MECHANISM OF TYING OF SHOES CIRCUMFERENTIALLY EMBRACING THE FOOT WITHIN THE SHOE

Inventor: Julius Csorba, Kosice (SK)

Correspondence Address: JULIUS CSORBA RUZINA 258 OKRES LUCENEC 98552 (SK)

Appl. No.: 10/392,039

Filed: Mar. 19, 2003

ABSTRACT

The invention is the mechanism of tying of footwear using one or more girth laces, which are led in predetermined directions around the foot across the instep of the shoe and through the sole of the shoe. Eyelets are located at the ends of the girth laces. The usual lace is wound through these and any other eyelets of the shoe. By tying up the tying mechanism, the girth laces slide around the foot and, together with the usual lace (if used), circumferentially embrace the foot within the shoe.
MECHANISM OF TYING OF SHOES CIRCUMFERENTIALLY EMBRACING THE FOOT WITHIN THE SHOE

BACKGROUND OF THE INVENTION

[0001] The invention pertains to the area of construction, manufacture and use of different kinds of footwear. The invention regards the efforts of footwear manufacturers to provide their customers with footwear, which to the maximum extent snugly and closely fits to the feet of the same size, regardless of the individual proportions of the particular foot.

[0002] When making purchase decisions, customers frequently consider the criteria of snug fit of the footwear and comfortable feeling of their feet. Further, some customers prefer footwear which more intensely closes and stiffens their feet in the footwear.

[0003] Footwear manufacturers try to achieve the snug fit of the foot in the shoe by use of materials and features of various properties and shapes. However, these cannot be individualized to the particular foot and only in some cases are adjustable to the actual shape of the foot.

[0004] To achieve the improved fit, the footwear manufacturers normally use shoe-casers, arch supports, shoe upholstery, shoe-sock, anatomically shaped shoe-sole and internal parts of the shoe, and other similar means. However, such means are designed for the proportions of an average foot. In addition, such means are frequently almost equally flexible in all directions and tend to subdue to the pressure of the foot, they do not efficiently prevent the undesired movements of the foot within the shoe.

[0005] Even in cases when the internal part of the sole of the shoe is ergonomically shaped, it cannot equally correspond to the individual proportions and equally fit to the feet of all people with the same size of foot.

[0006] Because of various individual proportions of feet of people with their feet of the same size, the contact between the foot and the shoe is frequently unequally close within the shoe and the shoe may still be variously loose and tight in different parts of the shoe. Since the foot tends to move within the unfitting shoe to looser areas, this causes deformation of the shoe and the foot, and the feeling of discomfort of the foot in the shoe.

[0007] The usual footwear-tying mechanism and the usual construction of footwear, to a certain degree, limit the ability of the manufacturers to provide their customers with the footwear with a notably improved fit.

[0008] In the usual footwear, the lace is normally located at the top of the shoe, at the upper part of the instep of the shoe. In the usual mechanism of tying of footwear by a lace, by pulling at the lace, the eyelets draw together the sides of the instep of the shoe to the central upper part of the shoe. During this process, the sole of the shoe is being, relative to the structure of joining of the instep with the sole of the shoe and shape of the foot, slightly stretched and/or bent by the pull of the instep of the shoe at the edges of this sole.

[0009] Use of the usual footwear tying mechanism frequently results in an increased tension and contact between the shoe and the foot in the upper part of the instep of the shoe, whereas the remaining parts of the footwear are relatively loose compared to this area. The usual tying mechanism of footwear does not fully embrace the foot around the girth of the shoe and, particularly in the area near the edges of the sole of the foot, it does not significantly reduce the space gap between the foot and the shoe, even when the lace is being tied hard. This is so primarily because the usual tying mechanism does not generate the sufficient embracing power around the whole circumference of the shoe. The tying power is not specifically directed into the girth sections, as it is the case with the invented tying mechanism. The relative stiffness of the sole of the shoe, which may be difficult to overcome by the usual tying mechanism, may contribute to the insufficient embrace of the foot within the shoe.

[0010] One of the differences between the invention and the usual tying mechanism is that the usual tying mechanism does not directly tie up and lock the heel of the foot within the shoe. The heel of the foot is normally enclosed in the heel part of the shoe by the shape of the heel part of the shoe supported by the sole of the shoe drawn up by the instep of a tied-up shoe. The usual tying mechanism does not embrace the heel of the foot together with the shoe to the extent provided by the invention.

[0011] The invented tying mechanism aims to achieve the improved fit of footwear to the feet which have the same size but different individual proportions.

[0012] While there are many footwear tying systems or mechanisms, none that the Applicant is aware of has the construction or operates as the one provided in the Application. According to the knowledge of the Applicant, none of the footwear manufacturers has so far manufactured or sold the footwear with the tying mechanism described in the Application.

BRIEF SUMMARY OF THE INVENTION

[0013] The invention is the tying mechanism of footwear. The invention requires new construction and structure of the footwear. The invention provides customers with closer and more comfortable fit of the footwear to their feet, resulting in the improved coordination of movements between the foot and the shoe and an increased control of the foot over the movements of the shoe.

[0014] The invention improves the fit of the footwear primarily by (i) the use of girth laces, which, together with the upper lace, circumferentially embrace the foot through the shoe, including the sole of the shoe; and (ii) adding the heel section of the shoe to the area controlled by the upper lace by means of the girth laces.

[0015] The invention embraces and locks the heel of the foot in the shoe by means of the girth laces (e.g. see FIGS. 4, 3, 5, 11 and an indication of the girth sections in FIG. 14). By adding the heel section to the area closely controlled by the upper lace through the girth laces, the invention allows the user to control tying of the shoe to a substantially larger extent with regard to the toe-to-heel distance.

[0016] The invention is aimed at improvement of comfort and snug fit of the shoe by increasing the area of equally close contact between the foot and the shoe. When the footwear is being tied up, the invented tying mechanism adjusts itself to the proportions of the user's foot by taking the exact girth measures of the foot in the individual girth
sections of the tying mechanism. Therefore, the footwear with the invented tying mechanism is more capable to snugly fit to the particular foot than the footwear using the usual footwear-tying mechanisms. This results in the improved coordination of movements between the foot and the shoe and capability of the footwear to better follow the movements of the foot than the footwear with the usual tying mechanism.

[0017] In contrast with the usual tying mechanisms, the invention tailors the shape of the foot in all selected girth sections of the shoe. The invention provides for equal tension in the girth sections of the foot, which are tied-up and controlled by the same upper lace.

[0018] The improved coordination of movements helps to prevent injuries of the user and his feet by uniting the foot with the footwear and, if used in sports footwear, may enhance sports performance.

[0019] The user may let loose the individual girth laces by omitting the respective eyelets by the upper lace.

[0020] The girth laces are led down one side of the shoe instep, through the sole of the shoe and up the other side of the shoe instep. Channels, rings, etc., which maintain the girth laces in place and direct the girth lace across the instep of the shoe (see FIGS. 4, 3, 25 and 1), are firmly attached to the instep of the shoe in order to secure embracing of the foot and the shoe in the selected directions. The outer coat (see FIGS. 2, 5 and 6) covers and protects the invented tying mechanism.

[0021] Tying of the shoe around the foot may be divided into any practicably possible number of girth sections. Therefore, the invented tying mechanism encompasses also the use of the girth laces additional to those described or drawn in the Application, or directed in other directions than are those drawn in the Application. The girth laces are controlled by the upper lace wound through the eyelets usually located at the ends of the girth laces. The eyelets may be formed by the girth laces (e.g. see FIGS. 1, 2 and 26), or the invention may use separate pieces of eyelets attached to the girth laces. The upper lace may be wound through these and any other eyelets of the shoe (see FIGS. 1, 2 and 4).

[0022] The girth lace is usually operated by two eyelets, i.e. one eyelet at each end of the girth lace. However, a single eyelet at a side may be used to strain two or more girth laces (i.e. one eyelet pulls several girth laces).

[0023] Another possibility of use of the invention (the minimal option) is the use of a single girth lace with only one eyelet at one of its two ends. The other end of the girth lace is firmly attached to the instep of a shoe. An ordinary eyelet (i.e. one firmly located at or firmly attached to the instep of the shoe) would be used instead.

[0024] Tying of the upper lace draws up the eyelets, with which the girth laces are joined. This movement strains the girth laces, which slide within or around the shoe and, together with the upper lace, embrace the foot by the shoe in the whole circumference. During this process, the space gaps between the foot and the internal part of the shoe are being reduced primarily in the area of the girth sections, i.e. where the girth laces are located. The areas of the girth sections shown in FIG. 14 are often crucial for the fit of the shoe to the foot. As a result, the contact between the foot and the shoe becomes closer.

[0025] The invention provides for equal tension in all girth sections controlled through the girth laces by the same upper lace. In order to provide for various tensions in the girth sections, the invented tying mechanism may use two or more upper laces, each of the upper laces controlling a set of girth laces.

[0026] By reducing space gaps and making closer the contact between the foot and the shoe, the invention helps to reduce the undesired movements of the foot within the shoe and enables the user to enjoy closer contact and control of movements of the shoe by the foot.

[0027] The invented tying mechanism also ties up and locks the heel of the foot in the shoe. The girth laces may be positioned in the heel part of the shoe as shown in FIG. 5. The girth laces may cross each other at the back of the heel of the shoe as depicted in FIGS. 3, 4 and 11. These girth laces cross in the area below the Achilles tendon, at or around the tip of the back of the heel of the foot (see FIGS. 14 and 16). To improve locking of the heel of the foot in the shoe, the cushions located in the heel area of the shoe may be used to fill in the space (the anatomical depression) between the anklebone and the lower part of the heel of the foot on both sides of the foot (see FIGS. 14, 15 and 16). The girth laces led in the heel part of the shoe, when strained, push the cushions into this area.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0028] FIG. 1 provides view of the invention from the above, with removed Outer Coat and several channels and girth tubes.

[0029] Numeral 1 indicates the round profile girth lace, numeral 3 the girth tube of the appropriate shape. The loops of the pairs of the girth laces sticking out of the girth tubes serve as the eyelets, through which the upper lace (numeral 7) is wound. Numeral 14 indicates the ordinary eyelet. Numeral 8 indicates the Inner Coat and numeral 26 the tongue of the shoe. Numeral 13 indicates the channels firmly attached to the Inner Coat, through which are led the Girth Tubes with the girth laces.

[0030] FIG. 2 provides view of the invention from the above. Numeral 9 indicates the Outer Coat, which, in this case, uses zipper. Numeral 8 indicates the Inner Coat, numeral 1 the girth lace, numeral 14 the ordinary eyelet. Numeral 13 indicates the channels firmly attached to the Inner Coat, in which are located the Girth Tubes with the girth laces. Numeral 7 is the upper lace and 26 is the tongue of the shoe.

[0031] FIG. 3 is the view of the invention from the back, with the Outer Coat removed. This figure shows one of several possible ways of crossing of the girth laces at the heel part of the shoe. The girth laces are located in the Girth Tubes. Numeral 8 indicates the Inner Coat, numeral 12 the Sole. Numeral 13 indicates the channels through which the Girth Tubes are led. Numeral 3 indicates the Girth Tubes.

[0032] FIG. 4 provides the partial side view of the invention, with the Outer Coat removed. This view shows possible channeling of the girth laces and the Girth Tubes in the heel part of the Shoe. Numeral 8 indicates the Inner Coat, numeral 13 the channels for the Girth Tubes, numeral 3 the Girth Tubes, numeral 5 the grooves in the Upper Layer of the
Sole, in which the Girth Tubes are placed. Numeral 10 indicates the Upper Layer of the Sole, 11 the Lower Layer of the Sole. Numeral 39 indicates the area where the Outer Coat is attached between the two layers of the Sole.

[0033] FIG. 5 provides the outline of the full side-view of the Shoe, with removed some of the channels for the Girth Tubes. Numeral 9 indicates the Outer Coat, numeral 8 indicates the Inner Coat, numeral 3 the Girth Tubes for the girth laces, numeral 13 the channels for the Girth Tubes, numeral 5 the grooves in the Upper Layer. Numeral 10 indicates the Upper Layer, numeral 11 the Lower Layer.

[0034] FIG. 6 is the side view of the Shoe. The dashed lines (numeral 27) indicate the girth sections. The Outer Coat (numeral 9) covers the Upper Layer of the Sole. Numeral 11 indicates the Lower Layer of the Sole. Numeral 39 indicates the place where the Outer Coat is joined between the two layers of the Sole.

[0035] FIGS. 7 and 8 show the possible use of the Y-shaped stripe-profile girth laces. In FIG. 7, the Y-shaped stripe-profile girth lace is the first from the left, in FIG. 8 it is the second from the left. Numeral 2 indicates the stripe-profile girth laces, numeral 6 indicates the grooves in the Upper Layer for the stripe-profile girth laces. Numeral 8 indicates the Inner Coat; 10 the Upper Layer; and 11 the Lower Layer.

[0036] FIG. 9 shows the Upper Layer of the Sole. Numeral 10 indicates the Upper Layer, numeral 5 indicates the grooves in the Upper Layer.

[0037] FIG. 10 is the side view of the Upper Layer and the Lower Layer. Numeral 10 indicates the Upper Layer; numeral 11 the Lower Layer. Numeral 5 indicates the grooves in the Upper Layer.

[0038] FIG. 11 shows the pair of the girth laces, which is nearest to the back of the heel of the Shoe. This Figure outlines possible direction of these girth laces across the heel part of the Inner Coat. The girth laces cross in the area at or around the tip of the heel of the foot. The Inner Coat is “unwrapped”. Numerals 14 indicate the ordinary eyelets which are nearest to the heel of the Shoe. Numeral 8 indicates the Inner Coat; numeral 1 indicates the girth laces; numeral 10 indicates the Upper Layer of the Sole; numeral 11 indicates the Lower Layer of the Sole.

[0039] FIG. 12 outlines the structure located in the Sole, providing for different sectional flexibility of the Sole in the areas where the girth laces are located. Numeral 16 indicates this structure; numeral 2 indicates the stripe-profile girth laces led through the Sole.

[0040] FIG. 13 indicates the areas where are located the stripe-profile girth laces in the above FIG. 12.

[0041] FIG. 14 shows possible location of the girth sections vis-à-vis the foot. Numeral 41 indicates the girth sections; numeral 29 indicates the instep of the foot; 30 is the heel; 31 is the tip of the heel; 32 is the big toe; 33 is the ball of the big toe; 40 is the arch of the foot; 28 is the anklebone; and 35 is the area of the anatomical depression between the anklebone and heel.

[0042] FIG. 15 roughly outlines the area of depression between the anklebone and heel (numeral 35).

[0043] FIG. 16 is the view of the heel of the foot from the back. Numeral 35 indicates the area of depression between the anklebone and heel on both sides of the foot, where may be located the cushions improving locking of the heel of the foot within the Shoe, pressed into the depression areas by the surrounding girth laces.

[0044] FIG. 17 indicates the stripe of an anti-abrasive material (numeral 15), which may be used to cover the loop formed by a pair of the girth laces serving as an eyelet.

[0045] FIG. 18 shows the same stripe put on the pair of the girth laces.

[0046] FIG. 19 is the stripe-profile girth lace (num. 2) led through the stripe-profile Girth Tube (num. 4).

[0047] FIGS. 20 and 21 show the Upper Layer of the Sole with grooves for the stripe-profile Girth Tubes (num. 6). Numeral 10 is the Upper Layer; 11 is the Lower Layer.

[0048] FIG. 22 is the outline of the circumferential tying of the shoe. Numeral 7 indicates the upper lace; 14 the eyelet at the end of the girth lace; 1 is the girth lace, 10 is the Upper Layer; 11 is the Lower Layer; and 8 is the Inner Coat. The girth lace together with the upper lace form a circle for the circumferential embrace of the foot within the shoe.

[0049] FIGS. 23 and 24 show the structure inserted in the Sole, which is used to provide for different sectional flexibility of the Sole in the areas where the girth laces are located (num. 17).

[0050] FIG. 23 shows this structure from the above, FIG. 24 provides a profile view. This particular type of the sole structure has channels, through which the girth laces are led. Numeral 1 indicates the round profile girth laces; numeral 2 the stripe-profile girth laces; numeral 42 the channels in the sole structure for the round profile girth laces; and numeral 43 the channels in the sole structure for the stripe-profile girth laces.

[0051] FIG. 25 shows the rings, which may replace the channels at the Inner Coat. Similar to the channels, these rings (num. 18) direct the girth laces across the instep of the Shoe in the predetermined directions.

[0052] FIG. 26 shows the stripe-profile girth lace (num. 2) through which the upper lace (num. 7) is wound. Numeral 44 indicates the sewn-up end of such girth lace, which serves as an eyelet for the upper lace.

[0053] FIG. 27 shows the girth laces (num. 1) joined with the Frame (24) located within the Sole. In this case, two parallel axles form the Frame. In this case, the tying mechanism embraces the foot within the shoe, save for the area between the two axles. Numeral 1 indicates the girth laces; numeral 37 indicates the places where are joined the girth laces with the axles.

[0054] FIGS. 28 and 29 outline possible alternative leading of the girth lace (num. 1) through the lower part of the Shoe. In these cases, the girth lace is not led only through the sole of the Shoe, but its direction is diverted so that it leads also through other parts of the Shoe. Num. 10 is the Upper Layer; num. 11 is the Lower Layer; num. 8 is the Inner Coat. In FIG. 29, num. 45 indicates the arch supporter located in the Shoe.
FIG. 30 shows some of the alternative methods of tying of the Shoe. The shown methods do not use the usual lace as the upper lace.

The stripe-profile girth laces (num. 2), are tied by the upper lace, which is in this case a stripe of Velcro (19).

Num. 20 is the version not using any upper lace, in which the stripe-profile girth lace is tied by Velcro. Num. 22 is the version not using any upper lace, in which the stripe-profile girth lace is tied by a buckle or by a hook. Num. 23 indicates the hook.

FIGS. 31, 32 and 33 show some of the possible shapes of the Frame located within the Sole. Numeral 12 indicates the Sole, numeral 24 indicates the Frame.

FIGS. 34 and 35 show possible adjustment of the Inner Coat. Parts of the Inner Coat are removed (num. 25) in order to provide for easier embracing effect of girth lace(s) led across this area of the Shoe.

FIG. 36 shows the round-profile girth lace (num. 1) placed in the round-profile Girth Tube (num. 3).

FIG. 37 (Drawing Sheet number 8/17) shows the girth laces attached within the Sole to the Frame (num. 24), which, in this case, is a single axle. Numeral 12 indicates the Sole; numeral 1 indicates the girth laces. Numeral 37 indicates the place where the girth laces are joined with the Frame.

Detailed Description of the Invention

The invention is the mechanism of circumferential tying of footwear, requiring the new construction and structure of the footwear. The circumferential tying of footwear is carried out in the selected girth sections of the footwear. The invented tying mechanism uses one or more girth laces and another lace, which is usually located at the top of the footwear and is operated in the usual manner (upper lace). The upper lace strains the girth laces and completes the circuit of the circumferential tying (see FIGS. 1, 2 and 22).

On the other hand, the usual mechanism of tying of footwear uses only the upper lace wound through the eyelets at the instep of the shoe. The usual tying mechanism is sometimes improved by stripes, which are led from the eyelet to the sole of the shoe and are usually sewn onto the instep of the shoe.

The purpose of the invention is to provide customers with an improved, closer fit of the footwear to their feet. The closer fit results in the closer coordination of movements between the foot and the shoe and an increased control of the shoe by the foot. In general, this improves comfort and safety of users of the footwear. The customer is in control of the tension of the tying mechanism.

The girth laces together with the upper lace embrace the foot in the whole circumference of the footwear, including the sole of the shoe. The upper lace, through the girth laces, also controls tying of the heel section of the shoe (e.g., see FIGS. 1, 3, 4, 5, 11 and 14).

The foot and the shoe get closer by tying the upper lace, which is wound through the eyelets of the shoe. Some or all of the eyelets are attached to the girth laces loosely positioned around the foot, usually within the shoe, including the sole of the shoe. The girth laces are led from the eyelet down the instep of the shoe, through the sole of the shoe and up the other side of the instep of the shoe to the other eyelet. The girth laces together with the upper lace embrace and bring together the shoe and the foot when the shoe is tied up by the upper lace (e.g., see FIGS. 24 and 1). The shoe may use any practically possible number of the girth laces.

In contrast with the usual mechanism of tying of footwear, the invention improves tying of footwear in two principal ways. These are the mechanism of circumferential (girth) embracing of the foot within the shoe, and the expansion of the tying mechanism's area of control by adding the heel section of the shoe to the area controlled by the tying mechanism (see FIGS. 3, 4, 5, 11, 14, 15 and 1).

The invention may be applied in the footwear for conventional, usual purposes (e.g. walking shoes, high shoes (boots)) and the footwear for sports (e.g. cleats, trainers, shoes for running, jogging, fitness, football, basketball, climbing, cycling, hiking, ice hockey, roller-skating, etc.). The invention may also be applied in special footwear (e.g. motorbike boots, military boots).

The process or method of manufacture of the invention is any process which leads to incorporation of the invention in any kind of footwear. The below description of the process of manufacture of the invention provides for one of the simplest methods of its manufacture allowing to demonstrate the operation and effect of the invention. The invention may become incorporated in footwear also by using other methods or other processes of manufacture.

Please note that the description below provides only the basic version and several alternative versions, in which the invention may be applied. The versions of the invention are submitted to illustrate but not to limit the invention.

Unless otherwise provided herein, the Application does not deal with the usual or obvious methods or means, which are commonly used in the footwear manufacturing industry to improve the fit of footwear, such as upholstery, perforations, materials, design, shape, etc. Among other things, the Application describes and shows several ways in which the invention may be incorporated in the footwear.

Basic Version—Round Profile Girth Laces Forming Pairs

This version is the preferred version of manufacture of the invention. The footwear in which the invention is incorporated ("Shoe") has the sole ("Sole") which is composed of two layers—the upper layer of the Sole ("Upper Layer") and the lower layer of the Sole ("Lower Layer"). The Sole is made of rubber, but it may also be made of any other suitable material used for manufacture of soles in the footwear manufacturing industry. The Lower Layer is to be in contact with the ground during the use of the Shoe.
First, the Upper Layer has to be processed by any method to create grooves in the Upper Layer, in which the Girth Tubes (see below), with the girth laces in them, will be placed (see FIGS. 9, 10, 20 and 21). The grooves must be appropriately wide and deep to take in the Girth Tubes with the girth laces in them.

Second, the channels made of fabric or other appropriate material are sewn onto the outer side of the internal layer of the instep of the Shoe, which will be in immediate contact with the instep and heel of the foot (“Inner Coat”). The location of these channels must correspond to the location of the grooves in the Upper Layer (see FIGS. 4 and 5).

Third, the Inner Coat is joined with the Upper Layer in any manner appropriate in the footwear manufacturing industry for joining the instep of the shoe with the sole of the shoe.

Four, there need to be prepared the flexible tubes long enough to lead from the upper mouth of the channel on the Inner Coat (see step Second above), down this channel, through the groove in the Upper Layer and up the channel on the other side of the Inner Coat (“Girth Tubes”). The Girth Tubes are used in order to provide for the smooth sliding of the girth laces.

Five, the individual girth laces, which embrace the foot in the Shoe, are put into the Girth Tubes as shown in FIG. 36. Then, the Girth Tubes are led through the channels on the outer side of the Inner Coat and placed in the grooves in the Upper Layer. After that, the Girth Tubes are firmly attached (e.g. glued) into the grooves in the Upper Layer by any method which allows smooth movement of the girth laces in the Girth Tubes.

Six, in order to prevent the damage to the invented tying mechanism caused by mud, grit or any other material, the Girth Tubes, the girth laces and the grooves of the Upper Layer are covered by a layer of flat covering material (“Outer Coat”) closely adhering to the Shoe (see FIGS. 2, 5 and 6).

The edges of the Outer Coat may be glued or otherwise attached to the Upper Layer (with the Girth Tubes already placed in its grooves) below the level of the Girth Tubes placed in the Upper Layer (see FIGS. 5 and 6). In this case, the edges of the Outer Coat will be eventually located between the Upper Layer and the Lower Layer. The Outer Coat may be closed at the instep of the shoe by any means, e.g. zipper, Velcro, lace, etc. (e.g. see FIG. 2).

Seven, the Lower Layer is joined with the Upper Layer by gluing or any other suitable method used in the footwear manufacturing industry. However, it is important to ensure that the Girth Tubes will not be misshaped, deformed, clogged or otherwise damaged in the process of joining the Lower Layer with the Upper Layer, which would prevent smooth movement of any of the girth laces in the Girth Tubes.

Eight, the girth laces are firmly joined together at their ends by sewing or any other appropriate method, to form the round shapes—the pairs of the girth laces. The pairs of the girth laces are operated by pulling at the loop at each end of such joined pair, which serves as an eyelet (see FIGS. 1 and 2). However, to prevent early abrasion of the eyelet, e.g. a stripe of an anti-abrasive fabric or other suitable material may be sewn up and put on the girth laces to cover that part of the pair of the girth laces which serves as an eyelet (see FIGS. 17 and 18).

Nine, the upper lace is wound through the eyelets located at the ends of the girth laces and through any other eyelets of the Shoe (see FIGS. 1 and 2).

In the heel part of the Sole, the Girth Tubes may be positioned approximately as depicted in FIG. 5. At the back of the heel part of the Inner Coat, the Girth Tubes may cross in the channels laying one over another, or as shown in FIG. 3. These Girth Tubes cross each other below the Achilles tendon, in the area of the Shoe around or at the tip of the heel of the foot (see FIGS. 14 and 16).

At the sides of the heel part of the Shoe, these girth laces, when strained, help to fill in the anatomical depression between anklebone and heel and to lock the heel of the foot in the Shoe. Ergonomically shaped cushions located in the heel part of the Shoe may be used to help to improve this effect. In such event, the girth laces located in the heel part of the shoe, when strained, push the cushions into this area.

Version with Other Types of the Girth Lace

Instead of the round-profile girth lace, the stripe-profile girth lace (“Stripe”) may be used in the invented tying mechanism (see FIGS. 19, 7 and 8). These types of the girth lace (together with any other suitable profile of the girth laces) may be used in various combinations in the same pair of Shoes.

Each Stripe may be tied by a single eyelet at each end of the Stripe (e.g. see FIG. 26).

In the process of manufacture of this version of the invention, the grooves in the Upper Layer have to be appropriately wide and deep to take in the girth lace of the particular profile placed in the Girth Tube of corresponding shape (see FIGS. 19, 20 and 21).

The advantage of the basic version of the invention (in comparison with this version of the invention using Stripes) is that the pairs of the round-profile girth laces, when led in the predetermined girth sections, provide for more equal, better tension on both edges of the girth section (each taken care of by one round-profile girth lace of the pair), than is the tension on the edges of the Stripes.

Version without Channeling the Girth Laces through the Sole

It is possible to avoid leading the girth laces through the Sole by leading the girth laces through any other part of the Shoe, which, in strictly technical terms, would not be considered the sole of the shoe, but would be still located under the foot. Such version of the invention can also achieve the embracing effect of the circumferential tying of footwear (e.g., see FIGS. 28 and 29).

Version with More than 1 Upper Lace

In this version of the invention, the girth laces are divided into 2 or more sets, each of the sets to be tied by a separate upper lace. This version allows to apply different tension for the individual sets of the girth laces.
Version with the Upper Lace other than Lace

[0092] It is not necessary to use the usual lace as the upper lace. Alternatively, other means of tying of footwear, such as Velcro, brace, buckle, clamp, belt, band, hook, sling, strap, slip, tape, clip, etc. may be used as the upper lace (e.g., see FIG. 30 using a stripe of Velcro as the upper lace).

Version without the Upper Lace

[0093] Another version of the invention is the use of a strap, band or any other means capable of embracing the foot within the Shoe around the whole circumference of the Shoe. Such girth lace capable of embracing the foot within the Shoe in the entire circumference would render the upper lace unnecessary. Such means of embracing the foot in the Shoe would be tied by a buckle or by any other suitable means. For examples, see FIG. 30.

Version with an Additional Heel-Component

[0094] The heel section of the Sole may be improved by the use of a cushion or cushions designed to help to lock the heel of the foot within the Shoe by filling in the anatomical depressions between the anklebone and the heel on both sides of the foot (see FIGS. 14, 15 and 16).

Version with the Y-Shaped Stripe(s)

[0095] In this version, the shape of the Stripe is modified into “Y” shape, which allows to tie a wider area of the Shoe by pulling at one eyelet attached to an end of the Y-shaped Stripe (e.g., see FIGS. 7 and 8).

Version with the Girth Laces Firmly Attached within the Sole

[0096] In this version of the invention, the girth lace does not go through the Sole from one side of the Shoe to another, but is firmly attached to a place within the Shoe.

[0097] In this version of the invention, the girth lace is attached to a place within the Shoe, e.g., onto an axle or other structure located in the Sole (“Frame”) (see FIG. 37 on the Drawing Sheet number 8/17, and FIGS. 27, 31, 32 and 33). The Frame may be made of any suitable material and may have various shapes, not limited to those shown in the above Figures.

[0098] Even this version of the invention allows to utilize the embracing effect of the invented tying mechanism, because the girth laces embrace the foot in the entire circumference of the Shoe, as is the case shown in FIG. 37 (Drawing Sheet number 8/17), or the girth laces embrace the foot in the circumference of the Shoe, save for the area enclosed by the Frame (see FIGS. 31, 32 and 33).

[0099] The embracing effect of the invention increases as the location of the Frame moves closer to the center of the Sole. The embracing effect gradually reduces when the place where the girth lace is attached to the Frame moves from the central part of the Sole closer to the line underneath the edge of the foot on the side of this girth lace. In such case, the part of the entire embracing effect which is generated by leading the girth laces through the Sole is not used and becomes approximately equal to that of the usual tying mechanism. However, it still would be possible to utilize the portion of the total embracing effect caused by leading the girth laces in the girth sections across the instep of the Shoe.

Version with Shortened or no Girth Tubes

[0100] As an alternative to the Girth Tubes covering the girth laces in their entire length, the Girth Tubes may cover the girth laces in a shorter part of their length. In the instep part of the tying mechanism, the girth laces may be led (without being covered by the Girth Tubes) through the channels, rings or other similar means, which are attached to the Inner Coat and direct the girth laces around the Shoe (see FIG. 25).

Version with High Shoes

[0101] The girth laces used for tying the heel section of the Shoe may be also led over or above the anklebone, if the invention is applied in sufficiently high shoes.

Version with Inserted Sole Structure

[0102] Together with the invention, a structure, as e.g. shown in FIG. 12 or 23, may be located within the Sole. This structure would be made of a material of different flexibility than is the flexibility of the material of the rest of the Sole. Because of its different flexibility, location and shape (and, in some cases, because of location of its branches), such structure would enable to achieve varying sectional flexibility of individual parts of the Sole.

[0103] This structure can be located between the Upper Layer and Lower Layer. This sole structure may form a set of channels through which the girth laces are led (see FIGS. 23 and 24).

Version with Improved Girth Tubes

[0104] The Girth Tubes may be manufactured with various sectional flexibility. This may alter the distribution of the embracing effect of the tying mechanism around the foot.

Version with Eyelet Variants

[0105] To form an eyelet, any means capable of serving as an eyelet may be attached to the girth laces. The eyelet may be attached to the end of the girth lace as well as to other parts of the girth lace.

Version with Altered Channeling of the Girth Lace

[0106] In this version of the invention, the girth lace is led not only through the Sole, but also through other parts of the shoe located below or under the foot, as for example depicted in FIGS. 28 and 29.

Types of the Girth Lace

[0107] The girth lace may be any means capable of embracing the foot within the Shoe, such as the usual lace, strap, brace, band, belt, rope, tape, etc., made of fabric, leather, plastic or any other suitable material. The girth laces may be flexible, inflexible, or made of a blend of flexible and inflexible materials. The girth lace may be entirely flexible or flexible only in individual sections or portions.

[0108] After completion of the process of manufacture described above, the shoes may be put on the foot and tied up by pulling at the upper lace in the manner usual with the usual tying mechanism. By tying up the upper lace, the girth laces are drawn by the attached eyelets and slide in the Girth.
Tubes around the foot. The girth laces together with the upper lace circumferentially embrace the foot in the Shoe.

I claim:

1. A mechanism of tying of a shoe,
   comprising
   (a) at least one girth lace; and
   (b) at least one layer of an instep of the shoe,
   the girth lace is led around the foot
   across the instep of the shoe; or
   between layers of the instep of the shoe; or
   through the instep of the shoe,
   and
   through a sole of the shoe,
   whereby
   by tying the girth lace, the girth lace embraces the foot
   within the shoe through the instep of the shoe and the sole of the shoe.

2. A mechanism of tying of a shoe according to claim 1,
   comprising an outer coat, whereby the outer coat is joined
   with the sole of the shoe and covers the girth lace.

3. A mechanism of tying of a shoe according to claim 1,
   further comprising means for directing the girth lace
   (i) across the instep of the shoe; or
   (ii) between layers of the instep of the shoe; or
   (iii) through the instep of the shoe.

4. A mechanism of tying of a shoe according to claim 1,
   wherein the girth lace is also led through a part of the shoe
   located under or below the foot and which is not the sole of the shoe.

5. A mechanism of tying of a shoe,
   comprising
   (a) at least one upper lace;
   (b) at least one girth lace;
   (c) at least one eyelet; and
   (d) at least one layer of an instep of the shoe,
   the girth lace is led around the foot
   across the instep of the shoe; or
   between layers of the instep of the shoe; or
   through the instep of the shoe,
   and
   through a sole of the shoe,
   and
   the eyelet is attached to the girth lace, and
   the upper lace is wound through the eyelet,
   whereby
   by tying the upper lace, the upper lace pulls the eyelet, and
   the eyelet strains the girth lace, and
   the girth lace together with the upper lace embrace the
   foot within the shoe through the instep of the shoe and
   the sole of the shoe.

6. A mechanism of tying of a shoe according to claim 5,
   comprising an outer coat, whereby the outer coat is joined
   with the sole of the shoe and covers the girth lace.

7. A mechanism of tying of a shoe according to claim 5,
   further comprising means for directing the girth lace
   (i) across the instep of the shoe; or
   (ii) between layers of the instep of the shoe; or
   (iii) through the instep of the shoe.

8. A mechanism of tying of a shoe according to claim 5,
   wherein the girth lace is also led through a part of the shoe
   located under or below the foot and which is not the sole of the shoe.

9. A mechanism of tying of a shoe according to claim 5,
   comprising five pairs of the girth laces,
   three pairs of the girth laces are led around the instep of
   the foot,
   one pair of the girth laces is led around the instep of the
   foot and the heel of the foot, and
   one pair of the girth laces is led around the heel of the foot
   and over the tip of the heel of the foot.

10. A mechanism of tying of a shoe,
    comprising
    (a) at least one upper lace;
    (b) at least one girth lace;
    (c) at least two eyelets; and
    (d) at least one layer of an instep of the shoe,
    the eyelets are joined with the girth lace,
    the girth lace is led
    from one eyelet
    (i) across the instep of the shoe; or
    (ii) between layers of the instep of the shoe; or
    (iii) through the instep of the shoe,
    and around the heel of the foot
    (i) across the heel part of the instep of the shoe; or
    (ii) between layers of the heel part of the instep of the shoe;
    or
    (iii) through the heel part of the instep of the shoe,
    and
    across the instep of the shoe; or
    between layers of the instep of the shoe; or
    through the instep of the shoe, and
    through the sole of the shoe,
    and up to the other eyelet joined with the girth lace,
    (i) across the heel part of the instep of the shoe; or
    (ii) between layers of the heel part of the instep of the shoe;
    or
    (iii) through the heel part of the instep of the shoe,
by tying the upper lace, the upper lace pulls the eyelets, and

the eyelets strain the girth lace, and

the girth lace together with the upper lace embrace the foot within the shoe through the instep of the shoe and the sole of the shoe.

11. A mechanism of tying of a shoe, comprising

(a) at least one upper lace;
(b) at least one girth lace;
(c) at least one layer of the instep of the shoe;
(d) at least one eyelet; and
(e) at least one frame located within the sole of the shoe,

the girth lace is led around the foot
across the instep of the shoe; or
between layers of the instep of the shoe; or
through the instep of the shoe,

and

through the sole of the shoe,

and

the girth lace is attached to the frame, and
the eyelet is attached to the girth lace, and
the upper lace is wound through the eyelet,

whereby
by tying the upper lace, the upper lace pulls the eyelet, and
the eyelet strains the girth lace, and
the girth lace pulls at the frame and pushes other parts of the sole of the shoe, and

girth lace together with the upper lace embraces the foot within the shoe through the instep of the shoe, the frame and other parts of the sole of the shoe.

12. A mechanism of tying of a shoe, comprising

(a) at least one girth lace; and
(b) at least one layer of the instep of the shoe,

the girth lace is led around the foot
across the instep of the shoe; or
between layers of the instep of the shoe; or
through the instep of the shoe,

and

through a heel part of a sole of the shoe,

whereby
by tying the girth lace, the girth lace embraces the foot within the shoe through the instep of the shoe and the heel part of the sole of the shoe.

13. A mechanism of tying of a shoe according to claim 12, wherein the girth lace is also led through a part of the shoe located under or below the foot and which is not the sole of the shoe.

14. A mechanism of tying of a shoe according to claim 12, further comprising

(a) at least one upper lace; and
(b) at least one eyelet,

the eyelet is attached to the girth lace,
the upper lace is wound through the eyelet,

whereby
by tying the upper lace, the upper lace pulls the eyelet,
the eyelet strains the girth lace, and
the girth lace together with the upper lace embrace the foot within the shoe through the upper part of the shoe and the heel part of the sole of the shoe.

15. An improvement of the mechanism of tying of a shoe, comprising

(a) at least one girth lace; and
(b) at least one sole structure,

the sole structure is made of a material which is either less flexible or more flexible than the rest of the sole, and
the sole structure is located within the sole of the shoe,

the shape of the sole structure, in the part of the sole of the shoe where the girth lace is located, is different from the shape of the sole structure, in the part of the sole of the shoe where the girth lace is not located,

whereby

the sole structure provides for different flexibility of the part of the sole of the shoe where the girth lace is located, than is the flexibility of the part of the sole of the shoe where the girth lace is not located.

16. An improvement of the mechanism of tying of a shoe according to claim 15, wherein the sole structure has at least one channel, and the girth lace is led through the channel in the sole structure.

* * * * *