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(54) Ski soles with inserts that cause either the drainage of water or the formation of a veil of water between the snow and the sole

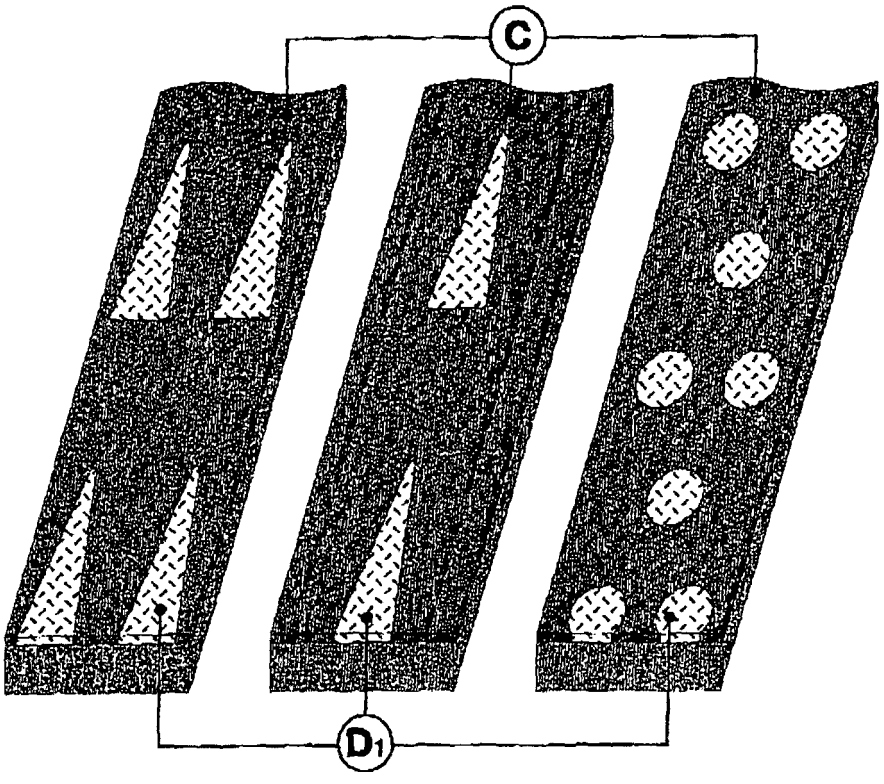
(57) TITLE:

Ski soles with special inserts that either cause the drainage of water formed or that cause the formation of a veil of water between the snow and the sole (to increase the smoothness in both cases).

SUMMARY

Soles for cross-country, alpine, mountaineering skis, snowboard etc with particular inserts of different materials which have the dual scope of eliminating excess water formation between the sole of the ski and the snow in conditions of humid, wet snow, or of causing the formation of a veil of water between the sole of the ski and the snow in conditions of cold, dry snow (to increase the smoothness in both cases).

Fig. 1 Fig. 2 Fig. 3



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Description

[0001] In the skiing world, particular attention is paid to the research and creation of equipment with soles able to produce the maximum speed on the snow. For this reason, in recent years, soles have been produced in sinterized Polyethylene with a variable density and mixed with particular additives like graphite powder, fluorine and other materials and mixtures which remain industrial secrets. The soles are therefore formed uniformly of a single material or mixture across their width, length and thickness. The soles produced in this way are then assembled as skis by the producer.

[0002] It is well known that the speed of the ski depends on the friction (mechanical and electromagnetic) which it produces in the sliding phase. The ski slides on the snow in two conditions:

- when a film of water forms between the snow and the sole, giving rise to lubricated sliding,
- or when the layer of water is not present, causing dry sliding.

[0003] The faster ski is obviously the one that slides on the film of water. This layer of water which acts as a lubricant between the sole and the snow is not uniform but instead has a thickness that gradually increases from the tip to the tail of the ski. Nevertheless, in conditions of high humidity and snow temperature, the excessive quantity of water that forms can cause the so called suction phenomenon, hence compromising the speed of the ski. The object is hence to improve the sliding of the ski both when the veil of water is excessive or when the veil of water is not present

[0004] The basic idea started with the fact that the ski slides on snow thanks "to the friction" it produces, even if this seems at first a paradox.

[0005] When the ski slides on the snow it produces friction that creates heat, which in turn causes the fusion of the snow crystals that, in this way, lubricate the sole with small particles of water and so allow the ski to slide. All this obviously happens with a correct equilibrium at a molecular level.

[0006] When, however, the ski slides on very cold snow the friction of the sole by itself is not able to melt the snow crystals suffciently. The insertion of wedges of another material, (in the central front part of the sole), whose coefficient of friction is better than that of the sole (e.g. Elastomerics), activates the above described mechanism. In the mechanical field or in other fields where friction is found, this type of phenomenon doesn't exist - skis represent the only such example.

[0007] When, instead, the ski must slide on '"warm" wet snows, the presence of excess water creates a cohesion between the surface of the sole and that of the snow, thereby reducing the speed of the ski. In this case the insertion of wedges of P.T.F.E. (Teflon), a fluorine based compound that is one of the most waterproof and non-stick polymers which exist in commerce today, placed in the rear central part of the ski, improves the smoothness that contributes to the expulsion of excess water.

1. The drainage of excess water (in case of lubricated sliding).

[0008] The scope of the present find is to favour the expulsion of excess water which forms between the sole and the snow by the insertion of wedges of water repellent material PTFE (Teflon), in the most critical points of the ski, similar or of another type as illustrated in Fig. (9)F. These inserts can be placed along the entire length of the sole of the ski (from the tip to the tail of the ski). In particular in cross-country skis these inserts will be placed preferably in the rear area of the ski starting from the point where the heel of the boot is found towards the tail where the veil of water is greater and in the front part of the ski starting from the area which goes from the point where the tip of the foot is found towards the spatola of the ski. These inserts must be of such a shape that they will convey the excess water towards the sides of the ski expelling it to the outside. The number of inserts, their form, their thickness, the type of material used and their placing are all to be considered as part of this present find as illustrated in Fig. N° (4) (5).

2. The formation of water between the sole and snow (in case of dry sliding).

[0009] When instead the conditions of the snow are such that the quantity of water between the sole and the snow is absent or insufficient, the ski moves on the snow deforming and/or shattering the "uneveness" present on the snow surface greatly reducing the sliding of the ski. The scope of the present find is that of resolving the problem by inserting materials that create friction, for example rubber or other materials, in strategic points of the sole. The heat generated by these inserts during the sliding phase of the ski favour the formation of a film of water between the sole and the snow as illustrated in Fig. (1) C. The number of these friction inserts must be such as to produce the right heating during the sliding phase so as to obtain an "energy exchange": the creation of friction produces heat that in turn produces a veil of water that acts as a lubricant for the sole thereby increasing the sliding. This, in turn, increases the speed of the ski. Naturally the friction inserts must be of a costituent material (polimeric plastics, elastomerics, rubber and others) and must be of a dimension, type of surface, outline, number and placement on the ski, to offer the most advantages possible in respect to the friction caused by the inserts themselves as illustrated in Fig. N° (1) (2) (3). With regards to cross country skis, these inserts will be placed preferably in the front area of the ski starting from the balancing point of the ski itself towards the tip and from the zone between the heel of the boot and the tail of the

ski. These inserts can be of various materials, forms, widths and multiple thicknesses and even in imaginitive shapes that are however designed to optimize the system, and are all considered inclusive of the present find.

[0010] Also included in this find, is a sole for skis obtained by multiple extrusion or coupling, by means of gluing or other systems, on the whole length, or part of it, with antirepellent plastic materials like PTFE (Teflon) or a mixture of elastomerics and other materials with a chemical composition that is different to the sole itself as shown in Fig. N° (6) (7).

[0011] In the past certain cross-country ski producers made skis with soft rubber inserts placed in the central zone of the sole and of the ski, the scope of which was to prevent the ski from sliding backwards in uphill. This was based on the same principles of ski waxes (klister or stick): that the snow crystals can penetrate anchoring themselves in the rubber and so permitting ascent without slipping back. This, therefore, has nothing to do with our find. Regular inserts in the sole of skis, made of the same material as the sole, but of a contrasting color, transparent or opaque, are often made. These are used to highlight the aaanufacturer's logo or name. This type of insert, also, has nothing to do with this find

[0012] The inserts, regarding both the systems for the formation of water particles (veil of water) or for the expulsion of excess water Fig. (9) C-F, can be placed on the inside of the sole as per example in Fig. D1, or they can occupy the entire length of the sole itself as in the example in Fig. D2. Furthermore, the inserts can be made of two or more different materials mounted between them with the scope of improving or augmenting the performance as in Fig. (8). Even in this case all the above mentioned premises are to be considered in regards to the form, the materials and the placement.

Claims

1. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the special inserts (D2) which are placed in the sole (F) are of waterproof material type PTFE (Teflon) or of other materials unlike the material of the sole itself.

2. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the inserts have a form that causes the expulsion of the water towards the external part of the ski. Fig. N° (4) (5).

3. SOLES FOR SKIS with particular inserts that cause or the drainage of or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the inserts have a chemical composition which drives back the excess water.

4. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the inserts can be one, or more than one, and positioned on the entire surface of the sole or part of it.

5. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the soles can be obtained by multiple extrusion, coupling, gluing or by other systems for the entire length or part of it, with water-repellent plastic materials generally a type of PTFE (Teflon) or however of materials with diverse chemical composition (E) with respect to the sole itself(G) as shown in Fig. N° (6) (7).

6. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that for the drainage of the water the inserts can have varying shapes, thicknesses and forms, the most diverse, even the most imaginative, but all orientated to the optimising of the conditions of the system. Fig. N° (4) (5).

7. SOLES FOR SKIS with particular inserts that cause or the drainage of or the formation of a veil of water between the sole and the snow **characterized by** the fact that to create the formation of a veil of water the special inserts (D1) placed in the sole (C) must be of materials that produce friction such as: elastomeric or polimeric plastics and other materials of diverse composition with respect to the sole itself

8. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that to create the formation of a veil of water between the sole and the snow the inserts must be of a chemical composition that produces friction and therefore heat and consequently is capable of melting the snow crystals.

9. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that to create the formation of a veil of water between the sole and the snow the inserts can have varying shapes and forms, the most diverse, even the most imaginative, but all orientated to the optimising of the conditions of the system. Fig. N° (1) (2) (3) (8).

10. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that to create the formation of a veil of water between the sole and the snow the inserts can be one, or more than one, and positioned on the entire surface of the sole of the ski or on part of it.

11. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that to create the formation of a veil of water the soles can be obtained by multiple extrusion, coupling, glueing or other systems for it's entire length or part of it, with mixes of elastomeric or polimeric plastics or however of materials with diverse chemical compositions (E) with respect to the sole itself (G) as in Fig. N° (6)(7),

12. SOLES FOR SKIS with particular inserts that cause or the drainage of, or the formation of a veil of water between the sole and the snow **characterized by** the fact that the inserts can be obtained by coupling two, or more, different materials set between them and inserted in the sole H as in Fig. (8).

Fig. 1 Fig. 2 Fig. 3 Fig. 8

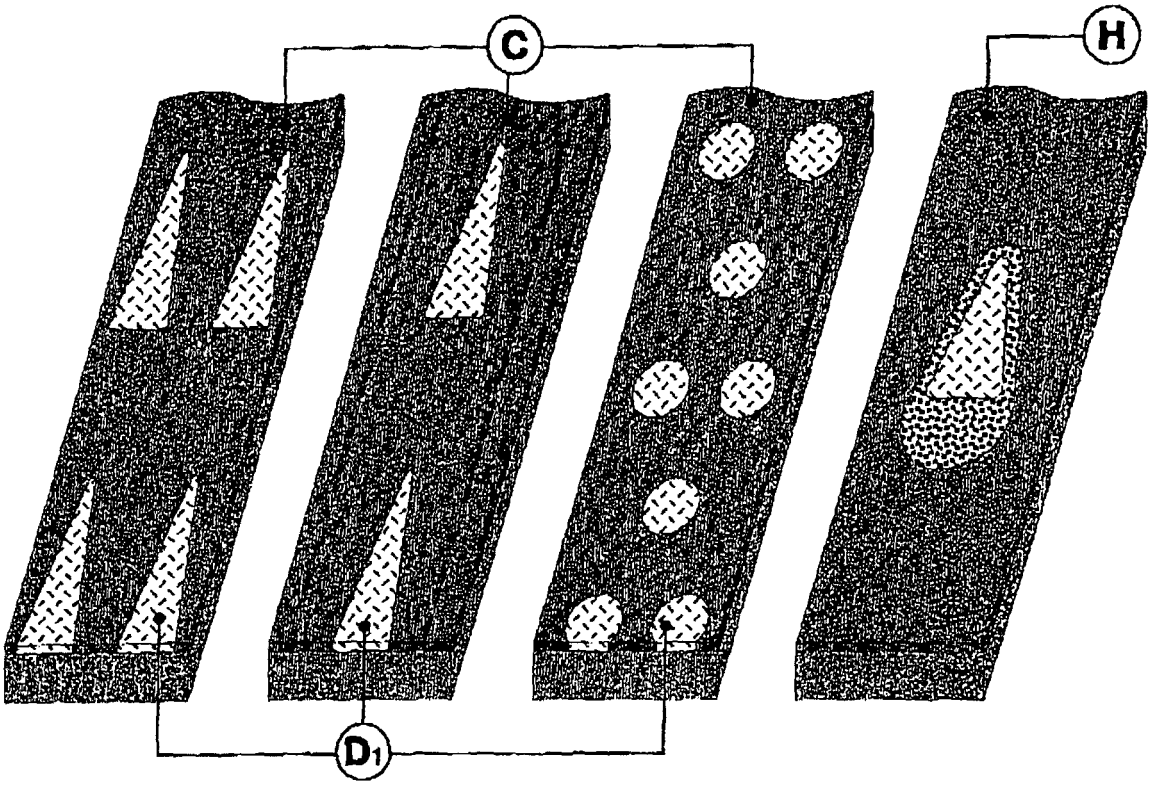

Fig. 4 Fig. 5 Fig. 6 Fig. 7