



US006522451B1

(12) **United States Patent**  
**Lynam**

(10) **Patent No.:** **US 6,522,451 B1**  
(45) **Date of Patent:** **Feb. 18, 2003**

(54) **EXTERIOR MIRROR PLANO-AUXILIARY REFLECTIVE ELEMENT ASSEMBLY**

(75) Inventor: **Niall R. Lynam**, Holland, MI (US)

(73) Assignee: **Donnelly Corporation**, Holland, MI (US)

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

(21) Appl. No.: **09/478,315**

(22) Filed: **Jan. 6, 2000**

(51) **Int. Cl.**<sup>7</sup> ..... **G02F 1/15; G02B 5/08; G02B 5/10; G02B 7/182; B60R 1/06**

(52) **U.S. Cl.** ..... **359/265; 359/267; 359/841; 359/850; 359/864; 359/866; 359/868; 359/872; 359/877; 248/549; 248/900**

(58) **Field of Search** ..... **359/841, 850, 359/851, 855, 864, 865, 866, 868, 872, 877, 265, 267; 248/549, 900**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

2,911,177	A	*	11/1959	West	
3,104,274	A	*	9/1963	King	359/864
3,170,985	A	*	2/1965	Katulich	
3,375,053	A		5/1968	Ward	350/293
3,389,952	A	*	6/1968	Tobin, Jr.	359/864
3,764,201	A	*	10/1973	Haile	

(List continued on next page.)

**FOREIGN PATENT DOCUMENTS**

DE	2409748		9/1975		
DE	3302735	*	8/1984		359/866
DE	4026578	*	4/1992		359/850
EP	0210757	*	2/1987		359/864
EP	0310261	A1	4/1989		
EP	0551802	*	1/1992		359/864

(List continued on next page.)

**OTHER PUBLICATIONS**

U.S. Pat. Ser. No. 09/350,930, filed Jul. 12, 1999, entitled Electrochromic Polymer Solid Films, Manufacturing Electrochromic Devices Using Such Films, and Processes for Making Such Solid Films an Devices, by Applicants Desraj V. Varaprasad et al.

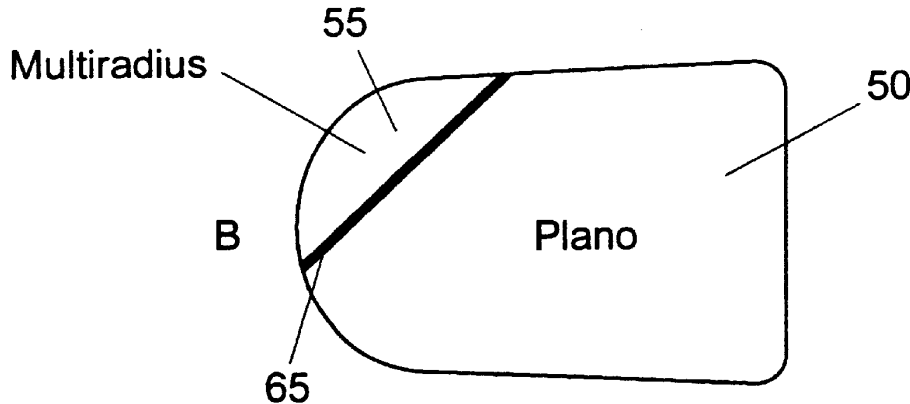
*Primary Examiner*—Ricky D. Shafer

(74) *Attorney, Agent, or Firm*—Van Dyke, Gardner, Linn & Burkhart, LLP

(57) **ABSTRACT**

This invention provides a plano-multiradius reflective element assembly suitable for use in an exterior sideview mirror assembly mounted to the side body of an automobile. The plano-multiradius reflective element assembly includes a plano reflective element which has a rearward field of view, when mounted in an exterior sideview mirror assembly mounted to the side body of an automobile, with unit magnification. The plano-multiradius reflective element assembly also includes an auxiliary reflective element including a multiradius portion with a rearward field of view. The plano reflective element provides a distortion-free rearward field of view and serves as the principal rearward-viewing portion of the plano-multiradius reflective element assembly. The multiradius portion provides a wide angle rearward field of view, and typically supplements the rearward field of view of the plano portion. The plano reflective element and the multiradius portion are separated by a demarcation element which enables the driver to readily delineate a rearward view in the plano portion from a rearward view in the multiradius portion. The plano reflective element and the multiradius reflective element are individually, separately, and adjacently attached to a single backing plate which is mounted to an actuator of the exterior sideview mirror assembly. By adjusting the position of the backing plate within the housing of the exterior sideview mirror assembly via the actuator, the rearward field of view of both the plano reflective element and the multiradius reflective element are simultaneously and similarly aligned.

**40 Claims, 8 Drawing Sheets**



U.S. PATENT DOCUMENTS

4,258,979	A	*	3/1981	Mahin	.....	359/868
4,268,120	A		5/1981	Jitsumori	.....	350/302
4,281,899	A	*	8/1981	Oskam		
4,306,770	A	*	12/1981	Marhauer	.....	359/866
4,311,362	A	*	1/1982	LaPorte	.....	359/864
4,331,382	A	*	5/1982	Graff	.....	359/868
4,449,786	A		5/1984	McCord	.....	350/293
4,555,166	A	*	11/1985	Enomoto	.....	359/877
4,678,294	A	*	7/1987	Van Nostrand	.....	359/864
4,727,302	A	*	2/1988	Mizuta et al.	.....	359/877
4,770,522	A	*	9/1988	Alten	.....	359/877
4,859,046	A	*	8/1989	Traynor et al.	.....	359/866
4,917,485	A	*	4/1990	Baldwin, Sr.		
5,005,962	A	*	4/1991	Edelman	.....	359/864
5,052,792	A	*	10/1991	McDonough	.....	359/866
5,107,374	A	*	4/1992	Lupo et al.	.....	359/841
5,115,352	A	*	5/1992	Do Espirito Santo	.....	359/864
5,166,833	A	*	11/1992	Shyu		
5,225,943	A	*	7/1993	Lupo	.....	359/841
5,239,405	A		8/1993	Varaprasad et al.	.....	359/272
5,432,643	A	*	7/1995	Huang	.....	359/864
5,550,677	A		8/1996	Schofield et al.	.....	359/604

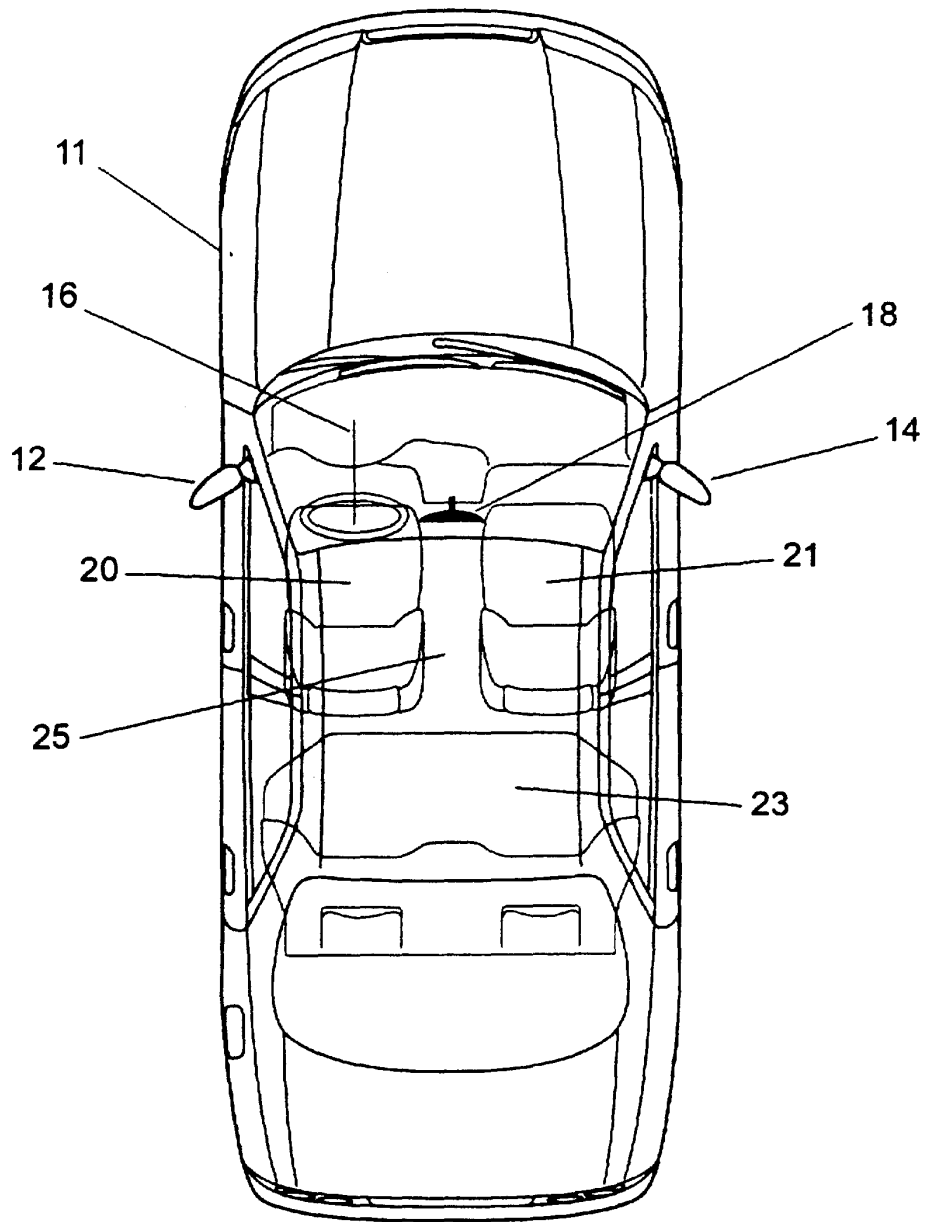
5,579,133	A	*	11/1996	Black et al.	.....	359/866
5,621,569	A	*	4/1997	Schlenke	.....	359/868
5,668,663	A		9/1997	Varaprasad et al.	.....	359/608
5,724,187	A		3/1998	Varaprasad et al.	.....	359/608
5,751,489	A		5/1998	Caskey et al.	.....	359/603
5,793,542	A	*	8/1998	Kondo et al.	.....	359/866
5,796,532	A	*	8/1998	Kanazawa	.....	359/864
5,910,854	A		6/1999	Varaprasad et al.	.....	359/273
6,032,323	A	*	3/2000	Smith et al.	.....	359/877
6,199,993	B1	*	3/2001	Mou	.....	359/864

FOREIGN PATENT DOCUMENTS

FR	2628042		9/1929			
GB	1279158	*	6/1972	.....		359/868
GB	2048189	*	12/1980	.....		359/868
GB	2092534	*	8/1982	.....		359/868
JP	0051637	*	4/1980	.....		359/866
JP	62-105103	*	5/1987			
JP	1186443		7/1989			
JP	1-208245	*	8/1989	.....		359/871
NL	7908257	*	6/1981	.....		359/864

\* cited by examiner

10



**Figure 1**

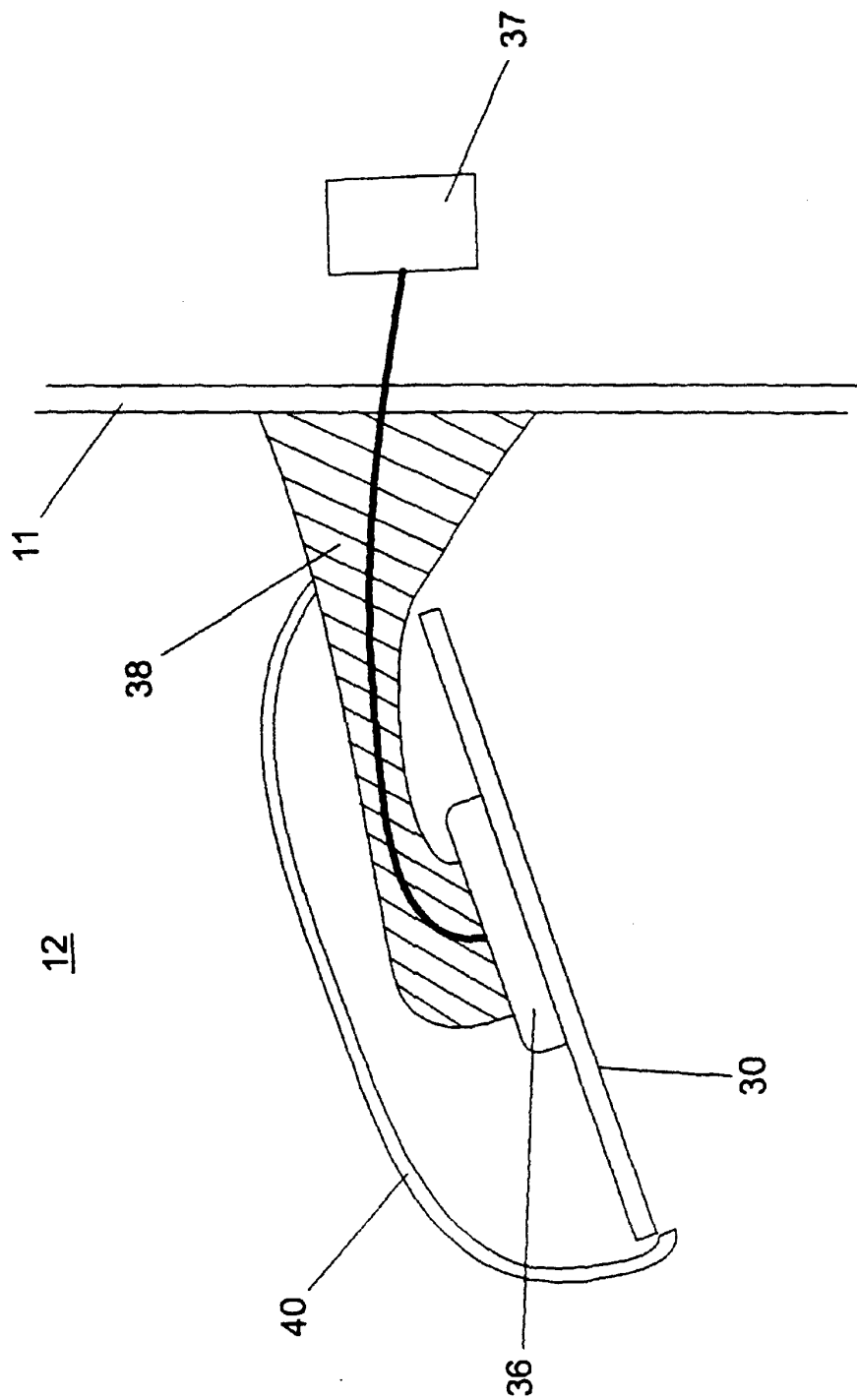


Figure 2

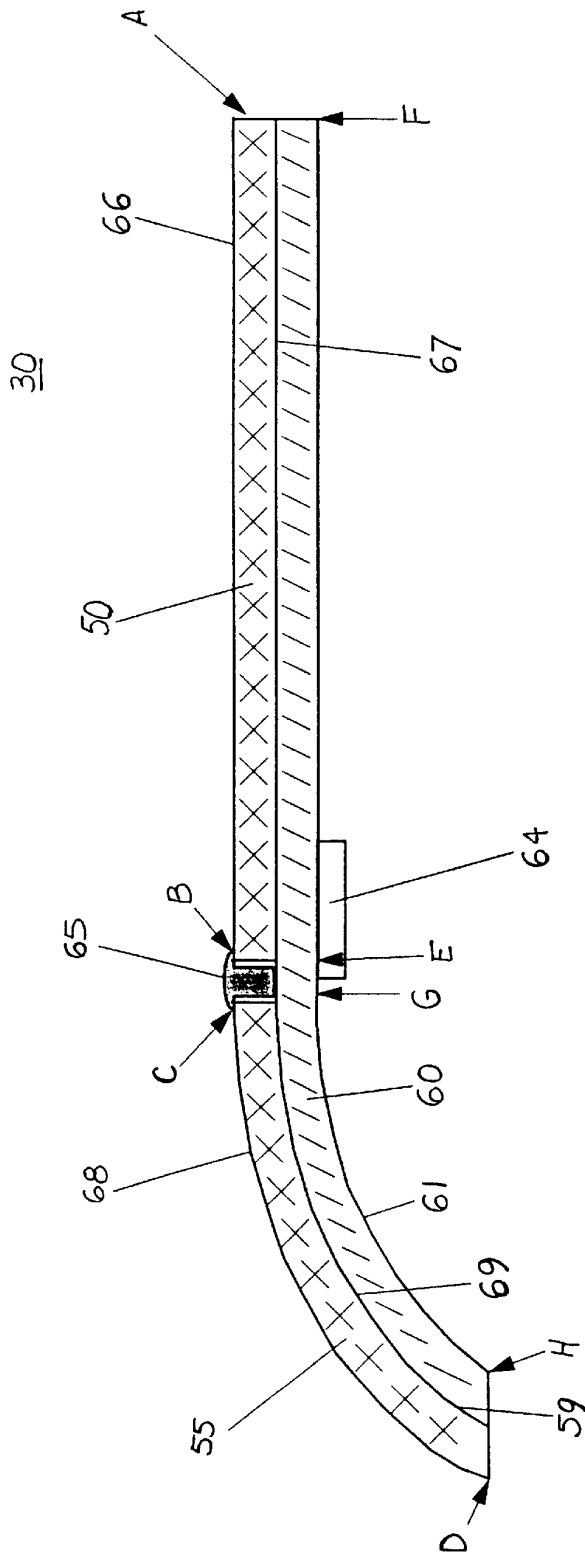


Figure 3

# 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.