United States Patent [19]

Vogel

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[45] **Oct. 2, 1973**

[54] **SKIS**

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[30] **Foreign Application Priority Data**

Aug. 7, 1970 Germany ..... P 20 33 845.8

[52] **U.S. Cl.** ..... **280/11.13 L,** 267/153

[51] **Int. Cl.** **A63c 5/12**

[58] **Field of Search** ..... 280/11.13 L, 11.13 E, 280/11.13 R, 11.14; 244/108; 9/310 A, 310 F; 267/153

[56] **References Cited**

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Primary Examiner—Benjamin Hersh
Assistant Examiner—Milton L. Smith

[57] **ABSTRACT**

The specification describes a ski with an elongated hollow girder made up of two shells. The two shells are generally U-shaped and have approximately parallel surface parts, with a facing of at least 0.2 mm, in each side wall of the respective ski. These surface parts are connected by a shock absorbing plastic material so as to provide a firm joint between them.

2 Claims, 8 Drawing Figures

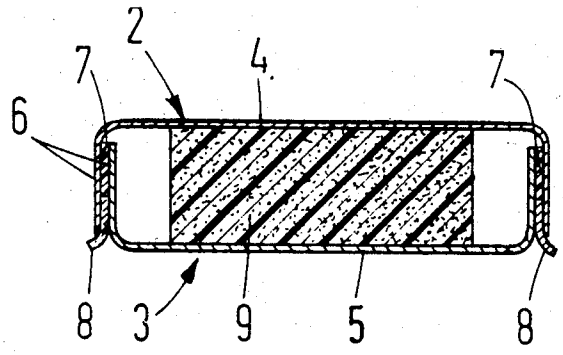


Fig. 1

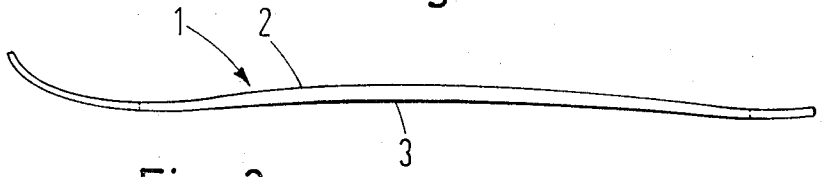


Fig. 2

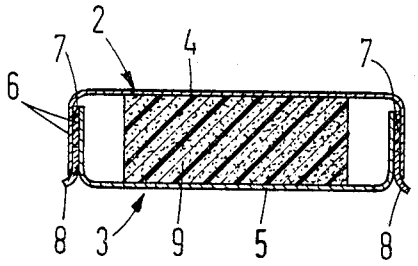


Fig. 3

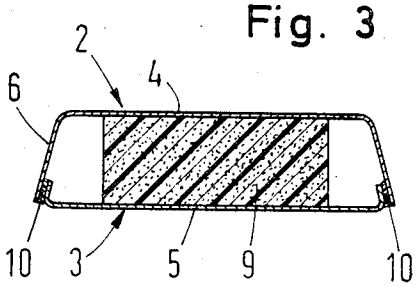


Fig. 4

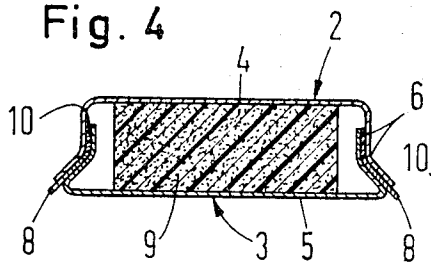


Fig. 5

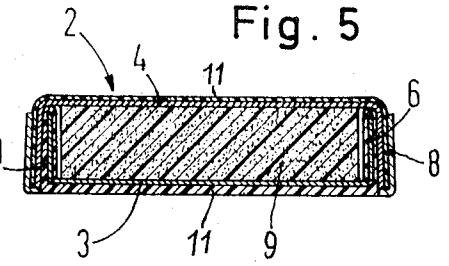


Fig. 6

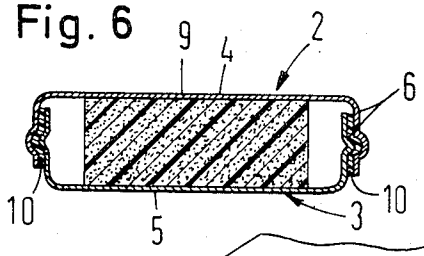


Fig. 7

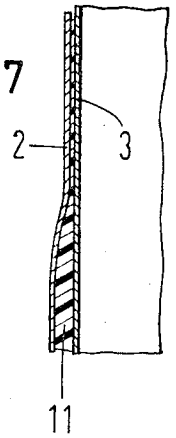
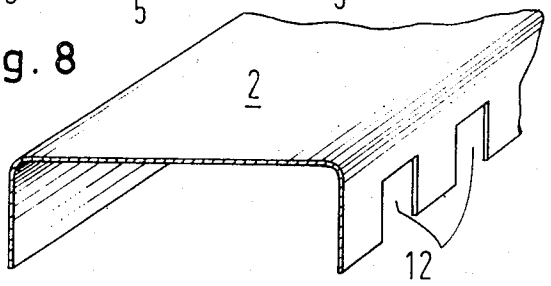


Fig. 8



SKIS

The present invention relates to skis with an elongated hollow girder made up of at least two shells.

A ski with a hollow girder made up of two shells is referred to in the Specification of the German Gebrauchsmuster Specification 1,918,146. One of the shells is in this case bent into an U-shape while the other is constructed as a substantially flat plate. The two shells made of steel are welded in their edge parts and thus form a compound body with a high flexural and torsional stiffness.

It has been found that it is not only the flexural and torsional stiffness which influence the properties of a ski, but that the damping of flexural and torsional vibrations influence the behavior of a ski in use.

Skies with damping properties have been previously produced using a sandwich construction. In the case of such a previously proposed construction two elongated plates, for example of aluminum have lamellar cores, for example of wood, laid between them. In this respect manufacture of the skies is complicated and expensive.

For improving damping while maintaining a favorable flexural and torsional stiffness there is the feature provided in accordance with the invention that the two shells have approximately parallel surface parts, with a spacing of at least 0.2 mm, at a position adjacent to each side wall of the ski, and these surface parts are connected together rigidly by means of a shock absorbing plastic. The invention provides for simple production because the shells fitted together can readily be glued by the shock absorbing plastics material. The plastics layer increases the damping properties in a particularly favorable manner.

Measurements carried out on control skis and skis in accordance with the invention gave the following results.

Three ski bodies were compared:

1. A hollow girder of duralumin with a thickness of 1 mm made up of two U-shaped shells which were glued together at their side edges with a spacing of 1 mm using polyurethane. The dimensions of the hollow girder were 500 × 70 × 8 mm.

2. A hollow girder with the same measurements and of the same material in which the U-shaped girder was welded with a plate to form a box structure.

3. The end of a ski in the upper price bracket with good damping properties with the same breadth and length and on average the same constructional height.

The three structures were so held that in each case a piece 250 mm long could freely vibrate. They were bent at the free end with a force of 5 kp. The force was suddenly removed by burning through a thread and the vibrational behavior of the pieces was determined without making contact (inductively).

As a measurement for the damping of the flexural vibration excited in this manner the half-life (time elapsing between beginning of vibration and the point in time at which the amplitude had sunk to half of the initial value) was registered.

In the case of the structure (1) the half-life amounted to 20 m s, in the case of structure (2) 100 m s and in the case of structure (3) 80 m s.

The construction in accordance with the invention thus provides for a substantially better damping effect than welded aluminum constructions or present high quality plastic skis.

It is advantageous to use polyurethane as a plastics material because this material has good adhesive properties and in accordance with the invention also has excellent damping properties.

In the case of one embodiment of the ski in accordance with the invention at least one of the shells has an U-shaped cross section whose limbs are arranged with a spacing from the associated surface parts of the other shell. It is, however, particularly advantageous for the two shells to have an U-shaped cross section, the limbs being connected by a plastics material layer of 0.2 mm in thickness. In this respect at a position adjacent to the connecting position of the two shells steel edge strips can be provided which are preferably made so that they can be interchanged.

In the case of a preferred embodiment the shells are made of a metal, for example aluminum or steel.

It is, however, also possible to produce the shells with a glassfiber reinforced plastics material.

The ski in accordance with the invention can be particularly economically produced by a method in which the two pre-fabricated shells are first fixed together loosely to form a hollow girder, then heated in a mold preferably to a temperature above 100°C and then at least in the zone of the spaced surface parts filled with plastics material. In order to increase the damping properties still further and reduce the weight of the ski, before the fitting together of the shells a foam material body can be placed inside which at least partially fills the cavity of the girder to be formed. In a particularly advantageous manner a foam body can be placed inside in a mold and have plastics material cast round it. The plastics material surrounds the hollow girder in one piece giving it its external profile and sticks together the spaced surface parts of the shell.

By means of recesses in the side faces of the shells and for different thickness of the connecting positions of the side faces it is possible to influence the running properties of the ski.

Embodiments of the ski in accordance with the invention are now described with reference to the drawings.

FIG. 1 shows a ski in side view schematically.

FIG. 2 shows a hollow girder made up of two shells, in cross section schematically.

FIG. 3 shows a hollow girder similar to FIG. 2 schematically.

FIG. 4 shows a somewhat differently shaped hollow girder in cross section.

FIG. 5 shows schematically a hollow girder made up of two U-shaped shells.

FIG. 6 shows schematically a hollow girder corresponding to FIG. 2 but somewhat altered in details.

FIG. 7 shows a glued joint with a varying thickness.

FIG. 8 shows part of a shell with recesses.

The ski shown in FIG. 1 has at least one part of its length as an elongated hollow girder **1**, which is made up of at least two shells. As is apparent from FIG. 2 the two U-shaped shells **2** and **3** are provided in this first embodiment. The base surfaces **4** and **5** form the top and bottom sides of the ski. At a position adjacent to the side walls **6** of the ski the two shells **2** and **3** have parallel surface parts formed by the U-limbs, which are arranged with a spacing between each other. The spacing amounts to at least 0.2 mm and is intended for receiving the shock absorbing plastics material, such as polyurethane, which connects the two shells **2** and **3**.

This plastics material glues the shells **2** and **3** together to form a flexurally and torsionally stiff compound body whose flexural and torsional vibrations are considerably damped.

The embodiment shown in FIG. **2** has steel edge strips **8** arranged in a replaceable manner adjacent to the connecting point between the two shells **2** and **3**. The strips **8** are fixed in one of the two side walls of the shells. Furthermore in the cavity formed by the two shells there is a foam material body **9** extending along the whole length of the hollow girder and fills up this cavity at least partially.

In the case of the cross sections shown in FIGS. **3** to **8** like parts are denoted by like reference numerals. The spaced connecting points spaced by a plastics material layer of at least 0.2 mm in thickness are denoted by reference numeral **10**.

FIG. **5** shows schematically two U-shaped molded girders **3, 4** which are encased with polyurethane **11**. In this case the adhesive layer **10** connecting the girders **3** and **4** at their side surfaces **6** has a thickness of approximately 0.8 mm. The girders **3** and **4** are encased with a polyurethane layer **11** and form a cavity, which

is filled with a foam material core **9**. The side faces **6** of the girders **3** and **4** carry external steel strip bodies **8**.

FIG. **7** shows part of a hollow girder with a connecting part **11** of different thickness, which is filled with plastics material.

FIG. **8** shows a shell **2** with recesses **12** which are arranged for modifying the running properties of the ski.

The embodiments of the invention in which an exclusive property or privilege is claimed are as follows:

1. A ski comprising at least two elongated hollow girders forming shells and being U-shaped, the shells having surface parts which are generally parallel and have a spacing of at least 0.2 mm at each side wall of the ski, the surface parts being connected together allowing relative movement by a shock absorbing plastics material to form a vertically aligned shock absorbing sandwich structure.

2. A ski in accordance with claim **1** in which the breadth of the joint gap varies as seen in cross through the ski along the length of the limbs.

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