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(54) Universal configurable multiple power supply

(57) A universal configurable multiple power supply is described, especially for portable or fixed electronic equipment, comprising a first part for receiving voltage which is connected to an alternating or direct voltage power supply socket connection and a second part, modularly connected to said first part, to deliver direct voltage to one or more user loads.

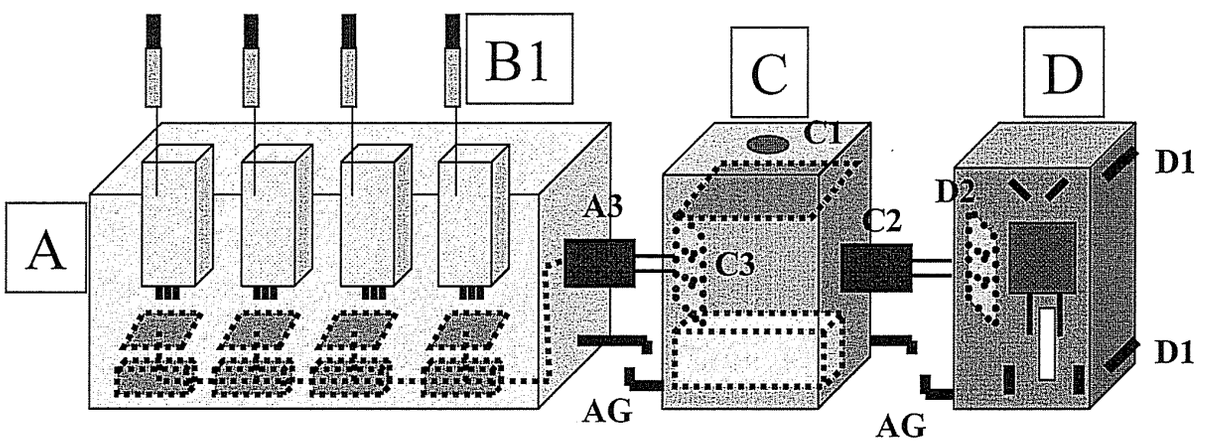

FIG. 1

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Description

[0001] The present invention refers to a universal configurable multiple power supply, especially for portable or fixed electronic equipment.

[0002] The adoption of electronic equipment on a large scale for communication, handling and storage of data, images, music, videos etc. has led to an exponential development in all related accessories.

[0003] The most widespread accessory is the power supply used to restore or maintain operation of any one of said pieces of equipment. Said power supplies consist of a current plug, a transformer with electrical or electronic setting to adapt the power supply voltage to that of the distribution network, and the necessary connection cable between the power supply and the user equipment. The connection with the user equipment is provided by a pin which is generally different as regards type or make from the equipment to be powered.

[0004] This leads to the problem of rationalising the use of said power supplies, in order to avoid excessive overall dimensions, especially when the total number increases, since normally each of the above-mentioned electronic devices requires its own power supply.

[0005] Therefore the aim of the present invention is to overcome all the above problems and to indicate a universal configurable multiple power supply, especially for portable or fixed electronic equipment, characterised in that it comprises: a first part for receiving voltage which is connected to an alternating or direct voltage power supply socket connection; a second part, modularly connected to said first part, to deliver direct voltage to one or more user loads.

[0006] The present invention concerns in particular a universal configurable multiple power supply, especially for portable or fixed electronic equipment, as better described in the claims, which form an integral part of this description.

[0007] The aims and advantages of the present invention will be more clearly illustrated by the following detailed description of an example of embodiment of the same (and its variants) and by the attached drawings provided for illustrative non-limiting purposes, in which:

figures 1, 2 and 3 show block diagrams of a first, second and third alternative respectively of a power supply with base, subject of the present invention;
figure 4 shows an embodiment diagram of the base block A;
figures 5 and 6 show embodiment examples of the pin B1 and related socket/plug combination;
figures 7a, 7b and 8 show further embodiment alternatives of the power supply without base, subject of the present invention, with related pins B2;
figures 9a, 9b show embodiment examples of the plug S on the user side, adaptable to the pins B1 and B2.
Figures 10a and 10b show a alternative of the pin, comprising rewinders for the electrical cable.

[0008] The same reference numbers and letters in the figures identify the same components or functionally equivalent components, elements or quantities.

[0009] In fig. 1, in a first embodiment alternative, the universal configurable multiple power supply comprises a block D consisting of a universal connection for wall power supply, consisting of a plug with multiple connections which can be selected according to the standard existing in the various countries. The block D comprises levers D1 which permit extraction from the block of the specific connection required, with the plug in compliance with the standard of the socket into which it is inserted. There is also a socket D2 positioned facing towards the block C.

[0010] A further block C includes a transformer for the required voltage reduction for example in the range from 250 V to 100 V to a low direct voltage, for example 12 V. The block C therefore comprises a switch C1 for selection of the input voltage (220 or 110 V or other value), or an automatic power supply voltage detector, a plug C2 facing towards the block D, which adapts to the socket D2 of the block D, and a socket C3 positioned opposite the plug C2.

[0011] In an embodiment alternative the output voltage of the block C on the socket C3 is alternating, e.g. 12 V ac.

[0012] A further block A, described in detail below, constitutes a modular base for housing a series of pins B1, each of which is designed to power a specific electric/electronic device. The block A comprises a plug A3 which adapts to the socket C3 of the block C, positioned facing towards the block C.

[0013] During operation, the plug A3 of the block A is inserted in the socket C3 of the block C, while the plug C2 of the block C is inserted in the socket D2 of the block D. In this way one single block A+B+C is formed. The blocks are fixed together by means of suitable couplings AG.

[0014] In fig. 2, in a second embodiment alternative, the universal configurable multiple power supply comprises a block E which integrates the blocks C and D of the first alternative in one single shell, while it also comprises a base A and pins B1 as in the first alternative, and a plug A3 for insertion in the socket E3 of the block E. In this way one single block A+E is formed. The blocks are fixed together by means of suitable couplings AG.

[0015] In an embodiment alternative the output voltage of the block E on the socket E3 is alternating.

[0016] In fig. 3, in a third embodiment alternative, the universal configurable multiple power supply comprises the modular base block A with pins B1 as in the previous alternatives. Appropriate connections can be connected to the latter for power supply from a vehicle, directly from a direct voltage of 12 V, type F for cigar lighter socket or type G for auxiliary socket, taken directly from the fuse

carrier compartment for example. The connections F or G can be inserted in the base A or be outside it.

[0017] Fig. 4 shows an embodiment example of the base A. It comprises voltage transformers I, one for each housing of pin B1, which transform the input voltage, direct or alternating, (12 V) with fixed value into a lower direct or alternating voltage. For example the transformers I can comprise Zener diode elements, for the stabilisation of direct voltage.

[0018] Housings M are provided for the pins B, in a set number, for example four, as in the figure. Each housing can be suitable for a certain direct or alternating voltage value, for example in the range between 3 V and 7 V. Connections L are also provided for wall mounting or fitting to any fixed supporting element also on a vehicle.

[0019] According to an embodiment alternative, voltage detectors H are present, one for each housing M, able to signal the required value and to adapt the direct or alternating voltage at output towards the pin B1 to the value required by the load.

[0020] According to a second alternative, alternatively to the voltage detectors H, manual switches are present which selectively connect the output voltages of the transformers I to the connections M according to the required value.

[0021] In the case of the embodiment alternative of the blocks C and D or E in which the output voltage of the blocks C and E on the socket C3 or E3 is alternating, the base A includes appropriate voltage rectifiers to provide direct voltages at the output towards the pins B1.

[0022] In a further alternative the base A does not include rectifiers, since the output voltages towards the pins B1 are alternating.

[0023] Fig. 5 shows an embodiment example of a first alternative of the pin B1. It comprises a body with electrical wire connecting to the plug S on the user side. The latter consists of a base S1 connected to the electrical wire and an end opposite the one to which the electrical wire is connected provided with a screw or equivalent fastening means S2 for a second part consisting of the electrical conduction element S3 which will engage in the device to be powered. This makes the conduction element interchangeable according to the model or form of socket present in the equipment to be powered.

[0024] The pin B1 comprises a plug Y2 on the power supply side which is inserted in the socket Y1 of the housing M of the base A (fig. 4). As shown in fig. 6, the socket Y1 and the corresponding plug Y2 can be of appropriate shape, in order to make the pin B1 interchangeable according to the voltage value to be supplied to the load. Plug Y2 and socket Y1 can be position-inverted between pin B1 and base A. Each housing M can receive all the voltage values, on different socket points, for example a common point for earth, in the centre in a radial configuration or at one side in a linear configuration, and a specific point for each voltage value, around the edge in a radial configuration or in-line in a linear configuration. In the case of a radial configuration, a reference R1 is provided consisting of a raised or protruding element or recess for correctly positioning the plug in the socket.

[0025] In a second alternative the pin B1 can include appropriate voltage transformation elements N1, which transform the input voltage, direct or alternating, (12 V) with fixed value into a lower direct or alternating voltage. For example the transformation elements can comprise Zener diode elements, for the stabilisation of direct voltage. In this case the transformers I may no longer be present in the base A, which comprises a line for transmitting the input voltage from the blocks C (fig. 1) or E (fig. 2) or from the sockets F or G (fig. 3) towards each of the housings M of the base A (fig. 4). Furthermore the plugs Y2 and sockets Y1 do not require particular forms.

[0026] Figures 9a and 9b show two alternatives of the plug S on the user side, of a coaxial type, for respective uses with positive polarity, in which the positive polarity is carried by the internal lead, and with negative polarity, in which the positive polarity is carried by the external lead.

[0027] Specific plugs S can therefore be produced for different voltage or form, differentiating them according to the position of the positive plug point, and also according to the polarity. This embodiment constitutes a further embodiment alternative of the base A, in which the different voltage values reach all the housings M on different positions.

[0028] According to a further embodiment of the universal configurable multiple power supply, figures 7a, 7b and 8, there is a block K (fig. 7a) or a block Z (fig. 7b) which integrates the pair of blocks C and D of the first alternative (fig. 1), or the single block E of the second alternative (fig. 2). In this alternative the base A is not present, while the various pins B2 can be connected directly in series to the block K of fig. 7a, or Z of fig. 7b.

[0029] In the version of fig. 7a, the block K also provides the base for the first pin B2, while in the version of fig. 7b, the block Z only has the function of the blocks C+D or E.

[0030] Inside the body of the pins B2 there is a parallel connection which carries the input power supply (e.g. 12 V direct) outwards towards other pins. Each pin includes a transformer N2 (fig. 8) and an automatic voltage detector, or a manual switch, which provide on the output plug S an appropriate voltage suitable for the equipment to be powered, of alternating or direct type, according to requirements.

[0031] For example the transformers I can comprise Zener diode elements, for voltage stabilisation.

[0032] There is also an appropriate mechanical coupling system U to maintain the connection between the pins B2, which are electrically interconnected by means of plugs and sockets V (fig. 8).

[0033] The plugs S of the pins B2 are equivalent to those of the pins B1 (fig. 5, 9a, 9b).

[0034] It is obvious that in this case maximum flexibil-

ity of use is obtained since, while maintaining the voltage constant, e.g. direct 12 V, pins with any output voltage value can be connected, variable according to requirements.

[0035] Embodiment alternatives with respect to the non-limiting example described are possible, without departing from the scope of protection of the present invention, comprising all the equivalent embodiments for a technician skilled in the art.

[0036] For example, for all the alternatives of the universal configurable multiple power supply described above, in the case of application for high currents, the weight and dimension of the various components can be considerable. In this case an appropriate wall support can be provided to sustain the elements, or they can be connected to the power supply socket by means of an electrical cable.

[0037] In all the alternatives described above, the pin can comprise a rewinder for the electrical cable. With reference to the figures 10a and 10b, the wire 6 (fig. 10a) is preferably an electrical wire, or a cable, or an optical fibre. The wire 6' (fig. 10b) can consist of a flat cable: it is a thin strap, with thickness of even less than 1 mm, highly flexible and robust to prevent tearing.

[0038] The wire 6 or 6' can be provided with a core made of steel, or another suitable strengthening material and can be of any type with any number of leads and maximum voltage and current value.

[0039] Reference 3 indicates a roller rewinder inside the shell, for the wire 6 or 6'. There is also a system inside the rewinder for automatic block/release, not shown in the figure, for blocking the wire at the required length and releasing it to rewind it on the winder roller 3, or to further lengthen it.

[0040] The pin S described above is present, connected to the terminal of the wire 6 or 6' outside the rewinder, for connection to the power supply or to the load.

[0041] Rewinding is ensured by a suitable internal spring, not shown in the drawings, connected to the winder roller, which permits automatic rewinding of the wire around the roller.

[0042] From the above description a technician skilled in the art is able to produce the subject of the invention without introducing further construction details.

Claims

1. Universal configurable multiple power supply, especially for portable or fixed electronic equipment, **characterised in that** it comprises:

   a first part for receiving voltage which is connected to an alternating or direct voltage power supply socket connection;
   a second part, modularly connected to said first part, to deliver direct or alternating voltage to one or more user loads.

2. Power supply as claimed in claim 1, **characterised in that** said first part comprises:

   - a first block (D) consisting of a universal connection for wall power supply, consisting of a plug with selectable multiple connections according to the standard existing in the various countries;
   - a second block (C) comprising a transformer for voltage reduction from 220 V, or from 110 V, to a low direct or alternating voltage, said second block connecting to the first;

   and **characterised in that** said second part comprises:

   - a third block (A), constituting a modular base for housing a series of pins (B1), each of which is designed to power a specific electric/electronic device.

3. Power supply as claimed in claim 2, **characterised in that** said first and second block (C, D) are enclosed in one single shell (E).

4. Power supply as claimed in claim 2 or 3, **characterised in that** said first block (D) comprises appropriate levers (D1) which permit extraction from the block of the specific connection required, with the plug in compliance with the standard of the socket into which it is inserted.

5. Power supply as claimed in claim 2 or 3, **characterised in that** said second block (C) comprises a switch (C1) for selection of the input voltage, a plug (C2) which adapts to the socket (D2) of the first block (D) and a socket (C3) positioned opposite the plug (C2).

6. Power supply as claimed in claim 1, **characterised in that** said first part comprises connections for power supply from a vehicle (F, G), and said second part comprises a third block (A), constituting a modular base for housing a series of pins (B1), each of which is designed to power a specific electric/electronic device.

7. Power supply as claimed in claim 2, **characterised in that** said third base block (A) comprises housings (M) for the pins (B1), in a given number, each of which connected to a transmission line for the direct or alternating input voltage (12 V), said pins (B1) comprising voltage transformation elements (N1), which transform the direct or alternating input voltage (12 V) with fixed value into a lower direct or alternating voltage towards the output.

8. Power supply as claimed in claim 2, **characterised**

in that said third base block (A) comprises:

- voltage transformers (I), one for each pin (B1) housing provided, which transform the direct or alternating input voltage (12 V) with fixed value into a lower direct or alternating voltage;
- housings (M) for the pins (B1), in a set number, each housing being suitable for a certain voltage value.

9. Power supply as claimed in claim 7 or 8, **characterised in that** it comprises connections (L) for wall mounting or fitting to any fixed supporting element also on a vehicle.

10. Power supply as claimed in claim 7 or 8, **characterised in that** it comprises voltage detectors (H), one for each housing (M), able to adapt the output voltage towards a corresponding pin (B1) to the value required by the load.

11. Power supply as claimed in claim 7 or 8, **characterised in that** it comprises manual switches that selectively connect the output voltages of the transformers (I) to the connections (M) according to the required value.

12. Power supply as claimed in claim 7 or 8, **characterised in that** said voltage transformers (I) comprise Zener diode elements.

13. Power supply as in any of the preceding claims, **characterised in that** each of said pins (B1) comprises a second plug (Y2) which is inserted in a socket (Y1) in the housing (M), the socket (Y1) and the corresponding plug (Y2) being of a shape such as to make the pin (B1) interchangeable according to the voltage value to be supplied to the load, by creation of a common point for the earth, and a specific point for each voltage value in different positions according to the voltage value.

14. Power supply as claimed in claim 13, **characterised in that** said common point for the earth is provided at the centre of said plug and socket (Y1, Y2) in a radial configuration or at one side in a linear configuration, and said specific points are provided around the edge, in the radial configuration, or inline in the linear configuration.

15. Power supply as claimed in claim 1, **characterised in that** said first part comprises:

- a first block (D) consisting of a universal connection for wall power supply, consisting of a plug with selectable multiple connections according to the standard existing in the various countries;
- a second block (C) comprising a transformer for voltage reduction from 220 V, or from 110 V, to a low direct voltage, said second block connecting to the first one;

and **characterised in that** said second part comprises a certain number of pins (B2), connected in series to said second block (C), each of which are designed to power a specific electric/electronic device.

16. Power supply as claimed in claim 15, **characterised in that** said second block (C) comprises a housing for the first of said pins (B2).

17. Power supply as claimed in claim 15, **characterised in that** said first and second block (C, D) are enclosed in one single shell (E).

18. Power supply as claimed in claims 15 or 16 or 17, **characterised in that** a parallel connection is present inside the body of the pins (B2) which carries the input power supply (12 V) outwards towards the other pins, and that each pin includes a transformer (N2) and an automatic voltage detector, or a manual switch, that provide an appropriate voltage value on the output plug suitable for the equipment to be powered.

19. Power supply as in any of the preceding claims, **characterised in that** a mechanical coupling system (U) is provided to maintain the connection between the various blocks.

20. Power supply as claimed in any one of the preceding claims, **characterised in that** each of said pins (B1, B2) comprises a body with electrical wire connecting to a plug (S), the latter comprising a base (S1) connected to the electrical wire and an end opposite the one to which the electrical wire is connected provided with a screw or equivalent fastening means (S2) for a second part consisting of the electrical conduction element (S3) which engages with the device to be powered.

21. Power supply as claimed in claim 20, **characterised in that** said opposite end of said plug (S) is suitable for uses with positive polarity and with negative polarity.

22. Power supply as claimed in any one of the preceding claims, **characterised in that** a suitable wall support is provided to support the elements, or these can be connected to the power supply socket by means of electrical cable.

23. Power supply as claimed in claim 2, 6 or 15, **characterised in that** said pins (S1, S2) comprise a re-

winder (3) for the electrical cable (6, 6').

24. Power supply as claimed in claim 23, **characterised in that** said electrical cable (6, 6') is an electrical wire, or a cable, or an optical fibre, or a flat cable.

25. Power supply as claimed in claim 23, **characterised in that** said electrical cable (6, 6') comprises a core made of steel or other suitable strengthening material and can be of any type with any number of wires and voltage value and maximum current.

26. Power supply as claimed in claim 23, **characterised in that** said rewinder (3) comprises a rewinding spring and an automatic block/release system for said electrical cable.

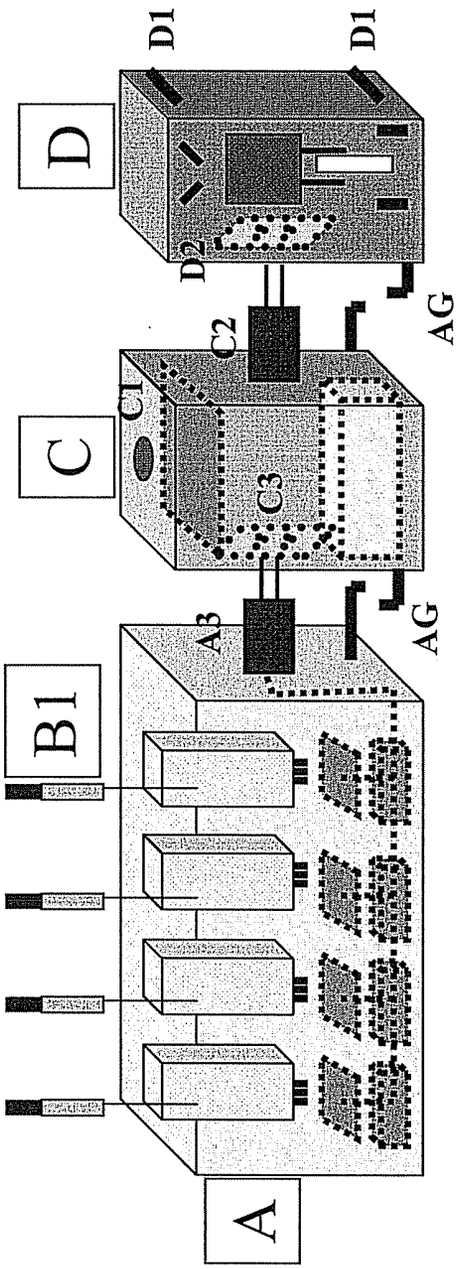

FIG. 1

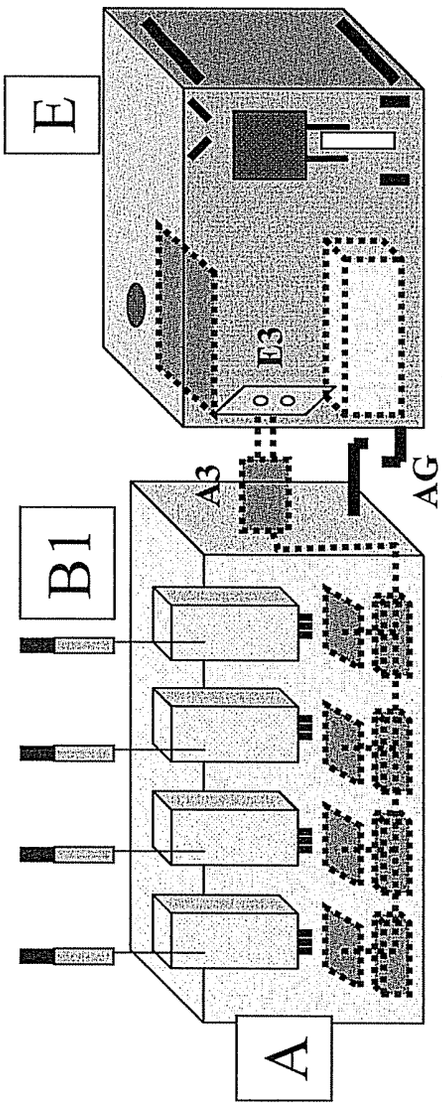

FIG. 2

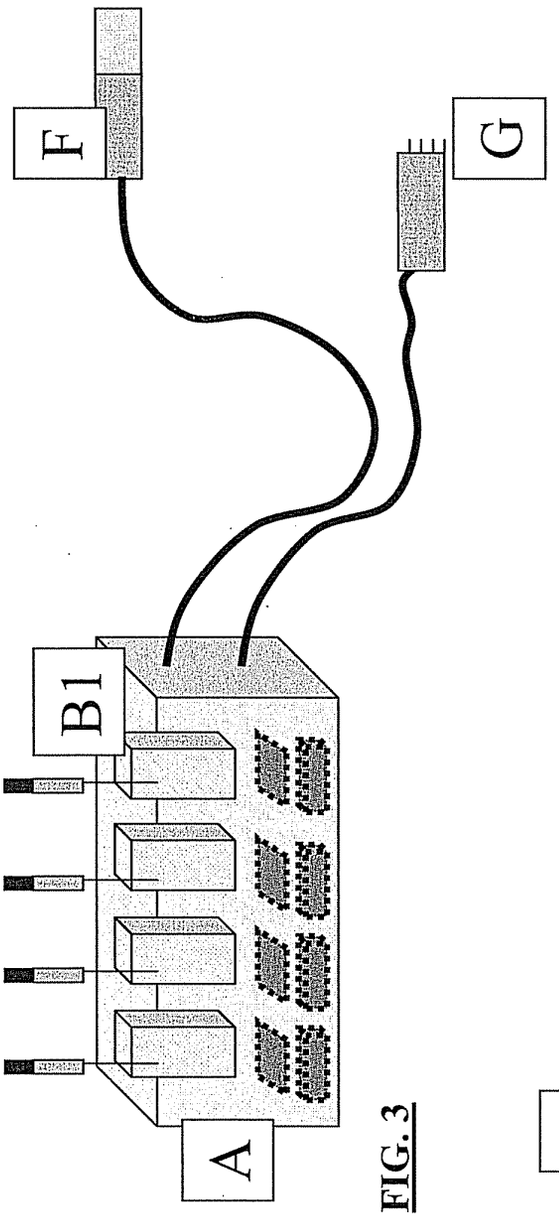

FIG. 3

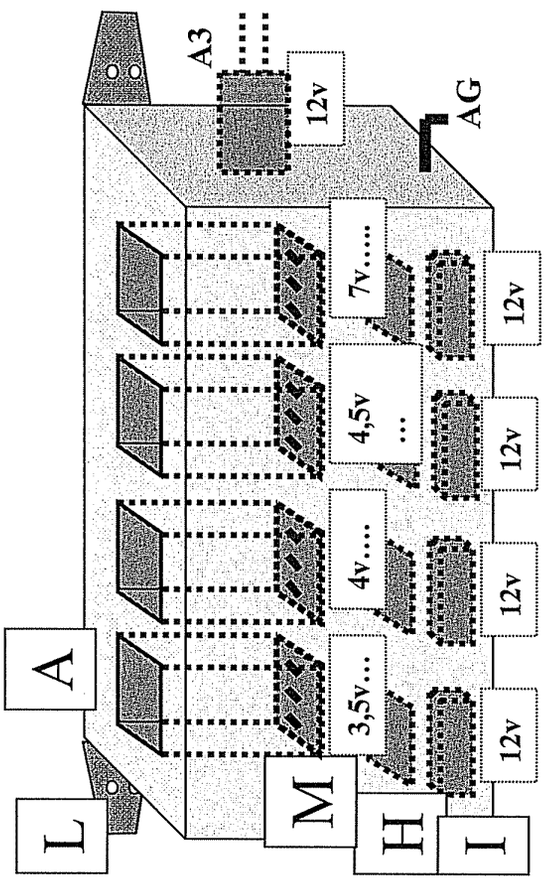

FIG. 4

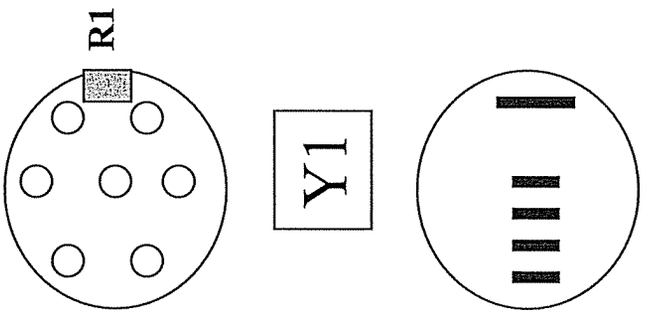

FIG. 6

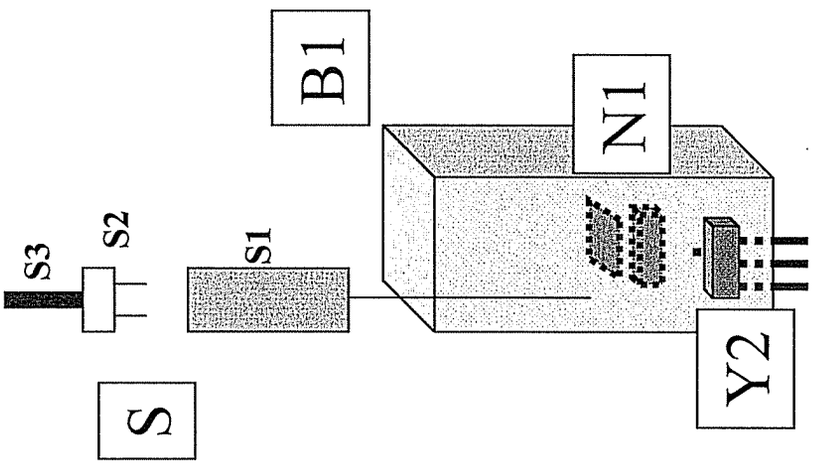

FIG. 5

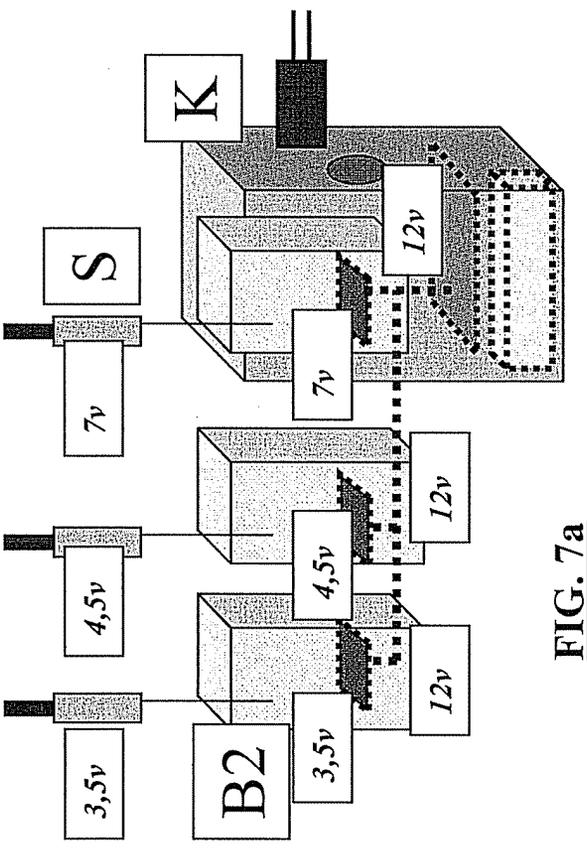

FIG. 7a

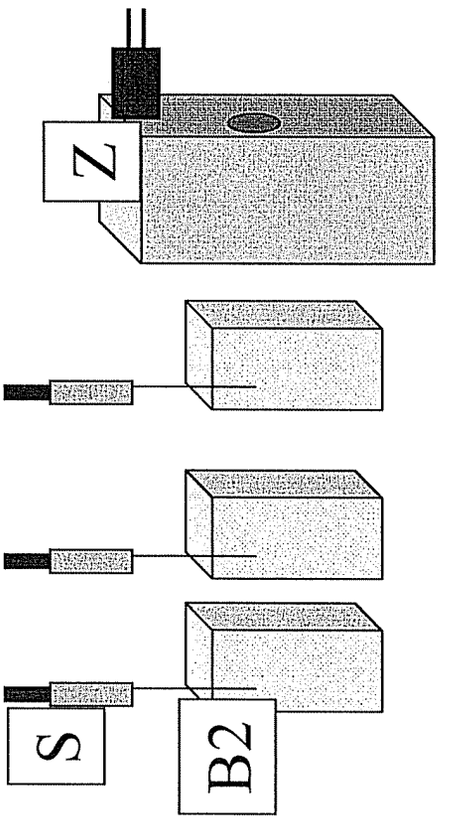

FIG. 7b

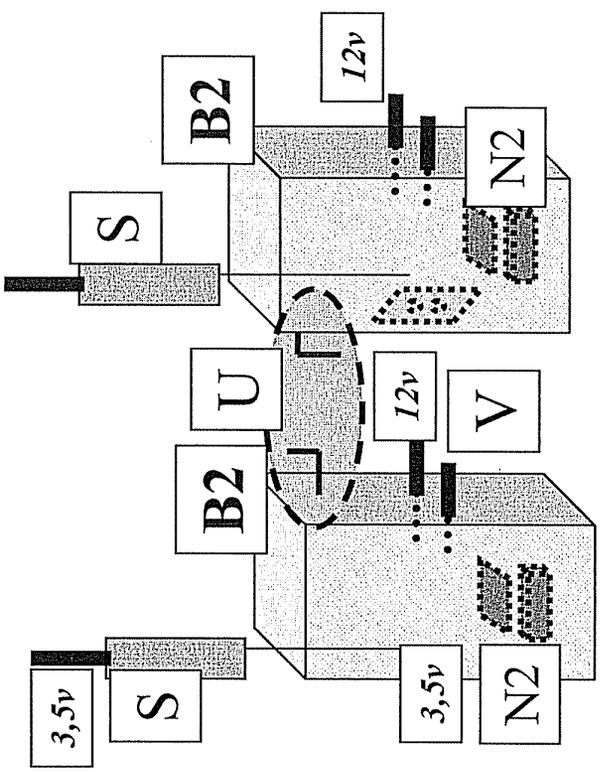

FIG. 8

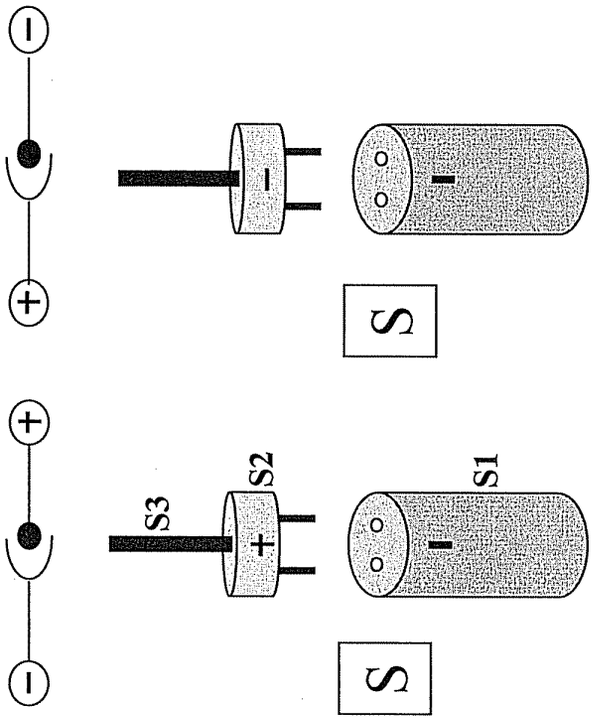

FIG. 9a

FIG. 9b

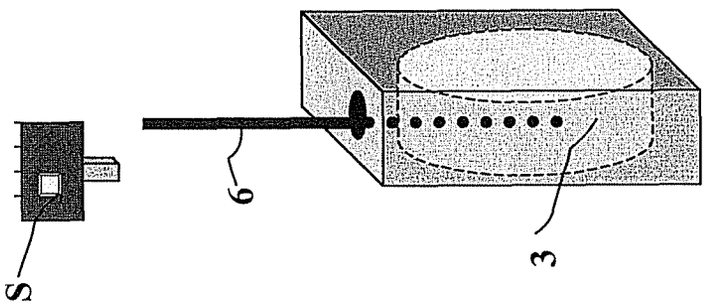

FIG. 10a

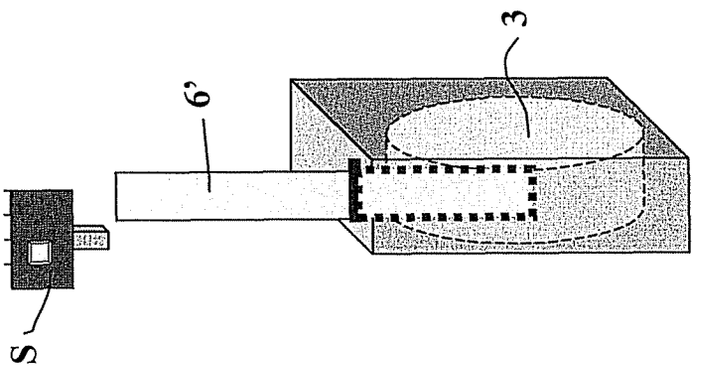

FIG. 10b