March 20, 1945. H. PERROT 2,371,912

PRESSED METAL SOLE FOR SHOES AND SHOE EMBODYING SAID SOLE

Filed May 21, 1942 5 Sheets-Sheet 1

Fig. 1.

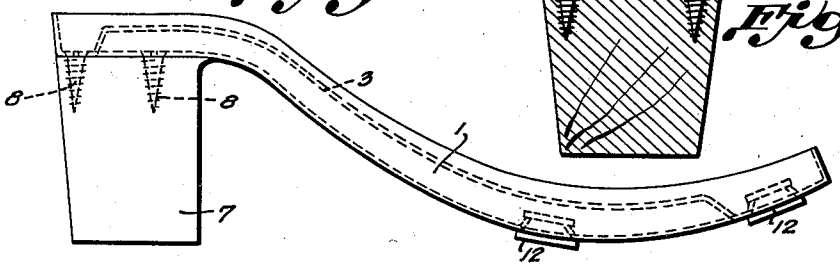


Fig. 1a.

Fig. 2.

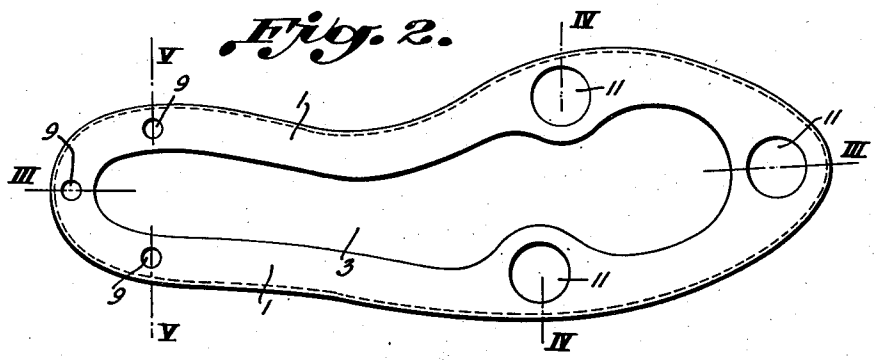


Fig. 3.

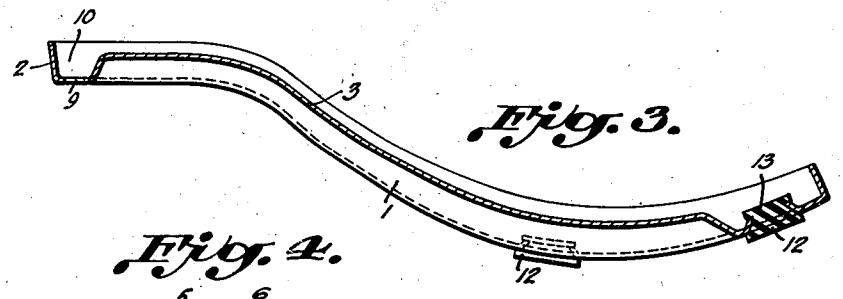


Fig. 4.

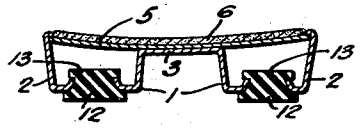


Fig. 5.

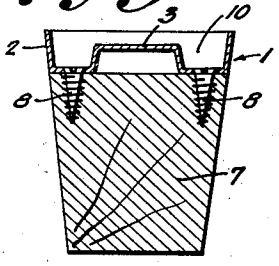


Fig. 6.

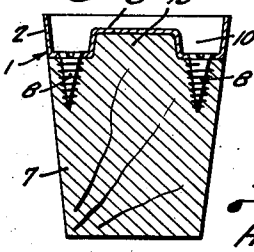
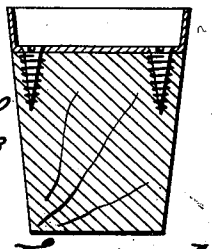


Fig. 12.



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PRESSED METAL SOLE FOR SHOES AND SHOE EMBODYING SAID SOLE

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Fig. 7.

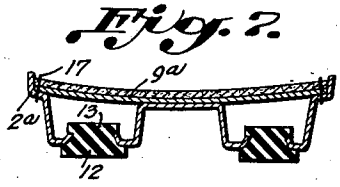


Fig. 8.

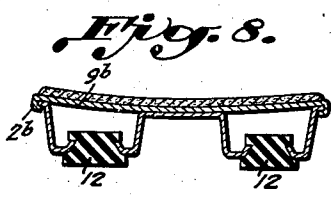


Fig. 9.

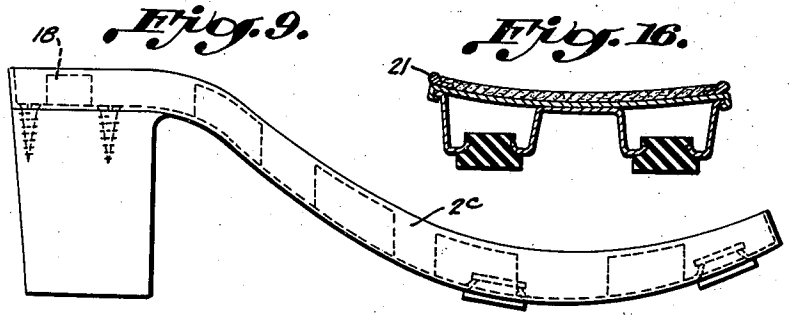


Fig. 16.

Fig. 10.

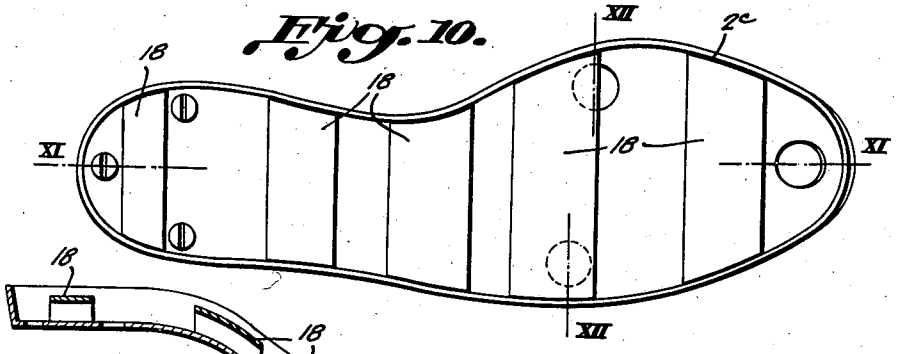


Fig. 11.

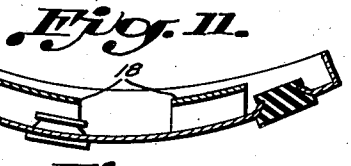


Fig. 12.

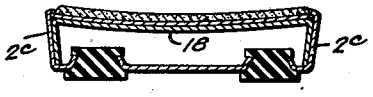


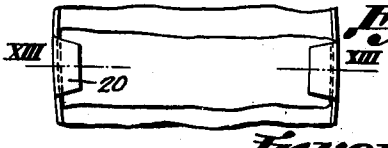
Fig. 15.



Fig. 13.



Fig. 14.



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Fig. 19.

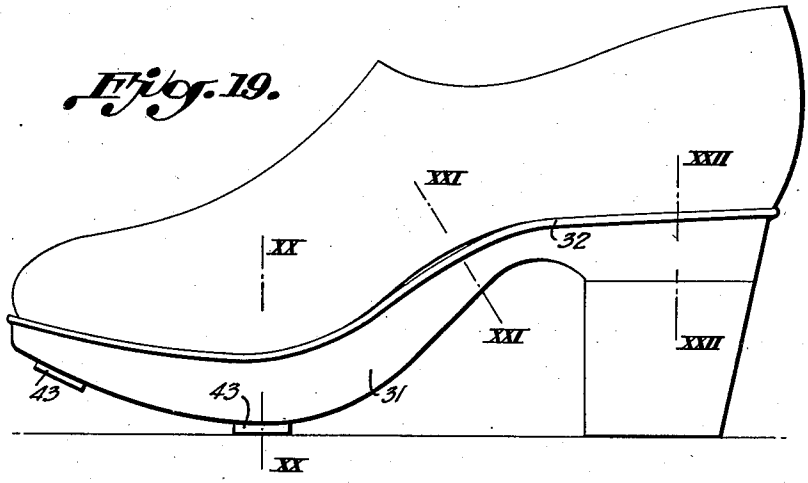


Fig. 20.

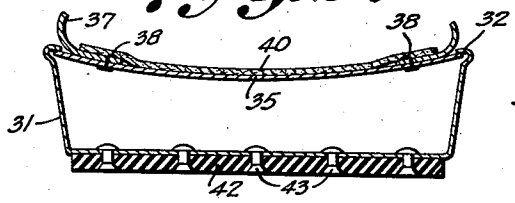


Fig. 21.

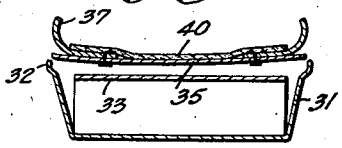


Fig. 22.

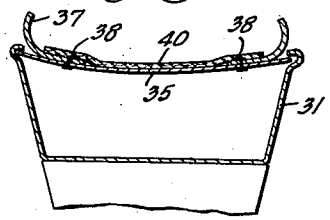


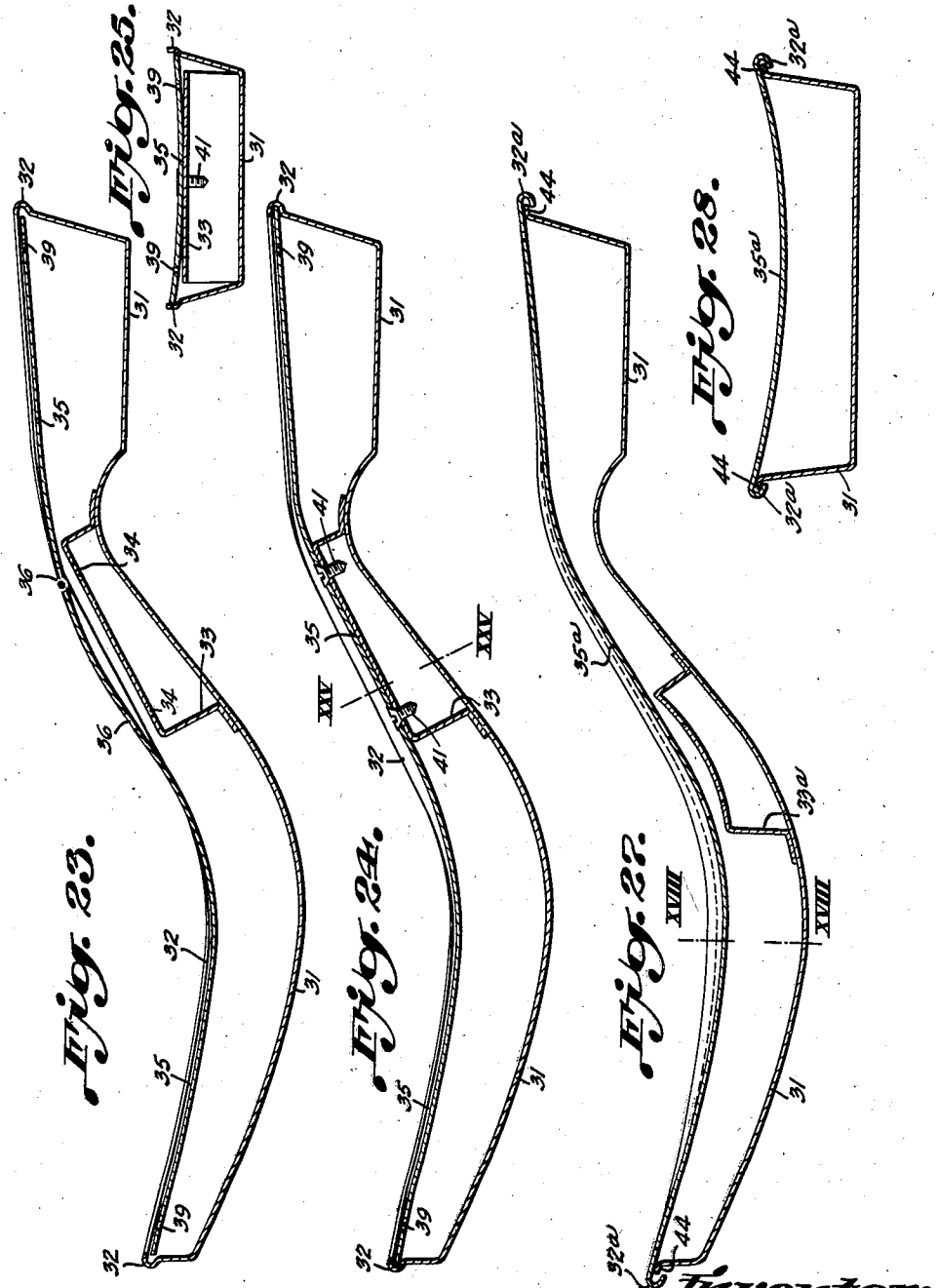
Fig. 26.

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PRESSED METAL SOLE FOR SHOES AND SHOE EMBODYING SAID SOLE

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PRESSED METAL SOLE FOR SHOES AND SHOE EMBODYING SAID SOLE

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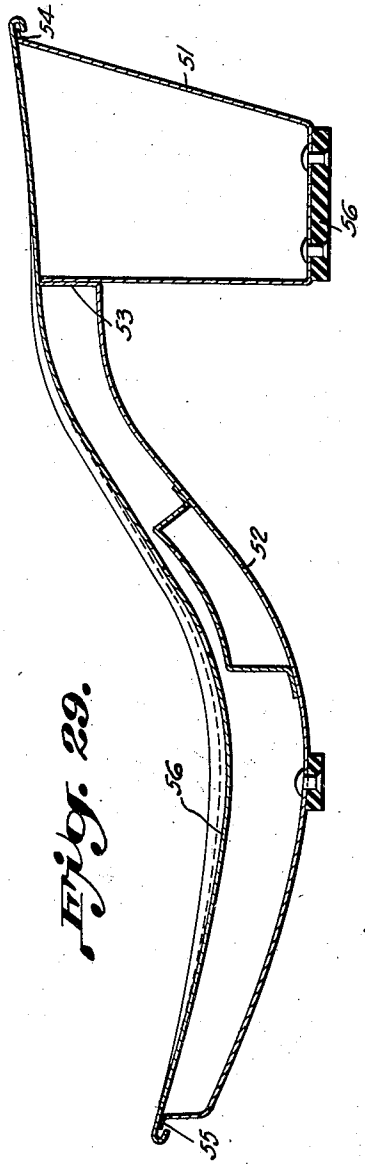


Fig. 29.

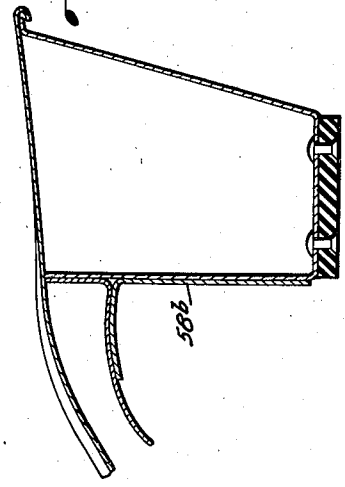


Fig. 31.

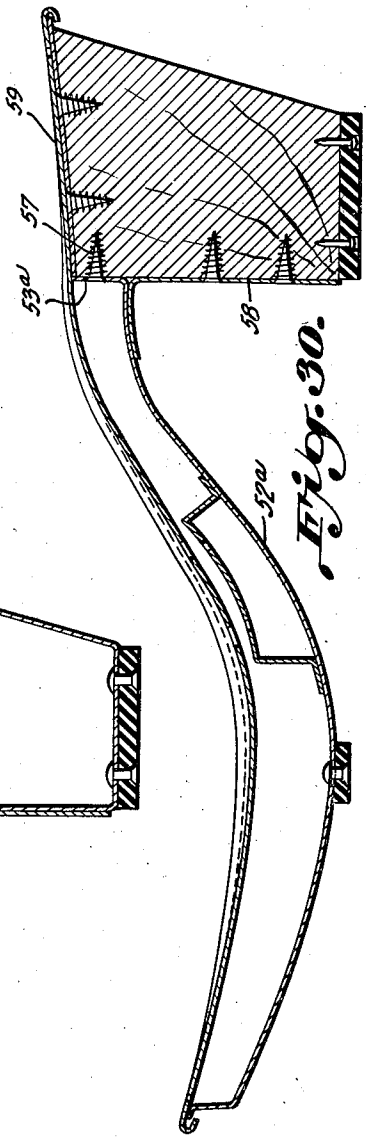


Fig. 30.

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Patented Mar. 20, 1945 2,371,912

UNITED STATES PATENT OFFICE

2,371,912

PRESSED METAL SOLE FOR SHOES AND SHOE EMBODYING SAID SOLE

Henri Perrot, Paris, France; vested in the Alien Property Custodian

Application May 21, 1942, Serial No. 443,954
In France August 11, 1941

23 Claims. (Cl. 36—25)

The object of the invention is to provide a metal sole for shoes, and a shoe embodying a metal sole, which will be of small weight and easy to manufacture at low price in very great quantities.

Other objects of the invention will appear from the following description of various embodiments of the invention the features of which will be pointed out in the claims.

In the annexed drawings:

Fig. 1 is a side elevational view of a first embodiment.

Fig. 2 is a plan view of the under side of the sole.

Figs. 3 to 5 are sections on the lines III—III, IV—IV and V—V in Fig. 2.

Fig. 6 is a similar view to Fig. 5, showing another way of fixing the heel.

Figs. 7 and 8 are similar views to Fig. 4, showing modifications in the mounting of the inner sole.

Fig. 9 is a similar view to Fig. 1, showing another embodiment, the inner sole being omitted.

Fig. 10 is a corresponding plan view.

Figs. 11 and 12 are sections on the lines XI—XI and XII—XII in Fig. 10.

Fig. 13 is a section on the line XIII—XIII in Fig. 14.

Fig. 14 is a partial plan view showing another manner of fixing the inner sole.

Fig. 15 is a partial sectional view similar to Fig. 12, showing a modification.

Fig. 16 is a sectional view similar to Figs. 3 to 5 and shows another manner of assembling the two parts of the sole.

Figs. 17 and 18 are similar views to Figs. 5 and 6, showing alternative arrangements of separate heel.

Fig. 19 is an elevational side view showing a shoe with removable inner sole after the mounting step but previous to the fastening of the two parts of the sole together.

Figs. 20, 21 and 22 are cross sections, at an enlarged scale, on the lines XX—XX, XXI—XXI and XXII—XXII in Fig. 19 respectively.

Figs. 23 and 24 are longitudinal sections showing, the upper omitted, the sole respectively before and after clamping together the two parts in the mutually engaging position.

Fig. 25 is a section on the line XXV—XXV in Fig. 24.

Fig. 26 is a similar view to Fig. 19, showing the shoe after the two parts of the sole have been clamped together.

Fig. 27 is a longitudinal section similar to Fig. 23, showing a modified embodiment.

Fig. 28 is a cross section on the line XXVIII—XXVIII in Fig. 27.

Fig. 29 is a longitudinal section of a shoe having a pressed metal sole assembly the insole of which is removable, this shoe being provided both with a pressed metal heel and with a sole terminating at the heel.

Fig. 30 is a similar view to Fig. 29 but shows as an alternative a shoe having a wooden heel.

Fig. 31 is a fragmentary view showing another way of securing a separate pressed metal heel.

In the embodiment shown in Figs. 1 to 5, the sole comprises a lower part 1, made of a sheet metal blank suitably stamped and pressed so as to present, after pressing, an outline corresponding to the foot outline and limited by a turned up flange 2. The middle longitudinal portion of this part is upwardly pressed, either with or without openings, so as to provide a suitably arched bearing surface (Figs. 3 and 4) for the inner sole 5, 6 (Fig. 4). The latter is shown as consisting of a sheet of metal 5 which is suitably arched both transversally and longitudinally and the upper surface of which is provided with a cushion lining 6 of any suitable material, such as for example salpa, cork, leather, pasteboard, and the like, glued or otherwise secured to the metal part 5. This inner sole is held in place, in this embodiment, by beading over the flanges 2 (Fig. 4). A heel 7, in this case of wood, is applied on to this sole and secured in position thereto, as shown, by means of three screws 8 threaded through holes 9 into the rear portion of said sole which bears on the upper surface of the heel (Figs. 1 to 5). It is to be observed that the general shape of the sole is such that the latter comprises a projecting center portion 3 surrounded on all sides by a channel portion 10, which is limited externally by the flange 2, the edge of which is at a somewhat higher level than the said center portion 3. In that portion of said sole which bears upon the ground holes 11 are provided the edge of which is turned down inwardly of the sole, said holes being adapted to receive and position cushioning pads 12, which are provided for this purpose with a peripherical groove adapted to engage with said turned up edge of the holes 11, after the stem 13 of said pads has been forcibly inserted therethrough. A cushioning pad 7 may also be secured underneath the heel.

In the modification shown in Fig. 6, the separate heel is provided on its upper face with a pro-

jecting tongue 15, which is sunk into the hollow formed by the pressed portion.

In the modification shown in Fig. 7, the upper portion of the flange 2a flares outwardly in order to support the edge of the inner sole 9a, and it is then bent upwardly, the fixing of the inner sole being effected by means of staples 17 threaded both through the flange 2a and the inner sole and clinched down on to the upper face of said inner sole.

In the modification shown in Fig. 8, there is again provided a flaring portion at the upper part of the flange 2b, and the inner sole 9b, which rests upon said flaring portion, projects laterally beyond and is beaded over said flaring portion.

The sole shown in Figs. 9 to 12 comprises a lower part made substantially as shown in Figs. 1 to 5 but differing therefrom in that instead of the longitudinal portion being pressed to provide a projecting support for the inner sole inwardly of the sole, said inner sole rests on several cross bridges 18 spaced along the sole and spot welded or otherwise secured to the flanges 2c of the lower part (Fig. 12), the whole of said bridges forming the support of the inner sole. To these various bridges may also be substituted a single bridge member, with or without openings, extending over the whole or part of the length of the sole. In both cases, the middle portion of the sole may still be pressed, the object of the rib thus formed in this case being not to support the inner sole but to stiffen the outer sole, as shown in Fig. 15.

Likewise, the beaded over modification shown in Fig. 8 may also be applied to all other cases, as shown as an example in Fig. 16, in which there is further shown a welt 21, which may also be used in Fig. 8.

In the modification of the separate heel of Fig. 17, the portion of the sole on which is applied the heel is entirely flat and, in Fig. 18, the heel is provided with a stud 22, similar to the stud 15 of Fig. 6 but engaged into a hole the edge of which may eventually be provided with an inner border flange 23.

Whatever may be the manner of designing the sole, there may be an advantage in extending the cushioning pads 12 upwardly so that they may engage, at least while walking, with the lower side of the inner sole, in view of damping the vibrations and the noise which might otherwise occur.

As shown in Figs. 19 to 26, the sole comprises a hollow lower part 31, made of a single pressed or dished metal blank. After pressing, the upper edge of the sides of this part are bent first outwardly and then inwardly, as shown in Fig. 20, so as to form over the whole periphery of this part 31 a groove or channel 32, opening inwardly, excepting over some length, in the region of the shank (Fig. 21), where said edge is not entirely bent inwardly, but is left substantially vertical. To the bottom of this part 31 is welded, in this case right over the shank, a bridge-like raised support 33 adapted to serve as a bearing member for the insole, said support being provided, in this case, with two holes 34 (Fig. 23). The inner sole 35 is itself formed of a strong arched plate, for example of pressed sheet metal or of cast plastic material, any cross section of which has a width substantially equal to the distance between the bottoms of two opposite channels 32 in the same sectional plane, that portion of said plate which is adapted to rest upon said support 33 being however more highly arched than the lower part and provided with two holes 36 (Fig. 23). This inner sole carries the upper 37, secured thereto by small nails 38 passing upwardly through pressed out holes 39 in said inner sole, the ends of said nails being clinched inside the upper over an additional inner sole 40, of pasteboard or other material, and embedded into the latter. When assembling the two parts, the edge of said inner sole is inserted into the channel 32, which may be effected easily by sliding the whole ball portion of the sole from the rear into said channel, and the rear portion of said inner sole is inserted by elastic deformation, effected by a light transversal pinching of said inner sole so as to reduce its width, while the rear portions of the lower part 31 are somewhat forced outwardly. The whole assembly will then assume the position shown in Figs. 19, 21 and 23, where it will be observed that the shank of the inner sole 31 is higher than the channel 32 and that the front and rear ends of said inner sole are not engaged with the corresponding portions of the channel 32. The inner sole 35 is then fastened to the support 33 by means of screws 41, of the Parker type or the like, threaded through the holes 36 of the upper and screwed into the holes 34 of said support 33. Owing to said inner sole being thus collapsed and flattened against the support 33 under the pressure of the screws 41, the highly curved portion of the inner sole will insert itself into the middle portion of the channel 32, whose edges are substantially vertical (Figs. 19, 24 and 25), while the whole length of the inner sole is so increased that its front and rear ends will engage with the corresponding portions of the channel 32 (Fig. 24); the shoe then assumes the aspect shown in Fig. 26.

There is further shown in the above described Figs. 19 to 26 an alternative manner of forming and mounting the cushioning pads 42. In this modification, the cushioning pads are given the shape of elongated plates, made of leather, rubber or the like, and are secured in position by small rivets 43 whose countersunk outer heads are passed through small holes pressed out of the bottom portion of the lower part.

In the modification shown in Figs. 27 and 28, it is the inner sole 35a which is rolled over its whole periphery to form a channel 32a opening downwards, the upper edge of the lower part sides being only bent outwardly to form a narrow flange 44. The curvature given to the portion of the inner sole which is to be applied and secured on to the bridge 33d is then less than that given to the shank of the lower part in the same region, i. e. that which will be assumed by the said inner sole after being fastened, so that the fastening causes an elastic reducing of the length of said inner sole and the insertion of the front and rear ends of the flange 44 into the channel 32a.

It will be apparent that the mounting of the upper and the cushioning pads in this modification may be effected in the same way as has been described with regard to the first embodiment.

In the form of embodiment shown in Fig. 29, the separate heel 51 is made of pressed sheet metal; on the other hand, the sole 52, which is also made of pressed sheet metal, instead of extending over the heel terminates at the front face of the latter and engages therewith by means of a turned up flange 53 which is welded thereto. At its upper end, except along the front

face, the heel **51** is provided with a flange **54** or a channel which continues the flange **55** or the channel of the sole in view of securing a removable insole **56** in the manner above described with reference to Figs. 23 to 25.

Under this heel is secured a cushioning pad **56**.

In the embodiment of Fig. 30, the sole **52***a* is formed like that of Fig. 29 but a wooden heel is used which is secured by means of screws **57** to the turned up flange **53***a* of the sole. In the angle formed between the sole and the front face of the heel is then arranged a metal strengthening angle corner **58**, one branch of which is welded underneath the sole and the other secured thereto by means of screws. To the upper part of the heel is secured by means of screws, as shown, or in any other suitable means, a plate **59**, preferably of annular shape, which is adapted to constitute the hooking flange or channel of the insole. Instead of hooking the insole around the heel, it may also be simply fastened to the upper part of the heel by means of screws passing therethrough. A cushioning pad may also be secured under the heel by any suitable means.

The embodiment according to Fig. 31 is similar to that of Fig. 29 from which it differs only in that it comprises, in addition, an angle-like metal strengthening member **58***b* similar to the strengthening member **58** of Fig. 30, the two branches of which are welded to the sole and the heel, respectively.

Whatever may be the embodiment, the sole may advantageously be stuffed with a soundproof material.

Obviously, the invention is in nowise limited to the details of construction shown or described, the same being only given as illustrating examples.

What I claim is:

1. A metal sole for shoes, including a metal pressed, longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot, the edge of the outer sole having an upturned flange, and an upper or inner sole part outlined to peripherally engage the upper portion of said flange, means securing the inner and outer sole parts together and other means supporting the greater portion of the inner sole spaced above the outer sole.

2. A metal sole for shoes, including a metal pressed, longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot, the edge of the outer sole being formed with an upturned flange and at least one metal member secured to said lower part, each such metal member providing a relatively wide supporting surface extending in the direction of the length of the sole and spaced above the outer sole, and a metal inner sole shaped to engage its periphery with the upper portion of the flange on the outer sole and with said supporting surface.

3. A metal sole for shoes, including a metal pressed, longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot, and the edge of which is turned up to provide a flange, and an upper or inner sole part outlined to peripherally engage the upper portion of said flange and having the greater portion thereof spaced at some distance above said lower part, both said parts being removably secured together at their edges.

4. A box-like sole for shoes comprising two superposed longitudinally bent or arched lower or outer and upper or inner sole parts the outline of each of which is similar to that of the under side of the foot, both said sole parts being spaced apart in height for the greater part of their surface and means engaging portions of the inner and outer soles intermediate their ends for removably securing the main and outer soles together.

5. A metal sole for shoes, including a metal pressed longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, and an upper or inner sole part secured to the lower one and outlined to peripherally engage the upper portion of said flange, the peripheral edge of said inner sole being supportably connected to substantial portions of the upper part of said flange.

6. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the underside of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage the said flange, supporting means spacing said inner sole above the outer sole, and means securing the inner and outer soles together, said supporting means comprising at least one bridge-shaped member secured to the outer sole and having an upper portion affording a supporting surface engaging the underside of the inner sole.

7. A metal sole for a shoe comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot, said outer sole having an upturned flange at its edge, an inner sole shaped to peripherally engage the said flange, supporting means spacing said inner sole above said outer sole, and means securing the inner and outer soles together, said supporting means comprising at least one bridge-shaped member welded to the outer sole and having an upper surface supportably engaging the underside of said inner sole.

8. A metal sole for shoes, including a metal pressed, longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, an upper or inner sole part outlined to peripherally engage said flange, said lower sole part being provided with means providing at some height above the ground engaging portion of said lower sole part a supporting surface in engagement with the under face of said upper sole part to support the latter and removable clamping means engageable with said inner sole and with said outer sole for securing said inner sole in place on said outer sole.

9. A metal sole as in claim 5, wherein one of said edges is formed with a lateral channel with at least one side of the channel supportably engaged with at least one side of the remaining one of said edges.

10. A metal sole for shoes comprising a metal longitudinally arched outer sole conforming in outline to the bottom of the foot, an upturned flange formed at the edge of said outer sole, the upper edge of said flange being deflected laterally outwardly, a metal inner sole conforming in outline to the outer sole to peripherally engage an upper part of said flange, the peripheral edge of said inner sole being formed to provide a laterally inwardly facing channel receiving the

outwardly deflected upper edge of the flange whereby the inner and outer soles are secured together.

11. A metal sole for shoes, including a metal pressed, longitudinally bent or arched lower or outer sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, a resiliently deformable upper or inner sole part outlined to peripherally engage said flange, said lower part being provided with means providing at some height above the ground engaging portion of said lower sole part a supporting surface in engagement with the under face of said upper sole part to support the latter, and means securing said upper sole part in a state of elastic deformation to said lower part to thereby cause actual engagement of the peripheral edge of said upper part with said flange.

12. A process of manufacturing metal sole for shoes, including covering by hand with a resiliently deformable upper sole part a lower sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, said upper sole part being outlined to peripherally engage said flange when in a convenient state of elastic deformation, to thereby be supported by said flange, and thereafter deforming to and securing said upper sole part in said state of elastic deformation to the lower part.

13. A metal sole for shoes including a lower sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, a resiliently deformable and longitudinally bent upper sole part outlined to peripherally engage said flange to be supported thereby when in a convenient state of elastic deformation and removable clamping means securing said upper part in said convenient state of deformation to said lower part.

14. A metal sole for shoes, including a lower sole part the outline of which is similar to that of the under side of the foot and the edge of which is turned up to provide a flange, a resiliently deformable and longitudinally bent upper sole part outlined to peripherally engage said flange to be supported thereby when in a convenient state of elastic deformation and removable clamping means securing said upper part to said lower part so as to elastically alter the longitudinal cross-shape of said upper sole part, thereby varying its length and causing the edge thereof to closely engage said flange.

15. A box-like sole for shoes comprising two superimposed inner and outer soles both having the outline of the bottom of the foot, said soles being vertically spaced for a major portion of their lengths, means securing the soles together, the outer sole being shorter than the inner sole whereby the inner sole projects rearwardly from the outer sole, a heel applied to the underside of the rearwardly projecting portion of the inner sole and against the rear end of the outer sole, and means securing the heel in place.

16. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole arranged to rest upon an upper part of said flange, supporting means on said outer sole beneath said inner sole and spacing said inner sole upwardly from the outer sole, said supporting means having substantial portions thereof supportably engaging substantial portions of the middle area of the inner sole, and means securing the inner sole in place on the outer sole.

17. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said supporting means comprising a longitudinally elongated upwardly displaced portion of the outer sole whose upper surface supportably engages the underside of the inner sole.

18. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said supporting means comprising a plurality of transversely elongated bridge-shaped members longitudinally spaced along and secured to the outer sole.

19. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said supporting means consisting of a single bridge-shaped member extending across the outer sole and substantially spaced from the opposite ends of and secured to the outer sole, said bridge-shaped member having its upper surfaces supportably engaging the underside of the inner sole intermediate the ends of the latter.

20. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said supporting means consisting of a single bridge-shaped member extending across the outer sole and substantially spaced from the opposite ends of and secured to the outer sole, said bridge-shaped member having its upper surface supportably engaging the underside of the inner sole intermediate the ends of the latter, the upper surface of said bridge-shaped member conforming substantially to the curvature of an intermediate portion of the inner sole and said portion of the inner sole initially being spaced above said upper surface, and securing means for securing the said intermediate portion of the inner sole on the upper surface of said member after distortion of said inner sole into substantial conformance with said upper surface, whereby said inner sole is secured in a tensioned condition.

21. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing

the inner sole in place on the outer sole, said supporting means consisting of a single bridge-shaped member extending across the outer sole and substantially spaced from the opposite ends of and secured to the outer sole, said bridge-shaped member having its upper surface supportably engaging the underside of the inner sole intermediate the ends of the latter, the said upper surface of the bridge-shaped member being longitudinally concaved at a curvature substantially greater than that of the intermediate portion of the inner sole, said intermediate portion of the inner sole being initially substantially spaced above the concaved supporting surface of the bridge shaped member, and securing means for drawing and holding said intermediate portion of the inner sole into conformance with said concaved supporting surface, whereby the inner sole is secured in a tensioned condition.

22. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said upwardly displaced portion of the outer sole being substantially spaced from the edges of the outer sole.

23. A metal sole for shoes comprising a longitudinally arched outer sole shaped similarly to the bottom of the foot and having an upturned flange at its edge, an inner sole outlined to peripherally engage an upper part of said flange, supporting means spacing said inner sole upwardly from the outer sole, and means securing the inner sole in place on the outer sole, said inner sole extending rearwardly beyond the outer sole to define a heel plate, and a heel engaging and secured to the underside of the heel plate and an adjacent portion of the upturned flange on the outer sole.

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