W. L. GORDON.

PNEUMATIC CUSHION INSOLE.

APPLICATION FILED OCT. 22, 1907.

901,236. Patented Oct. 13, 1908.

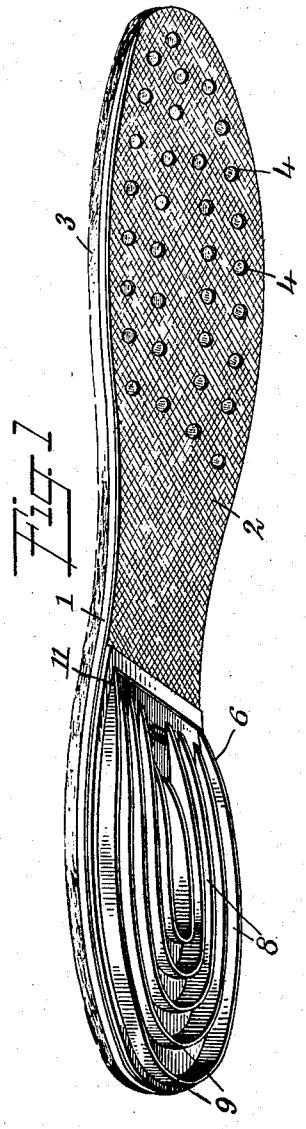


Fig. 1

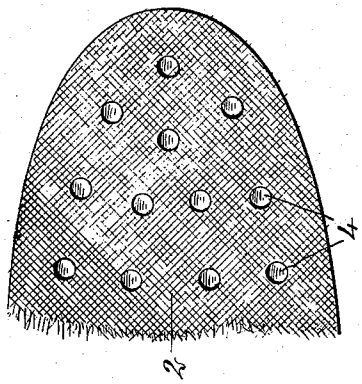


Fig. 3

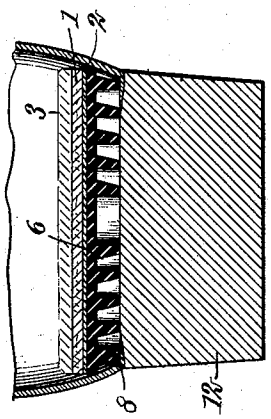


Fig. 2

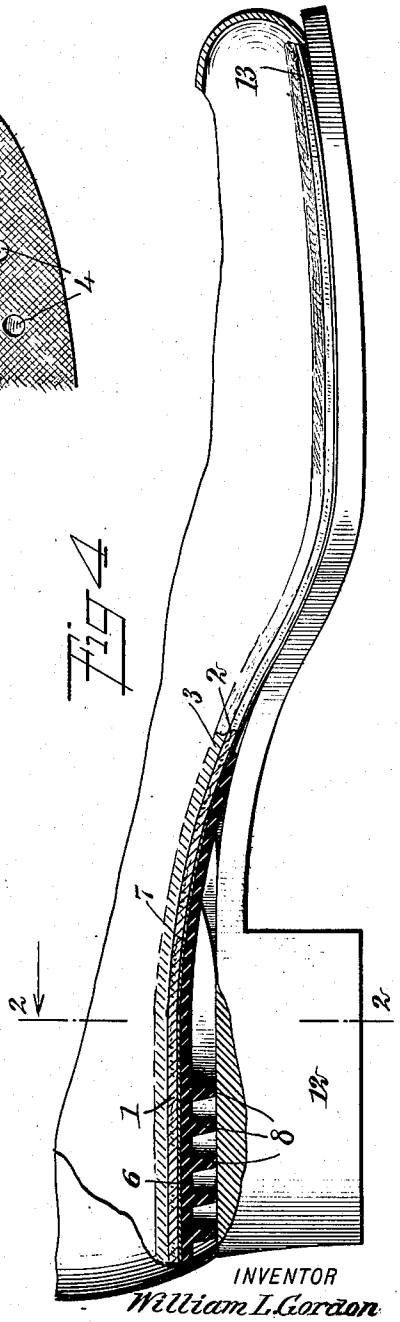


Fig. 4

WITNESSES

C. G. Bromley.

F. D. Anderson

INVENTOR

William L. Gordon

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM L. GORDON, OF DEAL, NEW JERSEY, ASSIGNOR TO PNEUMATIC HEEL CUSHION COMPANY, OF ASBURY PARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PNEUMATIC-CUSHION INSOLE.

No. 901,236. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed October 22, 1907. Serial No. 398,541.

To all whom it may concern:

Be it known that I, WILLIAM L. GORDON, a citizen of the United States, and a resident of Deal, in the county of Monmouth and State of New Jersey, have invented a new and Improved Pneumatic-Cushion Insole, of which the following is a full, clear, and exact description.

This invention relates to boots and shoes, and especially to the insoles thereof.

The object of the invention is to produce a pneumatic insole which will have a good cushioning effect at the heel, and which will operate to ventilate the forward portion of the shoe. With this end in view, the insole is constructed at the heel in such a way that when pressure is brought upon it, a quantity of air is forced forwardly under the toe of the insole, and the construction of the toe or forward portion of the insole is such as to facilitate the upward movement of the air toward the sole of the foot.

A further object of the invention is to improve the construction at the toe to increase the comfort in wearing the shoe, and to provide a new arrangement of the parts which will increase the strength and durability of the insole.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective showing an insole constructed according to my invention; Fig. 2 is a vertical cross section on the line 2—2 of Fig. 4, showing the rear portion of a shoe having an insole constructed according to my invention; Fig. 3 is a bottom plan of the forward portion of the insole; and Fig. 4 is a longitudinal section through a shoe showing the insole partly in elevation and partly in section.

Referring more particularly to the parts, 1 represents the body of the insole, which is preferably formed of cork, having the outline of the interior of the shoe in which the insole is to be worn. On its under side this insole body has attached thereto a layer 2 of a coarse textile fabric such as burlap. This burlap operates to prevent the insole from curling or creasing, and also strengthens the insole. It forms, also, a comfortable support for the foot on account of its porous and compressible nature.

On the upper side of the body 1 of the insole, a layer 3 is attached, which layer is formed of a light absorbent material such as felt. The forward portion of the insole under the ball of the foot and toe, is perforated as indicated, the perforations 4 being disposed in any suitable arrangement such as that illustrated. On the under side of the body of the insole at the heel 5 thereof, I attach a heel cushion 6, which is formed of compressible or elastic material such as rubber. In its structure, this cushion comprises a flat body or plate 7 on the under side of which are arranged a plurality of ribs 8. These ribs are of substantially horseshoe form as shown, the bows or curves 9 of the ribs being disposed at the rear. These ribs are arranged progressively, of increasing size from the central portion 10 of the heel outwardly. The forward portions of the ribs conform to the curvature of the side edge of the insole at this point. Their forward lower edges are tapered as indicated at 11 in Fig. 1, so that they terminate just forward of the heel 12 of the shoe. In this way, between the ribs there are formed a plurality of horseshoe-shaped channels or air ducts, the ends of which are open toward the forward portion of the shoe. All the ribs are of the same depth, so that their lower edges come against the inner face of the heel of the shoe; in this way the ducts or channels are all separated from each other.

As indicated clearly in Figs. 2 and 4, the ribs 8 are arranged so that their axes of cross section incline to the vertical line, the upper portion of the axes being disposed outwardly or toward the outer portion of the shoe. From this arrangement it should be understood that when pressure is exerted by the weight of the body at the heel, these ribs 9 collapse and bend inwardly, so that they compress the air in the channels between them. In this way these ribs operate as automatic valves or pulsators, causing a forward flow of the air from the heel under pressure, and a return flow of the air when the pressure is relieved. The air which is forced forwardly under the sole of the foot circulates upwardly through the perforations 4 and effectually ventilates the forward

portion of the shoe. In this way the foot within the shoe is kept dry and comfortable.

At the toe, the cork layer or body 1 is shaved down to a thin edge 13 as indicated, which increases the ease and comfort with which the shoe is worn. The advantage of this construction is especially noticeable in walking.

I have discovered that the reinforcing effect of the burlap 2 is increased if it is attached to the insole body so that the warp and woof of the fabric run at an inclination to the longitudinal axis of the shoe. I prefer to attach this burlap with the threads disposed at an angle of 45° as indicated in Fig. 3. The inclined position of the threads seems to give the fabric greater stiffness and strengthens it against tearing when the insole flexes as in walking.

In considering the operation of the present device, it will be evident that the instant that pressure is brought upon the heel of the insole, a contraction of the channels between the ribs, immediately takes place. Commencing at the rear it progresses forwardly. This contraction tends to compress the air in the rear portions of the channels, and force the same forwardly so that this air is projected forwardly within the shoe and under the insole. In other words, the forward movement of the air begins immediately and is maintained continuously until the limit of downward movement of the insole at the heel is reached.

Attention is also called to the inclination of the axes of the ribs, which tends to make them collapse under pressure rather than to expand; that is, they collapse inwardly at their lower edges under pressure. In the patented device, there are intermediate ribs of less height than the others, and these ribs do not touch the upper face of the heel until the higher or larger ribs have been considerably compressed. In other words, in the device disclosed above, there is a gradual and continuous downward movement of the cushion, producing a continuous forward flow of air.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An insole having a pneumatic heel cushion presenting a plurality of ribs on the under side thereof conforming substantially to the outline of the insole, said ribs being of substantially equal height and forming therebetween a plurality of horseshoe-shaped channels opening forwardly on the under side of said insole, said ribs being adapted to expand under pressure from above, whereby the said channels under pressure from the foot become contracted progressively from the rear forwardly and force the air forwardly therefrom, said insole having perforations in the forward portion through which the air forced forwardly from said cushion may pass upwardly.

2. An insole having a pneumatic cushion under the heel thereof, said cushion presenting a plurality of ribs of substantially horseshoe form, of progressively increasing dimension whereby a plurality of channels are formed opening forwardly, said ribs having their axes of cross section inclined inwardly below whereby they tend to collapse inwardly under pressure, thereby compressing the air in said channels, and forcing the same forwardly.

3. An insole consisting of a cork layer, a pneumatic heel cushion attached to the under side thereof at the heel and having a plurality of ribs extending in a front and rear direction with channels between said ribs adapated to force air forwardly under said layer when said ribs are compressed, said layer having perforations forwardly therein, and a layer of fabric covering said perforations through which the air may pass upwardly.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM L. GORDON.

Witnesses:
F. D. AMMEN,
JOHN P. DAVIS.