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3,538,627

FOOTWEAR EQUIPMENT UNIT FOR SKIING AND OTHER PURPOSES.

Filed March 5, 1969

4 Sheets-Sheet 1

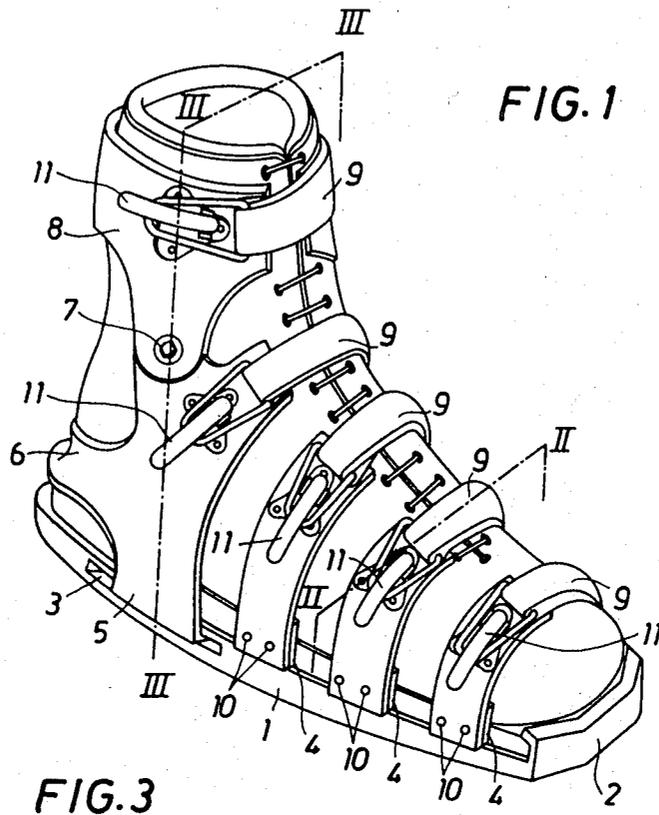


FIG. 1

FIG. 3

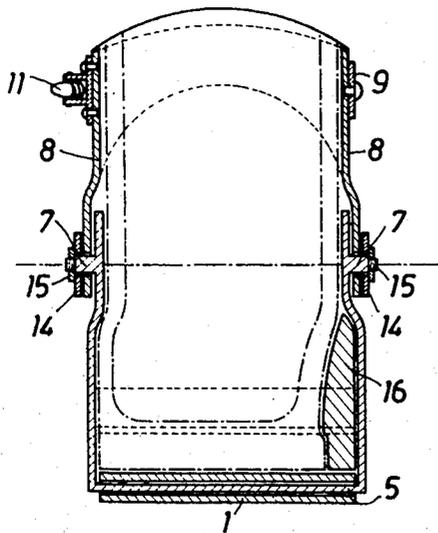


FIG. 2

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FIG. 4

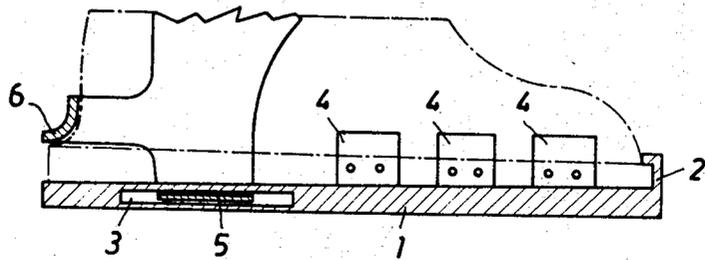


FIG. 5

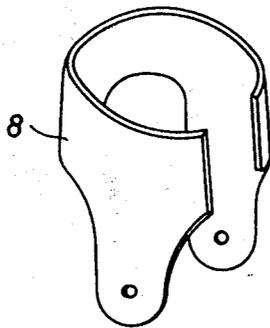


FIG. 6

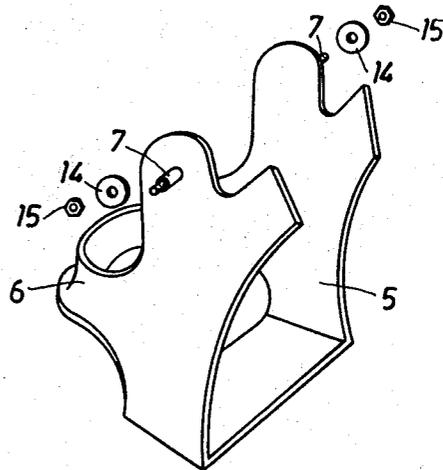


FIG. 7

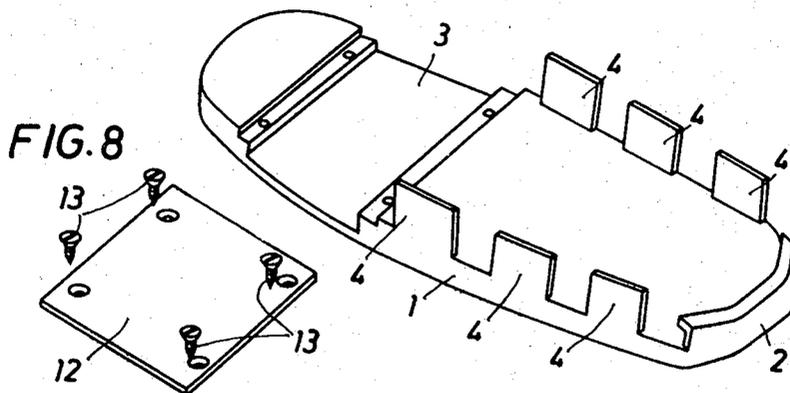
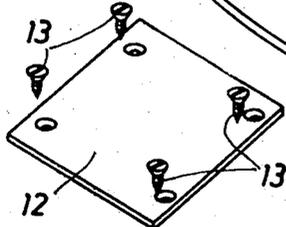


FIG. 8



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FIG. 9

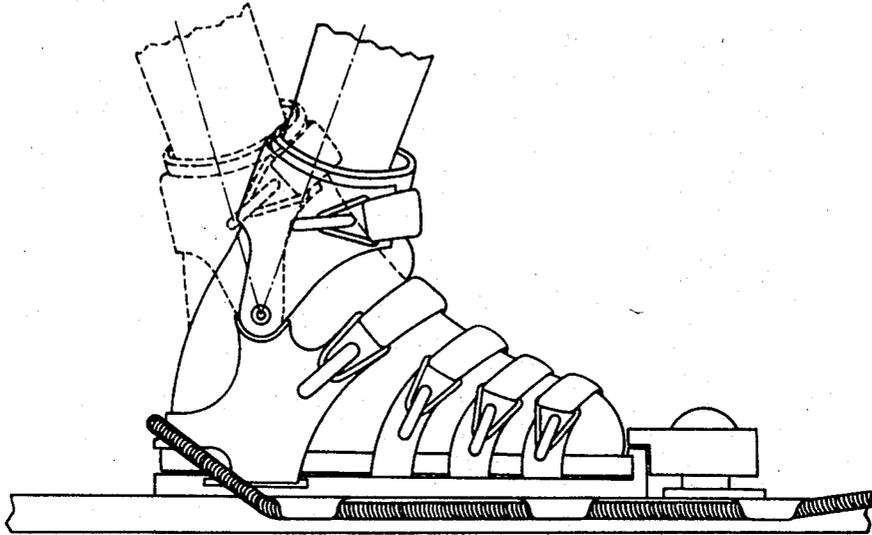
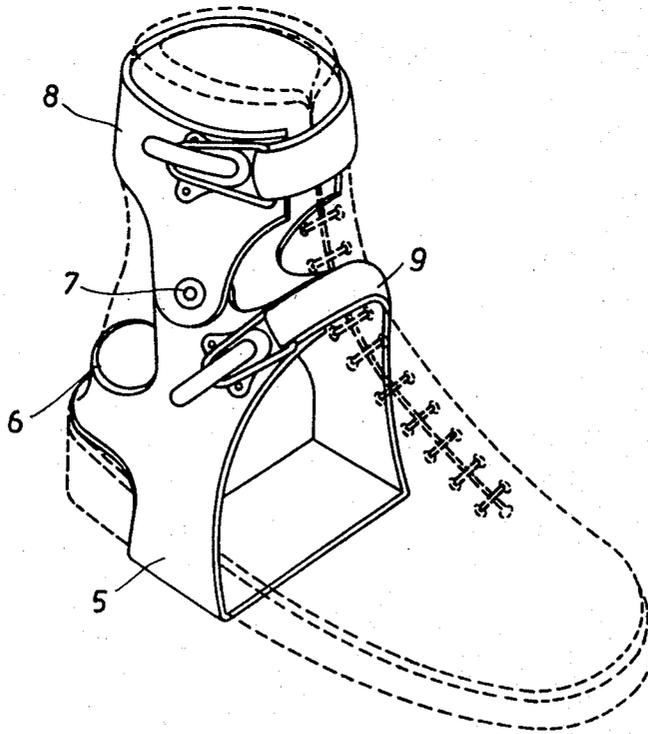


FIG. 10



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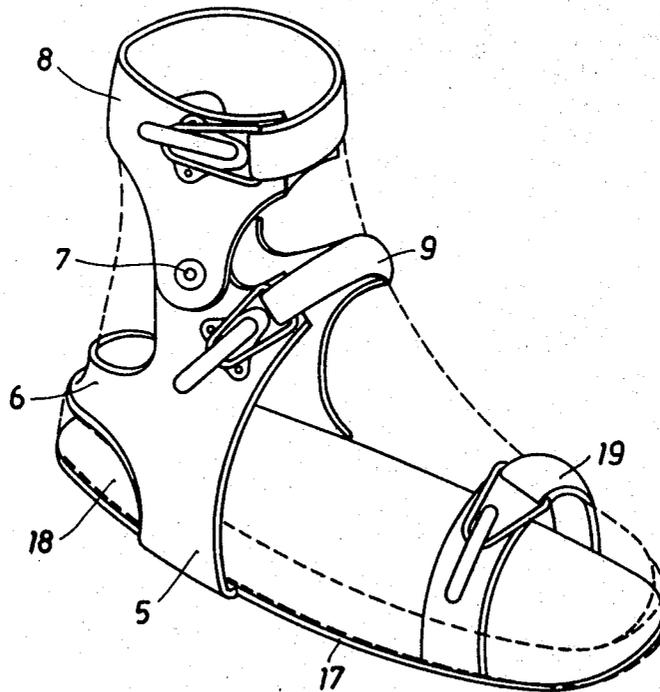
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FIG. 11



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**FOOTWEAR EQUIPMENT UNIT FOR SKIING
AND OTHER PURPOSES**

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142,661

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U.S. Cl. 36—2.5

10 Claims

ABSTRACT OF THE DISCLOSURE

Ski equipment including a shoe and an outer strengthening support which fits over the shoe and having two superposed elements pivoted to each other about an axis coinciding with the axis of the tibio-tarsal articulation of the foot. A portion of one of the support elements extends under the sole of the shoe.

Skiing as a sport has demonstrated the paramount importance of precision in swerving. Swerving is carried out as a result of combined movements of lateral inclination of the body and of the legs and calls for virtually perfect lateral rigidity at the level of the ankle in order to ensure easy and efficient execution of this movement. On the other hand, it is also essential to ensure that the forward and backward pivotal motion of this ankle articulation should be as free as possible since this is indispensable for achieving satisfactory balance and assuming the position which is best suited both to the slope and the speed.

The special boots employed for skiing at the present time satisfy these conditions only to a very partial extent. When lateral rigidity is achieved, boots of this type do not usually permit of free pivotal movement of the ankle in both forward and backward directions. In the majority of cases, this imperfect result is obtained by using boots of unnecessary weight and volume as well as by excessive tightening of the fastening devices.

These conditions usually produce stresses which frequently impose unfavorable conditions for skiing and also hinder the wearer to a considerable extent when walking if he does not slacken off the fastening straps. This can prove hazardous for the skier who may be obliged to abandon his skis accidentally and to walk in deep snow or on a skiing course.

The aim of this invention is to provide a remedy for this state of affairs and to achieve a number of other effects as well as to obtain a number of advantages.

To this end, the invention is directed to a footwear equipment unit which is primarily characterized in that it consists essentially in the combination of a boot or shoe (with flexible high upper or without a high upper) which can be a walking shoe of the usual type or any other type with an outer strengthening support which fits over said boot and affords both rigidity in the transverse direction of the boot and flexibility in the longitudinal plane of said boot in order that, after having been fitted in said strengthening support, said boot should in turn be endowed with rigidity in the transverse direction while retaining its flexibility in the longitudinal direction.

Said strengthening support is also a novel product per se and thus comes within the scope of the invention; the support is characterized in that it is formed by two superposed components which are pivoted to each other about a transverse axis located so as to coincide substantially with the axis of the tibio-tarsal articulation of the booted foot, one of the strengthening support components being

intended to fit at least to a partial extent over the part of the boot which corresponds to the foot while the other strengthening support component fits over that part of the boot which corresponds to the lower end of the leg.

Although the strengthening support can be directly adapted to all types of boots or shoes, the best results will be obtained by making use of a comfortable and flexible shoe with a high upper. This shoe will preferably be of watertight design and laced with eyelets and flat laces for the free support of the connecting and fastening elements of the equipment unit. Light boots in which the upper is maintained by elastic facings or a zip fastening will be employed to useful effect.

In a particular embodiment, the strengthening support comprises two superposed components which are pivotally coupled to each other and one of which is adapted to fit over the foot whilst the other fits over the bottom of the leg, the axis of articulation being located so as to coincide substantially with the axis of tibio-tarsal articulation of the booted foot.

The footwear equipment unit in accordance with the invention can also be usefully employed in ice-skating or roller-skating as well as in orthopedics.

Further properties and advantages of the invention will appear from the following description in which a few embodiments of the invention are given without any limitation, reference being made to the accompanying drawings, in which:

FIG. 1 is a view in perspective showing a boot for the right foot and fitted with a footwear equipment unit in accordance with the invention. The left foot will be fitted with an equipment unit which is wholly similar but symmetrical with respect to the axis of the wearer's body;

FIG. 2 is a view in cross-section taken along the line II—II of FIG. 1;

FIG. 3 is a view in transverse cross-section taken along the line III—III of FIG. 1;

FIG. 4 is a view in longitudinal cross-section taken through the axis of the apparatus;

FIG. 5 is a view in perspective of the movable upper support-component of the equipment unit;

FIG. 6 is a view in perspective showing the sliding double-stirrup component together with the pivot-pins corresponding to the tibio-tarsal articulation;

FIG. 7 is a view in perspective of the rigid sole-plate of the unit comprising: the toe-end abutment, the tenons for securing the fasteners and the groove in which the base plate of the double stirrup of FIG. 6 is adapted to slide;

FIG. 8 is a view in perspective of the cover-plate which serves to close off the groove of the sole-plate together with its fixing screws;

FIG. 9 is a view in elevation of a booted foot fitted with the equipment unit and placed on a ski to which the unit is attached by means of a standard fastening and illustrating the bending and extension of the skier's leg as a result of the pivotal motion of the upper support component about the axes thereof;

FIG. 10 is a view in perspective showing a strengthening support without a sole-plate; and finally

FIG. 11 is a view in perspective showing an alternative form of the strengthening support of FIG. 10.

In the non-limitative form of construction which is shown in FIGS. 1 to 9, the equipment unit comprises:

a single-piece double stirrup, one element 5 of which is located in the true stirrup position whilst the other horizontal element 6 surrounds and conforms to the heel of the boot, the bottom plate of the stirrup 5 being intended to fit in the groove 3 of the sole-plate and to be capable of sliding therein. The two arms

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of the stirrup 5 are each adapted to carry one of the two pivot-pins 7 at the upper ends thereof;

- a pivotal upper strengthening-support component 8 in each of the two lower extensions of which is formed a bore for receiving one of the pivot-pins 7 of the stirrup 5;
- a fastening system which is shown in the drawings by way of non-limitative example and consisting of sets of straps 9 attached by means of rivets 10 to the tenons 4 of the sole-plate 1 as well as to extensions of the stirrup 5 and to the edges of the opening of the split ring which forms the upper leg-support component 8. Said straps which are fixed in this manner are placed in opposite relation in pairs so as to meet on the outer face of the unit on which they are fastened by means of a combination of tightening hooks and buckles 11 of standard design.

In order to ensure more effective attachment as a result of the tightening action produced by the fastening means on the straps, the device can be fitted with bearing packing-pieces in the region of the internal lateral recess of the foot which corresponds to the arch. One of said packing-pieces is shown at 16 in FIG. 3.

The main elements which form the equipment unit, viz: the sole-plate, the double-stirrup component and the pivotal leg-support component will advantageously be formed of rigid and lightweight materials or of materials composed of a rigid internal reinforcement provided with a covering of greater flexibility. By way of non-limitative example, the following materials are suitable for this purpose:

- metal whether solid, cut-out, woven or covered with leather, rubber or plastic material;
- synthetic resins reinforced with metal or fiberglass;
- any material or combination of materials whether reinforced or not and having properties which are considered satisfactory for the purpose of ensuring lateral rigidity and providing a perfect junction between sole-plate and leg in the lateral positioning movements.

The bottom arm or plate of the stirrup 5 is placed within the recess of the sole-plate 1.

The plate 12 is then secured to the sole-plate 1 by means of the screws 13, thus closing the groove 3 within which the bottom plate of the stirrup 5 and consequently the entire stirrup component is capable of longitudinal displacement but, on the other hand, is closely associated laterally with the sole-plate 1.

The upper support component 8 is then fitted in position by inserting the pivot-pins 7 in the bores of each lower extension of said component.

The pivotal assembly thus formed is maintained laterally by placing washers 14 and lock-nuts 15 in position.

The sole-plate, the double stirrup component and the leg support component have previously been fitted with their respective straps provided with fastening hooks and buckles.

The equipment unit is then ready to receive the wearer's boot and the ski.

The boot is inserted between the open straps and the toe end is pushed into the abutment member of the sole-plate.

The wearer then applies the boot against the sole by inserting the heel, ankle and leg in the cradle element formed by the double stirrup component and the upper support component which are coupled by means of the pivot-pins.

The cradle element is then brought into contact with the rear of the wearer's leg and the horizontal stirrup 6 is positioned in the recess formed in the heel of the boot. This accurate positioning of the boot within the equipment unit is carried out by causing the bottom plate of the stirrup 5 to slide within the groove 3 of the sole-plate.

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This sliding insertion also permits the adaptation of a single equipment unit to boots of different sizes.

The fixing straps are then fastened with a sufficient degree of tightness to provide an effective bond between the equipment unit and the boot. The toe and instep straps extend and reinforce the lateral connection between the leg and the sole-plate.

By insertion of the bottom plate in the sole-plate groove, the above-mentioned cradle produces a lateral locking action whereby all lateral positionings and other movements are effectively transmitted to the sole-plate.

The articulation of said cradle in the vertical plane and at the level of the ankle permits extension and bending of the leg relative to the foot and conversely.

The booted foot is then ready to receive a ski to which it may be attached by any means usually employed in the case of conventional ski boots.

These fastening means will rigidly fix the ski to the sole-plate, with the result that a skier who is equipped with the footwear attachment according to the invention will be permitted to carry out turning movements with a high degree of accuracy while retaining ease of bending and extension which are particularly favorable in order to ensure the best positioning as well as to permit walking and cross-country.

In the example shown in FIG. 10, the strengthening support is designed to be employed with a boot having a fairly rigid sole so that said strengthening support is not provided with a sole-plate.

In the alternative embodiment which is illustrated in FIG. 11, the bottom plate of the stirrup 5 is extended by a front tongue 17 and a rear tongue 18, the front tongue being provided with a fastener 19 which passes over the front portion of the boot so as to maintain said tongue in contact with the sole.

What is claimed is:

1. A footwear equipment unit for sports and comprising a shoe and an outer strengthening support which fits over said shoe, said support being attached to said shoe and formed by two superposed components pivoted to each other about a transverse axis located so as to coincide substantially with the axis of the tibio-tarsal articulation of a foot which is engaged in the shoe, one of the strengthening support components being adapted to fit at least partially over that portion of the shoe which corresponds to the wearer's foot whilst the other support component is adapted to fit over the portion of the shoe which corresponds to the lower end of the wearer's leg, so that the shoe should be rigidly maintained in the transverse direction while retaining its flexibility in the longitudinal direction.

2. A footwear equipment unit according to claim 1, wherein the strengthening support component which fits over the portion of shoe corresponding to the foot is provided with a fastening which is intended to pass in front of the instep and comprises a sole-plate and a component having two stirrups one of which is a horizontal stirrup and to pass behind the heel of the shoe whilst the other stirrup comprises a bottom transverse plate which is attached to said sole-plate.

3. A footwear equipment unit according to claim 2, wherein the bottom plate of the double-stirrup component is mounted on said sole-plate so as to be capable of sliding longitudinally with respect to said sole-plate.

4. A footwear equipment unit according to claim 2, wherein the sole-plate is provided with a transverse groove in which is fitted the bottom plate of the double-stirrup component and is provided with a counter-plate which is secured to the sole-plate so as to close off said groove in which said bottom plate is thus imprisoned.

5. A strengthening support for imparting transverse rigidity to a sports shoe which is fitted therein, comprising two superposed components which are pivoted to each other about a transverse axis located so as to coincide substantially with the axis of the tibio-tarsal articulation

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of the wearer's foot which is engaged in said shoe, one of the strengthening support components being adapted to fit at least partially over the portion of shoe which corresponds to the wearer's foot whilst the other support component is adapted to fit over the portion of shoe which corresponds to the lower end of the wearer's leg.

6. A strengthening support according to claim 5, wherein the support component which fits over the portion of shoe corresponding to the wearer's foot consists of a member provided with a fastening means which passes in front of the instep and which comprises two stirrups of which one stirrup is horizontal and is intended to pass behind the heel of the shoe whilst the other stirrup has a bottom transverse plate which is intended to pass underneath said shoe.

7. A strengthening support according to claim 6, wherein the bottom transverse plate comprises an extension directed towards the front end of the shoe and another extension directed towards the rear end of the shoe, said extension directed towards the rear end of the shoe, said extensions forming two tongues which are intended to be disposed beneath the sole of the shoe, the front tongue being provided with at least one fastening which passes over the shoe.

8. A strengthening support according to claim 5, wherein the support component which is intended to fit over that portion of shoe which corresponds to the wearer's

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foot is provided with a fastening means which passes in front of the instep zone and comprises a sole-plate and a member consisting of two stirrups of which one stirrup is adapted to pass behind the heel of the shoe whilst the other stirrup comprises a bottom transverse plate which is attached to said sole-plate.

9. A strengthening support according to claim 8, wherein the bottom plate of the double-stirrup component is mounted on said sole-plate so as to be capable of longitudinal sliding motion with respect to said sole-plate.

10. A strengthening support according to claim 8, wherein the sole-plate is provided with a transverse groove in which the bottom plate of the double-stirrup component is fitted and is provided with a counter-plate attached to the sole-plate for closing off said groove in which said bottom plate is then imprisoned.

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U.S. Cl. X.R.

36—7.5