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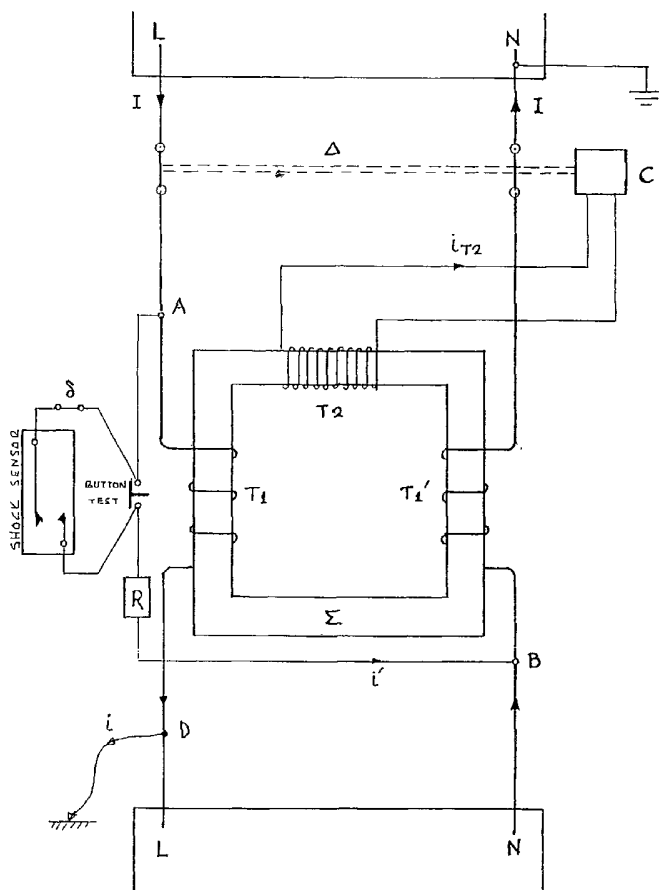
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(54) Title: PROTECTION OF ELECTRIC ENERGY CONSUMERS AGAINST EARTHQUAKES



(57) Abstract: A device called shock element (Σ), externally similar to the usual overcurrent protective breaker (table), containing a shock sensor and a resistance (R) (fig. 5a, fig. 5b, fig. 6), is placed in the electric panel and it is connected with the antielectric shock relay (fig. 2), so that in case of an earthquake to be placed out of operation, protecting thus the electric installation from fire or explosion. Except of the above device that is able to collaborate with the already commercially available relays, I propose: a) the replacement of the existing relay with a new that will contain one (or more) shock sensor having additionally attributes of earthquake sensitivity or b) the collaboration of two devices, that is a new relay and a shock sensor, that will have the possibility of lateral connection, providing the relay with the attribute of earthquake sensitivity. The main advantages of this invention are: 1. Reliability, 2. Low cost, and 3. Ease of installation.

Protection of electric energy consumers against earthquakes.

Protection method of electric energy consumers against earthquakes, with a shock sensor and a protective relay or with an earthquake sensitive protective relay.

5

Technical field in which the invention is referred

The existence of preventive safety measures is essential for earthquake-prone regions and countries in order to minimize the consequences of an earthquake. In case of a seismic
10 vibration the probability of fire events in buildings (residences, offices, manufactures, laboratories etc), from various causes, are increased. Such causes are:

- a) Building evacuation panic-stricken while various electric appliances are in operation (eg electric kitchen, iron, etc)
- b) Due to the tremble, electric appliances in operation (eg T.V.) could fall down and
15 initiate fire by breaking.
- c) Short-circuit may be caused from wall collapse and given the widespread use of Natural or Liquid gas, a spark could create explosive conditions.

The present invention could fill the gap of the protection of electric energy consumers from the above mentioned dangers.

20

Relative level of technique

This invention is referred to protective relay, which in collaboration with a shock sensor places the electric circuit (that it protects), instantly out of operation, in case of a seismic
25 vibration. The protective relay is a device commercially available from various companies of electric material production and could be found under different names:

- "earth leakage circuit breaker, current operated" or "automatic differential switch" or "differential switch against electric shock" or "differential relay". The relay is placed in the wall panel of the electric installation, protecting from current leakage and electrocution.
- 30 The shock sensor has two contacts that are linked instantly in case of a vibration. There can be various types of shock sensors depending on the way or the means by which the instant connection of the two contacts occurs. For example: a) a sensor with a constant and an oscillating contact, b) a mercury type sensor, c) a sensor with a metal bowl (small metal ball).

At my estimate most suitable for use in the present invention is the mercury type sensor, without excluding the other types.

When the shock sensor is connected in series to an electric resistance (R) then their combination will be called shock element (K.Σ.).

5

Disclosure of invention

Therefore the novelty of this invention lies in the utilization of a shock sensor which connected with the relay, attributes to the latter earthquake sensitivity.

10 The invention concerns three cases:

A. Seismic protection for already commercially available relays. In this case, in the electrical panel, next to the relay, an independent unit called shock element (K.Σ.) is placed containing a shock sensor and an electric resistance (R) in series. This device (K.Σ.), connected suitably in the power circuit of the relay, externally with two conductors,

15 activates the relay in case of vibration. It has the form of an overcurrent protective breaker.

B. A single device called earthquake sensitive relay. This will substantially be a new relay, which in the same wrapping (in its interior), it will also contain a shock sensor that is suitably connected to the auxiliary circuit of the relay, lending to it attributes of earthquake sensitivity, so that the relay provides also protection in case of vibration.

20 C. A relay which in the exterior plastic wrapping has two apertures (female terminals). In order to provide it with attributes of quake sensitivity as well, we place next to it a shock element that has two male terminals in corresponding place, in order that these can adjoin with the female lugs of the relay (P.Δ.E.) and thus collaborate for seismic sensitivity.

25 Description of the method of application with reference to the drawings

We see in (fig 1) the operation of the protective relay (P.Δ.E.) and of which parts this is constituted. The shock sensor has been connected at the left side.

30 **First, I describe the operation of P.Δ.E. leaving aside for now the subject of the shock sensor.**

The protective relay (P.Δ.E.) constitutes of a magnetic-core (Σ), two primary windings (T_1) and (T_1'), one secondary winding (T_2) that is connected with the electromagnet coil (C).

In the above part there is the electric power supply from the Power Company. The supply here is single-phase with a voltage of 230 V between phase (L) and neutral (N).

In the below part there is the consumer of the electric power which is being protected from the P.Δ.E. The provided electric intensity (I) is finally controlled by the bipolar switch (Δ). Using a bold line, I have drawn the main circuit (power circuit) through which the intensity (I), required by the consumer of electric power, flows.

- 5 The thin line denotes the auxiliary circuit of the (P.Δ.E.), to which the button TEST is connected as well as the resistance (R) in series. The resistance is placed in series in order that the magnitude of leakage current does not reach high value-levels at the pressing of the button.

The required current (I) for the consumer enters coil (T_1) and after it flows from the
 10 consumer comes out from coil (T_1'). Coil (T_1) causes a magnetic field at the magnetic core (S), equal and opposite with that caused by coil (T_1') so that finally the magnetic core (S) is not passed by magnetic lines, in conditions of regular operation. If however for some cause the currents that flow through coils (T_1) and (T_1') are not equal to each other [this can happen either in the case of accidental current leakage as in the point (Δ) where a small
 15 current (i) slips to the ground or in the case of artificial current leakage by pressing the button TEST that is found on the P.Δ.E., where a current of controlled value (i') slips from point (A) to point (B)] then

a magnetic field will be created in the magnetic core (Σ). This will affect the secondary winding (T_2) and then current (i_{T2}) will flow towards the electromagnet (C). If the current's
 20 amplitude is greater than 30 mA ($i_{T2} > 30 \text{ mA}$), the electromagnet (C) is actuated placing the switch (Δ) out of operation and consequently the consumer without voltage.

This way the commercially available protective relay (P.Δ.E.) functions, protecting from current leakage and the consumers from electrocution. Note: The electrocution is accidental current leakage.

- 25 **Now I place in parallel to the button TEST (I connect with two contacts) the shock sensor.** If a seismic vibration happens the sensor will connect (bridge) instantly its contacts. This acts precisely as if we were pressing the button (TEST) so that the switch (Δ) of the P.Δ.E. is put out of operation and the line without voltage.

Thus the P.Δ.E. has also the attribute of earthquake sensitivity, consequently protecting the
 30 appliances against earthquake.

Note: The switch (δ) that it has been placed in series to the circuit of the shock sensor, is found in the facade of P.Δ.E. providing the consumer the choice of protection from seismic vibrations or not.

The operation of the three-phase P.Δ.E. (polar voltage 400 V) is also based on the same
 35 principle, with the sensitivity of electromagnet (C) being 30 mA. The three-phase P.Δ.E.

appears in (fig 2). Here the phases are three (L_1, L_2, L_3) and a neutral (N). The total of coil windings (T_1, T_2, T_3) of the three phases on the iron core (S) is equal to the coil winding (T) of the neutral, in order that under regular conditions of operation (without current leakage) the magnetic core (Σ) is not crossed by magnetic lines. This occurs because the current total of the three phases that enters the consumption is equal to the current that comes out through the neutral. Consequently the magnetic fields at the core are equal and opposite and cancel each other out. Further description is exactly similar with the case of the single-phase P.Δ.E. and is not considered necessary to be mentioned.

Placing the shock sensor between any phase (from L_1, L_2, L_3) and the neutral (N) and in parallel to the button TEST, provides the three phase P.Δ.E. also attributes of seismic sensitivity.

As it has been also reported in the "Disclosure of invention" the appliances proposed are three.

15 - Description of case A with reference to fig.2.

Here the shock element (S.E) constitutes a separate (independent) unit, with an exterior button for the switch (δ), containing a shock sensor and in series to it, a resistance (R). This device is placed (clicks) in a rail of the electric panel and connected externally, with the P.Δ.E., providing seismic sensitivity, in the way that has already been described. Therefore in case of a strong seismic vibration, the contacts of the shock sensor connect instantly and a controlled current leakage is caused from phase (L) (in the entry of the P.Δ.E.), to neutral (N) (in the exit of the P.Δ.E.), through the shock sensor. It collaborates with all the differential relays (anti-electric shock) that are commercially available and have leakage current $I_\Delta = 30 \text{ mA}$. For example, I report relays from companies such as SIEMENS, GEYER, HAGER, MERLIN ROBUST, AEG, LEGRAND (single- or three- phase).

The resistance R will have a value of $4 \text{ K}\Omega$. This holds so that the current i that flows through the shock sensor (in case of a vibration) is almost double than I_Δ (i.e $i=2*I_\Delta=2*30\text{mA}=60\text{mA}$).

I remind that I_Δ is the minimal leakage current that actuates the differential relay and cuts off power supply. In Greece where the voltage is $U=230 \text{ V}$, we will have $R=U/I=230 \text{ V}/0.06 \text{ A}=3833 \text{ }\Omega$ (approximately $3.8 \text{ K}\Omega$) therefore $i=0.057\text{A}=57 \text{ mA}$ roughly double than the I_Δ , which is satisfactory.

If the grid voltage is different, eg $U=120\text{V}$, in the same way we calculate $R= 120/0.06 = 2000 \text{ }\Omega = 2 \text{ K}\Omega$.

It has very small dimensions and shape similar with this of an overcurrent protective breaker that is commercially available from various companies (eg SIEMENS, GEYER, HAGER, MERLIN ROBUST, AEG, LEGRAND).

The device of the mercury type shock element (K.Σ.) is depicted in its actual dimensions in the attached drawings (fig.5a, fig.5b, fig.6, fig.7). In fig. 5a the side aspect of an overcurrent protective breaker is shown, in its actual dimensions, from which the flame proof has been replaced by the resistance (R) and the mercury type vibration sensor (Hg). The sensor has a small inclination (angle α) with respect to the horizontal axis. The smaller the angle α becomes, the more sensitive the sensor is. In position (A) is found the mechanism of interruption and reconnection of switch (S), of the overcurrent protective breaker.

In fig. 5b, we see the frontage of the same overcurrent protective breaker in its actual dimensions.

In fig. 6, we see the side aspect of the same overcurrent protective breaker, from which however, except from the flame proof, the mechanism of interruption and reconnection of the switch has been also removed, and a simple switch (δ) without resilient springs was placed, since the switch (δ) will be infrequently used and even then without current leakage, except for the case of vibration. Thus the cost of (K.Σ.) is even more reduced.

In fig 7 we see two mercury type sensors (A and B) connected in parallel to each other and in series to the resistance (R). One sensor is directed along the X axis and the other along the Y axis. This combination of sensors is possible to be used in a (K.Σ.) in order to increase its sensitivity, from any direction the vibration emanates.

- Description of case B with reference to fig.3a and fig.3b.

It is a P.Δ.E. that contains a shock sensor connected in parallel across the button TEST. It clicks in the rail of the electric panel and has earthquake sensitivity attribute. In fig.3a the internal wiring of the single phase P.Δ.E. appears, with an incorporated shock sensor. In fig.3b the internal wiring of the three phase P.Δ.E. with the shock sensor is depicted. The (P.Δ.E.) is similar to the differential relays, single- or three- phase 230/400V, that are commercially available and have leakage current $I_{\Delta} = 30\text{mA}$ eg these from companies such as SIEMENS, GEYER, HAGER, AEG, LEGRAND etc. The only difference lies in that, internally there is a mercurial sensor connected in parallel with the button TEST (single- and three- phase P.Δ.E.). Especially for the three- phase P.Δ.E. case, they will potentially exist two or three shock elements (K.Σ) connected with one end respectively to each one of the three phases (L_1, L_2, L_3), while the other ends will be connected to the neutral.

- Description of case C with reference to fig.4.

Here the P.Δ.E. constitutes one unit and the shock sensor another. These two devices are placed in a rail of the electric panel side by side so that they collaborate providing the P.Δ.E. with quake sensitivity, and is manufactured as follows: The P.Δ.E. in its left side has two female terminals (apertures) that are internally connected in parallel with the button TEST. The shock sensor has externally, in the right side, two male terminals; so as to be connected to the female terminals of the P.Δ.E. The male terminals are internally connected to the ends of the sensor (shock sensor). Due to their connection, the P.Δ.E. acquires earthquake-sensitivity.

CLAIMS

- A protection method of electrical appliances, against the consequences from an earthquake, cutting off power supply, combining a shock sensor and a protective relay. The relay (or differential relay or current operated earth leakage circuit breaker or differential switch against electric shock or residual current circuit breaker) is a commercially available device, that is placed in a rail of the wall panel of electric installation, protecting it from the consequences of undesirable leakage and electrocution by interrupting instantly the power supply.
- 10 In order for the differential relay to acquire attributes of earthquake sensitivity, we appropriately connect it with a shock sensor. Thus the relay, in the case of a seismic vibration, in response to the shock sensor interrupts immediately the current flow. In this way the electric energy consumer is protected from the unpleasant consequences.
- 15 2. A device, according to Claim 1, that is designed to be placed (latched onto) in a rail of the electric installation panel, which I name shock element (K.Σ.) (fig 2), that contains (in the same wrapping) a shock sensor and in series to this the resistance R. Externally at the frontage there is a switch (δ), with a terminal in the upper part and another underneath. The purpose of this device is to be connected to the relay of the electric panel, so that in case of a seismic vibration the relay will respond (to a controlled current leakage) by interrupting current flow.
- 20 3. A device, according to Claim 1, of an earthquake sensitive relay (single- or three-phase 230/400 V), which contains additionally a shock sensor in order to acquire attributes of earthquake sensitivity. The shock sensor is connected in parallel across the button TEST. It is placed (latch coupled) in a rail of electric installation panel prior to the general switch and protects it (the electric installation panel) in cases of current leakage, electrocution and seismic vibration, by interrupting electric current flow. Externally both the single- and the three- phase differential relays, at the anterior part have the key button of switch (Δ), the button TEST, the key button of switch (δ). Internally the single- phase relay (fig 3a) contains the magnetic core (Σ), the winding (T_1) of phase (L), the winding (T_1') of the neutral (N), the auxiliary winding (T), the inductor of electromagnet (C), the contacts of switches (Δ) and (δ), the resistance (R) and the shock sensor.
- 30 Respectively, the three- phase differential relay (fig 3b), contains internally the magnetic core (Σ) [on it there are the windings (T_1 , T_2 , T_3) of the phases, the winding (T) of the
- 35

neutral and auxiliary winding (T)], the switches (Δ) and (δ), the inductor of the electromagnet (C), the button TEST and the shock sensor.

4. A device of two units, according to Claim 1, (fig 4), that are placed side by side and click in a rail of the electric panel, intended to protect the electric installation (not only from current leakage and electrocution) from the consequences of seismic vibrations as well. The first unit (at the right of fig 4) is a differential relay (single- or three- phase 230/400 V) which has a slight modification compared to the already commercially available ones. The difference lies in that externally and at its left side the relay has two female terminals (apertures). These are internally connected to the two contacts of the button (TEST). The second unit (left side in fig 4) concerns a shock sensor which externally, at its right side, bears two male terminals (pins) intended to be coupled with the female terminals of the relay, achieving thus the parallel connection of the shock sensor and the button (TEST). This way the relay acquires earthquake sensitivity. The unit of the shock sensor is exactly the same for both the single- and the three- phase relays.

5. A device, according to Claim 2, which I denominate shock element (K.Σ.) characterized from the fact that it contains a mercury type shock sensor and a resistance (R) connected in series to this. This appliance is placed in a rail of the electric table and connected (externally) with the differential relay (fig 2), attributing the relay earthquake sensitivity. The mercurial shock sensor (fig 5a, fig 6) is an oblong glass ampoule of small dimensions - containing a drop of mercury (Hg) - that in one end has two terminals, also extending inside the ampoule, which constitute the two contacts that are being connected when the drop of mercury (due to a vibration) moves and leans on them.

This appliance (K.Σ.) can work with all the commercially available relays which have operation voltage $U = 230/400$ V and minimal leakage $I_{\Delta} = 30$ mA. The value of the resistance R of the shock element (K.Σ.) will be determined as follows: The (i) that flows through the mercurial shock sensor (in case of vibration) should be approximately double the value of I_{Δ} . That is $2 \cdot I_{\Delta} = 2 \cdot 30 \text{ mA} = 60 \text{ mA}$. Thus the leakage achieved by the (K.Σ.) is capable to actuate the relay which will interrupt the current flow. The desirable current value (i), of artificial leakage, would therefore be not too high (to avoid the risk of destroying the mercury type sensor and the resistance (R) of (K.Σ.)), but efficient to actuate the relay. In Greece, where $U=230$ V the resistance $R = U/I = 230/0,06=3.833 \Omega$, in order that the leakage current has a sufficient value of 60 mA. Thus R should be 3.833Ω with a deviation of certain tens of Ω . If the grid voltage has a different value eg 120 V the

resistance has a value $R = 120/0,06 = 2000 \Omega = 2 \text{ k}\Omega$. In this case $R = 2 \text{ k}\Omega$ of (K.Σ.) is sufficient for a relay with $U=120\text{V}$ and $I_{\Delta} = 30 \text{ mA}$.

Likewise R can be determined in the case that the grid voltage (U) has another value, or the I_{Δ} (excitation current of the relay) is different than 30 mA . The device of the shock element (K.Σ.) that contains the mercury type vibration sensor, has small dimensions and a shape similar to that of the overcurrent protective breaker that is commercially available from various companies, and it is depicted in the attached drawings (fig 5a, fig 5b). In fig. 5a the side aspect of an overcurrent protective breaker is shown, in its actual dimensions, from which the flame proof has been replaced by the resistance (R) and the mercury type vibration sensor (Hg). The sensor has a small inclination (angle α) with respect to the horizontal axis. The smaller angle α becomes, the more sensitive the sensor is. In position (A) lies the resilient mechanism of interruption and reconnection of switch (S), of the overcurrent protective breaker.

The overcurrent protective breaker will henceforth be called shock element (K.Σ.). In fig. 5b, we see the frontage of the shock element (K.Σ.) in its actual dimensions.

With the use of the particular appliance (K.Σ.) and its collaboration with the protective relay of the electric panel, the cost for the electric installation protection against earthquake is minimal.

6. A device of shock element (K.Σ.) according to Claim 5 characterized from the fact that except from the flame proof, the mechanism of interruption and reconnection of the switch has been also removed (fig 6), and a simple switch (δ) without resilient springs was placed, since the switch (δ) will be infrequently used and even then without current leakage (which in any case is small (60 mA)) except of the case of vibration. We have also connected the mercury type shock sensor as well as the resistance (R). Thus the cost of (K.Σ.) is even more reduced. It is possible instead of a shock sensor, to place two, connected in parallel to each other (fig. 7), the first (A) directed along the Y axis and the second (B) along the X axis. This is done in order to increase the sensitivity of the shock element from any direction the vibration emanates

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7. A device of earthquake-sensitive differential relay according to Claim 3, which has a mercury-type shock sensor. It is found in the same unit with the relay and is connected in parallel to the contacts of button TEST, rendering the differential relay earthquake-sensitive. The appliance of earthquake-sensitive differential relay, is externally similar with the usual differential relays, with the addition of one extra switch (δ) – (fig 3a) and (fig

35

3b) – which controls the operation of mercury type vibration sensor. The mercury type shock sensor has a small inclination to the horizontal axis. The smaller the inclination is, the more sensitive the sensor is.

It is possible instead of a shock sensor, to place two, connected in parallel to each other, in order to increase the sensitivity of the shock element from any direction the vibration emanates. One will be directed along the X axis and the other along the Y axis, with the required inclination to the horizontal.

With the use of this particular device, the result is besides the protection of the electric installation, from current leakage, simultaneous protection against earthquakes, since the differential relay will interrupt power supply in case of a strong vibration. This can be accomplished without additional cost for the consumer, since the new element of this appliance is the mercury type vibration sensor, with a negligible cost. **It is my belief that in the future the traditional protective relay, as we know it, will be replaced by the earthquake-sensitive differential relay.**

15

8. A device of two units, according to Claim 4. The first unit concerns a three phase differential relay (at the right side of fig 4) while the second one contains three mercury type shock elements (fig 8). Externally the two appliances are similar to those of (fig 4), with the difference that the differential relay, will have by the side four female terminals (apertures), while the appliance of the shock elements has respectively four male terminals (pins) intended to be placed in the apertures of the relay. The female terminals of the relay are internally connected as follows: each one of the three first, to the entry of each phase (L_1 , L_2 , L_3) and the fourth to the neutral (N) at the exit of relay towards the electric installation. The unit of the shock elements (fig 8) contains internally three shock elements. Each one of their three upper ends is connected to each phase of the relay (via the external adjacent terminals), while the three underneath ends bridge via the fourth exterior terminal and they are connected to the neutral of the differential relay. Therefore we achieve earthquake-sensitivity for the three- phase differential relay, even if one or two phases of the grid (for any reason) do not have voltage. It is possible, the two units, at the same way, to have their terminals at the opposite side. Also there may exist a mechanism to keep the two units in contact with each other.

9. A device, according to Claim 7, of an earthquake-sensitive differential relay in which except of a shock sensor (or more shock sensors) that is connected in parallel to the ends of the button TEST, we are also able to place (inside the earthquake-sensitive relay) a

Shock Element (R in series to the shock sensor) that will be connected to another phase (except the one at which the button TEST is connected) and to the neutral. Thus when due to grid damage a phase is not found under voltage and a vibration occurs, earthquake-sensitivity will be induced at the other sensor.

5 **10.** Appliances in accordance with Claims 2,3,4,5,6,7,8 and 9 in which:

A) The shock sensors apart from mercury type could be of another type. For instance I report:

❖ A gravity type shock sensor with a constant and an oscillating contact (pendulum type)

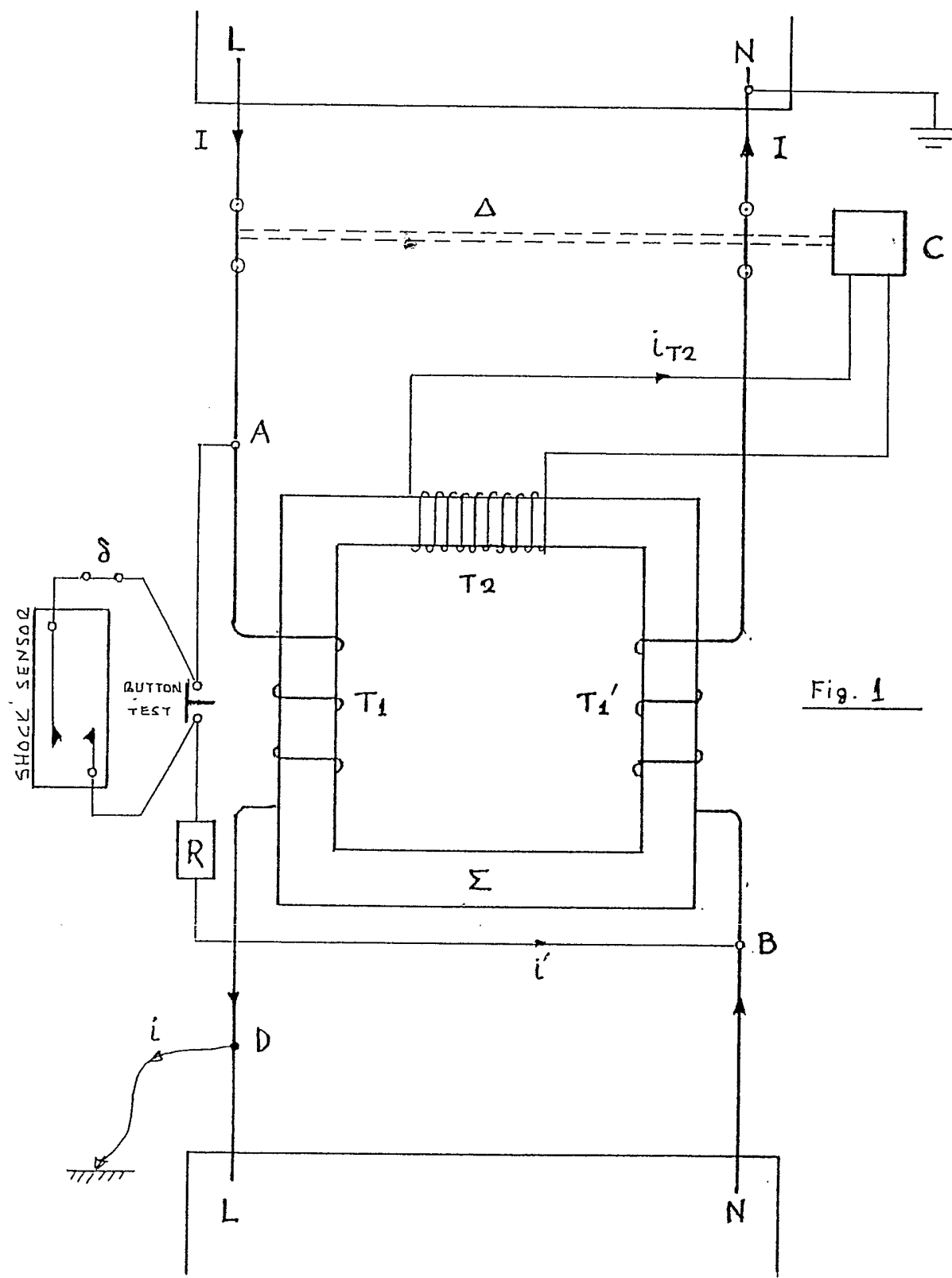
10 ❖ A shock sensor with one contact that is a small metal circular disk (as base),
while the second contact is a small metal annulus placed above the disk. On the disk a metal ball (bowl) leans freely and due to a vibration can move freely to the disk's circumference connecting instantly the two contacts.

15 Except of these sensors, other types of shock sensors could also be used having small volume.

B) It is possible in their facade to have a small lamp (LED) indicative of a stand by condition.

20 C) Their dimensions could vary depending on the type and the number of the shock sensors they contain.

D) In their back side they bring a detent mechanism (as the over current protective breaker switches) so as to click in the rail of electric panel.



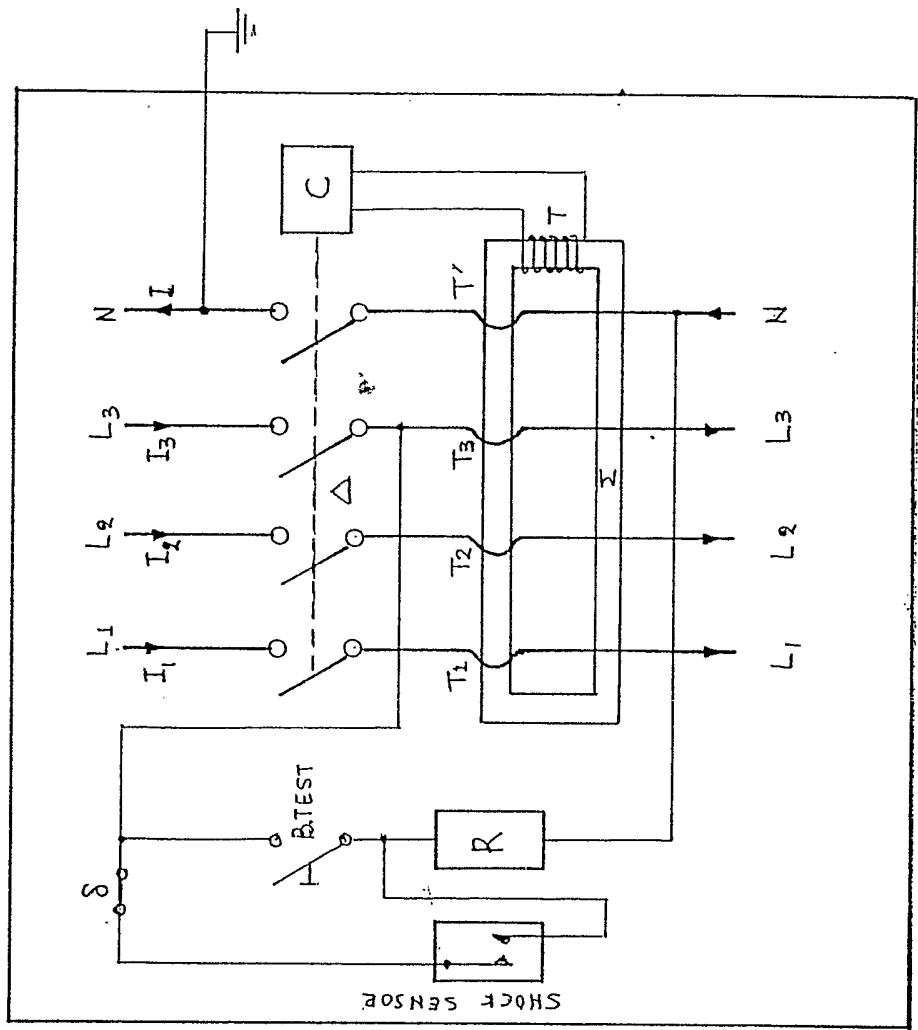


Fig. 3b

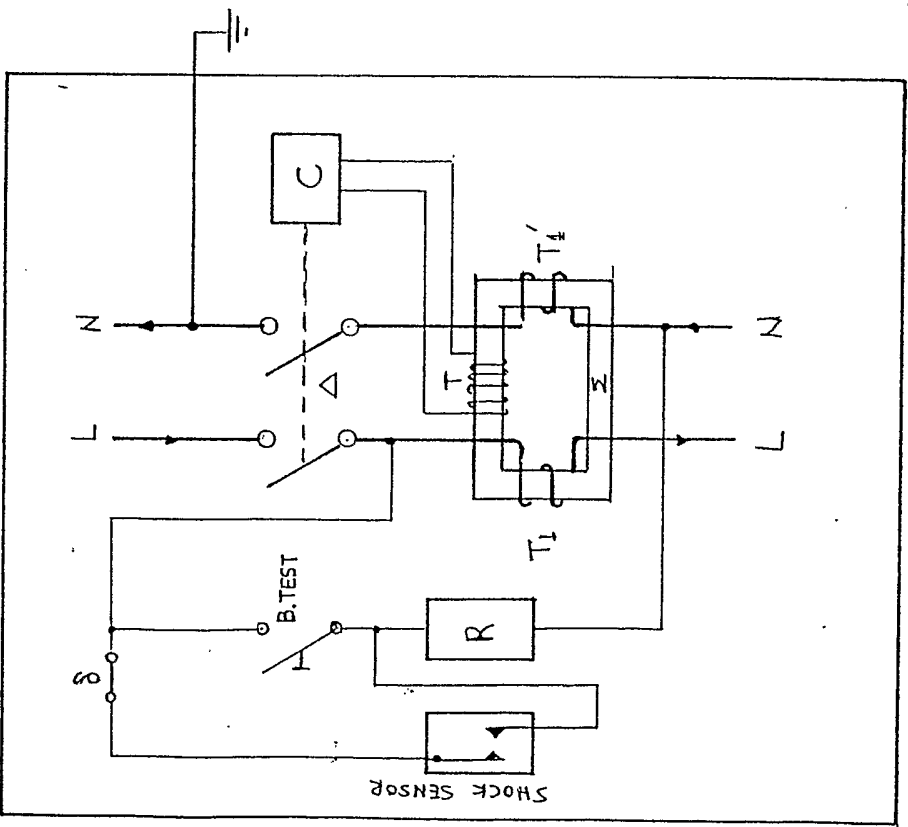


Fig. 3a

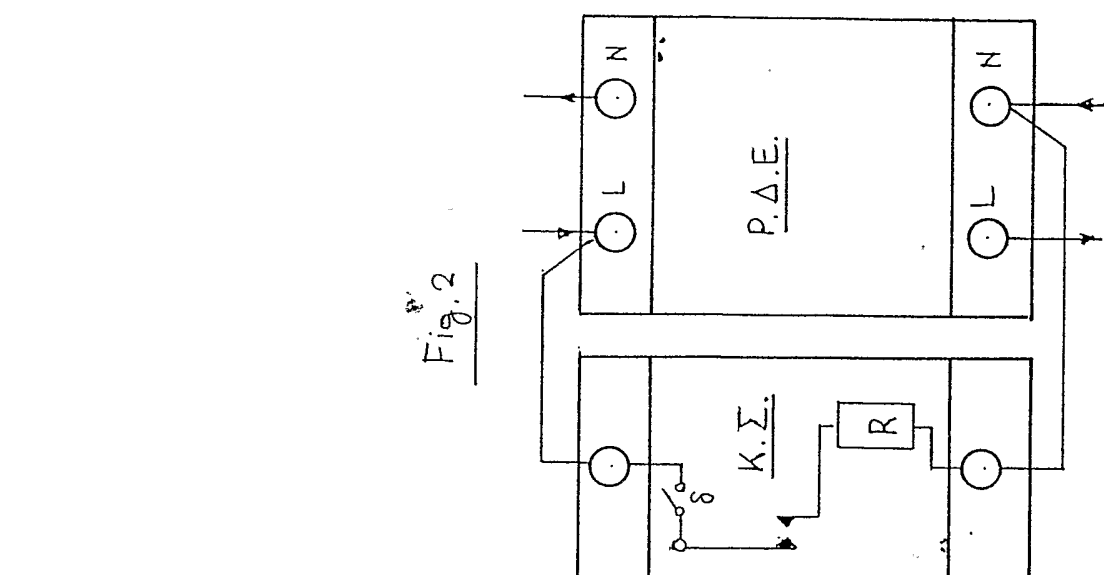


Fig. 2

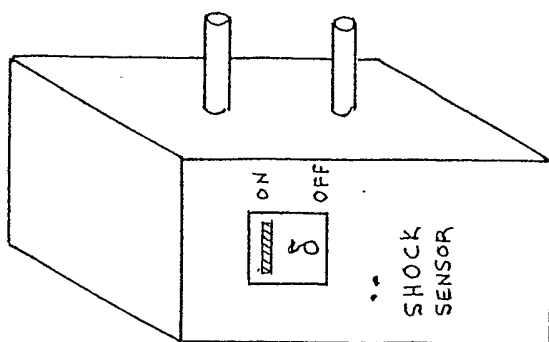
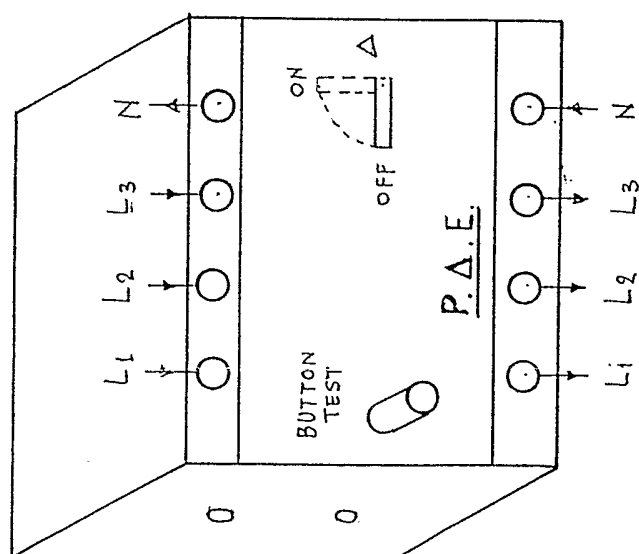
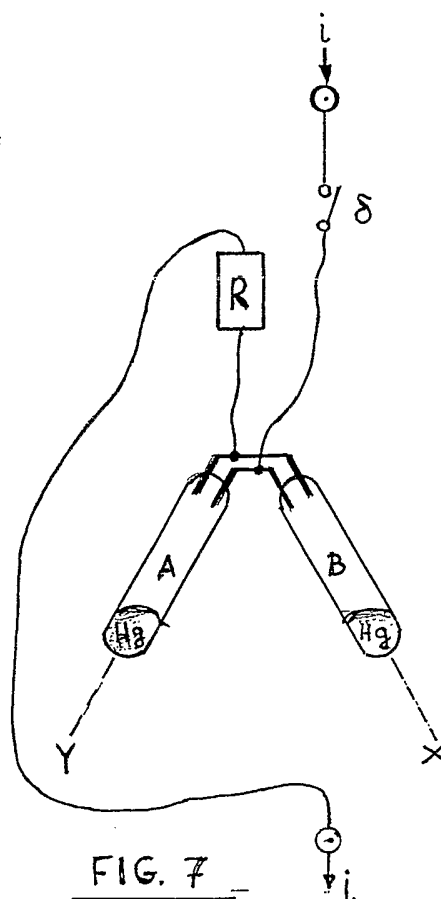
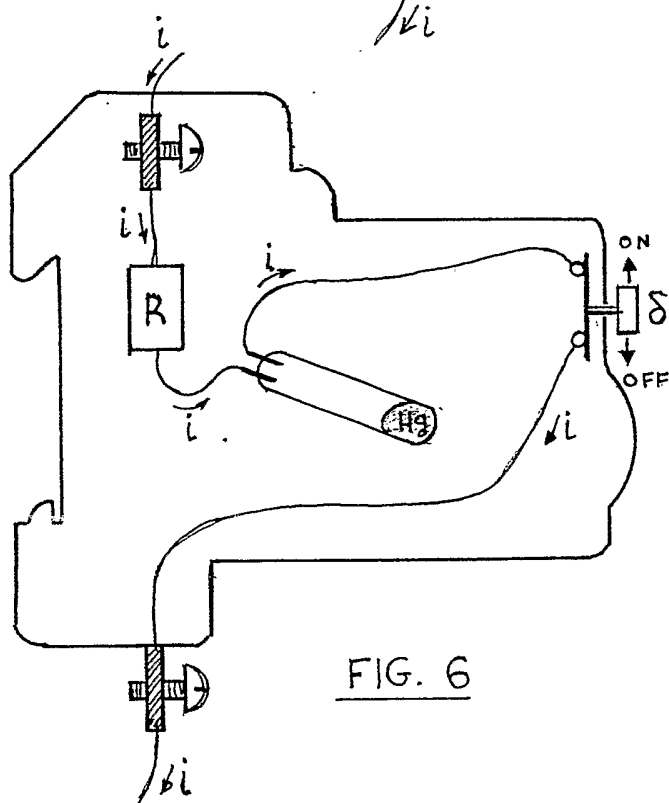
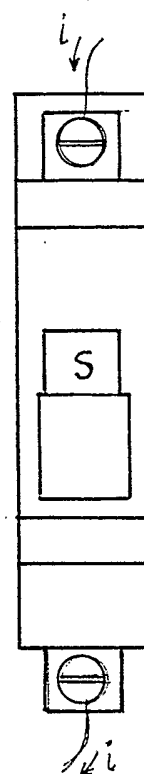
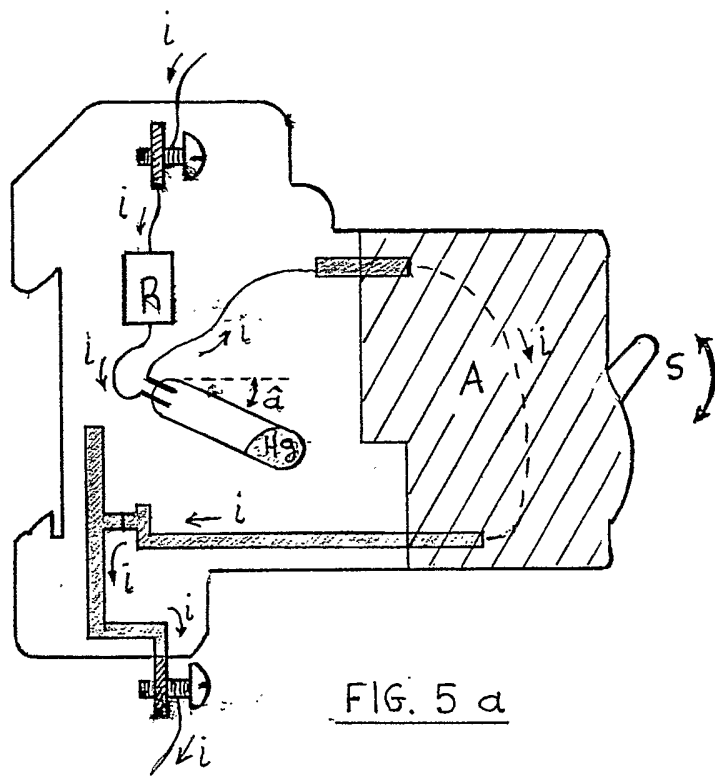
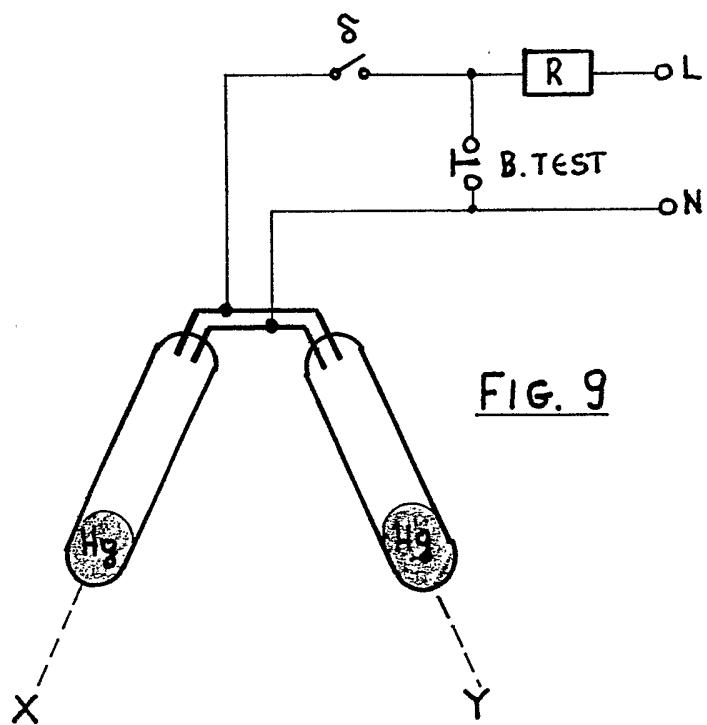
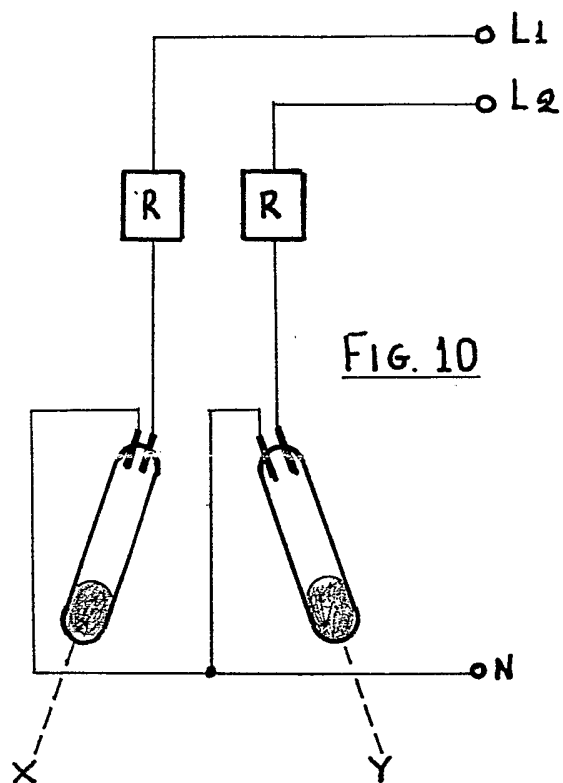
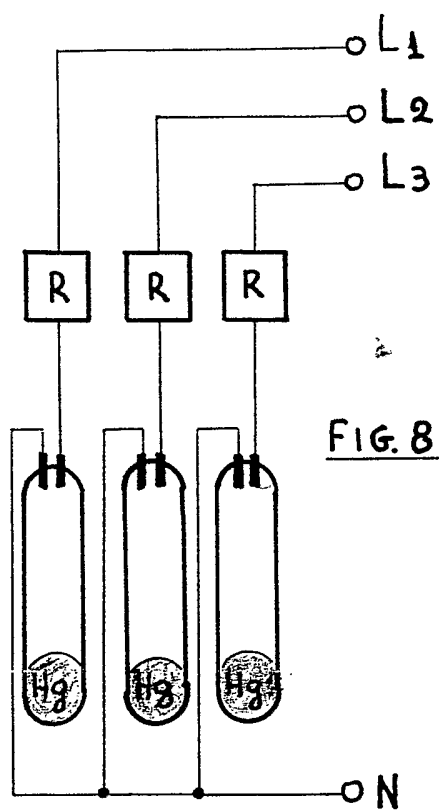


Fig. 4





INTERNATIONAL SEARCH REPORT

International Application No

PCT/GR 03/00017

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H02H3/33 H02B1/54 H01H83/04 H01H83/20

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 H02H H02B H01H

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 173 831 A (SAMMARTANO ARTHUR J) 22 December 1992 (1992-12-22)	1
Y	column 2, line 45 -column 3, line 31; figure 1	5-10
X	--- PATENT ABSTRACTS OF JAPAN vol. 1998, no. 01, 30 January 1998 (1998-01-30) & JP 09 247846 A (OSAKA CITY), 19 September 1997 (1997-09-19)	1-4
Y	abstract	7-10
X	--- PATENT ABSTRACTS OF JAPAN vol. 1998, no. 04, 31 March 1998 (1998-03-31) & JP 09 327119 A (NITTO KOGYO KK), 16 December 1997 (1997-12-16)	1,2
	abstract	
	--- -/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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& document member of the same patent family

Date of the actual completion of the international search

22 August 2003

Date of mailing of the international search report

01/09/2003

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INTERNATIONAL SEARCH REPORT

Internat  Application No

PCT/GR 03/00017

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International Application No

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