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<p>(84) Designated Contracting States: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR Designated Extension States: AL BA MK RS</p> <p>(71) Applicants:</p> <ul style="list-style-type: none"> • Van Welden, Paul 1860 Meise (BE) • Aelbrecht, Peter 1790 Teralfene (BE) 	<p>(72) Inventor: Van Welden, Paul 1860 Meise (BE)</p> <p>(74) Representative: Quintelier, Claude et al Gevers & Vander Haeghen Intellectual Property House Holidaystraat 5 Brussels Airport Business Park 1831 Diegem (BE)</p>
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(54) **Antenna for diminishing electro-magnetic pollution**

(57) An antenna with a conductor comprising a first and a second set of at least a first, a second, a third and a fourth substantially parallel and substantially straight segments arranged successively and adjacently to each other, each one of the segments of each set having a first and a second longitudinal end opposite to each other wherein in each set all of said first ends are at one side and all of said second ends are at an opposite other side, **characterised in that:**

- in each of said first and second set, at their first longitudinal ends:
 - said first segment is connected to said fourth segment, and
 - said second segment is connected to said third seg-

ment;

- in that at their second longitudinal ends:
 - said third segment of said first set is connected to one of said third or fourth segments of said second set,
 - said fourth segment of said first set is connected to the other of said third or fourth segments of said second set, and
 - said first segment of said second set is connected to said second segment of said second set;
- and in that the segments of said first set cross over the segments of said second set at an angle between 62 and 118 degrees.

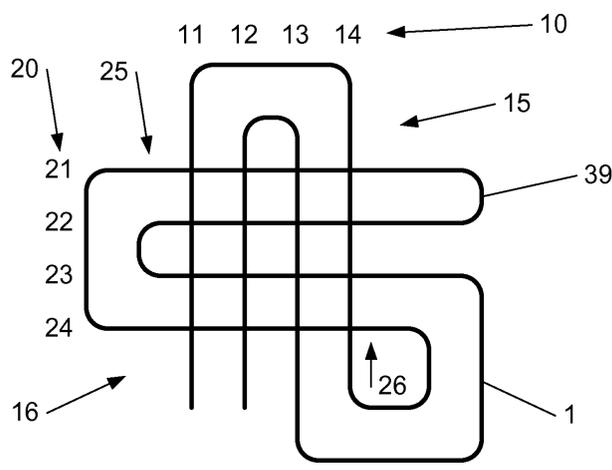


Fig. 1

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Description

[0001] An antenna with a conductor comprising a first and a second set of at least a first, a second, a third and a fourth substantially parallel and substantially straight segments arranged successively and adjacently to each other, each one of the segments of each set having a first and a second longitudinal end opposite to each other wherein in each set said first ends and second ends are similarly oriented.

[0002] Such an antenna is known from WO2008139253. In antennas, there is a constant push for miniaturization to satisfy the convenience and desires of consumers. The smaller the size of the antenna however, the lower the performance of the antenna. Antennas with conductors that comprise segments arranged parallel next to each other are therefore advantageous because they require less surface area than an antenna having the same length but without such segments.

[0003] Antennas are provided for transmitting and/or receiving signals by exciting and/or sensing electro-magnetic waves. Such electro-magnetic waves move along the environment. By transmitting signals, an electro-magnetic wave is spread into the environment. This electro-magnetic wave, which is artificial and man-made and thus unnatural, can be regarded as an electro-magnetic pollution. Especially because technology advances in the field of electronic devices spreading electro-magnetic waves, such as mobile phones, effects of electro-magnetic pollution start to be more and more clear. Such effects are for example occurrence of interference of different waves and signals. Well-known consequence of such interferences is the prohibition to use a mobile phone or a laptop in an airplane. Furthermore research has proven a relationship between fitness of a human and the presence of electro-magnetic pollution in the neighbourhood of this human. Electro-magnetic pollution proves to have negative effects on the stamina of a human.

[0004] It is an object of the present invention to provide an antenna that resolves a number of the above-mentioned problems.

[0005] To this end an antenna according to the present invention is **characterised in that:**

- in each of said first and second set, at their first longitudinal ends:
 - said first segment is connected to said fourth segment, and
 - said second segment is connected to said third segment;
- in that at their second longitudinal ends:
 - said third segment of said first set is connected to one of said third or fourth segments of said second set,

○ said fourth segment of said first set is connected to the other of said third or fourth segments of said second set, and

○ said first segment of said second set is connected to said second segment of said second set;

- and in that the segments of said first set cross over the segments of said second set at an angle between 62 and 118 degrees, preferably between 80 and 100 degrees, more preferably about 90 degrees.

[0006] When a current flows through the conductor, a magnetic field is generated according to well-known physical laws. Due to the particular connection of the segments, the flow direction of the current in adjacent segments will be opposite. Furthermore, because two sets of segments are located approximately perpendicularly to each other, a mechanically and physically balanced antenna is created. This balanced antenna has a surprising effect in that the electro-magnetic waves created by this antenna are more balanced in the sense that it does not pollute the environment as much as conventional antennas do. Tests have proven that the fitness of a human in the neighbourhood of electro-magnetic waves created by an antenna according to the present invention increases in view of the fitness of the same human in the neighbourhood of electro-magnetic waves created by a prior art antenna.

[0007] The antenna according to the invention comprises a conductor having two ends, namely the first and second segment of the first set of segments. To these ends, a generator or any other means known in the art, can be mounted so as to provide the antenna with a signal.

[0008] Preferably, said successive and adjacent segments may be interspaced with a substantially constant spacing. The spacing being constant increases the balance of the antenna and has proven to increase the above mentioned effects.

[0009] Advantageously, each of said first and second set may comprise a further pair of segments arranged successively and adjacently to said first segment, said first and second segment being connected at said second longitudinal end, to respectively the one segment of said further pair of segments lying adjacent to said first segment, and the other segment of said further pair of segments. Said first set comprises a first number of segments and said second set comprises a second number of segments, and preferably said first number being substantially equal to said second number. Increasing the number of segments results in a larger overall conductor length and thus an antenna with higher performance capability. Keeping the number of segments equal for each set results in an increase of the balance of the antenna and have proven to increase the above mentioned effects. Substantially equal indicates that the percentage of deviation between the number of segments in the first

set in the second set is smaller than 20%, preferably smaller than 10%, more preferably smaller than 5%, most preferably smaller than 1 %.

[0010] Advantageously, said first segment of said first set may be connected to said second segment of said first set so that a closed conductive circuit is formed. In this configuration, no generator or the like is connected to the open ends of the antenna, but these open ends are short-circuited. This results in an antenna with no active elements. This antenna senses the electro-magnetic waves in the environment and according to well known physical laws, a current will start to flow in the conductor due to these electro-magnetic waves. This effect will increase when the antenna is located close to a device sending an electro-magnetic signal, for example a mobile phone. Tests have proven that this current results in the creation of an electro-magnetic excitement that harmonizes the electro-magnetic pollution in the environment. Results are surprising in that such a passive antenna in the neighbourhood of a human diminishes the electro-magnetic pollution that negatively affects the stamina and fitness of this human thereby indirectly increasing the stamina and fitness of this human over a certain time. Positive effects can in some cases already be measured in a few hours.

[0011] The invention will now be described in more detail with respect to the drawings illustrating some preferred embodiments of the invention. In the drawings:

- figure 1 shows an antenna according to a first embodiment of the invention;
- figure 2 shows an antenna according to a next embodiment of the invention;
- figure 3 shows a first set of segments on a printed circuit board; and
- figure 4 shows a second set of segments on a printed circuit board.

[0012] In the drawings a same reference number has been allocated to a same or analogous element.

[0013] Figures 1 shows a conductor 1, which is a conductive path. In this path, two parts can be distinguished. In the first part 10, the path is mainly arranged in a vertical way, in columns, whereas in the second part 20, the path is mainly arranged in a horizontal way, in rows. The first part comprises a first set of segments 11, 12, 13, 14 that extend vertically, and the second part comprises a second set of segments 21, 22, 23, 24 that extend horizontally. Each segment is straight and linear. In each part, the segments are arranged adjacently and parallel to each other. At the longitudinal ends of the segments, these segments are connected to each other in a way as shown in Figure 1. Segments of different parts cross each other and at the places where a horizontal and a vertical segment cross, there is an isolation layer between these segments so that no current can flow through these crossing points.

[0014] Segments 11, 12, 13 and 14 all have a first lon-

gitudinal end 15 all at one side of the first part 10, and a second, opposite longitudinal end 16 all at an opposite side of the first part 10. Segments 21, 22, 23 and 24 all have a first longitudinal end 25 all at one side of the second part 20 and an opposite, second longitudinal end 26 all at an opposite side of the second part 20.

[0015] Configuration of the segments is as follows:

- First segment 11 of the first part 10 is connected to fourth segment 14 of the first part 10 at their first longitudinal ends 15;
- second segment 12 of the first part 10 is connected to third segment 13 of the first part 10 at their first longitudinal ends 15;
- the second longitudinal end 16 of the third segment 13 of the first part 10 is connected to the second longitudinal end 26 of the third segment 23 of the second part 20;
- the second longitudinal end 16 of the fourth segment 14 of the first part 10 is connected to the second longitudinal end 26 of the fourth segment 24 of the second part 20;
- fourth segment 24 of the second part 20 is connected to first segment 21 of the second part 20 at their first longitudinal ends 25;
- the third segment 23 of the second part 20 is connected to second segment 22 of the second part 20 at their first longitudinal ends 25;
- second segment 22 of the second part 20 is connected to the first segment 21 of the second part 20.

[0016] In this configuration, the conductor has two open ends, namely the second longitudinal end 16 of the first segment 11 of the first part 10, and the second longitudinal end 16 of the second segment 12 of the first part 10. The configuration of the segments allows, starting from the first open end, to let a current flow through all segments in the antenna so as to arrive at the second open end. Between these open ends, a signal generator, or any other means known in the art to be coupled with an antenna, can be provided so as to obtain an active antenna provided to send and/or receive signals. However these ends could also be short-circuited so as to obtain a passive antenna. This passive antenna will operate due to electro-magnetic waves in the environment that induce a current into the conductor of the passive antenna. This current on its turn will generate electro-magnetic waves that harmonize the electro-magnetic waves in the environment due to the specific configuration of the antenna.

[0017] The conductor 1 has a substantially constant thickness D. Depending on the application of the antenna, this thickness D can vary from 100mm to 0,000001 mm. Adjacent segments are interspaced with a distance S, which distance S should be at least enough to isolate these segments from each. The distance S is preferably directly proportional to the thickness D of the segments, and is preferably maximum 19 times the thickness D of

the segments. More preferably the distance S is maximum 6,18 times the thickness D of the segments, even more preferably the distance S is equal to the thickness D of the segments. Most preferably the distance S is smaller than the thickness D of the segments.

[0018] Figure 2 shows a preferred embodiment of the antenna according to the invention. In this preferred embodiment, the first set of segments comprises a further pair of segments 18 and 19. This further pair of segments being located adjacent to the first segment 11 and on the opposite side than the second segment 12. The second set of segments comprises a further pair of segments 28 and 29. This further pair of segments being located adjacent to the first segment 21 and on the opposite side than the second segment 22. These further pairs of segments are connected to the antenna as follows:

- First segment 11 of the first part 10 and the segment 19 of said further pair of segments of the first part 10 that is adjacent to this first segment 11 are connected to each other at their respective second longitudinal ends 16;
- second segment 12 of the first part 10 and the other segment 18 of said further pair of segments of the first part 10 are connected to each other at their respective second longitudinal ends 16;
- first segment 21 of the second part 20 is connected at the second longitudinal end 26 to the segment 29 of said further pair of segments of the second part 20 that is adjacent to this first segment 21;
- second segment 22 of the second part 20 is connected at the second longitudinal end 26 to the other segment 28 of said further pair of segments of the second part 20.

[0019] In the figure 2, contrary to figure 1, the connections between the first set of segments and the second set of segments are arranged as follows:

- the second longitudinal end 16 of the third segment 13 of the first part 10 is connected to the second longitudinal end 26 of the fourth segment 24 of the second part 20;
- the second longitudinal end 16 of the fourth segment 14 of the first part 10 is connected to the second longitudinal end 26 of the third segment 23 of the second part 20;

[0020] These sets of segments being connected the other way around with respect to figure 1 has no effect on the applicability of the antenna, and can be chosen depending on which way of connecting is the easiest in practice.

[0021] The second segment 22 of the second part 20 being connected to the first segment 21 of the second part 20, as indicated above and as can be clearly seen in figure 1, is still applicable. However in this preferred embodiment, this connection is not realised at the second

longitudinal end 26 of the second part 20 between the segments 21 and 22. This connection is realised at the first longitudinal end 26 of the second part 20 between the further pair of segments 28 and 29. For a constant segment length, these further pairs of segments thus increase the total conductor length thereby increasing the performance capabilities of the antenna.

[0022] From this figure 2 it can be clearly distinguished that a repeating pattern is formed in each part 10 and 20. Each part shows two meander patterns being interlaced into each other in such a manner that no overlap of meanders occurs. It will be clear that when a larger number of segments is present in an antenna according to the invention, it will be preferred to continue this repeating pattern by connecting the larger number of segments accordingly. Both the figures 3 and 4 show such a repeated pattern.

[0023] The figures 1 to 4 show that one end of the repeating pattern of the first part 10 is connected to one end of the repeating pattern of the second part 20. At the other end of the repeating pattern of the second part 20, there is a short-circuited end 39. Following a current starting at a first open end of the first part 10 and flowing through the conductor 1, this current first flows through a first meander of the first part 10. Then this current flows to the second part and through a first meander of this second part 20 so as to arrive at the short-circuited end 39. From this end 39, the current will flow through a second meander of the second part 20. Then this current flows to the first part and through a second meander of the first part 10 so as to arrive at the second open end of the first part 10.

[0024] Figure 3 shows the first part of the conductor and figure 4 shows the second part of the conductor. The patterns as shown in figure 3 and figure 4 can be realised as a printed circuit board or the like by known means in the art of electronics. These two printed circuit boards can be mounted onto each other so that the conductor on the one printed circuit board is insulated from the conductor on the other printed circuit board. However connectors 30, 31, 32 and 33 should be coupled in a conductive manner so that a current is allowed to flow from one printed circuit board through a connector into the other printed circuit board. To this end the connector 30 is to be coupled to the connector 31 and the connector 32 is to be coupled to the connector 33. These connections realise the connections from the first set of segments to the second set of segments as explained above. Instead of printing these two parts on different printed circuit boards, each part can be printed on one side of one printed circuit board so as to obtain a double printed circuit board.

[0025] However instead of realizing each part of the conductor on a different element, it will also be possible to create an antenna according to the invention where the segments are located substantially in the same plane. Provisions should be taken in such an embodiment that the segments are insulated from each other at the cross-

ing points thereof.

[0026] In a preferred embodiment of the invention, the antenna comprises two conductors which each are arranged according to the invention. Each of the two conductors comprises a first set of segments extending in a first direction and a second set of segments extending in a second direction. The angle between the first direction and the second direction is situated somewhere between 62 and 118 degrees, preferably between 80 and 100 degrees, more preferably substantially 90 degrees. The two conductors are positioned so that segments of the first conductor cross over the segments of the second conductor. More in particular, two conductors are positioned so that first direction of the first conductor encloses an angle with the first direction of the second conductor between 31 and 59 degrees, more preferably between 40 and 50 degrees, most preferably substantially 45 degrees.

[0027] When a passive antenna is realized having two conductors, it is preferred to not interconnect the two conductors, but keep them as separate antennas. However they can be connected in parallel in some cases just as active antennas can. In an active antenna, a signal generator or the like is connected to the open ends of the antenna. Figure 3 shows the open ends A and B of the antenna. For the ease of explanation, the open ends of a first conductor will be referred to as open ends A1 and B1. The open ends of a second conductor will be referred to as open ends A2 and B2. First and second conductor can be connected in parallel by connecting A1 with A2 and B1 with B2 or by connecting A1 with B2 and B1 with A2. First and second conductor can also be connected in series by connecting A1 with A2 or by connecting A1 with B2 or by connecting B1 with A2 or by connecting B1 with B2. It will be directly clear for a person skilled in the art how to connect a signal generator or the like to such coupled conductors.

[0028] An antenna according to the invention can be realized as a standalone antenna either active or passive. However this antenna can also be integrated in already existing or newly developed electronic devices for harmonizing the electro-magnetic waves transmitted by these electronic devices. For example an antenna according to the invention can be integrated into the chipset of a mobile phone either in an active or a passive way for reducing the electro-magnetic pollution created by this mobile phone. The antenna can be used for protecting a living subject from negative effects due to electro-magnetic waves. For this purpose, the antenna is preferably placed somewhere in the proximity of the living subject to be protected from negative effects due to electro-magnetic waves. If the antenna is active, this active antenna is preferably placed in a radius of no more than 1000 meters, more preferably no more than 100 meters, even more preferably no more than 20 meters, most preferably no more than 5 meter from the living subject. If the antenna is passive, this passive antenna is placed in a radius of no more than 10 meters, more preferably no

more than 5 meters, even more preferably no more than 2 meters, most preferably no more than 1 meter from the living subject.

[0029] Electro-magnetic pollution is unnatural, artificial, manmade, electro-magnetic waves. There are however several natural electro-magnetic sources such as the light of the sun, the earth's magnetic field and magnetic fields created by lightning.

[0030] Every human and animal has its own natural electro-magnetic field. Several techniques have been developed using this natural electro-magnetic field for diagnostic or medical treatment methods such as electrocardiogram, electroencephalography and pacemakers.

[0031] It will be clear that unnatural electro-magnetic field affect the natural electro-magnetic fields including the electro-magnetic fields of humans and animals. Recent studies have proven a relationship between electro-magnetic pollution and medical conditions such as osteoarthritis, fertility problems, allergies, asthma and depression. Electro-magnetic pollution affects the stamina and fitness and disturbs the natural sleep patterns. It thereby causes headaches, migraine, aggression, overall sleepiness and concentration and memory defects. Furthermore, studies of the International Agency for Research on Cancer (IARC) by order of the World Health Organization (WHO) published on the IARC website on October 8, 2008, have proven a relationship between cancer and the use of a mobile phone.

[0032] Our clinical trials have showed the positive effects of the antenna according to the invention by measuring and comparing several health parameters before and after the application of a passive antenna according to the invention in the environment of a subject. A first clinical trial has proven that the negative thermal effects to the brain, which are caused by the electro-magnetic waves excited by the mobile phone, due to the use of such phone is clearly diminished when such antenna according to the invention is applied to this mobile phone.

[0033] In a second clinical trial, the heart rate variability (HRV), which is a measure of the beat-to-beat variations in heart rate, has been used to prove the effect of the antenna according to the invention. Heart rate variability is regarded as an indicator of the activity of autonomic regulation of circulatory function. A first HRV measurement has been carried out on a number of persons which just made a phone call with their mobile phones for 15 minutes. After two hours of inactivity, this same number of persons made a phone call with their same mobile phones for 15 minutes, but the phones being provided with a passive antenna according to the invention. A second HRV measurement has been carried out just after this second call. Comparing these two measurements shows a clear improvement of the second HRV values in view of the first HRV values. Analogue trials have been carried out to also test an active antenna according to the invention, these test being carried out not with making a phone call, but with driving a car and with working at a wireless computer, the latter trials indicating a clear im-

provement when using the active antenna according to the invention.

[0034] A third clinical trial measures the rouleaux formation of red blood cells. Rouleaux are stacks of red blood cells which form because of differences in electrical voltage between cells. Conditions which do this include infections, inflammatory and connective tissue disorders, and cancers. It also occurs in diabetics and is one of the causative factors for micro vascular occlusion in diabetic retinopathy. Measurements of rouleaux formation have been carried out in an analogue way as the second clinical trial. Results show a strong rouleaux formation when using the mobile phone, driving a car and working a wireless computer without the antenna according to the invention. However when an antenna according to the invention is applied in the neighbourhood of the subject, a clear decrease of rouleaux formation can be seen.

[0035] An antenna according to the invention will be widely applicable for harmonizing electro-magnetic waves in houses, cars, airplanes, ... for harmonizing electro-magnetic waves coming from Wi-Fi enabled devices, cordless telephones, baby monitors, microwaves, GPS systems and more. The antenna according to the invention can be used as a therapeutic device and as a medical device.

Claims

1. An antenna with a conductor comprising a first and a second set of at least a first, a second, a third and a fourth substantially parallel and substantially straight segments arranged successively and adjacently to each other, each one of the segments of each set having a first and a second longitudinal end opposite to each other wherein in each set all of said first ends are at one side and all of said second ends are at an opposite other side, **characterised in that:**

- in each of said first and second set, at their first longitudinal ends:

- said first segment is connected to said fourth segment, and
- said second segment is connected to said third segment;

- **in that** at their second longitudinal ends:

- said third segment of said first set is connected to one of said third or fourth segments of said second set,
- said fourth segment of said first set is connected to the other of said third or fourth segments of said second set, and
- said first segment of said second set is connected to said second segment of said second set;

- and **in that** the segments of said first set cross over the segments of said second set at an angle between 62 and 118 degrees.

5 2. Antenna according to claim 1, **characterised in that** said angle is between 80 and 100 degrees.

3. Antenna according to claim 2, **characterised in that** said angle is substantially 90 degrees.

10 4. Antenna according to claim 1 or 2 or 3, **characterised in that** said subsequent and adjacent segments are interspaced with a substantially constant space.

15 5. Antenna according to any one of the preceding claims, **characterised in that** each of said first and second set comprises a further pair of segments arranged successively and adjacently to said first segment, said first and second segment being connected at said second longitudinal end, to respectively the one segment of said further pair of segments lying adjacent to said first segment, and the other segment of said further pair of segments.

20 6. Antenna according to claim 5, **characterised in that** said first set comprises a first number of segments and said second set comprises a second number of segments, said first number being substantially equal to said second number.

30 7. Antenna according to any one of the preceding claims, **characterised in that** said first segment of said first set being connected to said second segment of said first set so that a closed conductive circuit is formed.

35 8. Antenna according to any one of the preceding claims, **characterised in that** said antenna comprises a first antenna according to any one of the preceding claims and a second antenna according to any one of the preceding claims wherein segments of a first or second set of said first antenna cross over the segments of a first or second set of said second antenna at a second angle between 31 and 59 degrees.

40 9. Antenna according to claim 8, **characterised in that** said second angle is substantially 40-50 degrees.

45 10. Antenna according to claim 8, **characterised in that** said second angle is substantially 45 degrees.

50 11. Method of protecting a living subject against negative effects of electro-magnetic waves, **characterised in that** an antenna according to any one of the preceding claims is placed somewhere within a radius of 1000 meters of said living subject.

12. Method of protecting a living subject against negative effects of electro-magnetic waves according to claim 11, **characterised in that** said antenna is placed somewhere within a radius of 20 meters of said living subject. 5
13. Method of protecting a living subject against negative effects of electro-magnetic waves according to claim 12, **characterised in that** said antenna is placed somewhere within a radius of 5 meters of said living subject. 10
14. Method of protecting a living subject against negative effects of electro-magnetic waves according to claim 13, **characterised in that** said antenna is placed somewhere within a radius of 1 meter of said living subject. 15

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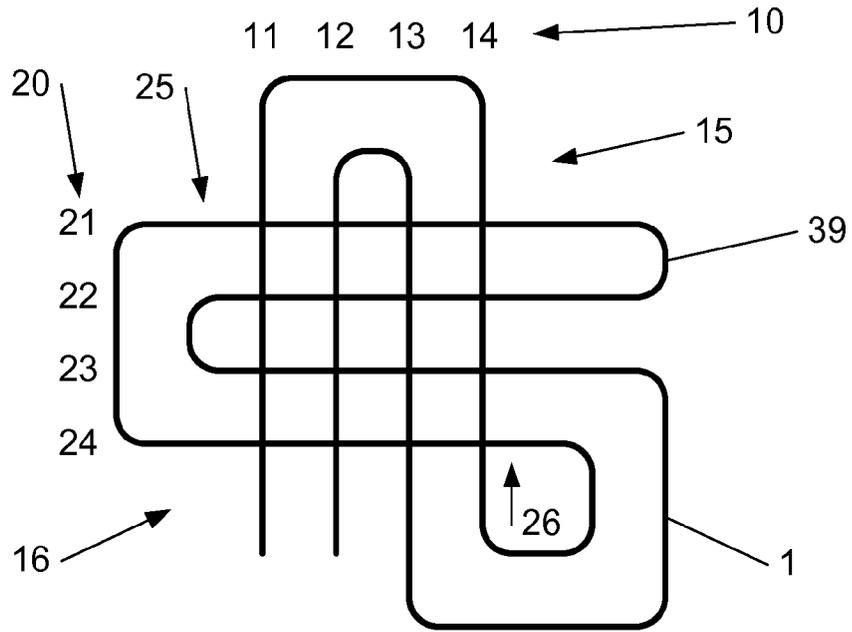


Fig. 1

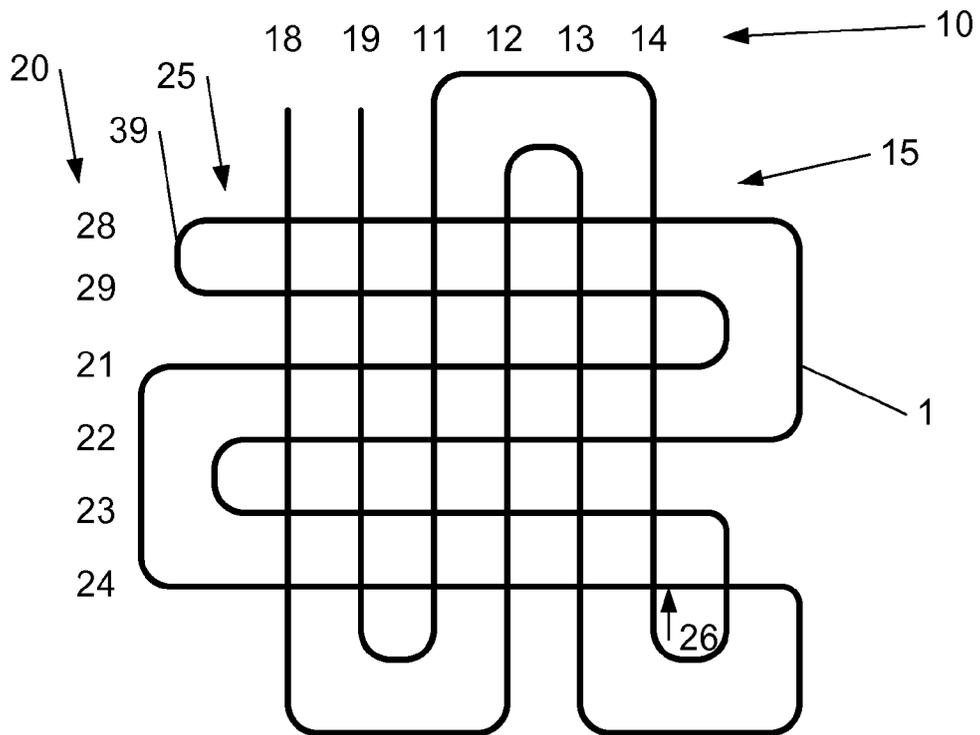


Fig. 2

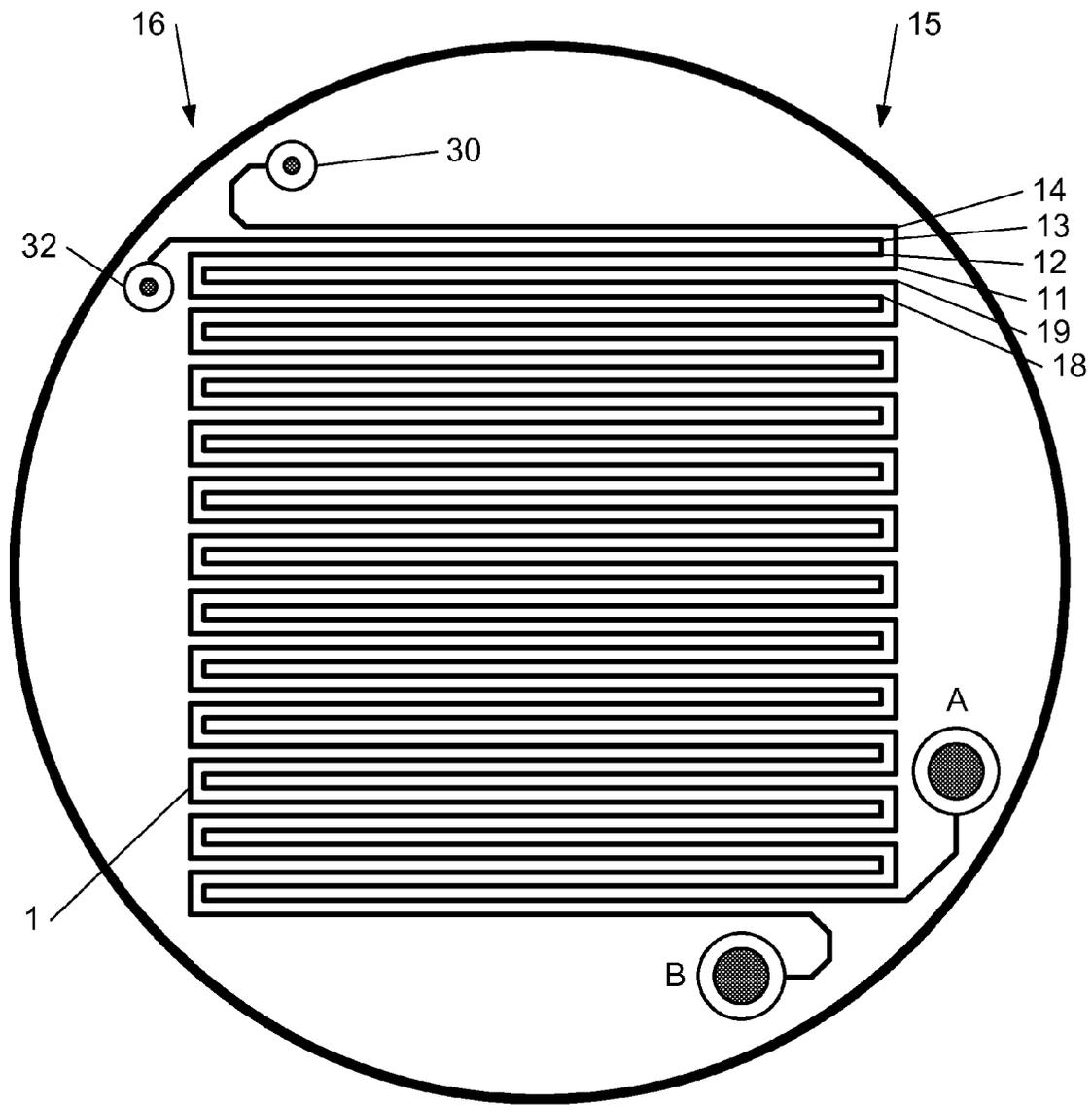


Fig. 3

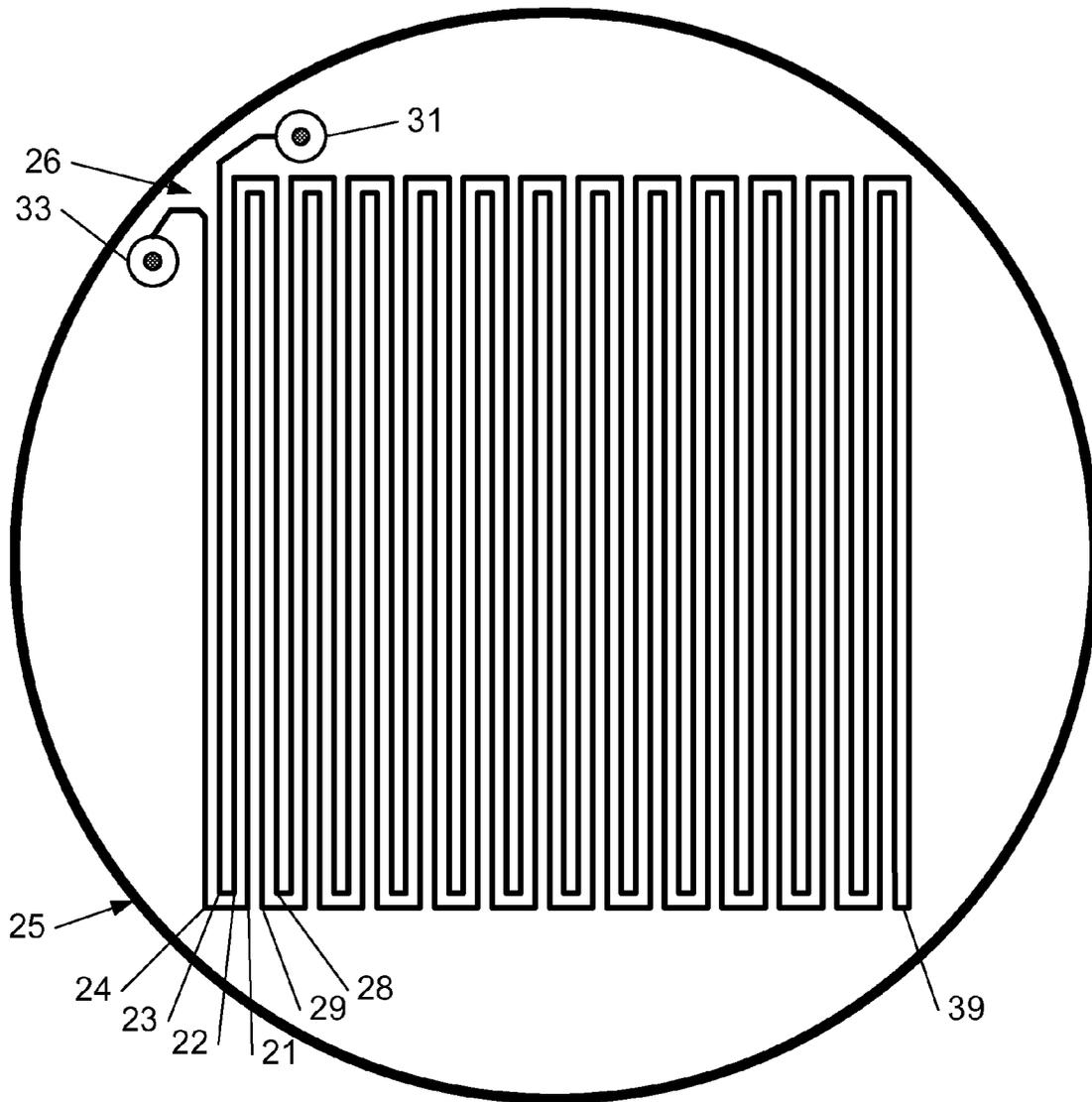


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 08 17 0752

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 99/53568 A1 (HARADA IND EUROP LIMITED [GB]; LANGLEY RICHARD JONATHAN [GB]; CLASEN G) 21 October 1999 (1999-10-21) * page 7, last paragraph - page 8, paragraph 1; figure 7 * -----	1-7, 11-13	INV. H01Q1/38 H01Q1/52 H01Q7/00 H01Q17/00
X	US 6 426 143 B1 (VOSS JOCHEN [DE] ET AL) 30 July 2002 (2002-07-30) * paragraph [0101] * * paragraph [0122] * -----	1-7, 11-13	
A	US 7 088 304 B2 (ENDO TAKANORI [JP] ET AL) 8 August 2006 (2006-08-08) * paragraphs [0146] - [0150]; figures 9,10 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01Q
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 April 2009	Examiner Jäschke, Holger
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503_03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 17 0752

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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29-04-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9953568 A1	21-10-1999	DE 69912420 D1	04-12-2003
		DE 69912420 T2	05-08-2004
		EP 1078421 A1	28-02-2001
		JP 2002511691 T	16-04-2002
		US 6480170 B1	12-11-2002

US 6426143 B1	30-07-2002	AU 3033399 A	18-10-1999
		CA 2325025 A1	30-09-1999
		DE 19812880 A1	30-09-1999
		WO 9949707 A1	30-09-1999
		EP 1066740 A1	10-01-2001
		JP 2002508602 T	19-03-2002

US 7088304 B2	08-08-2006	EP 1439608 A1	21-07-2004
		WO 03030300 A1	10-04-2003
		TW 589765 B	01-06-2004
		US 2005007296 A1	13-01-2005

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2008139253 A [0002]