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(12) **United States Patent**  
**Jain**

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(54) **METHOD OF MAKING A  
MICROELECTRONIC AND/OR  
OPTOELECTRONIC CIRCUITRY SHEET**

(75) Inventor: **Ajaykumar R. Jain**, San Carlos, CA (US)

(73) Assignee: **Versatilis LLC**, Shelburne, VT (US)

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(51) **Int. Cl.**  
**H01L 21/027** (2006.01)

(52) **U.S. Cl.** ..... **438/737; 257/E21.027**

(58) **Field of Classification Search** ..... 438/705, 438/734, 736, 737; 257/E21.023, E21.024, 257/E21.027, E21.037

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,023,197	A *	5/1977	Magdo et al. ....	257/700
4,237,600	A *	12/1980	Rosen et al. ....	438/109
5,817,550	A	10/1998	Carey et al. ....	438/166
6,028,362	A *	2/2000	Omura .....	257/774
6,150,256	A *	11/2000	Furukawa et al. ....	438/618
6,291,266	B1	9/2001	Sayyah .....	438/107
6,376,290	B1	4/2002	Gosain et al. ....	438/166

6,517,995	B1	2/2003	Jacobson et al. ....	430/320
6,642,092	B1	11/2003	Voutsas et al. ....	438/166
6,653,030	B2	11/2003	Mei et al. ....	430/5
6,680,485	B1	1/2004	Carey et al. ....	257/57
6,861,365	B2	3/2005	Taussig et al. ....	
6,885,032	B2	4/2005	Forbes et al. ....	257/72
6,887,792	B2	5/2005	Perlov et al. ....	438/703
6,930,020	B2	8/2005	Sayyah .....	438/455
7,056,834	B2	6/2006	Mei et al. ....	
2001/0026444	A1*	10/2001	Matsushima et al. ....	361/763
2002/0019081	A1	2/2002	Denis .....	438/149
2002/0020875	A1	2/2002	Arao et al. ....	257/347
2002/0064902	A1	5/2002	Sayyah .....	438/107
2003/0040164	A1	2/2003	Inoue et al. ....	438/438
2003/0134460	A1	7/2003	Forbes et al. ....	438/158
2003/0138704	A1	7/2003	Mei et al. ....	

(Continued)

*Primary Examiner*—Wael Fahmy

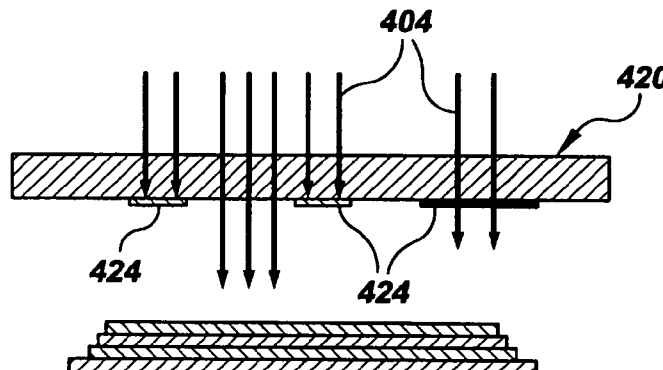
*Assistant Examiner*—Jennifer M Dolan

(74) *Attorney, Agent, or Firm*—Downs Rachlin Martin PLLC

(57) **ABSTRACT**

A circuitry sheet (322) comprising an electronic device layer stack (304) containing electronic devices, e.g., thin-film transistors, or portions thereof, formed by removing material from both sides of the device layer stack. The circuitry sheet may be made by an electronic/optoelectronic device manufacturing method (200) that includes the steps of forming the device layer stack on a temporary substrate (300), removing material from both sides of the device layer stack, and then attaching a permanent substrate (348) to the device layer stack. The method uses one or more resist layers (600) that may be activated simultaneously and independently to impart distinct circuit pattern images (603, 608, 612) into each of a plurality of image levels (612, 616, 620) within each resist layer, thereby obviating repetitive sequential exposure, registration and alignment steps.

**11 Claims, 58 Drawing Sheets**

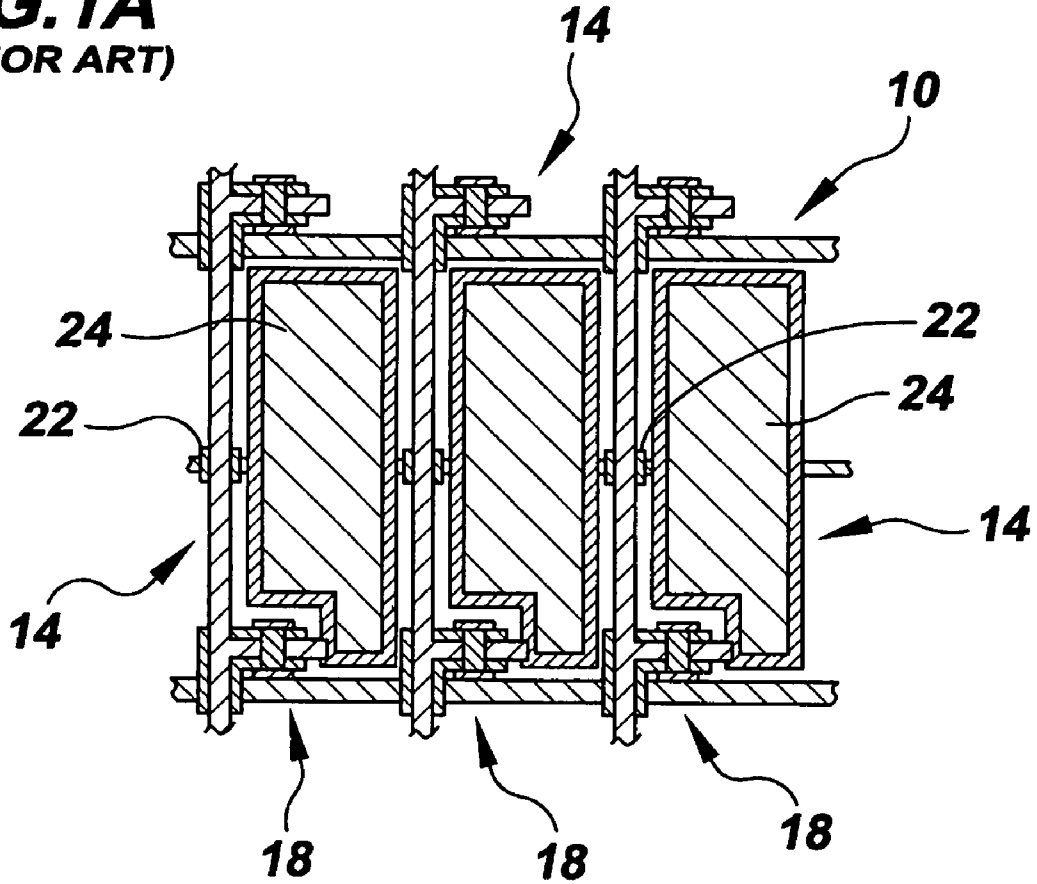


U.S. PATENT DOCUMENTS

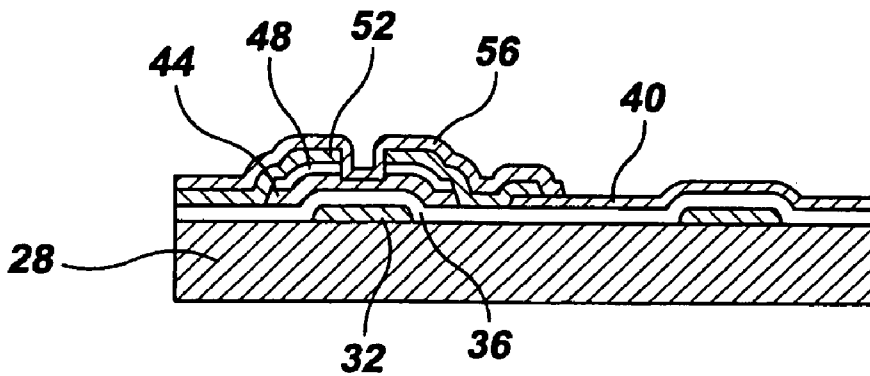
2003/0142062	A1	7/2003	Turner et al. ....	345/107	2004/0038497	A1	2/2004	Sayyah .....	438/464
2003/0157783	A1	8/2003	Fonash et al. ....	438/458	2004/0054980	A1	3/2004	Perlov et al.	
2003/0172873	A1	9/2003	Fischer et al. ....	118/718	2004/0087066	A1	5/2004	Voutsas .....	438/147
2003/0173890	A1	9/2003	Yamazaki et al. ....	313/498	2004/0090415	A1	5/2004	Albert et al. ....	345/107
2003/0178623	A1	9/2003	Nishiki et al. ....	257/59	2004/0095457	A1	5/2004	Pokorny et al. ....	347/171
2003/0188426	A1	10/2003	Naugler, Jr. ....	29/831	2004/0101998	A1	5/2004	Voutsas et al. ....	438/166
2003/0219923	A1	11/2003	Nathan et al. ....	438/99	2004/0108504	A1	6/2004	Forbes et al. ....	257/72
2003/0222315	A1	12/2003	Amundson et al. ....	257/368	2004/0110326	A1	6/2004	Forbes et al. ....	438/149
2003/0224582	A1	12/2003	Shimoda et al. ....	438/458	2004/0144988	A1	7/2004	Jung .....	257/98
2004/0002216	A1	1/2004	Taussig et al.		2004/0180295	A1*	9/2004	Chang .....	430/313
2004/0014265	A1	1/2004	Kazlas et al. ....	438/200	2004/0256352	A1	12/2004	Perlov et al.	
2004/0022513	A1*	2/2004	Hryniewicz et al. ....	385/131					

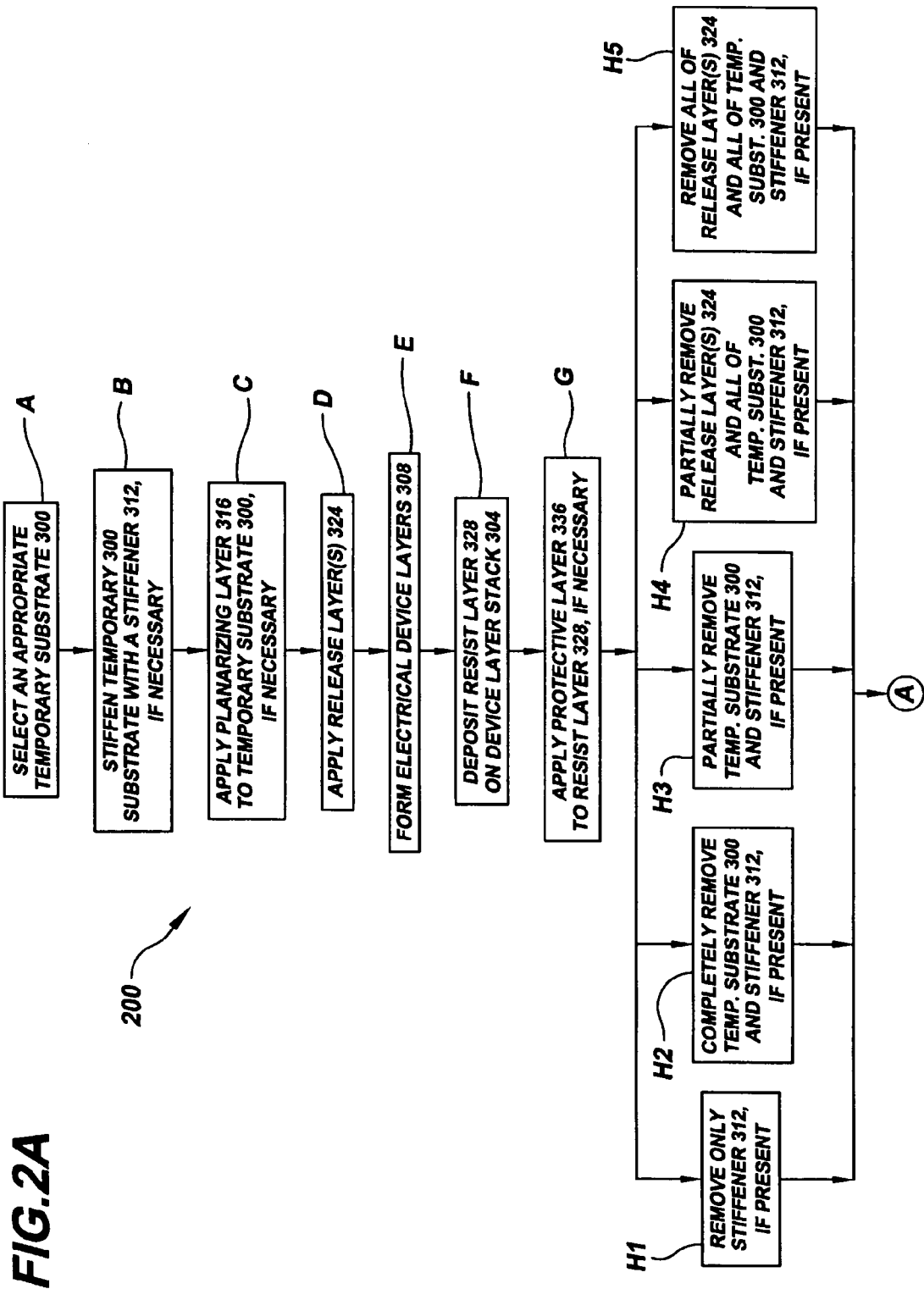
\* cited by examiner

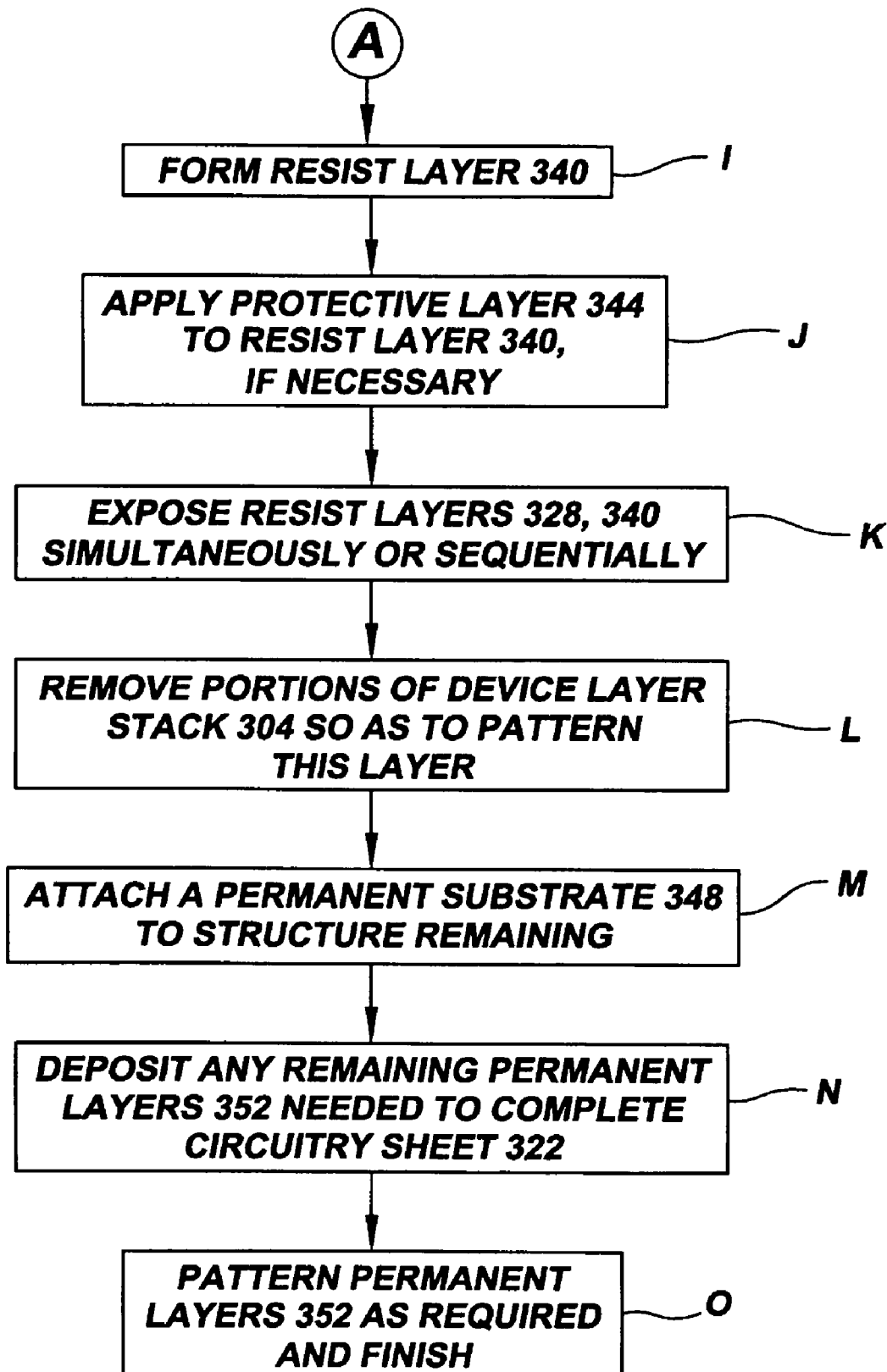
**FIG. 1A**  
(PRIOR ART)



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





**FIG.2B**

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