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

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(45) **Date of Patent: \*Aug. 31, 2004**

(54) **STRUCTURE HAVING REDUCED LATERAL SPACER EROSION**

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(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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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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(57) **ABSTRACT**

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A process for minimizing lateral spacer erosion of an insulating layer adjacent to a contact region and an apparatus whereby there is provided a contact opening with a small alignment tolerance relative to a gate electrode or other structure are disclosed. The process includes the steps of forming a conductive layer on a semiconductor body, then depositing an insulating layer adjacent to the conductive layer. Next, substantially rectangular insulating spacers are formed adjacent to the gate electrode. An etch stop layer is deposited adjacent the insulating layer, followed by an etch to remove the etch stop layer material from the contact region. This etch is conducted under conditions wherein the etch removes the etch stop layer, but retains the substantially rectangular lateral spacer profile of the first insulating layer. The apparatus is capable of maintaining high quality contacts between the conductive material in the contact region and an underlying device region such as a source or drain, or some other layer or structure, and is an effective structure for small feature size structures, particularly self-aligned contact structures.

(65) **Prior Publication Data**

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**Related U.S. Application Data**

(62) Division of application No. 08/577,751, filed on Dec. 22, 1995, now Pat. No. 6,066,555.

(51) **Int. Cl.**<sup>7</sup> ..... **H01L 23/48; H01L 23/52; H01L 29/40**

(52) **U.S. Cl.** ..... **257/774; 257/774; 257/775; 257/776; 438/634; 438/637; 438/639; 438/257**

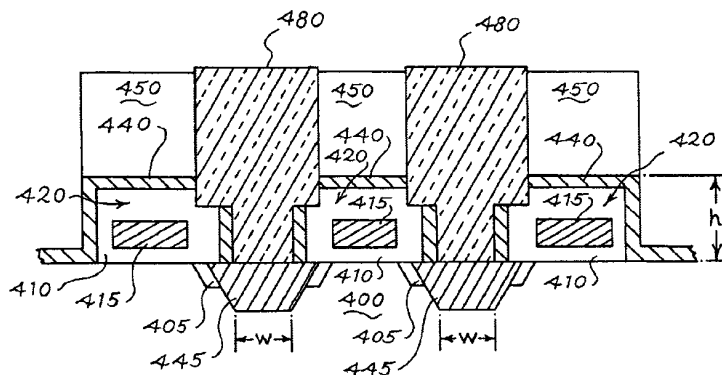
(58) **Field of Search** ..... **257/774, 775, 257/776, 756-760, 762, 763, 765; 438/634, 637, 639, 257**

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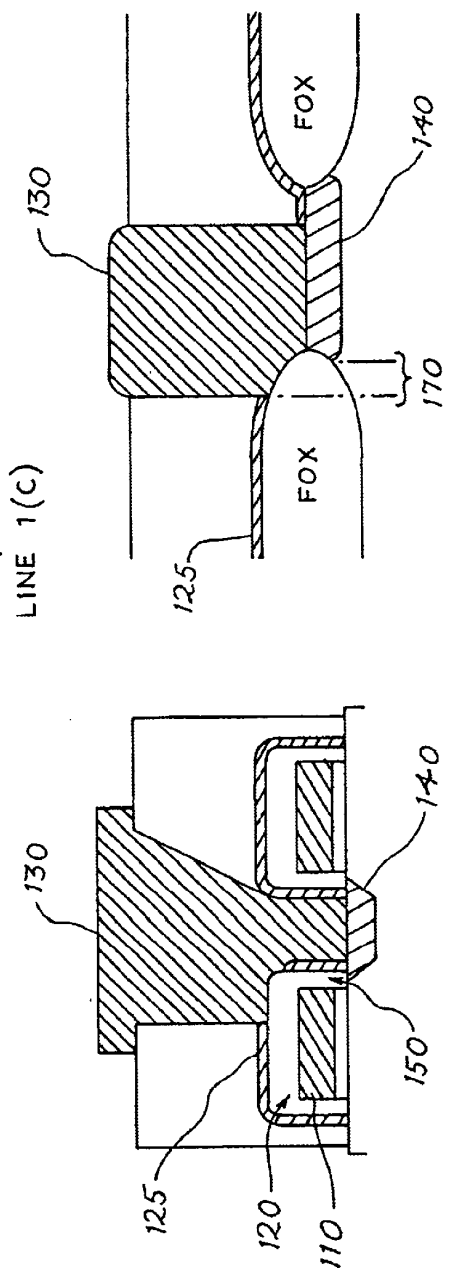
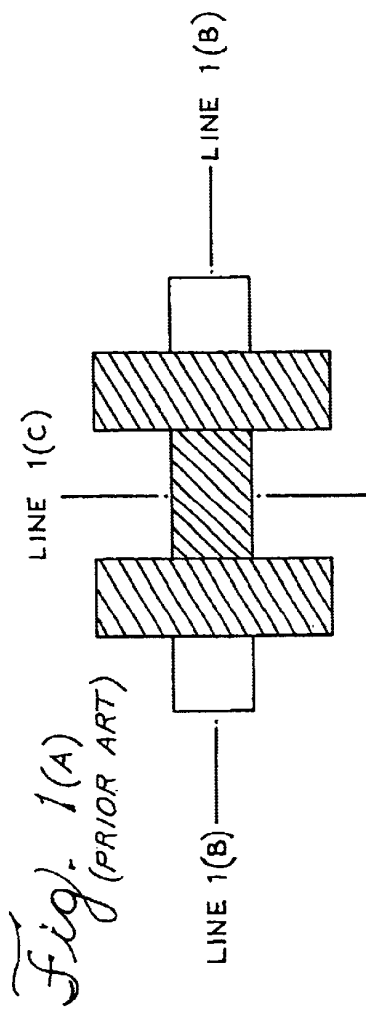
**12 Claims, 7 Drawing Sheets**



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*Fig. 1(c)*  
(PRIOR ART)

*Fig. 1(B)*  
(PRIOR ART)

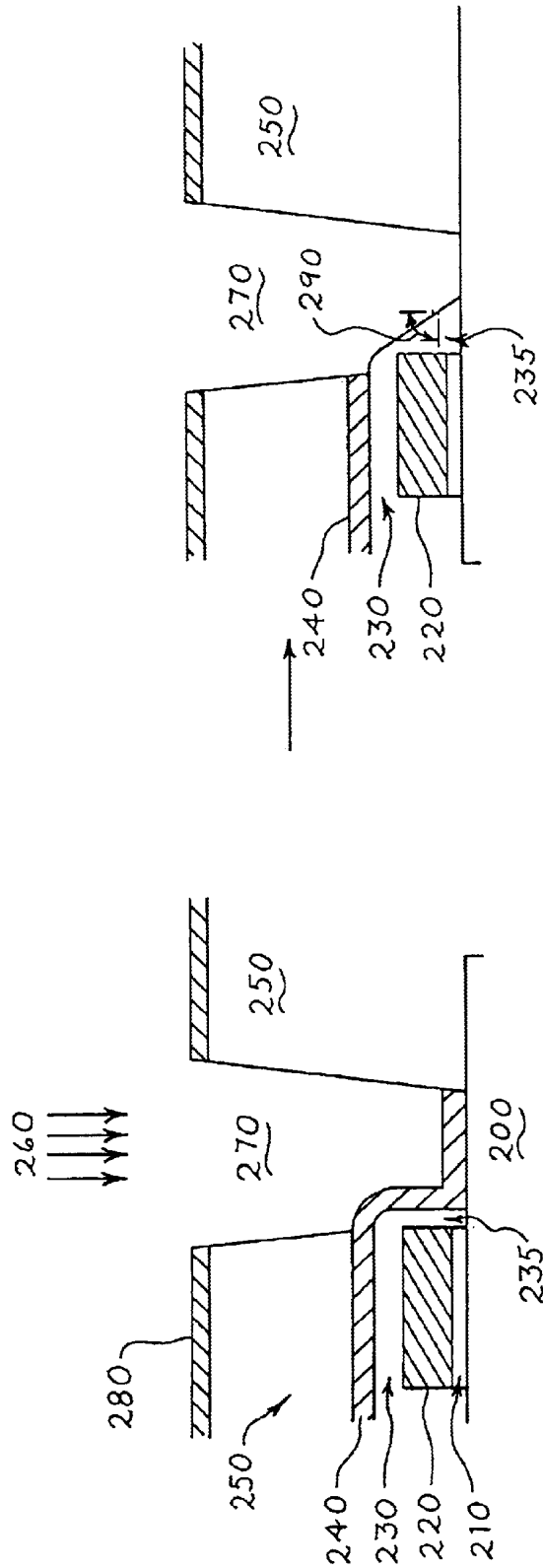
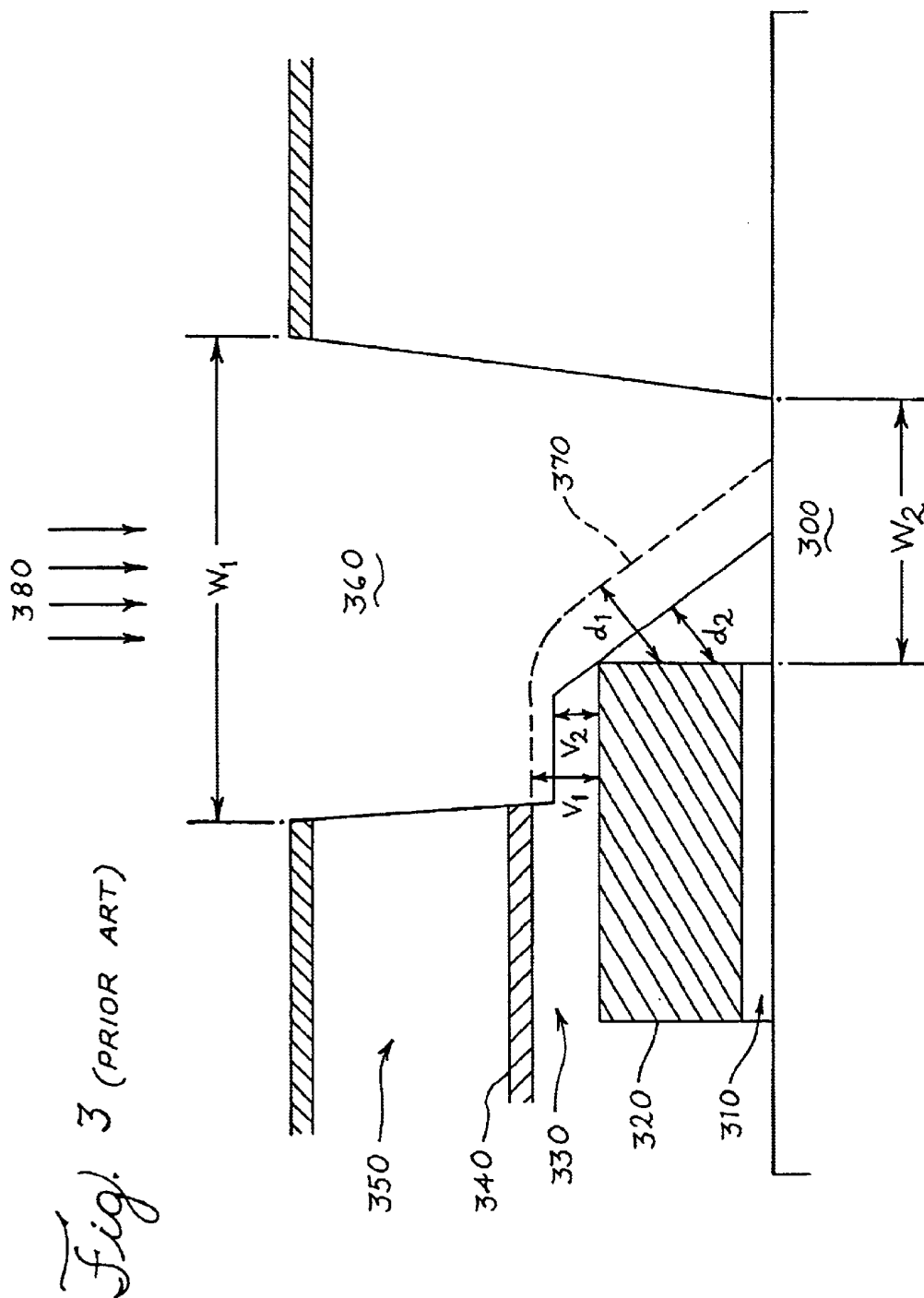


Fig. 2(A)  
(PRIOR ART)

Fig. 2(B)  
(PRIOR ART)



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