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W. J. BOOS
ORTHOPEDIC APPLIANCE
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2,400,680

FIG. 1.

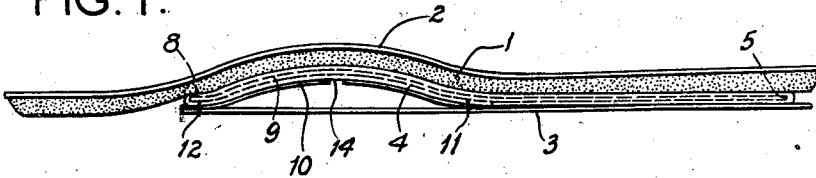


FIG. 2.

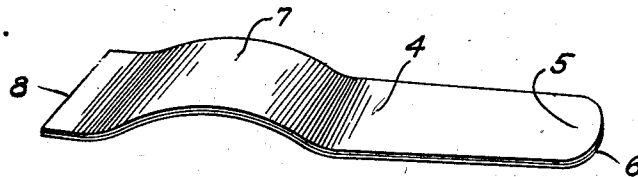


FIG. 3.

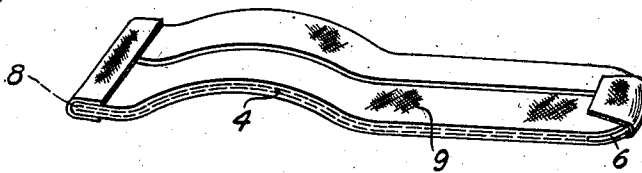
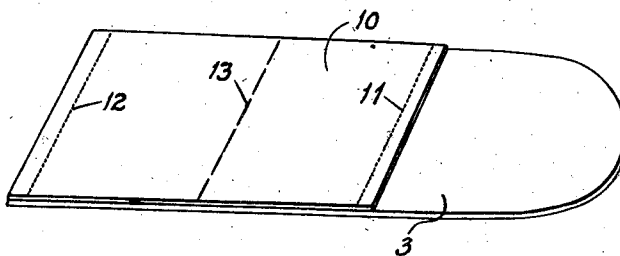


FIG. 4.



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ORTHOPEDIC APPLIANCE

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Easy Foot Rest Manufacturing Company, St.
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6 Claims. (Cl. 36—71)

This invention relates generally to orthopedic appliances, and particularly to resilient supports for the longitudinal arch of the foot.

Heretofore, orthopedic appliances have embodied a metallic member arranged to provide support for the longitudinal arch of the foot. In some instances these metallic members have been of resilient character and in other instances have been substantially firm.

It is generally recognized that a firm and unyielding support is undesirable, yet in attempting to make resilient metallic supports for the arch which are sufficiently resilient or flexible to yield in order to accommodate the foot in connection with which the device is used, it has been found that metallic springs are subject to fatigue and tend to break.

The object of the present invention, generally stated, is to provide a metallic spring for an orthopedic appliance which is flexible, yet capable of maintaining its form and strength for long periods of time.

Another object of the present invention is to provide an orthopedic appliance embodying a metallic spring constructed and arranged so as to be protected from the deleterious action of perspiration.

Other objects of the invention will become apparent to those skilled in the art when the following description is read in connection with the accompanying drawing, in which:

Figure 1 is a side elevation of an orthopedic appliance constructed in accordance with the present invention;

Figure 2 is a perspective view of the metallic spring member utilized in the device shown in Figure 1;

Figure 3 is a perspective view of the spring member of Figure 2, wrapped;

Figure 4 is a perspective view of the tensioning member embodied in the orthopedic appliance shown in Figure 1.

An orthopedic appliance is provided with an arched spring member which is constructed of sheet metal having the desired resiliency, but characterized by the fact that the spring member is composed of at least two laminae. In order to achieve greatly increased active life of such a spring member, the present invention further contemplates that the grain of the respective laminae in such a spring member be arranged out of parallel, and preferably at right angles.

It is a well known fact that in the rolling of sheet metal the resultant strips, or sheets, have different physical properties in the longitudinal

direction from those which they possess in the transverse direction. This is commonly known as "directional properties," and exists unless special treatment is provided for rendering the sheet metal non-directional. The "grain" to which reference is herein made extends in the longitudinal direction, that is, the direction in which the strip emerges from the rolls upon which it is made.

The respective laminae may be formed of the same or different material such, for instance, as spring steel, phosphor bronze, spring brass or the like, the gauge and physical properties being selected so as to best suit the purpose for the particular arch support in which the device is being used.

Referring now to the drawing for an illustrative embodiment of the present invention, the orthopedic appliance comprises a cushion member 1 of sponge rubber or other cushion material having a top covering 2, and a tensioning strip 3 extending as a chord across the bottom of the cushioning member so as to maintain the cushioning member and its cover 2 in bowed position, all in substantial accordance with disclosure of the patent to Closson, No. 1,959,050.

Provided in the bow of the device is a spring member 4 suitably connected to the lower side of the cushioning member and arranged above the tensioning strip 3. The spring member 4 is shown in detail in Figure 2, and consists of laminae 5 and 6 which, as indicated above, may be of the same or different material. The laminae 5 and 6 are preferably cut from stock in such manner that the grain in the lamina 6 runs substantially crosswise, while the grain in lamina 5 runs substantially longitudinally, or vice versa. After these laminae are cut from the stock they may be formed in suitable dies so as to provide the arched portion 7 and the forward lip 8, as shown in Figure 2; or the forming operation may be delayed until the laminae are connected together, when they may be formed in unison. Such deforming operation permanently sets each of the laminae in the arched relation but with the grain in respective laminae differently oriented with respect to the permanently set arch.

The laminae 5 and 6 may be suitably connected together as, for instance, by adhesive, rivets, welding or brazing, it being understood that while it is desirable to limit sidewise creepage, the arch portion 7 of the respective laminae will maintain them against undesirable longitudinal creepage. Any connecting means employed may, therefore, allow for slight creepage of the laminae relative to each other.

In order to protect the spring member 4 from the deleterious action of foot perspiration, the spring member is preferably enclosed in a moisture proof envelope which may be formed of waterproofed textile or a suitable coating composition. As shown in Figure 3 a textile covering 9 suitably treated so as to be waterproof is provided for the spring member 4, enclosing and protecting the same. The spring member 4 with its protective covering 9 may be assembled with the other parts of the orthopedic appliance and connected thereto, as by suitable adhesive cement.

In the manufacture of orthopedic devices of the character herein disclosed, the tensioning strip 3 may advantageously be applied to and assembled with the other elements of the structure by a supplemental strip 10, which is stitched to the tensioning strip 3 as indicated by the spaced lines of stitching 11 and 12. After the supplemental strip has been thus secured at spaced points at tensioning strip 3, it may be slit intermediate the lines of connecting stitching as along the dash line 13, to provide separate flaps which may then be conveniently adhered to the lower side of the cushioning member and spring member, as shown clearly in Figure 1, leaving a parting 14 between the flaps which were formed by the slit at 13.

While in the foregoing description a complete disclosure of one embodiment of the present invention has been made, it is apparent that many modifications and variations of the orthopedic appliance herein disclosed will present themselves to those skilled in the art without departing from the spirit of this invention. For example, the laminated spring may be utilized in lieu of the usual shank stiffener in a shoe, to provide a resilient sole which at the same time is sufficiently stiff. It is, therefore, to be distinctly understood that it is contemplated that the laminated spring member may be formed to suit the idiosyncrasies of the foot or in accordance with the whim of the manufacturer embodying longitudinal as well as lateral arches and irregularities. Such changes in form are to be understood to be within the contemplation of the present invention.

The invention having thus been described, I claim:

1. In an orthopedic appliance a resilient member comprising permanently arched laminae of sheet metal in continuous contiguity, the grain of the respective laminae being non parallel and differently oriented with respect to the permanent set of said resilient member.

2. In an orthopedic appliance a resilient member comprising permanently arched laminae of sheet metal in continuous contiguity, the grain of the respective laminae running substantially at right angles and differently oriented with respect to the permanent set of said resilient laminae.

3. In an orthopedic appliance a resilient member comprising permanently arched laminae of sheet metal in continuous contiguity, the grain of the respective permanently arched laminae running substantially at right angles and differently oriented with respect to the permanent set of said resilient member, and means connecting the laminae to maintain them substantially in register.

4. In an orthopedic appliance, a cushion member, a laminated sheet metal resilient member associated therewith, the grain in the respective laminae being non-parallel, and a tensioning strip for bowing the cushion member in a direction lengthwise of the grain of one lamina and into substantial conformity with the resilient member.

5. In the manufacture of bowed orthopedic appliances, the process comprising providing a tensioning strip and an attaching strip therefor, securing the attaching strip to the tensioning strip at spaced points, severing the attaching strip between such spaced points so as to provide flaps, providing a body part for the orthopedic appliance and connecting the flaps to the body part.

6. A spring, for use in footwear comprising permanently arched laminae of sheet metal in continuous contiguity, the grain of the respective permanently arched laminae running substantially at right angles and differently oriented with respect to the permanent set of said laminae.

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