G. NELSON.

ARTIFICIAL LIMB.

APPLICATION FILED MAR. 27, 1917.

1,340,239. **Patented May 18, 1920.**

Fig. 1.

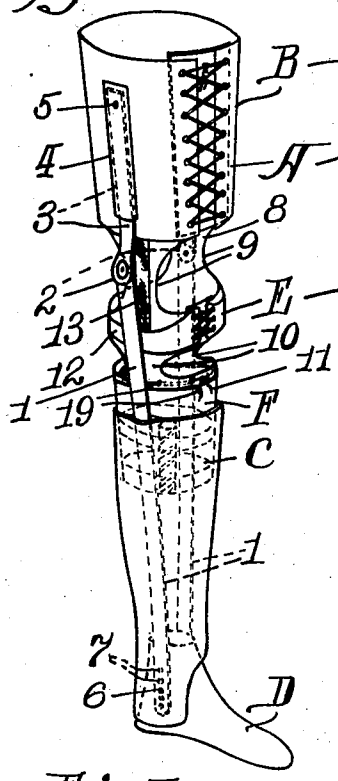
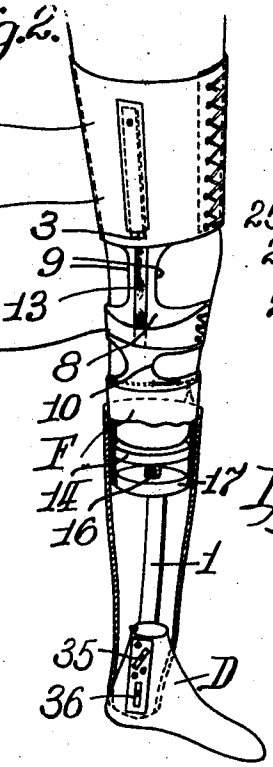


Fig. 2.



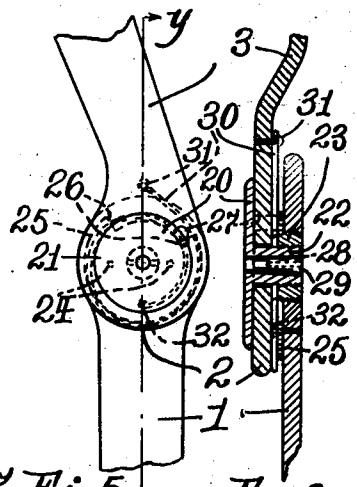


Fig. 5. y

Fig. 6.

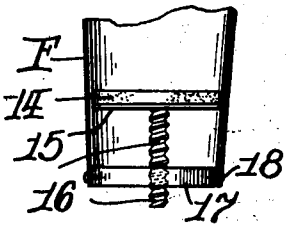
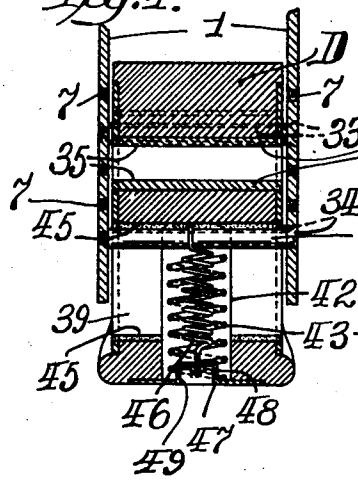


Fig. 7.

Fig. 4.



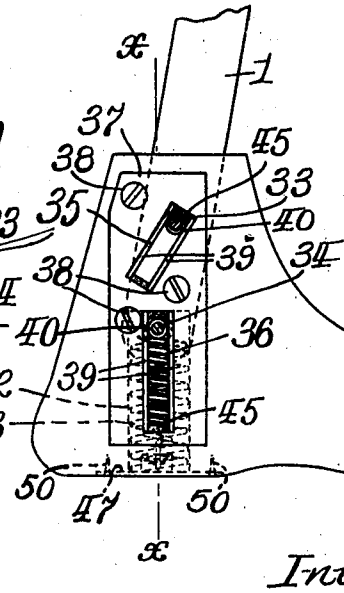
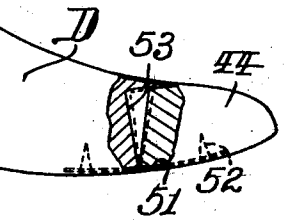


Fig. 3.



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UNITED STATES PATENT OFFICE.

GILBERT NELSON, OF ST. PAUL, MINNESOTA.

ARTIFICIAL LIMB.

1,340,239. Specification of Letters Patent. Patented May 18, 1920.

Application filed March 27, 1917. Serial No. 157,640.

To all whom it may concern:

Be it known that I, GILBERT NELSON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Artificial Limbs, of which the following is a specification.

My invention relates to artificial limbs and particularly to an artificial leg which is adapted to be used where an amputation of the leg has been made below the knee, it being evident that the artificial limb can also be used for shorter amputations.

The primary object is in an artificial limb of simple construction which can be manufactured or made at a small cost and which is practical in use. It is also an object to have the limb light weight so that it can be easily handled by the user.

A further object of my device is in a leg having a shin lacer which assists in taking the weight off the thigh and which is connected to the thigh laver by flexible non-stretching strips. It is also an object to have the slip-socket which fits about the amputated stump secured to the shin lacer and the thigh lacer, thus making it very easy and comfortable for the user when the artificial limb is attached to the amputated leg as the weight is evenly distributed on the leg.

In the drawing which forms part of the specification,

Figure 1 is a perspective of an artificial limb.

Fig. 2 is a perspective of the artificial limb attached to the stump of a leg showing part of the artificial limb in cross section.

Fig. 3 illustrates the foot of the artificial limb.

Fig. 4 is a cross section of Fig. 3 on the line X—X.

Fig. 5 is a side elevation of one of the knee joints on the artificial limb.

Fig. 6 is a central cross section of Fig. 5 on the line Y—Y.

Fig. 7 is a detail cross section of a portion of the slip-socket of the artificial limb.

In the drawing, A represents an artificial limb having a thigh lacer B which is preferably formed of several layers of leather. C represents a calf casing or boot which is also formed of suitable layers of leather. D represents the foot of the artificial limb which is slidably and pivotally connected to the lower arms 1 of the artificial limb. The arms 1 are formed of strips of steel or other suitable metal which are pivoted at 2 to the upper arms 3 which hold the thigh lacer B. The pivot points 2 of the arms 1 and 3 form the knee joints for the artificial limb A. The lacer B is securely held to the arms 3 by the sockets 4 into which the arms 3 are inserted and is rigidly held in place in the sockets 4 by means of screws 5 or other suitable holding means.

The calf casing C which is adapted to represent the calf of the natural leg, is adapted to be held to the arms 1, which pass between the layers of leather and form the casing, while the screws 6 hold the casing in position on the arms 1, and are threaded into the arms 1. The portion of the casing or boot C is adjustable by means of the holes 7 in the lower part of the arms 1 so that the casing C can be raised or lowered to suit the occasion and the screws 6 inserted into any of the holes 7.

The thigh lacer B is of ordinary construction and the inner lining 8 is formed of soft leather which extends downward, being cut away to form straps 9 and extending around to form the inner lining of the shin lacer E. The lining 8 extends below the shin lacer E and is cut away to form straps 10 which connect the slip-socket F with the shin lacer E. The soft leather lining 8 forms an annular lining for the slip-socket F. The outer portion 11 of the slip-socket F is formed of heavier and more durable leather. An annular band 12, which is cut down on either side and in the back to form a narrow strip, is adapted to go around the leg in back of the knee, and is formed of suitable strong leather which is secured to and extends about the lining 8. The strip 12 has ordinary eyelets which are adapted to receive the lacing at the front portion so that the shin lacer E can be snugly laced about the shin of the leg to which the artificial limb is attached.

Textile strips 13 are secured to the lacer B and the strip 12 of the shin lacer E so as to take the strain of the weight of the leg when the limb is in use and prevent the pulling or stretching on the lining 8. The strips 13 are of a strong heavy weave of material so as not to stretch when in use, thus the thigh and knee lacers B and E respectively, can carry the largest portion of the weight of the leg when the artificial limb A is in use.

The slip-socket F is adapted to hold the

stump of the leg and is formed with an adjustable seat portion 14 which is formed preferably of soft material such as felt or any other suitable material and is securely held to the plate 15 in a suitable manner. The plate 15 is rigidly secured to a screw 16 which is threaded in the circular portion 17 and closes the lower end of the slip-socket F. The circular portion or disk 17 is secured by means of screws 18 to the lower extremity of the slip-socket F. Thus by the use of the seat or rest portion 14, the slip-socket can be adjusted for different lengths of stumps of legs so that the stump can be comfortably held in the slip-socket and the pressure against the seat 14 of the stump of the leg made to suit the user of the artificial limb. A draw string 19 is threaded about the upper portion of the lining 8 of the slip-socket F and can be adjusted to the desired tension to firmly hold the slip-socket F to the stump.

The knee joints 2 which are formed on the inner ends of the arms 1 and 3 are pivotally secured together by means of the screw 20 having a broad flat head 21 on which is formed a hollow shank 22 which is threaded into a collar 23. The collar 23 is threaded into the arms 1 and is held rigidly to the same after being screwed home by means of pins 24. The flange 25 formed on the collar 23, is adapted to lie between the pivoted ends of the arms 1 and 3 and is cut out so as to form stops 26 which are adapted to be engaged by the pin 27 which is rigidly secured in the arms 3. The arms 3 are freely pivoted on the hollow shank 22. The shank 22 is split at 28 and a tapered pin 29 is driven into the hollow portion of the shank 22 when the same has been screwed into position, thus expanding the inner end and rigidly holding the screw 20 in place to the arms 1.

The pin 27 together with the stop shoulders 26, is adapted to limit the movement of the arms 1 and 3, thus allowing the arms to pivot at approximately right angles and preventing the knee joints from pivoting forward when in use, so as to hold the artificial limb rigid in vertical position.

A coil spring 30 is secured on one end at 31 to the arms 3 and secured to the arms 1 at 32. The coil spring 30 being adapted to assist in straightening the artificial limb when it is turned on the pivot points and in use.

The lower ends of the arms 1 are bent so as to lie approximately parallel and are pivotally secured to the foot D by means of the bolts 33 and 34. The bolts 33 and 34 pass through slots 35 and 36 which are formed in the plates 37. The plates 37 are held to either side of the foot D by means of screws 38. The slots 35 and 36 are formed with wearing plates 39 on either side against which sleeves 40 are adapted to slide when the artificial limb is in use. The sleeves 40 being slipped over the bolts 33 and 34 and extending between the lower ends of the arms 1 so as to form shoulders to prevent the ends of the arms 1 from binding on the plates 37 which are secured to the foot D, thus freely holding the arms 1 slidably to the foot D. The foot portion D has a hollow portion 42 formed under the heel in which a coil spring 43 is positioned so as to bear against the bolt 34 and to normally press the same into upper position. Thus sliding the bolt 33 to the upper position in the slot 35 and allowing the leg of the artificial limb to raise upward and forward as is the case with the human foot when walking. When the pressure is released from the artificial limb A, the spring 43 will tend to pivot the foot D in relation to the calf casing C and allow the foot to bend as in walking and when pressure is exerted on the heel of the foot D, the spring 43 will be compressed and the bolts 33 and 34 slid into the lower extremity of the slots 35 and 36, thereby holding the arms 1 rigid in relation to the foot D and giving a good bearing surface on the foot. The upper and lower ends of the slots 35 and 36 have leather or any other suitable cushions 45 secured in the same so as to prevent the noise of the bolts 33 and 34 working back and forth in the slots 35 and 36 when the limb is in use.

A small coil spring 46 has one end wrapped around the sleeve 40 of the bolt 34 and the other end secured to the plate 47 which tends to overcome the pressure of the spring 43 in the opposite direction. The end of the spring 46 is secured to the plate 47 and is adjustably held by the nut 48 in the recess 49 which is formed in the plate 47. Thus the tension of the spring 46 can be adjusted to suit the occasion. The plate 47 serves to close the lower portion of the opening 42 and is held in position by means of screws 50.

The toe 44 of the foot D is movably held by means of a flat steel spring 51 which is secured to the toe and foot portion by means of screws 52. The foot portion D is cut away at 53 to allow the rear end of the toe portion 44 to slide into the same when the foot D is in use, thus giving a free easy to toe movement to the foot D. The body portion of the foot D is made of wood or other suitable material and can be covered with leather or any suitable material. It is also evident that the foot D can have its lower surface covered with felt or rubber to make is soft and pliable. The arrangement of the slots 35 and 36 is such that when pressure is exerted on the foot D the bolts 33 and 34 are in the lower extremities of the slots 35 and 36 thus locking the arms 1 against lateral movement. When pressure is released off the foot the bolts 33 and 34 will

raise in the slots 35 and 36 and allow the foot to bend forward in the ankle of the leg.

In accordance with the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims:

1. In an artificial limb, comprising a thigh lacer, a calf casing, arms secured to said thigh lacer and calf casing, having knee joints and a shin lacer flexibly secured to said thigh lacer and free to swing in said limb, whereby part of the pressure in said artificial limb can be carried by said shin lacer, substantially as described.

2. In an artificial limb, comprising a flexible thigh lacer, a flexible calf casing, arms secured to said thigh lacer and calf casing, having knee joints, a shin lacer adapted to be secured about the shin of a leg, a slip-socket for the stump of a leg, said shin lacer and slip-socket being flexibly secured to said thigh lacer to allow them to move freely in said calf casing, substantially as described.

3. In an artificial limb, comprising a thigh lacer, a calf boot secured to arms formed with a knee joint, a shin lacer secured to said thigh lacer by means of flexible, non-stretching, textile strips, a slip-socket secured to said shin lacer and an adjustable cushion for the stump of a leg secured in said slip-socket, substantially as described.

4. In an artificial limb, comprising a thigh lacer and boot secured to upper and lower arms which are formed with knee joints, a foot being formed with two independent slots, one of said slots being vertical and the other of said slots lying at an angle to said vertical slot, bolts passing through both of said slots to slidably and pivotally connect said lower arms to said foot, said slots allowing said foot to pivot in relation to said lower arms when in one position and to lock the foot rigid in relation to said arms when in the other position, substantially as described.

GILBERT NELSON.