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METHOD FOR POSITIONING OF EXECUTIVE OPERATING ORGANS OF A SPECTROPHOTOMETER FOR RESEARCH OF THE ATMOSPHERIC OZONE

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Keywords: *method for positioning*

Abstract: *High positioning precision, independent on rotation direction when using a classic elemental basis, repair suitability and easy operation is of special interest.*

A principle for precise positioning of the executive operating bodies with an electromechanical feed-back is implemented.

МЕТОД ЗА ПОЗИЦИОНИРАНЕ НА ИЗПЪЛНИТЕЛНИ РАБОТНИ ОРГАНИ НА СПЕКТРОФОТОМЕТЪР ЗА ИЗСЛЕДВАНЕ НА АТМОСФЕРНИЯ ОЗОН

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Ключови думи: *метод за позициониране*

Абстракт: *Особен интерес представлява проблемът за висока точност на позициониране, независимо от посоката на въртене, при използване на класическа елементарна база, ремонтно-пригодност и лесна експлоатация. Реализиран е принцип за точно позициониране на изпълнителните работни органи с обратна електро-механична връзка.*

Introduction

The development of the satellite spectrophotometer necessitated the development of reliable and precise constructive decisions for the setting of a reading start or final decision of the executive element and its intermittent observation, feed-back between initial and an executive unit for the control of the positioning precision not only at the moment, but after a long exploitation, simplicity of execution, repletion and reliability of the results.

Its work is highly reliable. The implementation is possible with simple parts and is electrically adaptable with a microprocessor system and the leading motor. Various applicable schemes can be created with different precision of work which depends on the preliminary relation in the mechanic transmission. Depending on the wearing out with time, the principle allows it to be read by the microprocessor system in order to keep the necessary precision. A system with such feed-back can work with one- and two-direction circular motion.

The principle relies on the use of construction relations between the initial and final parts and the gearing relation of the mechanic transmission between them. It is made by two disks with one frontal slot each, which fit together immovably to the corresponding initial and final part and an optron in the infrared part of the specter. They are installed at a proper place in the construction for an easy tuning of the system; they do not need additional activity during operation in the practice at this moment. The schemes of two versions are presented: one is for unidirectional movement and the other – for two-direction circular motion within the range of ±0º…360º.

The variants are created for scanning spectral device with a diffraction grating which makes return circular motion from the arm of the cylindrical cog within the range of 9 revolutions. The principal scheme of the first variant is presented on Fig. 1 and it contains the following elements: a control block 1, supply 2 of the electric motor M, a photo raster transformer 4, a block for synchronization 3 with a link to the micro processing system mp, executing unit 5 including a cylindrical cog and an arm with a spring 13, rotating around an axis through point 0, in the plane of the diffraction grating 8. The source of radiation 6, diaphragm 7 and photo-electronic multiplier 9 form the spectral part of the device for analyzing of the solution in the gutter 14. It is moved by a mechanical gearing 10 cl=10, and a disc with a frontal slot 11 is immovably attached to each of the axes and the disks do not touch each other but they rotate in opposite directions. An optron 12 is attached immovably in the zone at a minimum distance and it works in the infrared part of the optical specter.

Operation:

The electromotor M is moved in the direction for initial fixing of the diffraction grating. In a certain moment of rotation of the disks 11, their slots stand in a straight line between the elements of the optron 12 and a single impulse is generated which stops the rotation of the electromotor M. The system is ready to work. At the start, an initial impulse is given through the slots of the disks 11 and the optron 12 and then the counting of the impulses is made by a photo-raster transformer 4 and the rotation of the arm 5 is synchronized with the diffraction grating 8. There is data in the micro processing system мр which values are apt for spectral analyses which correspond to a certain number of impulses from a photo-raster transformer 4. the system is fixed, the radiation intensity is measured and the process continues without the initial fixing. This is one of the working procedures, i.e. step by step and certain data for the analysis is collected. In another working procedure of constant scanning, the process is not interrupted and data is constantly written in the memory of мр for the results of the radiation intensity or their corresponding length of the specter.

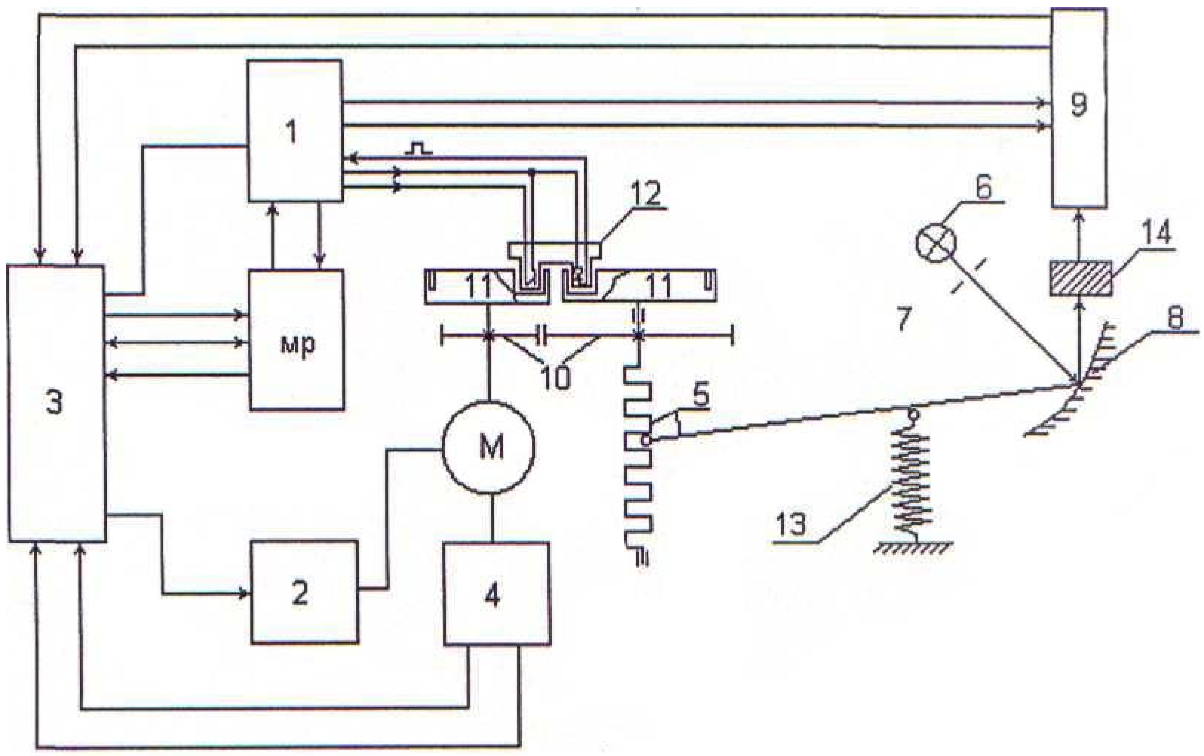

Fig. 1. Functional scheme of a scanning system for precise positioning with
an electromechanical feed-back

The second version is created for carrying out a task for automatic management and positioning in two directions for circular rotation within the range ±0º…360º. The principle scheme is presented in Fig. 2 and it contains the following parts: a control block for the operator 1, micro processor system, a block for synchronization 3, photo-raster transformer 4, a leading electromotor M, three-stage mechanic transmission 5 with a general transmission relation 1:5400, including a cylinder gearing, planetary reducer and worm gear. Two disks with frontal slots, which do not come into contact with each other, are attached to the axle of the electromotor M and the worm gear. An immobile optron, working in the infrared range 6H2144(MK203) is installed in the area with a minimum distance.

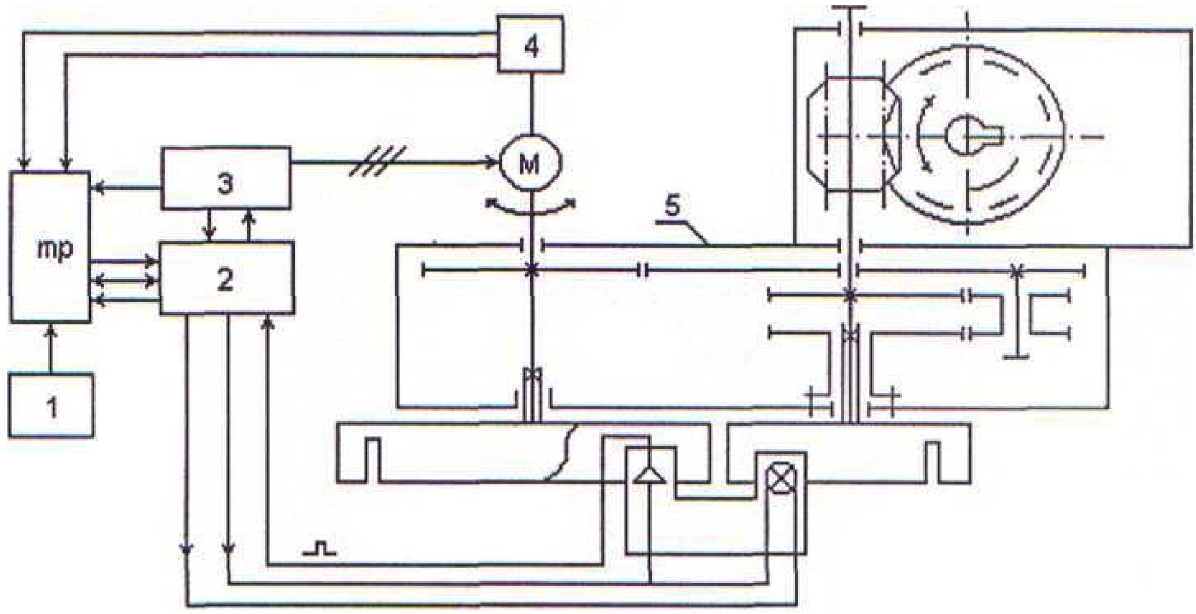

Fig. 2. Functional scheme for automatic control for precise positioning with an electromechanical feed-back

The transmission relation between the two axles is selected in a way that when the worm gear makes one full revolution 360º, the two slots stand in one line between the disks' axes and a single impulse is registered. It secures an initial nullification of the system according to certain criteria. The next task is positioning and it is made by the micro processor system on the basis of data from the raster transformer.

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