Nov. 12, 1935. R. E. LOFTS 2,020,423

ARTIFICIAL LIMB

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Fig. 2.

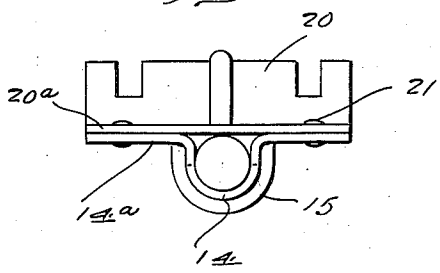


Fig. 1.

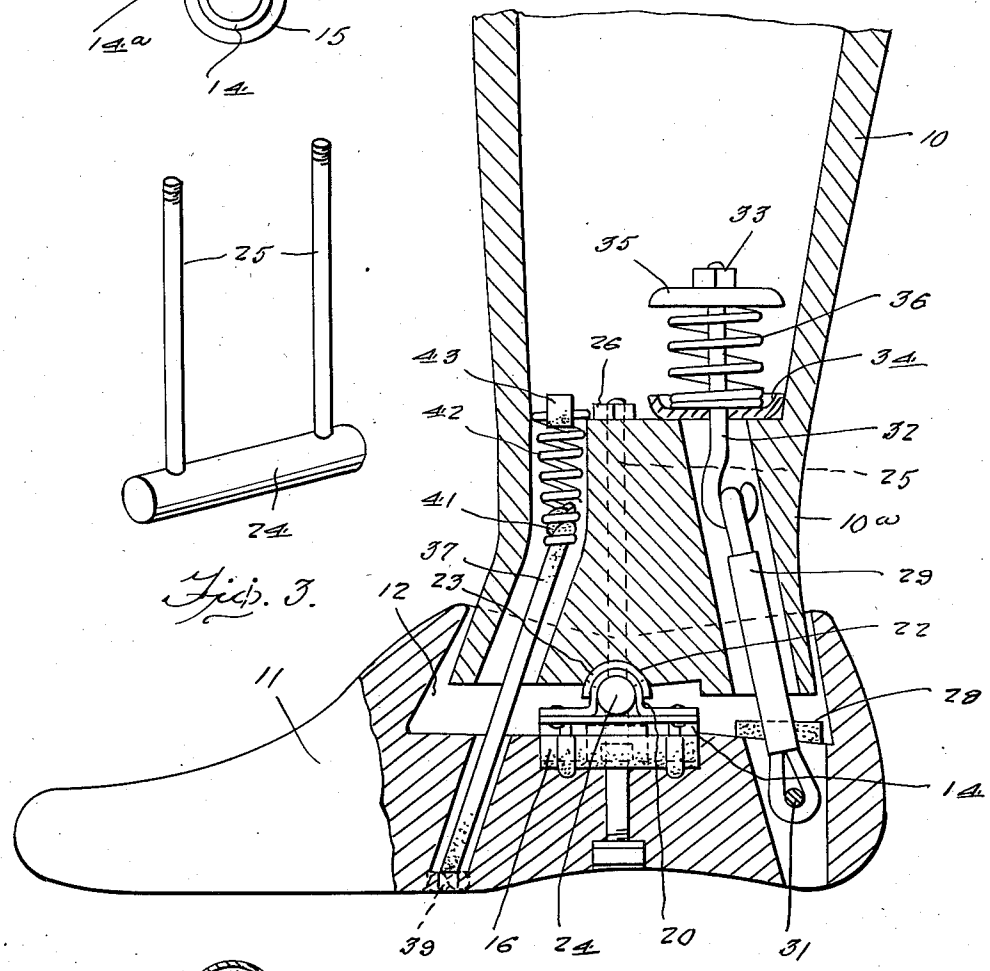


Fig. 3.

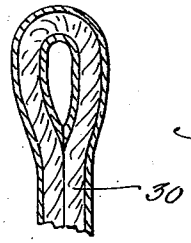


Fig. 4.

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Fig. 5.

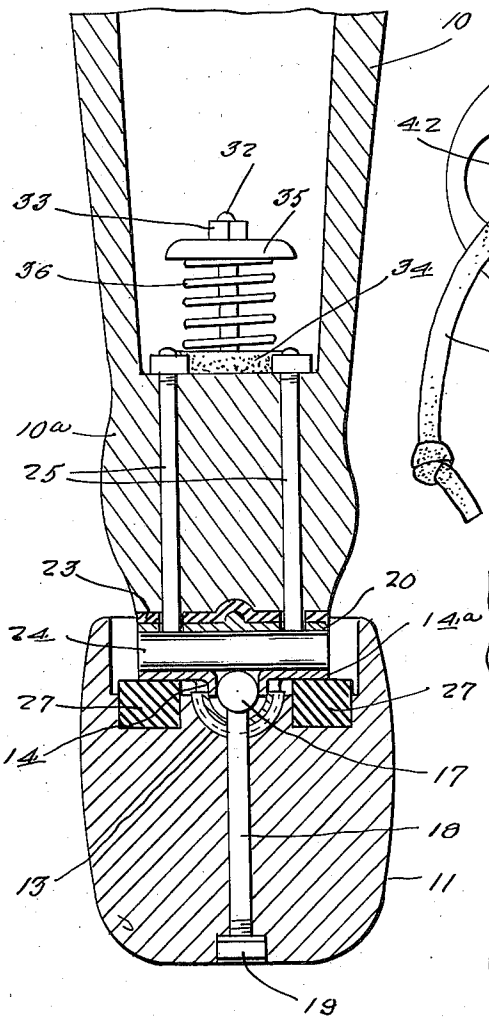


Fig. 6.

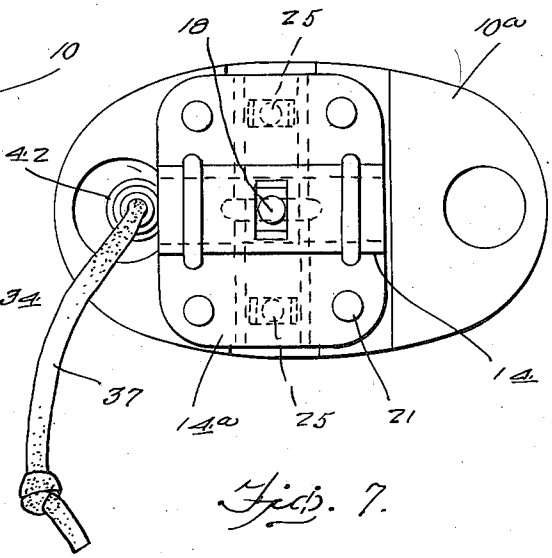
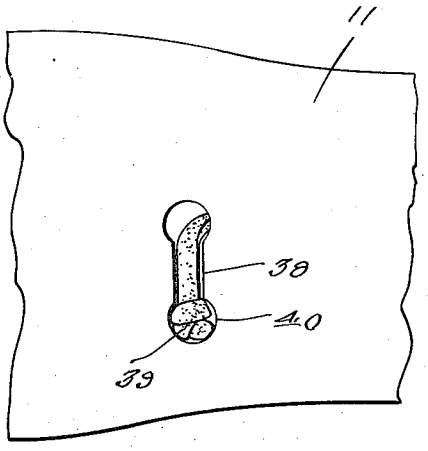


Fig. 7.



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UNITED STATES PATENT OFFICE

2,020,423

ARTIFICIAL LIMB

Ralph Emerson Lofts, Pineville, Mo.

Application August 15, 1934, Serial No. 739,976

1 Claim. (Cl. 3—6)

This invention relates to artificial limbs and an object of the invention is to provide an artificial limb which will have an ankle action corresponding to the action of the human limb.

More specifically, an object of the invention is to provide an improved ankle joint between the foot member and leg member of the limb.

The invention, together with its objects and advantages, will be best understood from a study of the following description taken in connection with the accompanying drawings, wherein:

Figure 1 is a view substantially in vertical section of the foot and leg members of the artificial limb embodying the features of the present invention.

Figure 2 is an elevational view of a pair of complemental cylinders forming part of the ankle joint.

Figure 3 is a perspective view of a bolt forming part of said joint.

Figure 4 is a fragmentary detail sectional view of the Achilles' tendon of the leg.

Figure 5 is a view substantially in vertical section through the ankle joint and taken at right angles to Figure 1.

Figure 6 is a bottom plan view of the leg.

Figure 7 is a fragmentary bottom plan view of the foot at the ankle.

Referring to the drawings by reference numerals, it will be seen that 10 indicates the main portion or leg part of the improved artificial leg which is of wood and made hollow while the reference numeral 11 indicates the unitary or one piece foot portion of the artificial limb.

In accordance with the present invention, the foot 11 at the ankle thereof is provided with a socket 12 that receives the ankle section 10*a* of the leg 10. In the bottom of the socket 12 there is provided a longitudinal recess 13 in which is located a semi-cylindrical sleeve 14 provided with ribs 15 that are embedded in the wood or material of the leg. The recess 13 receiving the sleeve 14 is lined with felt or other suitable material 16.

Arranged in the sleeve 14 is an ankle bolt 17, and connected therewith, in any suitable common manner, preferably by being integral with the bolt 17, is an anchoring bolt or shank member 18 that extends downwardly through a suitable opening provided in the foot 11 and at the lower end the member 18 is provided with a nut 19 as shown.

A second sleeve 20, similar to the sleeve or cylinder 14, extends transversely of the cylinder 14 and the cylinders 14 and 20, at the open sides thereof, are provided with flanges 14*a* and 20*a* respectively secured together by rivets or other suitable means 21.

The cylinder 20 is accommodated in a recess 22 provided in the ankle portion 10*a* of the leg 10, which recess is also alined with felt or other suitable material 23.

Journaled in the cylinder 20 is a second ankle bolt 24 that is provided with a pair of anchoring shanks or bolts 25 that extend upwardly through the ankle portion 10*a* of the leg 10 and are provided at their upper ends with nuts 26.

From the above it will be apparent that the joint between the foot 11 and the leg 10 at the ankle is such as to permit lateral displacement of the ankle joint as well as the usual displacement produced by the act of stepping and the motion of the body.

Suitably arranged in recesses at opposite sides of the cylinder 14 are the blocks 27, while at the heel of the foot there are suitably secured in the socket 12 thereof the blocks 28, the blocks 27 and 28 being of rubber and forming a cushion between the ankle section 10*a* and the foot. The flanges 14*a* bear on the blocks 27 and the blocks cushion the bearing housing made up of the sleeves 14*a* and 20. There is one block 28 on each side of the Achilles tendon to be described presently.

The Achilles' tendon of the leg is indicated by the reference numeral 29, and the same consists of a suitable strand 30 of any suitable limber or limp material looped and having opposite portions thereof intermediate the ends of the loop covered by a sheathing or sleeve of limp or limber material like leather as suggested in Figure 3. The member 29 extends through registering openings in the ankle portion 10*a* of the leg 10 and the heel portion of the foot 11, and at its lower end is anchored within the aperture of the foot 11 by a suitable cross rod 31. At its upper end, the member 29 is engaged by a hook 32 the shank of which, on its free end, is provided with a nut 33. Disposed on the shank of the hook 32 is a washer 34 of leather or other suitable material that rests on the wood portion of the ankle 10*a* internally of the leg 10, and interposed between the washer 34 and a metallic washer 35 is a spring 36. The spring serves to draw the rear or heel part of the foot up against the lower end of the ankle section 10*a* of the leg.

The forward tendon is indicated by the reference numeral 37 and consists of a suitable length of buckskin or other suitable limber or limp material which extends through registering openings in the ankle section or part 10*a* of the leg

10 and the foot 11 as shown in Figure 6. At its lower end the tendon strip 37 is accommodated in a groove 38 provided in the sole of the foot slightly forwardly of the arch, and at said end said strip is knotted as at 39 and the knot 39 is received in a circular socket 40 spaced transversely from the opening in the foot 11 and connected with the opening through the slot 38 as shown in Figure 7.

At its upper end, the forward tendon strip 37 is also knotted as at 41 and the knot 41 is engaged with the endmost coil of a tapered or conical coil spring 42. Extending transversely through the upper end of the spring 42 between the uppermost coils of the spring is a short leather piece 43 that is caused by the largest upper end of the spring to wedge against the walls of the opening in the ankle part 10a of the foot in a manner to secure the upper end of the spring within said opening and as also clearly shown in Figure 1. It will be apparent that while the tendons 29 and 37 connect the ankle section of the leg to the foot of the limb, they do not interfere with the foot rocking either in the direction of its length or transverse of its length, thus permitting the artificial limb at the ankle, as before stated, to function in a manner similar to the human limb at the ankle thereof.

What is claimed is:

An ankle joint for artificial limbs wherein the latter consists of separate leg and foot members connected together by front and rear pliable tendons fixed at their lower ends to the foot member and at their upper ends yieldingly coupled to the leg member comprising a cruciform bearing housing between the tendons and consisting of a pair of slotted bearing sleeves adapted to have the opposed sides of the sleeves seated in lined cavities respectively in the foot and leg members, said sleeves formed with lateral flanges on the confronting sides secured together in abutting relation to provide a relatively large support for the bearing housing, a pair of rocker bolts mounted in the bearing sleeves one superimposed at right angles to the other transversely of the leg member, said rocker bolts being of the same length and co-extensive with the bearing sleeves, a pair of co-planer anchor bolts rising from the upper rocker bolt one adjacent each end thereof extending through the slots in the upper sleeve and secured at their upper ends in the leg member, a single anchor bolt depending from the intermediate portion of the lower rocker bolt extending through the slot in the other bearing sleeve in a position between said pair of anchor bolts, said single anchor bolt lying in a plane co-incident with the axis of the superimposed rocker bolt and secured at its lower end in the bottom of the foot member, and a pair of opposed resilient cushion blocks at each side under the bearing housing engaging the flanges which blocks are adapted to be seated in the foot member.

RALPH EMERSON LOFTS.