THE PRESENT STAGE OF THE INVESTIGATIONS IN A UNIVERSITY "ŞTEFAN CEL MARE"- SUCEAVA IN SCOPE OF THE ELECTROMAGNETIC VIBROMOTORS

Dorel CERNOMAZU, Cezar TUDOSĂ and Elena-Daniela OLARIU
"Stefan cel Mare" University of Suceava
str. Universitatii nr.13, RO-720225 Suceava
elenadaniela_olariu@yahoo.com

Abstract. *This paper presents the actually study of the investigations in scope of the electromagnetic vibromotors. The investigations effected as part of the paper, based on speed regulation and the reversion of the sense of rotation has conduct to the new models of vibromotors which are described in pages of the paper*
Keywords: *vibromotor, speed regulation, sense of rotation.*

Introduction

The vibromotor represent a converter, which transforming the vibratory movement produced by electromechanic oscillator up from supply source of pulsating in a continuous motion. After type of motion obtained, the vibromotors can be: rotary or linear. In contrast with the classic electromagnetic motors or electrostatic motors, wherein the rotor and the stator are separated through an air gap and the electric current from the source is transferred in the rotor from the distance through the electromagnetic field, at the vibromotors this transference is realized by the friction, what presume the direct contact of rotor and stator.

The realization at the University „Ştefan cel Mare"

The change of the vibratory movement in a continuous motion depend both on the path printed of the material points from the aboveground of vibratory part, which acting by friction on movable element, both and on high-inertia of the movable element. The motion of this points manifest through an oriented cycle, which contained two phases: of extension and of withdrawal.

The figure 1 illustrates the principals variants utilized for the training of movable element the vibromotors, remark the next aspects corresponding.

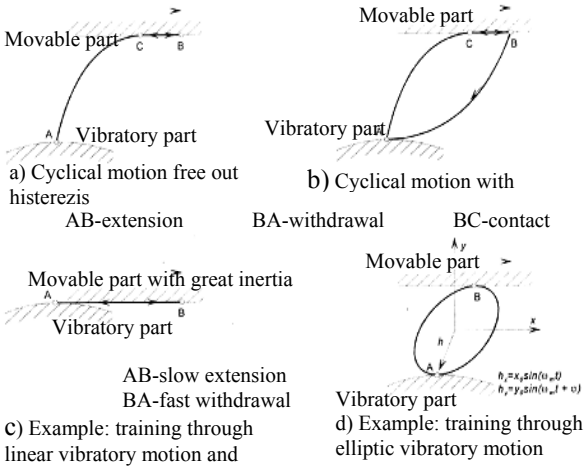

Figure 1. The types of the vibratory motions of acting

Each variant of motion is characterized through a period in which vibratory element there is in contact which movable element; at the variants a) and c) this phenomena appeared so much in speed phase both and in phase of withdrawal; at the variants b) and d) the period specified appeared only in extension phase; the efficient variants is the variants b) and d); in case the variants a) and c) through the maintenance in withdrawal phase of the contact of elements, appeared a friction acting owing to the inertia,

the movable element will be continued the motion , but with diminished speed.
For the improvement of contacting conditions an amelioration of performing the piezoelectric micromotors he impose the utilization a friction layer willing on all or another of the face in contact. The principle the friction layer is placed by rotor.
The principle the converting of vibratory movement in rotation is explicated in the figure 2.But the extremity of the vibrating bar he displaced with Δx, the bent bar will describe a supplementary curve Δl, and through the friction acting the disk in contact with this bar, will displaced with Δl in that some sense.

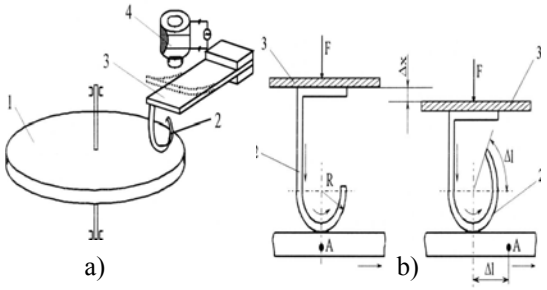

Figure 2. The vibromotor with rolling bars

The solution is applicable both in case the electromagnetic vibromotors all and in case a piezoelectric vibromotors the best results he obtained at a frequency of 600 Hz.
In scope the progress the speed of rotations and the torque developed by motors he utilized the more rolling bars fixed at terminal vibrating bar on the sense of length of his axis.
Experimentation the solution described is conducting the conclusion: the best results of the value the speed of rotations and of the torque is obtained in case in which the electromagnetic element is feed from a frequency of 50 Hz. This value increment in the same time with the rolling bars number and which the value pressing force of rolling bars on the surface of the rotor. This force reduces useful time a rolling bars owing to the premature wear.
The speed of rotation is adjusted through the change of the distance of contact point the rolling bar's with the surface of the rotor and the his axis, but and through increment emphasis of the vibration, as well, reversing sense of rotation is possible through reversion of the position the rolling bar's or the group of rolling bars
The technical solution detailed present the disadvantage don't revaluate the reversion of the sense of rotation and the possibility speed regulation the rotor's, because the vibrator is fastened of the sense of warping the elastic bar's sealed at an end, to the extremity of vibrating bar.
The investigations effected as part of the paper, based on speed regulation and the reversion of the sense of rotation has conduct to the new models of vibromotors. She represented a perfection of the initial solution detailed.
A first model oh vibromotors is presented in the figure 3. The technical solution refer to an electromagnetic vibromotor with the rolling bars, destined he working at the industrial frequency, and which is estimated with possibility the reversion of the sense of rotation.

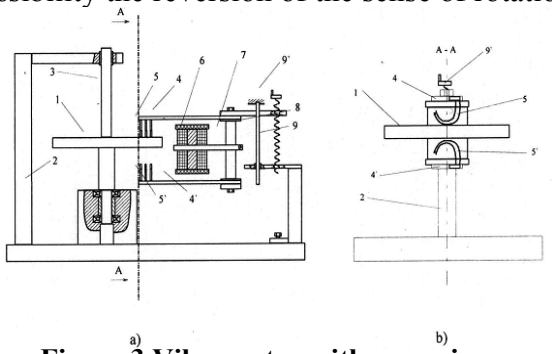

Figure 3.Vibromotor with reversion of the sense of rotation.

The vibromotor is constructing in principal of a disk armature 1mounted on the brace through a pintle 3. The rotor is actuated through friction of a stator device represented of a electromagnetic vibrator construct by two vibrating bars 4 and 4', realized of a ferromagnetic substance, which is equipped at an end with a rolling bars system 5 and 5'in direct contact with the fronts faces of the rotor. The vibrating bars there are under the action of magnetic field produced of the electromagnet 6 is fed from an alternating current source. The ensemble of the electromagnetic vibromotor is fastened on a brace 7, displaced on parallel direction whit the rotor axle on a guide 8, with help a catch screw 9, acted through a crank 9'.

The reversion the sense's of rotation is possibility through the elevation displacement of the stator system. For a sense of rotation wall of kerf of rotor disk is in contact with rolling bars placed on of the vibrating bars. For the other sense of rotation the rotor disks it will be under action of the rolling bars afferent the other vibrating bars.
The solution detailed presents the advantage an easy changing of the sense of rotation with the help a constructive simple solution.
Other the possibility, for the reversion of the sense of rotation duplex of possibility speed regulation in case a electromagnetic vibromotor, with rolling bars, destined he act to the industrial frequency is the solution presented in the figure 4.

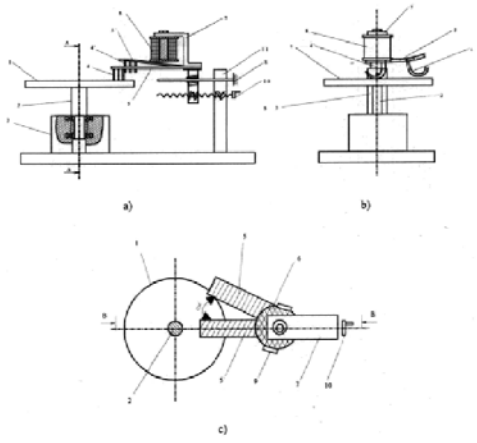

Figure 4.Vibromotor with reversion of the sense of rotation and the possibility speed regulation

The vibromotor is construct in principal of a disk armature 1mounted on the pintle 2 sustained of a plain bearing system 3. The rotor is actuated through friction of a stator device construct of two electromagnetic vibrator, construct each by two rolling bars system 4 and 4', fastened at the free extremity of vibrating bars system 5 and 5', realized of a ferromagnetic substance (light cold-rolled sheets) and acted by magnetic field produced of the electromagnet 6.The two vibrating bars 5 and 5'is staggered one face anther under an angle α. After case, one of the two rolling bars systems is in direct contact with rotor surface, caused the rotation in a sense or in another. The modification of sense of rotation to result from the different sense of rolling of the bars 4 respective 4'.The bringing in the situation of vibration of the ferromagnetic bars 5 and 5' he realize through that same electromagnet 6 feed from alternating current source. The electromagnet is fastened on a brace 7.The speed regulation obtained through the displacing in quaquaversal direction of the rolling bars system found under the influence of vibrating bar activated trough electromagnet. The displacing he obtained with help an ensemble format of a guide bar 8, lead screw 9 through a rosette 10.The modification of position the vibrating bar's in comparison with the position of electromagnet he realized through a ensemble found of a guide bar8, lead screw 9 and a rosette10 with a brace 11.

The sense of rotation reversing is possible through the rotation with a certain angle of fastening piece trough rosette.

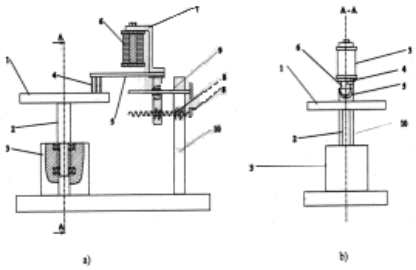

Figure 5.Vibromotor with reversion of the sense of rotation and the speed regulation

The solution presented in succession represented a new method for the reversion of sense of rotation and the possibility speed regulation in case a electromagnetic vibromotor with rolling bars destined he act to industrial frequency – figure 5.
The vibromotor analyzed is construct in principal of a disk armature 1mounted on the pintle 2 sustained of roller friction bearing system. The rotor is actuated through friction of a stator device construct of an electromagnet 6 feed from a alternating stress source of industrial frequency and which acted through the electromagnetic field over a vibrating bar 5 realized of a ferromagnetic substance (light cold-rolled sheets). To the free extremity of the

vibrating bar is fastened one or more rolling bars 4 are in frontal contact with rotor surface1. The pieces of electromagnetic vibromotor's are fastened or a brace 7, which is displaced through lead, screw 8 and guide bar 9 he lean upon a brace 10.The contact point between rolling bar and frontal rotor surface he displace on the diametrical direction giving the possibility modification the speed of rotation as a result to modification distance between contact point and rotor axis, and a reversion of sense of rotation then when the position of contact point given of rotor axis he invert.

The next technical solution presented in the figure 6 to refer to a electromagnetic vibromotor with rolling bars destined to work to industrial frequency and which is equipped with possibility the reversion of the sense of rotation is realized in practice.

The vibromotor analyzed is construct in principal of a disk armature 1 mounted on the pintle 2 sustained of a plain bearing system 3.

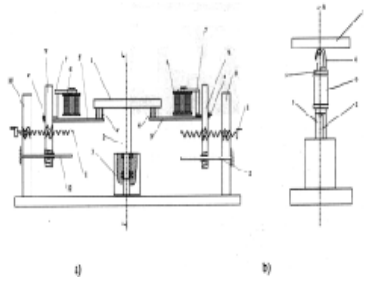

Figure 6.Vibromotor with reversion of the sense of rotation and the speed regulation

The rotor is actuated through friction of a stator device construct of two electromagnetic vibrator identical placed in oppose diametrical position in comparison whit rotor axis. The vibrating modules are construct of the electromagnets 6 respective 6' is fed from an alternating current source, acting over one from ferromagnetic bars 5 and 5' equipped each, at free extremity with all one or more rolling bars 4 respective 4'.

In function of necessary the sense of rotation is acted one of the two vibrating modules result as the inversion sense of rotation .The vibrating modules is fastened through the pieces of fastening 7 and 7' and the lead screws 8 and 8' on braces 9 and 9'. The speed regulation obtained through the displacing in quaquaversal direction of the rolling bars system found under the influence of vibrating bar activated through electromagnet. The displacing he obtained with helps an ensemble format of a brace of fastening 10, lead screw 11, guide bar 12.The advantage of solution is he obtained both reversion of the sense of rotation and the speed regulation, through selective intensifying of the two electromagnetic vibrator identical placed in oppose diametrical position in comparison whit rotor axis.

Presented in succession photography in connection with the practical realization of electromagnetic vibromotor which rolling bars, feed to industrial frequency

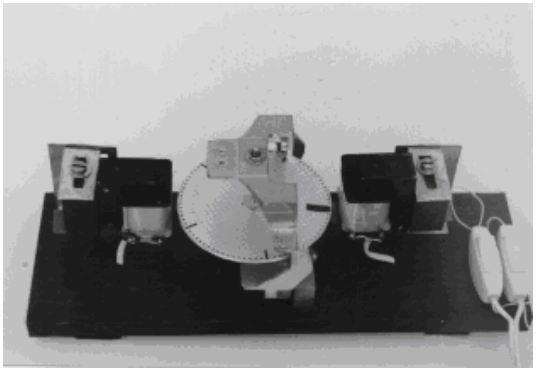

Figure 7. Electromagnetic vibromotor which rolling bars feed to industrial frequency

Contributions to perfecting the Marinescu oscilomotor

The Marinescu oscilomotor represented in figure 8 characterized through a linear alternating motion is composed of two iron packets1 and 2 with the poles NS respective N'S' placed to distance "d" and axes with a difference of 90^0.

The windings are fed to an alternating current, realized an electromagnetic alternative action over cylindrical magnetic armature 3, make of a one iron packet. This armature is fastened on a bar, which glide on two guiding, with a linear

alternating motion.

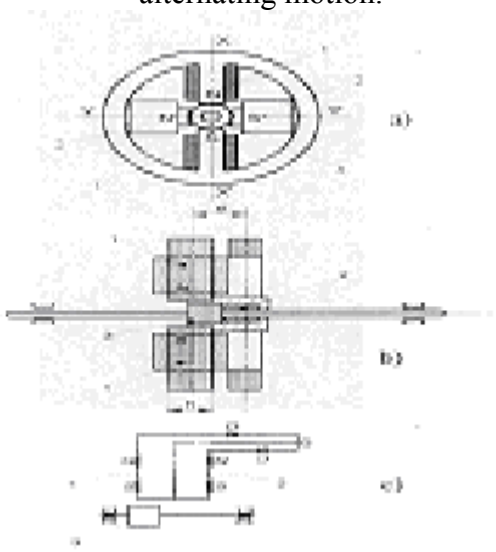

Figure 8. The electric vibromotor with alternating linear motion

In the figure 9 is presented a model of device for the verification the electrets charge on the basis of Marinescu oscilomotor.

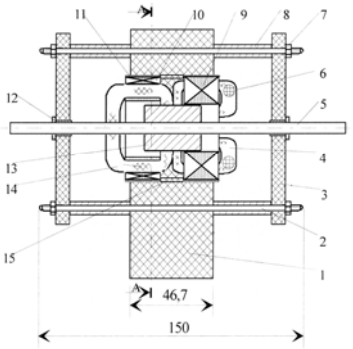

Figure 9.The Marinescu oscilomotor

The Marinescu oscilomotor is made of a brace 1 of plastic on which are fastened the all component elements of the oscilomotor. Through of two rods of fastening 2 and of four-distance piece 8 are fastened guiding pieces. The guiding pieces 3 of cylindrical form, centred, through axel 5 cylindrical middle13 in unsaid of stator construct of two irons packets 9 and 10 fixed in unsaid of the support 1 and outstripped of the guiding 15. The Marinescu oscilomotor is made of two irons stator packet 9, 10 at which the poles NS and N'S' are the coils 6 crossed of a alternating current, exercise in alternative mode electromagnetic force over the same cylindrical middle m, made of a magnetic irons packet.

For to provide the necessary space the placing of coils on the poles the two irons stator packet, NS and N'S' the axis xy and x'y' are difference with an angel of 90^0, the feeding the coils of poles NS and N'S' is make from the same alternating current source through of two semiconductors, so that the coils of each packet to be fed all a semi-period of current. In this way, in a half period of current, the magnetic mobile middle m, is attract of irons packet SN and in next half period is attract of irons packet N'S' so that mobile armature acquired a linear motion with frequency of alternating current, obtained the electromagnetic resonance condition.

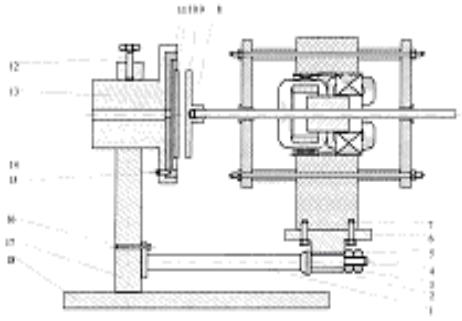

Figure 10. The oscilomotor for measurement the charge electrets

The support of measurement of thermoelectret charge's presented in the figure 10 is construct of a support 1, a brace 2, a guide piece 3, a screw 4, two nuts 5, a socle 6 of which he fastened the Marinescu oscilomotor. In stator field of the oscilomotor he displaced mobile armature with axel, to which it attached to one of the ends an electrode 9, which displaced solidary with the axel. The electrets 10, place on fixed brass electrode 11 that is tied with exterior circuit.

In the figure 11 is presented photography of the Marinescu oscilomotor.

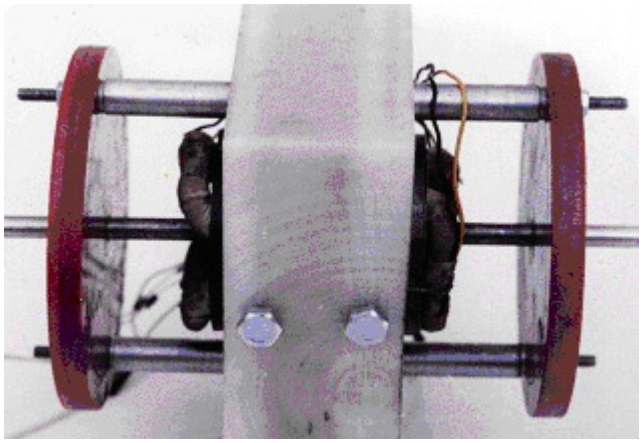

Figure 11. The Marinescu oscilomotor, bird's-eye view

Conclusion

A succinct analyze made of the authors this paper led to these conclusions:
- The vibromotors and unconventional oscillators represent an efficient alternative in rapport with classic solutions, realized on base of magnetic effect;
- the vibromotors is characterized through raised forces respective raised torques and in same time through slow speed;
-the vibromotors present the advantage a magnetic integrates function , equivalent an ensemble compound of a servomotor , a reducing gear and a brake.
As to the study the servomotors, it is observed that the more of classics models of verification and measurement, available to small power machines may be applied and the vibromotors which work to industrial frequency. In this way whit how the power and the sizes this unconventional motors are greater, with so more the grade of extension and application the classics method's it is greater. So as the power and the sizes this is smaller, the more so methods of determination of operating characteristics will have a character more particularly.

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