United States Patent [19]

Sturany

[11] **3,740,873**

[45] **June 26, 1973**

[54] **SKI BOOT WITH A SOLE WHICH RESISTS BENDING**

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[73] Assignee: **Wiener Metallwaren-fabrik Smolka** & Co., Vienna-Mauer, Austria

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[21] Appl. No.: **261,488**

[30] **Foreign Application Priority Data**

June 18, 1971 Austria A5311/71

[52] **U.S. Cl.** ..... **36/2.5 AL**

[51] **Int. Cl.** **A43b 00/00**

[58] **Field of Search** ..... 36/2.5 R, 2.5 AL, 36/2.5 J

[56] **References Cited**

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Primary Examiner—Patrick D. Lawson

Attorney—Woodhans, Blanchard & Flynn

[57] **ABSTRACT**

Ski boot with a rigid or flexible sole. In a ski boot provided normally with a relatively flexible sole, there is provided a stiff insert which is interrupted in the zone of the ball of the foot and is there provided with one or more cross members. Said cross members are contoured to having easy rolling movement with respect to each other or with respect to the adjacent surfaces of the insert. Tension wires are arranged in the sole in the tension zone thereof which wires are anchored at the forward end of the boot and attached to suitable tensioning means at the heel end. These tensioning means may be manually operated or may be operated automatically by the heel binding of the ski, whereby same when actuated will hold the boot sole rigid in condition for effective skiing but when released will permit the boot its normal flexibility.

6 Claims, 7 Drawing Figures

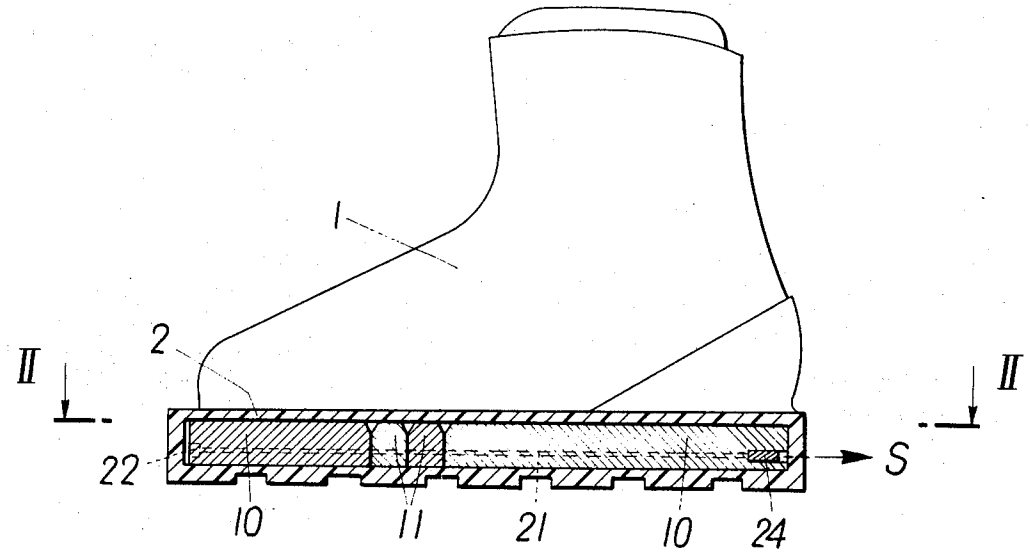


FIG. 1

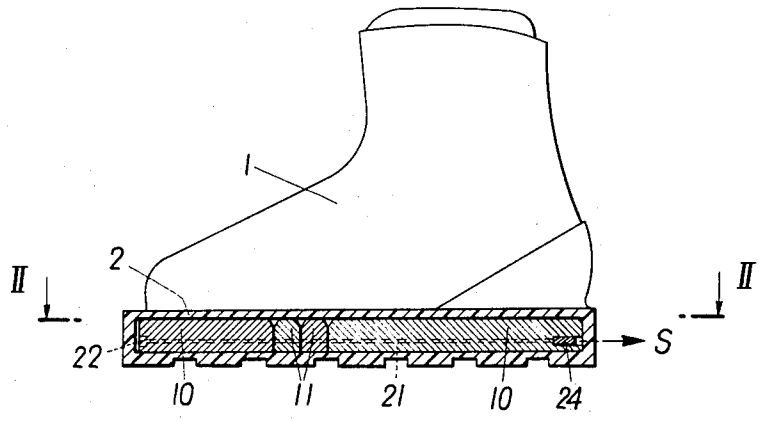


FIG. 1a

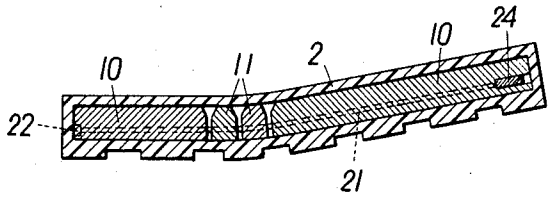


FIG. 2

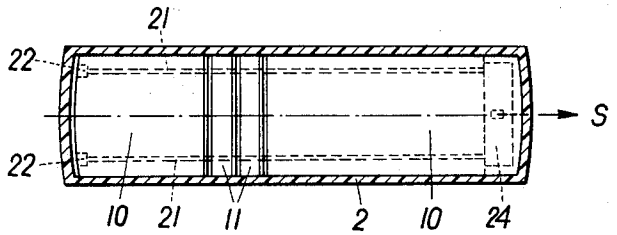


FIG.3

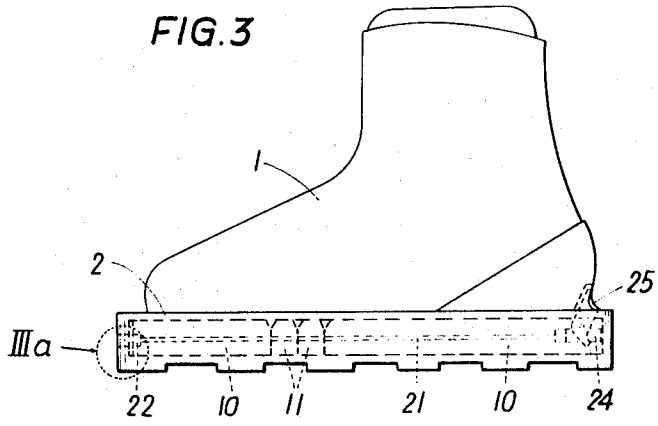


FIG.3a

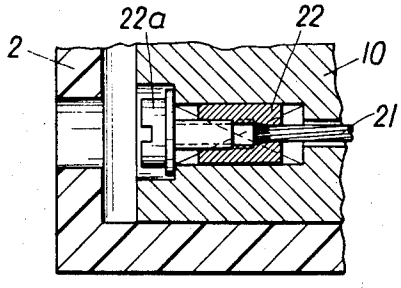


FIG.4

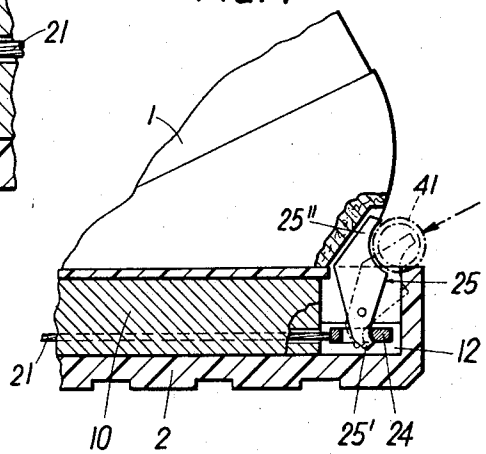
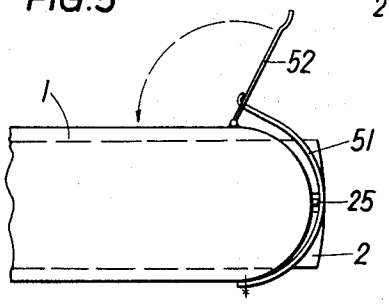


FIG.5



SKI BOOT WITH A SOLE WHICH RESISTS BENDING

The invention relates to a ski boot with a sole which resists bending and which is made for example of leather, plastic or the like.

Due to the influence of modern ski technique — mainly for racing — the ski boots have lately themselves gone through a development of their function from their original condition of quite useable auxiliary walking means to being purely couplings between foot and skis. In other words, the present ski technique requires a substantially lossfree transmission of forces to and from the body and the ski and the ski boot must consequently be as stiff as possible. In addition most safety bindings react correctly only if the ski boot transmits suddenly occurring load peaks without substantial losses — therefore practically without any deformation of the boot itself — to the safety elements of the ski binding. For these reasons, modern ski boots are of completely stiff formation in their position of use and are often molded of one piece and particularly with a highly bending-resistant sole. Thus, with such ski boots easy moving even for only a short time is practically impossible without skis — and a longer walk on foot is still worse.

Therefore it is desired to provide a ski boot with a sole which at one time acquires the desired rigidity upon being fixed to the ski, either through a simple manual operation or automatically by means of the ski binding, and acquires at another time without the ski the movability which is desired for walking.

According to the invention this is achieved in the case of such ski boots, the bending-resistant sole of which consists for example of leather, plastic or the like, in a simple and and satisfactory manner by providing that in the sole member there is completely embedded a pressure-resistant and bending-resistant insert — advantageously of a corrosion-resistant metal — into which advantageously in the zone of the ball of the foot at least one cross member is inserted. This lies transversely over the entire width and is advantageously profiled to have an easy rolling movement with respect to other similar cross members and/or with adjacent surfaces of the insert. This reinforcing insert is connected to a tensioning device which acts in longitudinal direction and can be externally operated, by means of which the entire reinforced sole member is selectively arranged, either to be rigidly fixed (stiff sole) during skiing, or to remain flexible during walking without skis (with a released tensioning device).

In a preferred embodiment of this ski boot, the tensioning device itself consists of two steel wires or the like which are inserted in a longitudinal direction in the tension zone of the hingedly assembled reinforcement insert. These steel wires are secured on the front end of the sole, advantageously adjustably, and are fixedly connected to the heel end, advantageously through a tensioning bar. This tensioning device can be held in extended position by means of a lockable tensioning member which cooperates with the tensioning bar.

The tensioning device includes a two-arm lever which is pivotally supported in the heel end of the reinforcing insert. One end of said lever engages the steel wire, either directly or through the tensioning bar, and the other end in holding position, which projects from the boot sole is held by means of a manually or automatically operable tightening means. In one embodiment the tensioning lever is advantageously held in locking position by means of a separate lever tightening means which is mounted on the ski boot and which grips around the heel and which engages the upwardly projecting lever arm. In another and particularly advantageous development of the tensioning device, the tensioning lever is, during stepping the ski boot into the ski binding, maintained automatically in locking position by means of the heel clamping means of the ski binding, which heel clamping means engages the upwardly projecting arm of the tensioning lever.

The drawings illustrate several exemplary embodiments of the inventively constructed ski boot with a normally bendable sole which can when desired be locked into a bending-resistant condition.

In the drawings:

FIGS. 1 and 1A illustrate such a ski boot, same having a rigid (skiing) sole when the bendable reinforcing insert is locked in rigid condition or having, after unlocking of the reinforcing insert, a bendable walking sole — each figure being in a vertical central-cross-sectional view;

FIG. 2 is a horizontal longitudinal cross-sectional view II—II of FIG. 1 of the boot sole with the reinforcing insert exposed;

FIG. 3 illustrates a ski boot with the reinforcing insert and tensioning device shown in phantom;

FIG. 3A is in an enlarged scale a cross-sectional view of the section IIIA of FIG. 3 of the front end of the boot sole showing means for the fine adjustment of the steel wires; and finally

FIGS. 4 and 5 illustrate two variations of the operating members for the tensioning device for the reinforcing insert.

The ski boot 1 which is illustrated in FIGS. 1 and 2 has a sole 2 which is made of leather, plastic or the like, in the sole member of which there is embedded, for example by being molded thereinto, a pressure-resistant and bending-resistant insert 10 of corrosion-resistant material, preferably of a hardenable light alloy or of plastic. This reinforcing insert 10 of the boot sole 2 is hingedly divided in the zone of the ball of the foot — thus approximately in the front third, namely by insertion of two riblike cross members 11 which are transversely positioned over the entire width and which are here profiled to be capable of mutual rolling movement. A tensioning device which acts in longitudinal direction S is provided by means of which, upon operation from outside, the entire sole member 2 can selectively either be fixed rigidly for skiing (FIG. 1) or, when the tensioning device is released, the sole will be flexible for walking without skis (FIG. 1A).

The ski boot can operate advantageously in that the sole in relaxed condition already has a slight longitudinal bending concavely as viewed from above — as indicated in FIG. 1A — by which during walking the action of the heavy boot is made easier.

In the top view of the boot sole 2 with exposed reinforcing insert 10 which is illustrated in FIG. 2, the tensioning device for the bendable reinforcing insert 10 is schematically indicated and same is illustrated structurally in FIGS. 3 and 3A. This tensioning device consists of two steel wires 21 or the like which are inserted in the tension zone of the reinforcing insert 10 in longitudinal direction. These are each at one end adjustably secured on the front end of the boot sole 2 and on the

other end connected fixedly on the heel through a tensioning bar **24** which is received in a recess **12** of the reinforcing insert **10.** The steel wires **21** are fixed, as by soldering, into a journal **22** at their front ends, which journal is engaged by a setting screw **22A** supported in the front side of the boot sole **2** and by means of which an exact adjustment of the tensioning device and thereby the rigidity of the sole in tensioned condition, can be made. A further adjustable tensioning member **25** (FIG. 4) is inserted flush in a recess **12** in the heel end of the reinforcing insert **10,** which tensioning member cooperates with the tensioning bar **24** and is accessible from the outside at its end which projects upwardly from the boot sole **2** for engagement by an operating member. This tensioning member consists of a two-arm lever **25,** at the lower end **25'** of which engages the tensioning bar **24** connecting the steel wires **21** and the upwardly projecting end **25''** of which can be engaged by suitable tensioning means **41.** During the closing movement of said tensioning means the lower end **25'** of the tensioning lever **25** maintains the tensioning device tensioned with both steel wires **21** and thus holds the bendable reinforcing insert **10** self-lockingly in its rigid condition.

In operating the system, the upwardly projecting, preferably grooved, arm **25''** of the two-arm tensioning lever **25,** which is supported in the recess **12** of the reinforcing insert **10** on a horizontal axis, is urged forwardly, after introduction of the ski boot into the safety binding, by the heel clamp **41** of same with sufficient force to urge the upper end of said arm **25''** into the recess which is provided between the sole and the upper boot so that the lower end **25'** of the tensioning lever **25** — as already mentioned — keeps the steel wires tensioned by engagement with the tensioning bar **24** and thus keeps the reinforcing insert **10** rigidly held. With this automatic operation of the tensioning device the boot sole **2** is provided in, but only in, the position of use during skiing with the rigidity required therefor. Without the ski, however, the boot sole remains automatically sufficiently movable or bendable to permit also the functioning of the ski boot as mountaineering boot.

FIG. **5** schematically illustrates a simple operating mechanism for the tensioning device with manual operation: A lever tensioning means **51–52** is mounted on the heel end of the ski boot directly above the sole **2,** which lever tensioning means consists of a semicircularly shaped bar **51** which is secured on one side and of a snap-lever **52** which is hinged to the other side; in this manner it is possible to bring the sole **2** into its rigid position of use prior to stepping into the ski binding.

The advantages which can be achieved by equipping modern rigid ski boots with the inventively constructed boot sole — which can be brought selectively into a flexibly bendable walking position or into a rigidly fixed position for skiing by means of a pressure-resisting and bending-resisting reinforcing insert — can be easily recognized from what has been discussed thus far. Further, in the case of two relatively high upper ski boots the danger of lower leg fractures, which danger is increased due to their lever action, is reduced considerably in the embodiment with the automatic release of the tensioning device for the reinforcing insert.

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

1. In a ski boot having a sole which resists bending, wherein the improvement comprises a pressure-resisting and bending-resisting insert (**10**), of corrosion-resisting metal, is embedded entirely in the sole member (**2**), into which insert, in the zone of the ball of the foot, there is provided at least one link member (**11-11**) which is positioned transversely over the entire width and which is profiled for rolling movement and that said reinforcing insert (**10**) is connected to a tensioning device which acts in longitudinal direction and can be externally operated, by means of which tensioning device the entire, reinforced sole member (**2-10**) is selectively during skiing fixed rigidly, self-lockingly (rigid sole) or remains flexible during walking without skis.

2. The improvement according to claim **1,** wherein the tensioning device for the hingedly assembled reinforcing insert (**10**) consists of two steel wires (**21**) which are inserted in its tension zone in a longitudinal direction, which steel wires are secured adjustably on the front end of the sole (**2**), and are fixedly connected, through a tensioning bar (**24**), on the heel end, and that this tensioning device can be locked in the extended position of the boot sole (**2**) by means of a lockable tensioning member (**25**) which cooperates with the tensioning bar (**24**).

3. The improvement according to claim **2,** wherein the tensioning member of the tensioning device consists of a two-arm lever (**25**) which is supported in the heel end of the reinforcing insert (**10**), which engages (at **25'**) on one end the steel wire (**21**), or the tensioning bar (**24**), and on the other end is held in locking position by its upwardly projecting second arm (**25''**) by means of a tensioning means.

4. The improvement according to claim **3,** wherein the tensioning lever (**25**) is held in locking position by means of a separate lever tensioning means (**51–52**) which is mounted on the ski boot (**1**) and grips around the heel and which engages the upwardly projecting lever arm (**25''**) (FIG. **5**).

5. The improvement according to claim **3,** wherein during insertion of the ski boot (**1**) into the ski binding the tensioning lever (**25**) is held automatically in locking position by means of the heel clamp (**41**) of the ski binding, which heel clamp engages its upwardly projecting arm (**25''**).

6. The improvement according to claim **1,** wherein the sole member (**2–10**) which is reinforced with the metallic reinforcing insert (**10**) is slightly curved, concavely when viewed from above, in longitudinal direction in relaxed rest position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3 740 873 Dated June 26, 1973

Inventor(s) Herbert Sturany

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 8; after "sole" insert---member---.

line 11; delete "is".

line 15; after "width" insert---of the sole member---.

delete "and" (second occurrence).

line 16; delete "that" and replace with ---, (comma) ---.

change "is" to ---being---.

line 18; change "by means of which"to---whereby by said external operation of said---.

line 19; after "entire", delete the "," (comma).

line 20; change "rigidly," to---rigidly and---.

line 21; change "(rigid sole)" to---to define a rigid sole---.

delete "remains".

line 28; after "sole" insert---member---.

line 36; after "a" insert---vertically oriented---.

line 38; should read
-- at the lower end of one end of the first arm of the steel wire (21), or the tension --.

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3 740 873 Dated June 26, 1973

Inventor(s) Herbert Sturany

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 39; delete "on the other end".

delete "in locking po-".

line 40; delete "sition by its" and insert---at the end of the---.

line 58; after "in" insert---the---.

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.