United States Patent [19]

Dassler et al.

[11] **3,818,617**

[45] **June 25, 1974**

[54] **OUTER SOLE FOR A SPORT SHOE**

[75] Inventors: **Rudolf Dassler**, Herzogenqurach; **Horst Dreier**, Worms; **Erich Strickle**, Mannheim; **Norbert Muller**, Mainz-Gonsenheim, all of Germany

[73] Assignee: **Puma-Sporlschuhfabriken Rudolf Dessler KG**, Wurzburger, Germany

[22] Filed: **Aug. 16, 1972**

[21] Appl. No.: **281,119**

[30] **Foreign Application Priority Data**

Sept. 15, 1971 Germany 2145982

[52] **U.S. Cl.** ..... **36/32 R**, 36/67 R, 36/2.5 AM

[51] **Int. Cl.** **A43b 13/04**

[58] **Field of Search** ..... 36/67 R, 67 D, 59 R, 2.5 R, 36/2.5 AM, 32 R, 2.5 AH

[56] **References Cited**

UNITED STATES PATENTS

2,316,601	4/1943	Larkin	36/59 A
3,316,662	5/1967	Schmadeke	36/32 R
3,410,005	11/1968	Szerenyi	36/2.5 AH
3,487,563	1/1970	Austin	36/67 D
3,513,571	5/1970	Larcher	36/67 A
3,593,436	7/1971	Vietas	36/32 R

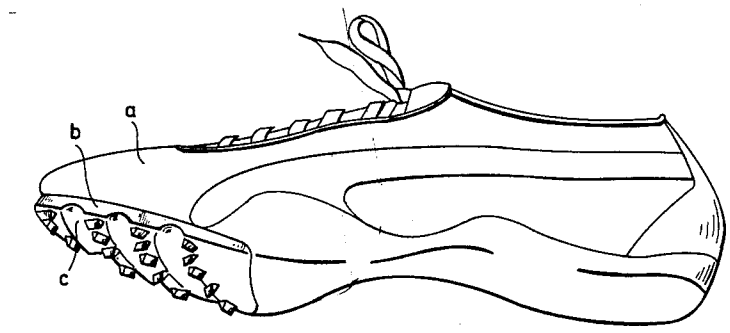
Primary Examiner—Patrick D. Lawson

Attorney, Agent, or Firm—Hane, Baxley & Spiecens

[57] **ABSTRACT**

There is disclosed a track sport shoe with an outer sole specifically designed for use on tracks covered with a layer of thermoplastic synthetic material. The outer sole is made of a thermoplastic synthetic material having an elastic modulus of at least 10,000 kp/cm^2. A plurality of generally wedge-or tooth-shaped protrusions are attached to the running surface of the sole in spaced apart relationship. Each of the protrusions has a large side disposed substantially normal to the surface of the sole and a smaller secondary side defining an angle with the sole. The tip of each protrusion forms a small surface area substantially parallel to the sole. The protrusions in conjunction with the elasticity of the sole provide a safe grip for the foot of an athlete on the track without penetrating or cutting into the same.

9 Claims, 5 Drawing Figures



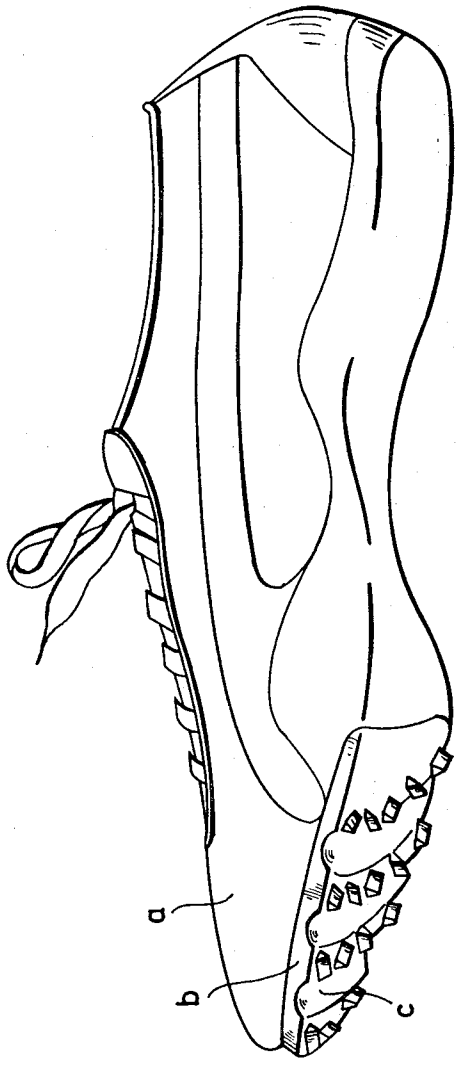


Fig. 1

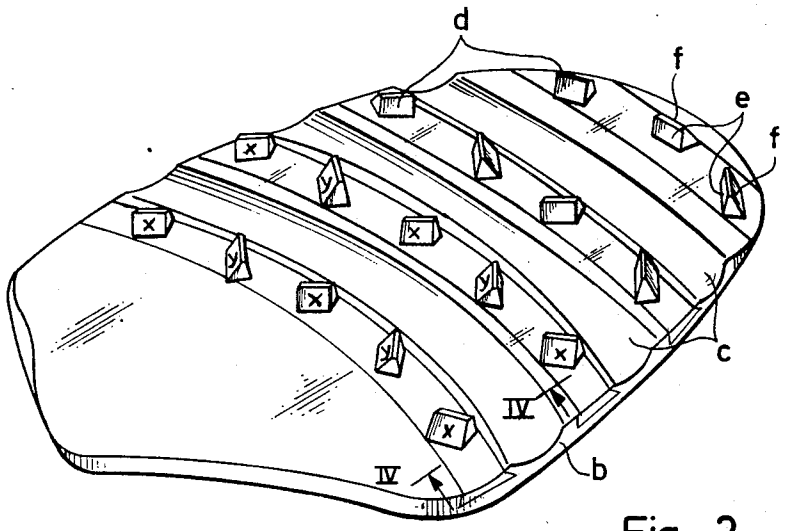


Fig. 2

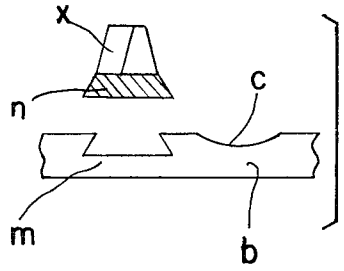


Fig. 4

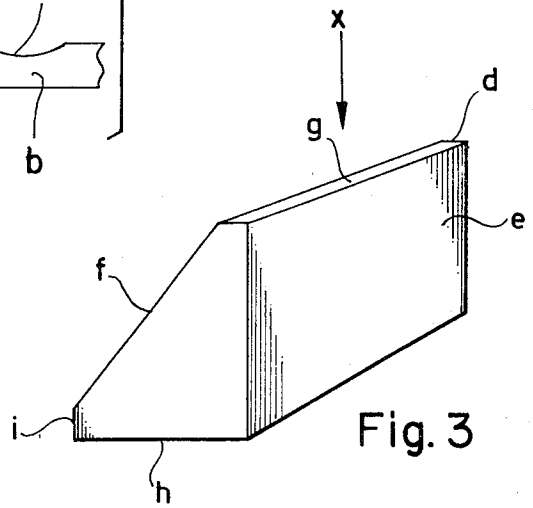


Fig. 3

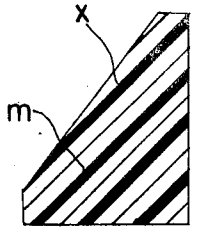


Fig. 5

OUTER SOLE FOR A SPORT SHOE

The present invention relates to an outer sole for sport shoes and particularly for sport shoes as are used by track runners and jumpers.

BACKGROUND

There are now known and widely used tracks covered with a layer of synthetic plastic material for athletic sports. Among the various synthetic plastics used or at least tried for the purpose, one of the best known track materials are materials having a polyurethane base and are known under the trademarks Tartan and Recortan. Other track materials which use a thermoplastic base material are known under the trademarks Akus and Fastrac. There are also known tracks using a layer having a bitumen base. Such tracks are known for instance under the name Rubcor.

Modern tracks coated with synthetic plastic have various advantages in that they require virtually no maintenance and have a long lifetime. Moreover, the tracks, except the tracks using a bitumen base, have rigidity and elasticity properties which are virtually independent of the ambient temperature. The result is that improved performances by the athletes are obtained and that the tracks can be continuously used. The tracks are usually provided with a slightly uneven surface; generally depressions of two to three mm. in the track surface are used.

Track shoes as are customarily used, have spikes or cleats on their sole. The use of soles of this kind is acceptable on tracks which are covered with a natural covering such as cinder. However, soles with spikes or cleats have several disadvantages when used on tracks covered with a synthetic material of the kind previously referred to. Cleats or spikes will penetrate or cut into the track material in which they will be more or less tightly gripped by the track material as materials used for such tracks have at least, to some extent, self-sealing properties. Obviously, penetration of spikes or cleats into the track material requires an extra effort on the part of the athlete and the withdrawal of the cleats or spikes from the track requires an even greater extra effort. As a result, a considerable decline of the performance of athletes wearing shoes having spikes or cleats has been observed on tracks covered with the afore referred to synthetic materials. As is readily apparent, such additional efforts required for each step or jump made by an athlete adds up to a quite considerably higher total effort which correspondingly reduces the performance of the athlete. Such increase in effort is of course a very important factor to an athlete as track races particularly sprints over short distances are often won by a few or even only one step. A further disadvantage of soles with spikes or cleats is that due to the required increased effort the foot and leg muscles of the athlete are exposed to a correspondingly increased strain which constitutes a danger of injury to the tissues and tendons of the foot or leg, especially if many twisting or bending movements are involved.

Furthermore, the track, which as pointed out before, has inherently a very long useful life, is subjected due to the innumerable cuts and holes caused by the penetrations and withdrawals of spikes or cleats, to a very considerable wear and tear. It has been observed that an extensive use of shoes with spikes or cleats causes a gradual crumbling of the surface of the track.

As it is apparent from the previous discussion, the introduction of the now widely used tracks covered with synthetic plastic materials of the kind previously referred to has also introduced a host of problems as far as the heretofore customary and satisfactory shoes having soles with spikes or cleats are concerned.

THE INVENTION

It is a broad object of the present invention to provide a novel and improved sport shoe, the use of which on tracks covered with a synthetic plastic material does not have the afore pointed out disadvantage of track sport shoes as heretofore known.

A more specific object of the invention is to provide a novel and improved track sport shoe which is suitable for use on tracks covered with plastic material, irrespective whether the track is dry, wet or even covered with a slippery film.

Another more specific object of the invention is to provide a novel and improved track sport shoe of the general kind above referred to which is low in weight and not only makes possible a smooth rolling-off the foot on the track but even assists such rolling-off.

SUMMARY OF THE INVENTION

The afore pointed out objects, features and advantages and other objects, features and advantages which will be pointed out hereinafter are obtained by making the sole of the shoe of a thermoplastic material which has an elastic modulus of at least 10,000 kp/cm^2. Preferably, the plastic is of a type that can be molded by a conventional injection molding technique. Material of this kind assures that the sole retains its shape as it is sufficiently rigid but has the necessary flexibility to permit convenient rolling-off of the foot. Moreover, it has, and this is very important, a shape recovery capability which assures that it returns to its original shape after rolling-off, that is, after lifting of the foot. These properties of the sole aid and facilitate the rolling-off action to which the sole is subjected at each step.

The invention also provides that the sole is provided with wedge-or tooth-shaped protrusions, which have a large primary or main flank or side which is disposed substantially normal to the surface of the sole and a small secondary flank or side which defines an angle with reference to the surface of the sole. Such shaping of the protrusions is based on the finding that protrusions on the running sole of a sport shoe to be advantageous for use on tracks covered with synthetic plastic material must not penetrate into the track material and should grip or clutch the surface of the track in a manner sucn that there is no danger of slipping of the athlete. In particular, the protrusions must be capable of controlling the lateral or centrifugal forces acting upon an athlete when running through a curve. The tooth-shaped protrusions on the sole according to the invention cause-and this is particularly important-only a superficial elastic deformation of the surface of the track. Such temporary deformation assures a sufficient protection against slipping of the athlete but avoids as aforementioned additional physical effort as they do not penetrate into the track. In other words, the inherent properties of a sole according to the invention eliminate the afore referred to additional effort necessitated by track shoes having cleats or spikes. The afore referred to primary flank of the protrusion which is oriented normal to the surface of the sole assists for each

step a pushing away of the foot from the track as is of course highly desirable. The angularly oriented other flank results in the wedge-or tooth profile of the protrusions thereby facilitating the afore referred to elastic deformation of the surface of the track and the rolling-off of the sole on the track.

A particular significance of the secondary flanks of the protrusions is that they prevent the penetration or cutting into the surface of the track. Moreover, when the track is covered with a slippery surface film or layer, it is assured that each layer is cut through when a runner or jumper places his foot off the track thereby causing the afore described desired temporary deformation of the track surface even if the same is coated with some slippery substance.

According to a further feature of the invention, the wedge-or tooth-shaped protrusions are preferably so arranged that with some of the protrusions the primary flank thereof is disposed crosswise of the length of the shoe, while the primary flank of other protrusions on the sole defines an angle with reference to the length of the shoe. The provision of the crosswise protrusions assures that the runner or jumper can push himself off a track surface without difficulty in the direction of his forward movement and the protrusions disposed at an angle help the runner to resist the lateral forces to which he is subjected when running through a curve. It has been found to be advantageous to arrange the angularly disposed protrusions at an angle of about 45° with reference to the length of the sole.

According to a further aspect of the invention, it has been found advantageous to make the protrusions from the same hardening material which is used for the track. The protrusions and the running sole itself are preferably made out of similar material. Advantageously, the protrusions are formed with reinforcements such as incorporation of glass fibers.

The protrusions can be produced independently of the sole and then incapsulated by the material of the sole as the same is produced by injection molding. However, the protrusions can also be mounted on strips which are exchangeably insertable into grooves provided in the sole for the purpose. These grooves are preferably disposed crosswise of the length of the sole. The strips and the protrusions thereon are then suitably secured in the correct position; for instance, mechanically, by gluing or by heat sealing. The grooves have preferably an undercut or keystoned cross-sectional outline; they may for instance be swallow-tailed, T-shaped or otherwise shaped in crosssection. The strips to be inserted into the grooves must, of course, have a matching cross-section.

It is further possible to provide holes in the sole into which the protrusions are inserted by means of pins which in turn are suitably secured, for instance, by gluing. Such arrangement has the advantage that the protrusions can be arranged as to number and location in accordance with the specific sport and track for which the shoes are intended.

As it is evident, soles, according to the invention, avoid the disadvantage of shoes, the soles of which have spikes or cleats attached thereto. As it is also evident, the protrusions according to the invention do not cut or penetrate into the material of the track and thus may result in a considerable improvement in the performance of an athlete wearing shoes according to the invention. It is also important that the protrusions are very reliable as to function, irrespective whether the track is dry, wet or slippery. In contradistinction to the often observed fact that an athlete using spikes or cleats always has the feeling that such spikes or cleats give the impression of walking or stilts, a shoe equipped with a sole according to the invention has the advantage that the sole conveys the impression to an athlete that his foot fully rests on the surface of the track.

As previously explained, the running sole is made of a thermoplastic synthetic material, having an elastic material, having an elastic modulus of at least 10,000 kp/cm^2 and is capable of being produced by injection molding. Suitable thermoplastics are for instance polyamides, polyformaldehydes, polyolefines or also polyurethanes.

A particular advantage that can be obtained with a sole according to the invention is that the protrusions according to the invention in contrast to spikes or cleats can be placed close to the rim of the sole due to the shape of the protrusions. It has been found that such closeness of the protrusions to the rim greatly improves the running capabilities of an athlete as his foot rolls-off on the running surface. This advantage is particularly noticeable when an athlete runs through a curve.

The better and more uniform distribution of the wedge-or tooth-shaped protrusions over the entire outer surface of the sole also results in a less tiresome load on the feet of the athlete. The structure of the protrusions also makes less likely injury to the athlete; injuries often occur when spikes are used; in fact, the protrusions of the invention practically preclude the likelihood of injuries. As a result, the safety of a sport shoe with an outer sole according to the invention is markedly increased.

Finally, the protrusions being exchangeably attached to the sole if desired can be colored, thereby increasing the attractiveness of the shoe; even multi-colored protrusions can be used.

If desired, the protrusions can be also provided on the heel portion of the sole in the same manner as has been previously described for the forward portion of the running surface of the shoe.

Finally, the protrusions can be secured to the sole by means of threaded studs as they are frequently used for golf shoes.

Further objects, features and advantages of the invention shall be pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a perspective view of a sport shoe having a sole according to the invention;

FIG. 2 is a fragmentary bottom view of FIG. 1 on an enlarged scale;

FIG. 3 is a perspective view of one of the protrusions on the sole on a further enlarged scale;

FIG. 4 is a sectional view taken along line IV—IV of FIG. 2; and FIG. 5 is a sectional view of FIG. 3.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

Referring now to the figures in detail, the sport shoe *a* as shown in FIG. 1 is of a generally conventional de-

sign except for the outer sole *b*. This sole is made of a thermoplastic synthetic material, preferably of a type that can be molded by conventional injection molding techniques and advantageously has an elastic modulus of at least 10,000 kp/cm². To increase the flexibility of the sole, the same may be provided with a plurality of grooves c which extend crosswise of the length of the sole.

As shown, a plurality of wedge-or tooth-shaped protrusions or cleats d are attached to the sole. The number and distribution of these protrusions are selected in accordance with the specific sport activity for which the shoe is intended. Each of the protrusions has a large primary side or flank *e* which is disposed substantially normal to the sole and a smaller secondary side or flank *f* which defines an angle with the sole, preferably an angle of about 45°. The sides *e* 'and *f* need not to be joined by an apex line but may be flattened to define a small top surface *q*. Similarly, the side *f* may be joined to the base *h* of the protrusion by a surface *i* parallel to side *e*. The protrusions are preferably reinforced, for instance, by glass fibers as it is indicated at *m* in FIG. 5.

As can best be seen in FIG. 2, the row of protrusions *d* nearest to the tip of the sole are disposed so that the primary side *e* face rearwardly as seen in the direction of forward movement of a person wearing the shoe while the secondary sides *f* face forwardly. Moreover, the center protrusion is disposed crosswise of the length of the sole while the two outer protrusions define an angle therewith. The protrusions in the second row from the tip are all disposed at an angle to the length of the sole, preferably the protrusions define angles of about 45° and so that the secondary sides *f* are always located on the forwardly facing side of the protrusions. The orientation of the protrusions in the two rows closest to the tip end of the sole due to their orientation assist in a rapid start of a runner as they help him to push his feet sharply against the track surface. Similarly, at each step, they tend to push the foot up from the track after the rolling-off of the sole on the track.

In the last two rows there are shown protrusions *x* and *y* which are so oriented that their secondary sides face outwardly and their primary sides face forwardly. Moreover, the protrusions *x* and *y* are disposed symmetrically with respect to lines extending in the lengthwise direction of the sole.

The sole and the protrusions attached thereto may be advantageously formed of the same material which is used by the layer on the track on which they are intended to be used though the material used for the sole and the protrusions may be more hardened than the material used for the track. As it is shown in FIG. 4, the protrusions may be secured to the sole by suitable undercut grooves *n* into which a matchingly shaped foot *p* on the protrusions is slid and then fastened by a suitable adhesive.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. A track shoe for use on tracks covered with a thermoplastic synthetic material having an elastic modulus of at least 10,000 kp/cm², and a plurality of protrusions having a generally wedge-shaped cross-sectional outline attached to the outer surface of the sole in spaced apart relationship, each of said protrusions having a primary side disposed substantially normal to the surface of the sole, a secondary side defining an angle with the sole and at its tip a substantially flat surface area substantially parallel to the sole, said protrusions being so oriented that the primary side of some of the protrusions is substantially crosswise to the length of the sole and the primary side of other protrusions is disposed at an angle with reference to the length of the sole.

2. The track shoe according to claim **1** wherein the primary sides of protrusions next to the tip of the sole face rearwardly and primary sides of protrusions at a greater distance from the tip face substantially forwardly.

3. A track shoe according to claim **1** wherein at least protrusions disposed along the lateral rim of the sole are so oriented that the secondary side thereof faces outwardly.

4. The track shoe according to claim **1** wherein

5. The track shoe according to claim **1** wherein said protrusions are made in one piece with the outer sole.

6. The track shoe according to claim **1** wherein the protrusions are embedded, one by one, into the material of which the sole is formed.

7. The track shoe according to claim **1** wherein said sole includes in its outer surface grooves extending substantially crosswise of the length of the sole, and wherein said protrusions are detachably mounted on carrier strips, said strips and the protrusions thereon being detachably secured in said grooves.

8. The track shoe according to claim **7** wherein each of said grooves has an undercut cross-section and the strips have a matching cross-section.

9. The track shoe according to claim **1** wherein said sole includes holes there through, said protrusions being inserted into said holes and secured therein.

* * * * *