Dec. 22, 1959 F. TAVI 2,918,293

SKI HAVING TENSIONING MEANS

Filed Oct. 24, 1957

FIG. 1.

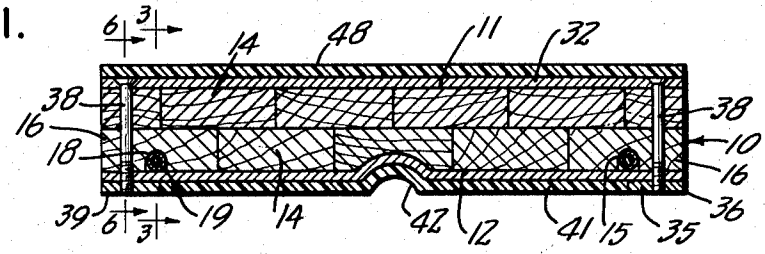


FIG. 2.

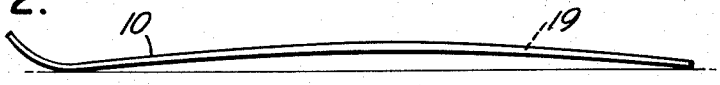


FIG. 3.

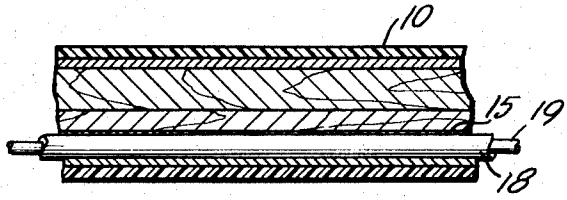


FIG. 8.

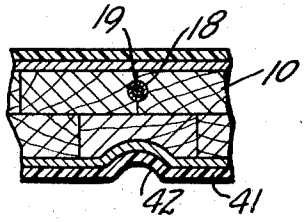


FIG. 4.

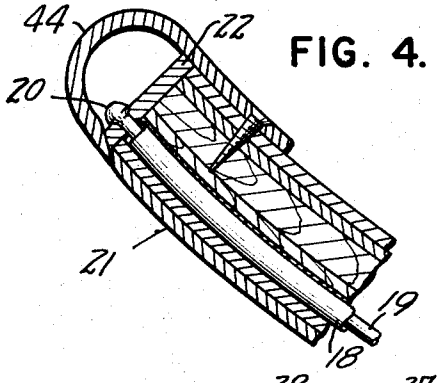


FIG. 5.

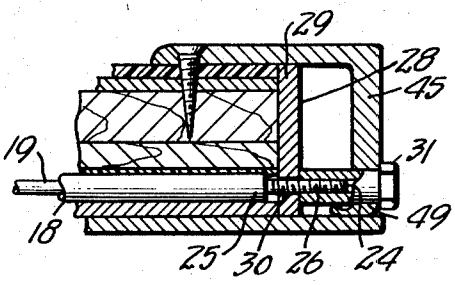


FIG. 6.

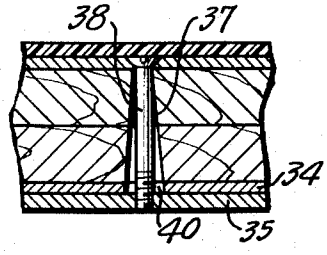


FIG. 7.

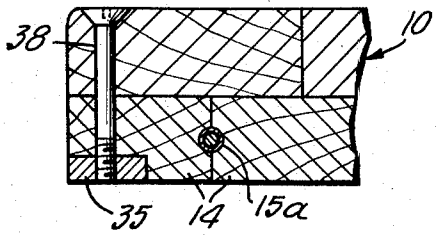
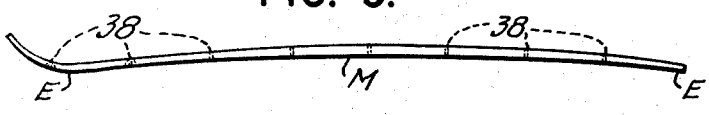


FIG. 9.



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SKI HAVING TENSIONING MEANS

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4 Claims. (Cl. 280—11.13)

This invention relates to skis and more particularly to skis variable at will in stiffness and camber.

One object of the invention is to provide a means for varying the stiffness of skis.

Another object is to provide means for varying the camber of the ski.

Still another object is to provide a means for securing continuous steel edge-strips to the ski and which strips will not work loose or buckle when the camber of the ski is varied.

Another object is to provide a ski of laminated construction in which the laminations are drawn more tightly together as the ski is excessively flexed, as in accidents.

Another object is to provide a ski in which continuous steel edge-strips may be easily replaced if they become damaged.

Another object is to increase the strength of a ski.

And yet another object is to minimize vibration of the ski.

Still another object is to provide means for varying the stiffness of the ski which means will be light in weight, noncumbersome, and will not interfere with boot fastenings or bindings, or protrude to gather snow or become caught on objects nearby.

The inventive features for the attainment of these and other objects are shown in connection with a ski having at least one recess, hole, or raceway extending the substantial length thereof with a tension member secured at one end and having means at the other to alter the effective length of the member with respect to the ski to cause the ski to bow. Yieldable means are provided for mounting steel edge strips on the bottom of the ski.

In the accompanying drawing showing, by way of example, several of many possible embodiments of the invention,

Fig. 1 is a transverse cross section of the ski;

Fig. 2 is a diagrammatic representation of the ski as seen from the side showing the tension members;

Fig. 3 is a fragmental longitudinal sectional view of the ski;

Figs. 4 and 5 show details of the front and rear ends of the ski;

Fig. 6 is a fragmental sectional longitudinal view showing means for mounting the edge strips;

Fig. 7 shows a modification of the invention;

Fig. 8 shows another modification of the invention, and

Fig. 9 shows the spacing of the means for securing the edge strips of the ski.

The ski comprises a longitudinal wooden strip **10** forming the body of the ski and having upper and lower faces **11** and **12**. The strip may be solid but preferably is built up from strip elements **14** secured together by adhesive. The lower face **12** is provided with a pair of substantially parallel grooves, one in each lateral portion **16** of the strip and substantially the length thereof.

A tube **18** of yieldable metal such as aluminum is disposed in each groove and extends substantially the

length thereof. A wire **19** in each tube is secured at its forward end **20** against rotation and rearward movement relative to the forward end **21** of the ski body by being made fast to a toe-piece **22**. The rear end **24** of the wire projects rearwardly of the rear end **25** of the tube and strip and is provided with threads **26**. The rear end **24** passes through an abutment plate **29** against the rear end **28** of the strip, the plate being provided with holes **30** for allowing the wire rear ends to extend rearwardly of the plate. A long nut **31** is provided on each wire rear end for engagement against the abutment plate, to draw up on the wires and put the strip under compression along the under portion thereof.

A resilient aluminum alloy top sheet **32** is disposed over said upper face and bonded thereto, and a similar lower sheet **34** over the lower face and bonded thereto, covers the grooves **15**. Stainless steel edge-strips **35** having an exposed outer and lower edge **36** are disposed against the lower face of the lower sheet at the marginal portions **16** of the sheet and wooden strip and for substantially the length thereof. The edge strips are secured to the ski body by screws **38** passing through provided holes **37** in the upper sheet, wooden strip, and lower sheet and in fast threaded engagement with the edge-strips, the screws being flush with the lower face **39** of the edge-strips. The holes toward each end of the ski have oval cross section with an increasing major axis as at **40** (Fig. 6) parallel with the direction of the strip as the section is taken from the upper to the lower sheets to permit longitudinal slippage of the edge-strips when the ski is flexed.

A runner sheet **41** of plastic is secured to the lower face of the lower sheet between the edge-strips and flush therewith. The lower face of the ski may be provided with a median groove **42**.

Suitable front and rear caps **44** and **45**, shaped so as not to interfere with normal skiing may be provided to give the ski a finished appearance.

While the invention as shown in Fig. 1 is preferable, the grooving at **15** may be replaced by bores **15***a* (Fig. 7) particularly if the ordinary wooden-type ski is desired. The provision of such bores is no great problem since the elements **14** need only be grooved before assembly and the tubing **18** inserted before the elements are bonded together. In fact, in the construction of the invention of Fig. 1 resin or plastic is used for bonding the lower sheet **34** to the body and the resin enters the grooves **15** about the pre-disposed tubes. Nor is it necessary that the bores or grooves always be in the lower portion of the ski; at least a portion of the bore may be in the upper portion as in Fig. 8. This Fig. 8 is included to show that the bore may be intermediate the marginal portions **16**. Combinations of various positions may be used so as to compensate for warp and to concentrate camber in different locations along the ski.

The aluminum alloy sheets **32**, **34** are preferably of aircraft aluminum alloy 7075–T6 of the order of a few hundredths of an inch thick, say 0.03". This material has elasticity and will stretch and retract with the wood. Prior to bonding it to wood it is advisable to give the sheet a primer treatment with casein-latex emulsion to insure a good bond. Suitable commercial adhesives may be used to make the bond. The runner sheet **41** may be of suitable material already in use for the purpose, such as pyroxylin. Sun glare reflected from the upper cover sheet may be prevented by a covering 48 of, say, plastic.

The wires are of the order of .09 inch in diameter, and fit fairly well in the aluminum tubing without vibration. Tension on the wires is varied by turning the nuts **31**, the threading of which is preferably fine so as to obtain close adjustment, lessen twisting of the wires

and reduce tendency for the nut to work loose. The latter condition can be avoided by having the cap **45** provided with a hole **49** to provide frictional engagement with the nut.

When the wires are drawn up the camber of the ski is increased with a corresponding amount of slippage between the edge-strips **35** and the ski body **10** and lower sheet **34**, the body and sheet being substantially integral.

It is preferable that the slippage be divided between each end E of the ski, for in practice the total slippage may amount to as much as ⅜ inch in a 6 foot ski, or 3/16 at each end. Accordingly, screws in the mid-portion M of the ski (Fig. 9) pass through cylindrical holes in the wood and lower cover to fasten the edge-strips securely, while toward each end E the hole flares toward the bottom as in Fig. 6 longitudinally of the ski but not transversely thereof. The cross section is, substantially the entire length, the same as in Fig. 1.

The screws **38** are case hardened and self tapping so that the screw becomes almost integral with the stainless steel edge-strip, but the yieldability of the screw, and to some extent of the strip, permits the required slippage.

The screws **38** also have the function of binding the aluminum sheets more tightly to the wood when the ski is excessively flexed as in accidents. In most ski constructions the aluminum sheets become separated from the wood during great flexing. An inspection of Fig. 6 shows that flexing, with slippage of the steel strips **35**, tends to draw the laminations of the ski closer together except for the thin plastic layer **48**.

A ski has a tendency to chatter or vibrate in use on certain types of snow. In the present ski this vibration is appreciably dampened by the rubbing of the edge strip on the lower cover sheet **34** so that the energy normally present to sustain the vibration is dissipated as frictional heat.

The loss in strength of the wood due to the grooves **15** or bores **15***a* is more than counterbalanced by the steel edge-strips **35** and wires.

The present invention does not interfere with boot binders, is light, permits a wide range of adjustment and leaves the ski with a conventional appearance.

The wood may be of a type used for conventional skis.

Still other modifications may be made by those skilled in the art, for instance the strip **35** may be omitted if the wood has sufficient strength. Of course the wire must normally lie remote from the plane of flexure of the ski.

The invention claimed is:

1. A ski comprising a longitudinal strip forming the body of the ski and having upper and lower faces and an upturned forward end portion; an end piece substantially across the forward end of the body; the body being provided with a pair of substantially parallel bores, one in each lateral portion of the strip and substantially the length thereof and nearer the lower face than the upper face; a wire in each bore and secured fast to the said end piece, the rear end of the wire projecting rearwardly of the rear end of the strip and provided with threads; abutment means against the rear end of the strip and provided with holes for allowing the wire rear ends to extend rearwardly of the abutment means, and a nut on the end of each of the wires for engaging the abutment means and tightening the wires to cause the body to bow.

2. A ski comprising a longitudinal wooden strip forming the body of the ski and having upper and lower faces and an upturned forward end portion; an end piece substantially across the forward end of the body; the lower face being provided with a pair of substantially parallel grooves, one in each lateral portion of the strip and substantially the length thereof; a tube in each groove and extending substantially the length thereof; a wire in each tube and secured fast to the said end piece, the rear end of the wire projecting rearwardly of the rear end of the tube and strip and provided with threads; an abutment plate against the rear end of the strip and provided with holes for allowing the wire rear ends to extend rearwardly of the plate; and a nut on the end of each of the rear ends of the wire and engaged against the plate.

3. A ski comprising a longitudinal wooden strip forming the body of the ski and having upper and lower faces and an upturned forward end portion; an end piece substantially across the forward end of the body; the lower face being provided with a pair of substantially parallel grooves, one in each lateral portion of the strip and substantially the length thereof; a tube in each groove and extending substantially the length thereof; a wire in each tube and secured fast to the said end piece, the rear end of the wire projecting rearwardly of the rear end of the tube and strip and provided with threads; an abutment plate against the rear end of the strip and provided with holes for allowing the wire rear ends to extend rearwardly of the plate; a long nut on each wire rear end for engagement against the abutment plate, a resilient aluminum alloy top sheet over said upper face and bonded thereto, and a similar lower sheet over the lower face and bonded thereto and covering the grooves; a pair of steel edge-strips, each having an exposed outer and lower edge, disposed against the lower face of the lower sheet at the marginal portions of the sheet and wooden strip and substantially the length thereof; screws passing through provided holes in the upper sheet wooden strip and lower sheet and in fast threaded engagement with the edge-strips, the screws being flush with the lower face of the edge-strips, the holes toward each end of the ski having oval cross section with an increasing major axis parallel with the direction of the strip as the section is taken from the upper to the lower sheets to permit longitudinal slippage of the edge-strips when the ski is flexed; and a runner sheet of plastic secured to the lower face of the lower sheet between the edge-strips and flush therewith.

4. A ski as claimed in claim 3, the edge-strips being secured fast to the body at the mid portion thereof.

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