

[54] **CROSSED DOUBLE LAYER SHOE UPPER** 2,945,310 7/1960 Levine 36/11.5
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[22] Filed: **Dec. 21, 1972**
[21] Appl. No.: **317,285**
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[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, 11.5,
36/45, 76 R

[56] **References Cited**
UNITED STATES PATENTS
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[57] **ABSTRACT**
A shoe with double uppers crossed in tension across the foot, with the inside upper attached to the sole under the foot and the outside upper attached to the wide part of the sole not under the foot.

8 Claims, 2 Drawing Figures

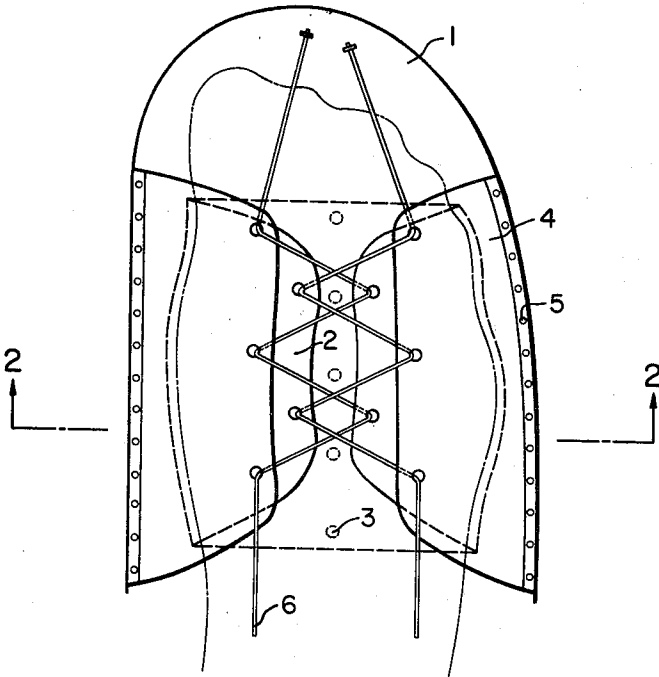


FIG. 1

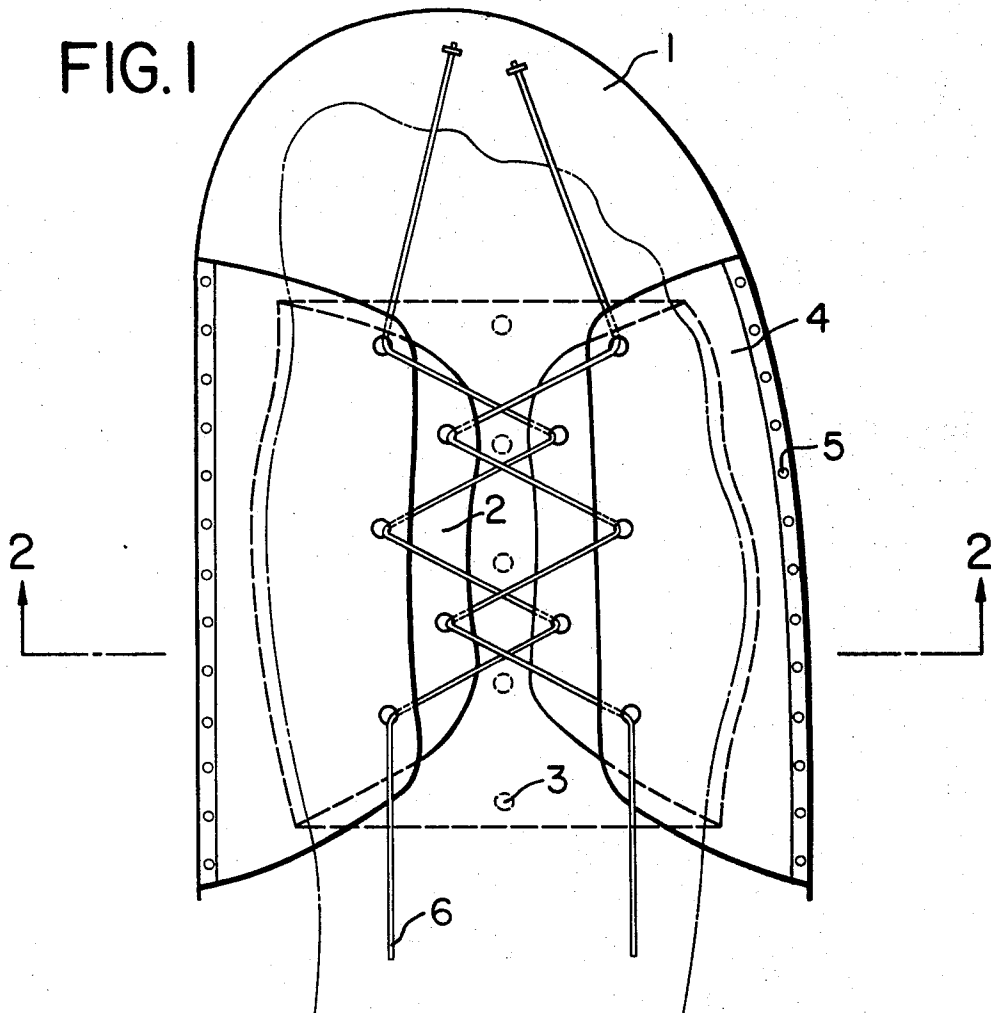
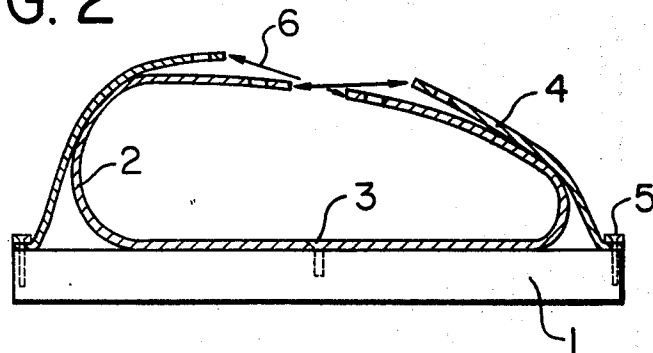


FIG. 2



CROSSED DOUBLE LAYER SHOE UPPER**Area of Invention**

This invention deals with an improved shoe upper to provide a more firm, yet comfortable, fit to a variety of foot shapes in a standardized shoe. More specifically, it deals with that part of a shoe which covers the front part of the wearer's foot, especially the ball of the foot.

There is a number of situations, especially for active sporting use, where it is important to have no looseness of the foot within the shoe. It is important that the slightest force or muscular thrust exerted by the wearer should be transmitted to an exact corresponding degree to the sole. Ski boots, skates, cleated football shoes, baseball shoes, basketball shoes, etc., are some examples where sloppy shoe fit is not acceptable.

Orthopedic shoes for unusual foot shapes likewise may be advantageously made according to the present invention.

Background

Most of the comfortable shoes today include uppers that are relatively flexible and pliable, and a sole that is appreciably stiffer than the uppers. The uppers generally are attached to the sole along a line approximately under the edge of the foot. The flexible uppers, therefore, are approximately perpendicular to the sole along this line of attachment.

It is a matter of physical law that a flexible member can transmit forces in tension only. Where a horizontal force is applied to any vertical flexible material, there can be no reacting force developed to constrain motion unless some tension exists in the flexible material and some angle develops in the flexible material. The reacting force is dependent on both the tension and the angle, and this reacting force must equal the applied force if motion is to be eliminated.

When the ball of the foot is thrust sideways in a shoe, frictional forces will react to a limited extent, but if the thrust force is larger than the frictional forces developed, the foot will slide sideways until the angles developed by the uppers relative to the sole are sufficiently different than 90°. When the thrust is in the opposite direction, or to the left instead of the right, the foot will slide in that direction until sufficient angles are developed in that direction.

It is not sufficient simply to attach the side uppers to the sole along lines that are under the foot so that the initial angles are less than 90° on the right and more than 90° on the left. A thrust to the right side in such a shoe can cause the upper to slide over the foot until the angle on the left becomes 90° or less.

Likewise, if both segments of the uppers are attached to the sole along lines that are wide of the foot, the foot can slide from side to side.

The attempted means to overcome this problem have included extra lacing to tighten the uppers all the way to the toes. For instance, the shoes attached to ice skates usually are constructed to be laced all the way from the toes to the lower leg. Extra tension can be helpful in developing extra friction forces and in not requiring as much angle change to be developed. But extra tension can also reduce blood circulation and comfort.

An entirely different approach is to use a rigid upper shell over the foot. High-performance ski boots now commonly are made with rigid uppers. The achieve-

ment of a comfortable fit has been a problem. The use of resilient padding defeats the object of preventing motion of the foot relative to the boot. The best ski boots now available are custom-fit by the injection of some fluid substance that will subsequently harden to conform to the shape of the foot. However, for those people whose feet are still growing, or whose feet tend to swell under tension, or who want to rent boots, or who want something less expensive than a custom-fitted boot, there is still room for improvement.

Description of Invention

The present invention is a shoe including a sole and two separate flexible uppers crossing over the ball of the wearer's foot, with one upper angled to constrain foot movement to the right relative to the sole, and the other angled to constrain foot movement to the left. As shown in FIG. 1, the sole(1) must be wider than the foot, and relatively stiff in at least one direction; i.e., the sole should not bend up around the sides of the foot. Such a shoe can be constructed with an inner upper(2) attached to the sole along a line or lines(3) under the foot, with both the right and left segments of this upper wrapping around the foot and extending part way over the foot. The outer upper(4) is attached to the wider part of the sole along lines (5) that are not under the foot, and both segments of this upper extend part way over the foot. Means(6) are provided to pull and maintain tension on the uppers across the top of the foot, but there is an essential arrangement within the scope of this invention whereby the inside segment of the right upper is held in tension by the outside segment of the left upper, and the inside segment of the left upper is held in tension by the outside segment of the right upper.

It is obvious that any of several conventional means to pull and hold tension can be used, such as shoe laces if crossed and interwoven, or buckling devices if attenuated, but not two full-length zippers.

It is obvious that various materials can be used for the uppers, like soft leather or a fabric, but some materials are preferred for their ability to conform to an irregular shape and then apply a relatively uniform pressure to all areas of the constrained shape.

Although a shoe upper is usually some sheet of flexible material, it need not be a continuous sheet, for instance, that is waterproof. Of course, it is preferable for at least one of the uppers of a ski boot to be waterproof, but we are concerned here with the ability of an upper to accept a tension load. Thus, one or both of the uppers could be a net-like web, or even a system of shoe laces extending all the way to the sole. For minimum weight and maximum flexibility, it may be preferable to construct the outer upper with shoe laces.

It has been common practice to construct shoes with pads or tongues under the laces or buckles to protect the foot from pinching or little pressure points; the same can be done in conjunction with this invention.

It is obvious that a shoe with a double upper as described can be used inside a larger boot, whether rigid or not.

It is possible that the sole can be more flexible in one direction, approximately perpendicular to the direction of stiffness previously specified. This can be advantageous, for instance, in a football shoe where flexibility facilitates faster running.

It is well known that boots with double uppers are old in the art, such as a ski boot with a laced inner boot and an outer boot with independent laces or buckles. However, such boots were not made to allow each inside segment of the upper to be held in tension by the opposite outside segment.

What is claimed is:

1. A shoe or boot that includes double uppers crossed over the ball of the foot of the wearer, and a sole, wherein the uppers are any flexible materials that resist elongation in tension, the sole is wider than the foot and stiffer than the uppers, the inner upper is attached to the sole along a line or lines under the foot, the right segment of the inner upper wraps around the right side of the foot and extends part way over the foot, the left segment of the inner upper wraps around the left side of the foot and extends part way over the foot, the right segment of the outer upper is attached to some part of the sole along a line not under the foot and beyond the right side of the foot, the left segment of the outer upper is attached to some part of the sole along a line not under the foot and beyond the left side of the foot, means are provided to pull and hold a tension force between the right segment of the inner upper and the left segment of the outer upper, and means are provided to pull and hold a tension force between the left segment of the inner upper and the right segment of the outer

upper.

2. A shoe or boot as in claim 1 where the outer uppers cover a smaller area than the inner uppers.

3. A shoe or boot as in claim 1 where the inner uppers cover a smaller area than the outer uppers.

4. A shoe or boot as in claim 2 where the outer uppers are the means to pull and hold a tension on the inner uppers.

5. A shoe or boot as in claim 3 where the inner uppers are the means to pull and hold a tension on the outer uppers.

6. A shoe or boot as in claim 1 where either outer upper is comprised of one or more straps.

7. A shoe or boot as in claim 1 where either outer upper is comprised of one or more devices to pull and hold a tension force.

8. A shoe or boot as in claim 1 where the left segment of the outer uppers are comprised of a shoe lace, arranged to pull and hold a tension force between the right segment of the inside upper and some part of the sole along a line not under the foot and beyond the left side of the foot, and the right segment of outer uppers are comprised of a shoe lace arranged to pull and hold a tension force between the left segment of the inside upper and some part of the sole along a line not under the foot and beyond the right side of the foot.

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