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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

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David J. Kappas

Director of the United States Patent and Trademark Office



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(12) **United States Patent**
Wang et al.

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(54) **GATE-CONTROLLED RECTIFIER AND APPLICATION TO RECTIFICATION CIRCUITS THEREOF**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(58) **Field of Classification Search** **327/28, 327/29, 110, 423, 424, 588**

See application file for complete search history.

(56) **References Cited**

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(57) **ABSTRACT**

Conventional diode rectifiers usually suffer from a higher conduction loss. The present invention discloses a gate-controlled rectifier, which comprises a line voltage polarity detection circuit, a constant voltage source, a driving circuit and a gate-controlled transistor. The line voltage polarity detection circuit detects the polarity of the line voltage and controls the driving circuit to turn on or turn off the gate-controlled transistor. The gate-controlled transistor may be a Metal Oxide Semiconductor Field Effect Transistor (MOSFET) with a gate, a source and a drain or an Insulated Gate Bipolar Transistor (IGBT) with a gate, an emitter and a collector. The constant voltage source is provided or induced by external circuits and referred to the source of the MOSFET or the emitter of the IGBT. Thanks to a lower conduction loss, this gate-controlled rectifier can be applied to rectification circuits to increase the rectification efficiency.

17 Claims, 7 Drawing Sheets

