

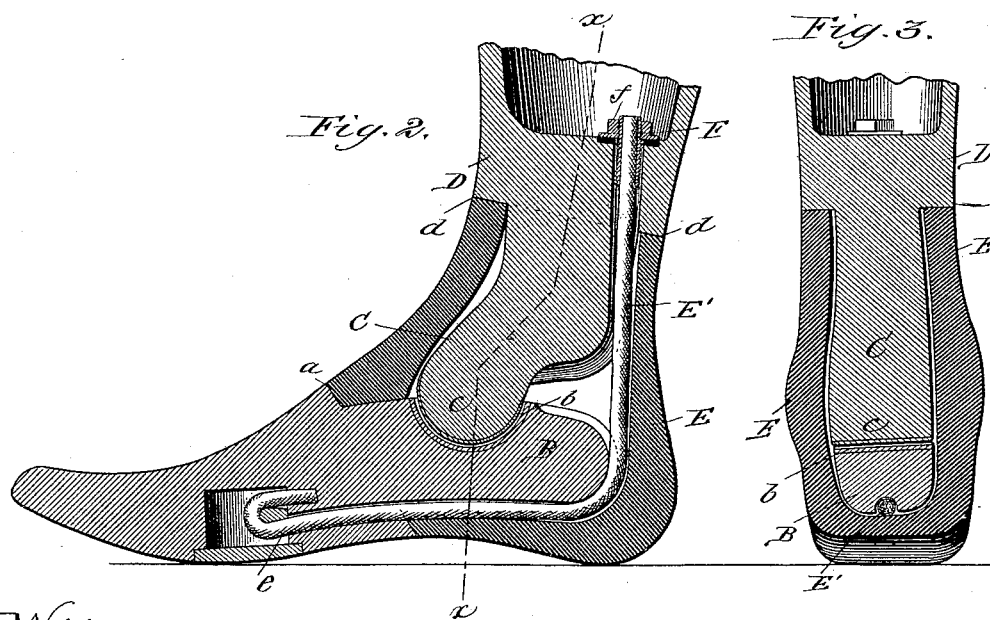
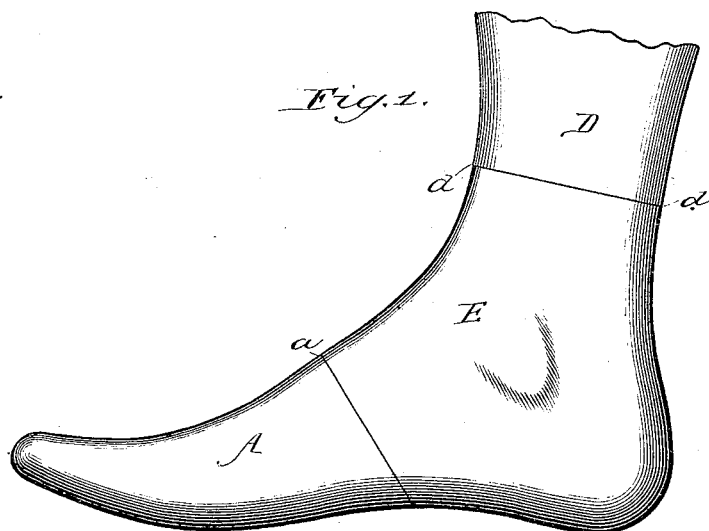
(No Model.)

D. W. BARTLETT.

ARTIFICIAL LEG.

No. 344,154.

Patented June 22, 1886.



Witnesses.
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UNITED STATES PATENT OFFICE.

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ARTIFICIAL LEG.

SPECIFICATION forming part of Letters Patent No. 344,154, dated June 22, 1886.

Application filed February 2, 1886. Serial No. 190,659. (No model.)

To all whom it may concern:

Be it known that I, DANIEL W. BARTLETT, a citizen of the United States, residing in Kansas City, county of Jackson, and State of Missouri, have invented certain new and useful Improvements in Artificial Limbs, of which the following is a specification.

This invention relates to improvements in artificial limbs in which mechanical means are employed for simulating the action of a natural toe and ankle joint. Prior to my invention these joints have been so constructed as to leave open or working joints between the members, or, if covered by a wooden or metallic shield, the moving parts of such covering would bite or pinch the stocking or shoe of the wearer between them, and this was particularly the case with such devices as provided for a lateral movement between the foot and leg portions thereof.

The prime object of this invention is to combine with an artificial limb a rubber covering or cushion, so arranged as to cover or conceal the joints between the members thereof, and at the same time permit, while it assists in, the action of the joint. Another object is to produce an artificial limb having joints or connections between its members, the action of which shall so closely simulate that of the natural joint as to permit a movement between the foot and leg portions in any direction. Further objects are to provide a covering for the joint in such a limb that shall have the external appearance and contour of that part of the natural limb whose place it supplies, and which, while serving as a cushion, shall connect and maintain the said members in their normal position, and to have a ball-and-socket joint between the foot and leg portions, which shall be covered, and the said members connected and maintained in their normal position, by the said cushion. Other objects are to produce such a joint between the foot and leg—i. e., an ankle-joint—that the toe-joint may be dispensed with without materially diminishing the naturalness of the action of the foot movement, and to produce a joint in which the members, while maintained in a normal position, are capable of a movement in any direction from that position, but which shall be limited in its movement in every di-

rection it may have. Finally, to provide certain details of construction, hereinafter more fully described and illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation embodying my invention; Fig. 2, a central vertical section thereof, and Fig. 3 a transverse vertical section on line *xx*, Fig. 1, looking in the direction indicated by the arrows.

Referring by letter to the accompanying drawings, A indicates the foot portion of my device, preferably composed of wood, and having the contour of a foot from the instep out. Back of the instep, and extending rearwardly toward the heel from a shoulder, *a*, is an extension, B, preferably formed integral with the part A, and constituting the socket of the ball-and-socket joint, having formed in the upper part thereof, and near the rear end, a depression or socket, *b*, into which seats and works the ball end *c* of an extension, C, projecting downwardly from the leg portion D, and made smaller than the said leg portion, in order to form a shoulder, *d*, above the ankle-joint, between which and the shoulder *a* is confined a rubber covering, E, constituting a cushion, for the purpose hereinafter described, cemented or otherwise rigidly secured at either end thereof to the faces of the shoulders *a* and *d*. This rubber covering or cushion lies flush with the surface of the foot and leg, and is designed to have as near as possible the exact external appearance and contour of the heel and that portion of the ankle and foot between the shoulders *a* and *d*.

The leg portion D, as usual in artificial limbs of this character, is hollowed out, as clearly illustrated in Fig. 2; but this hollowed portion does not extend quite down to the shoulder *d*, in order that sufficient body and strength may be left in the lower portion of the leg for the attachment of a cord, E', connecting the leg with the foot. This cord is preferably rigidly secured at one end to the foot portion in a suitable recess, *e*, provided in the ball of the foot, and extends rearwardly along the bottom of the extension B, about the center of the width thereof, and upwardly behind or to the rear of extension C, lying countersunk in suitable grooves provided on the under and rear face of said extensions.

The upper end of this cord passes through the solid portion of the leg D, projecting into the hollow thereof, and has provided on this end a screw-threaded tip, F, for reception of a nut, 5 f, between which and the leg may be placed a rubber cushion or spring, in order to give a slight elasticity to the said cord E', which preferably has no elasticity whatever, but which may, if desired, be formed of sufficiently 10 elastic material to give or stretch when required. As usual in artificial limbs, this cord is only employed for the purpose of limiting the forward movement of the leg and supporting the joint or connection between the 15 members, and more particularly in climbing stairs or like exercise, in which case the entire weight of the wearer is apt to be thrown upon the toe and too severely strain the joint; but it is obvious that this cord may be dispensed with, if desired, and the rubber cushion made sufficiently stiff to withstand all strains.

It will be seen, by reference to the drawings, that there is no rigid connection between the 25 foot and leg portions of my device in any direction, nor is the movement of the parts confined to any particular line of action, for the rubber covering or cushion which is cemented or otherwise rigidly secured at both ends, respectively, to the said members, permits the 30 free action of the ball-and-socket joint between the members in any direction, although it is found preferable, as will be seen by reference to Fig. 3, to form the working-surfaces 35 of the ball and socket flat or plane, in order to relieve the wearer of a constant strain to prevent a lateral movement of the leg with relation to the foot or a twisting of the foot portion out of line; but even should this occur, the action of the rubber cushion would 40 cause the foot to regain its normal position immediately upon being relieved.

To reduce friction between the parts, the working or articulating surfaces of the ball 45 and socket may be provided with a covering or facing of a substance other than that of which the leg is composed—for instance, one surface be provided with a brass facing and the other with rawhide, and this latter combination is of especial benefit in avoiding the 50 necessity for constant oiling of the joints and the disagreeable squeaking noise common to artificial limbs as heretofore constructed.

In practice the rubber covering E not only 55 acts as a cushion, but also serves to maintain in and return the parts to their normal position with relation to each other when not under pressure.

In stepping forward the first result is to 60 compress the rubber at the back or heel portion and stretch or bend the top or instep portion, in order that the foot may rest flat or in a horizontal position upon the ground, with the leg inclining to the rear, but as the leg 65 swings to and a little beyond or forward of a vertical position in the act of walking the action of the rubber cushion will be exactly the

reverse—that is to say, the instep portion will be compressed and the back or heel portion stretched or bent; hence it will be observed that the degree of expansion and compression or the elasticity of the cushion is the 70 only means employed for limiting the movement of the parts other than the cord heretofore described.

By reference to Fig. 3 it will be observed 75 that the cushion is a little thicker at either side of the foot, in order to stiffen the joint against a lateral movement, which end is furthered by flattening the articulating surfaces 80 of the ball and socket, as before described, for very slight lateral movement is needed between the parts; but, however slight, the movement should be provided for to permit the foot to accommodate itself to the unevenness 85 of the surface of the ground, and thus avoid unnecessary twisting of the leg.

By the employment of my device not only is the toe-joint dispensed with, but any open joint between the foot and leg portion which 90 would tend to bite and tear the shoe and stocking of the wearer is entirely avoided, and the foot made to fit and wear upon the shoe in exactly the same manner as the natural foot.

In conclusion, I may add that the covering 95 or cushion before referred to may be composed of rubber or any other suitable elastic material, and the ball and socket may be reversed—that is to say, the socket may be formed on the leg portion and the ball on the 100 foot portion.

I am aware that prior to my invention ankle-joints have been made in artificial limbs permitting a lateral movement thereof, and I 105 therefore do not claim, broadly, this feature of my invention, nor do I limit myself to the employment of my elastic cushion in connection with the joint herein shown and described, for it is obvious that this cushion or covering may be employed in connection with any form 110 of joint, whether providing for a lateral movement or not; hence I consider this feature of my invention as broadly new.

Having described my invention, what I claim, and desire to secure by Letters Patent, 115 is—

1. In an artificial limb, the leg portion, the smaller extension thereof below the ankle, in combination with the foot portion, the smaller extension thereof back of the instep, a ball-and-socket joint between said extensions, and the 120 elastic cushion covering said joint and connecting said foot and leg portions between the ankle and instep, and having the contour of that portion of the limb whose place it supplies, substantially as described.

2. In an artificial limb, the foot and leg portions, the smaller extensions thereof, and the shoulders formed by said extensions, in combination with a cushion secured to the faces of 130 said shoulders and lying flush with the said leg and foot portions beyond the extensions thereof, substantially as described.

3. In an artificial limb, the foot and leg por-

tions, the smaller extensions thereof, the ball-
and-socket joint between said extensions and
the shoulders formed by said extensions, in
combination with an elastic cushion secured
5 to the faces of said shoulders and lying flush
with the said leg and foot portions beyond the
extensions thereof, and a cord secured re-

spectively at either end thereof to the foot and
leg portions, substantially as described.

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