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Calculation of Pneumatic Device for Working Chamber of Saw Gin

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Abstract. In the article is presented a schematic diagram of a pneumatic actuator developed for the mechanism of lifting and lowering the working chamber of a saw gin. The air consumption per one working cycle of the pneumatic device and the system start-up time are determined. The structure of the pneumatic actuator that meets the requirements of the conditions for lifting and lowering the working chamber is selected. The method of controlling the velocity of the rod, the control of its velocity, the location of the output link, the parameters of the air orientation and the control apparatus are determined.

Key words: saw gin, pneumatic drive, lifting and lowering mechanism, air distributor, pneumatic cylinder, velocity, adjustable velocity

Introduction. The lifting-lowering of the working chamber is an integral part of the ginning process, and a lifting-lowering mechanism for the working chamber has begun to be designed, starting with the DP-branded Gin [1]. But due to energy consumption, high operating costs, narrow scope of application, lifting-lowering mechanisms are not currently used in most manufacturing enterprises. Today-in the 21st century-the lifting-lowering of the working chamber is carried out by the cotton gin operator using mechanism through manual labor. And the lifting-lowering mechanism, which meets the requirements of the Times, has fallen out of the attention of specialists in the field. By solving these issues, a favorable working condition is created for gin operators, machine performance increases, machine service is automated, the electric drive moving the saw cylinder is saved from overload, and as a result, its performance resource increases, it is possible to expand the possibilities of achieving a sharp reduction in machine service time [2-6].

Development of the principle scheme of pneumatic drive. When calculating a pneumatic drive, a principled scheme of it is developed. Then the system is calculated to power, the air consumption for one working cycle of pneumatic drive and the start time of the system are determined.

Results of analysis advance and return movement velocity of rod. It is necessary to choose a pneumatic drive structure that meets the requirements of the conditions imposed for lifting and lowering the working chamber. In this, the parameters of the rod velocity control method, its velocity control, the location of the outgoing link, air guidance and control apparatus are determined [7].

In the construction of the machine, the need arises to control the velocity of the acting link based on the technological conditions. A throttle is used to control the velocity of the pneumocylindr strain. Control of the air output rhythm through the throttle is called throttleing. Throttle makes it possible to adjust the velocity of the porcelain by changing the output rhythm of the air leaving the pneumocylindr to form an “airbag”. To reduce the rate of the piston, the air coming out of the pneumocylindre is reduced using a throttle, and if it is the opposite, the air flow is increased. In the adjustable throttle, it is possible to reduce the cross-sectional area of the channel, and, therefore, the volume consumption Size without bumps.

To adjust the velocity of the pneumocylindr with Double Impact force, throttles are installed in both channels to control the air output (figure 1). When adjusting the velocity of the advance movement of the rod, the air on the rod side and vice versa, the velocity of its return movement is carried out by throttleling

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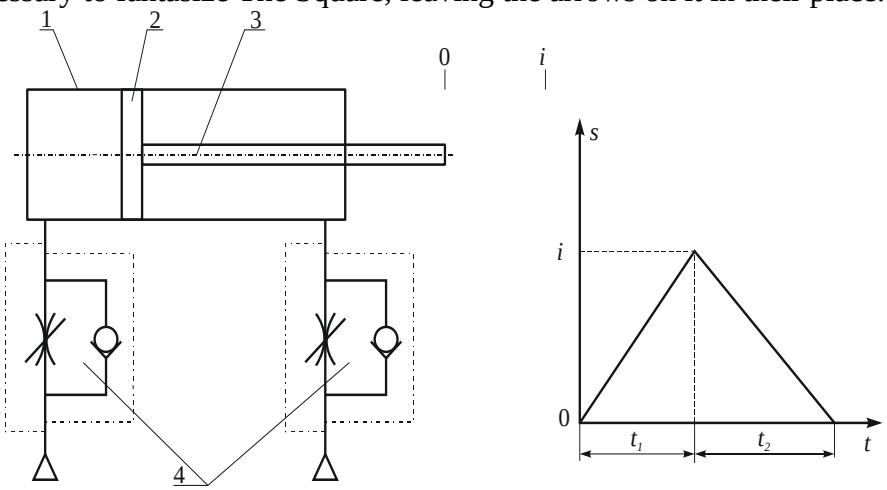
the air on the porshen side. This method is widely used because it does not affect the loading of the pneumocylindre.

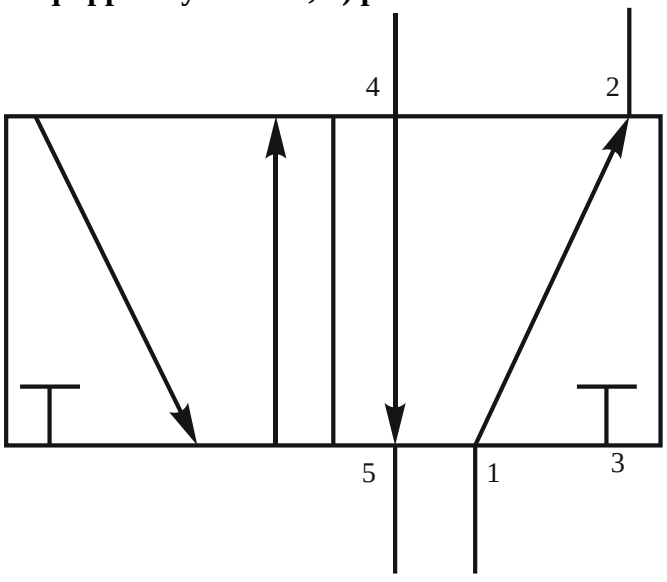
Analysis of air distributor. The control of the compressed air flow is carried out by opening or closing the cross-section through which the working air passes using a pneumothorax. Flow movement is displayed through arrows
(figure 2). Air distributor control: can be manual, mechanical, pneumatic or electronic. Conditional marking of the distributor includes probability positions (state of excitable elements), link lines, transitions and controls. The working position is determined by the square. To visualize the mode of operation of the distributor, it is necessary to fantasize The Square, leaving the arrows on it in their place.



a) b)

1 – cylinder, 2 – piston, 3 – rod, 4 – throttle, s – path of rod, t – the time it took for rod to be pushed (s), i – length of rod, t_1, t_2 – Time of respectively rod advance and Return movement (s)

Figure 1. Scheme of separately adjusting the velocity of the advance and return movement of the rod: a) scheme of pneumocylindr equipped by throttle, b) phase of rod movement



1 – nutrient channel, 2, 4 – exit channel, 3, 5 – exit channel to atmospheric

Figure 2. Scheme of air distributor

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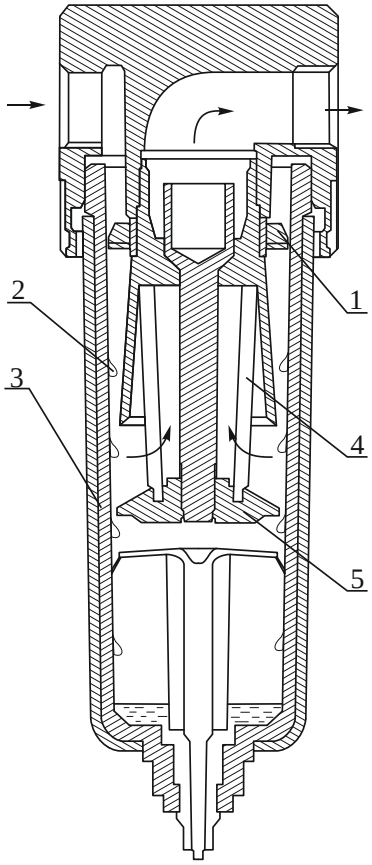
Usually the connecting holes are defined as follows:

1 – distributor penetration hole;

2, 4 – pneumocylindr outlet holes;

3, 5 – atmospheric discharge holes;

When formalizing a conditional scheme, at the top of the drawing, the acting organ is placed in a horizontal position, no matter how it is installed on the machine. A distributor is placed at the bottom of the working organ. The control elements of the distributor (knopka, sensor) are placed below the distributor. Below this, air preparation pneumoapparats are placed (Figure 3) [8].



1 – impeller, 2 – water vapour, 3 – cartridge, 4 – barrier, 5 – filter element

Figure 3. Filter scheme of using centrifugal force

Conclusion. The graphs obtained on the dependence of the angle of rotation of the working camera on the displacement of the shtok were analyzed. A developed principled scheme of pneumatic running was studied to raise-lower the working chamber.

References

1. Зикриёев Э.З. Первичная переработка хлопка-сырца. Учебное пособие. –Ташкент: Мехнат. 1999. –398 б.
2. SH.Usmonov. Arrali jin ishchi kamerasini kiritish-chiqarish mexanizmi// “Ilm-fan, ta’lim va ishlab chiqarishning innovatsion rivojlantirishdagi zamonaviy muammolar” mavzusida xalqaro ilmiy-amaliy konferensiya: Tezislar to‘plami. 2020 y. 13-15 may – Andijon, 2020. 434-437 b.
3. A Abdusamatov, A Mavlyanov Influence of the Perfective Working Body of Fiber Cleaning Machines on the Aerodynamic Parameters // American journal of science and learning for development 1 (2), 24-30
4. Ефремова К. Д. Компрессор-дозатор на базе пневматического цилиндра. Электронное научно-техническое издание «Наука и образование», 02.02.2012 г. https://cyberleninka.ru/article/n/kompressor-dozator-na-baze-pnevmaticheskogo-tsilindra/viewer

ISSN NO: 2770-4491
Date of Publication:26-05-2023

5. Sh.Usmonov, J.Ergashev, A.Umarov. Theoretical studies of determining the force of the lifting-lowering of the roll box // Textile Journal of Uzbekistan, 2021. №3.
6. L'automazione pneumatica dai principi di base alle tecniche pratiche // Camozzi Automation S.p.A. Società Unipersonale Via Eritrea, 20/I 25126 Brescia Italia, 2019.
7. SH.Usmonov. Arrali jin ishchi kamerasini ko'tarib-tushirish uchun qo'llaniladigan pnevmotizimning prinsipial sxemasi // "Fan, ta'lim, ishlab chiqarish integratsiyalashuvi sharoitida paxta tozalash, to'qimachilik, yengil sanoat, matbaa ishlab chiqarish innovatsion texnologiyalari dolzarb muammolari va ularning yechimi" Respublika ilmiy-amaliy anjumani: Tezislar to'plami. 2021 yil 21-22 aprel. –Toshkent, 2021. 33-35 b.
8. В.А.Кудинов, Е.М.Карташов. Техническая термодинамика. Учебное пособие для ВУЗов. – М.: Высшая школа, 2000. – 261 с.