



US005153145A

United States Patent [19]

[11] Patent Number: **5,153,145**

Lee et al.

[45] Date of Patent: **Oct. 6, 1992**

- [54] FET WITH GATE SPACER 0101077 5/1986 Japan .
- [75] Inventors: **Kuo-Hua Lee; Chih-Yuan Lu; Janmye Sung**, all of Lower Macungie Township, Lehigh County, Pa.
- [73] Assignee: **AT&T Bell Laboratories**, Murray Hill, N.J.
- [21] Appl. No.: **422,834**
- [22] Filed: **Oct. 17, 1989**
- [51] Int. Cl.⁵ **H01L 21/24; H01L 21/265; H01L 21/336**
- [52] U.S. Cl. **437/44; 437/41; 437/200**
- [58] Field of Search **437/34, 27, 28, 29, 437/30, 40, 41, 44, 56, 67, 235, 238, 239, 241, 186, 196, 200; 357/23.3, 23.4; 148/DIG. 147**

- [56] **References Cited**
- U.S. PATENT DOCUMENTS**
- | | | | |
|-----------|---------|---------------|--------|
| 4,503,601 | 3/1985 | Chiao | 437/44 |
| 4,701,423 | 10/1987 | Szluok | 437/44 |
| 4,703,551 | 11/1987 | Szluok et al. | 437/44 |
| 4,727,038 | 2/1988 | Watabe et al. | 437/29 |
| 4,818,714 | 4/1989 | Haskell | 437/44 |
| 4,843,023 | 6/1989 | Chiu et al. | 437/34 |

- FOREIGN PATENT DOCUMENTS**
- | | | |
|---------|---------|---------|
| 0241267 | 11/1985 | Japan . |
|---------|---------|---------|

OTHER PUBLICATIONS

Tsang et al., "Fabrication of High Performance LDDFET's with Oxide Sidewall-Spacer Technology", IEEE Journal of Solid State Circuits, vol. SC-17, No. 2, Apr. 1982, pp. 220-226.

IEEE Electron Device Letters V. 9(4), (1988). "LDD MOSFET's Using Disposable Side Wall Spacer Technology," J. R. Pfister, pp. 189-192.

VLSI Technology Symposium (1988). "Simultaneous Formation of Shallow-Deep Stepped Source/Drain for Submicron CMOS," C. W. Oh et al., pp. 73-74.

Primary Examiner—Olik Chaudhuri
Assistant Examiner—M. Wilczewski
Attorney, Agent, or Firm—John T. Rehberg

[57] **ABSTRACT**

A semiconductor integrated circuit structure and method of fabrication is disclosed. The structure includes a FET gate with adjacent double or triple-layered gate spacers. The spacers permit precise tailoring of lightly doped drain junction profiles having deep and shallow junction portions. In addition, a self-aligned silicide may be formed solely over the deep junction portion thus producing a reliable low contact resistance connection to source and drain.

5 Claims, 5 Drawing Sheets

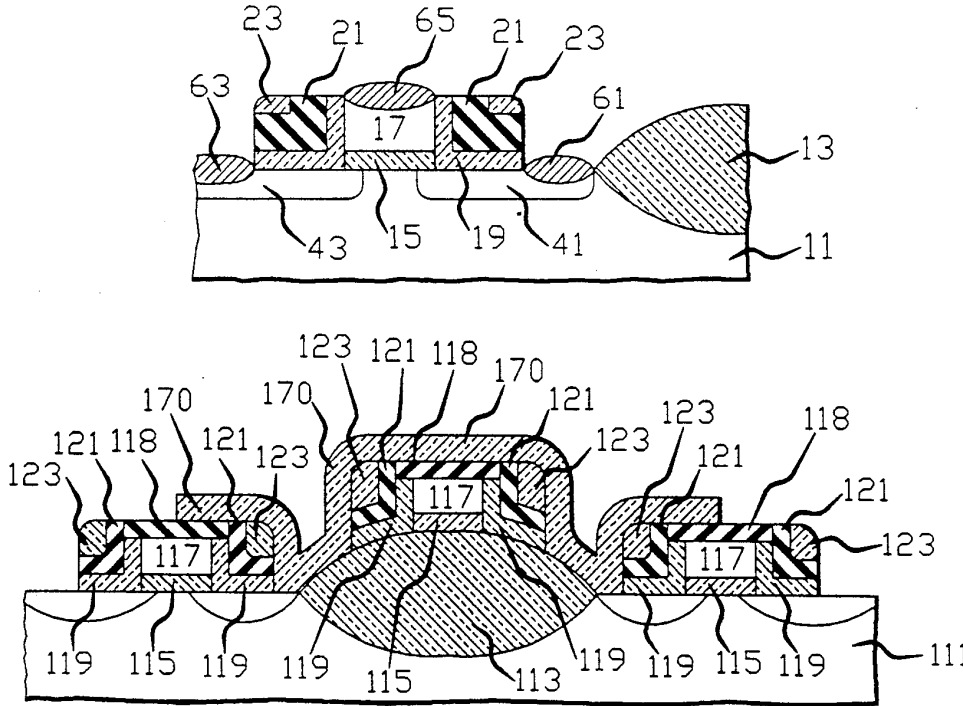


FIG. 1

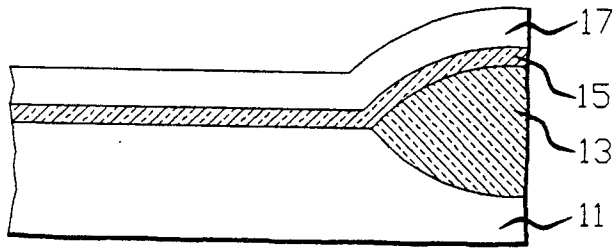


FIG. 2

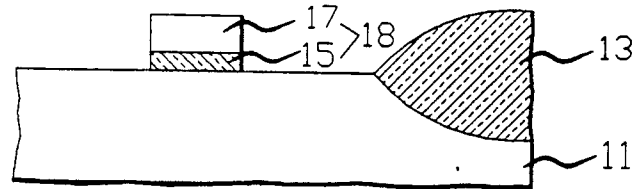


FIG. 3

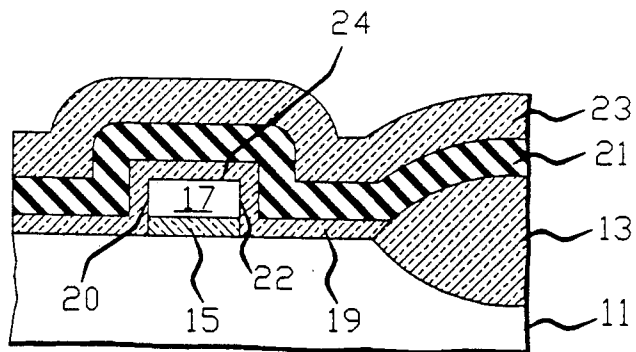


FIG. 4

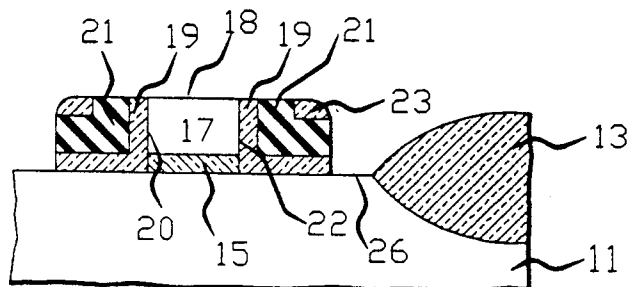


FIG. 5

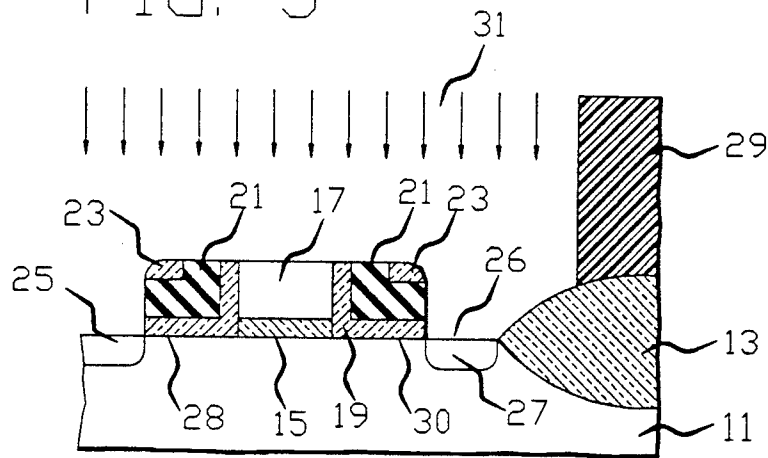


FIG. 6

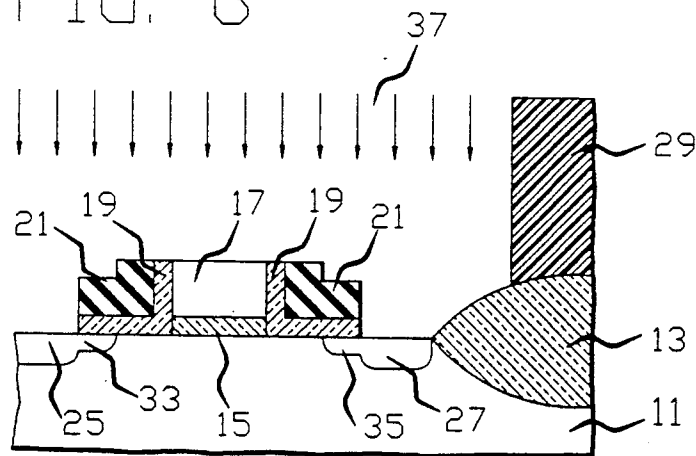


FIG. 7

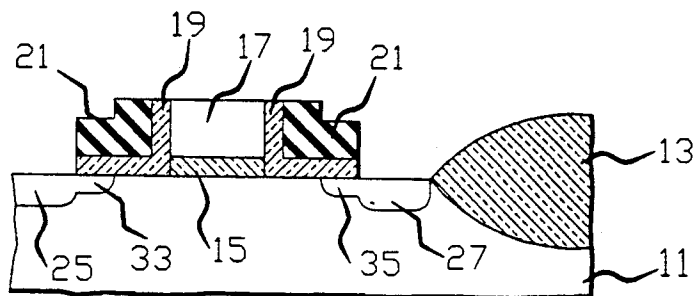


FIG. 8

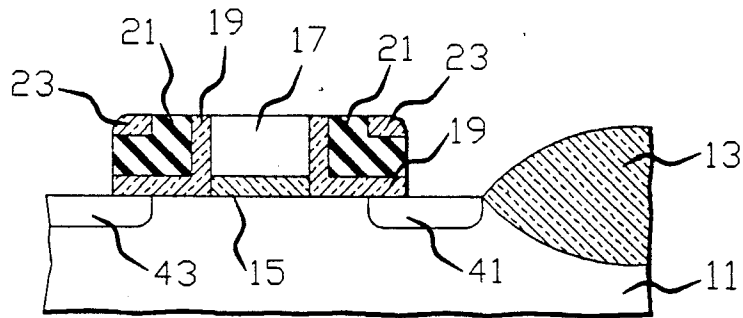


FIG. 9

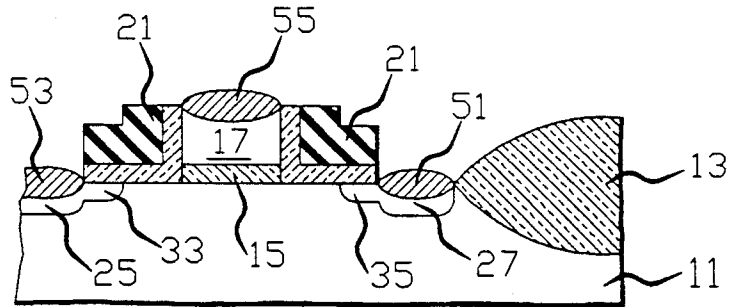


FIG. 10

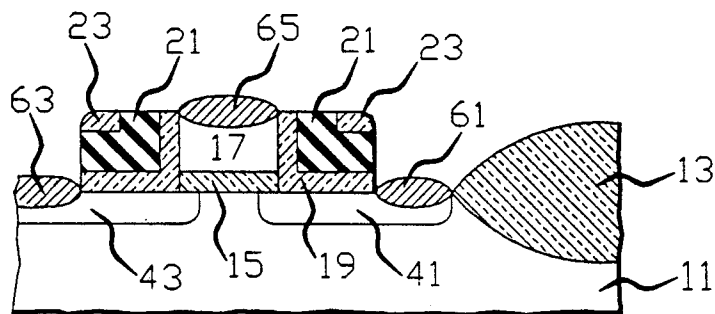


FIG. 11

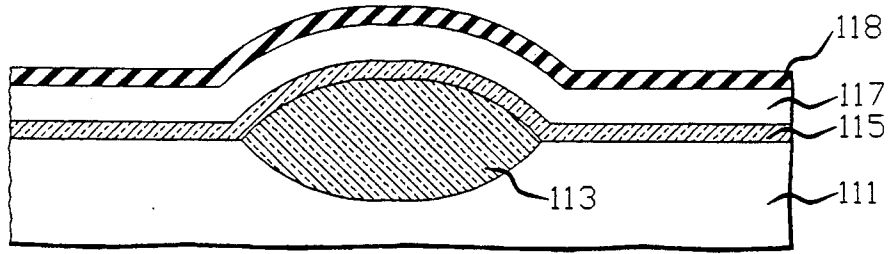


FIG. 12

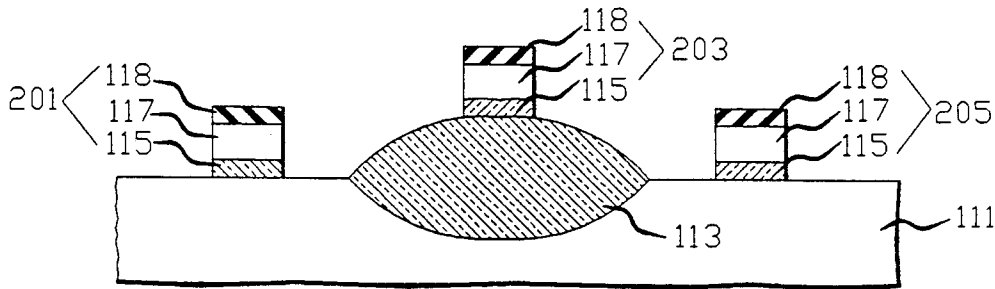
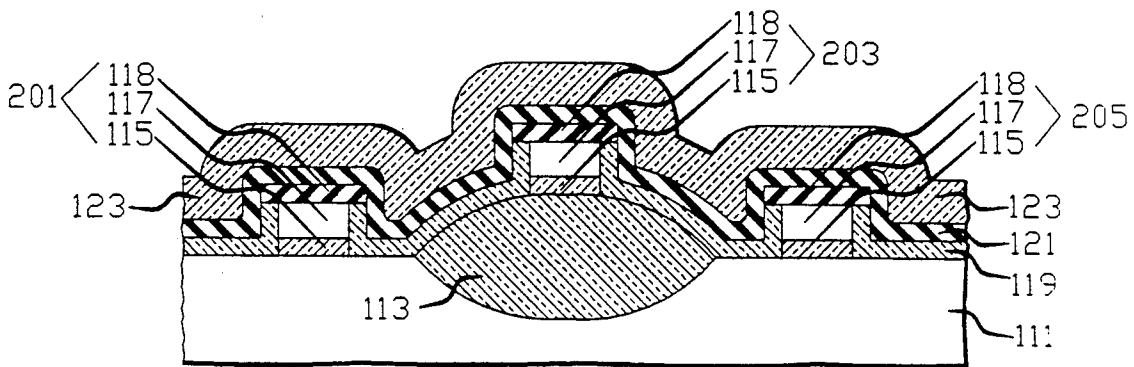


FIG. 13



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.