March 26, 1963 E. D. HARTMAN 3,082,548

SAND SHOE

Filed Jan. 29, 1962 2 Sheets-Sheet 1

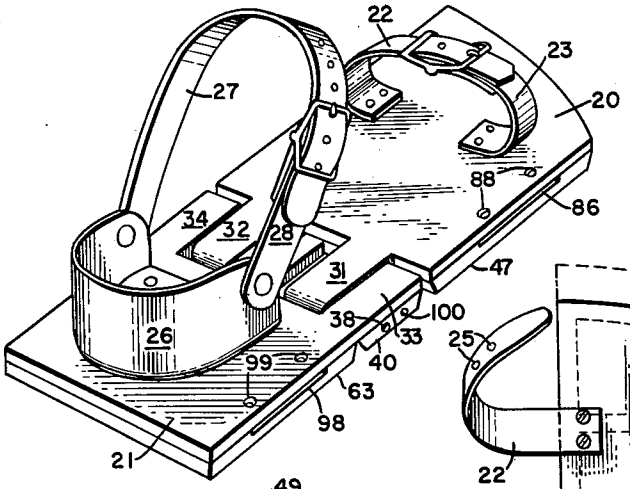


FIG. 1.

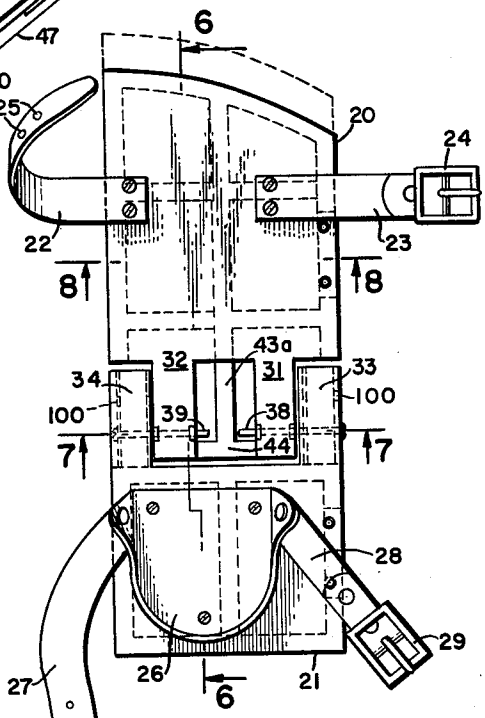


FIG. 2.

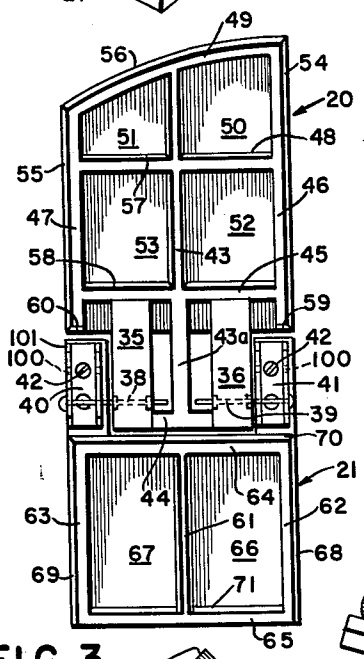


FIG. 3.

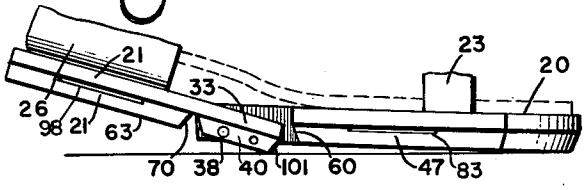


FIG. 5.

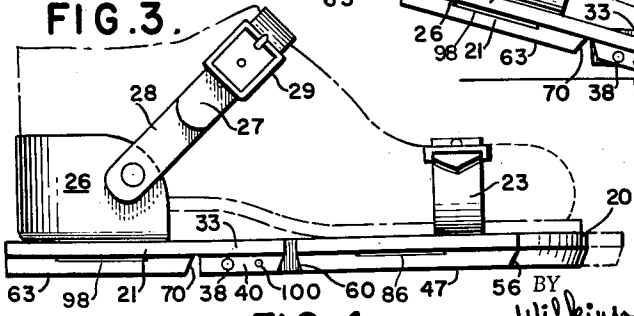


FIG. 4.

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SAND SHOE

Filed Jan. 29, 1962 2 Sheets-Sheet 2

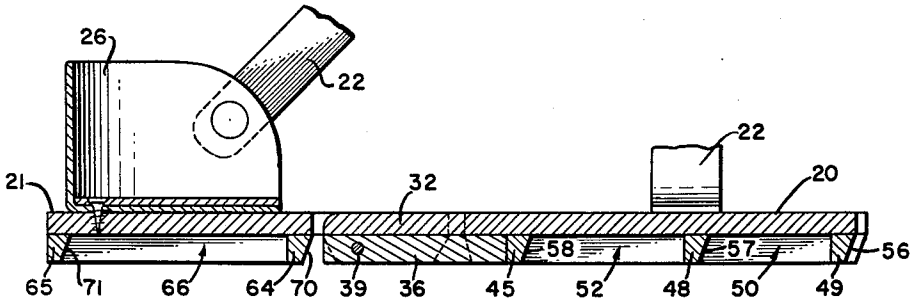


FIG. 6.

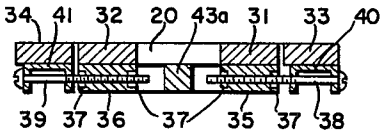


FIG. 7.

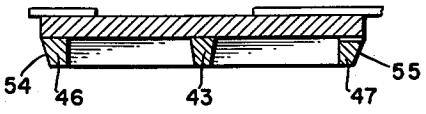


FIG. 8.

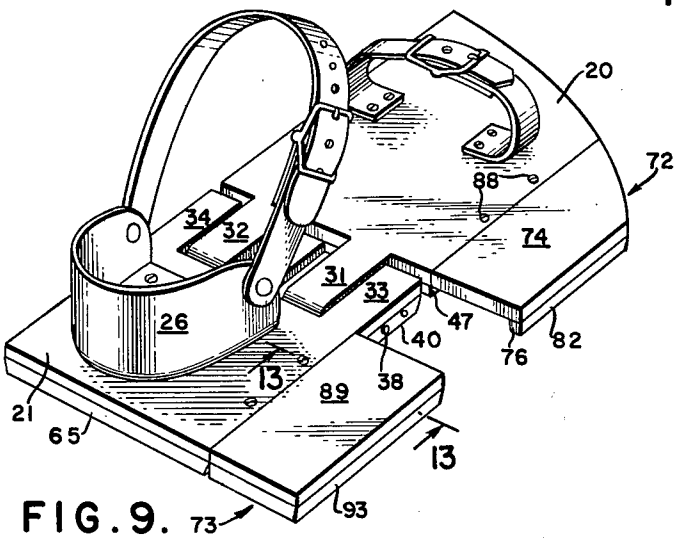


FIG. 9.

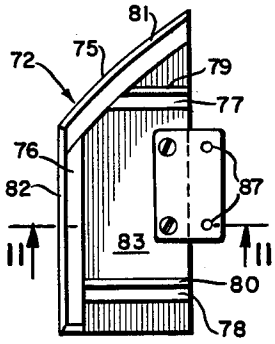


FIG. 10.

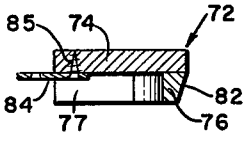


FIG. 11.

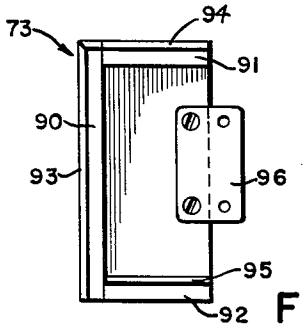


FIG. 12.

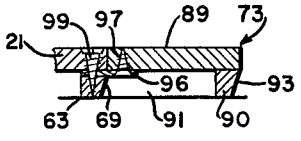


FIG. 13.

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3,082,548

SAND SHOE

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Filed Jan. 29, 1962, Ser. No. 169,222
15 Claims. (Cl. 36—2.5)

This invention relates to sand shoe, is of a service nature and use, adapted primarily as an aid in walking, running, marching and/or working over the entire range of loose-soil terrain from relatively moderate (such as sand) to (with basic sand shoe platforms alone, or with side extensions attached) extremely fine loose-soil terrain (such as ash, or ash-covered areas). The invention is well adapted to affording easy traversing of level loose-soil areas (as on beaches or deserts), equally so to climbing and descending loose-soil hummocks and hills (such as sand dunes).

Practically every person seeking to traverse loose-soil areas invariably encounters a laborious, excessive time- and energy-consuming task. Neither the feet of such persons nor ordinary shoes (or boots) are of sufficient size or area to prevent undue downward penetration into the loose soil. Furthermore, feet and ordinary shoes are lacking in any effective arrangement whereby purchase and traction against the underfoot loose-soil can be had whereby forward-movement traction is aided and facilitated: nor can slipping and sliding with practically every step be reduced or prevented.

Therefore, a principal object of my invention is to provide basic platforms (ribbed on under-surfaces) that give support and traction to wearers and wearers' feet under and beyond the side periphery of each foot, thus being of greater size and area than one's feet or shoes, in order to minimize and control downward penetration into loose soil during any and all occasions when traversing, or climbing and/or descending, any loose-soil terrain ranging from relatively moderate (such as sand) to extremely fine, powdery soils (such as ash).

A further object of my invention is to provide easily connected basic-platform extensions (also ribbed on under-surfaces: and connected to outer edges of basic platforms) to afford additional platform support areas (and ribs) required properly to minimize and control downward penetration of the finer loose-soils by the feet and platforms: and to provide additional forward-movement purchase and traction; and to afford reduction and prevention of slipping and sliding.

A still further object of my invention is to provide a flexibility in the sand shoe itself, so as to adapt it to and coincide with the natural flexing of wearers' feet. The invention in use thus closely conforms to the natural walking, running and marching motions and positions of the feet. Thereby the invention achieves a natural, comfortable, easily operated foot-conformation not inherent in a non-flexing platform or device.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

FIGURE 1 is a perspective view of a form of sand shoe constructed in accordance with the present invention.

FIGURE 2 is a top plan view of the same with the straps open to receive the foot of the wearer.

FIGURE 3 is a bottom plan view of the shoe.

FIGURE 4 is a longitudinal edge elevational view showing a shod foot in place in the sand shoe.

FIGURE 5 is a fragmentary view similar to FIGURE 4 with the heel raised in the act of walking.

FIGURE 6 is a longitudinal sectional view taken on the line 6—6 in FIGURE 2.

FIGURE 7 is a transverse sectional view taken on the line 7—7 in FIGURE 2.

FIGURE 8 is also a transverse sectional view taken on the line 8—8 in FIGURE 2.

FIGURE 9 is a perspective view of the sand shoe showing side attachments in place.

FIGURE 10 is a top plan view of a form of forward extension.

FIGURE 11 is a cross-sectional view taken on the line 11—11 of FIGURE 10.

FIGURE 12 is a top plan view of the after extension.

FIGURE 13 is a cross-sectional view taken on the line 13—13 of FIGURE 9.

Referring more particularly to the drawings, 20 and 21 designate respectively sole and heel platforms of wood or other suitable material of appropriate thickness, and shaped to fit roughly the heel and sole portions of the foot, shoe or boot of the wearer and for this purpose the sole platform may be provided with straps 22 and 23 each affixed at one end to the sole platform 20 and having respectively a buckle 24 and a series of perforations 25 whereby the straps may embrace the toe portion of the foot of the wearer: the heel platform 21 having a heel seat 26 for receiving the heel of the foot or the heel of a shoe or boot worn by the wearer. This heel seat is also provided with straps 27 and 28 involving a buckle 29 and a series of perforations 30 by which the straps may be made to encircle the foot, shoe or boot over the instep.

Extending rearwardly from the front platform 20 are a pair of laterally spaced shank members 31 and 32 in side by side lapping relationship with a pair of shank members 33 and 34 projecting forwardly from the rear platform 21.

As shown more particularly in FIGURE 7, bearing blocks 35 and 36 are affixed beneath the shank members 31 and 32 which have threaded openings transversely therethrough or such threaded openings may be made in stationary nuts 37 fitted in opposite ends of the openings to receive the threaded portions of pivot pins 38 and 39. Plain unthreaded shank portions of the pivot pins 38 and 39 also extend through plain unthreaded openings in bearing members 40 and 41 which are attached beneath the shank members 33 and 34 in side by side relation to the bearing blocks 35, 36. These bearing members 40 and 41 are preferably in the form of inverted metallic channels but if desired may be also in the form of solid wooden or other blocks. The heads of the screw pivot pins 38 and 39 abut against the external surfaces of the blocks or channel pieces 40, 41.

Such structure forms a method of articulation for pivotal mounting between the front and rear platforms 20 and 21. FIGURE 3 shows the employment of screws 42 for holding the channel pieces 40 and 41 to the undersides of the shank members 33 and 34.

This FIGURE 3 also shows a central longitudinal rib 43 which lies beneath the front or sole platform 20 as having an extension 43a projecting rearwardly beyond the rear edge of the front platform 20 and in spaced lateral relation to the adjacent bearing blocks 35 and 36. The extension rib 43a at its rear end is affixed to a crosspiece 44 which extends crosswise and is affixed to the opposite bearing blocks 35, 36. This forms a truss construction supplying strength and stability at the connecting portion between the two platforms.

As also shown in FIGURE 3, the bearing blocks 35 and 36 are underlapped with the rear portion of the front platform 20 and are abutted at their forward ends against a cross rib 45 which is affixed beneath the front platform

20 at a position crosswise of the front platform and spaced forwardly of the rear edge thereof. The forward ends of the bearing blocks 35 and 36 are affixed to the rear edge of the transverse rib 45 and also preferably to that area of the front platform lying rearwardly of the transverse rib 45. This arrangement also supplies further stability and strength to the intermediate construction of the sand shoe.

The front platform 20 on its underside, as also shown in FIGURE 3, is provided with longitudinal edge ribs 46 and 47, a second transverse intermediate rib 48 and a forward transverse edge rib 49. These ribs unite to form therebetween a plurality of compaction pockets 50, 51, 52 and 53.

The external edges of the ribs 46, 47 and 49 are beveled from the front platform downwardly and inwardly as indicated at 54, 55, 56. The forward edges of the transverse ribs 45 and 48 are also beveled from the platform downwardly and rearwardly, as indicated at 57 and 58. The rear edges of the longitudinal ribs 46 and 47 are also preferably beveled from the plane of the platform 20 downwardly and forwardly, as indicated at 59 and 60 in FIGURE 3.

The inner edges of the ribs 46, 47 and 49, the rear edges of the transverse ribs 45 and 48, and both longitudinal edges of the central longitudinal rib 43 are all vertical, that is, without bevel.

The rear platform 21 is intersected as to its underside by downwardly extending center and edge longitudinal ribs 61, 62 and 63 which together with fore and aft cross ribs 64 and 65 form compaction pockets 66 and 67. The outer longitudinal edges of the ribs 62 and 63 are beveled from the plane of the rear platform 21 downwardly and inwardly, as indicated at 68 and 69. The forward edge of the transverse rib 64 is beveled downwardly and rearwardly, as indicated at 70, and the forward edge of the rearmost transverse rib 65 is beveled downwardly and rearwardly, as indicated at 71. The internal edges of the ribs 62, 63 and 64, and both longitudinal edges of the center longitudinal rib 61, are vertical, that is without bevel; or in other words, these edges are normal to the plane of the lower surface of the rear platform 21.

Referring more particularly to FIGURES 9 to 13 inclusive, the sand shoe of this invention is so formed as to admit of the removable application thereto of extension pieces 72, 73.

The front extension piece 72 comprises a platform plate 74 preferably having a forward curved or diagonal edge 75 which conforms to the curvature of the forward edge of the platform 20. Beneath this platform plate 74 is a longitudinal outer edge rib 76 and two lateral ribs 77 and 78 affixed to the plate 74 and extending downwardly therefrom. The forward edges of the ribs 77 and 78 are beveled downwardly and rearwardly as indicated at 79 and 80, while the rear edges of these ribs are vertical or normal to the plane of the lower surface of the platform plate 74 as are also the inner edges of the ribs 76 and 81. The outer edges of the ribs 76 and 81 are beveled downwardly and inwardly, as indicated at 82. The ribs 76, 77 and 78 together with the adjacent rib 47 of the front platform 20 form a compaction pocket 83, like the other pockets referred to which all open downwardly through the base of the shoe.

The extension members 72 may be attached laterally of the front platform 20 in any suitable manner as by a metallic or other plate 84 shown as affixed by screws or other fastenings 85 to the underside of the plate 74 and as projecting inwardly therefrom so as to enter a slot 86 (FIGURE 1) in the rib 47. The extension part of the plate 84 is provided with holes 87 to receive screws or other fastenings 88 entered downwardly through the platform 20.

When the side extension 72 is put in place the lateral ribs 77 and 78 thereof may aline with the lateral ribs 45 and 48 of the platform 20 and abut against the side rib 47.

In a similar way the heel extension 73, as shown in FIGURES 12 and 13, may include a platform piece 89 having a longitudinal outer edge rib 90 and fore and aft lateral ribs 91 and 92. The longitudinal rib 90 is beveled downwardly and inwardly as indicated at 93 in FIGURE 13 as to its outer wall and is vertical as to its inner wall. The rear edge of the fore lateral rib 91 may be beveled downwardly and forwardly as indicated at 94. The front edge of this rib is preferably vertical as is the front edge of the rear cross rib 92. However, the rear edge of this rib 92 is beveled downwardly and forwardly as indicated at 95.

A metal or other plate 96 is overlapped with the lower portion of the rear platform member 89 and affixed thereto as by screws or other fastenings 97. The plate 96 is adapted to extend through a slot 98 (FIGURE 1) in the rib 63 and it is affixed to the rear platform 21 as by screws 99.

The bearing members 40 and 41 may have therein a number of holes 100 transversely therein suitable for receiving therethrough the pivot pins 38, 39 accordingly as it is desired to lengthen or shorten the shank of the sand shoe. By withdrawing the pivot pins 38, 39 and moving the rear or heel platform 21 backwardly or forwardly relative to the front platform and its bearing blocks 35, 36, any of the holes 100 may be made to register with the pin holes in the blocks 35 and 36 to secure the overall desired length of the sand shoe: whereupon the pins 38 and 39 may be replaced.

In FIGURES 4 and 5 the forward edges of the bearing members 40, 41 may be beveled, as indicated at 101, downwardly and rearwardly, which beveled edges are disposed opposite the beveled edges 59, 60, particularly in the horizontally alined relationship of the two platforms 20, 21 as shown in FIGURE 4.

The sand shoe platforms and ribs may be made of any suitable, relatively stiff or inflexible strip, sheet or molded material such as rubber, plastic, metal, chipboard, plywood, wood or the like; singly or in conjunction with two or more of these or similar materials. From experimentation I recommend material such as lightweight, good grade, long-wearing rubber or plastic as being economical, suitable to high production and finished molding, in conjunction with pivot pins, bearing members 40, 41, buckles which are preferably made of metal.

In the use of the shoes, the same are strapped to the feet of the wearer as indicated in FIGURE 4 and in the act of walking the platforms 20 and 21 may pivot or hinge relatively to one another, for instance as indicated in FIGURE 5 in one position of the foot in which the rear platform 21 is raised angularly out of the horizontal into a diagonal position. Owing to the fact that the toe portions 101 of the bearing members 40, 41 are a substantial distance forwardly of the pivotal axes 38, 39, and due to the bevel 101, the forward ends of the members 40, 41 will dig downwardly against the soil and have a tendency to lift the rear portions of the front platform 20 through the pivots 38, 39, as indicated in FIGURE 5; thus giving adequate purchase of the sand shoes in the loose soil and aids to the progress of moving through such soil.

The under-platform areas afford greater surface than shoes or boots, which surface is exposed to the loose soil and affords distribution of the wearer's weight over a wider area of such loose soil, thereby reducing downward penetration of the sand shoes into such loose soil.

The provision of the grids including the longitudinal and lateral ribs form the pockets which receive therein the loose soil. The sections of the ribs defining these pockets are narrow and penetrate the soil so as to cut off clods or sections of the loose soil which enter the pockets. The ribs, acting as confining walls, prevent these clods or entrapped sections of the soil from spreading laterally and owing to the inescapability of the soil from such pockets a greater compaction of soil in the pockets oc-

curs through the superposed weight of the wearer on the platforms.

Accordingly, as the platforms move down and the compaction becomes greater there is resistance to sinking and thus penetration is minimized and controlled. The sand shoes of the invention with the articulated platforms conform to foot movements and afford positive, effective means and method of forward-movement purchase and traction, reduction and prevention of sliding and slipping.

It will be noted that the heel seat **26** and forward straps are so located on the platforms that placement of the foot is required in a position on the shoe whereby the platforms do not extend laterally substantially beyond the inside line of the wearer's foot. This will prevent tripping of the wearers by catching one platform upon the other. The front platform, however, extends somewhat forward and laterally to the other side beyond the toes, slightly back and laterally beyond the heel, and materially laterally beyond the outside line of the foot. This latter extended area may be substantially and variously increased by various-sized front and rear side extensions such as shown in FIGURE 9.

The platforms and platform extensions may be of various and desired sizes governed by conditions of soil and other factors.

The improved sand shoes will promote the natural, unimpeded walking-running-marching and working stances and motions of the feet. The wearers may walk, run and march naturally up, over and down sandy and other loose-soil areas, hummocks and hills with great ease, comfort, speed, safety and energy conservation.

The invention will be found suitable to military personnel, to handicapped persons, such as elderly and semi-crippled persons, desiring or needing to traverse various otherwise excessive energy-taxing, loose soil areas and distances.

The beveled edges of the ribs reduce friction and weight drag of soil during forward movements of the sand shoe platforms. The rear edges of these ribs which are normal or at 90 degrees to the planes of the platforms are more effective in reaction to give forward movement in propelling the sand shoes and wearers in a forward direction and they also tend to resist sliding off these normal edges by the compacted clods in the pockets so as to avoid side slippage of the shoes.

The sand shoes will operate and perform satisfactorily when equipped only with the lateral ribs. However, the greatest realization and efficiency is attained with the use also of the longitudinal ribs in the grid construction illustrated.

The beveled edges of the longitudinal ribs at the outer sides thereof also reduce friction and weight drag of soil during forward movements of the sand shoe platform.

The toe rib **49** is curved and beveled also for the purpose of reducing friction and weight drag at the forward edge of the sand shoe.

The inner ribs and in fact the entire grid structure increases the platform's structural strength and weight-support properties besides functioning in the manner already described to minimize downward penetration and assist motion of translation in any direction.

The side extensions will of course increase the area of contact with the soil and increase the grid area and the number of pockets and may be used in more difficult soil conditions.

The beveled or sloping edges of the ribs tend to more easily shed the soil or clods in the pockets during lifting movements of the sand shoes, thus avoiding vacuum retardation in walking and facilitating the raising of the grids out of the soil and generally improving ability to move about in sand, loose and muddy soils.

Although I have disclosed herein the best forms of the invention known to me at this time, I reserve the right to all such modifications and changes as may come within the scope of the following claims.

What is claimed is:

1. A sand shoe comprising
(*a*) front and rear platforms pivotally connected,
(*b*) means for removably attaching the shoe to a wearer's foot, and
(*c*) means comprising intersecting rib grids of substantial depth affixed beneath the platforms so that
(*d*) downwardly opening soil-receiving pockets of substantial depth are formed.

2. A sand shoe as claimed in claim 1 in which at least some of said ribs
(*e*) run laterally and
(*f*) have beveled forward edges.

3. A sand shoe as claimed in claim 2 in which said beveled forward edges
(*g*) incline downwardly and rearwardly.

4. A sand shoe as claimed in claim 2 in which all other of the rib edges which define the pockets being
(*g*) at substantially ninety degrees to the planes of the platforms.

5. A sand shoe as claimed in claim 1 in which at least some of said ribs
(*e*) run longitudinally and
(*f*) have beveled outer edges.

6. A sand shoe as claimed in claim 5 in which said beveled outer edges
(*g*) incline downwardly and inwardly.

7. A sand shoe as claimed in claim 1 further comprising
(*e*) a lateral platform extension, and
(*f*) means for attaching the extension to a platform.

8. A sand shoe as claimed in claim 7 further comprising
(*g*) ribs outstanding from the bottom surface of the extension in complemental relation to the ribs of the platform to form therewith
(*h*) further soil-receiving pockets.

9. A sand shoe as claimed in claim 8 in which the extension ribs are
(*i*) beveled on their forward and external edges.

10. A sand shoe as claimed in claim 7 in which a longitudinal edge rib of the platform is
(*g*) slotted, said attaching means comprising
(*h*) a plate affixed to the extension having
(*i*) a projecting part adapted to be removably fitted into the slot, and
(*j*) fastening means in the platform positioned to cross the slot through the plate.

11. A sand shoe as claimed in claim 1 in which the pivotal connection comprises
(*e*) laterally lapping shank members on the respective platforms,
(*f*) bearing members carried beneath the shank members, and
(*g*) pivot means passing laterally through the bearing members.

12. A sand shoe as claimed in claim 11 wherein said bearing members have
(*h*) longitudinally displaced holes for selectively receiving the pivot means to hingedly connect the platforms at variable distances apart conformable to foot sizes of the wearer.

13. A sand shoe as claimed in claim 11 further comprising
(*h*) a truss bridging the bearing members of one of the platforms.

14. A sand shoe as claimed in claim 13 in which said truss comprises
(*i*) a longitudinal rib extension of the one platform disposed between the bearing members, and
(*j*) a cross piece uniting the rib extension with outer end portions of the bearing members.

15. A sand shoe as claimed in claim 11 wherein the bearing members of the shank members of the rear platform

(*h*) extend sufficiently forwardly of the pivot fulcrum points that when the rear platform is hinged upward incident to raising the heel the forward free beveled edges of said last-mentioned bearing members will engage and bite into the soil levering up the pivot means and rear portion of the front platform.

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