July 9, 1940.

H. R. HUSTAD

2,206,898

HEEL STRUCTURE FOR FOOTWEAR

Filed April 14, 1937

Fig. 1.

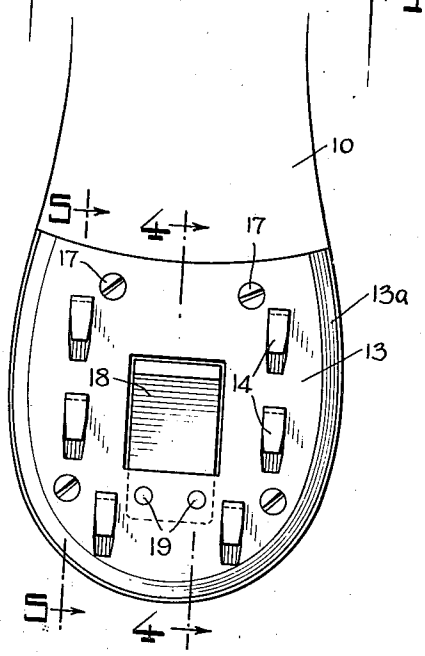


Fig. 7.

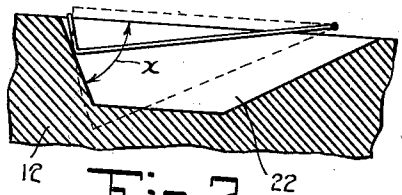


Fig. 2.

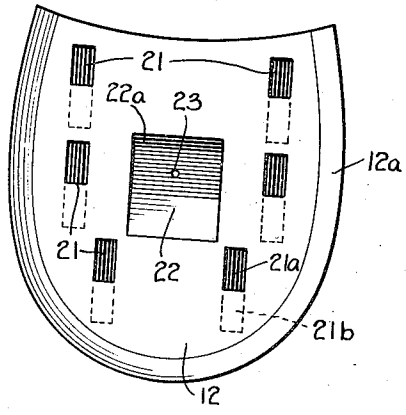


Fig. 3.

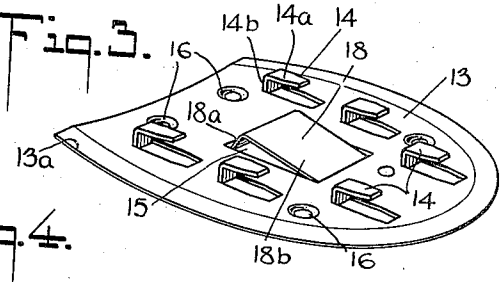


Fig. 6.

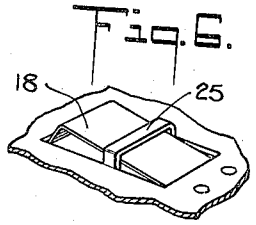


Fig. 4.

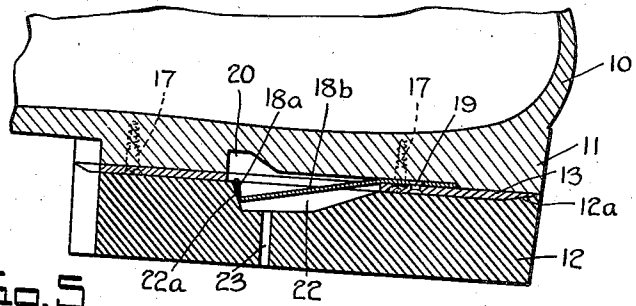
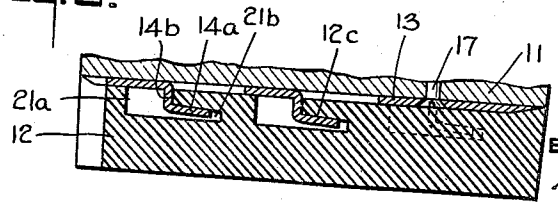


Fig. 5.



INVENTOR
Hugo R. Hustad
BY
HIS ATTORNEY

Patented July 9, 1940

2,206,898

UNITED STATES PATENT OFFICE

2,206,898

HEEL STRUCTURE OF FOOTWEAR

Hugo R. Hustad, New York, N. Y.

Application April 14, 1937, Serial No. 136,711

4 Claims. (Cl. 36—36)

My invention relates to heel structure for footwear, and particularly to heel structure having a tread portion removable and replaceable at will.

Embodiments of my invention afford heel structure which, to all outward appearance, is of the conventional type. During use of the footwear the entire heel maintains structural unity comparable to that of the usual permanently affixed heel. When, however, it becomes desirable to renew the tread portion, the renewal can be accomplished instantly and simply by the wearer himself.

While numerous attempts have been made to produce a heel structure for footwear provided with an easily and instantly renewable tread portion secured against the stresses and strains of all phases of use, yet retaining simplicity of construction and of application to the footwear as well as inexpensiveness of manufacture, a structurally successful and commercially practical product has not heretofore been had.

I have found certain structural fundamentals, hereinafter fully set forth, essential factors in attaining uniformly successful results.

In general, embodiments of my invention comprise a base heel permanently affixed to footwear, an independent tread heel, and a locking plate for inter-positioning between the base heel and the tread heel in removably securing the one to the other.

The plate is provided with engaging elements extending outwardly from one surface thereof. It may be rigidly secured to either the upper surface of the tread heel or the lower surface of the base heel with its engaging elements extending outwardly. The latter disposition is, commercially speaking, the most practical, but it is possible to attain desired results by the former disposition.

Either the bottom surface of the base heel or the top surface of the tread heel, depending upon the disposition of the plate relative to the two heel elements, is provided with a plurality of open recesses for respectively receiving the engaging elements of the plate.

The material of the stated heel element advantageously possesses frictional qualities for effecting, when in intimate contact with the engaging elements, a tight gripping fit therewith. This is usually realized by providing the tread heel of rubber or of a rubber composition, such being the material normally preferred for heel treads in general by reason of its cushioning and non-skid attributes. The recesses are advantageously formed in the rubber material during the stage of molding the heel.

An outstanding feature of all embodiments of my invention is the particular locking means employed for providing maintained tightness of fit of the tread heel to the base heel during use.

The locking means comprises a spring element, usually a single leaf spring, secured to the plate and having a free end normally urged outwardly of the plate into a coordinating recess provided in either the upper surface of the tread heel or the lower surface of the base heel, as the case may be.

The wall of the recess adjacent the free end of the spring element slopes to allow entrance of the said free end thereinto prior to final placement of the tread heel. The distance of entrance of the free end of the spring gradually increases toward the closed end of the recess, thereafter. Upon final placement, the stated free end of the spring stops short of the closed end of the recess and rests on the slope of the stated wall. Because of the normal urge of the spring a pressure fit is maintained against the sloping wall. Receding of the wall from the contacting end of the spring during the stresses and strains of use of the footwear enables the free end of the spring to penetrate deeper into the recess. When the wall is of a material such as rubber, its frictional resistance, plus the normal urge of the spring makes the interaction of the stated wall and the stated end of the spring somewhat analogous to a ratchet action in maintaining tightness of lock.

I preferably provide the engaging elements of the plate in the form of a plurality of L-shaped prongs having a width considerably greater than the thickness of the material thereof. The free ends of the prongs are directed in common, opposite the direction of the free end of the spring locking element. The interlocking of tread heel to base heel is accomplished by inserting the prong elements into their respective coordinating recesses and sliding the tread heel into final position, the spring automatically assuming its locking position.

The engagement of the prong elements with their coordinating recesses and the free end of the spring element abutting against the opposing wall of the locking recess effectively prevent displacement of the tread heel during all phases of use of the footwear. Because of the snug tight fit thus obtained, the heel structure maintains a unity of function and appearance comparable to that of the conventional types of permanently affixed heel structure.

Means are provided whereby access to the spring may be had without damaging the heel structure for forcing the same into substantially planar coincidence with the plate to allow removal of the tread heel from the base heel.

From a commercial standpoint, it is desirable that the entire plate be a metal stamping manufactured in a minimum number of operations.

In some cases it may be practical to form the base heel from one of the plastic resins such as "Bakelite" and, in place of a separate backing

plate, to either form the engaging elements of the same material and integral therewith or of other material incorporated with the material of the base heel during the molding stage. In such case the spring locking element may be incorporated in the base heel as a portion thereof during the molding stage or otherwise as found suitable.

In the drawing:

Fig. 1 illustrates, in bottom plane, footwear having a permanent base heel to which is secured a locking plate, pursuant to a preferred embodiment of my invention.

Fig. 2 illustrates, in top plan, a tread heel for interlocking cooperation with the plate of the footwear of Fig. 1.

Fig. 3 illustrates, in top perspective the plate of Fig. 1.

Fig. 4 represents a vertical section taken on line 4—4, Fig 1.

Fig. 5 represents a vertical section taken on line 5—5, Fig. 1;

Fig. 6 illustrates a modified detail of the plate;

Fig. 7 is an enlarged diagrammatic view showing the relationship between the spring locking element and its coordinating recess.

Referring to the drawing: the footwear 10, see Figs. 1 and 4, is of any suitable type provided with a permanent base heel 11. The tread heel 12, see particularly Fig. 2 is provided for removable securement to the base heel 11 by means of the interposed locking plate 13, see particularly Fig. 3.

The plate 13 is preferably of thin metal, stamped to provide the L-shaped prong engaging elements 14 and a central aperture 15 of an area considerably greater than the area of the aperture created by the provision of an L-shaped prong. The plate 13 preferably has a feather edge 13a extending around the lateral and back portions of its periphery, the margin of the plate tapering outwardly to form the feather edge. Perforations 16 may be provided in the plate for receiving the screws 17 serving in the present embodiment to rigidly secure the plate to the base heel 11.

Each prong 14 of the plate 13 desirably has its long leg 14a approximately twice the length of its short leg 14b, the width of the legs being several times the thickness of the material of the prong for providing a substantially flat extended area for frictional contact with the engaging recesses (hereinafter described) of the tread heel 12.

Disposed for operation in the central aperture 15 is a spring locking element 18, usually a short strip of spring steel having one end secured to the plate, as for instance by means of the rivets 19, and the other end normally urged outwardly from the plate. The spring element 18 is advantageously rectangular in configuration conforming substantially to the configuration of the aperture 15, and thus having a width several times the width of the prong elements 14. It is preferably L-shaped having a short leg 18a and a long leg 18b.

For maintaining the locked relationship when the tread heel is affixed to the plate, the free ends of the L-shaped prongs 14 are directed in common, opposite to the free end of the spring element 18.

The plate 13 in the present case is rigidly secured to the base heel 11, see Fig. 1, with the prongs 14 and the spring element 18 extending outwardly from its free surface. A recess 20 is provided in the base heel 11 for receiving the short leg 18a of the spring element during certain stages of the positioning and removing of the tread heel on and from the plate.

The tread heel 12 may be molded from rubber or a rubber composition to provide recesses in the material per se for engaging the prongs and the locking element of the plate. The recesses open at the top surface of the heel. The lateral and back peripheral portions of the margins of the tread heel are, in the present case, raised in inwardly tapering formation, see 12a, for cooperation with the plate's feather edge in concealing the plate.

Recesses 21 are provided for engaging the L-shaped prongs 14. They are disposed in formation, in their surrounding heel 12, corresponding to the formation of the prongs on their carrying plate 13. Each recess comprises an opening 21a of a magnitude sufficient to receive the long leg 14a of the prong, and leads to an extended cavity 21b for receiving the long leg when the heel is slid forward. The upper wall 21c of the extended cavity 21b advantageously slopes downwardly toward the closed end of the cavity for providing a wedge fit with the received prong. If the prongs are resilient and have their long legs substantially parallel with the plate, cooperation thereof with the sloping wall 21a of the cavity will result in an effective pressure fit of the tread heel against the base heel. If the prongs are rigid without "give," the long legs thereof may slope outwardly from the plate for coordination with the sloping walls 21c.

The wall of recess 22, i. e., wall 22a, over which the free end, i. e., end 18a, of spring locking element 18 drags as it enters the recess, slopes into the recess for enabling the stated end 18a to enter gradually. Otherwise, perfect registry of spring element 18 and its coordinating recess 22 would be necessary to attain locking coordination upon final placement of the tread heel.

The slope of wall 22a must bisect the arc-of-swing of end 18a at a location intermediate the opening and the bottom of the recess, see Fig. 7. The angle of wall slope relative to the plane of opening of the recess, see x, Fig. 7, is advantageously in a range of from 45° to 90°, and preferably closer to 90°, to provide for efficiency of interaction with end 18a of the spring element, in affording maintained tightness of lock. It is to be understood, of course, that the specific angle within the aforementioned range must be of such degree as will effect the herein set forth purposes of the invention. An exact 90° angle, or any angle so close thereto as to be substantially identical therewith, so far as function is concerned, would be ineffective. There must be a definite inclination, determined in degree by the particular factors involved, as, for instance, the degree of resilience of the spring element.

During application of the tread heel to the base heel, end 18a of spring locking element 18 will enter recess 22 gradually. The outer edge of the bend between short leg 18a and long leg 18b will come to rest upon sloping wall 22a intermediate the upper and lower ends of the wall upon final placement of the tread heel, and will be constantly urged into pressure contact with the material of the wall by the natural resiliency of the locking element.

The angular relationship of short leg 18a to long leg 18b of locking element 18 may be such that the outer face of short leg 18a coincides partially with the face of wall 22a.

If the material of the sloping wall 22a possesses a high coefficient of friction as when the material

is rubber, or if the outer face of short leg 18*a* possesses a high coefficient of friction, contact of the stated coinciding faces will accomplish a friction-grip fit normally maintained under pressure, see especially Fig. 7.

If during the stress and strains of use, wall 22*a* tends to recede from its friction-grip fit with end 18*a* of the spring element, the normal urge of the latter will force it deeper into recess 22 to assume a new friction-grip, pressure fit between the surfaces concerned. By this "ratchet action" efficiency of the locking device will be maintained constantly and automatically during all phases of use of the footwear.

The tread heel may be molded slightly concave-convex in form when the material from which it is formed is flexible, and may be applied to the plate with its concave surface proximate thereto. Application and securement of the tread heel to the plate will accomplish flattening of the latter under tension, and will insure substantial peripheral sealing of the joinder between tread heel and plate.

In attaching the tread heel to the base heel, the openings 21*a* of the recesses of the former are brought into registry with the long legs 14*a* of the prongs of the plate. The tread heel is then pushed into face to face contact with the plate, the spring locking element 18 being incidently pushed into substantially planar coincidence with the plate. Thereupon, the tread heel is pushed forward until the short legs 14*b* of the prongs abut against the back walls of the recess openings 21*a*, thus accomplishing engagement of the under surfaces of the long legs of the prongs with the contact surfaces 12*c* of the recesses. The spring element 18, coincidentally springs into locking position within the recess 22, as previously explained. The footwear is now ready for use.

For accomplishing removal of the tread heel from the base heel, a passage 23 may be provided in the material of the tread heel, leading directly from the bottom of the heel to a location in the chamber 22 adjacent the free end of the spring element 18. By inserting an appropriate tool through the passage 23, the spring element may be forced out of the recess, with its long leg 18*b* in substantially planar coincidence with the plate 13. The tread heel may then be slid backwardly for breaking engagement of the prongs 14 with their coordinating recesses 21.

If desired, the passage 23 may be dispensed with, and a flat blade inserted from the back of the heel structure in the plane of contact between the lower surface of the plate 13 and the upper surface of the tread heel 12. To attain proper leverage of the entering end of the blade in forcing the spring element 18 out of the recess 22, a fulcrum formation, e. g., bridge member, 25, see Fig. 6, may be provided at an appropriate location over the aperture 15 on the same surface thereof from which the prongs and resilient element extend.

The plate 13 and the extending elements carried thereby may be formed integrally by stamping from a single plate of metal, the tempering of the spring element being accomplished by suitable processing after the stamping.

Whereas this invention has been illustrated and described with respect to one embodiment thereof, it should be clearly understood that changes may be made in the specific structural characteristics thereof without departing from the spirit of the invention as set forth herein and generalized in the following claims.

I claim:

1. In combination with footwear having a base heel formation and an independent tread heel removably affixed to the base heel formation, fastening means interposed between the two, comprising a leaf spring locking element having one end secured to one of said heel structures, and having a free end normally urged outwardly therefrom; a coordinating recess disposed in the other of said heel structures, said recess serving to receive the outwardly urged spring locking element, one of the end walls of said recess sloping in appreciable degree from substantially the bottom of said recess to substantially the opening thereof in a direction away from that end wall which lies opposite thereto, and the free end portion of said spring locking element bearing frictionally against said end wall at a location thereon considerably spaced apart from the bottom of said recess; and means securing the said heel structures to one another in a manner preventing relative motion of said heel structures in any direction other than that in which the said spring element extends from its free end to its secured end.

2. Structure as recited in claim 1 wherein a rigid member bridging the outside surface of the said leaf spring element intermediate its free and its secured ends, said bridge member providing clearance sufficient to avoid interference with the normal outward urge of said leaf spring.

3. As an article of manufacture, a rigid plate having L-shaped projections of a width several times the thickness of the material thereof, said L-shaped projections extending outwardly from the same surface of the plate and having their free ends directed in common; a leaf spring having one end secured to the plate and the other end normally urged outwardly of the plate from the same surface thereof from which the L-shaped projections extend, said leaf spring having its free end directed oppositely to the free ends of the said L-shaped projections; and a bridge member crossing the said leaf spring intermediate its free and its secured ends on the side thereof which is urged outwardly from the plate, said bridge member providing clearance sufficient to prevent interference with the normal outward urge of said leaf spring.

4. Locking means for uniting contiguous substantially plane surfaces comprising a leaf spring element secured to one of said surfaces and having a free end normally urged outwardly therefrom; a coordinating recess disposed in the opposite of said contiguous surfaces receiving the outwardly urged spring element, one of the end walls of said recess sloping in appreciable degree from substantially the bottom of said recess to substantially the opening thereof in a direction away from that end wall which lies opposite thereto, and the free end portion of said spring element bearing frictionally against said end wall at a location thereon considerably spaced apart from the bottom of said recess; and means securing the said contiguous surfaces to one another in a manner preventing relative motion of said surfaces in any direction other than that in which the said spring element extends from its free end to its secured end.

HUGO R. HUSTAD.