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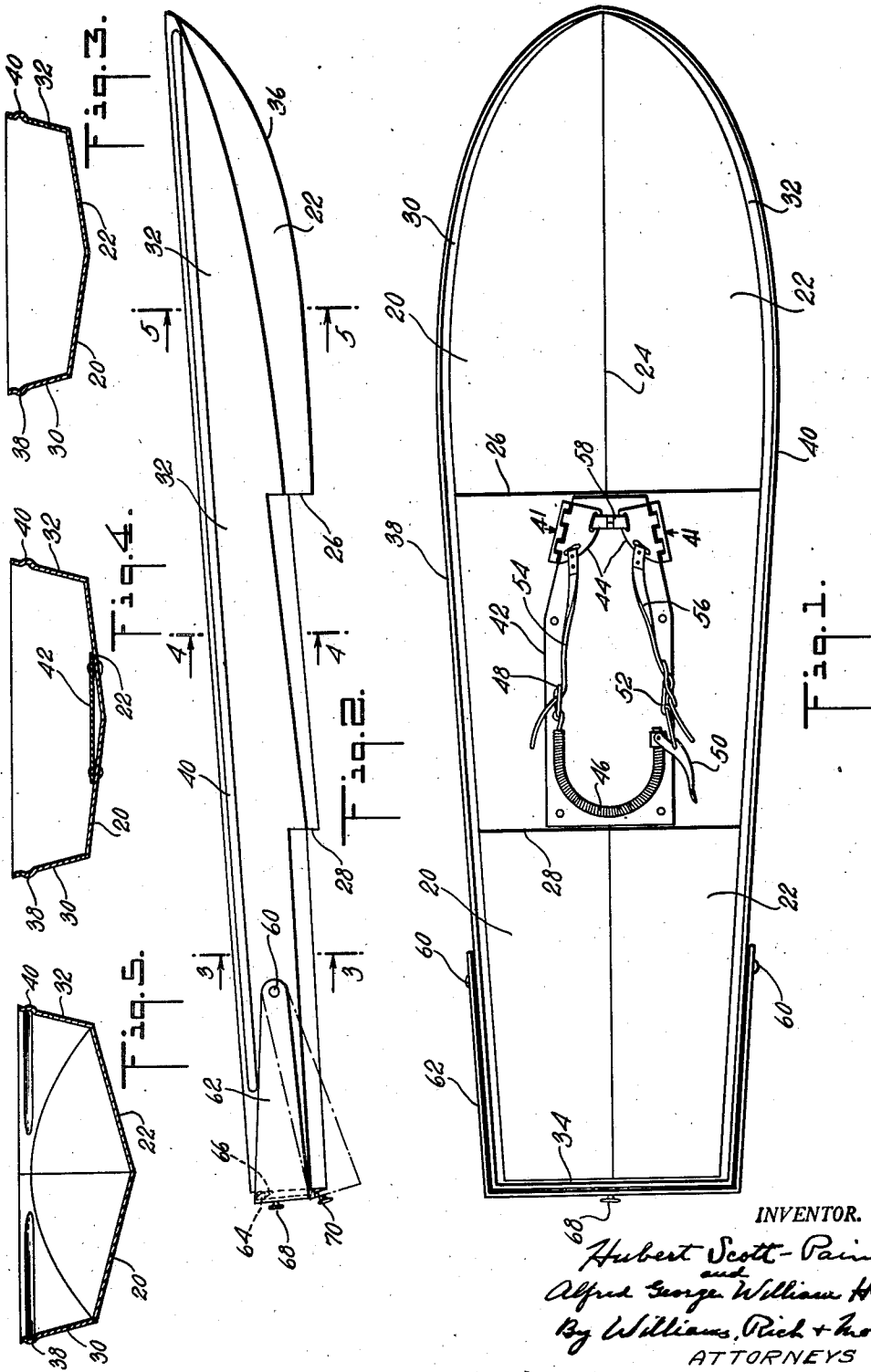
H. SCOTT-PAINE ET AL

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DEVICE FACILITATING WALKING ON MUD

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3 Sheets-Sheet 1



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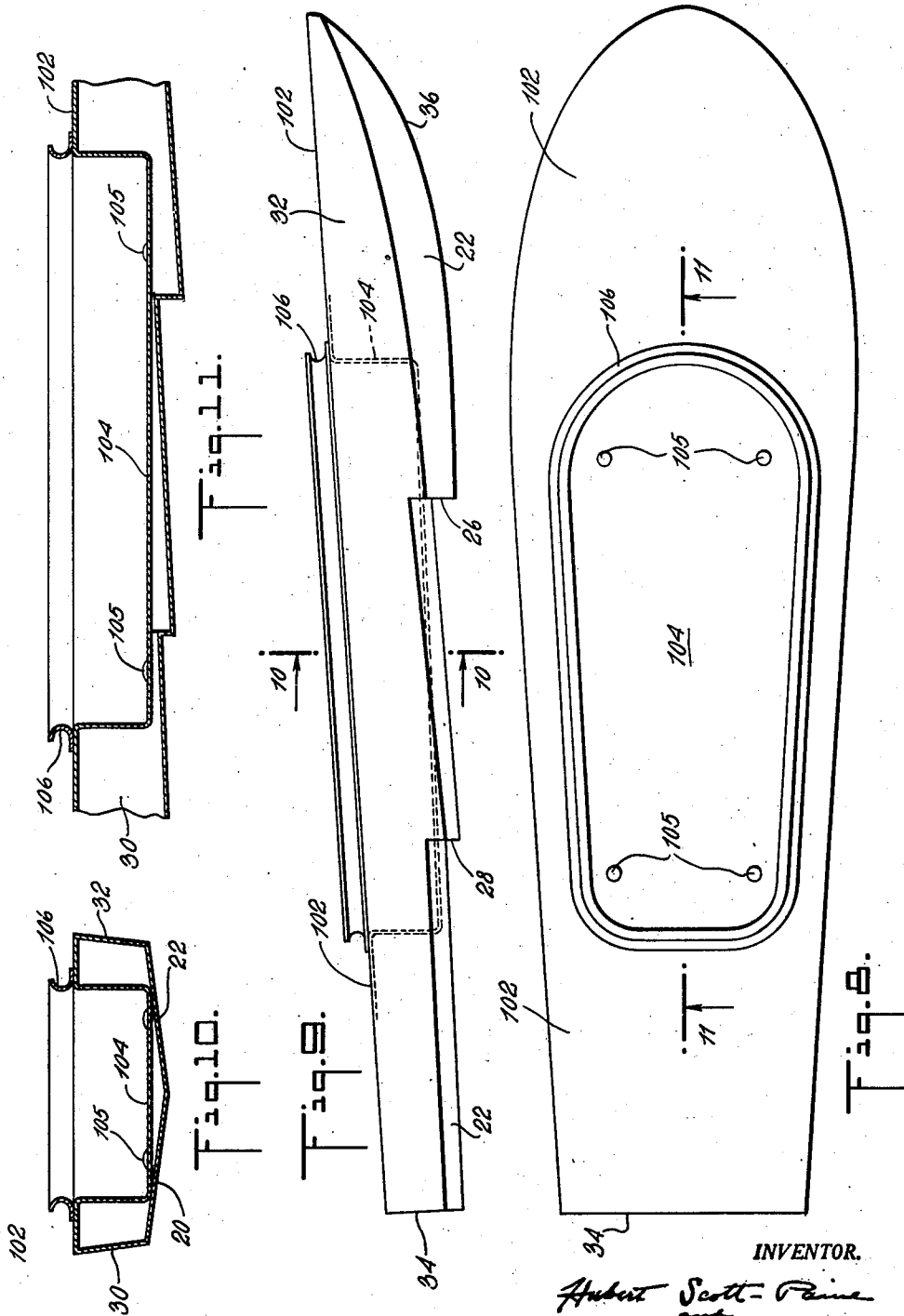
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UNITED STATES PATENT OFFICE

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DEVICE FACILITATING WALKING ON MUD

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This invention relates to devices facilitating walking on mud. Said devices are adapted to be attached to a person's feet and facilitate walking on deep and thin mud into which his feet and legs would otherwise sink so as to make walking difficult or impossible. Such devices are particularly useful for military personnel who may be required to travel over deep and thin mud, but they are also useful for civilians such as contractors, rescuers, surveyors, hunters, explorers, etc.

The problems to be surmounted in successful walking over deep and thin mud are very different from those encountered in walking or traveling over snow by the use of snow-shoes and snow-skis, and in traveling over water on water-skis, because snow and water differ radically in their characteristics from deep and thin mud. Snow-shoes support the weight of the wearer by distributing it over the areas of the snow-shoes, and the fact that snow may leak through the meshes of the snow-shoes or pass over their edges on to the top of them is not important since it is easily shaken off during walking. Snow-skis, also, support the weight of the wearer because of the areas of the skis, and any snow that gets on the top of them comes off during use; and there is the added advantage in comparison with snow-shoes that skis slide over the snow. In the case of water-skis, the area thereof is not sufficient to support the weight of the wearer when not in motion, the supporting effect being due to the planing effect when the wearer is pulled over the surface of the water by a bridle held in his hands and attached to a motor boat which must travel at sufficient speed to maintain the skis on or near the surface of the water.

Among the problems to be overcome in walking on deep and thin mud are the suction exerted by the mud, and the tendency to backward, sidewise and (when walking on a down-grade) forward slipping, owing to the very slippery nature of the mud surface. Another problem sometimes is the collection of mud and water in or on the top surfaces of the supporting devices, thereby not only wetting the wearer's feet but also increasing the weight of the devices and so impeding the progress of the wearer. The general object of the present invention is to provide devices adapted to be worn on the feet and capable of supporting on thin deep mud (and on solid ground) the weight of the wearer when he is standing still or walking, of making easy and safe walking on mud on the level or on a grade and even at a rapid rate, and when desirable of

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keeping the wearer's feet dry. A subsidiary object of the invention is to provide devices of the kind mentioned which are capable of being nested one within another, so as to facilitate their transportation in pairs or in a multiplicity of pairs. These objects are achieved by the devices embodying the invention about to be described.

The invention will be understood from the following description taken in connection with the accompanying drawings in which several embodiments of the invention are shown and in which Fig. 1 is a plan view of one embodiment of the invention; Fig. 2 is a side elevation thereof; Fig. 3 is a sectional elevation on the line 3—3 of Fig. 2; Fig. 4 is a sectional elevation on the line 4—4 of Fig. 2, the boot rigging being omitted; Fig. 5 is a sectional elevation on the line 5—5 of Fig. 2; Fig. 6 is a plan view of another embodiment of the invention; Fig. 7 is a side elevation thereof, showing a gaiter attached; Fig. 8 is a plan view of another embodiment of the invention; Fig. 9 is a side elevation thereof; Fig. 10 is a sectional elevation on the line 10—10 of Fig. 9; Fig. 11 is a fragmentary sectional elevation on the line 11—11 of Fig. 8; Figs. 12 and 13 are a plan view and an end elevation of the stationary portion of the toe clip shown in Fig. 1; and Figs. 14 and 15 are a plan view and an end elevation of the movable member of said toe clip.

The essentially simple construction of the device will be apparent from the drawings, from which it will be evident that all of the forms of the invention include a water-tight shell having bottom portions 20 and 22 inclined laterally and upwardly from a central longitudinal line 24 and provided with transversely extending step formations 26 and 28. Extending upwardly and outwardly from said bottom portions 20 and 22 at an angle thereto are side portions 30 and 32 and a rear portion 34. From the drawings, it will be obvious that the bottom of the shell at its forward end is upturned as shown at 36 and at its rear end is square. In the open-shell form of the invention shown in Figs. 1 to 5, the side portions 30 and 32 near their upper edges are preferably provided throughout the major portion of their length with bulges 38 and 40 which act to stiffen said side portions. These bulges 38 and 40 are unnecessary in the other forms of the invention which, as hereinafter described, are each provided with a cover which is secured to the tops of the side portions 30 and 32 and the end portion 34, thereby producing an essentially rigid structure.

Referring now particularly to the embodiment of the invention shown in Figs. 1 to 5, it will be apparent that the open-shell therein shown is provided on the inside of its bottom portion with a boot-rigging adapted to secure the device to a foot of the wearer. This boot-rigging may be of any suitable form, and no novelty is claimed for that portion of the boot rigging shown in Fig. 1 which is adapted to clamp around the heel of the boot. The particular toe-clips shown in Fig. 1, and in detail in Figs. 12 to 15, are, however, believed to be novel. These toe-clips will be hereinafter described, and it will be apparent that each is characterized by two portions hingedly connected together, one of said portions 41 (shown in Figs. 12 and 13) being adapted to be secured to the underside of a plate 42 attached to the bottom portions 20 and 22 of the shell, while the other portion 44 (shown in Figs. 14 and 15) of each toe-clip is hingedly attached to the fixed portion and is free to move from the depressed positions shown in Fig. 1 to positions in which they stand nearly upright but slightly tilted toward one another. Thus the toe-clip members 44, when the device is attached to a boot, will receive the toe of the boot between them; and, when the device is not in use, the toe-clip members 44 will lie substantially parallel to the plate 42. The particular advantage of these toe-clips is due to the fact that they permit nesting of a pair or a plurality of pairs of the open-shell form of the invention illustrated in Figs. 1 to 5. In Fig. 1, a heel-strap of well-known form is shown attached to the toe-clip members 44. As shown, this heel-strap consists of a heel portion 46 carrying at one end a buckle 48 and at the other end a clamping device 50 attached to a buckle 52, and said buckles 48 and 52 cooperating with straps 54 and 56 attached respectively to slots in the toe-clip members 44. A toe-strap 58 is also shown cooperating with other slots in the toe-clip members 44. As will be obvious from Fig. 1, the toe-clip portion of the boot-rigging is located somewhat forwardly of the longitudinal center of the shell, so that when the device is lifted by the toe-strap the forward upturned end thereof will rise before the square rear end. This is the location of the toe-clips in all of the embodiments of the invention.

It will be understood that the stepped portions 26 and 28 of the shells, and the square rear ends thereof will cooperate with the mud on which the devices are used, so as to resist, and in fact substantially prevent, rearward slipping during walking; and yet, of course, said stepped portions 26 and 28 and the square rear end of the shell do not resist forward movement of the shell. When walking on the devices down-grade on a muddy surface, however, resistance to forward slipping may be desirable, and a means for providing this resistance is illustrated in Figs. 1 and 2 at the rear end of the shell. As there shown, this means comprises a brake pivotally connected at 60 to the side portions 30 and 32 of the shell. As shown, the brake consists of a sheet-metal portion 62 bent into the form shown in Fig. 1 so that it extends around the square rear end 34 of the shell. The brake is retained in its inoperative position (shown in Fig. 2) by a lug 64 attached to the inside of the rear portion of the brake member 62 and adapted to cooperate with a lug 66 attached to the outside of the rear portion 34 of the shell near the top thereof. Extending from the outside of the rear portion of the brake is a knob 68, adapted to be grasped by

the fingers of the user of the devices, which permits the rear portion of the brake to be sprung outward slightly until the lug 64 is out of engagement with the lug 66, thereby permitting the brake to drop into its active position, shown in dotted lines in Fig. 2, the downward movement of the brake being limited by cooperation of the lug 64 with a lug 70 secured to the rear portion 34 of the shell near its bottom. When the brake is in its lowered active position, it will sufficiently retard forward slipping of the device when walking on a down-grade muddy surface; and when the brake is in its upper position, it does not function. It will be understood that this brake, or any equivalent thereof, may be applied to all of the embodiments of the invention shown in the drawings.

Sidewise slipping of the devices when walking on mud is effectively prevented not only by the engagement of the side portions 30 and 32 with the mud, but also by the lateral pressures exerted on the mud by the bottom portions 20 and 22 of the shells, owing to the inclinations thereof from the horizontal which are apparent from Figs. 2 to 5. Another important advantage of the illustrated form of the shell is due to the facts that not only are the bottom portions inclined laterally and upwardly from the central longitudinal line 24, but they are upturned at their forward ends as is well shown in Figs. 2, 7 and 9. The upturned and broadened shape at the forward end of the device insures that the forward end will have the proper buoyancy and will always tend to rise and slide over the muddy surface on which the devices are used. This is an important factor in making walking easy on these devices.

Figs. 6 and 7 show another embodiment of the invention which is characterized by the fact that the shell which has been described is provided with a cover 72 which may be welded or otherwise secured to the tops of the side portions 30 and 32 and the end portion 34 of the shell. This cover 72 is provided with an opening of the shape shown in Fig. 6 which is surrounded by an upwardly and outwardly extending lip 74. This lip 74 serves the double purpose of impeding the entrance of water or mud into the inside of the shell, and of providing means to which a gaiter 76 may be attached. As shown in Fig. 7, the gaiter 76 may be provided at its bottom with a hem containing a tie-cord 78. When the hem of the gaiter 76 is placed around the lip 74 and the cord 78 is drawn tight and tied, the gaiter is securely attached to the cover 72. The upper portion (not shown) of the gaiter 76 is wrapped around the leg of the wearer and tied in any suitable way; and as shown in Fig. 7, the gaiter may be provided preferably at its rear portion with a zipper 80, thereby facilitating the insertion of the foot and leg of the wearer through the gaiter into the device. Any suitable means may be used in the form of the invention shown in Figs. 6 and 7 for attaching the device to the foot of the wearer. Since, however, it is desirable that the boot-rigging be readily detachable from a point outside the cover 72, a special boot-rigging is shown in Figs. 6 and 7. As shown, this special boot-rigging comprises toe-clips 82 attached to a plate 84 secured to the bottom of the shell, said toe-clips 82 being connected by a toe-strap 86. Adapted to engage the heel of the boot, is a heel-strap 88 of any suitable form which is connected at its ends to a bridle 90, preferably a wire rope, which passes through

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fair-leads 92 projecting from the outsides of the toe-clips 82. At its forward end, the bridle 90 passes through an opening in a block 94 which is secured to a wire rope 96 which passes freely through an opening in the lower part of the lip 74. The forward end of this rope 96 is attached to a toggle device 98 of the form shown in Figs. 6 and 7 which is attached to the forward part of the top 72 of the device. Thus there is provided a boot-rigging which may be clamped or released by manual manipulation of the toggle means 98. In Fig. 7, a boot 100 is shown in dotted lines inserted in and secured to the shell by the boot-rigging which has just been described. It will be understood that the embodiment of the invention shown in Figs. 6 and 7 may be used either with or without the gaiter 76.

Another embodiment of the invention is shown in Figs. 8 to 11, but with the boot-rigging and the gaiter omitted, it being understood that these may be the same as those hereinbefore described. The form of the invention shown in Figs. 8 to 11 is characterized by the fact that the cover portion 102, which is welded or otherwise secured to the shell, is provided with a well portion 104 which projects downwardly into the shell and rests on and is secured by rivets 105 to the bottom portions 20 and 22 thereof. It will be understood that the well 104 is sufficiently large to receive the boot of the wearer which is secured to the bottom of the well by the boot-rigging (not shown) attached to the bottom of the well. The well may be surrounded by a lip 106 secured to the top 102 preferably by welding; and a gaiter may be secured to this lip in the manner shown in Fig. 7 and hereinbefore described. It will be understood that the form of the invention shown in Figs. 8 to 11 has the advantage of assured buoyancy under all conditions, since no mud or water can enter the space in the shell around the well 104. That is the only space into which water or mud may get is the well 104. This fact, makes the wearing of a gaiter with this form of device less important than in the form of the invention shown in Figs. 6 and 7.

The construction of the novel hinged toe-clips shown in Fig. 1 will be apparent from Figs. 12 to 15 in which the elements of those toe-clips are shown. The fixed elements 41 of the toe-clip are shown in Figs. 12 and 13 from which it will be apparent that each consists of a piece of sheet metal which may be cut and stamped to the form shown which has parallel portions 110, 112 and 114 provided with holes adapted to receive rivets, and a bent portion 116 which cooperates with the movable element 44 of the toe-clip. The movable elements 44 of the toe-clip are shown in Figs. 14 and 15 as each consisting of the sheet metal plate 44 cut and stamped to the form shown. The slot 120 is adapted to receive the toe-strap 58, and the slot 122 is adapted to receive one of the straps 54 or 56 (as shown in Fig. 1); and the notches 124 and 126 and the slot 128 are adapted to receive the portions 110, 114 and 112 of the fixed element 41 of the toe clip which is shown in Figs. 12 and 13, when the two portions of the toe-clip are assembled. As will be obvious, the movable portions 44 of the toe-clip are hingedly connected to and are capable of limited movement on the bent portion 116, from the position in which the two portions lie substantially parallel with one another, to the position in which they are at slightly less than a right angle to one another. The bent out

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portion 130 in the portion 44, shown in Figs. 14 and 15, is adapted to cooperate with the sole of the boot and hold it down against the plate 42 (Fig. 1) which overlays the portions 110, 112 and 114 of the fixed portions 41 of the toe-clip.

Of course, the bottom of the shell may be provided with any number of step formations; that is, one, two or more. In the form of the invention shown in the drawings, the step formations extend across the bottom of the shell at 90° to the center line thereof; but it will be understood that they may extend angularly on each side of the center line. Also, it is to be understood that the bottom portions of the shell may be longitudinally corrugated to increase the stiffness thereof, particularly when the shell is made of very thin sheet metal. Of course, the devices may be made of wood, plastic or any other suitable material, although sheet aluminum is preferable.

It is also to be understood that the devices may be used without the cover and the gaiter, or with the cover and without the gaiter, since it is quite practicable to walk on the devices even when they contain a good deal of mud or water, and still make progress where without the devices it would be impossible for a man to move. Obviously, also, the rear brake and associated parts may or may not be used.

The utility of devices embodying the present invention has been proven by using them to walk on deep and thin mud exposed along an estuary of the sea at low tide. Although this mud was very thin and soft, no difficulty was experienced in walking and maneuvering over it. The shells sank into the mud over a portion of the upwardly extending side portions and provided all the side area required to prevent side-slipping, but substantially no mud or water reached the top of the shells even when carrying heavy loads. Rearward slipping during walking was insignificant, owing to the resistance offered by the step formations and the square rear ends of the shells; and side-slipping was prevented by the resistance offered by both the inclined bottom sections and the side portions of the shells. Walking required little muscular effort, since the shells slipped over the mud, and the suction effect of the mud on the bottoms of the shells was negligible. When standing still, it was difficult to lift the devices vertically out of the mud owing to the suction, but merely a slight forward movement released the suction, first at the forward ends and then throughout the length of the shells and made the resumption of walking easy. An important feature of the devices is the broad, upturned, forward bottom area which makes bogging down impossible as long as forward movement can be maintained. No particular skill was required in walking, and after a few minutes practice the wearer of the devices was able to progress over the mud with confidence and at considerable speed.

What is claimed is:

1. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion provided with a transversely extending step formation, side and rear portions upwardly and outwardly extending from said bottom portion, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

2. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion upturned at its

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forward end and square at its rear end and provided with a transversely extending step formation, side and rear portions upwardly and outwardly extending from said bottom portion, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

3. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion inclined laterally and upwardly from a central longitudinal line and upturned at its forward end and square at its rear end and provided with a transversely extending step formation, side and rear portions upwardly and outwardly extending from said bottom portion, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

4. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion, side and rear portions upwardly and outwardly extending from said bottom portion, a cover cooperating with the tops of said side and rear portions and having an opening surrounded by an upwardly extending lip, means attached to the inside of said bottom portion for securing said shell to a foot of the wearer, and a gaiter cooperating with said lip and adapted to cooperate with the leg of the wearer.

5. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion, side and rear portions upwardly and outwardly extending from said bottom portion, a cover cooperating with the tops of said side and rear portions and having an opening surrounded by an upwardly extending lip, means attached to the inside of said bottom portion beneath said opening and oper-

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able by means mounted on said cover for securing said shell to a foot of the wearer and a gaiter attached to said lip and adapted to cooperate with the leg of the wearer.

6. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion inclined upwardly at its forward end and square at its rear end, side and rear portions upwardly and outwardly extending from said bottom portion, a brake movable into and out of braking position attached to the rear end of said shell, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

7. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion inclined upwardly at its forward end and square at its rear end, side and rear portions upwardly and outwardly extending from said bottom portion, a brake pivotally attached to said side portions and extending across the square rear end of said shell, means for holding said brake in either its braking or non-braking position, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

8. Devices adapted to be attached to the feet for walking on mud, each having a water-tight shell having a bottom portion inclined laterally and upwardly from a central longitudinal line and upturned at its forward end and square at its rear end, side and rear portions upwardly and outwardly extending from said bottom portion at an angle to the latter, and means attached to the inside of said bottom portion for securing said shell to a foot of the wearer.

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