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United States Patent [19]
Blackburn et al.

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- [54] **OCCUPANT SENSING APPARATUS**
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- [21] **Appl. No.:** **682,908**
- [22] **Filed:** **Apr. 9, 1991**
- [51] **Int. Cl.⁵** **B60R 21/32**
- [52] **U.S. Cl.** **280/732; 280/735;**
180/273
- [58] **Field of Search** 280/728, 730, 731, 732,
280/735; 180/273

FOREIGN PATENT DOCUMENTS

0357225 3/1990 European Pat. Off. .
3839134C1 2/1990 Fed. Rep. of Germany .

OTHER PUBLICATIONS

Interlink Electronics "Force and Position Sensing Resistors: An Emerging Technology".
Tekscan Corporate Capabilities.
Kynar Piezo Film Technical Manual.

Primary Examiner—Richard A. Schacher
Attorney, Agent, or Firm—Tarolli, Sundheim & Covell

[57] **ABSTRACT**

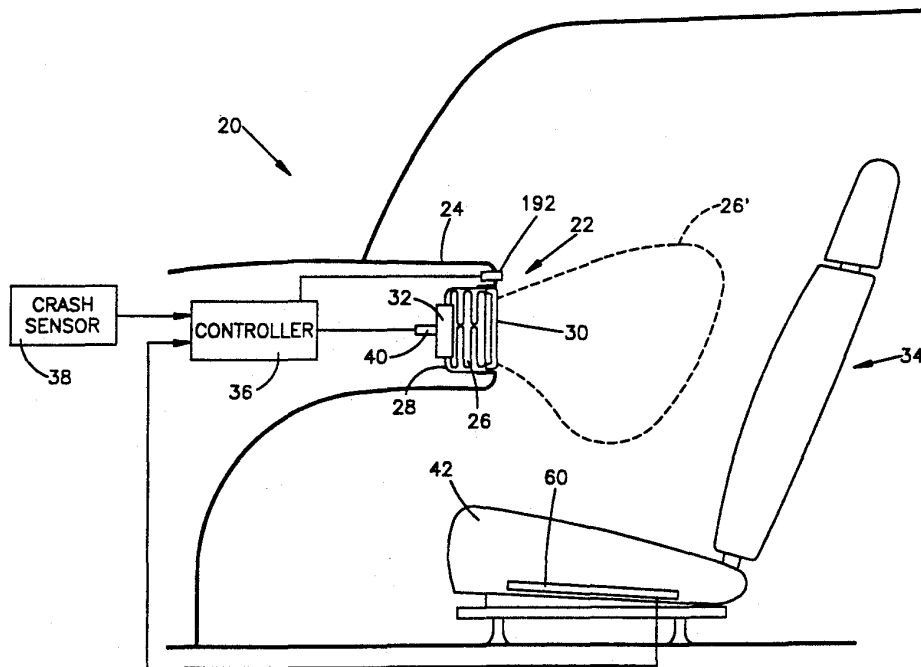
An occupant sensing apparatus for use in an occupant restraint system comprises a film having an electrical characteristic with changeable states and a contact member. When an occupant sits in a vehicle seat, the contact member pushes on the film and changes the state of the electrical characteristic. An electric circuit is connected to the film for providing a first signal when the film indicates an occupant is not present, a second signal when an occupant is present, and a third signal if the film and the circuit become disconnected. The occupant restraint system is enabled when either an occupant is present or an electrical fault condition occurs. In accordance with another embodiment of the invention, an array of sensors located in the seat determines the occupant's position and weight and controls deployment of the occupant restraint system in response to the determined position and weight.

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,172,684	3/1965	Isaac	280/735 X
3,340,523	9/1967	Whitman	
3,672,699	6/1972	DeWindt	
3,746,844	7/1973	Azum et al.	
3,992,028	11/1976	Abe et al.	
4,700,180	10/1987	Vance	
4,796,013	1/1989	Yasuda et al.	
4,804,859	2/1989	Swart	
4,810,005	3/1989	Fohl	
4,833,457	5/1989	Graebe, Jr.	
4,876,419	10/1989	Lodini	
4,876,420	10/1989	Lodini	
5,071,160	12/1991	White	280/735
5,071,160	12/1991	White et al.	
5,074,583	12/1991	Fujita	280/735
5,079,949	1/1992	Tamori	

9 Claims, 14 Drawing Sheets



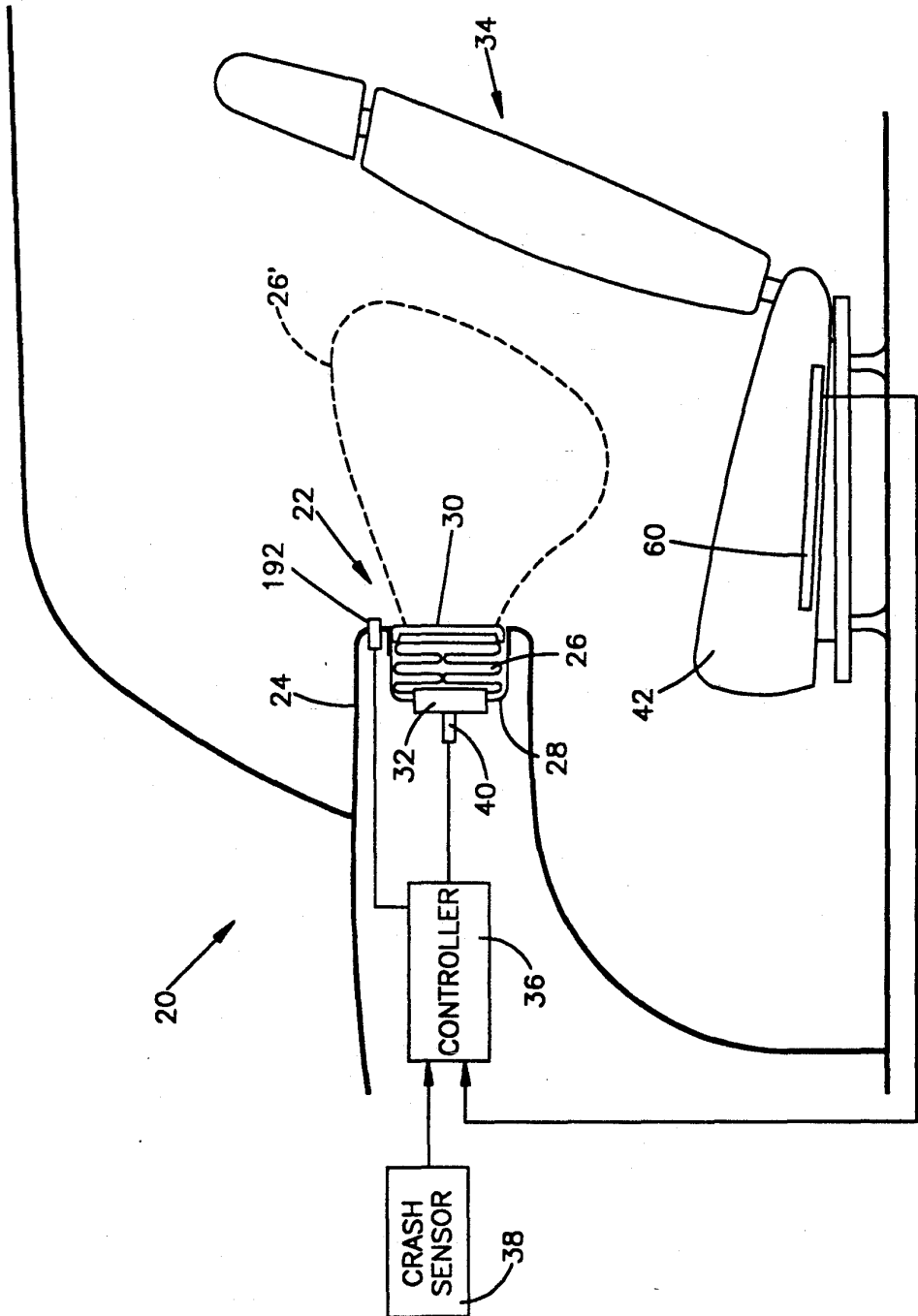
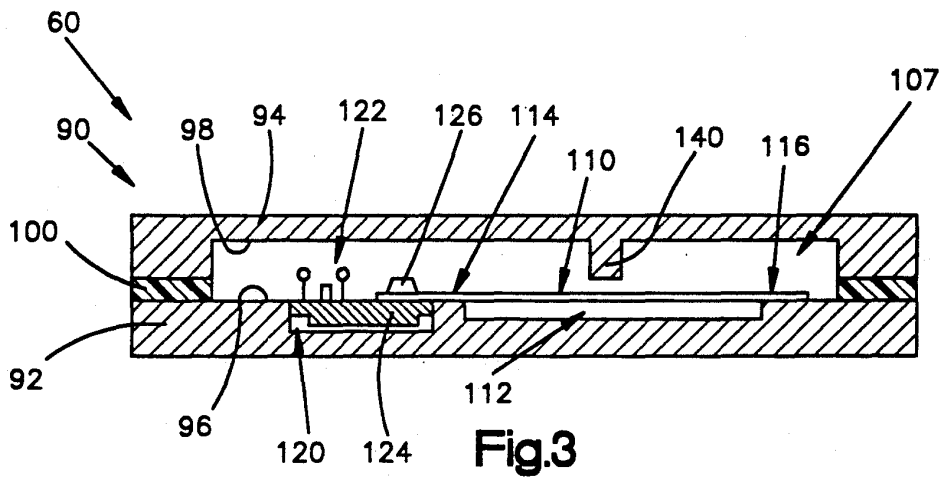
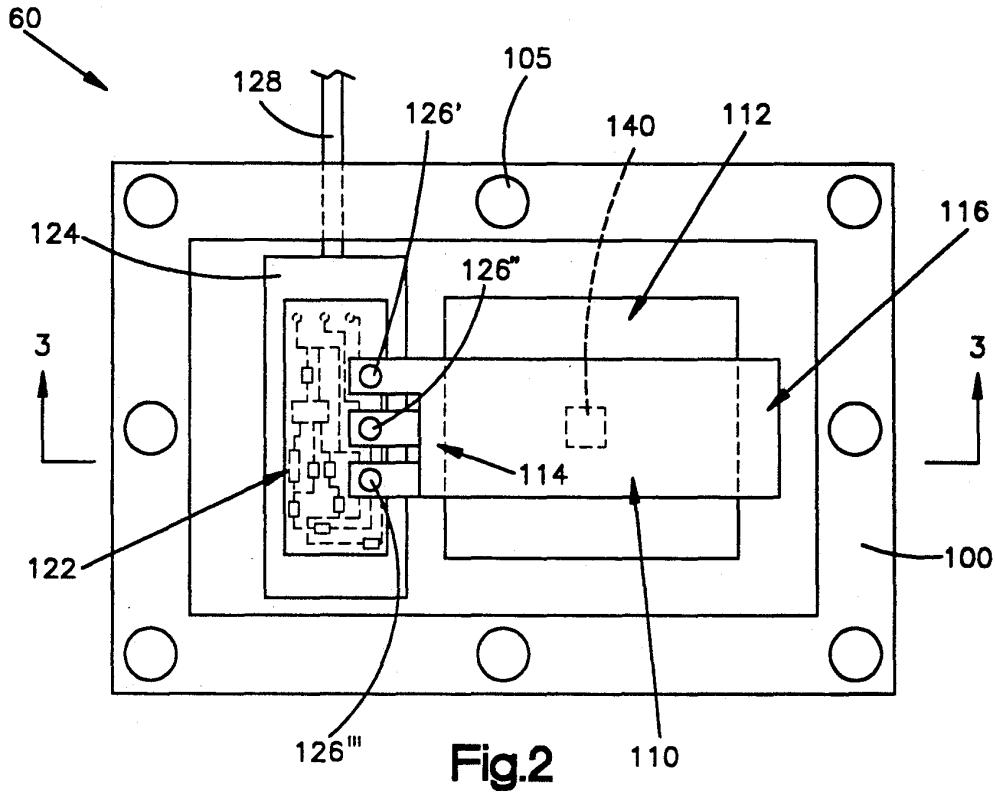


Fig.1



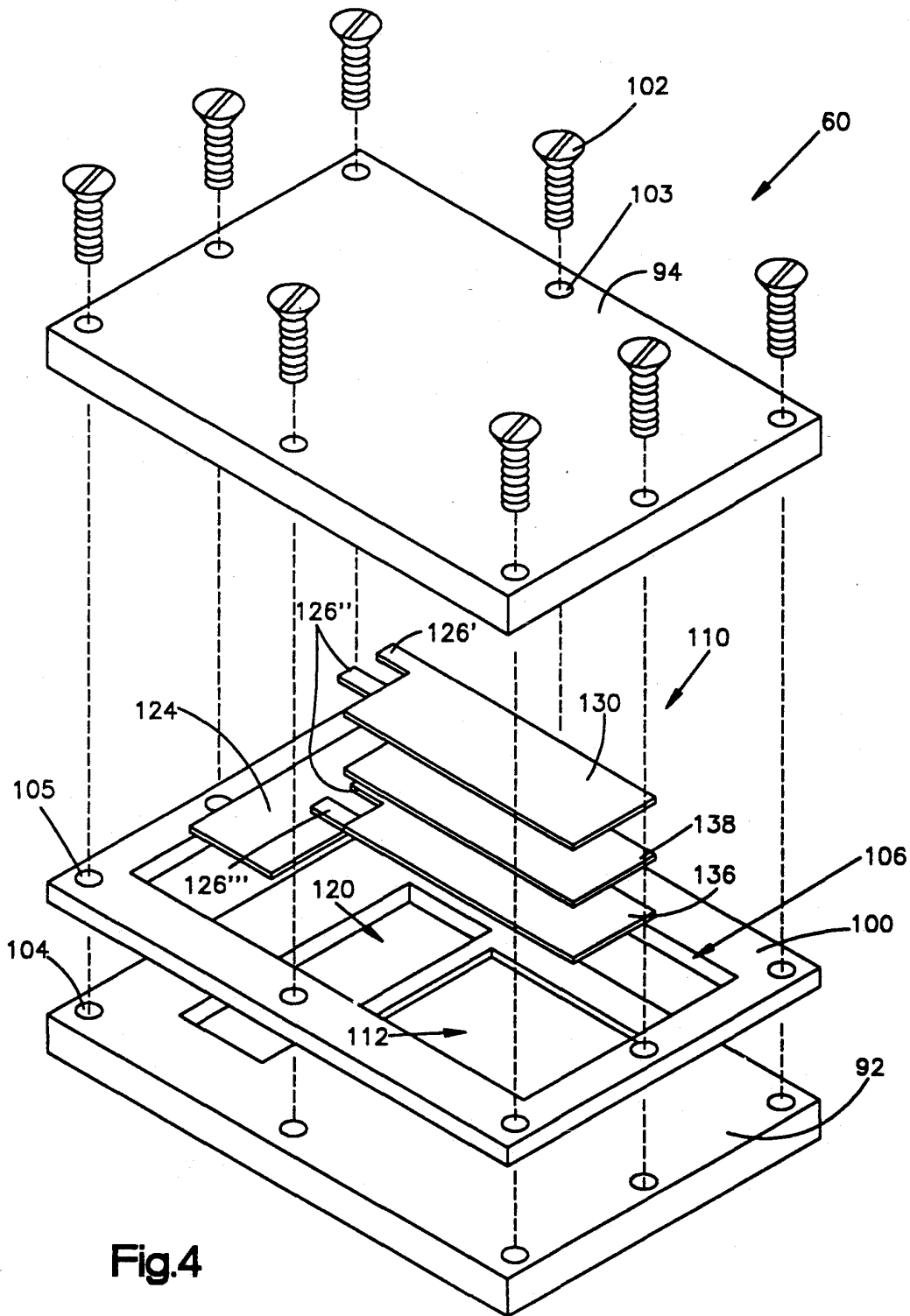


Fig.4

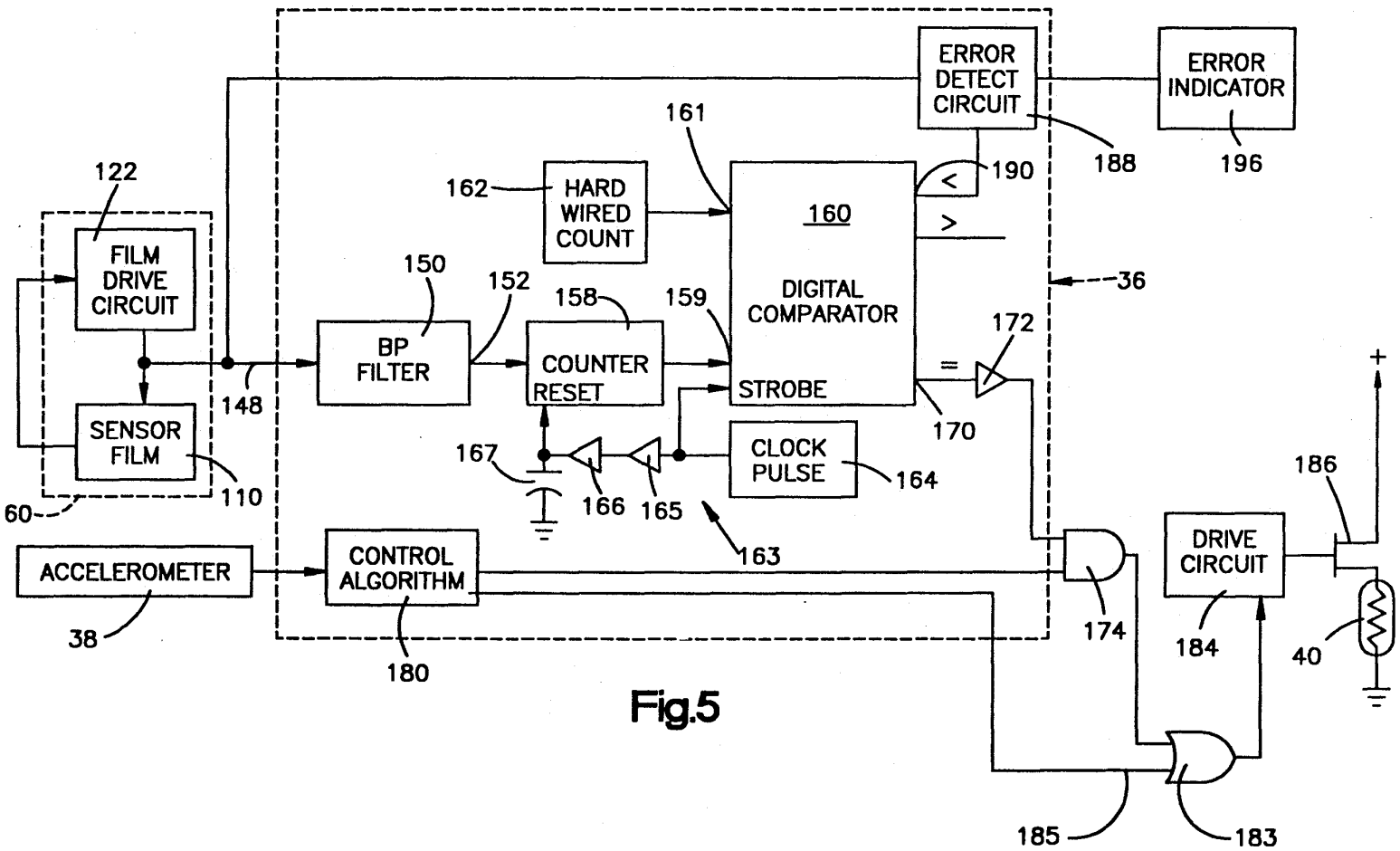


Fig.5

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