R. TRAUTMAN.

ARTIFICIAL LIMB.

APPLICATION FILED APR. 25, 1921.

1,412,149. Patented Apr. 11, 1922.

FIG. 1

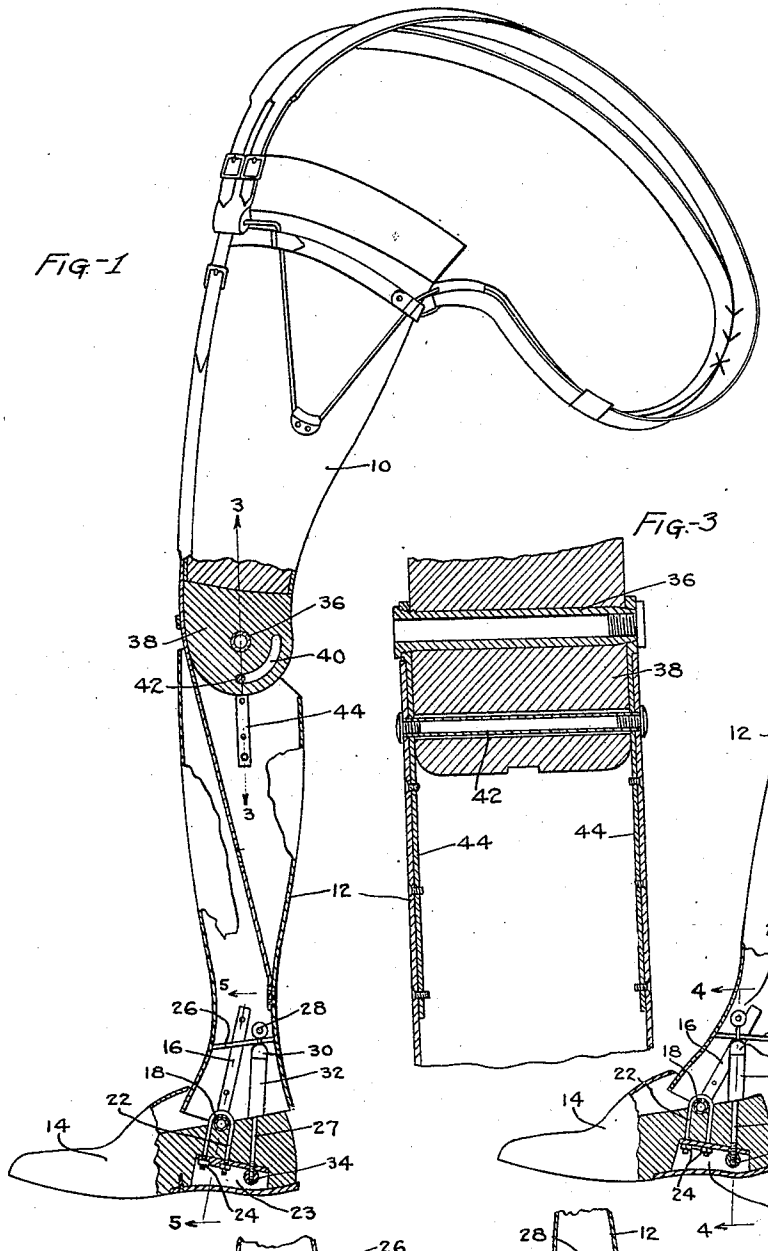


FIG. 3

FIG. 2.

FIG. 5.

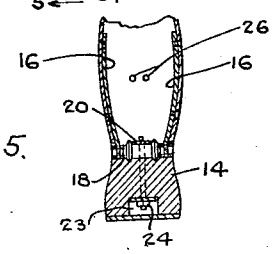
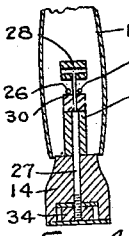


FIG. 4



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ARTIFICIAL LIMB.

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To all whom it may concern:

Be it known that I, RAY TRAUTMAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Artificial Limbs, of which the following is a specification.

My invention relates to artificial limbs. More particularly, the invention relates to features of construction associated with the connection of a foot member with a shank member for use in cases of both amputation below and above the knee. An object of my invention is to provide artificial members which will function in a manner similar to the corresponding human members. Another object is to provide for an ankle action by means embodied in a simple, strong, durable and efficient construction which is not liable to get out of order.

The full objects and advantages of my invention will be obvious from the foregoing desription, and the novel features embodied in my inventive idea will be particularly pointed out.

In the accompanying drawings which illustrate an application of my invention, Fig. 1 is a side view partly in section showing my improved features in connection with an artificial limb. Fig. 2 is a part sectional view showing the ankle joint operated into a different position from that shown in Fig. 1. Fig. 3 is a view in section on the line 3—3 of Fig. 1. Fig. 4 is a view in section on the line 4—4 of Fig. 2. Fig. 5 is a view in section on the line 5—5 of Fig. 1.

The drawings illustrate an artificial limb comprising a thigh member 10, a shank member 12, and a foot member 14. The shank member consists of a hollow shell preferably of fiber and the foot member 14 which is preferably solid, is connected thereto so as to have a rocking movement in the following manner. A metal strip 16 is secured inside of the shank member at its lower portion at each side thereof by rivets and a cylindrical member 18 is secured to the lower ends of the two strips. A U-bolt has a flat intermediate portion 20 which rests upon the cylindrical member 18 as a bearing and the two arms 22 of this bolt extend through the foot member into a recess 23 in the lower portion thereof where the ends of the arms of the U-bolt are provided with nuts 24. Above the ankle joint thus formed are a pair of parallel rods 26 slightly spaced from each other and secured to the front and back of the shank member. A heel bolt 27 has a flattened upper portion which extends between the rods 26, and this bolt is provided with a head 28 which rests slidably upon the upper surfaces of the rods. Mounted upon the bolt so as to slidably engage the lower surfaces of the rods is a block 30 which is preferably of fiber, and mounted on the bolt so as to be interposed between this bolt and the upper surface of the foot member is a resilient bumper 32 preferably of rubber. The heel bolt extends down into the recess 23 where it is provided with an adjustable thumb-nut 34. In the embodiment illustrated which is for use in cases of amputation above the knee, the thigh member 10 is attached to the shank member by a knee-bolt 36 which passes through a knee-block 38, the knee-bolt being secured at each side to the top of the shank member. The knee-block is provided with an arcuate slot 40 concentric with the knee-bolt and formed so as to extend for approximately the lower rear quadrant of the knee block. A stop bolt 42 extends through the slot 40 and is secured to the shank member preferably passing through knee-joint straps 44 which are provided for attachment of knee bolt 36.

The operation and advantages of my construction will be obvious from the foregoing description. The sliding heel bolt in connection with the ankle joint provides a construction by means of which the customary heel and toe cord are both eliminated with the result that there are fewer parts to get out of order and a stronger construction is produced. When the wearer steps on the heel, the upper portion of the sliding heel-bolt is forced toward the front of the shank member into the position shown in Fig. 2, this sliding movement being controlled by the parallel rods 26 and at the same time the resilient bumper is compressed. When the weight is removed from the heel, the bumper expands and forces the heel downward and the toe upward to their natural positions, as shown in Fig. 1. When the wearer steps on the toe portion, movement of the foot member is restrained by the rigid heel bolt in place of being restrained by means of the customary heel cord previously used. There is no liability of the heel-bolt becoming bent or twisted during walking because it slides back and forth, thus doing away with twisting or pulling action on this bolt at an angle.

Adjustment of the ankle motion can be readily made by loosening or tightening the thumb nut 34, and by lengthening the heel bolt more ankle motion is permitted, and by shortening the heel bolt there is less ankle motion. On account of the stop bolt 44 fitting slidably in the slot 40 an effective knee motion is provided which permits the shank member to bend backwardly with relation to the thigh member. When the shank member is straightened out the bolt 42 slides in the slot toward the front of the knee member, and when this bolt reaches the front end of the slot forward movement of the shank member is positively stopped so that proper alinement is obtained. This construction is practically noiseless and is of little weight with no parts liable to stretch or get out of order.

I claim:

1. An artificial limb comprising a shank member and a foot member pivoted together to form an ankle joint, a heel-bolt extending through said foot member, means in the lower portion of said shank member for supporting the upper end of said heel-bolt for sliding movement between the front and rear of said shank member, and resilient means tending to move said bolt into its rearward position.

2. An artificial limb comprising a shank member and a foot member pivoted together to form an ankle joint, a heel-bolt extending through said foot member and into a recess in the underside thereof, adjustable means for holding the lower end of said bolt in said recess, a pair of rods connecting the front and rear of said shank member at its lower portion, the upper end of said bolt passing between said rods, a head on the upper end of said bolt slidable upon the upper surfaces of said rods, and a resilient bumper interposed between said rods and the upper rearward surface of said foot member.

3. An artificial limb comprising a shank member and a foot member pivoted together to form an ankle joint, a heel bolt extending through said foot member and into a recess in the under side thereof, a thumb nut adjustably mounted on the lower end of said bolt and lying in said recess, a pair of rods connecting the front and rear of said shank member at its lower portion, the upper portion of said bolt passing between said rods, a head on the upper end of said bolt slidable on the upper surfaces of said rods, an enlargement on said bolt slidable on the lower surfaces of said rods, and a resilient bumper surrounding said bolt between said enlargement and the upper rearward surface of said foot member.

In testimony whereof I hereunto affix my signature.

RAY TRAUTMAN.