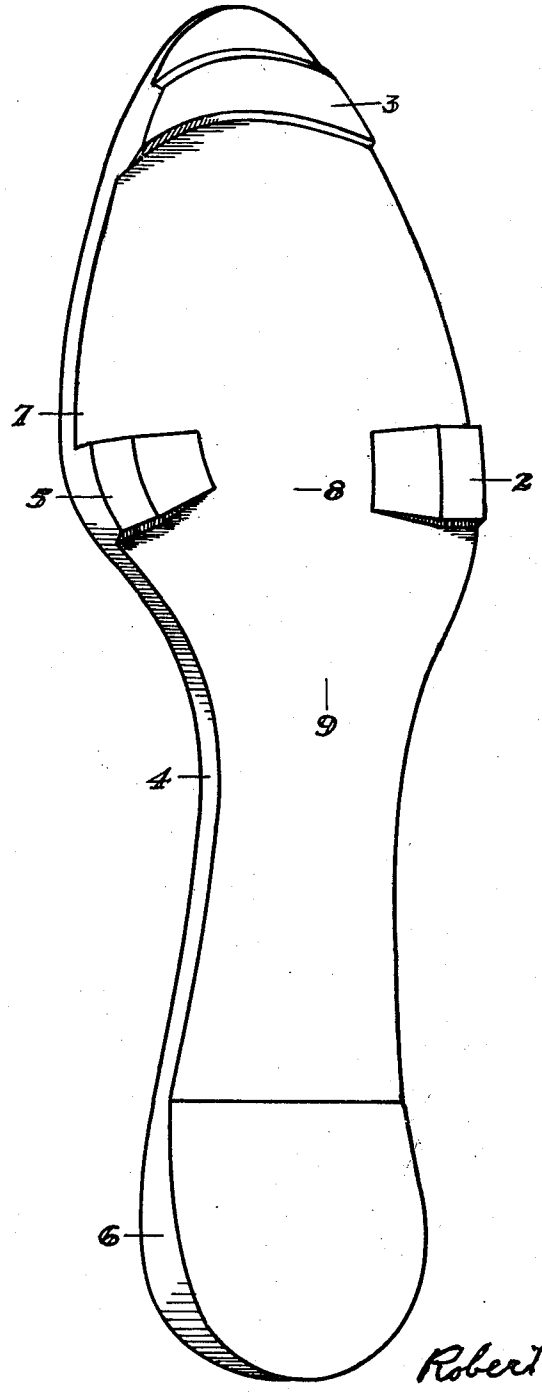
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SOLE OF A SHOE

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SOLE OF A SHOE

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This invention relates to thickenings to be placed in the sole of a shoe, or in a removable insole, subjacent the bony prominences on the sole of the foot, for the purpose of causing all of the body weight to be carried by these prominences and so of protecting all of the soft and tender parts of the sole of the foot from pressure. This invention is an improvement over my prior patents, #1,958,097, dated May 8, 1934, and #2,106,508, dated January 25, 1938.

There are nine arches in the sole of the foot, their function being to keep all of the soft parts in the sole of the foot from pressure. These arches are: the internal or longitudinal arch, the metatarsal, a shallow one between the cuboid bone and the fifth metatarsal head, a shallow one between the cuboid bone and the front of the heel, and one subjacent the proximal phalange of each of the five toes. If there is any pressure on the soft parts beneath any of these arches, foot trouble will result.

The foot is so constructed that the whole weight of the body is intended to be carried by the three bony prominences on the sole, viz.: (*a*) the heel bone or os calcis and (*b*) the heads of the first and fifth metatarsal bones, when the person is standing still; and (*c*) the terminal phalanges of the five toes, when the person is stepping forward. When the weight is carried thus, all of the soft parts in the sole of the foot, through which pass the muscles, blood vessels, and nerves, are protected from all pressure.

The above mentioned bony prominences wear down depressions in the leather insole of the shoe and the soft parts of the sole of the foot are therefore soon subjected to pressure.

The object of my invention is to assist nature by placing thickenings under the three bony prominences, thus making sure that the latter will be carried on a higher plane than the soft and tender parts. These thickenings are made of leather or other firm material and are of equal thickness so that the foot will rest level. (Sometimes, in individual cases, it may be necessary to make the thickening under the os calcis somewhat higher than the other thickenings.)

All of the muscles or sets of muscles of the foot are opposed by other muscles and true balance is attained only when all of the muscles have freedom of action. For example, the muscles which pass forward through the metatarsal arch and through the arches subjacent the proximal phalanges of the toes to the terminal phalanges, and which pass backward to the front of the os calcis and hold the latter forward when

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the heel is raised in walking, are opposed to the pull of the muscles in the calf of the leg, which are attached to the back of the os calcis. If these muscles in the sole of the foot are prevented for any reason (for example, pressure) from working freely, the muscles in the calf of the leg will pull the os calcis backwards and upwards and cause the whole back of the foot, including the internal arch, to drop down, thus causing fallen arches.

A number of other examples might be given but the above will serve to show the importance of keeping all pressure away from every part of the sole of the foot except from the bony prominences.

In my prior patents the thickenings subjacent the first and fifth metatarsal heads form a lowered portion under the metatarsal arch into which the second, third and fourth metatarsal heads may drop down, when the heel is raised in walking. The improvement in the present application extends that depression forward under the arches formed by the proximal phalanges of the five toes by means of placing a thickening across the full width of the insole subjacent the under side of the terminal phalanges, and thus allows the muscles in the sole of the foot complete freedom of action up to the terminal phalanges of the toes.

The improvement in the present application also calls for a wedge-shaped heel, higher at the back and gradually sloping forward. This heel, when used in combination with the thickenings subjacent the first and fifth metatarsal heads, keeps the pressure off the internal arch and the shallow arches anterior and posterior to the cuboid bone.

Thus, by means of the thickenings subjacent the first and fifth metatarsal heads and subjacent the under side of the terminal phalanges of the five toes, and by means of the wedge-shaped heel, the bony prominences on the sole of the foot are enabled to carry the whole weight of the body, as nature intended. These thickenings may be fastened to the top of the insole, or to the bottom of the insole, or may be incorporated in the body of the insole, without departing from the spirit or sacrificing any of the advantages of the invention.

The accompanying drawing illustrates a structure embodying the present invention and referring thereto:

1 represents the insole viewed from the left showing thickenings subjacent the bony prominences on the sole of the foot and lowered portion subjacent the soft and tender parts.

2 represents a thickening subjacent the head of the fifth metatarsal bone.

3 represents a thickening extending across the full width of the insole subjacent the under side of the terminal phalanges of the five toes. This thickening has two functions, viz.: *a*. It forms a lowered portion (7) subjacent the proximal phalanges of the five toes, and thus protects the muscles therein from pressure and allows them to operate freely. (It is essential that these muscles have freedom of movement, as when contracted they raise all the arches in the sole of the foot. The summary in the present application describes further why all of the muscles in the sole of the foot must have freedom of action and be kept from all pressure.) *b*. This thickening forces the under side of the terminal phalanges to take the weight, when the person is stepping forward.

4 represents the inner edge of the insole.

5 represents a thickening subjacent the head of the first metatarsal bone. 5 in combination with 2 forms a lowered portion subjacent the heads of the second, third and fourth metatarsal bones. (These heads extend farther forward than the first and fifth and will drop down into the lowered portion formed by 2 and 5, when the heel is raised in walking. The lowered portion formed by 2 and 5 also allows free passage of the muscles that pass from the terminal phalanges back through the arches.)

6 represents a wedge-shaped heel, thickest at the back end of the insole and gradually becoming thinner as it slopes forward.

7 represents the lowered portion formed by 3, subjacent the proximal phalanges of the five toes.

8 represents lowered portion formed by 2 and 5 subjacent the metatarsal arch.

9 represents the lowered portion, formed by 2, 5 and 6, which protects all of the soft parts in the arch of the foot from pressure.

7, 8 and 9 are one continuous lowered portion subjacent all of the soft and tender parts of the sole of the foot.

2, 3, 5 and 6 cause all of the weight to be carried by the bony prominences on the sole of the foot.

I claim:

1. A weight-bearing construction to be built into a shoe, or used as a removable insole, which comprises: a thickening across the full width of the insole subjacent the under side of the terminal phalanges of the five toes of a superimposed foot.

2. A weight-bearing construction to be built into a shoe, or used as a removable insole, which comprises: a thickening across the full width of the insole subjacent the under side of the terminal phalanges of the five toes of a superimposed foot; a wedge-shaped heel, thickest at the back end of the insole and gradually becoming thinner as it slopes forward; a thickening subjacent the head of the first metatarsal bone, of the same height as the one subjacent the under side of the terminal phalanges of the toes; a thickening subjacent the head of the fifth metatarsal bone, of the same height as the one subjacent the terminal phalanges of the toes.

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