May 16, 1950 G. WALLACH 2,508,318

RESILIENT HEEL FOR SHOES

Filed Jan. 31, 1949

FIG. 1.

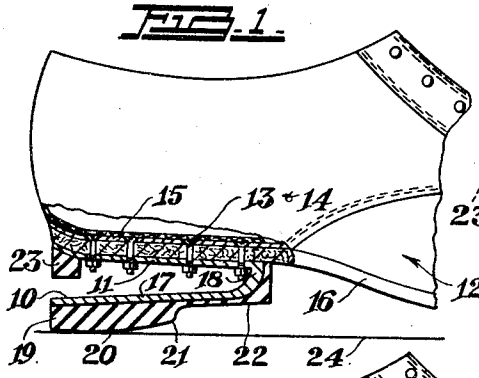


FIG. 2.

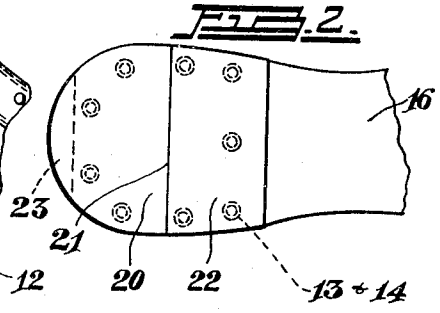


FIG. 3.

NO PRESSURE

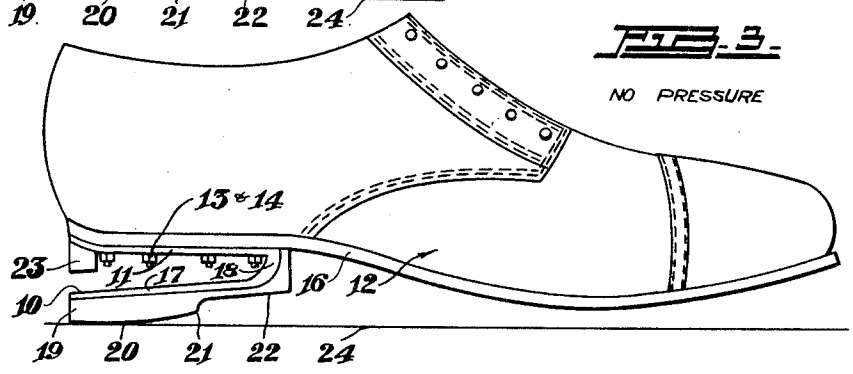


FIG. 4.

PART PRESSURE.

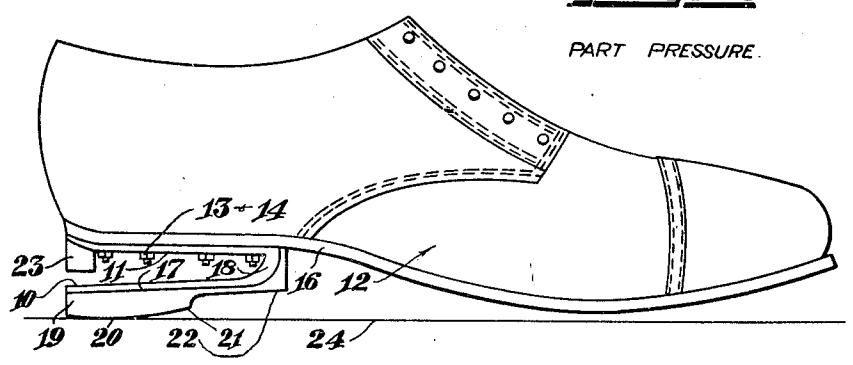
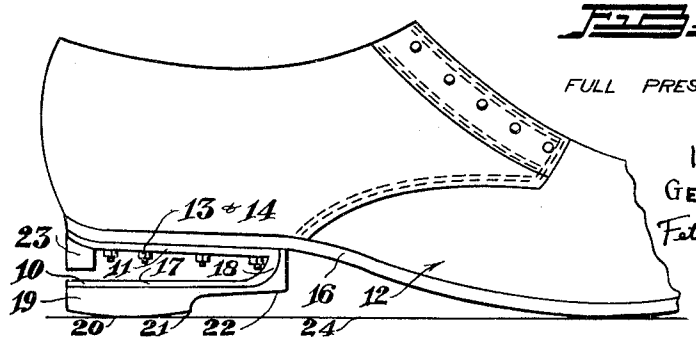


FIG. 5.

FULL PRESSURE.



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RESILIENT HEEL FOR SHOES

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1 Claim. (Cl. 36—38)

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The invention relates to a resilient heel for a shoe and is concerned with a heel structure in which a leaf spring is used to provide resilience.

Prior to the invention, the full amount of available resilience in a leaf spring used to mount the tread surface of a heel structure has not been available to the wearer during the total time that the heel is in contact with the ground or other walking surface. This was because the heel was provided with a conventional flat tread surface which caused maximum leverage of the spring to occur at the beginning of a step when the rear corner of the heel contacted the ground and then suddenly, during completion of the step, as the flat tread surface came into full contact with the ground, the flat tread surface caused the leverage to be reduced to practically zero so that the heel had no resilience during the remainder of the step.

According to the invention a heel structure is provided in which resilience is available to the wearer both at the beginning of the step and during its completion. The invention provides a heel structure having a leaf type spring to which is attached a curved tread surface extending from the rear of the heel and covering an area which is substantially to the rear of the section of the spring providing resilience. The tread surface of the heel is curved convexly from the rear to the front of the tread surface.

In the preferred form of a heel according to the invention, the leaf spring is formed with a middle resilient section sharply bent at a contained angle of less than 90° from the section which is anchored to the shoe, and the middle section is curved downwardly from the sharp bend until it adjoins the lower section to which the tread surface is attached. It is desirable that a resilient stop block be provided so that when the heel is being used on rough ground the flexing of the spring will be limited to an amount slightly greater than that which occurs during average use of the heel.

In taking a step with a heel according to the invention, the wearer applies pressure to the spring at its rearmost point and then, due to the curvature of the tread surface, the pressure is gradually and progressively transferred in a forward direction along the leaf spring so that the increased weight being applied to the heel is resiliently absorbed by the spring without any jarring to the wearer. Limitation of the area of the tread surface provides the important advantage that the heel is still resilient after full weight of the wearer is applied to it and has the further

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advantage that the heel can provide a springlike action to the shoe as the weight is being transferred to the other foot for the next step.

The invention will be further described by reference to the attached drawings which illustrate certain embodiments of it, and in which

Fig. 1 is a side elevation of part of a shoe showing in section a heel according to the invention,

Fig. 2 is a plan view of the heel shown in Figure 1,

Fig. 3 is a diagrammatic view showing a heel according to the invention during normal use as it makes initial contact with the ground without any substantial amount of pressure yet applied to the shoe,

Fig. 4 is a diagrammatic view similar to that in Figure 3 except that part pressure is being applied to the shoe, and

Fig. 5 is a diagrammatic view similar to Figure 3 except that full pressure is being applied to the shoe.

As shown in Figures 1 and 2, a heel according to the invention may comprise a leaf spring 10 having an upper section 11 which is anchored to a shoe 12 by screws 13 and nuts 14 which fasten the upper part 11 to an anchor plate 15 which is above the sole 16 of the shoe 12. The leaf spring 10 has a lower section 17 spaced from the upper section 11 and resiliently held by a curved middle section 18.

A rubber tread 19 is cemented to the under surface of the lower section 17 and extends about the middle section 18. The tread 19 has a convexly curved tread surface 20 which extends from the rear of the heel to a line 21 which is substantially behind the middle section 18, and at which line the thickness of the tread 19 is reduced so that its surface 22 from the line 21 to the front of the heel does not normally contact the ground or walking surface 24.

In elevation, the leaf spring 10 has the shape of a runner of a sleigh with the middle section 18 bent sharply away from the upper section 11 and curving downwardly and rearwardly until it adjoins the lower section 17. The contained angle between the direction in which the middle section 18 adjoins the upper section 11 is less than 90° so that the middle section is resilient to forces applied against the lower section 17.

A stop block 23 is cemented to the underside of the upper section 11 at the rear of the heel and extends toward the lower section 17 an amount which is so determined that the block 23 will act as a stop to the lower section 17 when the lower section is pressed upwardly an amount

greater than that which occurs during average use of the shoe 12. The space between the bottom of the block 23 and the lower section 17 provides for upward movement of the lower section 17 during normal walking.

Figures 3, 4 and 5 of the drawings illustrate three successive stages in the taking of a normal step with the shoe 12 and respectively illustrate the conditions of no pressure, part pressure and full pressure on the shoe 12. In Figure 3, the rearmost corner of the heel is making contact with the ground surface 24 and the sole 16 has not yet reached the surface 24. The tread surface 20 curves upwardly away from the surface 24 and the contact between the surface 24 and the heel is at the rear only of the tread surface 20.

In Figure 4, part of the weight of the wearer has been transferred to the shoe 12, but the sole 16 is not yet in contact with the surface 24. Due to the pressure applied to the heel the leaf spring 10 has been forced upwardly and there is a considerable portion of the tread surface 20 in contact with the ground surface 24 so that the lever arm acting on the resilient section 18 of the leaf spring 10 is considerably reduced from that of the no pressure condition as shown in Figure 3. This reduction in the length of the lever arm has taken place gradually due to the curvature of the tread surface 20 and by the length of the lever arm being reduced, the resilience of the spring 10 is gradually adjusted according to the weight being applied to the shoe 12.

In Figure 5, the heel is shown under full pressure and the sole 16 is now in contact with the ground surface 24. The forward part of the tread surface 20 is in contact with the ground surface 24 and the length of the lever arm acting on the resilient section 18 of the spring 10 has been further reduced. The rear of the tread surface 20 may now be slightly out of contact with the ground surface 24 and the space between the lower section 17 of the leaf spring 10 and the bottom of the stop block 23 has been

reduced so that an increase in pressure on the heel due to an unevenness in the walking surface 24 would cause the lower section 17 to come into contact with the stop block 23 to prevent damage to the spring 10. However, since the tread surface 20 does not extend beneath the resilient section 18, the heel is still resilient although full pressure is being applied to the shoe 12.

As pressure is removed from the heel during the transfer of weight from one foot to the other when taking a further step, the leaf spring 10 urges the rear of the shoe upward and forward utilizing the stored energy in the spring to gently impel the walker forward thereby reducing the fatigue of walking.

What I claim as my invention is:

A heel for a shoe comprising a plate of spring material of substantially the same width as the heel, said plate being folded latitudinally upon itself to form an upper section adapted to be anchored to a shoe and a lower section spaced from the upper section and resiliently held by a middle section, the middle section extending across the front part of the heel and the lower section extending to the rear of the heel, and tread means attached to the lower section, the tread surface of said tread means only covering an area which is substantially to the rear of the middle section and which extends to the rear of the heel, said tread surface being curved convexly from the rear of the tread surface to the front of the tread surface.

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The following references are of record in the file of this patent:

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