

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number
WO 00/71382 A1

- (51) International Patent Classification⁷: B60N 2/58
- (21) International Application Number: PCT/CA00/00588
- (22) International Filing Date: 19 May 2000 (19.05.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/134,850 19 May 1999 (19.05.1999) US
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

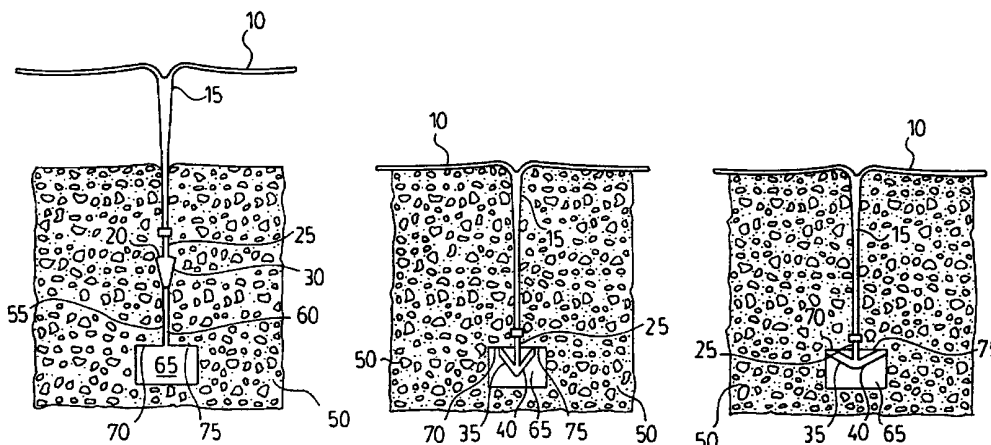
Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 00/71382 A1

(54) Title: TRIM COVER ATTACHMENT SYSTEM



(57) Abstract: Generally, there is described a passenger seat comprising: a frame element; vehicle anchorage means connected to the frame element; a seat body (50) comprising a resilient material fixed (e.g., by adhesion or mechanical retention) with respect to the frame element and a groove (55) disposed in a surface thereof; a trim cover (10) disposed over at least a portion of the seat body; and trim cover attachment means attached to the trim cover. The trim cover attachment means comprises a tongue (20) in the groove. The tongue (20) is operable between a closed position during insertion in the groove and an open position after insertion in the groove.

TRIM COVER ATTACHMENT SYSTEM

TECHNICAL FIELD

5 In one of its aspects, the present invention relates a trim cover attachment system. In another of its aspects, the present invention relates to a seat and particularly, to a passenger seat for use in vehicles, which incorporates the trim cover attachment system.

BACKGROUND ART

10 Passenger seats in vehicles, such as automobiles, are typically fabricated from a foam (usually polyurethane) material which is molded into the desired shape and covered with an appropriate trim cover. The foamed material is selected to provide passenger comfort by providing a resilient seat and the trim cover is selected to provide the desired aesthetic properties.

15 It is known in the art that, while the resiliency of the foamed material in the seat provides passenger comfort, it does not provide the necessary structural strength for the seat. This necessitates additional reinforcement of the seat to provide the degree of structural strength required to ensure proper mounting of the seat within the vehicle and proper support of anti-submarine elements, if
20 present. Accordingly, prior art vehicular seats typically include a perimeter frame of metal which strengthens the seat. Further, support rails are typically mounted across the metal frame to stiffen the frame and to provide a suitable attachment point for the means used to anchor the seat to the vehicle. Conventionally, the metal frame and/or support rails are substantially completely embedded in the
25 foam material when the seat is molded. In many cases, the metal frame will further comprise a plurality of apertures or other means for attaching a trim cover to the seat.

Of course, the requirement for such a perimeter metal frame and for support rails adds to the cost of manufacturing the seat and, more importantly,
30 adds to the weight of the seat and the overall weight of the vehicle in which it is installed. This added weight increases both the cost of shipping the seat to the vehicle manufacturer and the eventual lifetime operating expense for the vehicle.

Finally, the presence of metal frame and support rails or other components in the seat hampers the eventual recycling of the seat materials which is becoming increasingly important in today's environmentally concerned marketplace.

5 United States patents 5,400,490 and 5,542,747 (hereinafter referred to as the "Burchi #1 Patents"), issued March 28, 1995 and August 6, 1996, respectively, describe a passenger seat comprising a frame element molded from relatively high density, rigid foam; vehicle anchorage means connected to the frame element; and a seat body comprising a resilient material fixed with respect to the frame element. The provision of a frame element molded from relatively
10 high density, rigid foam obviates the need for a conventional metal frame. The Burchi #1 Patents also teach application of a trim cover to passenger seat. The trim cover may be attached using push pins or a combination of bottom flaps (see Figures 3 and 9 in the Burchi #1 Patents) with conventional mechanical attachment means (e.g. Velcro™, J-retainers or push pins).

15 United States patents 5,762,842, 5,827,546, 5,827,547 and 5,882,073 (hereinafter referred to as the "Burchi #2 Patents") teach a passenger seat comprising: a frame element, vehicle anchorage means connected to the frame element, a seat body comprising a resilient material fixed with respect to the frame element and trim cover attachment means, the trim cover attachment
20 means comprising a relatively high density, rigid foam member having a groove disposed in a surface thereof, the groove capable of receiving connection means comprised in a trim cover. Thus, in the Burchi #2 Patents a "tongue and groove" connection system may be utilized to affix a trim cover to the frame element of the passenger seat. The combination of the tongue and the groove
25 provides an interference fit of sufficient strength that the trim cover will not readily detach from the frame element of the passenger seat. Similarly, the precise design of groove 15 is not particularly restricted and, in some cases, may be dictated by the design of tongue member 40.

30 While the advances taught in the Burchi #1 Patents and the Burchi #2 Patents represent significant advances in the art, there is always room for improvement. One such area is in the attachment of the trim cover to the passenger seat. Specifically, in certain cases, for a number of reasons, it

desirable to utilize a trim cover attachment system which is strongly locks in place the trim cover and the passenger seat. Also, in certain cases, it may not be desirable to have the trim cover retained directly by the frame element - i.e., in various of the illustrated embodiments in the Burchi #1 Patents and the Burchi #2 Patents, the trim cover is retained directly in the frame element.

DISCLOSURE OF THE INVENTION

It is an object of the invention to obviate or mitigate at least one of the above-disadvantages of the prior art.

10 Accordingly, in one of its aspects, the present invention provides a passenger seat comprising:

a frame element;

vehicle anchorage means connected to the frame element;

15 a seat body comprising a resilient material fixed with respect to the frame element and a groove disposed in a surface thereof;

a trim cover disposed over at least a portion of the seat body; and

20 trim cover attachment means attached to the trim cover and comprising a tongue for insertion in the groove, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.

In another of its aspects the present invention provides a padded element comprising a seat body comprising a resilient material and a groove disposed in a surface thereof;

a trim cover disposed over at least a portion of the seat body; and

25 trim cover attachment means attached to the trim cover and comprising a tongue for insertion in the groove, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.

30 In another of its aspects, the present invention provides a trim cover system for a padded element, the trim cover system comprising:

a trim cover; and

trim cover attachment means attached to the trim cover and comprising

a tongue for insertion in a groove in the padded element, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will be described with reference to the accompanying drawings, in which:

Figures 1-3 illustrate production of an embodiment of the present passenger seat.

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BEST MODE FOR CARRYING OUT THE INVENTION

Accordingly, an aspect of the present invention relates to passenger seat. As used herein the term "seat" is intended to have its conventional meaning and includes one or both of a cushion (i.e., the portion of the seat on which the occupant sits) and a back or back rest (i.e., the portion of the seat which supports the back of the occupant). As is known in the automotive, airline and related industries, a "seat" includes both a cushion and a back (or backrest). Thus, as used herein, the term "seat" includes a cushion, a back (or back rest) or a unit construction comprising a cushion and a back (or backrest).

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The frame element may be constructed of a foam having an indentation force deflection at 25% deflection in the range of from about 150 to about 4000 pounds, more preferably from about 500 to about 2500 pounds, most preferably from about 900 to about 2000 pounds, when measured pursuant to ASTM 3574-B₁.

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In this embodiment it is preferred to construct the frame element of a polyurethane foam. More preferably, the polyurethane foam of frame element 20 preferably has a specific gravity of less than about 0.40, more preferably in the range of from about 0.10 to about 0.25. Preferably, the liquid foamable polyurethane composition used to produce frame element 20 has a free rise density of from about one to about twenty pounds per cubic foot, more preferably from about two to about eight pounds per cubic foot. For most molded foams, this would give use to a foam core having a density in the range of from about 1.5

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to about 24 pcf, more preferably from about 2.5 to about 12 pcf.

Non-limiting and preferred examples of suitable polyurethane foams for use in producing frame element are conventional rigid polyurethane foams

5 Generally, the polyurethane foam suitable for use in producing such a frame element and having the requisite characteristics may be produced from the following general non-limiting formulation:

<u>Component</u>	<u>Amount</u>
Polymer Polyol	100 - 0 parts
10 Polyol	0 - 100 parts
Crosslinker	0 - 30 parts/100 parts total polyol
Catalyst	0.05 to 3.5 parts/100 parts total polyol
Silicone Surfactants	0 - 1.5 parts/100 parts total polyol
15 H ₂ O	0.5 to 3.5 parts/100 parts total polyol
Isocyanate	Adequate quantity for an index of from about .60 to 1.30 ratio of NCO equivalents to the equivalents of NCO reactive sites.

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Suitable polymer polyols, polyols and isocyanates are described in United States patents 3,304,273, 3,383,351, 3,523,093, 3,939,106 and 4,134,610, Belgian patent 788,115, Canadian Patent 785,835 and "Polymer/Polyols, a New Class of Polyurethane Intermediate", Kuryla, W.C. et al., J. Cellular Plastics, March 25 (1966). See also, "Flexible Polyurethane Foam" by Herrington et al. (1991).

Suitable crosslinkers, catalysts and silicone surfactants are described in United States patents 4,107,106 and 4,190,712

The preferred polyurethane foam suitable for use in frame element 20 may be produced from the following formulation:

-6-

	<u>Component</u>	<u>Amount</u>
	Polymer Polyol ¹	20 - 100 parts
	Polyol ²	0 - 80 parts
	Crosslinker ³	5 - 15 parts/100 parts total polyol
5	Catalyst ⁴	0.5 - 1.2 parts/100 parts total polyol
	Silicone Surfactants ⁵	0.3 - 1.1 parts/100 parts total polyol
	H ₂ O	1.75 - 2.75 parts/100 parts total polyol
	Isocyanate ⁶	Adequate quantity for an index of from about 0.8 to 1.1 ratio of NCO equivalents to the equivalents of NCO reactive sites.
10		

¹ AC West Virginia Polyol Co. NIAX 31-28

² 5000 MW propylene oxide adduct of glycerine with 75% primary capping

15 ³ BASF 953

⁴ DABCO R-8020

⁵ Goldschmidt B-4113

⁶ Dow Chemical Company PAPI 901

20 Alternatively, the frame element may be a conventional metal frame - see, for example, the Burchi #1 Patents and the Burchi #2 Patents for a discussion of the use of conventional metal frames.

The present passenger seat further comprises a resilient body in which the frame element is embedded. The resilient body may be constructed of any material conventionally useful in the production of seats. The resilient body may be made of a foam or non-foam material. Non-limiting examples of useful non-foam materials include fibers matrices such as horse hair, organic fibers and the like. The resilient body may also be constructed of any suitable foam material. Ideally, the resilient body is constructed of a relatively low density, resilient foam, more preferably a polyurethane foam. Polyurethane foams useful for this purpose are well known in the art.

30 The present passenger seat further comprises a groove disposed in the

surface of the seat body. As will become apparent, this groove may be disposed directly into the seat body or it may be disposed in the frame element (made of foam or metal) which is embedded in the seat body. In either case, the groove is disposed (directly or indirectly) in the seat body. The purpose of the groove is to receive a tongue which is attached to the trim cover.

With reference to Figures 1-3, the operation of the present trim cover attachment system will become apparent. Specifically, a trim cover 10 has attached to it a fabric portion 15 which functions as a retainer. Attached to fabric portion 15 is a tongue 20. Tongue 20 comprises a body portion 25 and a locking portion 30. Locking portion 30 comprises a pair of projections 35,40.

As illustrated, trim covered 10 is attached to a seat body 50 made of a conventional resilient polyurethane foam. Seat body 50 has disposed therein a groove 55. Groove 55 comprises an elongate passageway 60 having an open first end and connected to a trench 65.

In the preferred embodiment which is illustrated, trench 65 comprises a pair of shoulders 70,75.

In this preferred, illustrated embodiment, groove 55 is disposed directly in resilient seat body 50 and the frame element is not illustrated. Of course, groove 55 could be disposed in a foam or metal frame element without departing from the spirit and scope of the present invention.

In use, once it is desired to attach trim cover 10 to seat body 50, tongue 20 is inserted into groove 55. As illustrated in Figure 1, during insertion of tongue 20 through elongate passageway 60 of groove 55, projections 35,40 of locking portion 30 are resiliently biased or compressed to a closed position which facilitates insertion of tongue 20.

Once locking portion 30 enters trench 65, projection 35,40 of locking portion 30 are biased to an open position and are locked into place against shoulders 70,75 in trench 65.

As will be apparent to those of skill in the art and as illustrated in Figures 2 and 3, locking portions 35,40 opened further as an increased pulling force on trim cover is applied. The result of this is that projections 35,40 aggressively "bite" into the foam thereby increasing the retention power of the foam with

respect to the pulling forces applied. This allows for placement of the groove directly in resiliency body 50 (although this is not a requirement). An advantage of this approach is significantly labour saving and a first run capability improvement (i.e., allowing for the potential of eliminating inserters, mislocated components and voids in the product being made).

5 While the invention has been described hereinabove with reference to various preferred embodiments and specific Examples, it will be clearly understood by those of skill in the art that modifications to and variations of the preferred embodiments and specific Examples are possible which do not depart
10 from the spirit and scope of the present invention. Accordingly, it is contemplated that such modifications to and variations of the preferred embodiments and specific Examples are encompassed by the invention.

All publications, patents and patent applications referred to herein are incorporated by reference in their entirety to the same extent as if each individual
15 publication, patent or patent application was specifically and individually indicated to be incorporated by reference in its entirety.

What is claimed is:

1. A passenger seat comprising:
 - a frame element;
 - vehicle anchorage means connected to the frame element;
 - a seat body comprising a resilient material fixed with respect to the frame element and a groove disposed in a surface thereof;
 - a trim cover disposed over at least a portion of the seat body; and
 - trim cover attachment means attached to the trim cover and comprising a tongue for insertion in the groove, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.
2. The passenger seat defined in claim 1, wherein the frame element is made of a relatively high density, rigid foam.
3. The passenger seat defined in claim 1, wherein the frame element is made of a molded relatively high density, rigid foam.
4. The passenger seat defined in any one of claims 1-3, wherein the frame element is made of a polyurethane foam.
5. The passenger seat defined in claim 4, wherein the polyurethane foam has an indentation force deflection at 25% deflection in the range of from about 150 to about 4,000 pounds when measured pursuant to ASTM 3574-B₁.
6. The passenger seat defined in claim 4, wherein the polyurethane foam has an indentation force deflection at 25% deflection in the range of from about 500 to about 2,500 pounds when measured pursuant to ASTM 3574-B₁.
7. The passenger seat defined in claim 4, wherein the polyurethane foam has an indentation force deflection at 25% deflection in the range of from about 900

to about 2,000 pounds when measured pursuant to ASTM 3574-B₁.

8. The passenger seat defined in any one of claims 1-7, wherein the frame element is embedded in the seat body and the groove is disposed in the frame element.

9. The passenger seat defined in any one of claims 1-7, wherein groove is disposed in the seat body.

10. The passenger seat defined in any one of claims 1-8, wherein the groove is disposed along substantially an entire periphery of the passenger seat.

11. The passenger seat defined in any one of claims 1-10, wherein the groove comprises a passageway having an open first end and a closed second end opposite the first end.

12. The passenger seat defined in claim 11, wherein the passageway is elongate and is substantially orthogonal with respect to the surface of the seat body.

13. The passenger seat defined in any one of claims 11-12, wherein the closed second end has a curved cross-sectional shape.

14. The passenger seat defined in any one of claims 11-13, wherein the closed second end has a substantially circular cross-sectional shape.

15. The passenger seat defined in any one of claims 11-13, wherein the closed second end comprises at least one abutment surface for engagement of the tongue in the open position.

16. The passenger seat defined in any one of claims 11-13, wherein the closed second end comprises a pair of abutment surfaces for engagement of the tongue

in the open position.

17. The passenger seat defined in any one of claims 1-16, further comprising at least one pelvic support element connected to the frame element.

18. The passenger seat defined in any one of claims 1-17, wherein the vehicle anchorage means includes an anchor portion to engage a portion of a vehicle and an attachment portion embedded in the frame element.

19. The passenger seat defined in any one of claims 17-18, wherein the at least one pelvic support element is integrally molded with the frame element.

20. The passenger seat defined in any one of claims 1-19, wherein the frame element is adhered to the resilient material.

21. The passenger seat defined in any one of claims 1-20, wherein the tongue comprises a locking portion operable between the closed position and the open position, and a body portion.

22. The passenger seat defined in claim 21, wherein the locking portion comprises at least one projection movable between the closed position and the open position.

23. The passenger seat defined in claim 21, wherein the locking portion comprises at least one projection resiliently movable between the closed position and the open position.

24. The passenger seat defined in any one of claims 22-23, wherein the locking portion comprises a plurality of projections resiliently movable between the closed position and the open position.

25. The passenger seat defined in any one of claims 22-23, wherein the

locking portion comprises a plurality of projections resiliently movable between the closed position and the open position.

26. The passenger seat defined in any one of claims 22-23, wherein the locking portion comprises a pair of projections disposed on opposed sides of the body portion and resiliently movable between the closed position and the open position.

27. The passenger seat defined in any one of claims 22-23, wherein the locking portion comprises a pair of projections disposed on opposed sides of the body portion and movable between the closed position and the open position.

28. The passenger seat defined in any one of claims 22-27, wherein the locking portion and the body portion are angularly disposed with respect to one another.

29. The passenger seat defined in any one of claims 22-28, wherein the locking portion angularly disposed away from a distal end of the tongue.

30. The passenger seat defined in any one of claim 1-29, wherein the attachment of the trim cover to the seat mechanically fixes the resilient material with respect to the frame element.

31. A padded element comprising a seat body comprising a resilient material and a groove disposed in a surface thereof;
a trim cover disposed over at least a portion of the seat body; and
trim cover attachment means attached to the trim cover and comprising a tongue for insertion in the groove, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.

32. A trim cover system for a padded element, the trim cover system

comprising:

a trim cover; and

trim cover attachment means attached to the trim cover and comprising a tongue for insertion in a groove in the padded element, the tongue operable between a closed position during insertion in the groove and an open position after insertion in the groove.

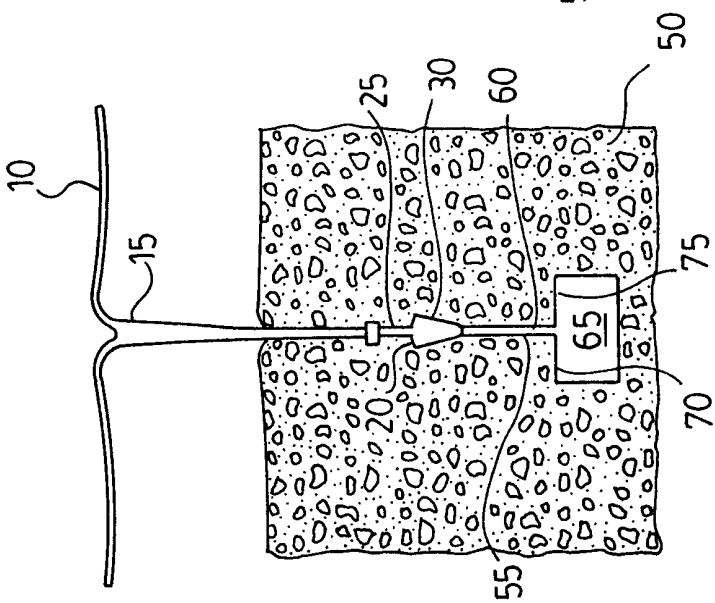


FIG. 1.

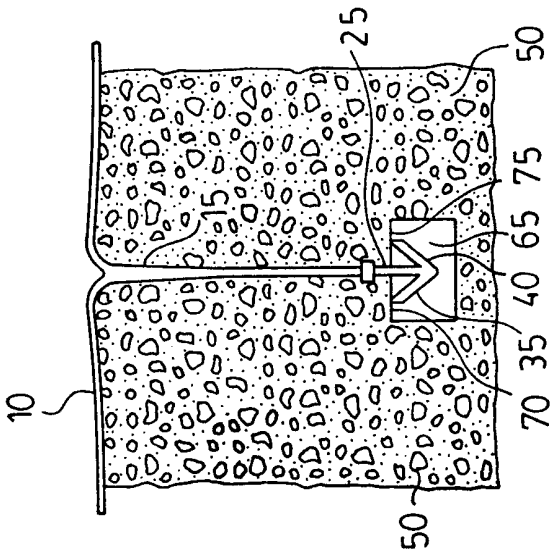


FIG. 2.

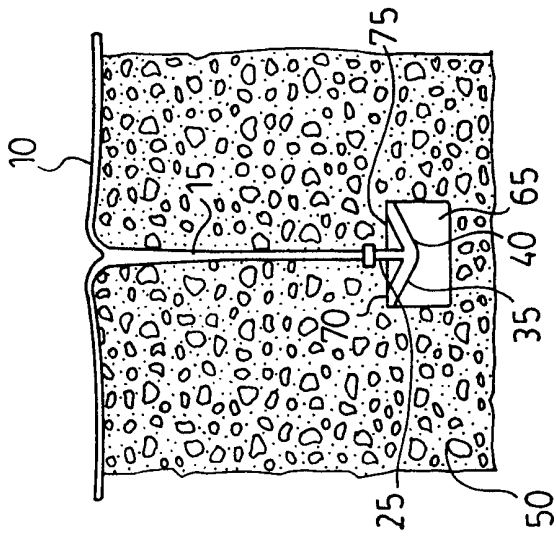


FIG. 3.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00588

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60N2/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 733 001 A (ROBERTS CLIFFORD D) 31 March 1998 (1998-03-31)	1, 9, 10, 18, 21-29, 31, 32
Y	column 3, line 43 -column 6, line 65; figures 1-10	2, 4, 17
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Y	US 4 134 610 A (LINDEWALL FRANK W) 16 January 1979 (1979-01-16) cited in the application	2, 4
A	abstract	1
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A	abstract; figures 5-7	1

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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

30 August 2000

Date of mailing of the international search report

06/09/2000

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00588

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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