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(54) Modular protection system for ski-runs

(57) A modular protection system comprising a plurality of elements (10), each element comprising a projection (11) on one side and a recess (12) on the other side, said projection (11) being arranged to cooperate with said recess (12) such than an element (10) can be joined to another element (10), to form a substantially rectilinear or curved surface.

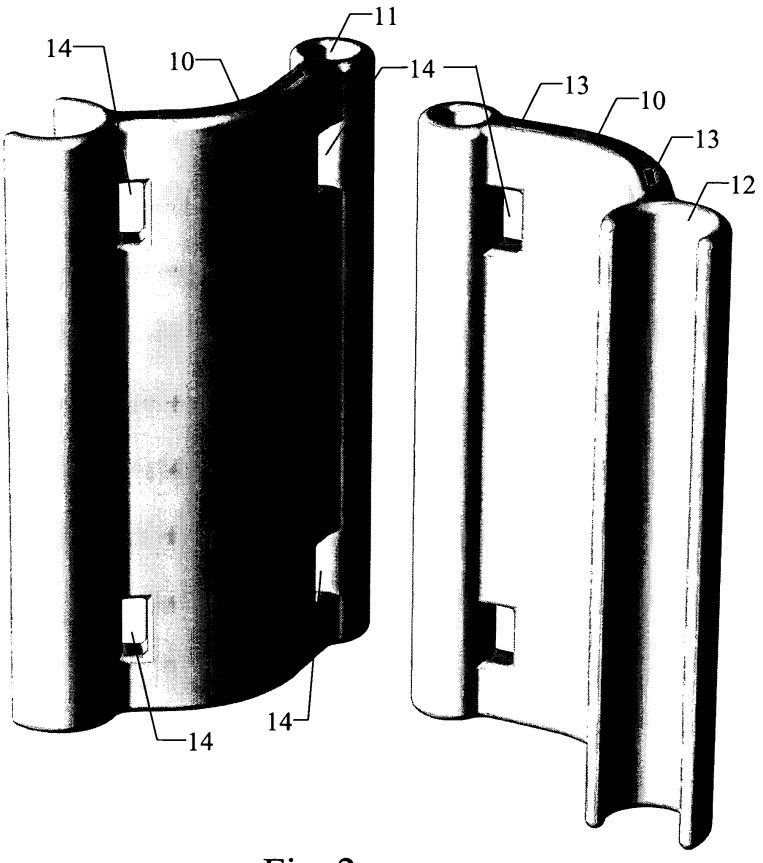


Fig. 2

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Description

[0001] The present invention relates to a modular protection system, in particular for ski-runs.

[0002] Protection mattresses for ski-runs are known, in particular for protecting ski lift pylons, snow cannons, trees and against all those dangers present along a ski-run, so that the skier does not collide against the various obstacles which may be encountered along such runs.

[0003] The mattresses are normally made from sheets of foam rubber or expanded polyurethane covered with PVC.

[0004] They are normally of parallelepiped shape with one or more mattresses wrapping the obstacles.

[0005] An object of the present invention is to provide a protection system which is modular and versatile.

[0006] Another object is to provide a system which is easily assembled and disassembled.

[0007] Other objects are to provide an easily formed system able to ensure the required safety.

[0008] These and other objects are attained according to the invention by a modular protection system comprising a plurality of elements, each element comprising a projection on one side and a recess on the other side, said projection being arranged to cooperate with said recess such than an element can be joined to another element, to form a substantially rectilinear or curved surface.

[0009] Further characteristics of the invention are described in the independent claims.

[0010] By virtue of the present invention, an easily assembled and disassembled protection system is obtained, of dimensions suitable for any obstacle. Its components are both soft and robust at the same time.

[0011] They can be used not only for ski-runs, but also for motorcycle and karting competitions, and for any activity which needs to be made safer.

[0012] The characteristics and advantages of the present invention will be apparent from the ensuing detailed description of one embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 shows schematically a protection element according to the present invention, seen from above;
Figure 2 shows schematically a pair of protection elements according to the present invention, seen in perspective view;
Figures 3a, 3b and 3c show schematically, seen from above, some protection elements coupled together in accordance with three different forms of assembly, according to the present invention;
Figure 4 shows schematically, in perspective view, some coupled-together protection elements with some accessories, according to the present invention;
Figures 5a, 5b and 5c schematically show connection elements for the protection elements, according to the present invention;
Figure 6 shows schematically a connection strap for the protection elements, according to the present invention.

[0013] With reference to the accompanying figures, a modular protection system according to the present invention comprises a protection element 10 composed of a panel which is not completely flat but is slightly curved to form an internal angle of about 140°.

[0014] The preferred dimensions of the protection element 10 are a height of 1 m and width of 0.5 m, a height of 1 m and width of 1 m, and a height of 1 m and width of 2 m.

[0015] The thickness of the protection element 10 is about 70 mm.

[0016] Other dimensions are possible, according to the application.

[0017] At one of its lateral ends the panel widens to form a tubular conduit or tube 11 along its entire height. The inner diameter of the tube 11 is about 70 mm, its outer diameter being about 130 mm.

[0018] At its other lateral end the panel widens to form an open circular ring 12 along its entire height. The ring opening is equivalent to a circular arc having an angle of about 90° at its centre. The inner diameter of the circular ring 12 is about 130 mm, its outer diameter being about 200 mm.

[0019] The open circular ring 12 is formed such that the tubular conduit 11 can be inserted into it.

[0020] The open circular ring 12 and the tubular conduit 11 are formed such that they are able to mutually cooperate by virtue of the projection on one and the recess in the other, to hence form an insertion joint.

[0021] Two cavities 13, preferably of rectangular shape, are provided in the upper and lower surface of the protection element 10.

[0022] Four holes 14, preferably of rectangular shape, are provided in the front surface of the protection element 10. Two holes 14 are positioned in proximity to the tubular conduit 11, one towards the top and one towards the bottom. The other two holes 14 are positioned in proximity to the open circular ring 12, one towards the top and one towards the bottom.

[0023] Figure 3 and 4 show some elements 10 coupled together to form structures which can be positioned around or in front of those obstacles which are to be protected.

[0024] To form a single-layer structure, the tubular conduit 11 of one protection element 10 is inserted into the open circular ring 12 of another protection element 10, until the required length has been reached.

[0025] If several protection elements 10 are connected together while always maintaining the same angulation direction, closed surfaces such as in Figures 3a and 3b can be formed, usable for surrounding poles, trees, pylons, etc.

[0026] If several protection elements 10 are connected

together with a variable angulation direction, virtually rectilinear or curved structures can be obtained as required, as can be seen in Figures 3c and 4.

[0027] To form a more stable coupling between the protection elements 10, straps 20 are used, inserted through the holes 14 of adjacent elements, as visible in Figure 4.

[0028] The straps 20 are formed of silicone material. They are tightened by means of a clip 21 or alternatively can be arranged with a hook on one side and an eye on the other.

[0029] To form a multi-layer structure, the protection elements 10 are superposed after inserting tubular inserts 22 into the tubular conduit 11 of the underlying protection element 10, so that these inserts also become inserted into the overlying protection element 10.

[0030] The inserts 22 are internally hollow elements of substantially cylindrical shape, slightly conical towards their ends and provided with one or more swellings to improve the fixing.

[0031] Inserts 24 of parallelepiped shape, provided with one or more circular swellings to improve the fixing, are inserted into the cavities 13. These inserts, which remain fixed between the underlying and overlying protection elements 10, provide the structure with greater stability.

[0032] To also maintain a more stable coupling between superposed protection elements 10 the straps 20 are used, inserted through the holes 14 of adjacent elements, as visible in Figure 4.

[0033] When tubular inserts 22 are not placed in the tubular conduits 11, these are closed by positioning plugs 23. The plugs 23 can also be placed in those tubular conduits 11 lying at the base and hence in contact with the ground. In this manner the tubular conduits 11 do not become filled with snow of soil. The figure shows an internally hollow plug 23, but these can also be formed with a closed end.

[0034] The tubular inserts 22 and the plugs 23 are preferably internally hollow so that they can be used to support warning poles 30 or stiffening poles 31 for the structure. The poles 30 and 31 are preferably formed of plastic material.

[0035] The protection elements 10 can be provided with warning lamps, for example LED lamps embedded in the plugs 23 and in the tubular inserts 22. The lamps can be powered by batteries rechargeable by photovoltaic panels fixed to the protection elements 10.

[0036] According to the present invention, the protection elements 10 are formed by rotomoulding and filled via suitable holes which when moulding is finished are closed and hidden by expanded polyurethane (PUR).

[0037] The elements 10 are hence hollow bodies filled with expanded polyurethane. The hollow bodies have a thickness variable from 0.5 to 10 mm.

[0038] Rotomoulding is a method using hollow moulds composed of only the external part of the figure.

[0039] The rotomoulding machine is composed essentially of three stations: a loading/discharge station in which the mould is mounted and loaded before commencing the cycle; a baking station in which the mould enters an oven; and a cooling station in which the mould is cooled prior to discharge.

[0040] Rotomoulding is a process consisting essentially of four stages.

[0041] A weighed quantity of liquid or powder polymer is poured into a hollow mould with thin metal walls, which is mounted on the arm of the moulding machine. The mould is then closed by jaws or bolts. The mould, which is able to rotate about two perpendicular axes, is inserted into a hot oven. It is heated, the liquid (or powder) in its interior increasing in temperature. The mould is moved and the material deposits on the mould walls in successive layers, to form the shape of the workpiece. When the material is molten and has consolidated, the mould is moved to a cooling station in which firstly blown air and then atomized water cause the temperature to fall below the polymer crystallization or solidification value.

[0042] Rotation about two axes also continues during this stage to prevent material depositing.

[0043] When the workpiece has cooled, the mould is moved into a discharge station in which the workpiece is extracted from the mould. At this point the mould is ready to be again loaded and resume the moulding process.

[0044] The main advantage of elements obtained by rotomoulding are the following.

[0045] It enables the final required element shape to be obtained at low cost; metal elements can also be inserted; and graphical parts can be directly printed on the elements.

[0046] The material for forming the protection elements 10 by rotomoulding is a thermoplastic elastomer.

[0047] In particular, this material must have high thermal stability to prevent loss of properties during its grinding into powder. It must also have a low degree of viscosity to enable the material to cover the inner surface of a mould and to melt into a homogeneous mass. The standard measurement used as an indication of the material flow properties is the melt flow rate MFR (viscosity index) measured in g/10 min. The raw materials used for rotomoulding possess an MFR between 2g/10min and 8g/10min. Higher MFRs are required for particularly complex moulded details.

[0048] In this respect, as the MFR increases, the mouldability of the material increases, making it possible to reproduce accurate surface details.

[0049] In contrast, properties such as impact resistance, ESCR, resistance to atmospheric and chemical agents decrease as the MFR increases. It must also have a good impact resistance, this being a critical factor especially in low temperature applications.

[0050] Traction and bending resistance must be sufficient for the particular application of the workpiece. Polyethylene has a relatively low resistance, while synthesis resins such as nylon and polycarbonate offer better performance.

[0051] The thermoplastic polymers used advantageously include polyethylene, however polycarbonate, polypropylene, nylon, Plastisol PLC, urethanes and elastomers can also be used.

[0052] The PUR inserted into the interior (of density variable from 20 to 150 g/cm^3) has no contact with the external environment and in particular doe not come into contact with water or rain.

[0053] The materials used and the dimensions can be chosen at will in accordance with requirements and the state of the art.

[0054] The system conceived in this manner is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept; moreover all details can be replaced by technically equivalent elements.

Claims

1. A modular protection system comprising a plurality of elements, each element comprising a projection on one side and a recess on the other side, said projection being arranged to cooperate with said recess such than an element can be joined to another element, to form a substantially rectilinear or curved surface.

2. A system as claimed in claim 1, **characterised in that** each element comprises a curved panel.

3. A system as claimed in claim 1, **characterised in that** said projection comprises a tubular structure, said recess comprising a structure in the form of an open circular ring.

4. A system as claimed in claim 1, **characterised in that** warning lamps are associated with said plurality of elements.

5. A system as claimed in claim 1, **characterised in that** an element is maintained joined to another element by straps.

6. A system as claimed in claim 1, **characterised in that** an element is maintained joined to another element by inserts insertable into said projection.

7. A system as claimed in claim 1, **characterised in that** each element comprises recesses in its upper and lower surfaces to cooperate with an insert in order to ensure greater stability of the structure.

8. A system as claimed in claim 1, **characterised in that** each element comprises vertical through holes in proximity to said projection.

9. A system as claimed in claim 1, **characterised in that** said plurality of elements are in the form of a hollow body formed from a single piece of thermoplastic polymer filled internally with expanded polyurethane.

10. A system as claimed in claim 1, **characterised in that** said plurality of elements are formed by rotomoulding.

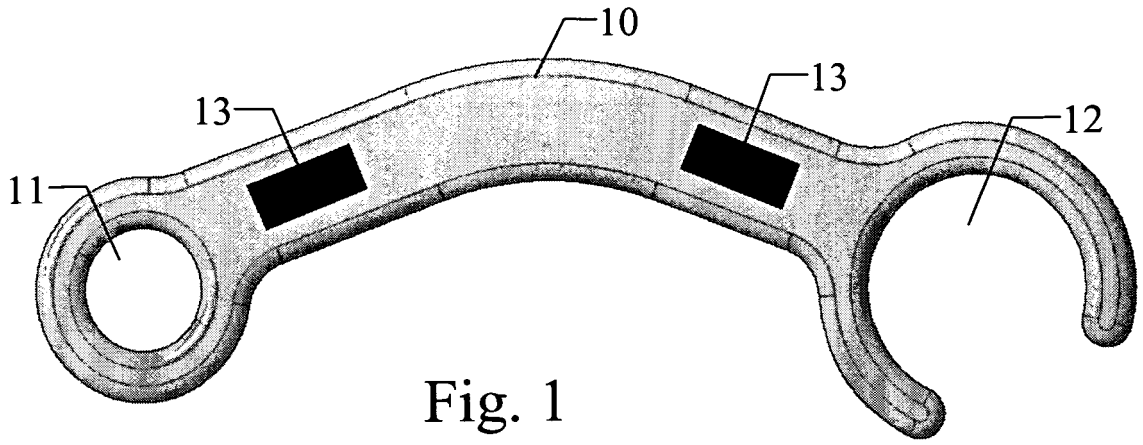


Fig. 1

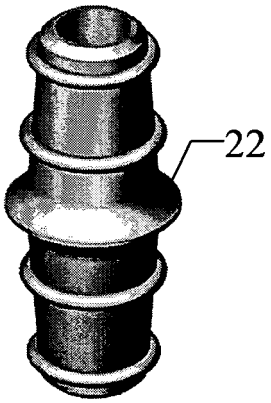


Fig. 5a

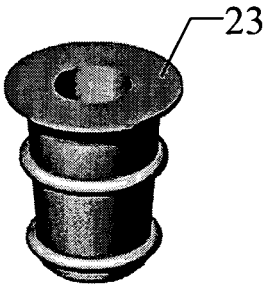


Fig. 5b

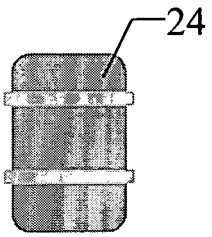


Fig. 5c

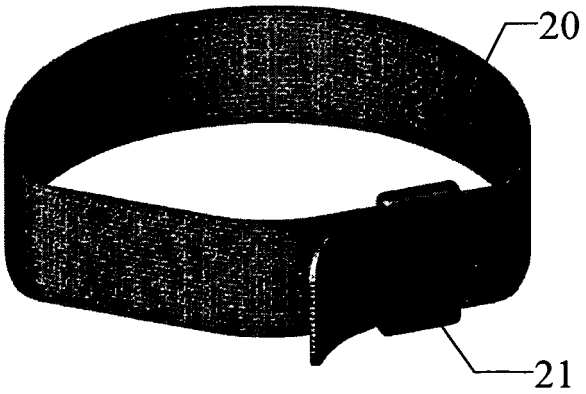


Fig. 6

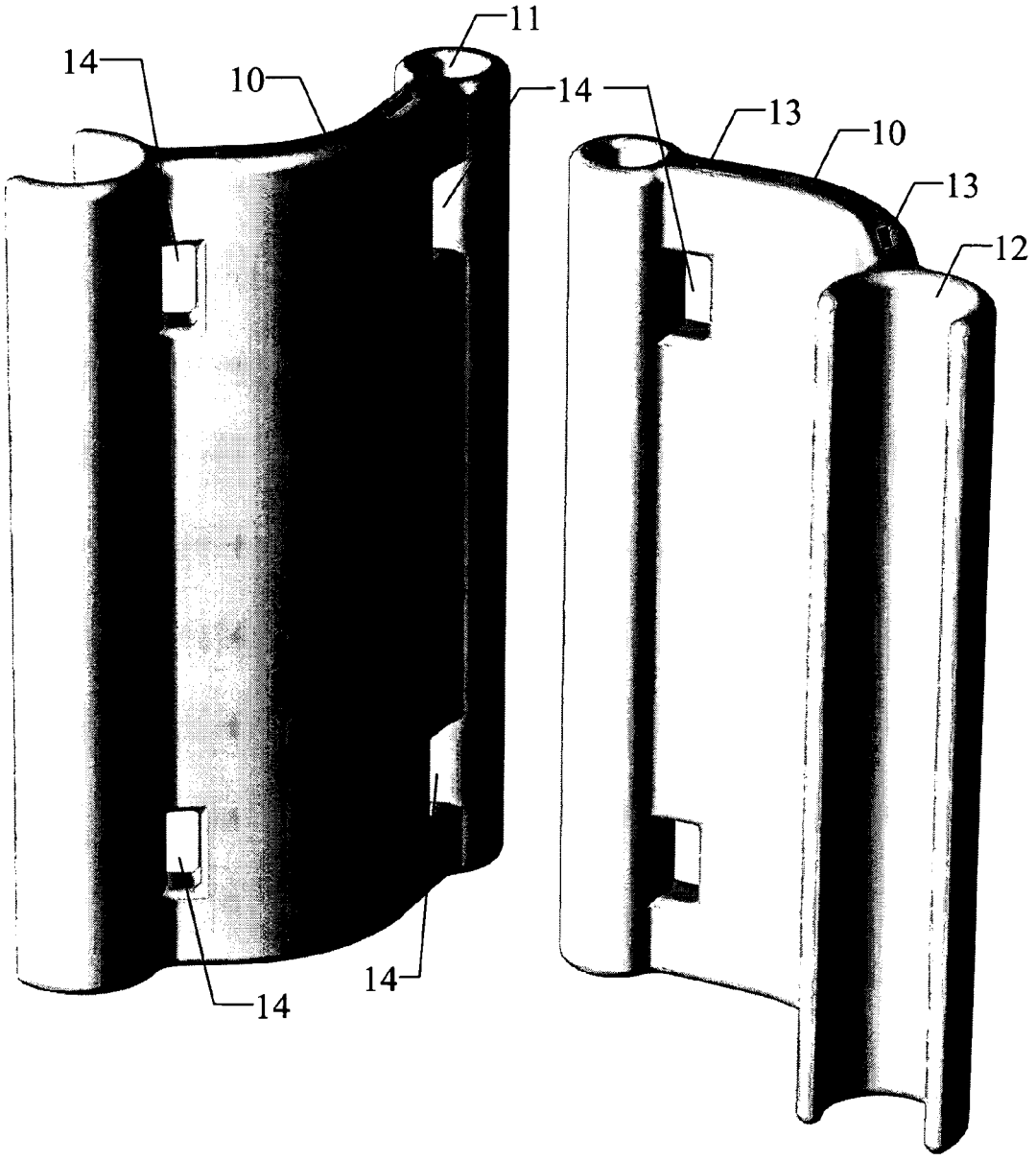


Fig. 2

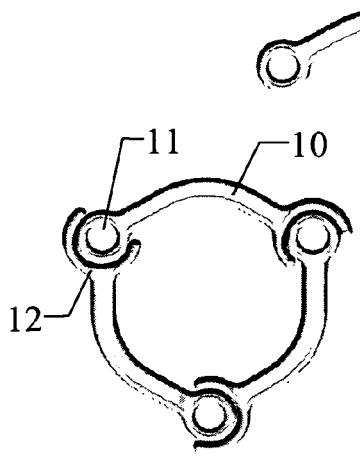


Fig. 3a

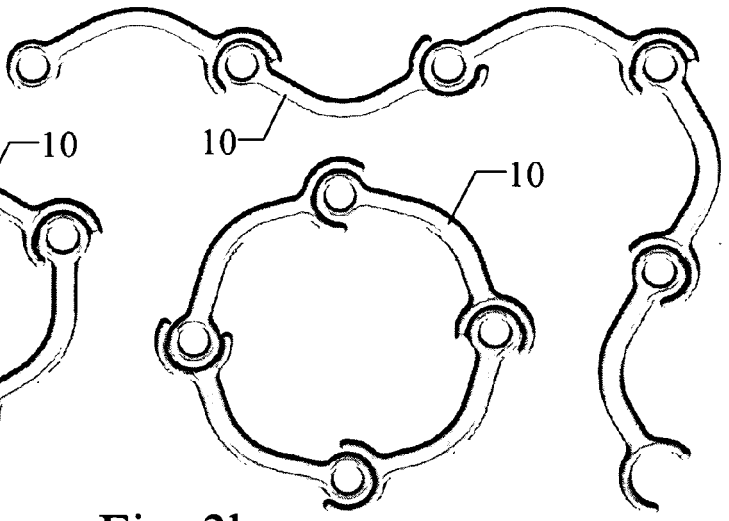


Fig. 3b

Fig. 3c

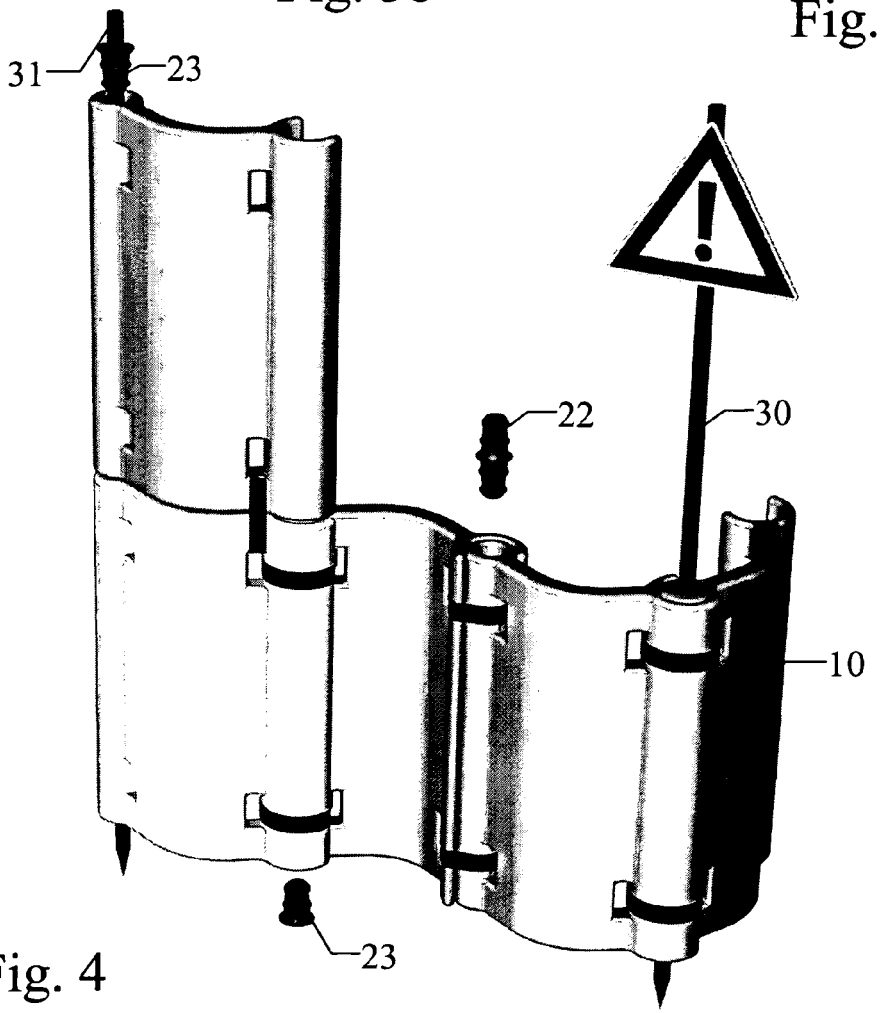


Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 09 01 5609

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 4 982 535 A (PICKETT WILLIAM H [US]) 8 January 1991 (1991-01-08) * columns 3-5; figures 1-3,6-9 *	1-3,6-8 4	INV. A63C19/06 A63C19/10 A63B71/02
X	FR 2 885 918 A1 (SMOBY SA [FR]) 24 November 2006 (2006-11-24) * the whole document *	1,3,4, 6-10	E01F15/06 A63B71/00 E01F7/02
X	FR 2 786 211 A1 (SOC D TECH INNOVANTES [FR]) 26 May 2000 (2000-05-26) * the whole document *	1-4,8-10	
X	US 5 836 714 A (CHRISTENSEN MARC E [US]) 17 November 1998 (1998-11-17) * column 1 - column 15; figures 2,6-11,19,20 *	1,3,4,6	
Y	WO 03/033084 A1 (PHOTONA CO LTD [JP]; IWAKIRI SHIRO [JP]; MIZOBATA KAZUO [JP]; YAMAUCHI) 24 April 2003 (2003-04-24) * abstract *	4	
X Y	US 2002/014619 A1 (CHRISTENSEN MARC E [US] ET AL) 7 February 2002 (2002-02-07) * figures 1,2,4 *	1,3,6-8 5	TECHNICAL FIELDS SEARCHED (IPC) A63C A63B E01F
Y	CH 695 458 A5 (LIPKA KAREL [CH]) 31 May 2006 (2006-05-31) * figures 1,5 *	5	
X Y	EP 1 297 866 A (BATES ANDREW JOHN [GB]; CARTWRIGHT JOHN [GB]; CAVENEY MAUREEN ANN [GB]) 2 April 2003 (2003-04-02) * the whole document *	1,3 5	
Y	FR 2 617 409 A (SCORE [FR]) 6 January 1989 (1989-01-06) * the whole document *	5	
	-/--		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 April 2010	Haller, E

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EP 09 01 5609

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 202 354 B1 (KIRBY JAKE [US]) 20 March 2001 (2001-03-20) * the whole document * -----	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

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09-04-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4982535 A	08-01-1991	NONE	
FR 2885918 A1	24-11-2006	NONE	
FR 2786211 A1	26-05-2000	NONE	
US 5836714 A	17-11-1998	NONE	
WO 03033084 A1	24-04-2003	JP 2002085612 A	26-03-2002
US 2002014619 A1	07-02-2002	NONE	
CH 695458 A5	31-05-2006	NONE	
EP 1297866 A	02-04-2003	GB 2381466 A US 2003056907 A1	07-05-2003 27-03-2003
FR 2617409 A	06-01-1989	NONE	
US 6202354 B1	20-03-2001	NONE	

EPO FORM P0459

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