PATENT

FOR INVENTION

№ 2231137

DEVICE FOR PROTECTION OF MAN FROM ELECTROMAGNETIC RADIATION

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Application № **2002129253**
Priority of invention of **November 04, 2002**.
Registered in the State Register of Inventions of the Russian Federation on **June 20, 2004**
The term of the patent expires on **04 November, 2022**.

Head of the Federal Service of Intellectual Property, Patents and Trademarks

/signature/ B. P. Simonov

(19) RU (11) 2231137 (13)
(51) 7 G 12 B 17/00, A 61 N 1/16

AGENCY OF PATENTS AND TRADEMARKS

(12) INVENTION DESCRIPTION

(21) 2002129253/09 **(22) 04.11.2002**
(24) 04.11.2002
(46) 20.06.2004 Bulletin № 17
(72) I. N. Serov (RU)
(73) AIRES New Medical Technologies Foundation (RU)
(56) RU 2167678 C1, 27.05.2001. RU 2117497 C1, 20.08.1998. RU 9999 U1, 16.05.1999. WO 01/54221 A1, 26.07.2001. WO 99/25044 AI, 20.05.1999.
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(54) DEVICE FOR PROTECTION OF MAN FROM ELECTROMAGNETIC RADIATION

(57) The invention relates to radioelectronics, namely to a device for protection of man from electromagnetic radiation. The technical result consists in creating a device for protection of man from electromagnetic radiation of a wide range of electric appliances. The technical result is achieved due to the fact that the device consists of the first substrate, on which a square matrix is formed. The matrix consists of a set of identical squares, each of which is a center-oriented (symmetrical with respect to the center) part of the fractal structure with fractalization level M of 3 or more. Underneath the first substrate lies the second one. It accommodates a structure containing eight identical circumferences going through the location of the matrix center with equal distances between the centers of each two neighboring circumferences, four of which lie in the intersection points of the matrix sides. The substrate accommodates an aggregate of squares where the sides of the first square coincide with the matrix sides, the sides of the second square go through the angles of the first one; and the sides of the third square go through the angles of the second one; and an aggregate of identical squares with the same center, each

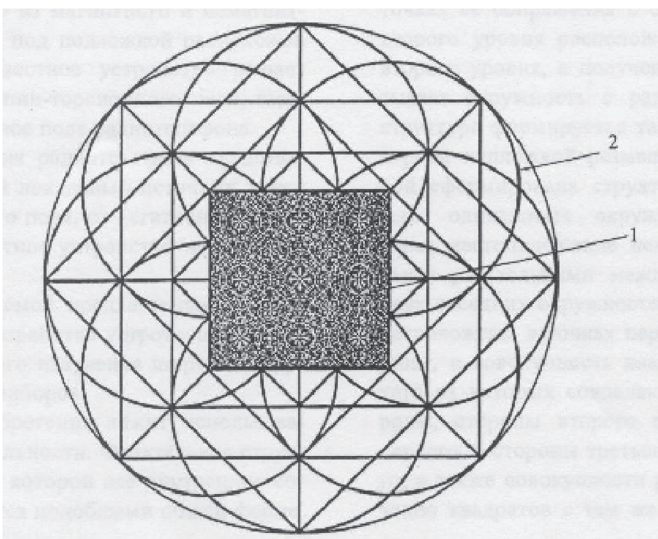

Fig. 1

at 45° to its twin square. The structures on the substrates are formed by lines of a material with a crystal lattice and are electrically insulated from each other. 12 claims, 9 figs.

The invention relates to medicine, occupational hygiene and sanitary science, and is designed for use as a device to protect from electromagnetic radiation a person using different irradiators — radiotelephones, computers, TV sets, microwave ovens, etc.

Usually an operator is protected from the effects of electromagnetic radiation by screening the electronic equipment. However, this type of protection cannot be used for the operator of a radio transmitter unit, particularly a person using a radiotelephone because the transmitting antenna cannot be placed inside the protection screen but is situated in close proximity to the user.

It is known (1) that any item acting as a protective field generator worn by a person can be used as a protective device. To do that, the weakened wave parameter of an irradiator is first transferred to the item. It can be a watch, a keychain, keys etc. Research employing the method of R. Voll's electropuncture diagnostics demonstrated efficiency of such protection.

However, that protection is only effective against one type of irradiators. When radiation parameters change (the irradiator is replaced by one of a different type), such a protective device works inefficiently.

Known (2) is a device for protection from energy influence of a radiotelephone. It is closest to the proposed device in design thereof. It contains a substrate, on which star-shaped geometrical figures made of magnetic material and magnetic insulators are placed one above another, and under the substrate there is an electric magnet. The earlier device accomplishes the task of generating a spin torsion field that cancels out the spin torsion field of a radiotelephone.

However, the design of the radiotelephone is a powerful local source of the electromagnetic field among other things; and the earlier device does not protect from its adverse influence.

The purpose of the proposed invention is to design a protective device against electromagnetic radiation of a wide range of electric appliances.

The invention is based on the phenomenon of fractality. A fractal structure is a structure where all internal constituents are similar to the general form, and the general form is a derivative analog of its fundamental base. The mathematical notion of the fractal unites structural forms of different calibers and reflects the hierarchical principle of their organization (3). The concept of fractality in physics is relatively recent, but its application gave more information on the properties of many phenomena and uncovered ties between seemingly completely different physical phenomena and objects. However, the theory of influence of the fractal structures on objects is in the development stage, experimental data is being collected.

The task at hand is accomplished owing to the fact that the proposed device, as well as the earlier one, contains the first substrate, but unlike in the earlier device, the first substrate in the proposed one accommodates a square matrix comprised of a set of identical single squares. The matrix consists of a set of identical squares, each of which is a center-oriented (symmetrical with respect to the center) part of the fractal structure with fractalization level M of 3 or more. The module of the first fractalization level consists of 1+N circumferences of radius R0, where N is more than two, and the centers of N circumferences are evenly spaced on the first circumference, and a circumference with radius 2Ro. The center of the latter circumference coincides with the center of the first circumference, and the circumference with radius 2R0 is the first circumference of the module of the second fractalization level. The points of its interface with the first-level circumferences are the centers of the first-level modules, and the resulting structure is encircled by a circumference with radius 4R0, which is the first circumference of the third-level fractalization module. The points of its interface with the second-level circumferences are the centers of the second-level modules, and the resulting structure is encircled by a circumference with radius 8R0. The resulting structure is further formed in the same manner. Underneath the first substrate is the second one, which accommodates a structure containing eight identical circumferences going through the location of the matrix center with equal distances between the centers of each two neighboring circumferences, four of which lie in the intersection points of the matrix sides; and an aggregate of squares where the sides of the first square coincide with the matrix sides, the sides of the second square go through the angles of the first one, and the sides of the third square go through the angles of the second one; and an aggregate of squares identical to the mentioned ones with the same center, each at 45° to its twin square. The structures on both substrates are formed by lines of a material with a crystal lattice, and the lines on the first substrate are electrically insulated from the lines on the second substrate.

The set of attributes specified in cl. 2 of the Claims characterizes a device for protection of man from electromagnetic radiation where the fractal structure contains at least one additional circumference that goes through the intersection points of N circumferences of the same radius in each module.

The set of attributes specified in cl. 3 of the Claims characterizes a device for protection of man from electromagnetic radiation where the fractal structure contains at least one additional circumference that goes through the intersection points of N circumferences of the first module. The centers of the circumferences with radii equal to the radius of the additional circumference are in the same intersection points. Those circumferences are encircled by a circumference with a radius equal to two radii of the additional circumference. Additional modules are further generated at levels two, ...n, where n does not exceed M.

The difference between the radii of the additional circumferences introduced in cls. 2 and 3 of the Claims and the radii of the other circumferences is a fractional number, which increases the protective effect of the device. Building the additional fractal structure introduced in cl. 3 of the Claims greatly increases the density of lines and amplifies the protective properties of the device, but complicates its production process.

The set of attributes specified in cl. 4 of the Claims characterizes a device for protection of man from electromagnetic radiation, the fractal structure of which contains at least one additional circumference with radius Rd that goes though the intersection points of N circumferences of the last-level module. That additional circumference encircles N circumferences with radii Rd/2 and interfaces with them in the same intersection points. The centers of the N circumferences lie on the circumference with radius Rd/2, the center of which coincides with the center of the additional circumference. Also, each circumference in this module is the final one for a module of the same structure with the circumferences with radii Rd/4. The structure further fractalizes in the same way to a fractalization level not exceeding M.

Such a method of "feedback" fractalization of the additional circumference is used when the size of the module's external outline is predetermined, and high density of saturation with the lines is necessary to increase the protective properties of the device.

The set of attributes specified in cl. 5 of the Claims characterizes a device for protection of man from electromagnetic radiation where the fractal structure contains four N circumferences.

The set of attributes specified in cl. 6 of the Claims characterizes a device for protection of man from electromagnetic radiation where the fractal structure of the device contains eight N circumferences.

The fractal structure with eight N circumferences has a very high line density, which increases protective properties of the devices as compared to N equal to four, but is more difficult to make.

The set of attributes specified in cl. 7 of the Claims characterizes a device for protection of man from electromagnetic radiation where the second substrate contains additional lines continuing the sides of the smallest squares and ending in their intersection points.

The set of attributes specified in cl. 8 of the Claims characterizes a device for protection of man from electromagnetic radiation where the second substrate has an additional circumference circumscribing the smallest squares.

The set of attributes specified in cl. 9 of the Claims characterizes a device for protection of man from electromagnetic radiation where the second substrate has an additional circumference circumscribing the largest squares.

The experiment shows that all additional lines and circumferences on the second substrate as per cls. 7 and 9 of the Claims increase the bandwidth carrying the protective properties of the device.

The set of attributes specified in cl. 10 of the Claims characterizes a device for protection of man from electromagnetic radiation where the first substrate is made of silicon, the second one of paper, and the lines on both substrates of the structure are made of metal.

The set of attributes specified in cl. 11 of the Claims characterizes a device for protection of man from electromagnetic radiation where the second substrate is made of polyvinyl, and the lines on it are graphite.

Making the second substrate of such materials as paper or polyvinyl reduces the cost of the device.

The set of attributes specified in cl. 12 of the Claims characterizes a device for protection of man from electromagnetic radiation where the height of the lines making up the structures on both substrates is equal or divisible by their width.

It is the optimum ratio for efficient operation of the device.

The set of attributes specified in cl. 13 of the Claims characterizes a device for protection of man from electromagnetic radiation, wherein its surface is finished with a sealing coat, for example, a compound.

The coating is recommended for a longer service life.

One of the hypotheses explaining the effect of the fractal structure on radiation of a radiotelephone consists in following. When a device for protection of man from electromagnetic radiation interacts with a radiotelephone located in close proximity to the user's head, the distances between the phone's irradiator, the protective device, and the brain areas exposed to radiation are significantly smaller than the wavelength of the radiation. Therefore the field in that area can be treated as quasi-static, its structure dependent not on the wavelength, but only on the above mentioned distances. That resultant field will be modulated by the generated spatial structure of the protective device to a greater extent if the observation point (the point in the brain) is closer to the irradiator–protective device system.

The invention is illustrated by means of drawings:

Fig. 1 shows the general view of the device;

Figs. 2–5 show the formation patterns of the fractal structure;

Figs. 6–7 show the layouts of the single squares of the matrix;

Fig. 8 shows the first substrate;

Fig. 9 shows the second substrate with the additional lines.

The device for protection of man from electromagnetic radiation consists of (Fig. 1) first substrate 1, on which the square matrix is formed. The matrix consists of a set of identical squares (Fig. 6, 7), each of which is a center-oriented (symmetrical with respect to the center) part of the fractal structure with fractalization level M of 3 or more. It is formed as follows. The module of the first fractalization level (Fig. 2) consists of 1+N circumferences of radius R0, where N is more than two (Fig. 2 shows a module with N=4) and the centers of N circumferences are evenly spaced on the first circumference with the center at point O; and a circumference with radius 2R0, which center coincides with the center of the former circumference in point O. The first module is now built, but the circumference with radius 2R0 is the first circumference of the second-level module (Fig. 3). On that circumference, the points of its interface with the circumferences with radius R0 are the centers of the first-level modules. The construction of the second-level module is completed by drawing a circumference with radius 4R0 with the center in point O, which in turn is the first circumference of the third-level module (Fig. 6). Further construction occurs in the same manner, i. e. the centers of the second-level modules are placed in the points of interface of the circumference with radius 4R0 and circumferences with radius 2R0; then a circumference with the center in point O and radius 8R0, and so on. Fig. 4 shows the making of the first-level module with fractalization of the additional circumference that goes through intersection points of N circumferences with each other (1_1, 2_1, 3_1, 4_1), and its fractalization centers are located in those points. With N=4, each circumference intersects two neighboring ones, and one additional circumference goes through the intersection points. With N=8, each circumference intersects six neighboring ones, and three additional circumferences can be drawn through the intersection points.

If the size of the last level module's external outline is predetermined, the additional fractal structure looks as follows. At least one additional circumference with radius Rd goes through the intersection points of N circumferences of the last-level module. It encircles N circumferences with radius Rd/2 and interfaces with them in the same intersection points. Their centers lie on the circumference with radius Rd/2, the center of which coincides with the center of the additional circumference. Each circumference in this module is the final one for a module of the same structure with circumferences with radii Rd/4. The structure further fractalizes in the same way to a fractalization level not exceeding M. In this case, the smallest additional circumference can be located within the circumference with radius R0. Such fractalization method of additional circumference is illustrated in Fig. 5. For purposes of clarity, a module at the first fractalization level with N=8 is shown. An additional circumference with radius Rd goes through the intersection points of circumferences with radii R0, and interfaces with circumferences with radius Rd/2 in the same points.

When manufacturing the device, a matrix (Fig. 8) consisting of a set of identical squares is formed on the first substrate. Each square is a center-oriented part of one of the above-described fractal structures (Figs. 6 and 7). The optimal value of side L of a square is 2R0(M+1), with the center of the circumference with radius R0 located in the center of the square. Fig. 6 shows the origin of a square with N=4 and fractalization level M=3. When using a fractal structure with additional circumferences (Fig. 7), the line density in the square can be very high. With L=2R0(M+1), lines of modules of all levels are used, and the line density in the square is quite even. If the center of the circumference with radius R0 is in the center of the square, the structure is symmetrical and therefore stable. Underneath the first substrate is second one 2 (Fig. 1). It accommodates a structure containing eight identical circumferences. The circumferences go through the location of the matrix center with equal distances between the centers of each two neighboring circumferences, four of which lie in the intersection points of the matrix sides. The substrate also accommodates an aggregate of squares where the sides of the first square coincide with the matrix shapes, the sides of the second square go through the angles of the first one; and the sides of the third square go through the angles of the second one; and an aggregate of identical squares with the same center, each at 45° to its twin square. The structures on both substrates are formed by lines of a material with a crystal lattice, and the lines on the first substrate are electrically insulated from the lines on the second substrate.

To broaden the bandwidth of electromagnetic radiation covered by the protective properties of the device, the structure on the second substrate contains additional lines continuing the sides of the smallest squares and ending in their intersection points (Fig. 9). For the same purpose, a circumference around the matrix is formed on the second substrate, as well as a circumference encircling the largest squares. In Fig. 9 those additional lines and circumferences are heavier.

It has been established that sphere-shaped fractal structures are the most effective. However, their manufacture is virtually impossible today. The proposed device uses a two-dimensional section of a globe. But due to the fact that the lines of made of a material with a crystal lattice, it can be considered that the fractal structure is not flat, but three-dimensional. Both the heights of the lines and the material of the substrate carrying the crystal lattice, for example silicon, contribute to gaining the third dimension. Each of those factors increases the protective properties of the device.

There are several methods to generate the proposed fractal structures on a substrate, for example silk screening or photolithography. |Thus, silk screening is used on a polyvinyl substrate to produce a fractal structure with 80–100 micron wide and 40–50 micron high graphite lines. Fractal structures made by means of photolithography, for example on a silicon substrate, bear aluminum lines with a height and width of 1 micron.

Maximum effect is produced by devices where substrates are made of materials with a pronounced crystalline structure, such as silicon, aluminum. However, making a wolfram-molybdenum lattice of 1.15 micron lines, for instance on a silicon substrate, requires complex expensive technology; therefore protective devices on that base are rather costly. |The cost of protection can be reduced by making at least one substrate of an inexpensive material, which will carry whereon a graphite fractal structure. However, such devices are less effective as compared to the above-mentioned ones. An important factor of the functional properties of fractal structures generated on a substrate is the barrier effect of changing mass density; it changes at the demarcation between the lines making up the fractal structure and the "free field." The more pronounced that difference is, the greater is the aftereffect.

A device for protection of man from electromagnetic radiation with dimensions of 35x35 mm (where the size of the matrix is 7.5 mm) can be conveniently secured on the sides of a computer, microwave oven, on a radiotelephone receiver.

Experiments have proved that a radiotelephone transmitter has the most negative impact on the user as compared to other home appliances.

The main method of research of the protective properties of the device was the electroencephalographic (EEG) method due to a special relation of EEG to the studied aspects of comprehensive cerebration. The study considered a possibility of restoration of bioelectrical activity (BEA) disrupted by anthropogenic factors, by means of the device for protection of man from electromagnetic radiation.

When using a radiotelephone, changes in the BEA of the human brain are so pronounced that they merit the name of an electromagnetic storm on a local scale. The results of clinical trials reveal that using the protective device virtually offsets those changes completely. Researched showed that application of a radiotelephone significantly changes the structure of BEA causing disintegration of the initial activation-deactivation balance, it disturbs not only the rhythmic pattern, but also the rhythm distribution pattern on the surface of the head. In the area where a radiotelephone is placed, asymmetry of delta activity increases by 37% on the average. However, in presence of the protective device asymmetry is canceled out. Statistical processing of EEG altered under the influence of a radiotelephone shows that most reliable changes manifest in the alpha band. Alpha rhythm can be treated as an "encoder system" that the brain needs in order to prevent perception of the outside world and responses to irritants from being distorted and worn off by the influx of sensory stimuli. In presence of the device, the total rhythmic activity is re-arranged and the brain raises "alpha-protection."

Change of EEG under the influence of a computer, TV set, microwave oven radiation do not have such a pronounced character. However, it is known that daily and continuous use of a PC monitor over 6–8 years can cause pathological visual disorders, disorders of the central nervous, cardiovascular, and immune systems. But EEG shows that, if one or more of the proposed protective devices on the electric appliances, "alpha-protection" is generated.

LITERATURE CITED

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2. Patent №2167678, RU, МПК A 61 N 1/16.

3. Peitgen H.-O., Richter P. H. The Beauty of Fractals. Moscow, MIR, 1993.

PATENT CLAIM

1. A device for protection of man from electromagnetic radiation where the first substrate accommodates a square matrix consisting of a set of identical squares each of which is a center-oriented (symmetrical with respect to the center) part of the fractal structure with fractalization level M of 3 or more. The fractal structure is formed as follows. The first-level fractalization module consists of 1+N circumferences with radius R0, where N is more than two and the centers of N circumferences are evenly spaced on the first circumference; and a circumference with radius 2R0, the center of which coincides with the center of the first circumference. The circumference with radius 2R0 is the first circumference of the second-level fractalization module, and the points of its interface with the circumferences of first-level fractalization module are the centers of the first-level fractalization modules. The resulting structure is encircled by a circumference with radius 4R0, which is the first circumference in the third-level fractalization module, and the points of its interface with the circumferences of the second-level fractalization modules are the centers of the second-level fractalization modules. The resulting structure is encircled by a circumference with radius 8R0, and the fractal structure further develops in the same manner. Underneath the first substrate lies the seconds one carrying a fractal structure containing eight identical circumferences going through the location of the center of the square matrix, with equal distances between the centers of each two neighboring circumferences, four of which lie in the intersection points of the sides of the square matrix; and an aggregate of squares where the sides of the first square coincide with the sides of the square matrix, the sides of the second square go through the angles of the first square, and the sides of the third square go through the angles of the second square; and also an aggregate of identical squares with the same center, each at 45° to its twin square. The fractal structure is made up of lines of material with a crystal lattice, and the lines on the first substrate are electrically insulated from the lines on the second substrate.

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2. A device for protection of man from electromagnetic radiation as per cl. 1 wherein the fractal structure contains at least one additional circumference that goes through the intersection points of N circumferences of the same radius in each fractalization module.

3. A device for protection of man from electromagnetic radiation as per cl. 1 wherein the fractal structure contains at least one additional circumference that goes through the intersection points of N circumferences of the first-level fractalization module. The centers of the circumferences with radii equal to the radius of the additional circumference are in the same intersection points. Those circumferences are encircled by a circumference with a radius equal to two radii of the additional circumference. Additional modules are further generated at levels two, ...n, where n does not exceed M.

4. A device for protection of man from electromagnetic radiation as per cl. 1 wherein at least one additional circumference with radius Rd goes through the fractal structure's intersection points of N circumferences of the last-level fractalization module. It encircles N circumferences with radius Rd/2 and interfaces with them in the same intersection points. Their centers lie on the circumference with radius Rd/2, the center of which coincides with the center of the additional circumference. Each circumference in the module at this fractalization level is the final one for the module at this fractalization level with the same structure with circumferences with radii Rd/4. The structure further fractalizes in the same way to a module at the fractalization level not exceeding M.

5. A device for protection of man from electromagnetic radiation as per any of cls. 1-4 wherein the fractal structure contains four N circumferences.

6. A device for protection of man from electromagnetic radiation as per any of cls. 1-4 wherein the fractal structure contains eight N circumferences.

7. A device for protection of man from electromagnetic radiation as per any of cls. 1–6 wherein the structure on the second substrate contains additional lines continuing the sides of the smallest squares and ending in their intersection points.

8. A device for protection of man from electromagnetic radiation as per any of cls. 1-7 wherein the second substrate has an additional circumference circumscribing the square matrix.

9. A device for protection of man from electromagnetic radiation as per any of cls. 1-8 wherein the second substrate has an additional circumference circumscribing the largest squares.

10. A device for protection of man from electromagnetic radiation as per any of cls. 1–9 wherein the first substrate is made of silicon, the second one of paper, and the lines on both substrates of the fractal structures are made of metal.

11. A device for protection of man from electromagnetic radiation as per any of cls. 1–9 wherein the second substrate is made of polyvinyl, and the lines of the fractal structure on the substrate are graphite.

12. A device for protection of man from electromagnetic radiation as per any of cls. 1-11 wherein the height of the lines making up the structures on both substrates is equal or divisible by their width.

13. A device for protection of man from electromagnetic radiation as per any of cls. 1-12 wherein the surface is finished with a sealing coat, for example a compound.

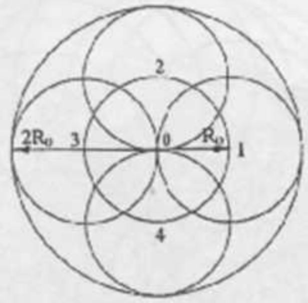

Fig. 2

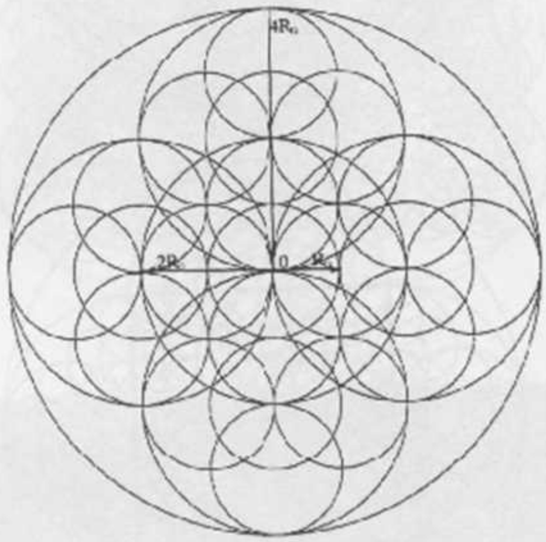

Fig. 3

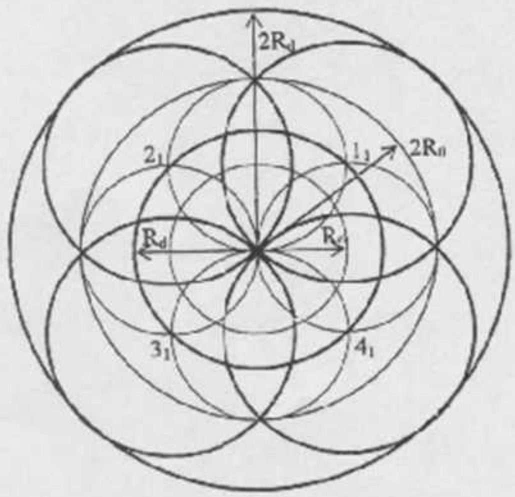

Fig. 4

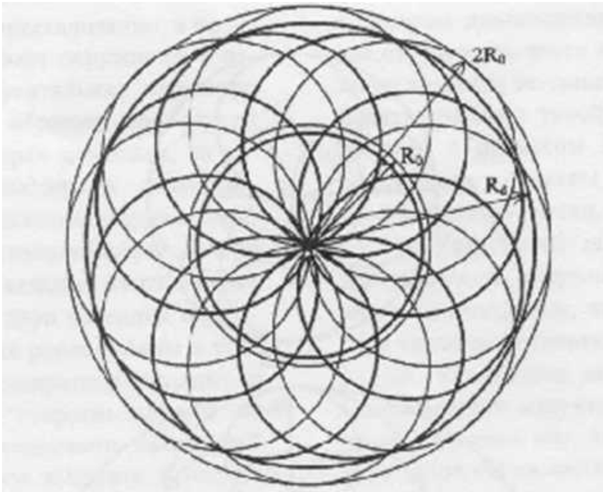

Fig. 5

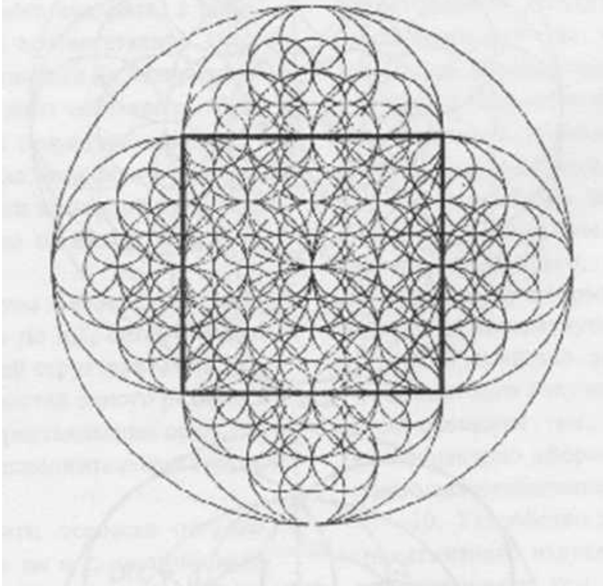

Fig. 6

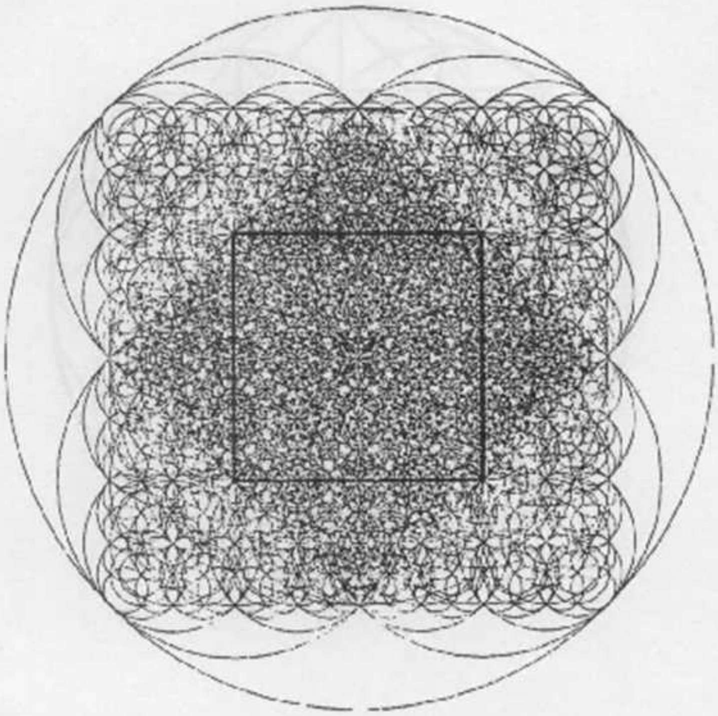

Fig.7

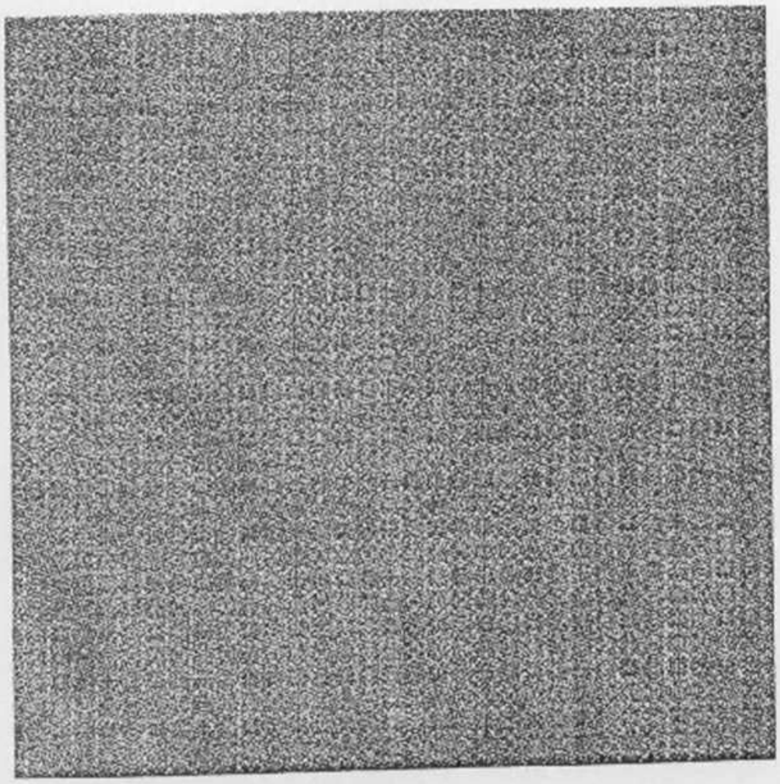

Fig. 8

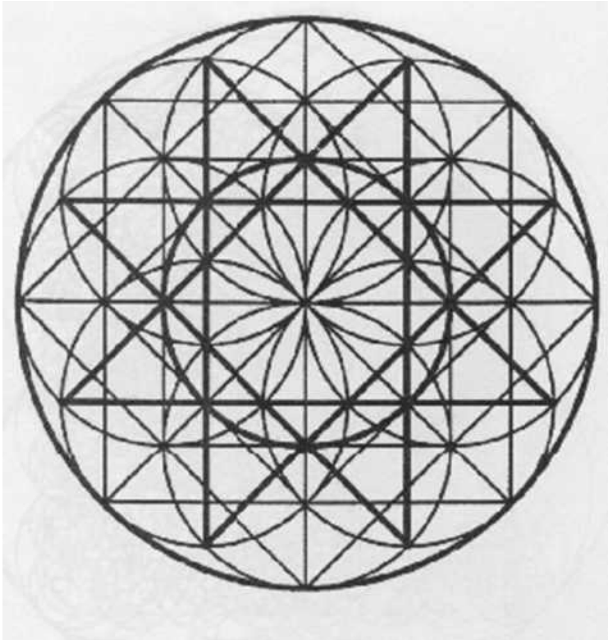

Fig. 9

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Research and Development Department
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of the Federal Institute of Industrial Property
d. 30, korp. 1, Berezhkovskaya nab., Moscow, G-59, GAP 5, 123995
Printed on the printing base of the FIIP, Department of Issue of Official Publications

APPENDIX
TO PATENT FOR INVENTION
№ 2231137

Registered on 12.03.2009, Agreement of Alienation of Patent Title № РД0047886.

New patentee: Igor Nikolayevich Serov (RU)

The entry is made to the State Register of Inventions of the Russian Federation
March 12, 2009
Head of the Federal Service of Intellectual Property, Patents and Trademarks
/signature/ B. P. Simonov