V.Jokhovsky used aeromechanical Textiles (Cotton, linen, wool, etc.k.) which analyzed fiber shearing, dirt and defect cleaning and softening equipment [4]. This equipment works as follows: the fiber that comes in the flow line falls into the supply bunker, the adjusting device maintains the constant height of the fiber in the bunker, which ensures the same flow of wool fiber that comes out of the equipment.

The fiber in the bunker is fed to the blade (pile) drum using rollers and supply cylinders. The Blades of the drum rotate at a speed of 500-600 r/min, hitting the layer of wool, vibrating and

softening the hold of fiber in it and throwing it over the grill that surrounds the drum. The supply rollers transfer the fiber layer to a rotating mouthpiece at a speed of 900-1000 r/min, with the help of which the fiber layer is released and transferred to the next equipment.

Improved wool fiber traction and cleaning equipment [4]. This equipment is laboratory equipment with low performance. Developed sheep wool cleaning equipment [4]. The equipment is structured as follows: the body box and the engine are installed on top of it. The engine drives parallel regulated Rotary shafts within the body box. One end of the rotating shafts is provided with a belt pulley, while the val surface is surrounded by piles located on different slopes. The invention is simple structured, with a woolen fiber inserted into the case box, and the pile shafts located in parallel are rotated and titibe cleaned using the engine. This equipment increases the efficiency of cleaning wool fibers. Yan Zengi was the developer of the wool fiber dirt and grease cleaning device, constructed from the body and cleaning cylinder [5]. A cleaning cylinder, filter plate and actuator are firmly attached to the device body. The equipment is designed for washing, cleaning and compressing wool from water. The dirt and oils contained in the wool are squeezed out of the water after cleaning, their moisture is reduced, and the wool is transferred to the next process.
In our country, a lot of scientific research has been carried out to improve the process of processing wool fiber, including: Those who have installed a brushed drum in the middle of a drum with two piles of wool fiber traction and cleaning equipment [4]. The disadvantage of this equipment is the fiber blockage in the supply mechanism, the inability to completely connect the piles with fiber smoke. Having achieved partial desiccation by using a saw disc and a beating roller with the aim of cleaning wool from difficult separable impurities when cleaning it from plant impurities [5]. At the enterprise, titib purified wool fiber is sent to the washing baths through the PU-120-Sh autopitatel. This unit is 1) wool fiber loading device, 2) Transporter, 3) vertical colossal transporter, 4) smoothing comb, 5)adjusting and vibrating drum, 6) composed of directing parts. Shaken wool fibers are thrown into five washing baths. In the first bath, the woolen fiber is ivitized, in the second, forging, in the fourth bath, it is cleaned with alkalis and rinsed in the fifth Bath. The purpose of the washing process is to completely cleanse the wool fiber of fatty – sweat substances and various impurities that contaminate it whenever possible.

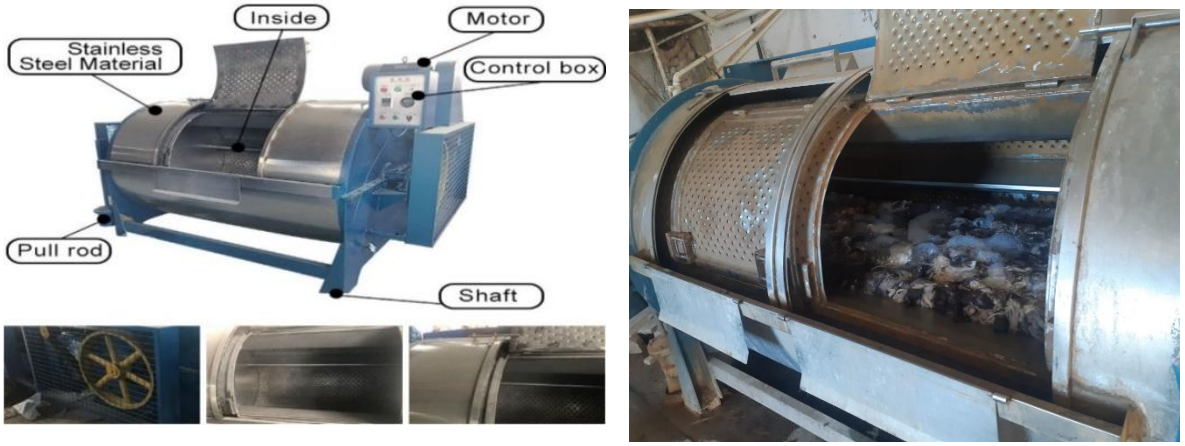

Figure 6. Modern intensive washing device

CONCLUSIONS

There is intensive washing technology in the TZGX100 brand of washing equipment with a modern computerized system installed in a small enterprise of local coarse wool fibers. The capacity of the unit is 100-150 kg to wool fibers The washing process is carried out in 3 stages for 15 minutes (Figure 6). At present, it is necessary to determine the tolerance of wool fibers to mechanical influences, the level of quality and the amount of pollution of the grown fiber as a result of the climate and the natural environment, and design new equipment based on its indicators. An urgent task is to thoroughly study the process of cleaning wool fibers and carry out scientific research in the experiment.

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