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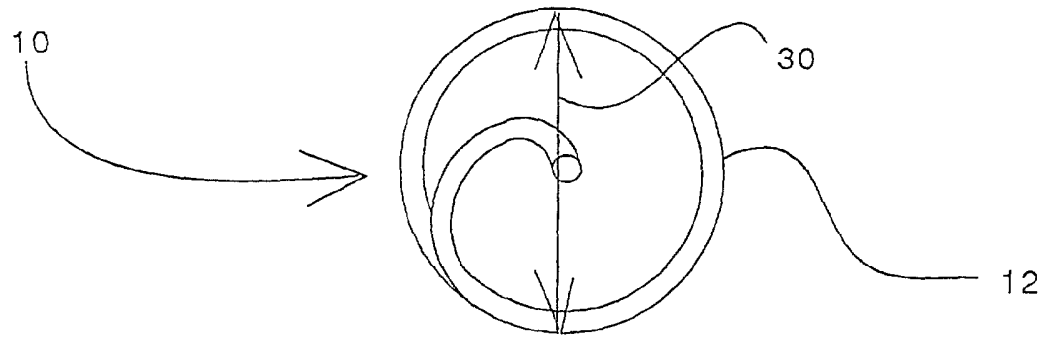
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LIGHTNING STRIKE PULSE DISSIPATOR



(57) Abstract: Currents following through coil sets up a magnetic field, which changes the magnetic polarity of the coil every 1/50 of a second. The same current flowing through coil also sets up a magnetic field of which its magnetic field also now changes every 1/50 of a second. At the same time the magnetic field around each turn of each coil also changes. According to Lens Law the magnetic field set up in a coil will always react against the source of supply causing the magnetic field in the coil. Once you have installed the coil and it is on line with, for example, 11 KV the following takes place. The coil's magnetic field is now activated with a constant flow of 11 KV. When the lightning strikes the overhead line and the spike is running on the overhead line to the transformer *via* the coil. As it hits the coil both sides is now activated much higher than the 11 KV for instance 1000 000 volt now you have got two coils electric field opposing each other. This lightning spike is now absorb, dissipated, neutralized, cancelled. All this happens within 1/50 of a second. Then the power is back to (11 KV) normal. You have not redirected the lightning spike, you have neutralized it completely.

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(1) TITLE OF THE INVENTION

Lightning strike pulse dissipator

(2) FIELD OF THE INVENTION

This invention relates to an energy pulse dissipator for dissipating a large pulse of electrical energy as moving along a conductor. Although not so limitesd the invention finds useful application in dissipating a lightning pulse as flowing along a conventional electricity transmission line.

(3) SUMMARY OF THE INVENTION

According to the invention there is provided an energy pulse dissipator for dissipating a large pulse of electrical energy as moving along a conductor comprising

an appropriate plurality of electro-magnetic fashion magnetic field generating configurations being movably arranged relative to one another even if in response to only inherent configuration movement though biased to return to a rest condition, while being set up to generate inter-active magnetic fields, even in the appropriate case being fractionally out of phase, at least once the dissipator as inter-spaced along an electricity conducting line is subjected to an energy pulse, the configurations further being of suitable make-up to, to an adequate extent for limiting the problem creating effect of such pulse down the line, cause the dissipation of pulse energy, on passing of such pulse along the dissipator, in response to a rapid energy dissipating movement of the configurations resulting from the magnetic fields

as instantaneously generated in response to the progression of such pulse along the dissipator once, as operatively inter-spaced, subjected thereto.

The configurations may be arranged to result in a to and fro movement relative to one another once subjected to an energy pulse thus being adequately spaced to enable performance of this moving action.

The configurations may preferably be set-up to create magnetic fields of opposing polarities.

In an embodiment the configurations may be electrically serially interconnected to one another resulting in the magnetic fields being fractionally out of phase.

Each configuration may be arranged about a centre line.

The configurations may preferably be movable and biased owing to being of resilient character.

Each configuration my be in the form of at least one conductor of resilient material extending convolutely about its centre line resulting in the dissipation of energy in response to expansive contraction of the conductors.

The conductors may preferably be of a material having the same current carrying characteristics and ability as the conventional line material.

In an embodiment the configurations may be in the form of coils.

In a preferred embodiment the direction of convolution of successive coils may be opposite to one another for creating opposing adjacent magnetic fields and where the dissipator is intended to be used in conjunction with conventional open air current conducting lines, the number of turns per coil is in the order of between six and twelve

In a specific embodiment the pitch of the coils may be in the order of one mm.

At least one of the following parameters may apply to the dissipator

a coil diameter of in the order of 75 mm;

an intermediate coil spacing distance as bridgingly connecting the coils along their matching extended centre lines at a spacing of in the order of 75mm; and

dissipator upstream and downstream connecting bridges extending from generally the centres of the coils along extensions of generally their centre lines for connection of the coils along a power line at a spacing between the coils and the connecting positions of generally in the order of 100mm.

Further according to the invention there is provided a method of dissipating a large pulse of electrical energy as travelling along a conductor comprising

causing the pulse as travelling along the conductor to pass along equipment arranged to create a magnetic field in response to the passage of the pulse which is of adequate extent to result in the mechanical displacement of an original condition recoverable displaceable facility responsive to the magnetic field thereby to cause the mechnical dissipation of an adequater extent of pulse energy to limit the resultant pulse energy, if any, as travelling further down the line from affecting electrical equipment which would otherwise have been sensitive to the pulse.

The pulse may be caused to pass along equipment incorporating the recoverable displaceable facility in the form of an appropriately interspaced dissipator as described above.

(4) BRIEF DESCRIPTION OF THE DRAWING

The invention is now described, by way of example, with reference to the accompanying drawings. In the drawings

Figure 1 shows an energy dissipator, according to the invention, in the relaxed condition side elevation,

Figure 2 shows the dissipator of figure 1 as viewed in the direction of arrow A in figure 1,

Figure 3 shows the magnetic field of the dissipator once operatively interspaced, at the time of pulse passage there along, and

Figure 4 diagrammatically shows the dissipator as operative located along a conductor.

(5) DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings an energy dissipator, according to the invention, is generally indicated by reference numeral 10.

The dissipator 10 comprises two inherently resilient electro-magnetic fashion magnetic field generating configurations to and fro movable arranged with respect to one another in response to the generation of magnetic fields there along while biased to return to a rest condition in the form of two serially arranged coils 12 and 14 of conductive material.

Each coil 12, 14 extends at least generally symmetrically about its centre line 16 and 18 respectively. The coils 12, 14 are interconnected by a connecting conducter 20 positioned co-axially with respect to the centre lines 16 and 18 when the dissipator 10 is viewed in its neutral condition as shown in figure 1. Once the dissipator 10 is operatively located, as shown in figure 4, the centre lines 16 and 18 will not necessarily extend axially. Even so the centre lines 16, 18 will still extend along a curve with the conductor 20 extending along the

curvature. The coils 12 and 14 and the conducter 20 are in fact integrally formed from one length of conductor.

According to the laws of nature coils create magnetic fields in response to the flow of a changing current there along. When the coils 12, 14 are interspaced along a line conductor this will thus give rise to magnetic fields about each with opposite poles at the opposite ends of each coil 12, 14 when so exposed to a varying currrent, as, for example, created by a pulse of electricity passing along the dissipator 10. The coils 12 and 14 are furthermore wound to create magnetic fields of opposite polarities. To this effect the coil 12 is anti-clockwise wound as viewed along arrow A and the coil 14 clockwise. They can obviously be wound the other way round as well. Referring in particular to figure 3 the magnetic fields as indicated by broken lines 24 thus result in the creation of two repulsing poles adjacent one another in the zone 26 between the coils 12, 14 once the dissipator as operatively locacted is subjected to a varying current

For use of the dissipator 10 to dissipate a large electrical pulse, as in particular created by lightning, as flowing along a conventional high tension line normally at 22 000 Volts or 11 000 Volts or even a transformed down tension of 380 Volts, it has been found that the dissipator 10 must advantageously be of the same material as that of the line ie. a copper or aluminium based material. It has also been established that a rest position pitch 28 between the turns of the coils 12, 14, as shown in figure 1, generally equal the thickness of the coil wire and a number of turns of between six and twelve per coil 12, 14 promote desirable dissipating characterisics. The same applies to a connecting conductor 20 length and a coil diameter 30 of in the order of 75mm and end connecting lengths 32 of in the order of 100mm.

Referring to all the drawings the dissipator 10 as specifically described is thus useful in dissipating a large electrical pulse as superimposed on a tranmission line. A large electrical pulse running along a line enters the dissipator 10 from one side and passes rapidly there along. While passing the first coil 12, 14 a magnetic field is instantaneously generated as shown in figure 3. Almost simultaneously a magnetic field is also generated in the subsequent coil 14, 12 with the fields so created forming opposite poles in the zone 26. The effect of the magnetic fields are to cause an immediate and at least substantial displacement

in the coils 12, 14 which, amongst other, result in their full contraction at a rate causing a large release of energy.

When the parameters of the dissipator 10 are properly selected, as discussed above for the typical line voltages, the pulse becomes dissipated to an adequate extent in response to the movement of the coils 12, 14 causing the release of energy to result in the resultant extent of pulse, if any, being too small to affect equipment down the line.

Referring particularly to figure 4 the dissipator 10 is usefully employed to dissipate a lightning pulse caused by a lightning strike of a line. The dissipator 10 is conveniently intespaced along the line between an isolator cup 34 and the conventional lightning arrestor 36. A pulse running along a line in response to the lightning strike is appropriately dissipated by the dissipator 10 to result in the arrestor 36 remaining intact. Line downtime is thus reduced in comparison with what it would have been as a qualified person must normally be called in to reset the arrestor 36.

(6) CLAIMS

(1) An energy pulse dissipator for dissipating a large pulse of electrical energy as moving along a conductor comprising

an appropriate plurality of electro-magnetic fashion magnetic field generating configurations being movably arranged relative to one another even if in response to only inherent configuration movement though biased to return to a rest condition, while being set up to generate inter-active magnetic fields, even in the appropriate case being fractionally out of phase, at least once the dissipator as inter-spaced along an electricity conducting line is subjected to an energy pulse, the configurations further being of suitable make-up to, to an adequate extent for limiting the problem creating effect of such pulse down the line, cause the dissipation of pulse energy, on passing of such pulse along the dissipator, in response to a rapid energy dissipating movement of the configurations resulting from the magnetic fields as instantaneously generated in response to the progression of such pulse along the dissipator once, as operatively inter-spaced, subjected thereto.

(2) A dissipator as claimed in claim 1 in which the configurations are arranged to result in a to and fro movement relative to one another once subjected to an energy pulse thus being adequately spaced to enable performance of this moving action.

(3) A dissipator as claimed in claim 1 or claim 2 in which the configurations are set-up to create magnetic fields of opposing polarities.

(4) A dissipator as claimed in any one of the preceding claims in which the configurations are electrically serially interconnected to one another resulting in the magnetic fields being fractionally out of phase.

(5) A dissipator as claimed in any one of the preceding claims in which each configuration is arranged about a centre line.

(6) A dissipator as claimed in claim 5 in which the configurations are movable and biased owing to being of resilient character.

(7) A dissipator as claimed in claim 6 in which each configuration is in the form of at least one conductor of resilient material extending convolutely about its centre line resulting in the dissipation of energy in response to expansive contraction of the conductors.

(8) A dissipator as claimed in claim 7 in which the conductors are of a material having the same current carrying characteristics and ability as the conventional line material.

(9) A dissipator as claimed in claim 7 or claim 8 in which the configurations are in the form of coils.

(10) A dissipator as claimed in claim 9 in so far as claim 9 depends on claim 4 and claim 4 depends on claim 3 in which, where the direction of convolution of successive coils are opposite to one another for creating opposing adjacent magnetic fields and where the dissipator is intended to be used in conjunction with conventional open air current conducting lines, the number of turns per coil is in the order of between six and twelve

(11) A dissipator as claimed in claim 10 in which the pitch of the coils is in the order of one mm.

(12) A dissipator as claimed in claim 10 or claim 11 in which at least one of the following parameters apply

a coil diameter of in the order of 75 mm;

an intermediate coil spacing distance as bridgingly connecting the coils along their matching extended centre lines at a spacing of in the order of 75mm; and

dissipator upstream and downstream connecting bridges extending from generally the centres of the coils along extensions of generally their centre lines for connection of the coils

along a power line at a spacing between the coils and the connecting positions of generally in the order of 100mm.

(13) A method of dissipating a large pulse of electrical energy as travelling along a conductor comprising

causing the pulse as travelling along the conductor to pass along equipment arranged to create a magnetic field in response to the passage of the pulse which is of adequate extent to result in the mechanical displacement of an original condition recoverable displaceable facility responsive to the magnetic field thereby to cause the mechnical dissipation of an adequater extent of pulse energy to limit the resultant pulse energy, if any, as travelling further down the line from affecting electrical equipment which would otherwise have been sensitive to the pulse.

(14) A method as claimed in claim 13 in which the pulse is caused to pass along equipment incorporating the recoverable displaceable facility in the form of an appropriately interspaced dissipator as claimed in any one of claims 1 to 12.

(15) A dissipator substantially as described with reference to the accompanying drawings.

(16) A method substantially as described.

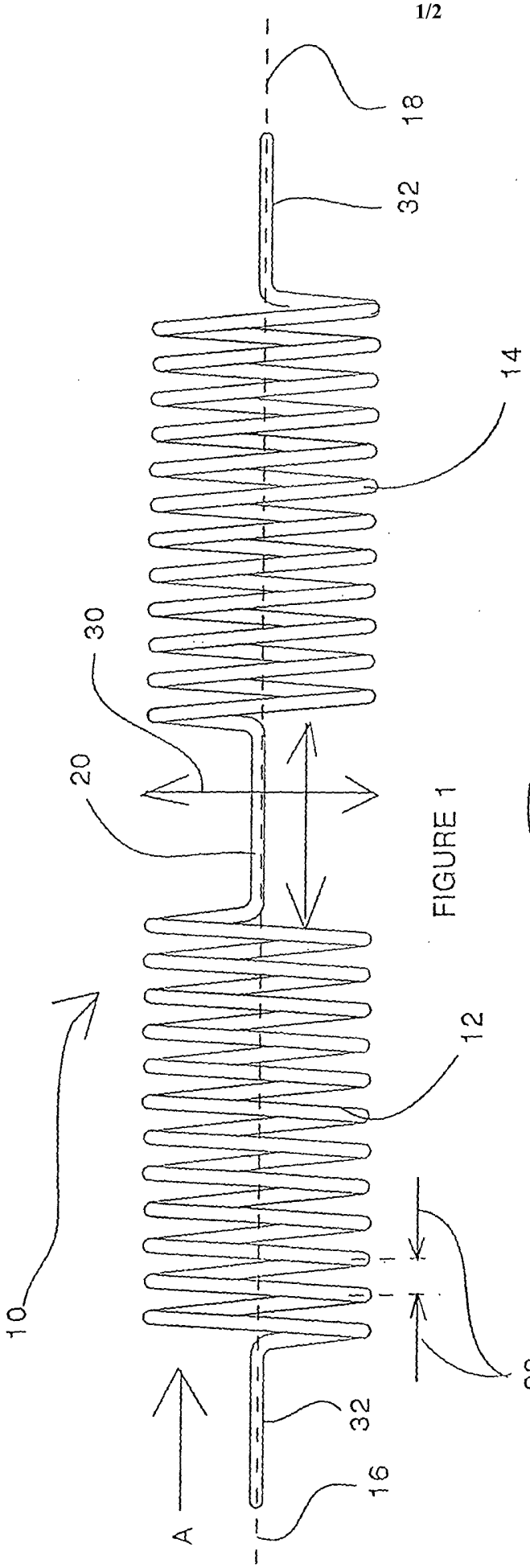

FIGURE 1

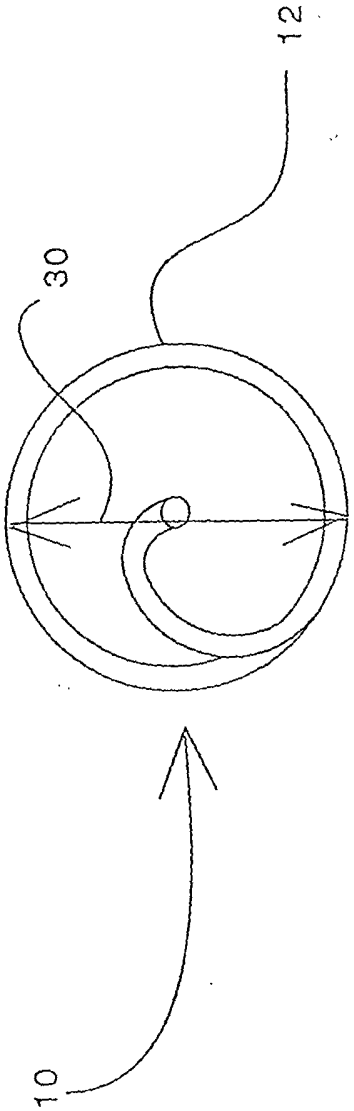

FIGURE 2

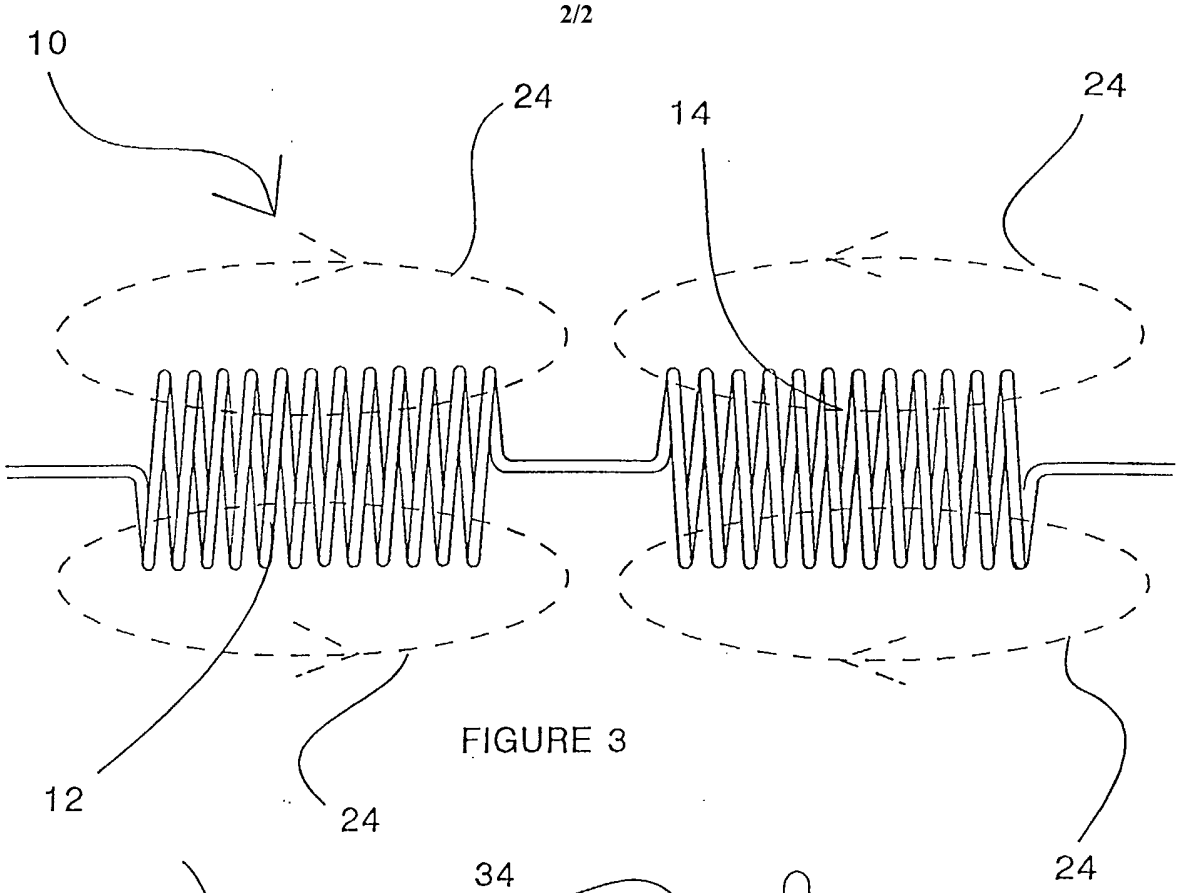

FIGURE 3

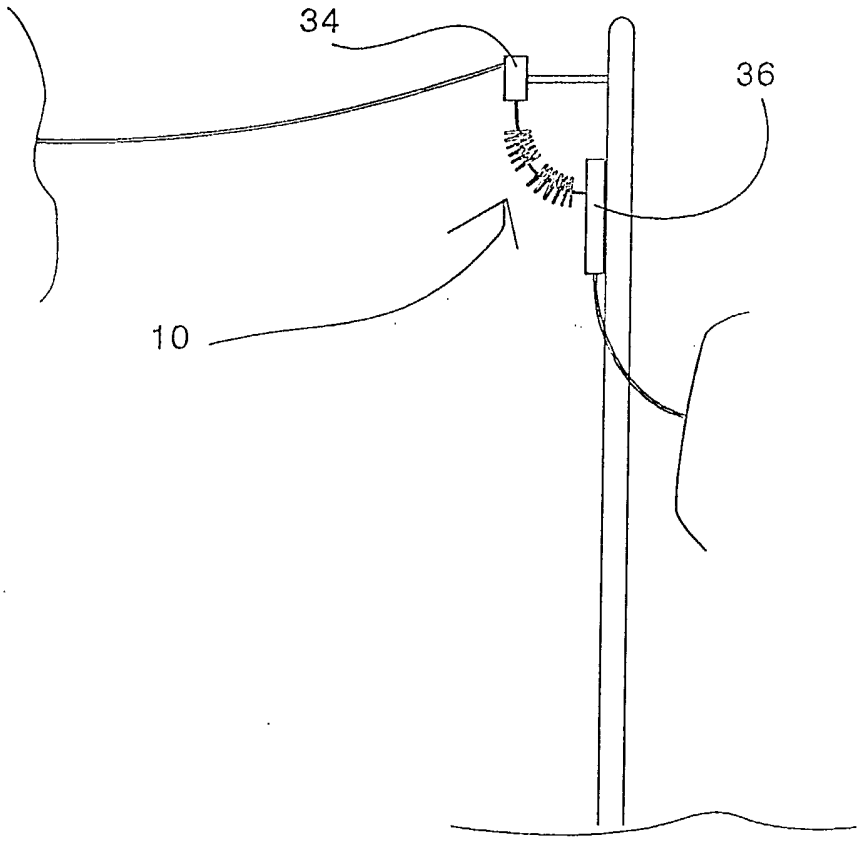

FIGURE 4

INTERNATIONAL SEARCH REPORT

Int tional Application No
PCT/ZA 01/00130

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01F7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Derwent Publications Ltd., London, GB; AN 2000-183411 XP002193528 ALLAN DENNIS CLOETE: "lightning strike dissipator" & ZA 9 903 117 A, 5 November 1999 (1999-11-05) abstract -----	1-16

☐ Further documents are listed in the continuation of box C.

☐ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 April 2002	14/05/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vanhulle, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int tional Application No
PCT/ZA 01/00130

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
ZA 9903117 A	05-11-1999	NONE	