

Dec. 9, 1958

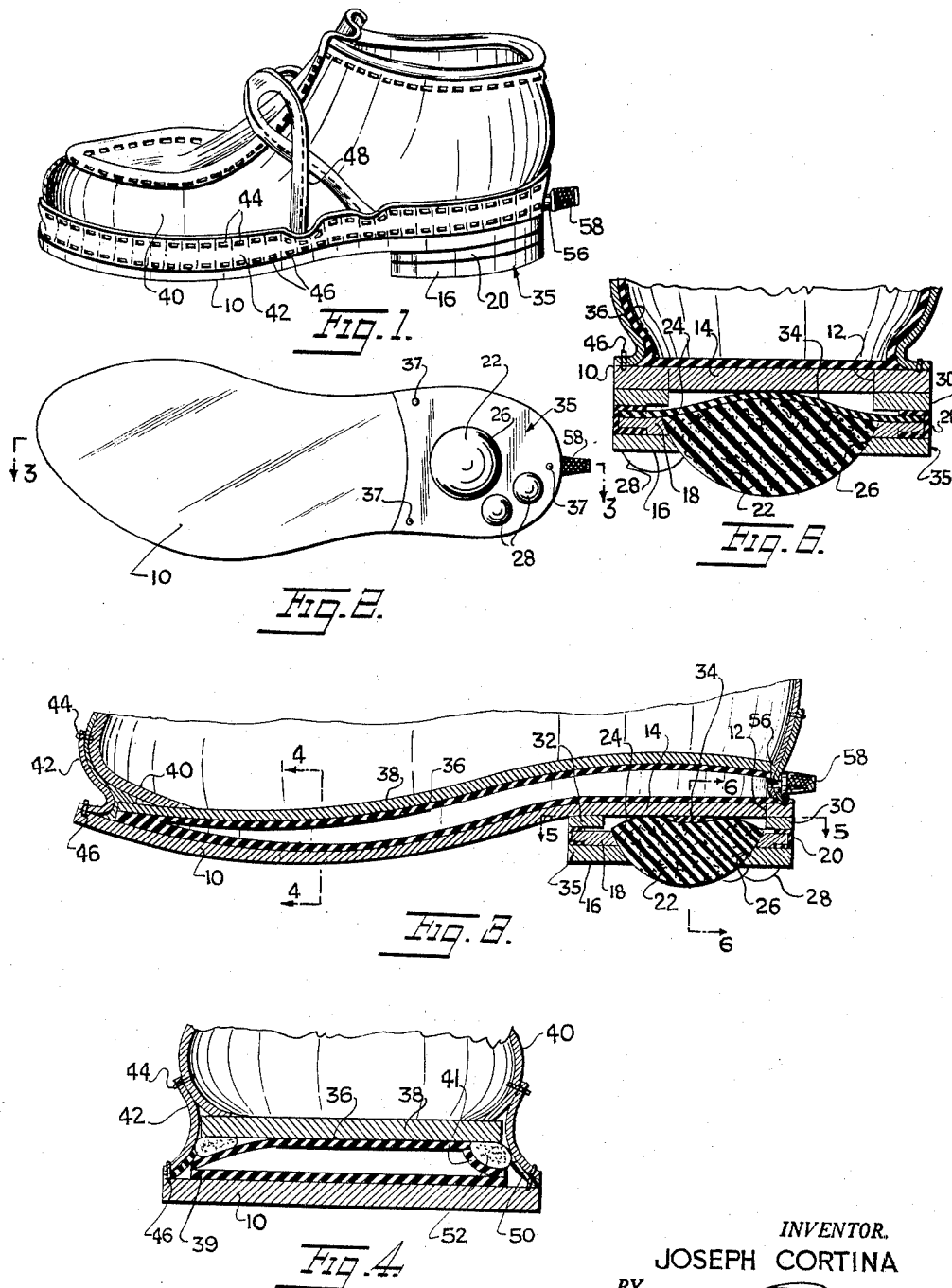
J. CORTINA

2,863,230

CUSHIONED SOLE AND HEEL FOR SHOES

Filed March 15, 1957

2 Sheets-Sheet 1



INVENTOR.
JOSEPH CORTINA
BY *John P. Hackett*
ATTORNEY

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J. CORTINA

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2 Sheets-Sheet 2

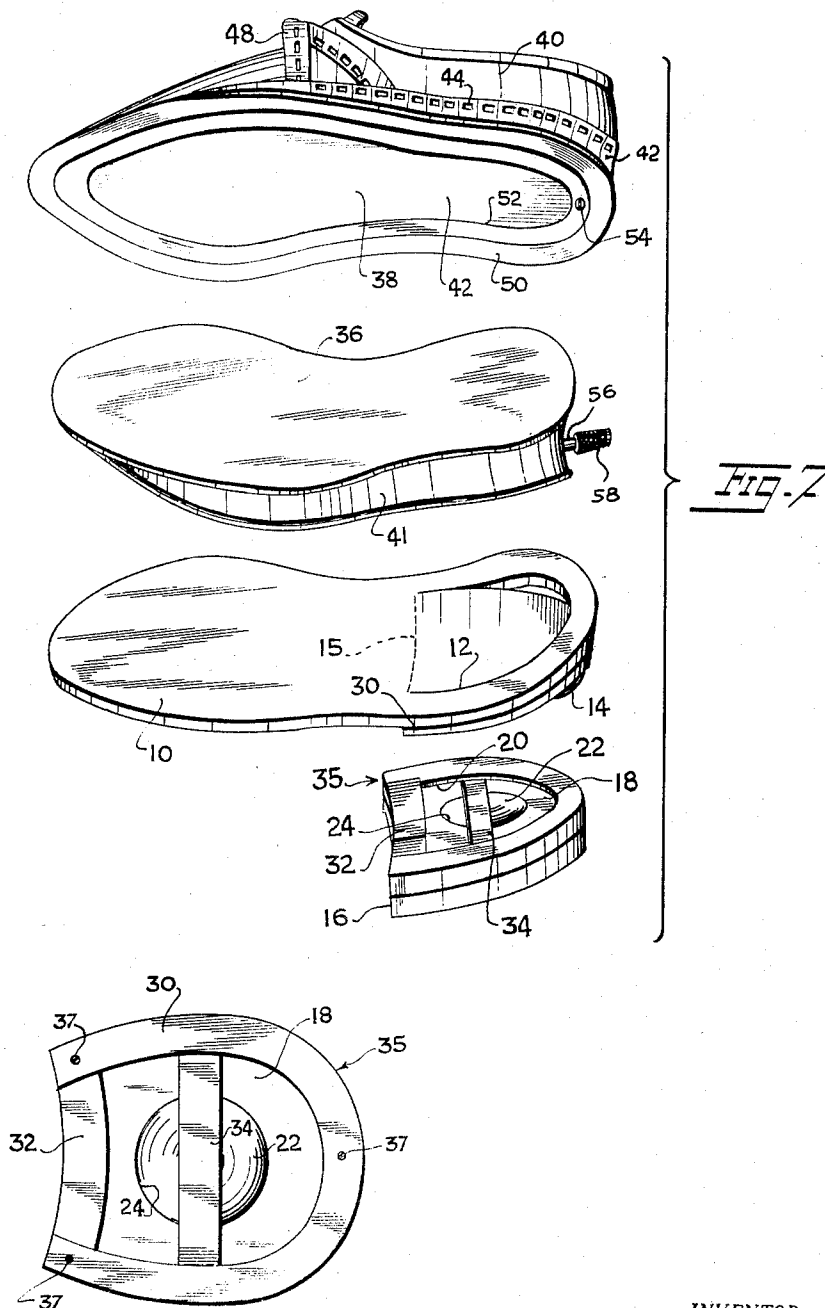


FIG. 5.

INVENTOR.
JOSEPH CORTINA

BY *John H. H. H. H.*

ATTORNEY

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2,863,230

CUSHIONED SOLE AND HEEL FOR SHOES

Joseph Cortina, New York, N. Y.

Application March 15, 1957, Serial No. 646,328

3 Claims. (Cl. 36—29)

This invention relates generally to footwear and, more particularly, to a shoe having means for cushioning the sole and heel of the foot of the wearer.

It is a principal object of the invention to provide a shoe with cushioning means for absorbing ordinary shocks encountered during wear of the shoe.

A further object of the invention is to provide a shoe with an inflated cushion yieldable on each step so as to cushion the foot.

A further object of the invention is to provide a shoe with an inflated cushion for the sole of the foot of the wearer and with cushioning means for the heel of the foot so as to provide a cushioning effect during running and walking.

A still further object is to provide a shoe with an inflated cushion for the sole of the foot of the wearer and with a hemispherical, resilient element in the heel below the inflated cushion for cushioning the foot of the wearer.

Still another object of the invention is to provide a shoe with foot cushioning means that is completely concealed when the shoe is worn, that is particularly adapted for use in heavy work shoes, and that reduces fatigue and gives comfort and relief to wearers who are on their feet for a considerable part of the workday.

A still further object is to provide a shoe with an inflated cushioning device having means for adjusting the pneumatic pressure so as to give the desired firmness to suit the needs of the individual wearer.

It is also further proposed to provide a shoe with cushioning means for the sole and foot of the wearer that is relatively inexpensive to manufacture considering that cushioning is provided for the entire area of the foot.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a shoe made in accordance with the invention.

Fig. 2 is a bottom plan view thereof.

Fig. 3 is a longitudinal sectional view thereof taken substantially on the plane of the line 3—3 of Fig. 2, parts being broken away.

Fig. 4 is a transverse sectional view taken on the plane of the line 4—4 of Fig. 3.

Fig. 5 is a horizontal sectional view taken on the plane of the line 5—5 of Fig. 3.

Fig. 6 is a transverse sectional view taken on the plane of the line 6—6 of Fig. 3.

Fig. 7 is an exploded perspective view showing the various components of the shoe.

Referring to Figs. 1-7 of the drawings in detail, in the shoe shown therein reference numeral 10 designates an outer sole of comparatively thick material, such as leather

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or a suitable composition used in the manufacture of shoe soles. The sole has, of course, sufficient flexibility to permit wearing of the shoe with comfort, and in effect is of the same general configuration and thickness as an ordinary outer sole.

However, in accordance with the present invention (see Fig. 7), there is formed in the heel portion of sole 10 a U-shaped slit 12, which generally parallels the correspondingly shaped edge of the heel portion. The slit 12 provides a tongue 14 bounded by the slit, and formed integrally with the material of the outer sole, said tongue flexing along a line 15 so as to, in effect, be hinged upon the outer sole 10 for swinging movement about an axis extending transversely of the outer sole.

A leather heel 35 includes a lower member 16 and an upper member 18, cemented or otherwise secured to the top surface of the lower member. Said members each has the outer configuration shown in Fig. 5, which is usual in shoe heel construction, and extending along the side and back edges of the upper member 18 is a rubber, edge-cushioning strip 20 of channeled formation, said strip 20 embraceably receiving the edge portion of the upper member 18. Strip 20 may be cemented or otherwise fixedly secured to the upper member 18.

A part-spherical heel cushion 22 of sponge rubber or other soft, resilient material is cemented or otherwise securely engaged in registering openings 24, 26 of heel members 18, 16, respectively, with the bottom portion of the cushion projecting downwardly below the bottom surface of the member 16 and the upper portion projecting above the top surface of member 18 a short distance. The top surface of cushion 22 is shallowly convex in an upward direction.

Referring to Figs. 2 and 3, secured to the underside of member 16 adjacent cushion 22 are downwardly convex cleats 28 of rubber or other resilient material, these being slightly less resilient than the cushion 22 and being adapted to engage the ground surface on each step, following compression of the cushion 22. There is, thus, a primary cushioning action afforded by the cushion 22, followed by a secondary cushioning action of less resiliency, produced by the cleats. A spacer 30 of leather or composition material extends about the upwardly projecting portion of the cushion 22. The spacer 30 is in position overlying the edge-cushioning strip 20 as best shown in Fig. 6, and is cemented to the underside of the outer sole 10 (see Fig. 7), rather than to the heel.

Between the forward ends of the side portions of the spacer 30 there extends a transverse spacer piece 32, cemented to the top surface of the member 18.

Also, and as best shown in Figs. 3, 5, 6 and 7, a hold-down strip 34 of rubber or other elastic material extends transversely of the heel, diametrically of the heel cushion 22, with its ends cemented under the side portions of the edge-cushioning strip 20.

The heel formed and as described above has been generally designated 35 in the several figures of the drawing. With the exception, of course, of the spacer 30 which is secured to the outer sole rather than to the heel, the heel may be preassembled as shown in Fig. 7, and then attached to the outer sole through the provision of nails 37 or equivalent fastening elements. If desired, the heel may be cemented to the outer sole in addition to being nailed. All this is well within the skill of those working in the art, and constitutes construction details that do not affect the carrying out of the actual invention.

As will be noted from Fig. 6, when the heel is secured to the outer side of the outer sole, the tongue 14 overlies and is substantially in contact with the hold-down strip 34 of the cushion. Thus, the tongue, on each step taken by the user, is adapted to flex upwardly above the plane

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of the sole, responsive to any compression of the cushion causing corresponding upward bulging of the top surface of the cushion. In a manner to be presently made apparent, the upward flexing of the tongue 14 in turn results in the tongue being moved to a position exerting pressure against the underside of an inflatable bladder 36, which provides a cushioning action over the entire length of the shoe.

The bladder 36, as shown in Fig. 7, has an outer configuration corresponding to the outer configuration of the shoe itself; that is, of the outer sole 10 (see Fig. 2). The bladder, however, has its periphery inset from the periphery of the outer sole, as will be apparent by reference to Figs. 4 and 7.

Further, the bladder is so formed that along its outer side edge, the top and bottom portions of the bladder are cemented directly together in face-to-face contact as shown at 39 in Fig. 4. At the other side of the bladder, however, said portions are spaced apart, being connected by a side wall 41. The top and bottom portions of the bladder are in face-to-face contact also at the toe end of the bladder with this contact continuing along the outer side of the bladder for approximately half the length thereof, after which, along the outer side, the top and bottom portions of the bladder are spaced apart by a side wall arranged similarly to and constituting an integral extension of the side wall 41, which extends for substantially the full length of the bladder as shown in Fig. 7.

The bladder is confined between the outer sole 10 and an inner sole 38, which is of a composition or leather material of relatively low flexibility. Inner sole 38 is secured at its periphery in any suitable manner to the shoe upper 40, which can be of any desired design or appearance. The design of the upper shown in Fig. 1, purely by way of example, shows an upper designed for use as a work shoe or, perhaps, as a shoe for informal or rough wear.

The bladder 36 may also be provided with wide, side walls around its complete periphery, thus to facilitate the raising of the inner sole 38 from the outer sole 10, by inflating the bladder to a desired air pressure.

This inflated shoe would serve as an automatic balancing means for the wearer.

A highly important characteristic of the invention resides in the fact that the upper 40 and the inner sole 38, which receive and confine the foot, are spaced wholly out of contact with the outer sole 10 and heel 35 by the bladder 36. In other words, the upper 40 and the inner sole 38 are so arranged that there is a cushion of air over the full area of the shoe, afforded by the inflated bladder 36. Thus, the foot is in actuality supported on air and has bodily upward and downward movements relative to the outer sole 10, with these movements being fully cushioned by compression of the air as necessary during the movement of the foot downwardly toward the outer sole.

A flexible connection extends peripherally over the entire shoe, between the shoe upper and the outer sole. Said connection comprises a peripheral strip 42 of flexible leather or the like, the top edge of which is stitched at 44 to the shoe upper, with the bottom edge being stitched at 46 to the periphery of the outer sole 10.

Ornamental ties 43 on the shoe upper (Fig. 1) are secured at their lower ends to the upper by the stitching 44, with the ties being interposed between the connecting strip 42 and the upper 40.

It is desirable to prevent chafing of the edge portion of the bladder, and to this end there is provided (Fig. 4) a rubber edging strip 50 extending peripherally of the shoe and secured to the underside of the connecting strip 42 by cement, and also by the stitching 46. Strip 50 is also shown to good advantage in Fig. 7, and surrounds a cushioning strip 52 formed of cotton wadding or the like, also cemented to the underside of the connecting strip, and to the bottom surface of the inner sole 38.

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Strips 50, 52, engage the edge portion of the bladder, to prevent chafing and wear of the bladder.

The bladder can be filled with air under pressure to any desired extent, and to this end, there is formed in the strip 52 an opening 54, at the heel end of the shoe (see Fig. 7). The opening continues through the connecting strip 42, and the registering openings receive a valve 56 extending from the bladder and provided with a cap 58. The valve is a conventional valve such as is used on automobile tire tubes or bicycle tires, and projects exteriorly of the shoe a short distance as shown in Fig. 1.

As will be apparent, one fills the bladder 36 with a selected amount of air to inflate the bladder, thus providing a cushion of air under pressure between the outer and inner soles, extending over substantially the full area of the shoe. As a result, when the shoe is worn, on each step there will be a downward pressure of the foot against the sole, which pressure is transmitted to and is cushionably resisted by the bladder 36. Thus, there is a cushioning action over substantially the full shoe area. The pressure exerted downwardly by the heel of the foot is even greater than the toe pressure, during normal walking and as a result, after initial cushioning of the pressure by bladder 36 there is a further cushioning action by the soft rubber heel cushion 22, resulting from the fact that the tendency of the air to compress within the bladder 36, when the initial pressure is received, is transmitted to the tongue 14 which tends to flex downwardly.

Simultaneously with the downward flexure of tongue 14, there is an upward pressure against the heel cushion exerted by the surface with which the shoe is in contact. The heel cushion 22 compresses to absorb the pressures exerted thereagainst both upwardly and downwardly, and tends to flex the tongue 14 back to its normal position shown in Fig. 3. As the tongue 14 tends to now swing upwardly, the bladder exerts a further cushioning action, resiliently resisting the upward movement of the tongue. Still further, when the heel cushion compresses in the manner described, there is a final or auxiliary cushioning action afforded by the rubber cleats 23 in the manner previously described herein.

The net result is that the shoe provides a highly comfortable cushioning characteristic when worn, so that the constant shocks and pressures which are ordinarily suffered over a period of a day are in effect almost completely nullified by a novel combination of and coactive relationship between air and rubber cushions. The entire upper of the shoe is insulated from the outer sole by the air cushion afforded by bladder 36, so as to be capable of movement independently of the outer sole, the connecting strip flexing as necessary during such movement.

The shoe, of course, is usable to advantage not only by workmen who must be on their feet for long periods of time, but has general utility in footwear, in view of the fact that a very large number of persons suffer regularly from the considerable discomforts experienced as a result of confinement of the feet in hot, heavy shoes having so little a cushioning action as to provide only a very small amount of relief from shocks encountered during normal walking or standing activities.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

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

1. A cushioned shoe comprising a shoe upper, an inner sole connected thereto, an outer sole underlying the inner sole, means interposed between the outer and inner soles providing an air cushion between the same, a heel

assembly underlying and secured to the outer sole, and a flexible connection between the outer and inner soles yielding responsive to compression of the air cushion resulting from movement of the outer sole toward the inner sole, said means comprising an inflatable bladder, said bladder having an outer configuration corresponding to the outer configuration of each of the outer and inner soles, the periphery of the bladder being offset inwardly from the periphery of the outer sole, said flexible connection comprising a strip extending through the full periphery of the shoe upper and connected at its opposite edges to the shoe upper and outer sole respectively, the heel assembly including a compressible heel cushion normally projecting downwardly for engagement against the supporting surface, the outer sole having a flexible tongue overlying the heel cushion so as to be flexed upwardly into engagement with the bladder responsive to compression of the heel cushion, said heel assembly further including upper and lower, superposed heel members of comparatively rigid material, having registering openings receiving the heel cushion, the heel assembly additionally including an edge cushioning strip of resilient material extending about the edge of the upper heel member and having a channelled cross section so as to receive the edge of the upper heel member and cushion the same above and below the upper heel member.

2. A cushioned shoe comprising a shoe upper, an inner sole connected thereto, an outer sole underlying the inner sole, means interposed between the outer and inner soles providing an air cushion between the same, a heel assembly underlying and secured to the outer sole, and a flexible connection between the outer and inner soles yielding responsive to compression of the air cushion resulting from movement of the outer sole toward the inner sole, said means comprising an inflatable bladder, said bladder having an outer configuration corresponding to the outer configuration of each of the outer and inner soles, the periphery of the bladder being offset inwardly from the periphery of the outer sole, said flexible connection comprising a strip extending through the full periphery of the shoe upper and connected at its opposite edges to the shoe upper and outer sole respectively, the heel assembly including a compressible heel cushion normally projecting downwardly for engagement against the supporting surface, the outer sole having a flexible tongue overlying the heel cushion so as to be flexed upwardly into engagement with the bladder responsive to compression of the heel cushion, said heel assembly further including upper and lower, superposed heel members of comparatively rigid material, having registering openings receiving the heel cushion, the heel assembly additionally including an edge cushioning strip of resilient material extending about the edge of the upper heel member and having a channelled cross section so as to receive the edge of the upper heel member and cushion the same above and below the upper heel member, the heel assembly still further including a transverse, elastic strip overlying the heel cushion to yieldably exert a pressure against the heel cushion tending to force the same downwardly within the heel assembly.

3. A cushioned shoe comprising a shoe upper, an inner sole connected thereto, an outer sole underlying the inner sole, means interposed between the outer and inner soles providing an air cushion between the same, a heel assembly underlying and secured to the outer sole, and a flexible connection between the outer and inner soles yielding responsive to compression of the air cushion resulting from movement of the outer sole toward the inner sole, said means comprising an inflatable bladder, said bladder having an outer configuration corresponding to the outer configuration of each of the outer and inner soles, the periphery of the bladder being offset inwardly from the periphery of the outer sole, said flexible connection comprising a strip extending through the full periphery of the shoe upper and connected at its opposite edges to the shoe upper and outer sole respectively, the heel assembly including a compressible heel cushion normally projecting downwardly for engagement against the supporting surface, the outer sole having a flexible tongue overlying the heel cushion so as to be flexed upwardly into engagement with the bladder responsive to compression of the heel cushion, said heel assembly further including upper and lower, superposed heel members of comparatively rigid material, having registering openings receiving the heel cushion, the heel assembly additionally including an edge cushioning strip of resilient material extending about the edge of the upper heel member and having a channelled cross section so as to receive the edge of the upper heel member and cushion the same above and below the upper heel member, the heel assembly still further including a transverse, elastic strip overlying the heel cushion to yieldably exert a pressure against the heel cushion tending to force the same downwardly within the heel assembly, the outer sole including a U-shaped spacer at the heel portion thereof extending about said tongue and interposed between the outer sole and the upper heel member, said heel assembly including a transverse spacer in the plane of the first-named spacer and cooperating therewith in spacing the heel assembly from the outer sole, thus to provide compression of the heel cushion in the space surrounded by the first-named and second-named spacers, for engagement of the heel cushion against the flexible tongue of the outer sole.

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