

596807^{64670/86}

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

X/WE, GIOVANNI GILARDONI and SERGIO GILARDONI of Via Statale Bergamina, 23 20075 LODI (MILANO) ITALY and Via Defendente, 17 20075 LODI (MILANO) Italy F spectively.

NO OBJECTION ACCEPTED AND AMENDMENTS VIEWED 28-2-90

hereby apply for the grant of a Standard Patent for an invention entitled

ELECTRONIC CIRCUIT ENSURING PROTECTION AGAINST ELECTRICAL DISCHARGE, IN PARTICULAR FOR HAIRDRYERS

which is described in the accompanying complete specification.

This application is made under the provision of Part XVI of the Patents Act 1952 and is based on an application for a patent or similar protection made

in Italy

on 13 September 1985
No. (22142 A/85)

in

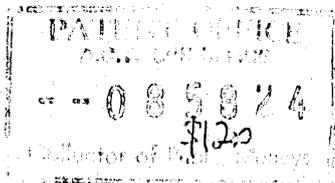
on
No. (

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Dated this 19 day of August 1986

GIOVANNI GILARDONI and
SERGIO GILARDONI



By:

[Handwritten Signature]

Registered Patent Attorney

TO: The Commissioner of Patents,
COMMONWEALTH OF AUSTRALIA

Commonwealth of Australia
The Patents Act 1952
DECLARATION IN SUPPORT

In support of the (Convention) Application made by:

Giovanni GILARDONI and Sergio GILARDONI of Via Statale Bergamina, 23 20075 LODI
(MILANO) Italy and Via Defendente, 17 20075 LODI (MILANO) Italy Respectively.

for a patent for an invention entitled:

ELECTRONIC CIRCUIT ENSURING PROTECTION AGAINST ELECTRICAL
DISCHARGE. IN PARTICULAR FOR HAIRDRYERS

X (We) Giovanni Gilardoni and Sergio Gilardoni

~~do hereby declare as follows:~~ do solemnly and sincerely declare as follows:

a) ~~xxxx~~ (We are) the applicant(s) for the patent

X X

~~do hereby declare as follows:~~

Delete the following if not a Convention Application

The basic application(s) as defined by section 141 (1) of the Act was ~~(was)~~ made

in Italy on September 13, 1985 N. 22142 A/85

in on

in on

by GIOVANNI GILARDONI & SERGIO GILARDONI

The basic application(s) referred to in this paragraph is ~~(are)~~ the first application(s) made in
a Convention country in respect of the invention the subject of the application.

a) ~~xxxx~~ (We are) the actual inventor(s) of the invention.

X X

X

~~do hereby declare as follows:~~

~~do hereby declare as follows:~~

Declared at Milan this 8th day of August 19 86

Signed Status Applicant and Inventors

GIOVANNI GILARDONI
SERGIO GILARDONI

Declarant's Name

Gilardoni Giovanni

Sergio Gilardoni

F. B. RICE & CO PATENT ATTORNEYS

This form is suitable for any type of Patent Application. No legalisation required.

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ELECTRONIC SHOCK PROTECTION CIRCUIT

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(56) Prior Art Documents
EP 1831
US 4550358
US 4270158

(57) Claim

1. An electronic safety device of the type comprising a pair of parallel, slightly spaced-apart metal sensing grids, and an electronic control and tripping circuit which controls a relay for maintaining closed a control switch of an electrical feed line until such time as a short circuit occurs between the sensing grids, when the control and tripping circuit is tripped to open the control switch, each of the two grids being connected to the electronic control and tripping circuit by a pair of connection wires through which a supplementary control current constantly flows, accidental interruption of one of two circuits each formed by a grid and two respective connection wires causing tripping of said control circuit and consequent opening of said control switch, each said grid being in series between its associated said two connection wires.

2. A device as claimed in claim 1, comprising an integrated circuit having a first section through which

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there flows a first control current passing through a first sensing grid and the respective pair of said connection wires, and a second section the operation of which depends on the operation of said first section and through which there flows a second control current passing through a second sensing grid and the respective pair of connection wires, this second current forming a maintaining signal for the base of a transistor which controls an energization circuit of said closure relay.

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COMMONWEALTH OF AUSTRALIA

Patents Act 1952

C O M P L E T E S P E C I F I C A T I O N
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Related Art :

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Complete Specification for the invention entitled: ELECTRONIC CIRCUIT
ENSURING PROTECTION AGAINST ELECTRICAL DISCHARGE, IN PARTICULAR FOR
HAIRDRYERS

The following statement is a full description of this invention
including the best method of performing it known to us :-

The EP-A-0001831 filed on 2.11.1978 with the same inventors of the present application describes a hairdryer provided with a safety device which, by means of an electronic control and tripping circuit, instantly interrupts electrical feed to the hairdryer should conditions arise -
5 such as the presence of moisture or water on electrically conducting parts - which could cause short-circuiting or, more dangerously, electrical discharge through the user's body.

This device is based on the use - as moisture or water sensing element - of a pair of parallel, slightly spaced-apart metal grids which are
10 electrically isolated from each other and are connected individually to the control and tripping circuit by conductor wires. One pair of grids is disposed in correspondence with each air inlet or outlet aperture of the hairdryer.

The operation of this device is perfect, both with regard to
15 response time and with regard to the certainty of the circuit remaining de-energized and of the electrical feed to the hairdryer remaining cut off for the entire time during which water or moisture is present on the sensing grids.

In the industrial production of hairdryers in accordance with the
20 EP-A-0001831, in which the requirement of a high production rate does not always permit maximum care in manufacture, it has however been found that an item of possible risk is the connection between the sensing grids and the control circuit. As stated, each grid is connected to the control and tripping circuit by a fairly thin conductor wire soldered at one end to
25 the grid and at the other end to one of the circuit terminals. If one of these wires should become accidentally interrupted, or if one of the respective soldering points should succumb - which could happen not only during manufacture but also during use - the respective control grid would remain isolated and therefore be no longer able to perform its
30 function.

Also in the DE-A-3122232 it is described a device similar to the one of the EP-A-0001831, however from the very much schematic description it

does not result dealt and then neither solved the problem,
which is at the base of the present invention.

The present invention provides an electronic safety
device of the type comprising a pair of parallel, slightly
5 spaced-apart metal sensing grids, and an electronic
control and tripping circuit which controls a relay for
maintaining closed a control switch of an electrical feed
line until such time as a short circuit occurs between the
sensing grids, when the control and tripping circuit is
10 tripped to open the control switch, each of the two grids
being connected to the electronic control and tripping
circuit by a pair of connection wires through which a
supplementary control current constantly flows, accidental
interruption of one of two circuits each formed by a grid
15 and two respective connection wires causing tripping of
said control circuit and consequent opening of said
control switch, each said grid being in series between its
associated said two connection wires.

An advantage of the present invention is then to
20 obviate also said



~~does not result dealt and then neither solved the problem, which is at the base of the present invention.~~

~~The object of the present invention is then to obviate also said~~
possible risk, deriving from manufacturing defects. This result is
5 attained in that each of the two grids is connected to the control
circuit not by a single conductor wire but by a pair of conductor wires,
through which a supplementary control current constantly circulates,
accidental interruption of the circuit formed by the grid and the two
connection wires causing tripping of the control circuit.

10 Further characteristics and advantages of the circuit according to
the present invention will be more apparent from the detailed description
given hereinafter of one possible embodiment of the circuit, shown by way
of example on the accompanying drawing.

As shown, the control and tripping circuit comprises, in the manner
15 already described in the said EP-A-0001831, a relay K1 controlling a
switch INT which can itself be operated by a pushbutton P. When the
pushbutton P is pressed, the switch INT is closed and feeds the
electronic control and tripping circuit by way of the transformer TF1 and
rectifier DR1.

20 This circuit comprises basically a transistor TR1 which controls the
feed to the relay K1. When the electronic circuit is operative, a current
circulates through the transistor T1 and relay K1 so that this latter is
activated and keeps the switch INT closed. As soon as a tripping signal
is produced, the transistor T1 ceases to conduct, the relay K1 is
25 deactivated and the switch INT opens.

According to the said EP-A-0001831, the tripping signal is produced
- when short-circuiting occurs between the sensing grids - by virtue of a
second transistor upstream of T1 becoming inhibited and thus also
inhibiting the transistor T1, to deactivate the tripping circuit.

30 According to the present invention, upstream of the transistor T1
there is instead disposed an integrated circuit IC1 - for example of the
FCD810 type produced by the firm FAIRCHILD (U.S.A.) or the TI-L116 type



produced by the firm TEXAS INSTRUMENTS (U.S.A.) - and in addition, the sensing grids RV1 and RV2 are connected to the circuit each by means of two conductor wires, the grid RV1 being connected by the wires 4 and 5, and the grid RV2 being connected by the wires 3 and 6.

5 The circuit is connected in such a manner as to obtain the following operation:

CIRCUIT ACTIVATED:

10 - a current circulates through a first section of the integrated circuit IC1 by way of the resistor R1, IC1, wire 4, grid RV and wire 5 connected to earth;

- this current circulation through the first section of the integrated circuit IC1 also ensures that a current circulation is maintained through the second section of IC1 by way of the resistor R1, IC1, resistor R2, wire 3, grid RV2, wire 6, diode DZ1 and resistors R3 and R4;

15 - the effect of the current circulation through R4 is to keep the transistor T1 under conduction, to thus also maintain the relay K1 energized.

CIRCUIT DESACTIVATED:

20 - if an interruption occurs in 4 or 5 the feed voltage to IC1 fails, the first section of this latter is deactivated, and also blocks the operation of its second section. The control voltage at the base of T1 also fails, with the result that this latter becomes inhibited, to de-energize the relay K1;

25 - if an interruption occurs in 3 or 6 the control voltage at the base of T1 immediately fails, this becoming inhibited in the aforesaid manner;

30 - if short-circuiting occurs between the grids RV1 and RV2 (this case is already included in the said EP-A-0001831 the wire 6 becomes connected to earth by way of the wire 5, and the resistors R3 and R4 together with DZ1 become short-circuited to earth, with the result that the base RT1 is again earthed and T1 no longer conducts.

The invention is not limited to the particular embodiment described and illustrated, nor to the specific use in a hairdryer, and construc-

tional modifications and various other uses in the domestic electrical appliance field are applicable thereto, as can be easily implemented by an expert of the art within the scope of the stated inventive concepts.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. An electronic safety device of the type comprising a pair of parallel, slightly spaced-apart metal sensing grids, and an electronic control and tripping circuit which controls a relay for maintaining closed a control switch of an electrical feed line until such time as a short circuit occurs between the sensing grids, when the control and tripping circuit is tripped to open the control switch, each of the two grids being connected to the electronic control and tripping circuit by a pair of connection wires through which a supplementary control current constantly flows, accidental interruption of one of two circuits each formed by a grid and two respective connection wires causing tripping of said control circuit and consequent opening of said control switch, each said grid being in series between its associated said two connection wires.

2. A device as claimed in claim 1, comprising an integrated circuit having a first section through which there flows a first control current passing through a first sensing grid and the respective pair of said connection wires, and a second section the operation of which depends on the operation of said first section and through which there flows a second control current passing through a second sensing grid and the respective pair of connection wires, this second current forming a maintaining signal for the base of a transistor which controls an energization circuit of said closure relay.

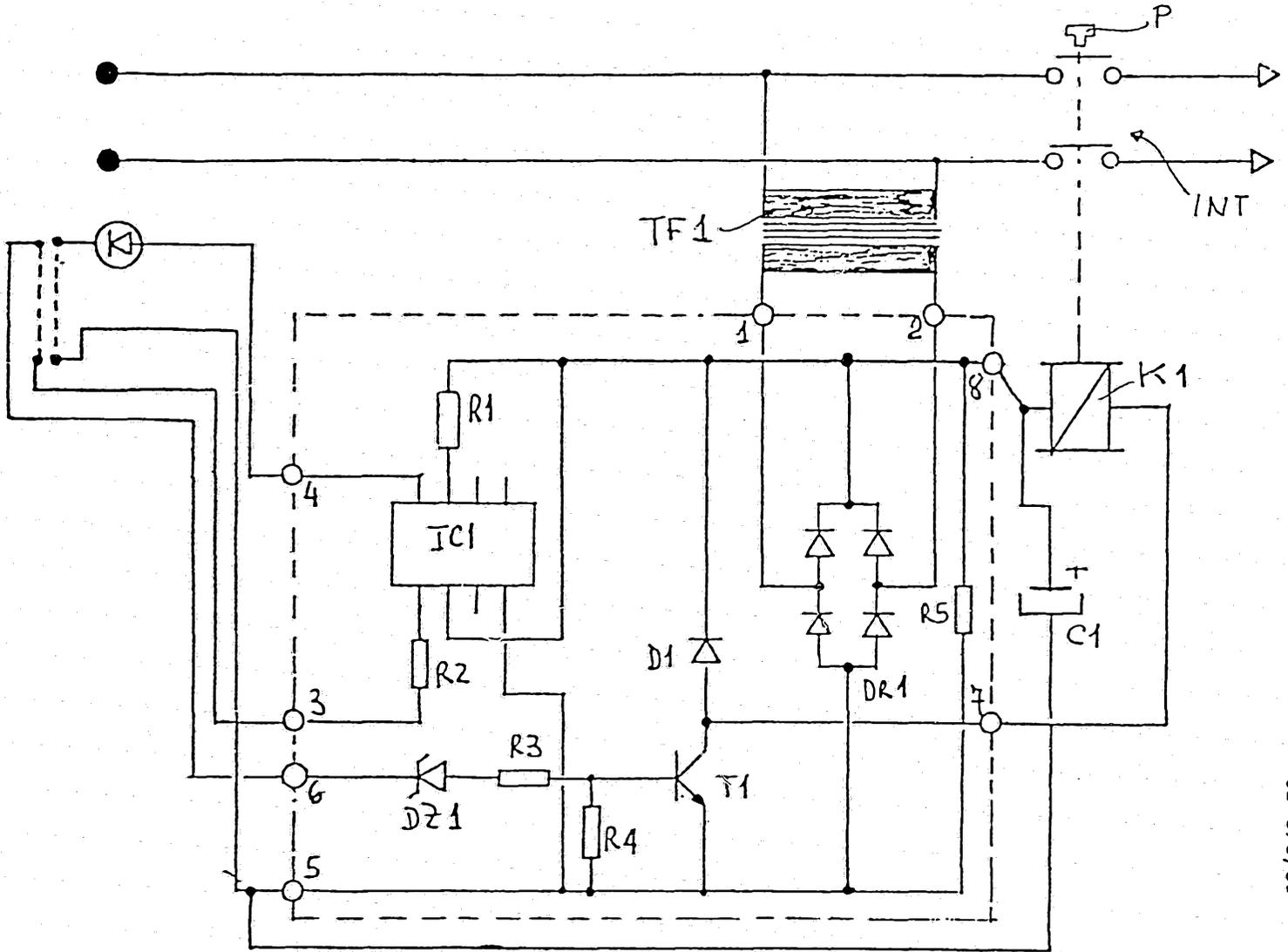
3. A device as claimed in claim 1, wherein short-circuiting between the two sensing grids causes the maintaining signal of the control transistor base to flow to earth.

DATED this 30th day of January 1990

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