Aug. 14, 1962 E. MARCUS 3,049,120

TOE STRAIGHTENING DEVICE

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Fig. 1.

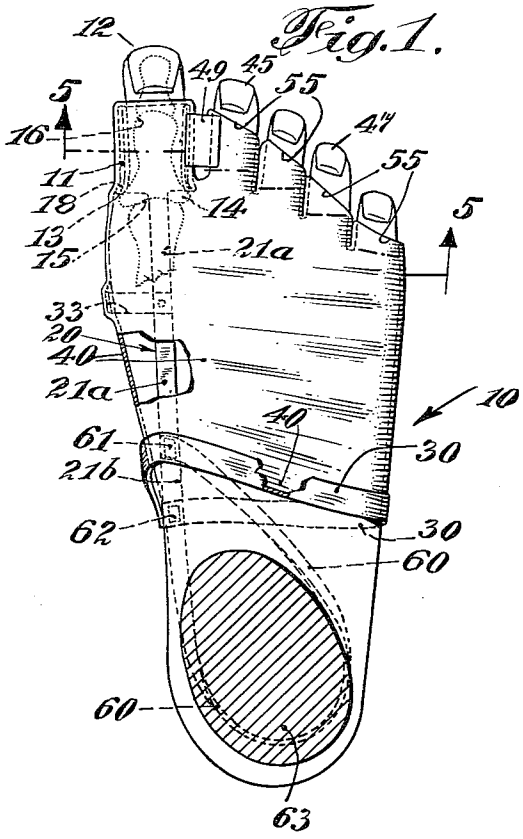


Fig. 2.

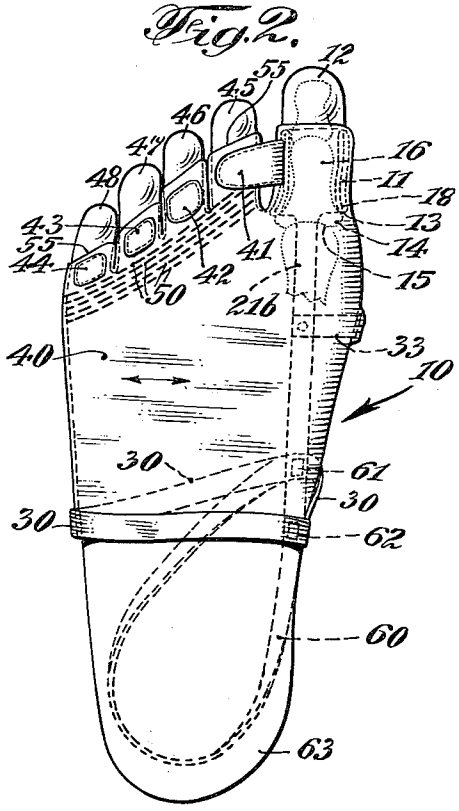


Fig. 3.

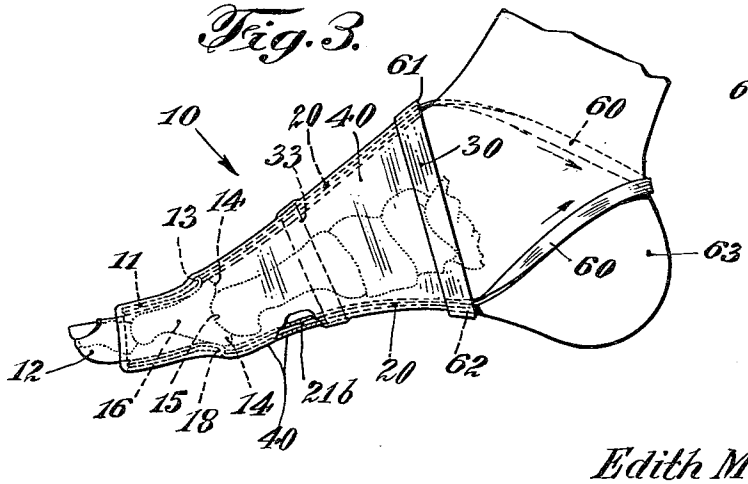
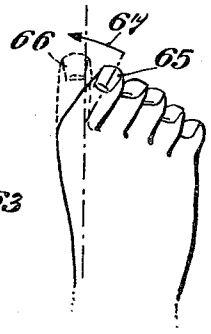


Fig. 4.



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Fig. 5.

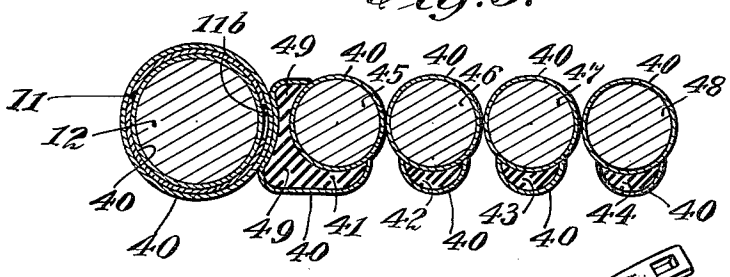


Fig. 6.

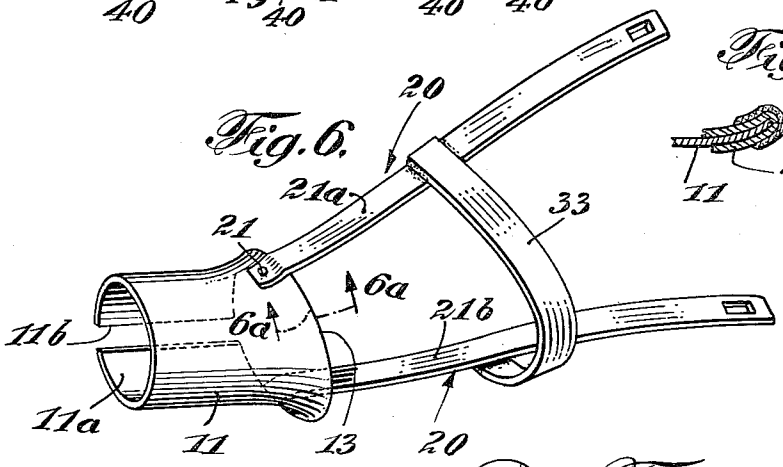


Fig. 6a.

Fig. 9.

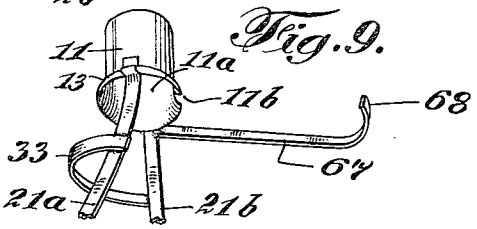


Fig. 7.

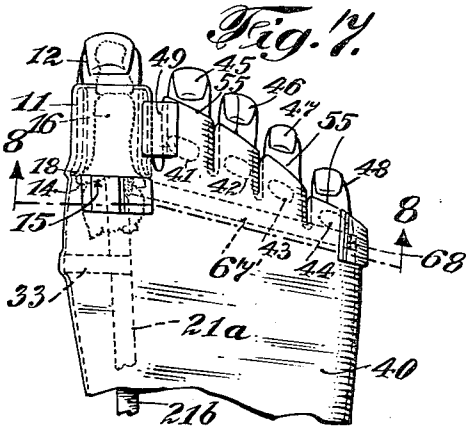


Fig. 8.

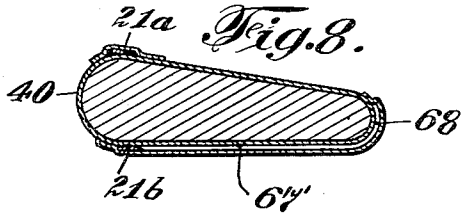
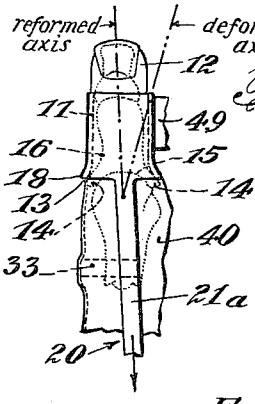


Fig. 10.



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3,049,120
TOE STRAIGHTENING DEVICE

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Filed Sept. 24, 1959, Ser. No. 841,989
11 Claims. (Cl. 128—81)

This invention relates to structures having for their object the correction of the position of the toes of the feet of a human being.

This invention consists of a structure for the toes of the feet, particularly for the larger toe, to place it in its normal and healthy position, and also to place the four smaller toes into normal and healthy position, and in such a position to assist the immobilization of the large toe in its normal position. It is when such toes are out of normal position that pain is suffered.

The present invention is a proposed stabilizer for all of the toes, and serves to train such toes to remain in their normal position.

A preferred embodiment of the invention utilizes a ring or band, preferably made of metal of suitable thickness to give a certain rigidity to embrace the rim of the first or larger phalange bone of the large toe, which forms a socket for the ball of the first metatarsal bone of the foot. It will be found on examination that when a large toe is out of place, the socket of the first phalanx bone of the toe is shifted to move the large toe longitudinally toward the body of the foot as well as into a substantially normal position with respect to other components of the foot. When pressure is applied to the peripherally extending rim of this socket bone or larger phalanx, by the ring mentioned above, the socket of the phalange will engage the ball of the first metatarsal bone, and the phalanx will be moved to its normal position, and thus move the large toe into a position in alignment with the straight line into which the ring is being pulled, and the ring will be held in place on the phalanx bone.

The ring has an upward extension, which may or may not be used. Theoretically and functionally, the ring does the work, but the extension helps considerably. The upper edge of this extension embraces the joint between the first and second phalanges. This extension can be made integral with the ring, or be suitably integrally joined.

This extension and the ring has a longitudinal slot to enable the walls of the extension and ring to freely yield, and not be fixed.

At the lower end of the extension, fastening devices secure the ring to straps, one above and one below, the foot, which extend rearwardly towards the ankle.

This is preferably made in one piece, or by a suitable connection, and the end is then secured into an embracing elastic glove.

Another part of the invention is the provision for placement of the small toes in a certain position, whereby the ball of the portion of the foot is raised, which facilitates the operation of said ring, in the direction of the pull thereon. The elasticity of the glove is to raise the big toe joint with the metatarsal.

A further and important aspect of the invention resides in a glove enclosing the forward end of the foot from its waist downwardly and frontward outwardly substantially to the tip of the toes, the metal pulling straps, the strengtheners for the same, the small toe raiser, the end of any pad, all being within and forming part of the glove. Thus the glove can be removed from and replaced on the foot as a unit. Some patients are advised to keep the glove with its parts on the foot for a long time. In a modified form, an extension is provided to hold the small toes in place.

In the accompanying drawings, in which like characters indicate corresponding parts,

FIG. 1 is a top plan view of a human foot, showing my improvement applied thereto;

FIG. 2 is a bottom plan view, of a human foot, showing the improvements bottom side up.

FIG. 3 is a vertical side view, of the improvement applied to the human foot;

FIG. 4 is a diagrammatic sketch, showing the deformed large toe position, and the normal reformed toe position;

FIG. 5 is a vertical section on line 5—5 of FIG. 1;

FIG. 6 is a perspective view of the reformer, used within the glove;

FIG. 6*a* is a cross-sectional view on an enlarged scale taken along line 6*a*—6*a* on FIG. 6 but showing, in addition, suitable padding;

FIG. 7 is a top view of a modified structure;

FIG. 8 is a vertical section of FIG. 7 on line 8—8;

FIG. 9 is a perspective view of a modified form of the frame structure; and

FIG. 10 is a diagrammatic partial top view of the straightener portion.

Referring to the drawings, the foot generally indicated by the character **10** has a ring **11** surrounding the large toe **12**, with its inner end edge **13**, resting on the peripherally outwardly projected rim **14** of the socket **15** of the first bone **16** or phalanx of the larger toe **12** (FIG. 3). Edge **13** is peripherally bent outwardly in a curved portion extending circumferentially around the ring **11**, and this curved portion is peripherally also supplied with a soft layer of felt, such as is used in the parts of a piano action, or with lamb's wool, for protection (see FIG. 6*a*), so that the bevelled portion and layer do not injure the flesh surrounding the first bone of the large toe, when the circumferential bevel **18** of the ring **11** abuts against the circumferential rim **14** of the socket end of the first phalanx bone. Cylindrical ring **11** is suitably shaped to conform to the juxtaposed portions of the toe and is provided with a slot **11***b* along the inner side facing the largest small toe. This cylinder assists in holding the encased large toe in a desired corrective position as its beveled inner end **11***b* is held seated against the enlarged end **14** of bone **16**.

From the lower end of the ring **11** extend two diametrically disposed metal straps **20**, preferably peripherally integral with the ring, since one end **21** of the strap **20** can be riveted or otherwise secured to the ring **11**; one on top, and the other at the bottom of the foot. The free end of the top strap **21***a* is alongside longitudinally, laterally inwardly of the first metatarsal bone, and extends rearwardly back to a circular band **30**, which extends around the foot, at about the waist of the foot. This is preferably made of reasonably strong elastic band structure extending around the foot.

The other or lower strap **21***b* is on the bottom of the foot, and extends longitudinally laterally inwardly of the protruding ball so as not to interfere with it, to immobilize the ball. The free end of this lower strap is secured by riveting or the like to the band **30**. This elastic is made sufficiently strong to provide a rigid connection, so that when the band **30** is pulled backwardly towards said waist of the foot, the rim **11** will be pulled against the rim **14** of the first bone or phalanx of the large toe.

The straps are preferably of fine sheet aluminum, and of sufficient strength to pull the ring **15** into toe correcting position.

Preferably, the two straps, **21***a* and **21***b*, are joined by a transverse strap **33** connecting the two main straps, which also serves to hold the straps **21***a* and **21***b* in permanent position.

All the parts disclosed are covered or embraced by the woven glove **40** of stretchable material, so that these parts

are part of the glove, and as the rear edge of the glove all around has the elastic circular band 30, the glove may be taken off and readily put on in its entirety.

Thus, there is produced a glove 40, having the large toe adjuster within the same, to place the phalange in line with the large toe metatarsal bone, and thus have these bones in normal or natural position, aligned with each other. The glove 40 has fingers (cut off)—or not, and at the lower part there are secured to the glove pieces 41, 42, 43 and 44 of sponge rubber, or the like, which enter the lower curved portions of the four small toes, 45, 46, 47, 48. The member 41 between the big toe and first small toe 45, is lengthened to serve as a spacer 49, so that when the big toe is brought into its normal position, the piece fits into the slot and serves to block the big toe from coming back from its reformed position. This auxiliary action protects the position of the big toe in its normal position, aligned with the metatarsal bone of the foot. The lower part of the glove is provided with parallel stitches 50 to strengthen the glove.

The front end 55 (FIG. 1) makes a neat appearance as a front finish to the glove.

The glove 40 enclosing the phalanx bone straightener and the sponge rubber members, 41, 42, 43 and 44, having been applied to the foot it needs only to be held in place in a manner to exert a certain pull on the glove 40. This is done by providing a loop 60 of an elastic band, one end 61 of which is secured to the upper strap, and the other end 62 is secured to the lower strap, the loop going around the rear 63 of the heel portion of the foot.

The inward end of the glove 40 is provided with an elastic band of some stiffness, to give a body to the rear of the glove, and thus facilitate the positioning of the straps, so that the straps can pull down the phalanx ring against the rim of the first phalanx bone, and move the rim against the ball of the largest metatarsal bone to bring the two bones in alignment.

FIG. 6*a* is a section on line 6*a*, FIGURE 6, and shows a slight curvature covered by the glove 40, and on the outside by a piano felt 62' or lamb's wool, so as to protect the effect of a metal contact with the skin of the toe.

In FIG. 4, the positioning of the toes is shown, the inclined position being shown at 65, and the normalized toe being shown at 66, the curvature movement being shown by the arrow 67.

If desired, the phalanx straightener is provided with a right-angled positioner 68 as part of the lower strap 67', and having an end secured to the face of a ring 11*a* of a length, whereby the smaller toes are held in postion on the strap 67'.

The invention has been illustrated in various embodiments, but changes may be made therein, without departing from the spirit of my invention.

I claim:

1. A toe straightener comprising a rigid ring having an outwardly flared end, said ring being of a size to fit loosely about the first phalanx of the great toe with the flared end thereof supported by the flaring inner rim end of said phalanx and closely but closely embracing the main body portion of the great toe, and fastening means engageable with the foot and effective to hold said ring seated against the flaring rim at the inner end of said first phalanx with the axis of the latter shifted laterally into general alignment with the axis of the metatarsal bone without subjecting the main body of the great toe to longitudinal pressure.

2. A toe straightener as defined in claim 1 characterized in that said fastening means comprises rigid means adapted to lie flush against the surface of the foot rearward of the great toe and including means for holding said rigid means against the foot and the great toe shifted into alignment with the axis of said metatarsal bone.

3. A toe straightener as defined in claim 2 characterized in that said holding means includes a glove-like member of flexible sheet material adapted to closely embrace the metatarsal arch portion of the foot.

4. A toe straightener as defined in claim 1 and including glove means adapted to fit over the forward portion of the foot and to embrace at least the major portion of individual toes, and a sponge rubber insert attached to said glove and adapted to be positioned between the two larger toes and aiding in holding the great toe aligned with the longitudinal axis of said metatarsal bone.

5. In foot toe straighteners, the combination of a ring adapted to encircle the first of the phalanxes of the large toe, one end of said ring being flared outwardly to be supported by the outer portion of the circumferential rim of said first phalanx, means extending from the rim towards the waist of the foot for holding the ring seated against the phalanx rim, whereby said phalanx is moved into its natural position on the ball of the foot, in alignment with the ball of the first metatarsal bone, and a glove of woven elastic or stretchable material, embracing all the foregoing parts.

6. A foot and toe straightener comprising a ring having a flared end adapted to encircle the large toe with the flared end of said ring supported on the larger base end of the first phalanx bone whereby said ring is adapted to be pivoted along with said phalanx bone in a direction to shift the axis of the big toe to a desired corrective position without applying axially compressive forces to the toe proper, and means attached to said ring for securing the same to the foot to hold the toe directed as desired for corrective purposes.

7. A foot and toe straightener as defined in claim 6 characterized in that said attaching means for said ring includes means rigid with said ring and secured to the flared end thereof and projecting rearwardly toward the main body of the foot along the exterior surfaces of the foot and adapted to cooperate therewith to hold said ring and the big toe in a desired position while leaving the toe proper free of axially acting pressures.

8. A foot and toe straightener as defined in claim 6 characterized in the provision of soft flexible elastic glove means having a main body adapted to fit about at least the forward portion of the foot and serving to distribute more equitably over the foot stresses imposed on the foot by said toe straightener and the attaching means holding the same to the foot.

9. A foot and toe straightener as defined in claim 8 characterized in that said glove includes a plurality of ringlets at one end shaped to encircle and receive the major portion of the toes and to hold the same separated.

10. A foot and toe straightener as defined in claim 9 characterized in the provision within certain of said elastic ringlets of resilient padding adapted to underlie and support upwardly arched toes and cooperating with the ring encircling the big toe in correcting the relationship of the toes to one another and to the foot proper.

11. A foot and toe straightener as defined in claim 9 characterized in that the free ends of said toe receiving ringlets are open-ended and terminate rearwardly of the foremost ends of the toes.

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