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Cylindrical magnetron with multiple dynamic areas of toroidal plasma

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The new cylindrical magnetron with a dynamic oscillatory magnetic field, as developed at the Institute of Precision Mechanics, is of innovative design, which is not currently being used on the domestic market. In the course of an analysis of publication databases on the Internet, and contacts with research-production centres associated with the domain of the presented innovation, it was revealed that there are only two research centres (in the US and the UK) which deal with this type of design and magnetron. The proposed design of a magnetron-type plasma source and the method of coating vacuum deposition by magnetron is applied to large closed and open spaces, e.g. in pipes of heat exchanges, inner surfaces of combustion engine cylinders, gun barrels, application of coatings on plastic and fabric foil products. Until now, inner surfaces of metal pipes operated under corrosion and impact loads have been modified by coatings, e.g. Cr +6coatings obtained by Cr galvanisation which poses a great environmental burden. A crucial utility and innovative factor of the presented magnetron is the development of functional coating application on long pipe inner surfaces, which are from 45 mm to 200 mm in diameter and from 100 to 1500 mm in length. The application of a magnetron and plasma environment for the synthesis of coating materials results in obtaining advanced metallic coating materials, nitric/carbide/oxide metals included in the groups IVB to VIIB of the periodic table (e.g. CrN, NbN, ZrN and ReN, etc.). Therefore, it has become possible to conduct research on new aerological material systems featuring better functional properties.

Keywords
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