May 8, 1951 H. C. CAMPBELL 2,551,724

ARTIFICIAL FOOT AND ANKLE JOINT

Filed March 16, 1950

Fig. 1

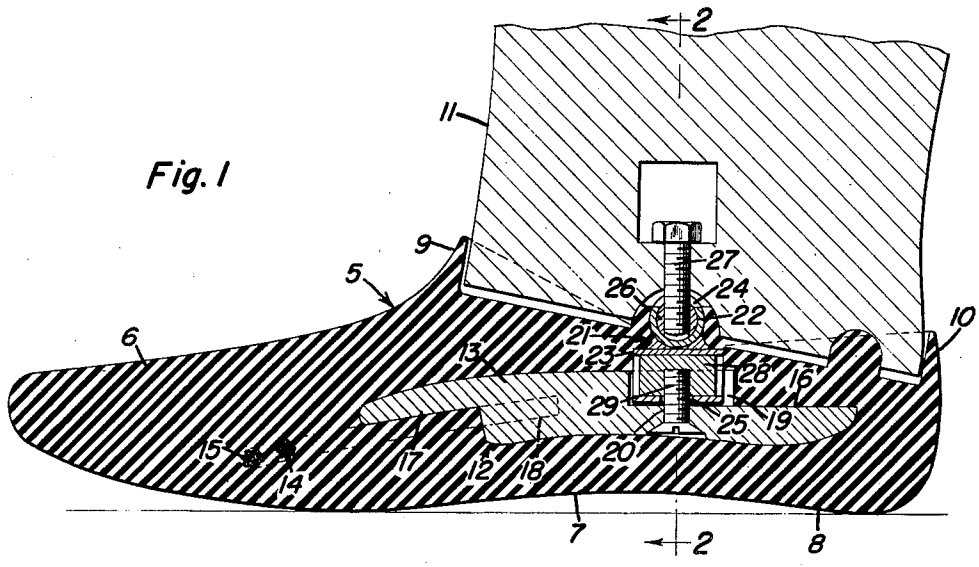


Fig. 2

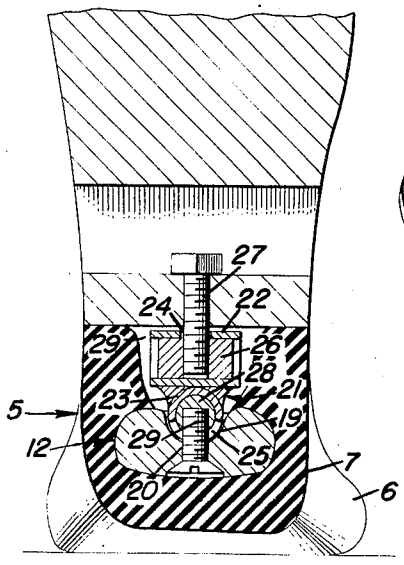
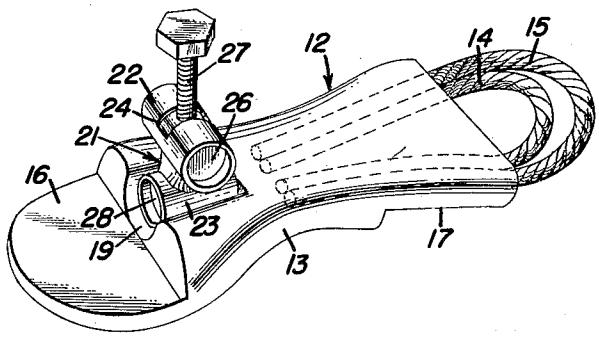


Fig. 3



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ARTIFICIAL FOOT AND ANKLE JOINT

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5 Claims. (Cl. 3—7)

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This invention relates to artificial limbs, and has particular reference to an improved resilient artificial foot and an ankle joint therefor.

An object of the invention is to provide a resilient foot member having a novel reinforcing and anchoring element embedded therein, and a particular type of ankle joint associated with and connected to said element in such a way as to provide a durable and efficient assembly in which the foot is allowed to move in substantially the same manner as is permitted by the natural ankle joint.

Another object is to provide a reinforcing and anchoring element which includes a rigid part adapted to properly stiffen the rear part of the foot member and provide for effective connection to the ankle joint, and a flexible forwardly projecting part which allows free bending of the forepart of the foot member and aids in firmly anchoring said element in said foot member.

The exact nature of the invention will be apparent from the following description when considered with the accompanying drawing, in which:

Figure 1 is a vertical longitudinal section taken through an artificial foot and ankle joint embodying the present invention and through the adjacent lower leg portion to which the foot is joined;

Figure 2 is a transverse vertical section taken on the line 2—2 of Figure 1;

Figure 3 is a perspective view of the ankle joint and the reinforcing and anchoring element.

Referring in detail to the drawing, 5 indicates a resilient artificial foot member, preferably made of rubber and having a toe portion 6, an intermediate portion 7, and a heel portion 8, as well as having flanges 9 and 10 at the top of portions 7 and 8 to overlap the lower end of the lower leg portion 11 to which the foot is joined.

Substantially completely embedded in and disposed longitudinally of the foot member is an elongated reinforcing and anchoring element 12 composed of an elongated plate-like casting 13, and nested flexible resilient loops 14 and 15 projecting forwardly from said casting. The casting 13 is located in the intermediate and heel portions 7 and 8, and the loops 14 and 15 extend forwardly into the rear part of the toe portion 6 so as to reinforce but not materially oppose flexing of the latter. The casting is reduced in thickness at the top of the rear or heel portion thereof as at 16 and at the bottom of the front portion of the same as at 17. The ends of the loops 14 and 15 are anchored in the thicker intermediate portion of the casing as indicated at 18, and said loops extend forwardly beneath and beyond the reduced front portion of said casting. The rear part of the thicker intermediate portion of the casting has a central longitudinal channel or recess 19 in the top thereof, and is provided with a vertical opening 20 which centrally intersects said channel or recess.

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An ankle joint 21 is provided between the artificial foot and the leg portion 11, and such joint includes two tubes 22 and 23 disposed one upon the other in crossed right angular relation and rigidly connected together, the upper tube 22 having a circumferential slot 24 at the top, and the tube 23 having a similar slot 25 at the bottom. Journaled in the tube 22 is a shaft 26, and a bolt 27 passes through the leg portion 11 and the slot 24 and is screwed into the shaft 26 to secure the joint to said leg portion. A second shaft 28 is journaled in the tube 23, and a second bolt 29 is passed through the opening 20 of casting 13 and the slot 25 of tube 23, and is screwed into the shaft 28 to secure the joint to the foot. The tube 22 is disposed above the casting 13 and within a recess 29 provided in the top of foot member 5 so that the tube 22 can swing laterally and permit turning of tube 23 on shaft 28. It will also be apparent that shaft 26 can turn in tube 22. Accordingly, the joint permits lateral and forward and backward relative pivotal movement between the leg portion and the foot substantially as allowed by the natural ankle joint. In practice, the element 12 is embedded in the foot member 5 when the latter is molded.

Having described the invention, what is claimed as new is:

1. In combination, a resilient artificial foot member, an elongated reinforcing and anchoring element embedded in and disposed longitudinally of said foot member, said element including an elongated plate-like member having a longitudinal recess in the top thereof, a tube disposed in said recess and having a circumferential slot at the bottom, a shaft arranged in said tube, a bolt extending through said plate-like member and said slot and screwed into said shaft, said tube being journaled on said shaft, a second tube fixed upon and disposed transversely of the first-named tube and having a circumferential slot at the top, a second shaft journaled in said second tube, and a bolt adapted to attach the second shaft to a lower leg portion passing through the slot of the second tube and screwed into the second shaft.

2. The construction defined in claim 1, and

nested flexible resilient loops attached to and projecting forwardly from said plate-like member.

3. The construction defined in claim 1, and nested flexible resilient loops attached to and projecting forwardly from said plate-like member, said plate-like member being reduced in thickness at the bottom of its forward portion, said loops having ends anchored in said plate-like member rearwardly of said forward portion and being extended forwardly beneath and beyond said forward portion.

4. The construction defined in claim 1, wherein the rear portion of said plate-like member is reduced in thickness at the top and rearwardly from the rear end of said longitudinal recess.

5. In combination, a resilient artificial foot member, an elongated reinforcing and anchoring element embedded in and disposed longitudinally of said foot member, said element including an

elongated plate-like member having a longitudinal recess in the top thereof, a tube disposed in said recess and having a circumferential slot at the bottom, a shaft arranged in said tube, a bolt extending through said plate-like member and said slot and screwed into said shaft, said tube being journaled on said shaft, a second tube fixed upon and disposed transversely of the first-named tube and having a circumferential slot at the top, a second shaft journaled in said second tube, and a bolt adapted to attach the second shaft to a lower leg portion passing through the slot of the second tube and screwed into the second shaft, said second tube being disposed above said plate-like member, said foot member having a top recess in which said second tube is laterally movable.

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No references cited.