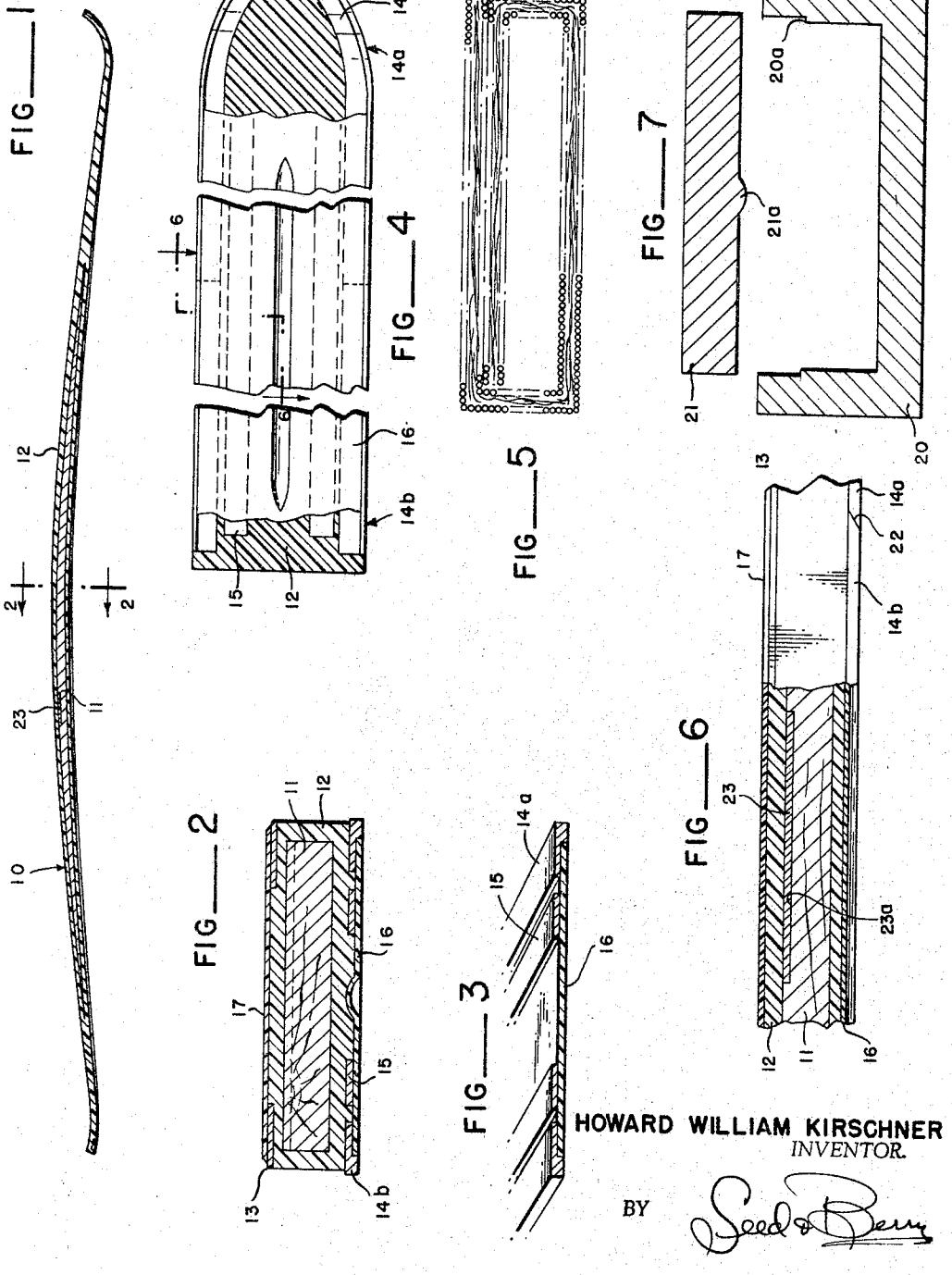
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The present invention relates to snow skis of the type in which fiber-reinforced plastic is used as a structural material and incloses a void or low density core extending along a major part of the length of the ski.

While skis of this type have numerous advantages there have been certain attendant disadvantages, as for example, susceptibility of the upper edges of the ski to becoming badly worn or punctured by the running edges of the skis if the skis are crossed during use. The present invention aims to provide protection for the upper edges of the skis without at the same time causing changes in the camber of the skis under various temperature conditions otherwise detracting from the performance level of the skis. The invention also aims to carry out this objective without complicating the manufacturing procedure and unduly raising production costs.

Another object of the invention is to provide an improved protective running edge arrangement for skis which does not have any tendency to tear loose from the body of the ski, particularly at the tip, under adverse skiing conditions.

Another object of the invention is to provide a ski having an unusually high strength to weight ratio and superior compressive strengths without change of camber responsive to temperature change.

Another object is to provide a ski having a dampening effect allowing a soft tip but which still retains good holding characteristics on ice.

The invention further aims to provide such a ski which will have good screw-holding power for retaining bindings, particularly of the swivel-heel type.

Other more particular objects and advantages of the invention will, with the foregoing, appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIG. 1 is a longitudinal vertical sectional view of a ski embodying the present invention;

FIG. 2 is an enlarged transverse vertical section taken on the line 2—2 of FIG. 1;

FIG. 3 is a transverse cross-sectional view of a sub-unit of the ski before the final assembly thereof;

FIG. 4 is a fragmentary detail bottom plan view of the ski with parts broken away, and showing in phantom the forming at the tip of the forward running-edge strips;

FIG. 5 is a transverse cross-sectional diagrammatic view of the fiber layer in the envelope which surrounds the core;

FIG. 6 is a detail fragmentary longitudinal vertical sectional view taken along the line 6—6 of FIG. 4; and

FIG. 7 is a transverse sectional view of a mold for forming the ski.

Referring to the accompanying drawings, it is seen that an improved ski **10** constructed according to the present invention does not depart in size or shape from a conventional ski. In production the length, width, thickness and camber may be varied according to skier preference and requirements and do not constitute part of the invention. Sheet metal screws or other suitable fasteners may be used to mount the choice of bindings (not shown) for boot retention.

As is conventional, the thickness of the ski varies along its length, being greatest at the center where the bending moments are normally the maximum when the ski is in use. Also, the ski is given a longitudinal camber along the major part of its length and tilts up slightly at the rear and more predominately at the front whereat the ski also tapers inwardly to a tip. The thickness of the ski along any given transverse cross-section is shown substantially constant, but this is not essential to the practice of the teachings of the invention.

In general, the ski **10** comprises a core **11** enclosed by a fiber-reinforced synthetic resin envelope **12** to which are secured top edge protective strips **13**, running edge protective strips **14***a*–**14***b*, and compensating strips **15**. There is also provided a bottom running layer **16** and a top decorative layer **17**. The core **11** is basically a filler and may be formed of wood, such as spruce, or some other low density material preferably, although not essentially, having relatively good shear strength. It is given a camber and thickness taper substantially in conformance with the finished ski through the central portion of its length and is feathered at its ends. While the core **11** is illustrated as being formed from a single piece of wood, in which case it is preferred to have the wood grain extend longitudinally of the core, it is to be understood that it may be a laminated, cellular or hollow structure. It is preferred that the core, either in its natural state or by the provision of a coating, not absorb to any appreciable extent the resin used in the envelope.

As shown in FIG. 5, fibers for the envelope **12** may be arranged in three layers. The two outer layers each comprise juxtaposed continuous fiber strands extending the full length of the ski, the strands being initially held in their juxtaposed relation in any suitable manner such as by transverse bands of plastic. Since the primary purpose of the middle layer is to provide transversely or diagonally extending fibers this can be accomplished by providing a woven fiber mat. Glass fibers are preferred for all of the layers, but it is to be understood that other high-strength fiber may be suitable. It is also to be understood that the described fiber layers can be varied in arrangement or numbers, the primary purpose being to provide a substantial number of full length fibers so as to impart the desired bending strength to the ski and to also have some of the fibers extending crosswise of the ski to resist torsional deflection, particularly near the ends of the ski. Thus, the fibers may be provided in the form of yarn, cloth, mat, threads or cord to give the desired results.

It is preferred to provide the upper part of the envelope with the greater strength. This is accomplished by first superimposing the fiber layers upon one another in flat relation to form a laminated flat sheet, and then, after saturating the sheet with the resin and laying thereon the core, botom face downward, wrapping first one side and then the other side of the sheet around the core so that the two longitudinal edge portions of the resulting envelope are in overlapping relation as shown in FIG. 5, thereby giving the top of the ski above the core a double thickness of fibers relative to the portion of the envelope beneath the core. The envelope is made the length of the desired ski (longer than the core) and is cut to a taper at the front in the general manner of the tip of the finished ski. A suitable thermosetting resin such as an epoxy characterized by good adhesiveness and flexibility is used for the envelope.

The running edge strips may be formed of tempered high carbon steel or some other suitable hard non-brittle material and are of a general L-shape in transverse cross-section so as to cover over the outer edges of the running layer. Instead of providing a respective running edge for each side of the ski as has been conventional in the ski art, I provide a front strip **14***a* and a pair of back strips **14***b*—**14***b* which meet approximately half way

along the length of the ski at a pair of scarf joints **22**. As indicated in phantom in FIG. 4, the front running strip **14***a* has its inner leg **14***a'* formed with a generally V-shaped cutout **24** midway the length of the strip so that the strip may be bent at the apex of the V to conform with the lateral taper at the tip of the ski. The curvature at the rear of the ski is gradual enough to permit the rear edge strip **14***b* to be die-formed in correspondence therewith.

The protective strips **13** and the compensating strips **15** are preferably of like material, and may be of a tempered aluminum alloy, or of the same material as the running-edge strips. Although the compensating members **15** are shown in strip form they can be in rod form as well.

Also provided on the ski of the present invention, at the proximate boot heel position, is an aluminum mounting plate **23** which extends laterally between the upper protective strips **13** and is seated in a transverse recess **23***a* in the top of the core **11**. This mounting plate has superior holding power for holding sheet metal screws to the plastic envelope **12**.

FIG. 7 illustrates the use of a mold suitable for constructing the improved ski. The mold is inclusive of a female member **20** having its cavity dimensioned and contoured to conform to the upper surface and edge formation of the finished ski. The mouth of the mold **20** is formed with a small peripheral step **20***a* to provide a relief point for the outer edge of the running edge strips **14**. The male die member **21** is shaped to conform to the lower surface of the finished ski as defined by the outer edges of the strips **14** and has a central ridge **21***a* through the major part of its length to provide the conventional center running groove.

The running layer **16** can be formed from a sheet of polyethylene or some other suitable material preferably of low moisture absorption and with low coefficient of friction, which is tough and highly abrasion resistant. As indicated in FIG. 3, preparatory to the molding operation the running-edge strips **14***a*–**14***b* and the tension strips **15** are bonded by a suitable adhesive to the upper face of the running layer to form a composite sub-unit. This sub-unit is placed in the top of the mold **20** in inverted position after the mold has been charged with the protective strips **13** along its lower corners and the envelope-covered core in inverted position. The resin is preferably applied to the fiber laminations of the envelope **12** before the core is wrapped therein. After the mold is fully charged the male die **21** is pressed therein under about 100 p.s.i. pressure and the mold heated to about 160° F. After partial cooling the ski is discharged, stress-relieved, and cured. Then the decorative top layer **17** is bonded in position by a suitable adhesive.

The finished ski maintains a substantially constant camber under varying temperature conditions because stresses created by thermally-induced changes in length in the upper protective strips **13** are compensated for by like effects on the strips **15**. In addition to its protection function, the strip **13** is also valuable in contributing compressive strength to the ski, particularly in the tip portion forward of the core **11**, without detracting from the performance level. The novel arrangement of the continuous running-edge strips **14***a*–**14***b* securely holds them in place even under extremely adverse skiing conditions, and helps to resist warping.

It is believed that the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is accordingly my intention that no limitations be implied and the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. A ski comprising, an elongated core of low density material, top and bottom layers of high density, resinous, fibrous material bonded to the upper and lower faces of said core, protective strips secured along the upper longutudinal edges of said top layer, running-edge strips secured along the bottom longitudinal edges of said bottom layer, and compensating means secured to said bottom layer and extending longitudinally thereof for balancing stresses created by temperature changes in said upper protective strips.

2. A ski according to claim **1** in which said upper protective strips and said compensating means are formed of the same material.

3. A ski according to claim **1** in which said upper protective strips are formed of tempered aluminum, and in which said compensating means comprises a pair of tempered aluminum strips.

4. A ski according to claim **1** in which said core comprises a wood piece feathered at its ends and with its grain extending longitudinally of the core.

5. A ski according to claim **1** in which said top and bottom layers are provided by an envolope which encloses said core and extends well beyond at least one end of the core to form the tip portion of the ski.

6. A ski according to claim **5** in which said protective strips and compensating means are bonded to said envelope.

7. A ski according to claim **1** in which said compensating means comprises a pair of longitudinal strips of the same material as said upper protective strips and located between said running edge strips.

8. A ski according to claim **1** in which a running layer is bonded to said bottom layer, compensating means, and running-edge strips for providing the bottom running surface of the ski.

9. A ski according to claim **8** in which a decorative layer is bonded to the top of said top layer and protective strips.

10. A ski according to claim **1** in which said top layer includes a plurality of continuous glass fibers.

11. A ski according to claim **1** in which said running-edge strips comprise a front continuous strip having its two ends at the central part of the ski and extending continuously therefrom around the tip of the ski, and back strips continuing rearwardly from said two ends of the front strip.

12. A ski according to claim **11** in which the front and back strips meet at a pair of beveled butt joints in which the front strip overlaps the back strips.

13. A ski according to claim **1** in which said top and bottom layers are formed by a resin-impregnated laminated fiber sheet which encloses said core and has its longitudinal side edge portions overlapped on the top of the core.

14. A ski according to claim **13** in which a majority of the lamina comprise continuous glass fibers extending the length of the sheet.

15. A ski according to claim **1** in which a mounting plate for ski bindings is secured to said core.

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