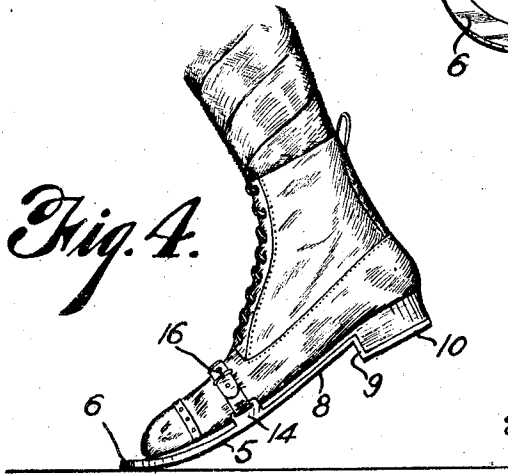
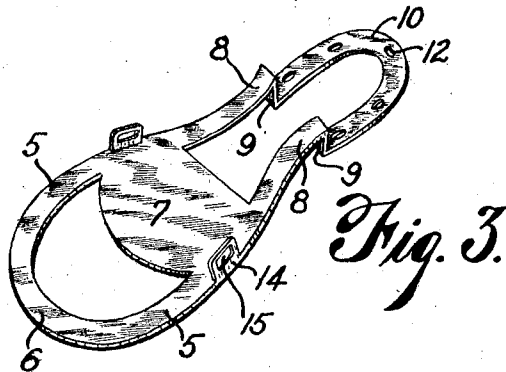
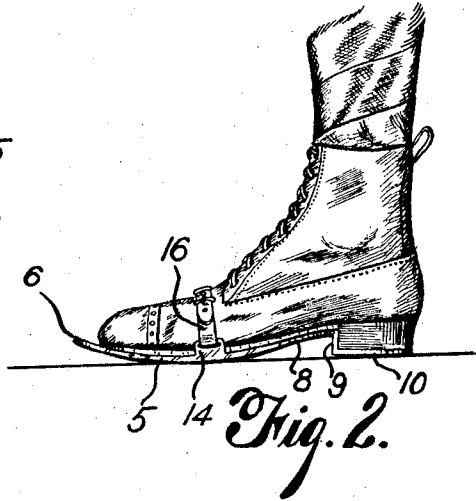
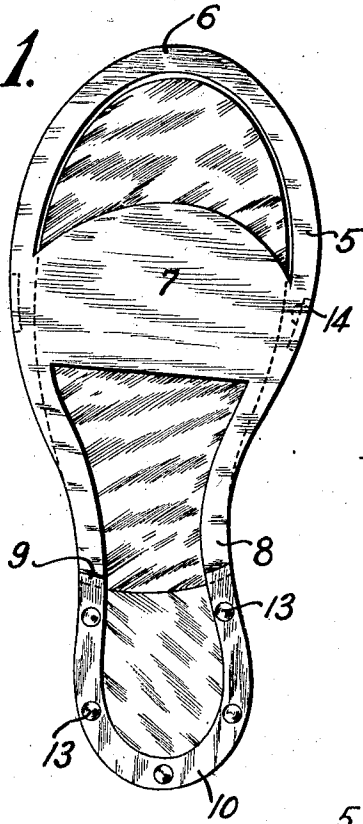


F. D. ANDERSON.  
SHOE ATTACHMENT TO FACILITATE WALKING.  
APPLICATION FILED JULY 17, 1918. RENEWED SEPT. 23, 1920.

1,360,995.

Patented Dec. 7, 1920.

*Fig. 1.*



Inventor  
Frederick D. Anderson  
By *A. J. [Signature]* Attorney

# UNITED STATES PATENT OFFICE.

FREDERICK D. ANDERSON, OF DENVER, COLORADO.

SHOE ATTACHMENT TO FACILITATE WALKING.

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Specification of Letters Patent.

Patented Dec. 7, 1920.

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*To all whom it may concern:*

Be it known that I, FREDERICK D. ANDERSON, citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Shoe Attachments to Facilitate Walking; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to attachments for shoes to facilitate walking, running and kindred forms of locomotion, and is particularly designed for soldiers and sportsmen.

The object is to obtain a more uniform movement of the leg over the foot with less bending of the knee, ankle and toes and the expense of less muscular energy, to obtain a longer and quicker step, and to obtain a wider tread for travel over soft, uneven or other unusual surfaces.

The device comprises briefly, a pair of side members or blades which extend rearwardly and are firmly connected with the heel of the shoe and which extend forwardly beyond the toe of the shoe where they unite. The portions of the blades adjacent the ball of the foot are connected by a web or plate which supports the ball of the shoe, while the entire structure forward of the heel is curved from the horizontal on a curve whose radius gradually shortens as the curve approaches the toe. The device is practically rigid, but may have a very slight degree of resilience to give a slight spring to the foot when in action in order to increase the efficiency of the foot. If it were not for thus aiding the foot a trifle in this respect the device from a mere mechanical standpoint could advantageously be perfectly rigid.

The particular advantages of the attachment are pointed out hereinafter, together with a discussion of the principles thereof. In the drawing:

Figure 1 shows a face view of the device applied to the bottom of a shoe.

Fig. 2 shows an edge view thereof.

Fig. 3 is a perspective of the device detached.

Fig. 4 indicates the rolling movement and shows the foot at the end of this movement and as it is about to leave the ground.

The attachment may be struck out of a sheet of metal as shown or it may be formed in any other desirable manner.

It is composed of a body portion and a heel portion, the body comprising side members or blades 5 which merge at the front in a toe portion 6, and a transversely arranged plate or web 7 connecting the blades adjacent the ball of the shoe and forming a support or bearing surface therefor. The blades 5 forward of the arch and the toe portion 6 lie beyond the edge of the shoe sole to provide a more extensive tread than that of the shoe sole itself. The rear portions 8 of the blades are curved inwardly under the arch forming a support therefor and then extend down in front of the heel as at 9 and connect with the rearwardly curved heel portion 10 which underlies the heel. The heel portion is provided with apertures 12 through which screws or rivets 13 are passed to secure the device to the shoe.

Upstanding ears 14 may be provided on the blades 5 at their outer edges, these ears having eyes 15 through which a strap 16 may be passed by means of which the forward portion of the device may be secured to the shoe, the strap passing over the vamp in front of the instep, as shown.

When the device is applied there is a narrow space between the inner edges of the blades 5 and toe portion 6, and the edges of the sole. This space, however, is wide enough so that pebbles will not be wedged and held between the sole and the attachment. Also this space together with that between the web 7 and toe portion 6 allows some freedom of movement of the toes as the weight of the body is shifted and avoids cramping of the toes.

The part of the device forward of the heel is curved, the degree of curvature being slight at the arch but gradually increasing toward the toe.

It will be seen therefore that a rolling motion is obtained when traveling, this motion being on a fulcrum which moves from the ball to the toe and being more pronounced on the greater curvature of the toe, with the result that a considerable portion of the flexing of the joints of the foot and leg is thereby eliminated.

Four very important advantages accruing from the use of this invention are set forth below.

1. The movement of the leg over the foot is an even, continuous, rolling motion, performed with greater ease than in ordinary walking.

In walking without the device foot motion before the foot leaves the ground is made up of two series of motions. First, the upward and forward motion of the heel, the shoe being bent at the ball of the foot, and, second, the upward and forward motion of the sole of the shoe. In normal walking without the device this second series starts later than the motion of the heel, and when it starts (which occurs midway of the swing of the leg over the foot) it starts more slowly than the heel is then traveling but gains in speed until it has caught up with the heel both in speed and relative position just as the foot leaves the ground. The bottom of the foot is at first a straight line (while flat on the ground), then curved (while the heel is being carried upward and forward), and straight again (as the foot leaves the ground). Thus, without the device, it is necessary to employ a quickened or spasmodic spring action at the latter part of the said movement, with consequent strain on the muscles of the leg and foot.

When using the device the foot is placed on the approximate segment of a circle, and motion on this circular surface starts as soon as the heel leaves the ground. The point of engagement with the ground or fulcrum moves forward rapidly as the heel goes up, but evenly and with a rolling motion similar to that of a wheel. As fast as the heel is raised the up-curved toe-portion of the device goes down and engages the ground. There is, therefore, no sudden or spasmodic spring of the foot whereby the point of contact is changed rapidly from the ball of the foot along the whole surface of the sole of the shoe to the end of the sole, with consequent muscular strain.

In normal walking without the device the employment of the above described series of motions, whereby the toes are bent and a spring or spasmodic motion is used, localizes the efforts and pressure and this is accentuated when walking uphill or in running. By means of the blades of the device, which engage the ground and are carried backward and attached to the heel, and by means of the plate or web between the blades of the device, the efforts in locomotion and the pressure are not so much localized but spread over the whole foot. This is of particular advantage in going up hill, against the wind, or while carrying a load. It also enables one to hold back with greater ease going down hill or before the wind. Another result of this spreading effect is to

afford a better support for the arch of the foot and the ankle.

2. The bending of knee, ankle, and toes is lessened, and muscular energy consequently saved.

In normal walking without the device the toes are considerably bent about midway of the upward and forward motion of the heel before the foot leaves the ground. The toes then straighten out as the spasmodic action or spring takes place, and the fulcrum shifts rather suddenly from the ball of the foot to the point of the toes. In order to perform this spring the knee is bent and brought forward more than would otherwise be necessary. As well as taxing the muscles of leg, ankle and foot, this excessive bending at each step tends to chafe the toes and the foot inside the shoe. In locomotion with the device the device forms a contact with the ground in the shape of the segment of a circle, and as the heel goes up the surface of the segment engages the ground at successive points. The whole foot is raised and carried forward by this operation, with very little bending at the toes. There is also less bending at the ankle and at the knee joint. This results in a saving of muscular effort. The toes do not become tired so soon as in normal walking and there is less chafing upon one another and against the inner part of the shoe. Going up hill or against the wind the advantage of this lessened bending is very noticeable. The walking on the toes often practised on steep slopes is dispensed with. After placing the foot flat on the slope of the ground the upward and forward rolling leverage movement is easily and readily performed. It is also not necessary to bend the body and knee forward to the extent required on steep slopes without the device. One very important result is that hard breathing and loss of "wind" are greatly cut down in hill climbing. In running with the device it is not necessary and indeed not desirable or possible to run on the toes. Advantages similar to those in walking are had. The aforesaid lessened bending is not obtained at the price of stiffness or confined positions. The toes are free and comfortable at all times.

3. The shoe is lengthened without the extra length engaging the ground until it is usable to the best advantage, resulting in a longer and quicker step.

In normal locomotion without the device the farther the sole of the shoe extends in front of the toes up to certain limits the longer and faster the step. A longer sole makes a longer lever arm, but at the same time there is a greater strain in performing the spring action in which the fulcrum jumps to the front of the foot. The upward curve of the device, which extends beyond

the point of the shoe, increases the length of the shoe, but the increased length does not engage the ground until the foot is about ready to leave the ground and in a position to use the increased length to the best advantage. The fulcrum then is extended beyond what it would be without the device. The result of the foregoing is a lengthened step, and a quickened step, with less strain and expenditure of energy than in the case of a lengthened shoe without the device. The weight and strain is distributed over the foot by the device instead of being localized as would be the case in an extremely long shoe without the device.

4. The shoe is widened and therefore negotiates soft and unusual surface conditions with great advantage.

The tendency of the foot is to be impeded and to sink while walking over sand, soft ground, mud or snow, as is well known. The device gives much the effect of a broad-tired wheel and the foot does not sink so easily. Ability to negotiate rough and uneven ground is also increased by the broader surface. It is clear that this broader contact gives lateral stability to the foot and body. The advantages derived from the rolling motion, lessened bending of toes, etc., and greater length of contact are great enough to outweigh strongly any tendency of the foot to be retarded upon very smooth and hard surfaces by the increased width.

I claim:

1. The combination with a shoe having a flexible sole, of an attachment therefor, said attachment comprising an approximately rigid body portion rigidly connected with the shoe, said portion having an upper face constituting a bearing surface on which the sole rests, and an under face constituting a tread, said body portion being curved continuously, and the space below the toe of the shoe being open, the opening extending beyond the edges of the sole for flexure of the toe thereof.

2. The combination with a shoe, of an attachment therefor, said attachment being approximately rigid, comprising a body portion and a heel portion connected by an arch section, the heel portion being rigidly and permanently secured to the heel of the

shoe, the body portion having an upper face on which the sole of the shoe rests, and an under face which constitutes a tread, said body portion being continuously curved and also being free of attachment to the sole.

3. The combination with a shoe of an attachment therefor, said attachment being approximately rigid and comprising a body portion and a heel portion connected by an arch section, the heel portion being rigidly secured to the heel of the shoe, the body portion having an upper face on which the sole of the shoe rests and an under face which constitutes a tread, said body portion being curved continuously, on a gradually increasing curve and being free of attachment to the sole.

4. The combination with a shoe of an attachment therefor, said attachment comprising an approximately rigid body portion rigidly connected with the shoe, said portion having an upper face constituting a bearing surface on which the sole rests, and an under face constituting a tread, said body portion being curved continuously and also being free of attachment to the sole.

5. The combination with a shoe of an attachment therefor comprising an approximately rigid body portion rigidly connected with the shoe and having spaced side members adjacent the edges of the sole of the shoe and a web connecting said side members below the ball of the shoe the space below the toe of the shoe being open, the opening extending beyond the edges of the sole for flexure of the toe therethrough, the ball of the shoe resting upon the upper face of said web, the lower face of the web constituting a tread, said body portion being curved continuously.

6. The combination with a shoe having a flexible sole of an attachment therefor comprising a body portion connected to the shoe having side members which lie beyond the edges of the sole and are spaced from said edges to form an opening for flexure of the sole therethrough, a plate connecting portions of said side members and supporting the ball of the shoe, said plate and side members constituting a tread.

In testimony whereof I affix my signature.

FREDERICK D. ANDERSON.