Технічні науки

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CARBON - CARBON FABRICS IN MODERN PHARMACEUTICAL EQUIPMENT

Achieving the ideal end result using activated carbon-carbon fabrics and their innovative modifications in modern treatment processes, pharmaceutical and medical equipment, including integrative versions

Summary. *In the field of medical and pharmaceutical smart technologies focused on artificial intelligence and artificial neural networks, the process of introducing innovations is significantly complicated due to the need to obtain permission for all fundamentally new technical and technological solutions, as well as new composite and nano-sized materials, to be used in medical and clinical practice and in pharmaceutical production;*

The area of application of innovations of all types is usually extremely saturated with all sorts of traditionally used technical solutions and materials, so that innovative changes of all types, according to the conditions of implementation, must be adapted and combined with traditional technologies and materials that fully comply with the requirements and limitations of current standards in the field of medicine and pharmaceuticals;

In infrastructure and basic solutions, including those of auxiliary importance, correct and coordinated harmonious combinations between system elements at all levels generally determine the success of the innovation process in combination with the entire infrastructure and design architecture of equipment and special tools.

In general, innovation is not an end in itself, the central goal of the entire innovation process is to obtain the final result from the implementation of innovative ideas at a level that will allow achieving a qualitative improvement in all parameters of the treatment process, while maintaining the continuity of technology, technology and materials, including consumables.

Key words: *Ideal end result, Activated tissues, Activated carbon-carbon tissues, Innovative modifications, Modern treatment process, Pharmaceutical equipment, Medical equipment, Traditional technologies and materials, Designer equipment architecture, Special tools, Treatment process,*

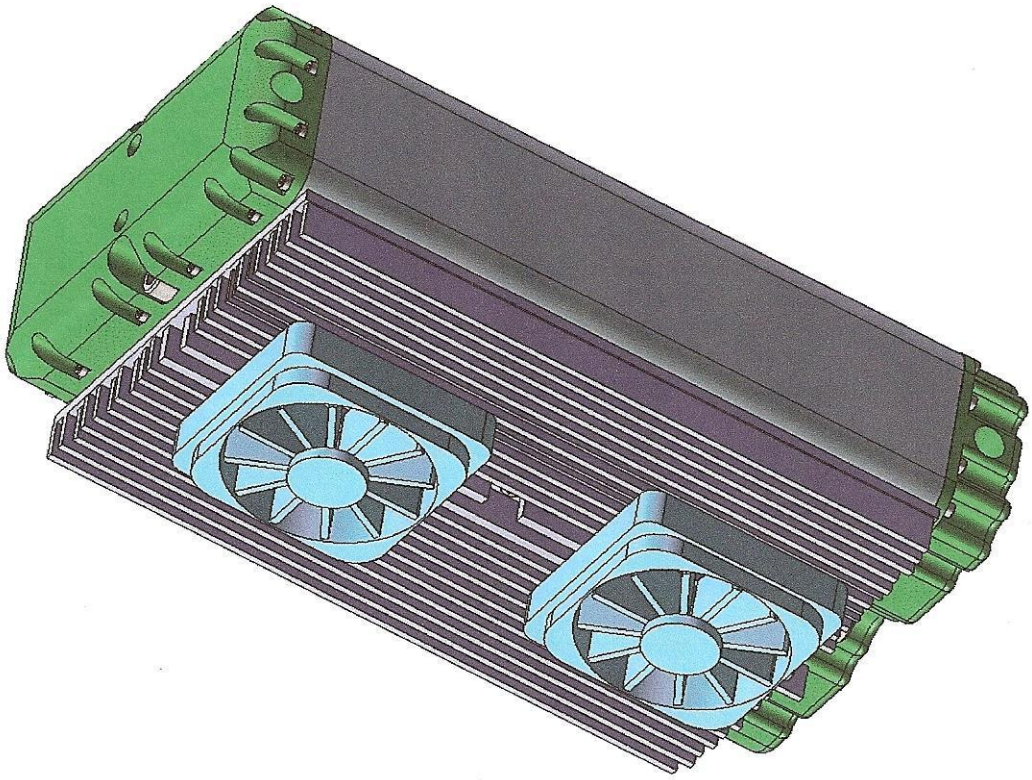

Fig. 1. Water purification and regeneration system using granular zeolite as a natural ion exchange material

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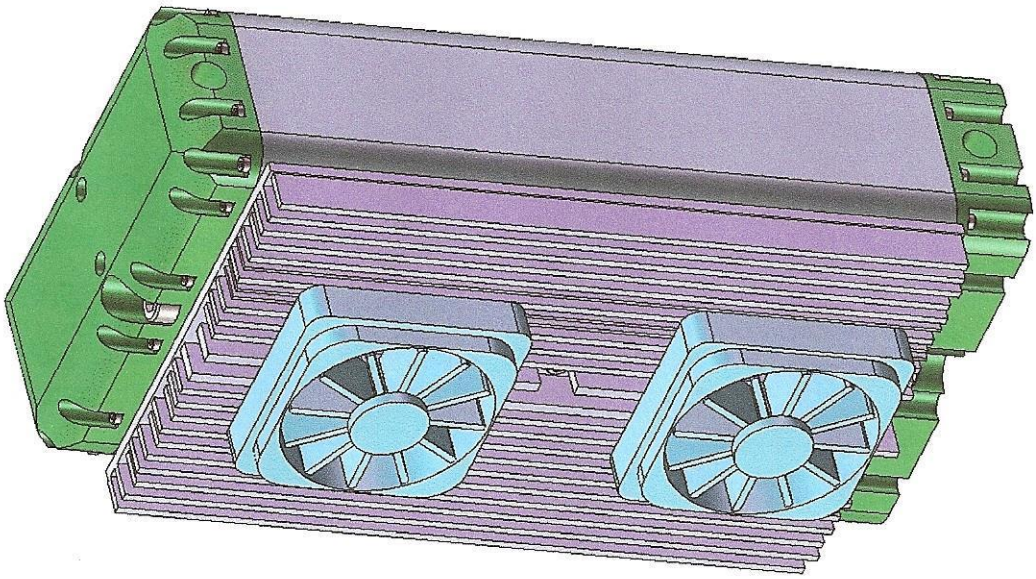

Fig. 2. The same system as in Figure 1

In infrastructure and basic solutions, including those of auxiliary importance, correct and coordinated harmonious combinations between elements systems at all levels, in general, determine the success of the innovation process in combination with the entire infrastructure and design architecture of equipment and special tools

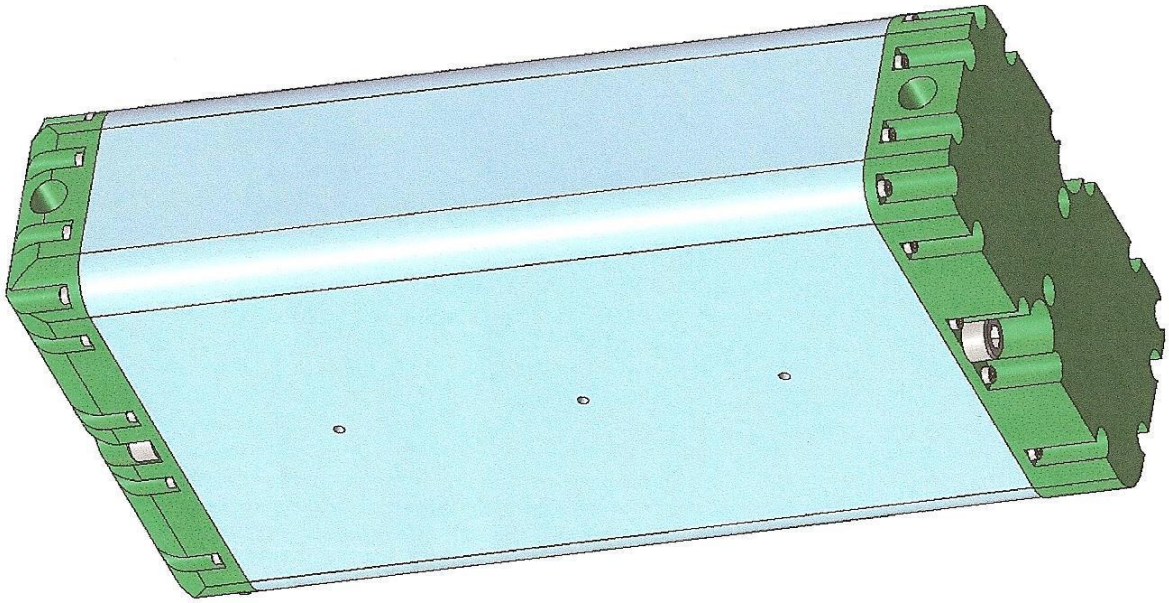

Fig. 3. Design elements of the device body

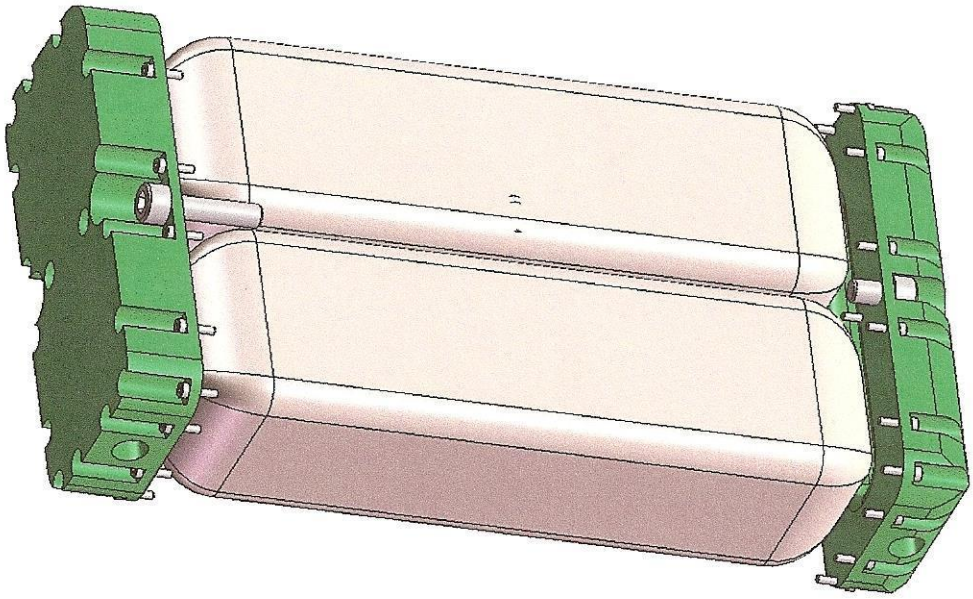

Fig. 4. Zeolite capsules

In general, innovation is not an end in itself, the central goal of the entire innovation process is to obtain the final result from the implementation of innovative ideas at a level that will allow achieving a qualitative improvement in all parameters of the treatment process, while maintaining the continuity of technology, technology and materials, including consumables.

In principle, the author of this publication intends to consider some real dependencies between these elements and to conduct an analysis of the basic methods and schemes for adapting innovative solutions and materials in the structure and interdependencies between traditionally used technologies, techniques and materials.

Until recently, when the innovation process was practically carried out by specialists in the field of medical technologies and materials, who did not have specific experience and skills in computer modeling and simulation of processes, implementation was carried out based on the positive results of tests and research.

For quite a long time and not always successfully, a dialogue was conducted between conservatively minded specialists and innovators, and not always in favor of the innovators

Practitioners were in a waiting mode for such solutions that could clearly show really possible and effective ways of implementing innovations without any significant violation of the balance of stability of technological processes

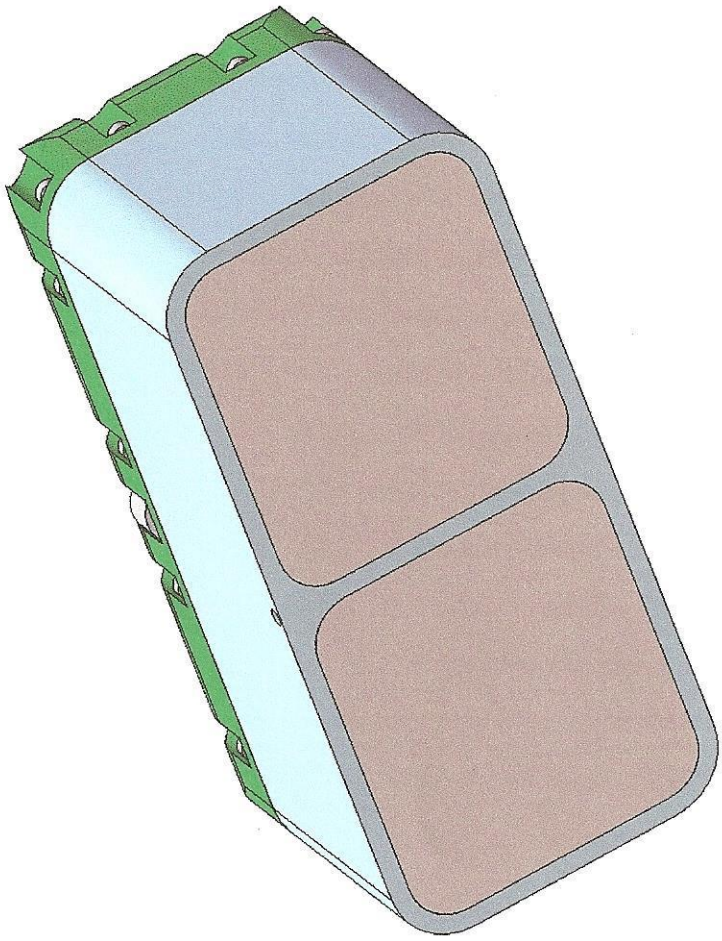

Fig. 5. The location of the capsules with zeolite in the device body

To the credit of the supporters of innovative transformation of technological redistribution, it should be noted that recently several comprehensive solutions have appeared for the painless implementation of innovative technologies in the real conditions and circumstances of modern medical and not only science and practice.

The author of this publication finds the most acceptable complex integrative solutions, within the framework of proposals contained in scientific and technological publications, - Victoria Roytberg;

First of all, what distinguishes Victoria Roytberg's proposals and developments from similar proposals by other authors is a broad platform for

experimental computer modeling, which arose thanks to Victoria Roytberg's comprehensive and deep knowledge of the basic techniques and methods of systemic and combinatorial computer modeling within the framework of related innovative processes, including at the intersections of fundamental disciplines.

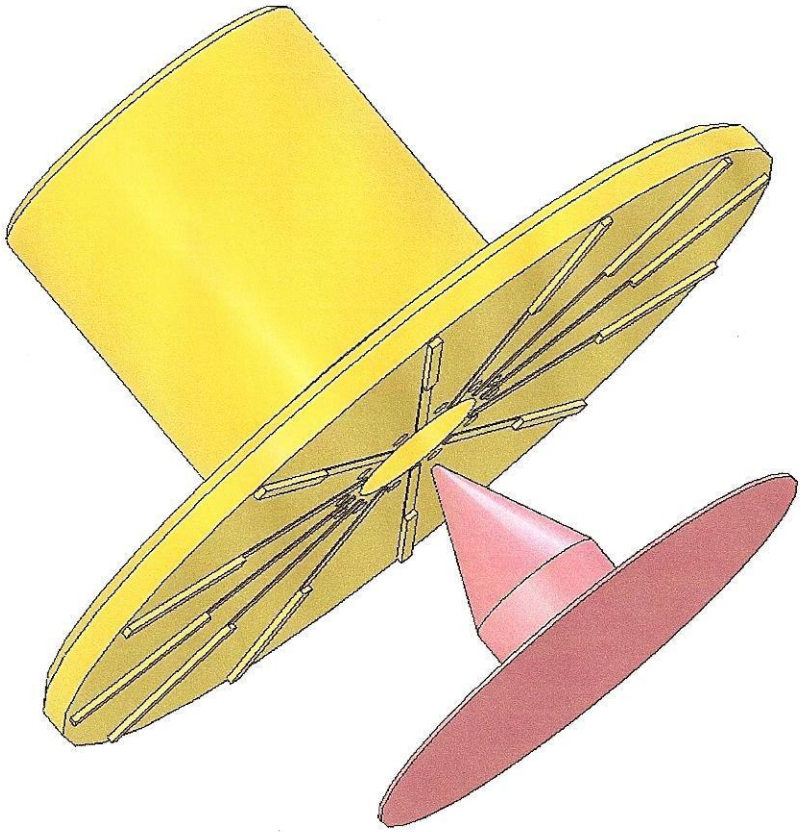

Fig. 6. One of the versions of the aerodynamic foam generator

In analyzing all 11 innovative medical technologies proposed in her innovative publications, Victoria Roytberg puts forward an extremely important thesis for solving the problem - the combinatorial structure of each solution - that is, a harmonious combination and mutual complementarity between traditional technologies and materials and innovative technologies and materials, mainly composites.

Moreover, from the proposals of Victoria Roytberg, it is the trend of integration and comprehensive adaptation of new materials and technological methods in the environment and conditions of existing and tested technologies and materials that is fundamentally important, which is prepared for the transformation of properties and capabilities at a new, innovative level.

The adoption of these trends made it possible to take into account the potential for the subsequent development of materials, structures and technological methods and to smoothly move, for example, from flexible and permeable, volumetric-porous systems and materials to materials with the same chemical composition and properties, but solid ones.

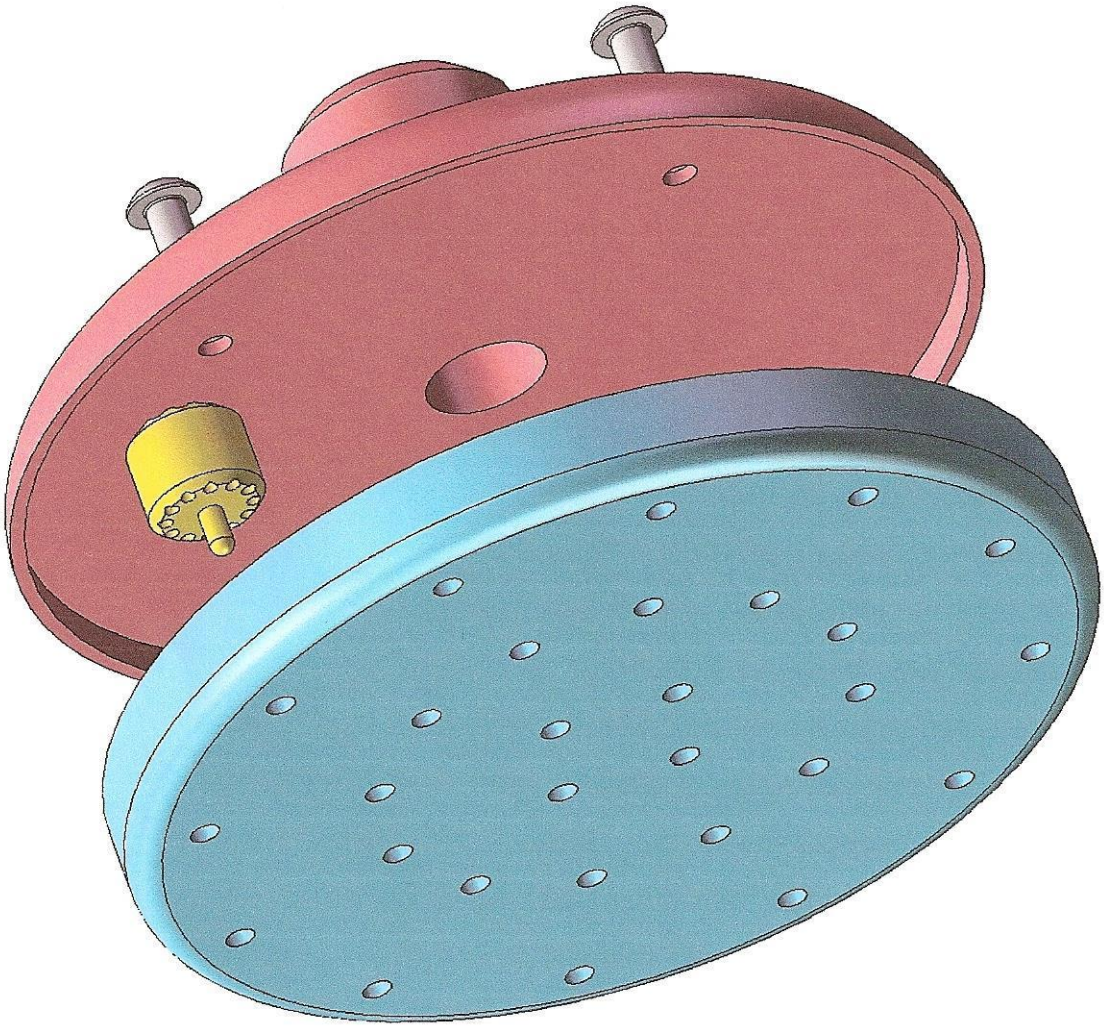

Fig. 7. Body of the massage device with a pulsating foam generator effect

In addition, such a fundamental approach to the use of new composite materials in new applications with completely unusual properties and characteristics allows the creation of new medical devices and instruments with the parameters required in modern medical technologies.

If we pay attention to the fact that in addition to the latest composite materials, there are exceptionally valuable natural materials in nature, then the application of the trends outlined in Victoria Roytberg's publications also allows us to create a

harmonious combination between long-known natural materials and repeatedly tested design and technological techniques.

The photo at the beginning of this publication shows exactly this application of natural aluminosilicate - zeolite in the laboratory preparation of water for, for example, washing the surface of the body of patients for the subsequent treatment process.

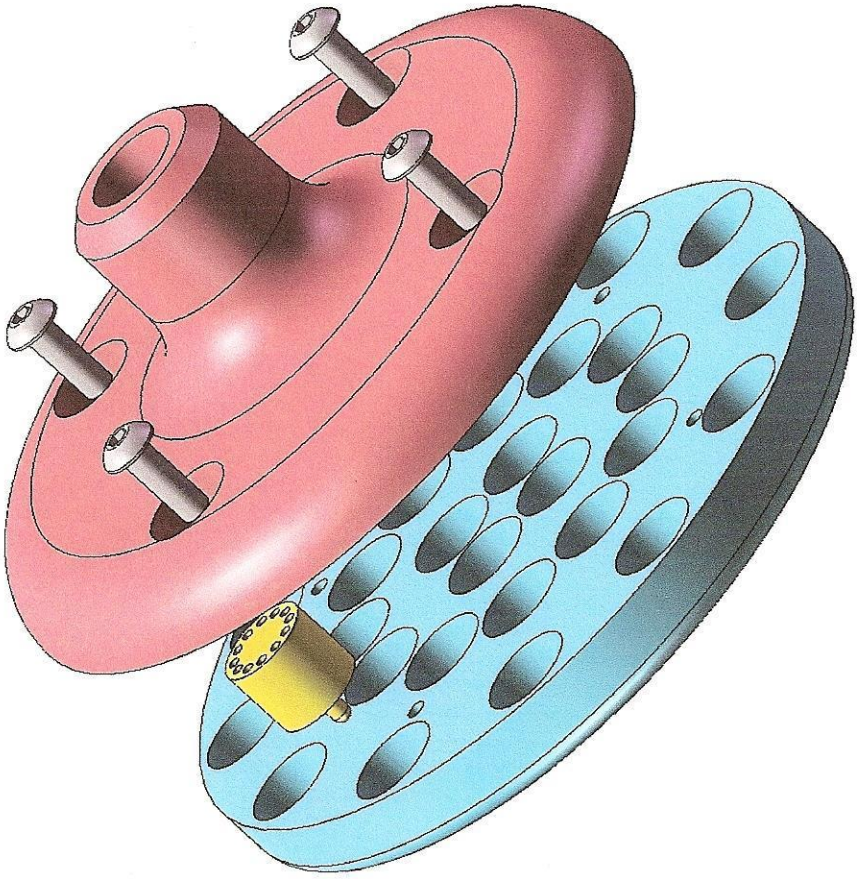

Fig. 8. The massage device is similar to the device in Figure 7

The presented models show that, based on the general principles of innovative design proposed by Victoria Roytberg, it is possible, within the framework of a traditional form and design - for example, an ion exchange filter, using natural and

completely safe materials, to obtain a virtually ideal final result with unusual parameters and properties:

- complete absence of chemical reagents in the process
- use of natural ion exchange conditions in zeolite
- the enormous potential of the unique exchange capacity of zeolite, including for the purification of liquids with radioactive contamination

With such design trends, the requirements for the design itself are changing radically, which allows for the widespread introduction of computer modeling methods and techniques into the development process.

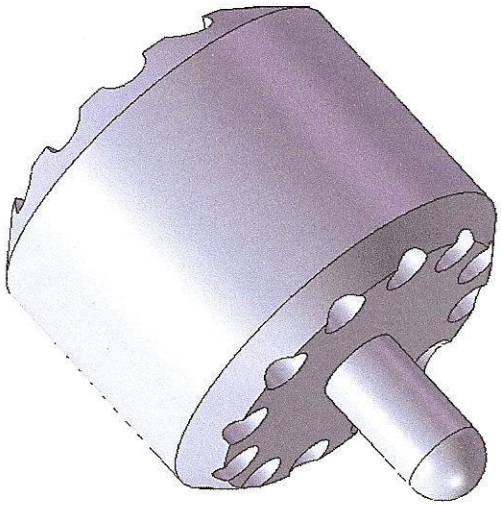

Fig. 9. Pulsating aerodynamic massage element

The conceptual solutions proposed by Victoria Roytberg allow for further development of, for example, carbon-carbon composites in the form of fabric, into solid parts pressed from these fabrics, which have completely unusual properties and open up new innovative possibilities in the treatment and related processes.

For such materials, the novelty and advantage lies in their exceptionally high temperature resistance - the ability to work in ambient temperatures of up to 4000 degrees Celsius.

Disinfection at such temperatures allows for the absolute guaranteed destruction of all bacteria, viral formations and other types of contamination of instruments.

The following models feature massage heads in which all parts, including massage plungers, are made of pressed carbon-carbon fabric.

This trend in the design of the device and the methods of its application are characterized by the possibilities of using all new combinations of properties and qualities of new materials and their derivative combinations with traditional materials and methods of their application in system design.

Fig. 10. An element similar to the element in Figure 9

The fundamental possibility of the emergence of such technical solutions appeared when all stages and phases of the project development process were based on the principles of combinatorial design and software-modeled selective selection

of innovative materials themselves and their integrative combinations and modifications declared in Victoria Roytberg's publications.

Further, as an example, the author of this publication gives the design of a version of systems of local, local vortex cleaning of the patient's body surface, built on the methods and effects of Bernoulli, in preparation for a therapeutic intervention.

The material for the manufacture of the parts of the device shown is the same pressed carbon-carbon composite, as mentioned above, which allows for extremely effective cleaning and disinfection of contact elements.

Only a few examples are given, which quite clearly show the correctness of the trends and principles of design and selection of construction materials for their further modification and optimization of properties and capabilities.

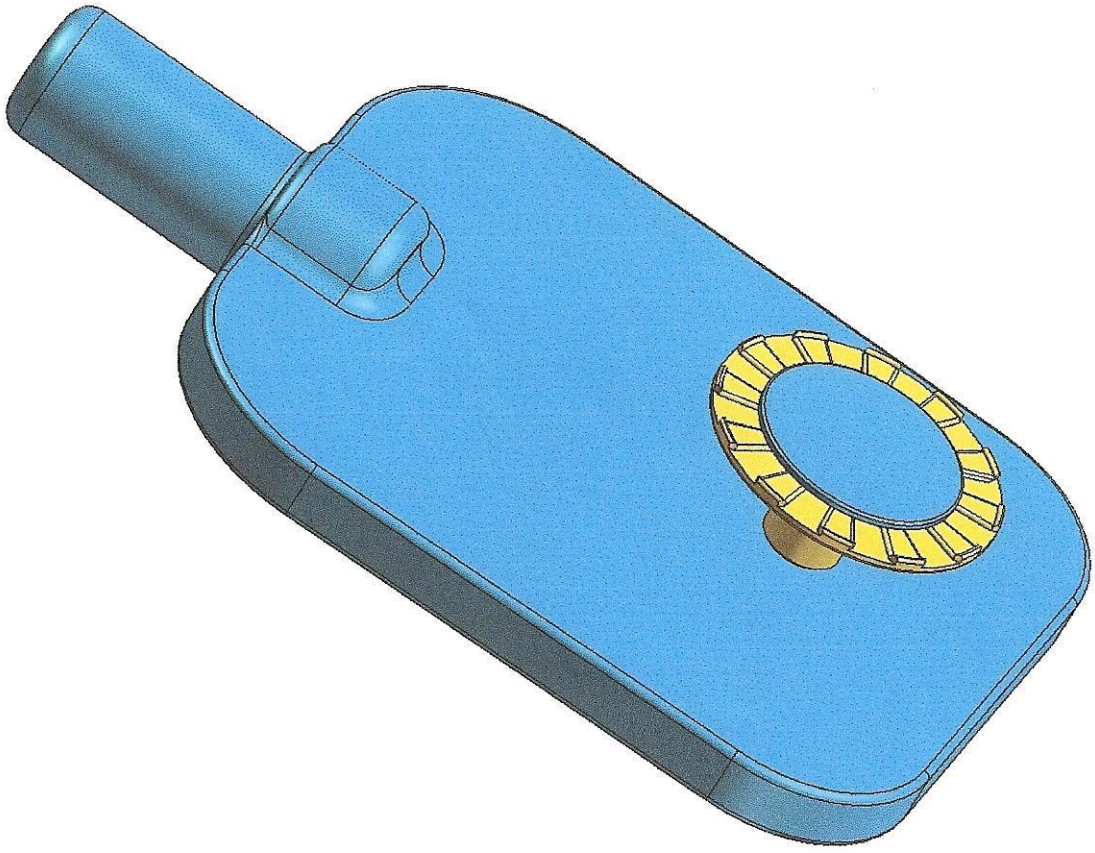

Fig. 11. Aerodynamic massage element with liquid activation effect

As design practice has shown for such devices and equipment that can be classified as auxiliary medical equipment, tooling and instruments, it is most appropriate to use modern versions of the Solid Works series of design programs when designing

The possibilities for structural analysis of the level and quality of design are already pre-programmed and all accumulated data and parameters allow this information to be effectively applied in a parallel process of computer modeling to determine the correctness of the design decisions made.

In addition, if all the necessary technical requirements, technical conditions and local standards are available for the formation of the design, individual critical requirements and control parameters embedded in Solid Works allow the use of the internal reserves of this program for a more detailed process of computer modeling even at the stages of the so-called late design.

In the event that each detail of the development plays not a decorative, but a fundamental role in ensuring the normal functioning of a device or fixture or tool, then the Solid Works program allows for detailed and local modeling for a part or unit made up of several functionally related parts.

Another factor that significantly facilitates the possibility of conducting the installation and selective process of computer modeling is the use of design programs rather than graphic ones for design.

The author plans to devote subsequent publications to this.

List of references, patent and license materials

Appendix 1

United States Patent **5,871,814**
February 16, 1999

Pneumatic grip

Abstract

A device for shaping a vacuum includes a housing having a primary passageway which includes an inlet. A fluid shaping mechanism is disposed in the primary passageway in fluid communication with the inlet for changing the shape of a fluid flow into a planar fluid flow flowing radially outwardly from a central point. The fluid shaping mechanism includes a conically-shaped portion disposed within the primary passageway, a plurality of secondary passageways extending through the housing from a periphery of the cone-shaped surface to outlets at a bottom surface of the housing, and a reflector adjacent to and spaced from the bottom surface for uniformly reflecting the fluid from the secondary passageways radially outwardly to create a vacuum adjacent thereto.

Appendix 2

United States Patent **8,871,090**
October 28, 2014

Foaming of liquids

Abstract

Methods and systems for processing of liquids using compressed gases or compressed air are disclosed. In addition, methods and systems for mixing of liquids are disclosed.

Appendix 3

United States Patent **9,399,200**
July 26, 2016

Foaming of liquids

Abstract

A foaming mechanism configured to receive a plurality of streams of gas and generate a foamed liquid, having an aerodynamic component and an aerodynamic housing disposed around at least a portion of the aerodynamic component. The aerodynamic housing includes a plurality of first channels and a plurality of second channels connected to the plurality of first channels at regular intervals on a distributed plane. The distributed plane is about perpendicular to the plurality of first channels, wherein the plurality of first channels and the plurality of second channels are configured to transform an axial stream of the gaseous working agent into a plurality of radial high-speed streams of the gaseous working agent by channeling the gaseous working agent through the plurality of first channels and into the plurality of second channels on the distributed plane. A hydrodynamic conical reflector and a hydrodynamic housing form a ring channel in an area between the hydrodynamic conical reflector and the hydrodynamic housing. An accumulation mechanism is configured to disperse the plurality of radial high-speed streams of the gaseous working agent into the ring channel and create turbulence to foam the liquid.

Appendix 4

United States Patent Application **20100224506**
Kind Code **A1**
September 9, 2010

PROCESS AND APPARATUS FOR COMPLEX TREATMENT OF LIQUIDS

Abstract

Methods and apparatus for complex treatment of contaminated liquids are provided, by which contaminants are extracted from the liquid. The substances to be extracted may be metallic, non-metallic, organic, inorganic, dissolved, or in suspension. The treatment apparatus includes at least one mechanical filter used to filter the liquid solution, a separator device used to remove organic impurities and oils from the mechanically filtered liquid, and an electroextraction device that removes heavy metals from the separated liquid. After treatment within the treatment apparatus, metal ion concentrations within the liquid may be reduced to their residual values of less than 0.1 milligrams per liter. A Method of complex treatment of a contaminated liquid includes using the separator device to remove inorganic and non-conductive substances prior to electroextraction of metals to maximize the effectiveness of the treatment and provide a reusable liquid.