

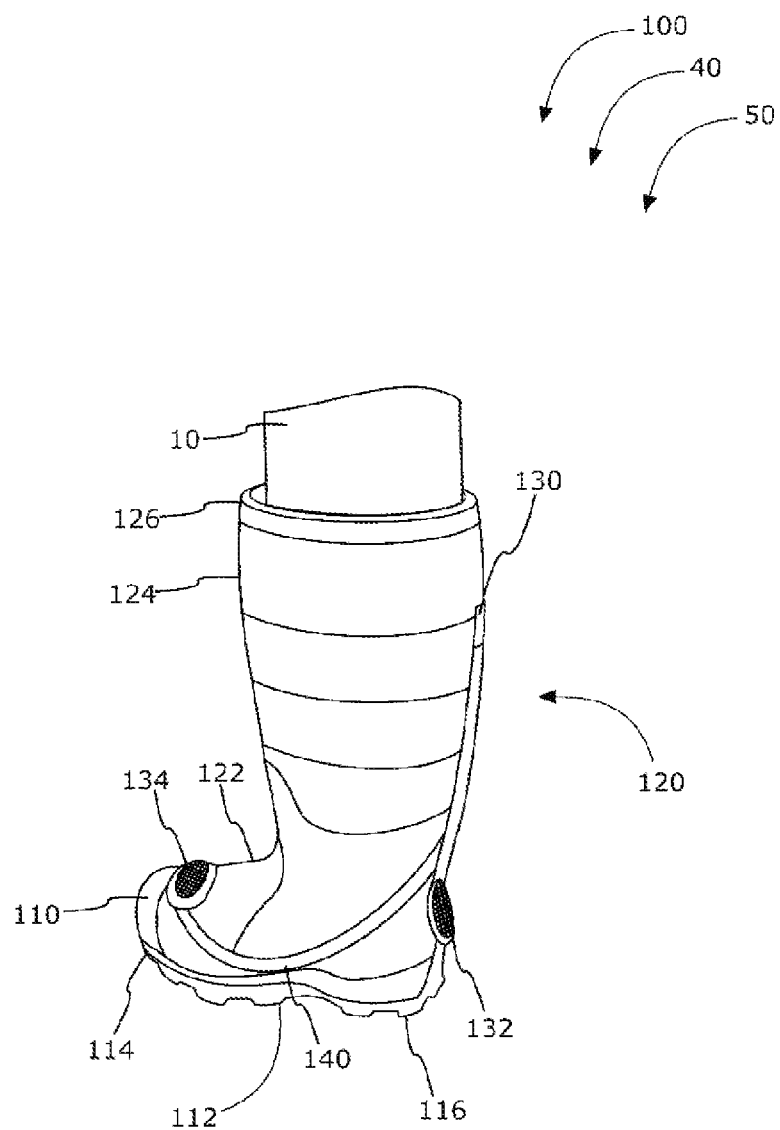


FIG. 1

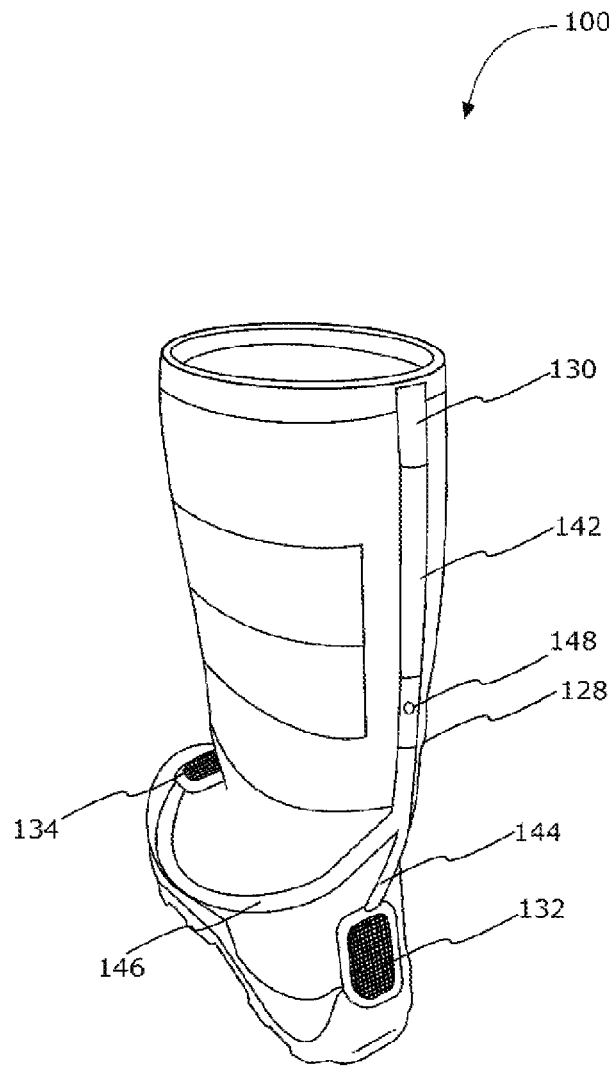


FIG. 2

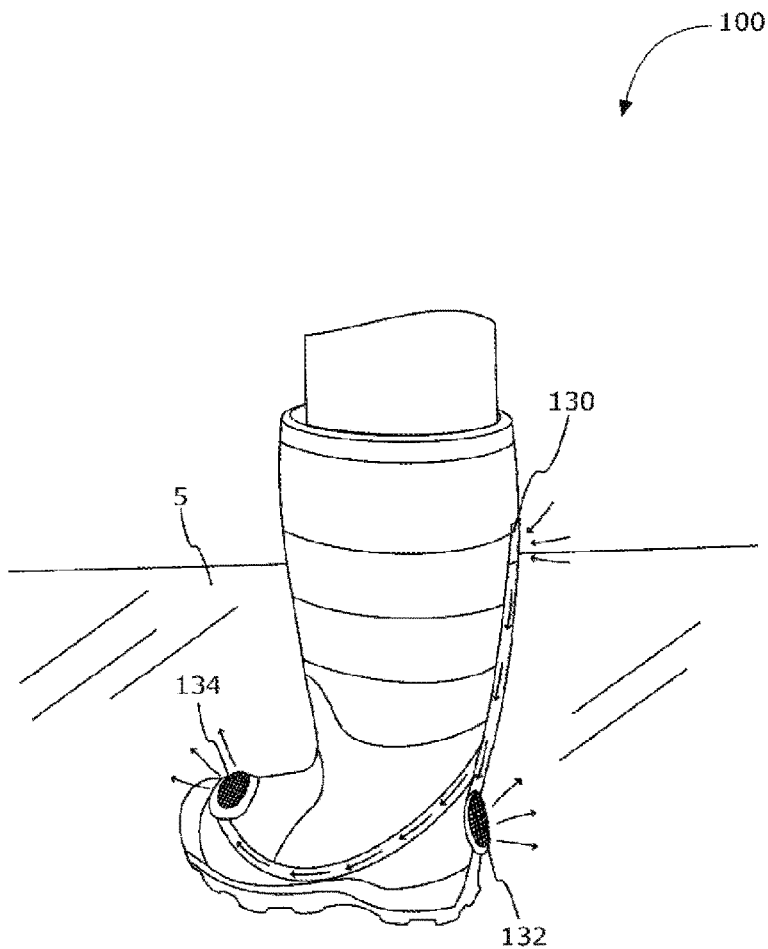


FIG. 3

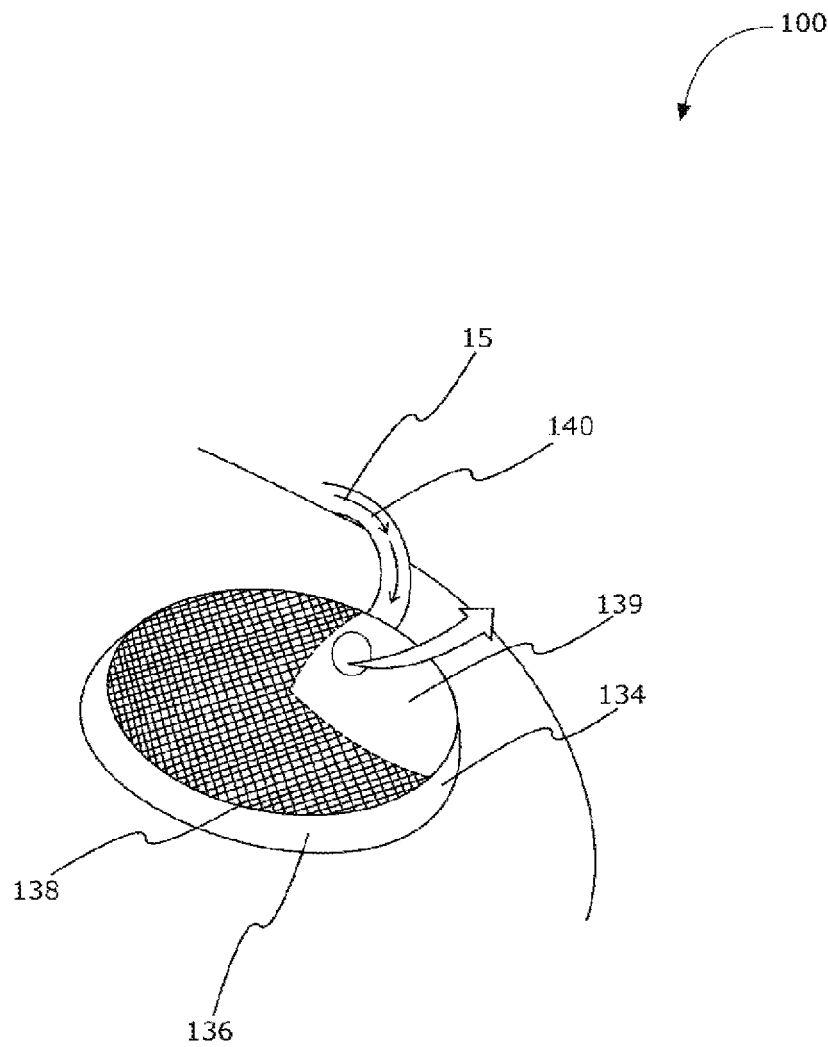


FIG. 4

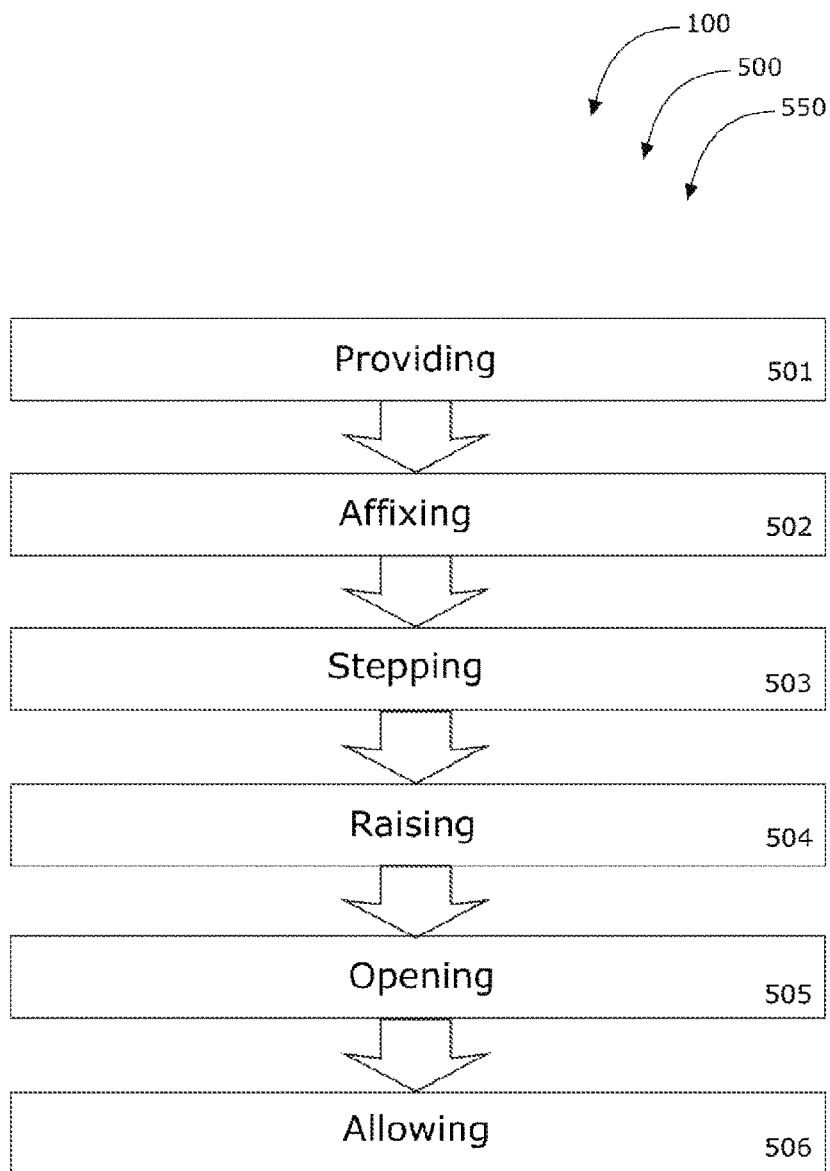


FIG. 5

SUCTION-PREVENTING FOOTWEAR AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present application is related to and claims priority to U.S. Provisional Patent Application No. 62/447, 897 filed Jan. 18, 2017, which is incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

[0002] The following includes information that may be useful in understanding the present disclosure. It is not an admission that any of the information provided herein is prior art nor material to the presently described or claimed inventions, nor that any publication or document that is specifically or implicitly referenced is prior art.

TECHNICAL FIELD

[0003] The present invention relates generally to the field of apparel of existing art and more specifically relates to footwear.

RELATED ART

[0004] Many people wear boots. Boots are a type of footwear that mainly cover the foot and ankle. Some boots extend up the leg, sometimes as far as the knee or even the hip. Boots may also be worn both for their functionality such as protecting the foot and leg from water, extreme cold, mud, etc.

[0005] 89When walking through deep mud, a suction is often created that can result in an individual's boots coming off in the mud. In addition, it can also cause a person to become stuck in the mud and require rescue. Muddy conditions may prevent rescue workers and other personnel from entering an area. Outdoor enthusiasts often have to exert a great deal of energy to walk through mud and other earthy conditions. An effective solution is required.

[0006] U.S. Pat. No. 4,888,887 to Terry S. Solow relates to a suction-ventilated shoe system. The described suction-ventilated shoe system includes air-exit ports located on the outer surface of said shoe, preferably in the midsole region. The suction-ventilated shoe system contains a novel, multivented, suction-operated insole that enables the entire surface of said insole to be uniformly ventilated. Each air vent of said multivented, suction-operated insole contains its own independent, foot-operated, air-suction pump means, whose exhaust air is directed to exit the shoe via special air ducts that are connected between said insole's air-suction pump means and said shoe's air-exit ports.

SUMMARY OF THE INVENTION

[0007] In view of the foregoing disadvantages inherent in the known footwear art, the present disclosure provides a novel suction-preventing footwear and method. The general purpose of the present disclosure, which will be described subsequently in greater detail, is to provide an efficient and effective suction-preventing footwear and method.

[0008] A suction-preventing footwear is disclosed herein. The suction-preventing footwear includes a boot, a first-vent, a second-vent, a third-vent, a manifold, and a one-way valve. The boot may include a sole having a heel and toe, as

well as an upper extending above the sole for covering a user's foot having a vamp, a boot shaft, and a cuff. The first-vent may be affixed to the boot shaft near or on the cuff. The second-vent may be affixed to the top of the vamp, and the third-vent may be affixed to the rear of the boot shaft above the heel of the sole. The manifold may join the first-vent, the second-vent, and the third-vent together, such that each is in fluid communication with the others. The one-way valve may be disposed within the manifold, restricting airflow to a single direction such that air may pass from the first-vent to the second-vent and the third-vent, but not from the third-vent or the second-vent to the first-vent.

[0009] According to another embodiment, a suction-preventing footwear is also disclosed herein. The suction-preventing footwear includes firstly, providing the suction-preventing footwear as described; secondly, affixing the footwear to the foot of the user; thirdly, stepping into a deformable material, said deformable material being mud; fourthly, raising the footwear from the deformable material; fifthly, opening the one-way valve in response to a pressure differential caused by suction below the footwear; and sixthly, allowing air to pass from the first-vent to the second-vent and the third-vent, thereby maintaining atmospheric pressure around the second-vent and the third-vent.

[0010] For purposes of summarizing the invention, certain aspects, advantages, and novel features of the invention have been described herein. It is to be understood that not necessarily all such advantages may be achieved in accordance with any one particular embodiment of the invention. Thus, the invention may be embodied or carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein. The features of the invention which are believed to be novel are particularly pointed out and distinctly claimed in the concluding portion of the specification. These and other features, aspects, and advantages of the present invention will become better understood with reference to the following drawings and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The figures which accompany the written portion of this specification illustrate embodiments and methods of use for the present disclosure, a suction-preventing footwear and method, constructed and operative according to the teachings of the present disclosure.

[0012] FIG. 1 is a perspective view of the suction-preventing footwear during an 'in-use' condition, according to an embodiment of the disclosure.

[0013] FIG. 2 is a perspective view of the suction-preventing footwear of FIG. 1, according to an embodiment of the present disclosure.

[0014] FIG. 3 is a perspective view of the suction-preventing footwear of FIG. 1, according to an embodiment of the present disclosure.

[0015] FIG. 4 is a perspective view of the suction-preventing footwear of FIG. 1, according to an embodiment of the present disclosure.

[0016] FIG. 5 is a flow diagram illustrating a method of use for preventing suction underneath footwear, according to an embodiment of the present disclosure.

[0017] The various embodiments of the present invention will hereinafter be described in conjunction with the appended drawings, wherein like designations denote like elements.

DETAILED DESCRIPTION

[0018] As discussed above, embodiments of the present disclosure relate to footwear and more particularly to a suction-preventing footwear as used to prevent suction underneath footwear from inhibiting use.

[0019] Generally, the suction-preventing footwear provides a rain boot with a self-purging vent and valving system designed to prevent suction from occurring when wearing the boots in deep mud and other wet conditions. The footwear may be available in knee and chest height that enable movement in deep muddy conditions. It affords advantage in wet earthy conditions for rescue workers, military personnel, fishermen, and hunters. Atmospheric vents connected to service valved relief ports strategically located around the boot work efficiently to break suction created near toe and heel of boot, alleviating resistance. The footwear prevents a pressure differential from occurring when the boots are pulled from the mud.

[0020] The suction-preventing footwear effectively enables wading through mud without causing suction. The boot incorporates shaped air channels, which allow communication between shielded, valved ports, strategically located at points of maximum suction relief to highest level of individual boot model. This allows air pressure inside a cavity caused by the boot to equalize with atmospheric air pressure. As a result, the pressure differential is negated as the boot is pulled from the mud. The air channels are preferably of a tubular shape and may be made from materials that allow the boot to flex so as not to restrict air movement. A removable one-way flapper valve integrated into the air channels may be made of a medium soft rubber that allows the flap to open with negative suction pressure and close at atmospheric pressure. A removable shield for the ports may be made of soft rubber for sealing with a nylon screen membrane molded into assembly. The boots may be available in various styles and sizes, including knee high, chest waders, and survival suits. The exact specifications may vary upon specific dynamics of wet soil type, and different required level of performance to each task.

[0021] Referring now more specifically to the drawings by numerals of reference, there is shown in FIGS. 1-4, various views of a footwear 100.

[0022] FIG. 1 shows a footwear 100 during an 'in-use' condition 50, according to an embodiment of the present disclosure. Here, footwear 100 may be beneficial for use by a user 40 to prevent suction beneath the footwear. As illustrated, footwear 100 may include boot 110, first-vent 130, second-vent 132, third-vent 134, and manifold 140. Other venting means and more or less vents may be used. Boot 110 may be configured to accept foot 10 of user 40, and may include sole 112 having heel 116 and toe 114, and upper 120 extending over sole 112, upper 120 being configured to cover the foot. Upper 120 may have vamp 122, boot shaft 124, and cuff 126. First-vent 130 may be affixed to boot shaft 124 of upper 120 of boot 110, being disposed adjacent to cuff 126 of upper 120 of boot 110. Second-vent 132 may be affixed to vamp 122 of upper 120 of boot 110. Third-vent 134 may be affixed to boot shaft 124 of upper 120 of boot 110, adjacent to heel 116 of sole 112 of boot 110. Manifold

140 may join first-vent 130, second-vent 132, and third-vent 134 in fluid communication with each other, and may be affixed to upper 120 of boot 110. Boot shaft 124 may be knee-high, and may be constructed of an elastomer, boot 110 being configured to flex. Manifold 140 may be likewise constructed of an elastomer, manifold 140 being configured to flex as boot 110 flexes.

[0023] Upon reading this specification, it should be appreciated that, under appropriate circumstances, considering such issues as user preferences, design preference, structural requirements, marketing preferences, cost, available materials, technological advances, etc., other structural arrangements such as, for example, different types of footwear, alternative manifold structures, etc., may be sufficient.

[0024] FIG. 2 shows footwear 100 of FIG. 1, according to an embodiment of the present disclosure. As above, footwear 100 may include first-vent 130, second-vent 132, and third-vent 134. Manifold 140 (FIG. 1) may further include first-conduit 142 coupled to first-vent 130, second-conduit 144 coupled to second-vent 132, and third-conduit 146 coupled to third-vent 134, such that first-conduit 142, second-conduit 144, and third-conduit 146 are connected to each other and are in fluid communication with each other. First-conduit 142, second-conduit 144, and third-conduit 146 may be tubular, first-conduit 142, second-conduit 144, and third-conduit 146 having a circular cross-section. One-way valve 148 may be disposed within manifold 140 (FIG. 1), one-way valve 148 being configured to allow airflow 15 (FIG. 4) to pass from first-vent 130 to second-vent 132 and third-vent 134. One-way valve 148 may comprise a flapper valve and alternately a check valve, and may further include a rubber seal. First-conduit 142 may extend vertically along rear side 128 boot shaft 124 (FIG. 1).

[0025] Referring now to FIG. 3 showing a perspective view of the suction-preventing footwear of FIG. 1, according to an embodiment of the present disclosure. First-vent 130, second-vent 132, and third-vent 134 may be in fluid communication with each other, such that airflow 15 (FIG. 4) may pass from first-vent 130 to second-vent 132 and third-vent 134. Footwear 100 may be partially submerged in mud 5. As footwear 100 is removed from mud 5, airflow 15 (FIG. 4) may move from first-vent 130 to second-vent 132 and third-vent 134 to prevent suction from occurring at second-vent 132 and third-vent 134.

[0026] FIG. 4 is a perspective view of the suction-preventing footwear 100 of FIG. 1, according to an embodiment of the present disclosure. Second-vent 132 and third-vent 134 may each include ovate member 136 having screen 138, screen 138 being configured to allow airflow 15 into and out of ovate member 136, and interior volume 139, configured to convey airflow 15 from screen 138 to manifold 140. Screen 138 may be constructed of nylon.

[0027] Referring now to FIG. 5 is a flow diagram illustrating a method for preventing suction underneath footwear 500, according to an embodiment of the present disclosure. In particular, the method for preventing suction underneath footwear 500 may include one or more components or features of the footwear 100 as described above. As illustrated, the method for preventing suction underneath footwear 500 may include the steps of: step one 501, providing a footwear comprising a boot configured to accept a foot of a user of the footwear including a sole having a heel and a toe, and an upper extending over the sole configured to cover the foot having a vamp, a boot shaft, and a cuff, a first-vent

affixed to the boot shaft of the upper of the boot disposed adjacent to the cuff of the upper of the boot, a second-vent affixed to the vamp of the upper of the boot, a third-vent affixed to a rear of the boot shaft of the upper of the boot adjacent to the heel of the sole of the boot, a manifold joining the first-vent, the second-vent, and the third-vent in fluid communication with each other, and a one-way valve disposed within the manifold configured to allow air to pass from the first-vent to the second-vent and the third-vent; step two **502**, affixing the footwear to the foot of the user; step three **503**, stepping into a deformable material, said deformable material being mud; step four **504**, raising the footwear from the deformable material; step five **505**, opening the one-way valve in response to a pressure differential caused by suction below the footwear; and step six **506**, allowing air to pass from the first-vent to the second-vent and the third-vent, thereby maintaining atmospheric pressure around the second-vent and the third-vent.

[0028] It should be noted that the steps described in the method of use can be carried out in many different orders according to user preference. The use of “step of” should not be interpreted as “step for”, in the claims herein and is not intended to invoke the provisions of 35 U.S.C. § 112(f). It should also be noted that, under appropriate circumstances, considering such issues as design preference, user preferences, marketing preferences, cost, structural requirements, available materials, technological advances, etc., other methods for preventing suction underneath footwear, are taught herein.

[0029] The embodiments of the invention described herein are exemplary and numerous modifications, variations and rearrangements can be readily envisioned to achieve substantially equivalent results, all of which are intended to be embraced within the spirit and scope of the invention. Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientist, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application.

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A footwear comprising:
 - a boot configured to accept a foot of a wearer of the footwear including
 - a sole having a heel and a toe, and
 - an upper extending over the sole configured to cover the foot having a vamp, a boot shaft, and a cuff;
 - a first-vent affixed to the boot shaft of the upper of the boot disposed adjacent to the cuff of the upper of the boot;
 - a second-vent affixed to the vamp of the upper of the boot;
 - a third-vent affixed to a rear of the boot shaft of the upper of the boot adjacent to the heel of the sole of the boot;
 - a manifold joining the first-vent, the second-vent, and the third-vent in fluid communication with each other; and
 - a one-way valve disposed within the manifold configured to allow air to pass from the first-vent to the second-vent and the third-vent.
2. The footwear of claim 1, wherein the manifold includes a conduit having a first-conduit coupled to the first-vent, a second-conduit coupled to the second-vent, a third-conduit coupled to the third-vent, and a junction joining the first-

conduit, the second-conduit, and the third-conduit, the first-conduit, the second-conduit, and the third-conduit being in fluid communication with each other.

3. The footwear of claim 2, wherein the first-conduit, the second-conduit, and the third-conduit are tubular, the first-conduit, the second-conduit, and the third-conduit having a circular cross-section.

4. The footwear of claim 1, wherein the manifold is affixed to an exterior of the upper of the boot.

5. The footwear of claim 1, wherein the second-vent and the third-vent each comprise an ovate member having a screen configured to allow the passage of air into the ovate member and an interior volume configured to convey air from the screen to the manifold.

6. The footwear of claim 5, wherein the screen is constructed of nylon.

7. The footwear of claim 2, wherein the first-conduit extends vertically along the rear of the boot shaft of the upper of the boot.

8. The footwear of claim 1, wherein the one-way valve comprises a flapper valve and alternately a check valve.

9. The footwear of claim 1, wherein the one-way valve further includes a rubber seal.

10. The footwear of claim 1, wherein the boot shaft is a knee-high shaft, the boot shaft being configured to cover a leg of the user below a knee of the user.

11. The footwear of claim 1, wherein the boot is constructed of an elastomer, the boot being configured to flex.

12. The footwear of claim 1, wherein the manifold is constructed of an elastomer, the manifold being configured to flex as the boot flexes.

13. The footwear of claim 1, wherein the boot further includes at least one removable shield comprising a rubber cover selectively affixable to the first-vent, the second-vent, and the third-vent, the at least one removable shield being configured to prevent the passage of air and debris into the first-vent, the second-vent, and the third-vent.

14. The footwear of claim 1, wherein the footwear further includes a chest-wader permanently coupled to the footwear.

15. The footwear of claim 1, wherein the footwear further includes an immersion suit permanently coupled to the footwear.

16. The footwear of claim 1, wherein the footwear further includes at least one auxiliary-vent coupled to the manifold, the at least one auxiliary-vent being in fluid communication with the first-vent, the second-vent, and the third-vent.

17. A suction-preventing footwear, the footwear comprising:

- a boot configured to accept a foot of a wearer of the footwear including
 - a sole having a heel and a toe, and
 - an upper extending over the sole configured to cover the foot having a vamp, a boot shaft, and a cuff;
- a first-vent affixed to the boot shaft of the upper of the boot disposed adjacent to the cuff of the upper of the boot;
- a second-vent affixed to the vamp of the upper of the boot;
- a third-vent affixed to a rear of the boot shaft of the upper of the boot adjacent to the heel of the sole of the boot;
- a manifold joining the first-vent, the second-vent, and the third-vent in fluid communication with each other; and
- a one-way valve disposed within the manifold configured to allow air to pass from the first-vent to the second-vent and the third-vent;

wherein the manifold includes a conduit having a first-conduit coupled to the first-vent, a second-conduit coupled to the second-vent, a third-conduit coupled to the third-vent, and a junction joining the first-conduit, the second-conduit, and the third-conduit, the first-conduit, the second-conduit, and the third-conduit being in fluid communication with each other;

wherein the first-conduit, the second-conduit, and the third-conduit are tubular, the first-conduit, the second-conduit, and the third-conduit having a circular cross-section;

wherein the manifold is affixed to an exterior of the upper of the boot;

wherein the second-vent and the third-vent each comprise an ovate member having a screen configured to allow the passage of air into the ovate member and an interior volume configured to convey air from the screen to the manifold;

wherein the screen is constructed of nylon;

wherein the first-conduit extends vertically along the rear of the boot shaft of the upper of the boot;

wherein the one-way valve further includes a rubber seal;

wherein the boot shaft is a knee-high shaft, the boot shaft being configured to cover a leg of the user below a knee of the user;

wherein the boot is constructed of an elastomer, the boot being configured to flex; and

wherein the manifold is constructed of an elastomer, the manifold being configured to flex as the boot flexes.

18. A method of preventing negative pressure from forming under a boot, the method comprising the steps of:

providing a footwear comprising a boot configured to accept a foot of a user of the footwear including a sole having a heel and a toe, and an upper extending over the sole configured to cover the foot having a vamp, a boot shaft, and a cuff, a first-vent affixed to the boot shaft of the upper of the boot disposed adjacent to the cuff of the upper of the boot, a second-vent affixed to the vamp of the upper of the boot, a third-vent affixed to a rear of the boot shaft of the upper of the boot adjacent to the heel of the sole of the boot, a manifold joining the first-vent, the second-vent, and the third-vent in fluid communication with each other, and a one-way valve disposed within the manifold configured to allow air to pass from the first-vent to the second-vent and the third-vent;

affixing the footwear to the foot of the user;

stepping into a deformable material, said deformable material being mud;

raising the footwear from the deformable material;

opening the one-way valve in response to a pressure differential caused by suction below the footwear; and

allowing air to pass from the first-vent to the second-vent and the third-vent, thereby maintaining atmospheric pressure around the second-vent and the third-vent.

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