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(54) **Alternating current regulating means**

Wechselstrom-Regulierungsmittel

Dispositif de régulation de courant alternatif

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an alternating current regulating means, and in particular to a means for outputting a stable electric current.

2. Description of Prior Art

[0002] A load means an object which consumes electricity for its operation, such as a television, air conditioner, electric fan or the like. Since the electricity generated by a power plant is delivered for a long distance so as to a end user and electric cables used for delivering the electricity inevitably have a large internal resistance, the electric current reaching the user end is unstable, which may adversely affect the lifetime of the load. Even, some delicate or precise loads may suffer damage due to the unstable input electric current.

[0003] Therefore, people try to propose a current-regulating means. One end of the current-regulating means is electrically connected to a power supply, and the other end thereof is electrically connected to a load. After an electric current passes through the current-regulating means, the electric current can be regulated to become a stable current for the load.

[0004] However, the conventional current-regulating means has a drawback. That is, the input electric current has to be a direct current, and otherwise the conventional current-regulating means cannot generate a stable current. Since the power supply in a house or a factory generates an alternating current, the conventional current-regulating means cannot be directly used in a house or factory.

[0005] Since the conventional current-regulating means has the above-mentioned problems, the present Inventor tries to solve the problems in prior art.

[0006] US 3,153,187 A1 relates to a transistor alternating-current voltage regulator including a first and a second current path between a current source and a load, wherein along each current path a diode and a transistor are arranged. The transistors are regulated by a regulating mechanism including a plurality of transistors, resistors, transformers, diodes and capacitors. Starting from this state of the art, it is the object of the present application to provide an alternating current regulating means which improves the quality of the output average current and at the same time simplifies the construction of the controlling mechanism.

SUMMARY OF THE INVENTION

[0007] In order to solve the problems of the conventional current-regulating means, the present Inventor proposes a novel and reasonable structure based on his research and experiments.

[0008] The above-mentioned object is solved by the alternating current regulating means according to claim 1. Advantageous improvements of the invention are described by the dependant claims.

[0009] The present invention relates to an alternating current regulating means, which includes:

a positive half-cycle current-limiting circuit comprising a first diode, a first current-limiting circuit, a first input end and a first output end, a cathode of the first diode being electrically connected to an input end of the first current-limiting circuit, an anode of the first diode being electrically connected to the first input end, an output end of the first current-limiting circuit being electrically connected to the first output end;

a negative half-cycle current-limiting circuit comprising a second diode, a second current-limiting circuit, a second input end and a second output end, an anode of the second diode being electrically connected to an input end of the second current-limiting circuit, a cathode of the second diode being electrically connected to the second input end, an output end of the second current-limiting circuit being electrically connected to the second output end;

a current input section, one end of the current input section being electrically connected to the first input end and the second input end and coupled to a first connecting point, the other end of the current input section being electrically connected to an input power supply; and

a current output section, one end of the current output section being electrically connected to the first output end and the second output end and coupled to a second connecting point, the other end of the current output section being electrically connected to a load.

[0010] According to the present invention, one end of the alternating current regulating means is electrically connected to the input power supply, and the other end thereof is electrically connected to the load. When the input power supply generates an alternating current flowing to the first connecting point, the first diode allows the positive half-cycle current of the alternating current to pass through, and the second diode allows the negative half-cycle current of the alternating current to pass through. As a result, the alternating current is divided into the positive half-cycle current flowing into the first current-limiting circuit and the negative half-cycle current flowing into the second current-limiting circuit. The difference of phase angle between the positive half-cycle current and the negative half-cycle current is 180 degree. Thus, the positive half-cycle current flowing to the first current-limiting circuit is outputted to the second connecting point with a stable and constant value, and the negative half-cycle current flowing into the second current-limiting circuit is outputted to the second connecting point with a

stable and constant value. Since the difference of phase angle between the positive half-cycle current and the negative half-cycle current is 180 degree, the positive half-cycle current and the negative half-cycle current flow to the second connecting point to form an electric current having a continuous periodic wave for the load. In this way, the problem that the conventional current-regulating means only regulates a direct current to become a stable output current can be solved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is a schematic view of the present invention;
FIG. 2 is a schematic view showing a positive half-cycle current-limiting circuit of the present invention;
FIG. 3 is a schematic view showing a negative half-cycle current-limiting circuit of the present invention; and
FIG. 4 is a schematic view showing an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Please refer to FIG. 1. The present invention is directed to an alternating current regulating means 1, which includes a positive half-cycle current-limiting circuit 2, a negative half-cycle current-limiting circuit 3, a current input section 4, and a current output section 5.

[0013] The positive half-cycle current-limiting circuit 2 comprises a first diode 21, a first current-limiting circuit 22, a first input end 23 and a first output end 24. A cathode of the first diode 21 is electrically connected to an input end of the first current-limiting circuit 22. An anode of the first diode 21 is electrically connected to the first input end 23. An output end of the first current-limiting circuit 22 is electrically connected to the first output end 24. With this arrangement, when the first input end 23 is electrically connected to an input power supply generating an alternating current, the first diode 21 allows the positive half-cycle current of the alternating current to pass through but obstructs the passage of the negative half-cycle current of the alternating current. As a result, only the positive half-cycle current of the input power supply can flow into the first current-limiting circuit 22, and then the first current-limiting circuit 22 makes the positive half-cycle current to become a stable valve.

[0014] Please refer to FIGS. 1 and 2, which show a preferred embodiment of the positive half-cycle current-limiting circuit 2. The first current-limiting circuit 22 includes a first bipolar junction transistor 221, a first bias resistor 222, a first current-limiting resistor 223, and a first voltage-regulating unit 224. The first bipolar junction transistor 221 is electrically connected to the input end of the first current-limiting circuit 22. One end of the first bias resistor 222 is electrically connected to a base of the first bipolar junction transistor 221, and the other end of the first bias resistor 222 is electrically connected to the input end of the first current-limiting circuit 22. The first voltage-regulating unit 224 is electrically connected to the base of the first bipolar junction transistor 221, the output end of the first current-limiting circuit 22, and an emitter of the first bipolar junction transistor 221. The first voltage-regulating unit 224 is configured to control the current value outputted by the emitter of the first bipolar junction transistor (221. One end of the first current-limiting resistor (223 is electrically connected to the first voltage-regulating unit (224, and the other end of the first current-limiting resistor (223 is electrically connected to the output end of the first current-limiting circuit (22. A preferred embodiment of the first voltage-regulating unit (224 is a controllable Zener diode (also referred as "TL431"). An anode of the controllable Zener diode is electrically connected to the output end of the first current-limiting circuit 22, and a cathode of the controllable Zener diode is electrically connected to the base of the first bipolar junction transistor 221. A reference end of the controllable Zener diode is electrically connected to the input end of the first current-limiting resistor 223. Hereinafter, the first voltage-regulating unit 224 is described by using the controllable Zener diode as an example.

[0015] When the positive half-cycle current of the alternating current flows through the first diode 21 and into the first current-limiting circuit 22, the positive half-cycle current flows through a collector of the first bipolar junction transistor 221 and reaches the emitter of the first bipolar junction transistor 221. The value of the current reaching the emitter depends on the first bias resistor 222. When the positive half-cycle current flows through the current-limiting resistor 223, both ends of the current-limiting resistor 223 will generate a voltage Ve-r. The breakdown voltage of the first voltage-regulating unit 224 is defined as V_z. If Ve-r > V_z, the first voltage-regulating unit reduces the bias voltage outputted by the first bipolar junction transistor 221, so that the output current of the first bipolar junction transistor 221 can be limited to an average current value. Therefore, when the resistance of the bias resistor 222 and the current-limiting resistor 223 is changed, the average current value of the positive half-cycle current can be controlled. Since the first current-limiting circuit 22 of the present embodiment is constituted of fewer elements, the total manufacturing cost is reduced to make the present invention more competitive. Furthermore, the manufacturing procedure is also simplified.

[0016] The negative half-cycle current-limiting circuit 3 comprises a second diode 31, a second current-limiting circuit 32, a second input end 33 and a second output end 34. An anode of the second diode 31 is electrically connected to an input end of the second current-limiting circuit 32. A cathode of the second diode 31 is electrically connected to the second input end 33. With this arrangement, when the second input end 33 is electrically connected to an input power supply generating an alternating

current, the second diode 31 allows the negative half-cycle current of the alternating current to pass through but obstructs the passage of the positive half-cycle current of the alternating current. The output end of the second current-limiting circuit 32 is electrically connected to the second output end 34. The second current-limiting circuit 32 allows the negative half-cycle current to pass through to become a stable valve.

[0017] Please refer to FIGS. 1 and 3, which show a preferred embodiment of the negative half-cycle current-limiting circuit 3. The second current-limiting circuit 32 includes a second bipolar junction transistor 321, a second bias resistor 322, a second current-limiting resistor 323, and a second voltage-regulating unit 324. A collector of the second bipolar junction transistor 321 is electrically connected to an output end of the second current-limiting circuit 32. One end of the second bias resistor 322 is electrically connected to a base of the second bipolar junction transistor 321, and the other end of the second bias resistor 322 is electrically connected to the output end of the second current-limiting circuit 32. The second voltage-regulating unit 324 is electrically connected to the base of the second bipolar junction transistor 321, the output end of the second current-limiting circuit 32, and an emitter of the second bipolar junction transistor 321. The second voltage-regulating unit 324 is configured to control the current value outputted by the emitter of the second bipolar junction transistor 321. One end of the second current-limiting circuit 323 is electrically connected to the second voltage-regulating unit 324, and the other end of the second current-limiting circuit 323 is electrically connected to the input end of the second current-limiting circuit 32. A preferred embodiment of the second voltage-regulating unit 324 is a controllable Zener diode. An anode of the controllable Zener diode is electrically connected to the input end of the second current-limiting circuit 32, and the cathode of the controllable Zener diode is electrically connected to the base of the second bipolar junction transistor 321. A reference end of the controllable Zener diode is electrically connected to an output end of the second current-limiting resistor 323. Hereinafter, the second voltage-regulating unit 324 is described by using the controllable Zener diode as an example.

[0018] When the negative half-cycle current of the alternating current flows through the second diode 31 and into the second current-limiting circuit 32, the second current-limiting circuit 32 is operated in the same manner as that of the first current-limiting circuit 22. Thus, the redundant description is omitted for simplicity. Therefore, the second current-limiting circuit 32 restricts the negative half-cycle current to an average current value. Since the second current-limiting circuit 32 of the present embodiment is constituted of fewer elements, the total manufacturing cost is reduced to make the present invention more competitive. Furthermore, the manufacturing procedure is also simplified.

[0019] One end of the current input section 4 is electrically connected to the input power supply, and the other end of the current input section 4 is electrically connected to the first input end 23 and the second input end 33 and coupled to a first connecting point 11. One end of the current output section 5 is electrically connected to a load 6, and the other end of the current output section 5 is electrically connected to the first output end 24 and the second output end 34 and coupled to a second connecting point 12. In the present embodiment, the load 6 means an object which consumes electricity for its operation, such as a television, electric fan, electric lamp or the like.

[0020] The current input section 4 is electrically connected to the first input end 23 and the second input end 33 and coupled to the first junction 11. The current output section 5 is electrically connected to the first output end 24 and the second output end 34 and coupled to the second connecting point 12. With this arrangement, when the alternating current flows through the first diode 21 and the second diode 31, the alternating current is divided into a positive half-cycle current and a negative half-cycle current. Since the difference of phase angle between the positive half-cycle current and the negative half-cycle current is 180 degree, the positive half-cycle current and the negative half-cycle current flow to the second connecting point 12 to form an electric current of a continuous periodic wave for a load. Thus, the phase angle error will not be generated in the alternating current to adversely affect the load 6.

[0021] Please refer to FIG. 4, which shows another embodiment of the present invention. In the present embodiment, a voltage-controlling unit 7 is provided. One end of the voltage-controlling unit 7 is electrically connected to the current input section 4, and the other end of the voltage-controlling unit 7 is electrically connected to the input power supply. The voltage-controlling unit 7 is configured to control the voltage V of the input power supply and to change the value Ve-r. As a result, after the alternating current flows through the first current-limiting circuit 22 and the second current-limiting circuit 32, the average current value is changed, thereby controlling the current value flowing into the load 6. When the load 6 is an electric bulb, the voltage-controlling unit 7 is configured to control the brightness of the electric bulb, thereby saving the electricity. The voltage-controlling unit 7 may be a variable resistor. By changing the resistance of the variable resistor, the voltage of the input power supply can be changed. A preferred embodiment of the voltage-controlling unit 7 may be a bidirectional silicon controlled rectifier for adjusting the voltage of the input power supply.

[0022] Please refer to FIG. 1, which shows another embodiment of the present invention. In the present embodiment, a rectifier 8 is provided. One end of the rectifier 8 is electrically connected to the load 6, and the other end of the rectifier 8 is electrically connected to the current output section 5. When the input power supply generates an alternating current, the rectifier 8 converts the alternating current into a direct current for the load 6. In a

further embodiment of the present invention, a capacitor 9 is provided. One end of the capacitor 9 is electrically connected to the load 6, and the other end of the capacitor 9 is electrically connected to the rectifier 8. By using the capacitor 9, the current flowing into the load 6 becomes more stable. Furthermore, a bleeder resistor 91 is provided to be electrically connected to the capacitor 9. The bleeder resistor 91 is configured to bleed excess charges in the capacitor 9 when the alternating current regulating means 1 is inactive. In this way, it is safer to use the alternating current regulating means 1 in the next time.

[0023] According to the above, the present invention really has industrial applicability and it has not seen or used in public. Further, the present invention has non-obviousness, so that it conforms to the requirements for an invention patent.

Claims

1. An alternating current regulating means, including:

a positive half-cycle current-limiting circuit (2) comprising a first diode(21), a first current-limiting circuit (22), a first input end (23) and a first output end (24), a cathode of the first diode (21) being electrically connected to an input end of the first current-limiting circuit (22), an anode of the first diode (21) being electrically connected to the first input end (23), an output end of the first current-limiting circuit (22) being electrically connected to the first output end (24);

a negative half-cycle current-limiting circuit (3) comprising a second diode (31), a second current-limiting circuit (32), a second input end (33) and a second output end (34), an anode of the second diode (31) being electrically connected to an input end of the second current-limiting circuit (32), a cathode of the second diode (31) being electrically connected to the second input end (33), an output end of the second current-limiting circuit (32) being electrically connected to the second output end;

a current input section (4), one end of the current input section (4) being electrically connected to the first input end (23) and the second input end (33) and coupled to a first connecting point (11), the other end of the current input section (4) being electrically connected to an input power supply; and

a current output section (5), one end of the current output section (5) being electrically connected to the first output end (24) and the second output end (34) and coupled to a second connecting point (12), the other end of the current output section (5) being electrically connected to a load (6)

characterized in that

the first current-limiting circuit (22) includes a first bipolar junction transistor (221), a first bias resistor (222), a first current-limiting resistor (223), and a first voltage-regulating unit (224), a collector of the first bipolar junction transistor (221) is electrically connected to an input end of the first current-limiting circuit (22), one end of the first bias resistor (222) is electrically connected to a base of the first bipolar junction transistor (221), the other end of the first bias resistor (222) is electrically connected to the input end of the first current-limiting circuit (22), one end of the first current-limiting resistor (223) is electrically connected to an emitter of the first bipolar junction transistor (221), the other end of the first current-limiting resistor is electrically connected to the output end of the first current-limiting circuit (22), the first voltage-regulating unit (224) is electrically connected to the base of the first bipolar junction transistor (221), the output end of the first current-limiting circuit (22) and the emitter of the first bipolar junction transistor (221), the first voltage-regulating unit (22) is configured to control the current value outputted by the emitter of the first bipolar junction transistor (221).

2. The alternating current regulating means according to claim 1, wherein the second current-limiting circuit (32) includes a second bipolar junction transistor (321), a second bias resistor (322), a second current-limiting resistor (323), and a second voltage-regulating unit (324), a collector of the second bipolar junction transistor (321) is electrically connected to the output end of the second current-limiting circuit (32), one end of the second bias resistor (322) is electrically connected to a base of the second bipolar junction transistor (321), the other end of the second bias resistor (322) is electrically connected to the output end of the second current-limiting circuit (32), one end of the second current-limiting resistor (323) is electrically connected to an emitter of the second bipolar junction transistor (321), the other end of the second current-limiting resistor (323) is electrically connected to the input end of the second current-limiting circuit (32), the second voltage-regulating unit (324) is electrically connected to the base of the second bipolar junction transistor (321), the input end of the second current-limiting circuit (32) and the emitter of the second bipolar junction transistor (321), the second voltage-regulating unit (324) is configured to control the current value outputted by the emitter of the second bipolar junction transistor (321).

3. The alternating current regulating means according to claim 2, wherein the first voltage-regulating unit (224) is a first controllable Zener diode, an anode of

the first controllable Zener diode is electrically connected to the output end of the first current limiting circuit (22), a cathode of the first controllable Zener diode is electrically connected to the base of the first bipolar junction transistor (221), a reference end of the controllable Zener diode is electrically connected to the one end of the first current-limiting resistor (223), the second voltage-regulating unit (324) is a second controllable Zener diode, an anode of the second controllable Zener diode is electrically connected to the input end of the second current-limiting circuit (32), and a cathode of the second controllable Zener diode is electrically connected to the base of the second bipolar junction transistor (321), a reference end of the second controllable Zener diode is electrically connected to the one end of the second current-limiting resistor (323).

4. The alternating current regulating means according to claim 1, further including a voltage-controlling unit (7), one end of the voltage-controlling unit (7) being electrically connected to the current input section (4), and the other end of the voltage-controlling unit (7) being electrically connected to the input power supply.

5. The alternating current regulating means according to claim 4, wherein the voltage-controlling unit (7) is a bidirectional silicon controlled rectifier.

6. The alternating current regulating means according to claim 1, further including a rectifier (8), one end of the rectifier (8) being electrically connected to the current output section (5), and the other end of the rectifier being electrically connected to a load 6.

7. The alternating current regulating means according to claim 6, further including a capacitor (9) and a bleeder resistor (91), one end of the capacitor (9) being electrically connected to the rectifier (8), the other end of the capacitor (9) being electrically connected to the load (6), the bleeder resistor (91) being electrically connected to the capacitor (9), the bleeder resistor (91) being configured to bleed charges stored in the capacitor (9) when the alternating current regulating means is inactive.

Patentansprüche

1. Wechselstrom - Regelungsvorrichtung, die umfassen:

einen Strombegrenzungsschaltkreis für die positive Periodenhälfte (2), der eine erste Diode (21), einen ersten Strombegrenzungsschaltkreis (23), ein erstes Ein-gangsende (23) und ein erstes Ausgangsende (24) umfasst, wobei eine Kathode der ersten Diode (21) elektrisch mit dem Eingangsende des ersten Strombegrenzungs-schaltkreises (22) verbunden ist, wobei eine Anode der ersten Diode (21) elektrisch mit dem ersten Eingangsende (23) verbunden ist, wobei ein Ausgangsende des ersten Strombegrenzungsschaltkreises (22) elektrisch mit dem ersten Ausgangs-ende (24) verbunden ist:

einen Strombegrenzungsschaltkreis für die negative Periodenhälfte (3), der eine zweite Diode (31), einen zweiten Strombegrenzungsschaltkreis (32), ein zweites Eingangsende (33) und ein zweites Ausgangsende (34) umfasst, wobei eine Anode der zweiten Diode (31) elektrisch mit dem Eingangsende des zweiten Strombe-grenzungsschaltkreises (32) verbunden ist, wobei eine Kathode der zweiten Diode (31) elektrisch mit dem zweiten Eingangsende (33) verbunden ist, wobei ein Aus-gangsende des zweiten Strombegrenzungsschaltkreises (32) elektrisch mit dem zweiten Ausgangsende verbunden ist;
einen Stromeingangsbereich (4), wobei ein Ende des Stromeingangsbereichs (4) elektrisch mit dem ersten Eingangsende (23) und dem zweiten Eingangsende (33) verbunden ist und an einen ersten Verbindungspunkt (11) angeschlossen ist, wobei das andere Ende des Stromeingangsbereichs (4) elektrisch mit einer Eingangsstromversorgung verbunden ist; und
einen Stromausgangsbereich (5), wobei ein Ende des Stromausgangsbereichs (5) elektrisch mit dem ersten Ausgangsende (24) und dem zweiten Ausgangsende (34) verbunden ist und an einen zweiten Verbindungspunkt (12) angeschlossen ist, wobei das andere Ende des Stromausgangsbereichs (5) elektrisch mit einer Last (6) verbunden ist,

dadurch gekennzeichnet, dass
der erste Strombegrenzungsschaltkreis (22) einen ersten Bipolartransistor (221), einen ersten Vorspannungswiderstand (222), einen ersten Strombegrenzungswi-derstand (223) und eine erste Spannungsregulierungseinheit (224) umfasst, wobei ein Kollektor des ersten Bipolartransistors (221) elektrisch mit einem Eingangsende des ersten Strombegrenzungsschaltkreises (22) verbunden ist, wobei ein Ende des ersten Vorspannungswiderstands (222) elektrisch mit einer Basis des ersten Bipolartransistors (221) verbunden ist, wobei das andere Ende des ersten Vor-spannungswiderstands (222) elek-

trisch mit dem Eingangsende des ersten Strombegrenzungsschaltkreises (22) verbunden ist, wobei ein Ende des ersten Strombe-grenzungswiderstands (223) elektrisch mit einem Emitter des ersten Bipolartransistors (221) verbunden ist, wobei das andere Ende des ersten Strombegrenzungswiderstands elektrisch mit dem Ausgangsende des ersten Strombe-grenzungsschaltkreises (22) verbunden ist, wobei die erste Spannungsregulie-rungseinheit (224) elektrisch mit der Basis des ersten Bipolartransistors (221), dem Ausgangsende des ersten Strombegrenzungsschaltkreises (22) und dem Emitter des ersten Bipolartransistors (221) verbunden ist, wobei die erste Spannungsregu-lierungseinheit (224) darauf ausgelegt ist, die durch den Emitter des ersten Bipolartransistors (221) ausgegebene Stromstärke zu steuern.

2. Wechselstrom - Regelungsvorrichtung nach Anspruch 1, wobei der zweite Strom-begrenzungsschaltkreis (32) einen zweiten Bipolartransistor (321), einen zweiten Vorspannungswiderstand (322), einen zweiten Strombegrenzungswiderstand (323) und eine zweite Spannungsregulierungseinheit (324) umfasst, wobei ein Kollektor des zweiten Bipolartransistors (323) elektrisch mit dem Ausgangsende des zweiten Strombegrenzungsschaltkreises (32) verbunden ist, wobei ein Ende des zweiten Vorspannungswiderstands (323) elektrisch mit einer Basis des zweiten Bipolartransistors (321) verbunden ist, wobei das andere Ende des zweiten Vorspannungswiderstands (323) elektrisch mit dem Ausgangsende des zweiten Strombegrenzungsschaltkreises (32) verbunden ist, wobei ein Ende des zweiten Strombegrenzungswiderstands (323) elektrisch mit einem Emitter des zweiten Bipolartransistors (321) verbunden ist, wobei das andere Ende des zweiten Strom-begrenzungswiderstands (323) elektrisch mit dem Eingangsende des zweiten Strombegrenzungsschaltkreises (32) verbunden ist, wobei die zweite Spannungs-regulierungseinheit (324) elektrisch mit der Basis des zweiten Bipolartransistors (321), dem Eingangsende des zweiten Strombegrenzungsschaltkreises (32) und dem Emitter des zweiten Bipolartransistors (321) verbunden ist, wobei die zweite Spannungsregulierungseinheit (324) darauf ausgelegt ist, die durch den Emitter des zweiten Bipolartransistors (321) ausgegebene Stromstärke zu steuern.

3. Wechselstrom - Regelungsvorrichtung nach Anspruch 2, wobei die erste Span-nungsregulierungseinheit (224) eine erste steuerbare Zenerdiode ist, wobei eine Anode der ersten steuerbaren Zenerdiode elektrisch mit dem Ausgangsende des ersten Strombegrenzungsschaltkreises (22) verbunden ist, wobei eine Kathode der ersten steuerbaren Zenerdiode elektrisch mit der Basis des ersten Bipolartransistors (221) verbunden ist, wobei ein Referenzende der steuerbaren Zenerdiode elektrisch mit dem einen Ende des ersten Strombegrenzungswiderstands (223) verbunden ist, wobei die zweite Spannungsregulierungseinheit (324) eine zweite steuerbare Ze-nerdiode ist, wobei eine Anode der zweiten steuerbaren Zenerdiode elektrisch mit dem Eingangsende des zweiten Strombegrenzungsschaltkreises (32) verbunden ist und wobei eine Kathode der zweiten steuerbaren Zenerdiode elektrisch mit der Basis des zweiten Bipolartransistors (321) verbunden ist, wobei ein Referenzende der zweiten steuerbaren Zenerdiode elektrisch mit dem einen Ende des zweiten Strombegrenzungswiderstands (323) verbunden ist.

4. Wechselstrom - Regelungsvorrichtung nach Anspruch 1, die ferner eine Span-nungssteuerungseinheit (7) umfasst, wobei ein Ende der Spannungssteuerungs-einheit (7) elektrisch mit dem Stromeingangsbereich (4) verbunden ist und wobei das andere Ende der Spannungssteuerungseinheit (7) elektrisch mit der Eingangsstromversorgung verbunden ist.

5. Wechselstrom - Regelungsvorrichtung nach Anspruch 4, wobei die Spannungsregu-lierungseinheit (7) ein bidirektionaler Siliziumgleichrichter ist.

6. Wechselstrom - Regelungsvorrichtung nach Anspruch 1, die ferner einen Gleichrichter (8) umfasst, wobei ein Ende des Gleichrichters (8) elektrisch mit dem Stromausgangsbereich (5) verbunden ist und wobei das andere Ende des Gleichrichters elektrisch mit der Last (6) verbunden ist.

7. Wechselstrom - Regelungsvorrichtung nach Anspruch 6, die ferner eine Kapazität (9) und einen Ableitwiderstand (91) umfasst, wobei ein Ende der Kapazität (9) elekt-risch mit dem Gleichrichter (8) verbunden ist, wobei das andere Ende der Kapazität (9) elektrisch mit der Last (6) verbunden ist, wobei der Widerstand (91) darauf ausgelegt ist, in der Kapazität (9) gespeicherte Ladungen abzuleiten, wenn die Wech-selstrom - Regelungsvorrichtung inaktiv ist.

Revendications

1. Moyen de régulation de courant alternatif comprenant :

un circuit limiteur de courant de demi-cycle positif (2) comprenant une première diode (21), un premier circuit limiteur de courant (22), une première extrémité d'entrée (23) et une première

extrémité de sortie (24), une cathode de la première diode (21) étant reliée électriquement à une extrémité d'entrée du premier circuit limiteur de courant (22), une anode de la première diode (21) étant reliée électriquement à la première extrémité d'entrée (23), une extrémité de sortie du premier circuit limiteur de courant (22) étant reliée électriquement à la première extrémité de sortie (24),

un circuit limiteur de courant de demi-cycle négatif (3) comprenant une seconde diode (31), un second circuit limiteur de courant (32), une seconde extrémité d'entrée (33) et une seconde extrémité de sortie (34), une anode de la seconde diode (31) étant reliée électriquement à une extrémité d'entrée du second circuit limiteur de courant (32), une cathode de la seconde diode (31) étant reliée électriquement à la seconde extrémité d'entrée (33), une extrémité de sortie du second circuit limiteur de courant (32) étant reliée électriquement à la seconde extrémité de sortie,

une section d'entrée de courant (4), une extrémité de la section d'entrée de courant (4) étant reliée électriquement à la première extrémité d'entrée (23) et à la seconde extrémité d'entrée (33) et couplée à un premier point de connexion (11), l'autre extrémité de la section d'entrée de courant (4) étant reliée électriquement à une alimentation de courant d'entrée et

une section de sortie de courant (5), une extrémité de la section de sortie de courant (5) étant reliée électriquement à la première extrémité de sortie (24) et à la seconde extrémité de sortie (34) et couplée à un second point de connexion (12), l'autre extrémité de la section de sortie de courant (5) étant reliée électriquement à une charge (6),

caractérisé en ce que

le premier circuit limiteur de courant (22) inclut un premier transistor bipolaire à jonction (221), une première résistance de polarisation (222), une première résistance limitatrice de courant (223) et une première unité de régulation de tension (224), un collecteur du premier transistor bipolaire à jonction (221) est relié électriquement à une extrémité d'entrée du premier circuit limiteur de courant (22), une extrémité de la première résistance de polarisation (222) est reliée électriquement à une base du premier transistor bipolaire à jonction (221), l'autre extrémité de la première résistance de polarisation (222) est reliée électriquement à l'extrémité d'entrée du premier circuit limiteur de courant (22), une extrémité de la première résistance limitatrice de courant (223) est reliée électriquement à un émetteur du premier transistor bipolaire à jonction (221), l'autre extrémité de la première résistance limitatrice de courant est reliée électriquement à l'extrémité de sortie du premier circuit limiteur de courant (22), la première unité de régulation de tension (224) est reliée électriquement à la base du premier transistor bipolaire à jonction (221), à l'extrémité de sortie du premier circuit limiteur de courant (22) et à l'émetteur du premier transistor bipolaire à jonction (221), la première unité de régulation de tension (224) est configurée pour commander la valeur de courant sortie par l'émetteur du premier transistor bipolaire à jonction (221).

2. Moyen de régulation de courant alternatif selon la revendication 1, le second circuit limiteur de courant (32) inclut un second transistor bipolaire à jonction (321), une seconde résistance de polarisation (322), une seconde résistance limitatrice de courant (323) et une seconde unité de régulation de tension (324), un collecteur du second transistor bipolaire à jonction (321) est relié électriquement à l'extrémité de sortie du second circuit limiteur de courant (32), une extrémité de la seconde résistance de polarisation (322) est reliée électriquement à une base du second transistor bipolaire à jonction (321), l'autre extrémité de la seconde résistance de polarisation (322) est reliée électriquement à l'extrémité de sortie du second circuit limiteur de courant (32), une extrémité de la seconde résistance limitatrice de courant (323) est reliée électriquement à un émetteur du second transistor bipolaire à jonction (321), l'autre extrémité de la seconde résistance limitatrice de courant (323) est reliée électriquement à l'extrémité d'entrée du second circuit limiteur de courant (32), la seconde unité de régulation de tension (324) est reliée électriquement à la base du second transistor bipolaire à jonction (321), à l'extrémité d'entrée du second circuit limiteur de courant (32) et à l'émetteur du second transistor bipolaire à jonction (321), la seconde unité de régulation de tension (324) est configurée pour commander la valeur de courant sortie par l'émetteur du second transistor bipolaire à jonction (321).

3. Moyen de régulation de courant alternatif selon la revendication 2, la première unité de régulation de tension (224) étant une première diode Zener qui peut être commandée, une anode de la première diode Zener qui peut être commandée étant reliée électriquement à l'extrémité de sortie du premier circuit limiteur de courant (22), une cathode de la première diode Zener qui peut être commandée étant reliée électriquement à la base du premier transistor bipolaire à jonction (221), une extrémité de référence de la diode Zener qui peut être commandée étant reliée électriquement à l'une des extrémités de la première résistance limitatrice de courant (223), la seconde unité de régulation de tension (324) étant

une seconde diode Zener qui peut être commandée, une anode de la seconde diode Zener qui peut être commandée étant reliée électriquement à l'extrémité d'entrée du second circuit limiteur de courant (32) et une cathode de la seconde diode Zener qui peut être commandée étant reliée électriquement à la base du second transistor bipolaire à jonction (321), une extrémité de référence de la seconde diode Zener qui peut être commandée étant reliée électriquement à l'une des extrémités de la seconde résistance limitatrice de courant (323).

4. Moyen de régulation de courant alternatif selon la revendication 1 comprenant de plus une unité de commande de la tension (7), une extrémité de l'unité de commande de la tension (7) étant reliée électriquement à la section d'entrée de courant (4) et l'autre extrémité de l'unité de commande de la tension (7) étant reliée électriquement à l'alimentation de courant d'entrée.

5. Moyen de régulation de courant alternatif selon la revendication 4, l'unité de commande de la tension (7) étant un redresseur bidirectionnel commandébvc au silicium.

6. Moyen de régulation de courant alternatif selon la revendication 1 comprenant de plus un redresseur (8), une extrémité du redresseur (8) étant reliée électriquement à la section de sortie du courant (5) et l'autre extrémité du redresseur étant reliée électriquement à une charge 6

7. Moyen de régulation de courant alternatif selon la revendication 6 comprenant de plus un condensateur (9) et une résistance de décharge (91), une extrémité du condensateur (9) étant reliée électriquement au redresseur (8), l'autre extrémité du condensateur (9) étant reliée électriquement à la charge (6), la résistance de décharge (91) étant reliée électriquement au condensateur (9), la résistance de décharge (91) étant configurée pour décharger des charges dans le condensateur (9) lorsque le moyen de régulation de courant alternatif est inactif.

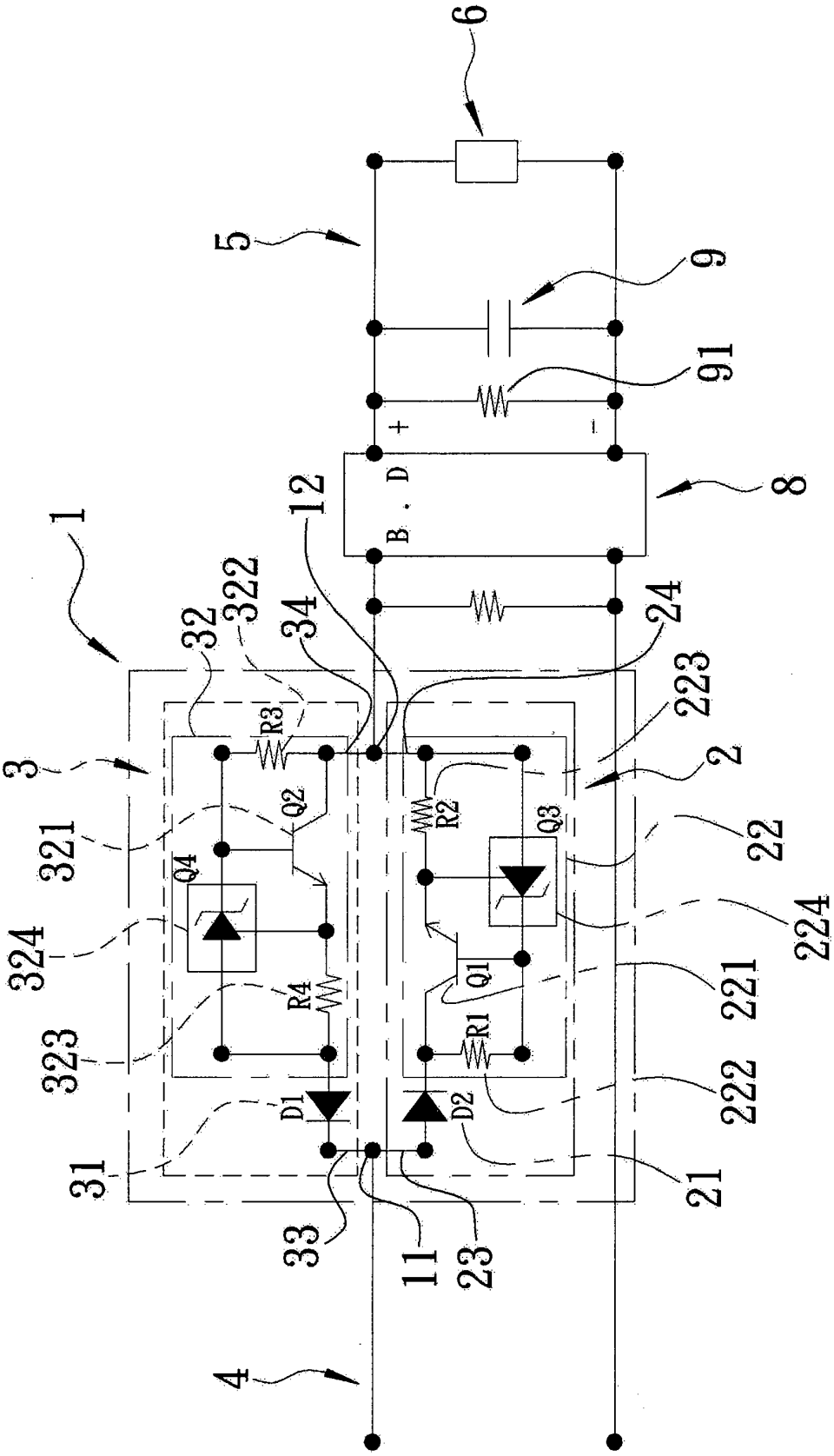

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FIG. 1

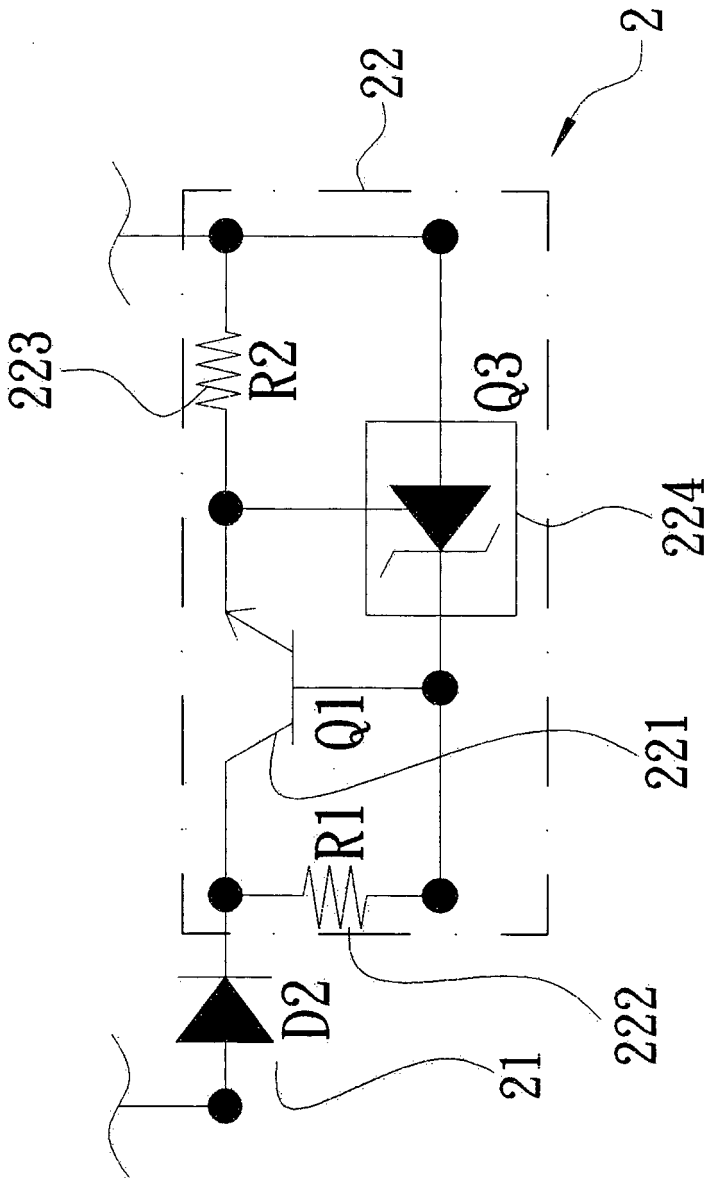


FIG. 2

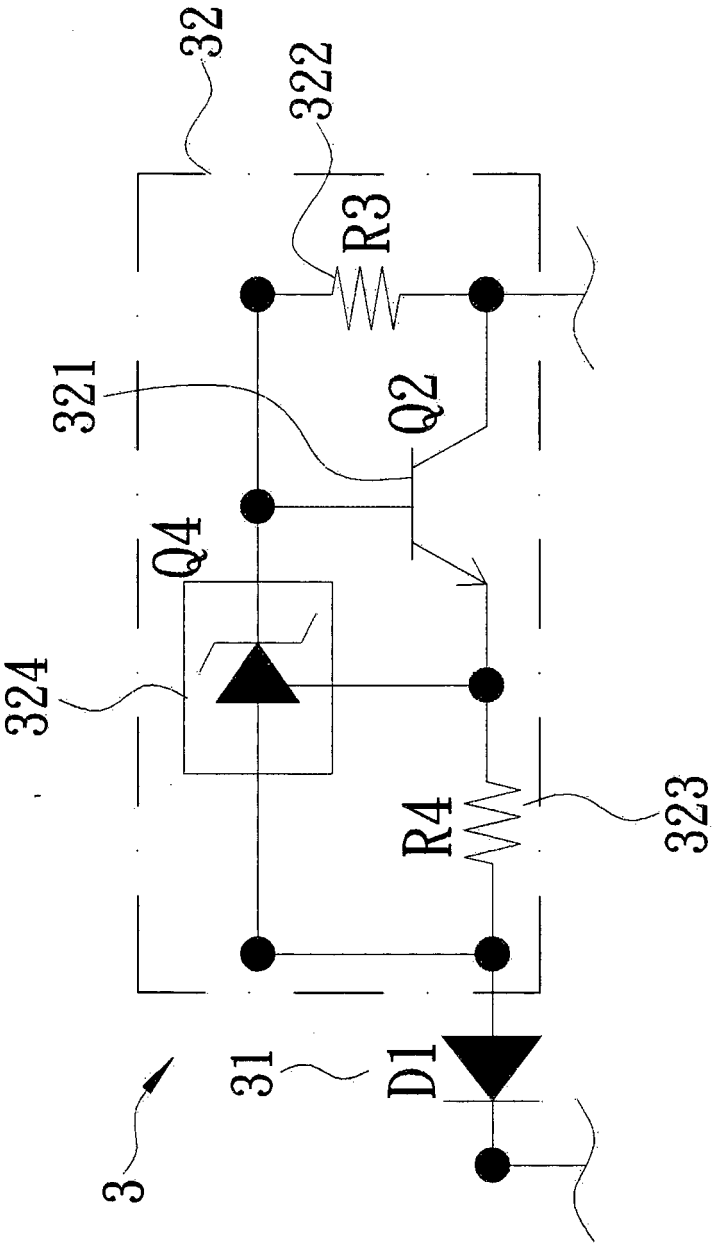


FIG. 3

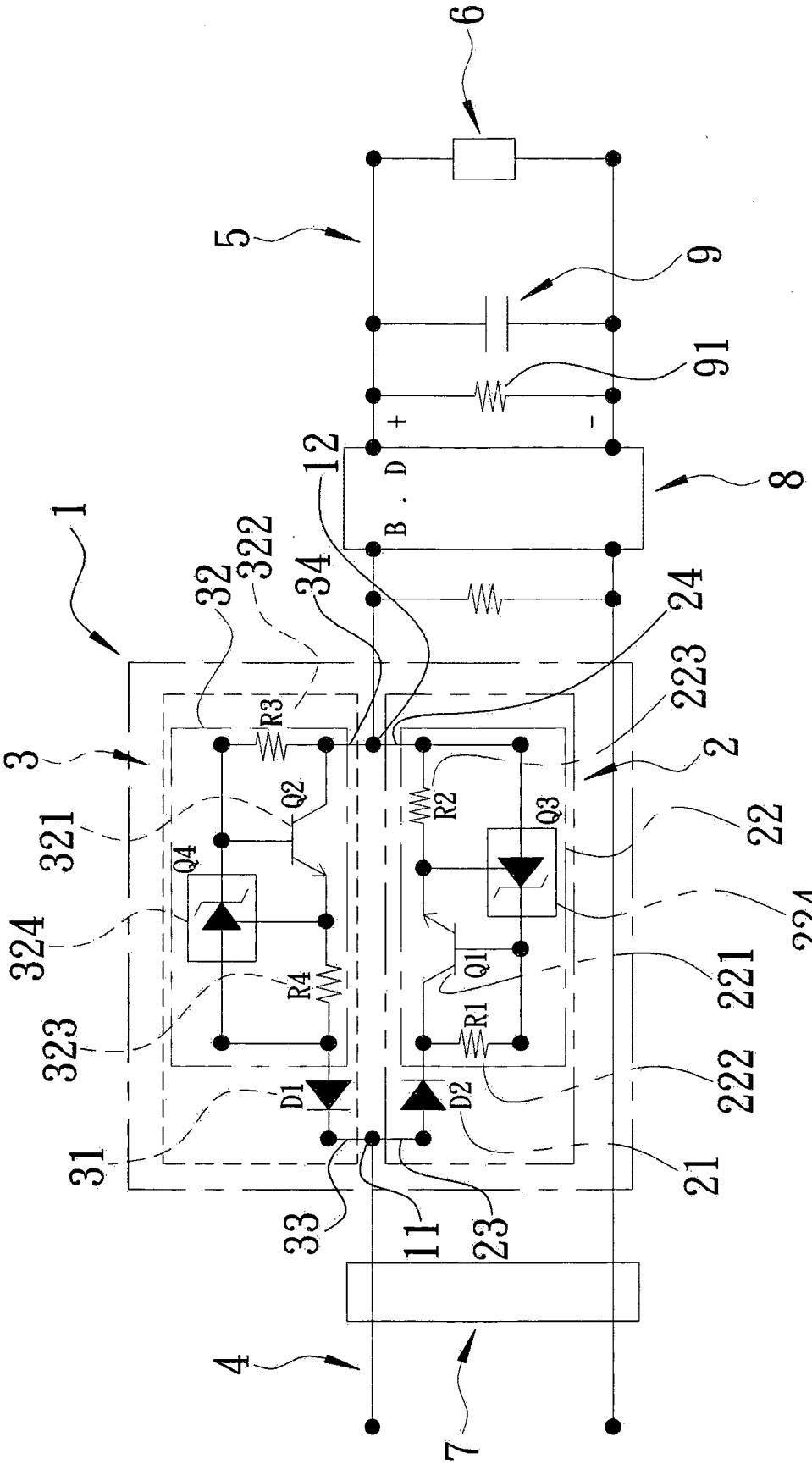

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FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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