Jan. 4, 1966 S. ISRAEL 3,226,852

CUSHIONED SHOE HEEL

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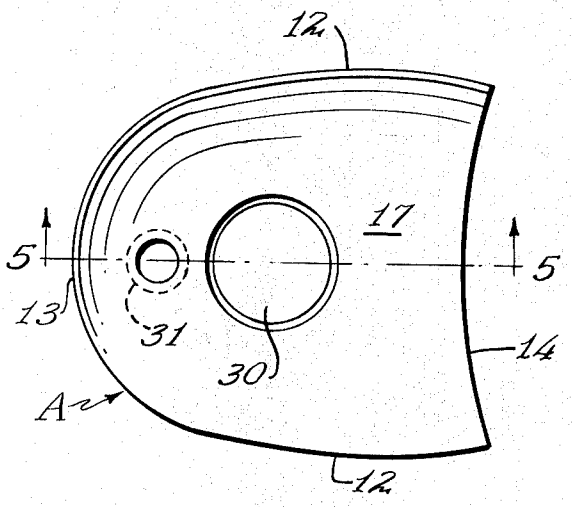


FIG. 2

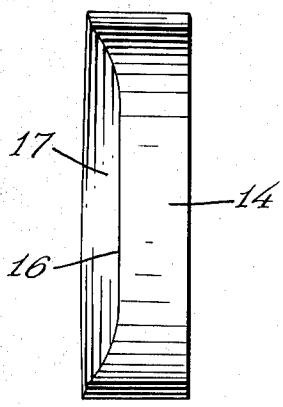


FIG. 3

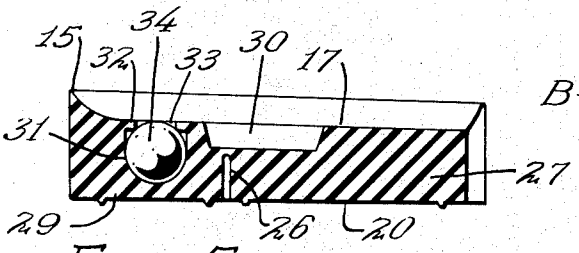


FIG. 5

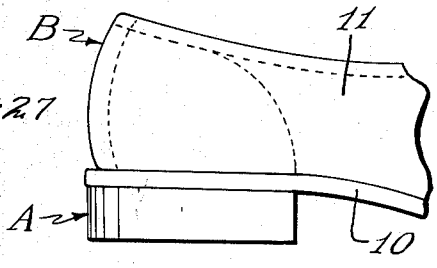


FIG. 1

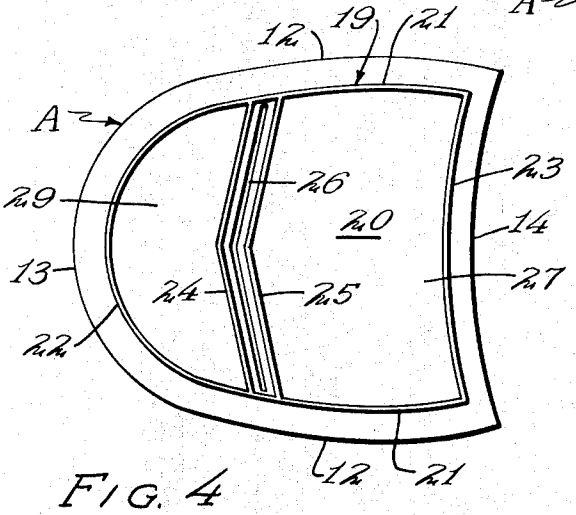


FIG. 4

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CUSHIONED SHOE HEEL

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This invention relates to an improvement in cushioned shoe heel and deals particularly with a heel construction that conforms to the bio-mechanical principles that govern the action of the human foot.

Authorities generally agree that the human body suffers from fatigue while walking with conventional shoes on hard surfaces. Various means have been provided to alleviate this strain and fatigue. For example, as a result, heels have been produced including a peripheral shell which supports a heel pressure plate which is arranged to telescope to a greater or lesser degree into the shell. Springs are provided between the pressure plate and the sole of the shoe for reducing the shock of transferring the weight of the body to the heel of the shoe. Various other types of heels have been produced which incorporate springs of one type or another in an effort to cushion this shock. Even the conventional rubber heel has been designed to act as a cushion. However, most such constructions are impractical for most purposes due to the cost of production and to the number of parts employed in the assembly. Furthermore, most such heels do not function in a manner to conform with the bio-mechanical actions of the human foot. In walking, the calcaneus or great heel bone forms the actual point of applied force until the body has swung forwardly to the extent necessary to apply pressure to the forward portion of the foot forwardly of the arch. This great heel bone is located some distance forwardly of the rear of the heel due to the fleshy protective layer which surrounds this heel bone. As a result, as the human steps forwardly, the rear edge of the shoe heel engages the floor while the weight of the body which is being transferred to the foot is actually applied to the sole of the shoe at a point near the center of the shoe heel. As a result of this misalignment of pressure, all of the weight of the body tends to compress the shoe heel along the rear edge thereof, and the rear of the heel tends to act as a fulcrum for swinging the sole of the shoe against the floor.

Obviously, this does not conform with the normal bio-mechanical action of the human foot for in walking barefooted, a portion of the heel much closer to the great heel bone first comes in contact with the ground, and the foot rolls naturally forwardly and slightly outwardly until the forward part of the foot strikes the floor. In other words, conventional rubber heels produce a moment arm of material length between the point where the weight of the body is exerting force against the heel and the point at which the heel engages the floor. It is an object of the present invention to produce a heel which creates a rocker action and allows the shoe to roll more gradually until the forward part of the sole engages the floor.

A further feature of the present invention resides in the provision of a heel having an outline generally conforming in outward shape and appearance to a conventional rubber heel but which includes a kerf or groove which extends most of the distance across the width of the heel rearwardly of the heel center. This kerf terminates short of the side walls of the heel thereby producing a heel structure having an unbroken peripheral wall. At the same time, when pressure is applied to the rear edge of the heel, the center portion of the kerf widens very materially at the transverse center of the

heel, permitting the rear portion of the heel to hinge into angular relation to the forward portion thereof.

A further feature of the present invention resides in the provision of a cavity in the upper surface of the heel above the center portion of the kerf and extending into closely spaced relation to the base of the kerf. This cavity materially reduces the thickness of the heel between the forward and rear portions of the heel and in the lateral center thereof to materially increase the flexibility of the heel in that area.

A further feature of the present invention resides in the provision of a relatively non-compressible member imbedded in the rear portion of the heel and extending through the major portion of the thickness of the heel. This relatively non-compressible element is preferably in the form of a solid sphere which is imbedded in the longitudinal center portion of the heel rearwardly of the kerf and preferably flush with the upper surface of the heel. The purpose of this member is to increase the resilient action of the heel. When downward pressure is applied to the rear edge of the heel, the tendency of the rear portion of the heel to flex relative to the forward portion thereof is increased by this relatively non-compressive area and the sphere causes a tendency for the width of the kerf to increase near the transverse center of the heel.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims:

In the drawings forming a part of the specification:

FIGURE 1 is a side elevational view of the rear portion of a shoe showing the heel in place thereupon.

FIGURE 2 is a top plan view of the heel removed from the shoe or before being applied thereto.

FIGURE 3 is an end elevational view showing the forward end of the heel shown in FIGURE 2.

FIGURE 4 is a bottom plan view of the heel showing the kerf extending thereacross.

FIGURE 5 is a sectional view through the heel, the position of the section being indicated by the line 5—5 of FIGURE 2.

As indicated in FIGURE 1 of the drawings, the heel A is mounted in its usual position beneath the rear portion of the sole 10 of the shoe B, the shoe B including an upper 11 of any suitable type. The heel A, when looked at in plan, usually includes oppositely curved sides 12 which are connected by an arcuate rear end portion 13. The forward edge of the heel is slightly concave as indicated at 14. In other words, the general shape of the heel A is conventional.

As indicated in FIGURES 3 and 5 of the drawings, the marginal edge of the heel is increased in thickness as indicated at 15, this marginal edge extending along the curve sides 12 and the rear edge 13. The forward edge of the heel 14 is concave as indicated at 16. When in place upon the sole 10, the upper surface 17 of the heel becomes generally flat. This feature in itself is not novel in the present invention.

The numeral 19 indicates in general a slight downwardly projecting rib which extends inwardly of the periphery of the under surface 20 of the heel and is usually spaced from the heel periphery a uniform distance. The rib 19 includes curved sides 21, an arcuate rear connecting portion 22, and a slightly concave forward portion 23 which follows the contour of the forward wall 14 of the heel. A pair of spaced chevron-shaped ribs 24 and 25 connect opposite sides 21 of the rib 19, the apex of each chevron-shaped rib being directed toward the rear of the heel. These ribs add to the non-slipping qualities of the heel, but are also added as decoration and to improve the appearance of the final product.

A chevron-shaped kerf 26 extends into the heel from

the under surface thereof, the kerf **26** terminating adjacent the sides **21** of the rib **19**. As indicated in FIGURE 5 of the drawings, the kerf **26** in the form illustrated extends more than half way through the body of the heel from the under surface **20** to the upper surface **17** thereof. This kerf **26** therefore divides the major portion of the body of the heel into a front section indicated in general by the numeral **27** and a rear portion which is indicated in general by the numeral **29**. The sections **27** and **29** are connected by the portion forming the remainder of the heel above the base of the kerf **26** and also by the marginal edges of the heel between the rib **19** and the outer walls of the heel.

As indicated in FIGURES 2 and 5 of the drawings, a recess **30** is provided in the central portion of the heel and in the upper surface **17** thereof. This recess **30** is shown as being circular in form although the exact shape may be varied to some extent. As indicated in FIGURE 5, the base of the recess **30** is spaced from the base of the kerf **26** by a relatively thin area of the resilient material, materially increasing the flexibility of the heel at the center portion of the kerf.

In the preferred form of construction, the rear portion **29** of the heel is also provided with an aperture or socket **31** which is located between the apex of the chevron-shaped kerf **26** and the rear edge of the heel. As indicated in FIGURE 2 of the drawings, this socket **31** is generally on the longitudinal center line of the heel, and spaced slightly behind the recess **30**. The socket **31** is provided with an inturned flange **32** at its upper open end which provides a restricted opening **33**. A solid spherical member **34** such as a ball bearing is located in the socket **34** and extends through the major portion of the thickness of the heel. Thus this area of the heel is rendered less resilient than the remainder thereof.

The heel is applied to the sole **10** of the shoe B by adhesive which connects the upper surface **17** of the heel with the under surface of the sole **10**. It is very desirable that adhesive be employed for this purpose, as nails would have a tendency to destroy some of the resilience of the heel body. The spherical member **34** is inserted into the socket **32** by stretching the flange **33**, the body being made of resilient material such as rubbery or a rubbery substance.

In use, as the wearer of the shoe takes a step, the rear portion of the heel strikes the hard surface, and as the weight of the body is increased, the compressive force against the portion of the heel rearwardly of the sphere **34** causes the rear portion **29** of the heel to flex relative to the front portion **27**. As will be seen when external pressure is exerted against the rear portion of the heel, the center portion of the kerf increases materially in width at the bottom surface of the heel, the kerf tapering in width to the ends of the kerf. In other words, the ends of the kerf do not greatly increase in width, but the center portion increases materially in width. This same action takes place whether the pressure is applied to the rear center portion of the heel or if it is applied outwardly or inwardly of the center portion of the heel as is often the case.

As the center portion of the kerf widens, the rear portion of the heel tends to flex into angular relation to the forward portion thereof. Accordingly, as the body

swings forwardly, the heel provides what may be described as a rocker motion, the heel tending to roll downwardly as the weight upon the heel springs forwardly. As a result, the heel conforms more closely to the natural bio-mechanical action of the foot itself.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in Cushioned Shoe Heel, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A heel adapted to be mounted at the rear end of a shoe sole, the heel comprising:

a body of resilient material having a substantially flat under surface,

a kerf in said under surface of said body and extending at least substantially one half the thickness of said body, and less than the full thickness thereof,

said kerf extending in a generally transverse direction from a point spaced from one side of the heel body to a point spaced from the other side thereof,

said kerf dividing the lower portion of the heel body into a forward portion and a rear portion connected along the sides of the body,

said kerf being chevron shaped with the apex of the chevron directed toward the rear of the body,

whereby pressure applied to the read edge only of the heel will cause the kerf to increase in width intermediate its ends through flexing of said body.

2. The structure of claim **1** and including a recess in the upper surface of said body overlying the central portion of said kerf and having a base in closely spaced relation to the bottom of the kerf.

3. The structure of claim **1** and including a relatively non-resilient member embedded in the upper surface of said body rearwardly of the apex of said chevron-shaped kerf and spaced forwardly from the rear edge of the heel,

said relatively non-resilient member extending from a point substantially flush with the upper surface of said body to a point in closely spaced relation to the bottom surface thereof.

4. The structure of claim **1** and including a relatively non-resilient sphere embedded in the upper surface of said heel body closely adjacent the apex of said chevron-shaped kerf, and spaced forwardly from the rear edge of said heel body,

said sphere being of a diameter slightly less than the thickness of said heel body, and being substantially flush with the upper surface of said heel body.

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