# B. F. Palmer,

## Artificial Leg.

No. 4,834. Patented Nov. 4, 1846

Fig. 1

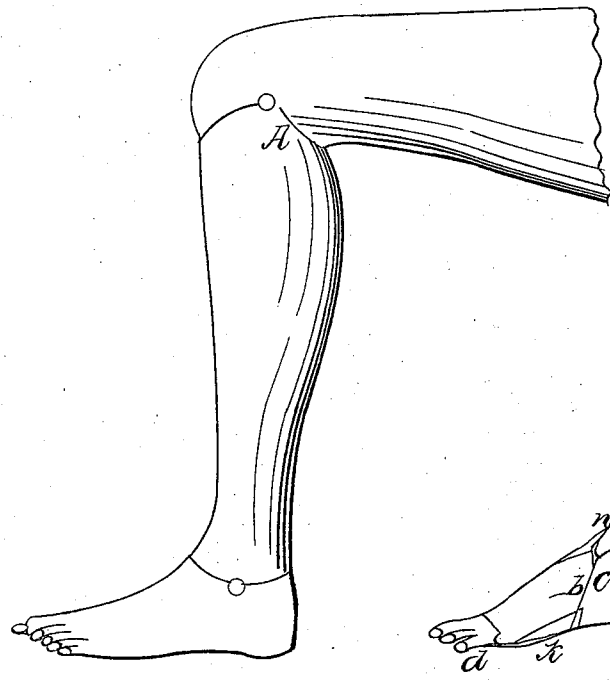
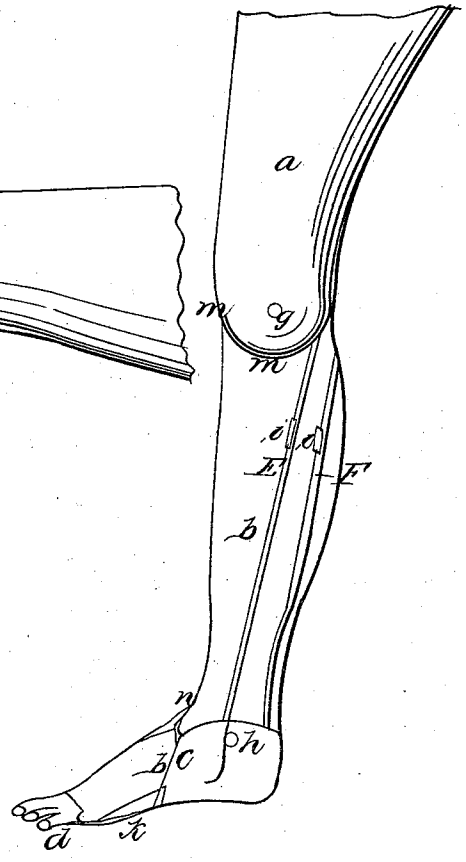



Fig. 2



# UNITED STATES PATENT OFFICE.

BENJ. F. PALMER, OF MEREDITH, NEW HAMPSHIRE.

## ARTIFICIAL LEG.

Specification of Letters Patent No. 4,834, dated November 4, 1846.

*To all whom it may concern:*

Be it known that I, BENJAMIN FRANKLIN PALMER, of Meredith, in the county of Belknap and State of New Hampshire, have invented a new and useful Improvement in Artificial Legs and Feet; and I do declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, which forms a part of this specification, in which—

Figure 1, is a perspective view. Fig. 2, is a vertical section on a line parallel with the foot.

The nature of my invention consists in new and improved articulations of the knee, ankle, and toes, in constructing the various parts in such new manner as to leave no opening in the exterior of the leg about the joints, and in supplying and arranging tendons and springs in such manner as to give more elasticity, strength, durability and freedom of motion to the limb than are to be found in artificial legs heretofore known and used.

The construction of my leg is as follows. *a*, *b*, *c*, and *d*, are made of any suitable material, *a*, being that part of the leg above the knee, *b* that part between the knee and ankle, *c*, the foot, and *d*, the toes. *a*, is hollow, and so constructed as to receive within it the stump of the natural limb (in case of amputation above the knee) which may rest in any desirable manner according to circumstances, *b*, is also hollow, and receives within it the natural limb in case of amputation below the knee. The lower end of *a*, is a hemisphere, (and may be varied in order to give a correct likeness of any limb at the knee) which rolls within the shell of *b*, upon the pivot, *g*, which passes through it equidistant from the points *m*, *m*. That portion of *b*, about the joint is made very thin in the anterior part, and cut away in the rear, to give sufficient motion to the knee, as shown by the line A, in Fig. 1.

*z*, is a smoothly polished metallic bolt which passes through an aperture in *a*, and through two metallic plates that are fastened, one upon each side of *b*. This bolt does not move within the metallic plates when the leg is in use, but may be taken out at any time, by means of a nut upon one end, or otherwise. Two other metallic plates are fastened to the lower part of *b*, (one upon each side) which pass down a little below its lower extremity, upon the sides of the foot, *c*. The bolt, *h*, passes through these metallic plates and the foot, in a proper place for the ankle. This bolt moves within the foot, but not within the metallic plates when the leg is in operation. That part of *c*, in the rear of the bolt, *h*, is so constructed that its upper extremity moves within the shell of *b*, (which is very thin at this place, and of any desirable shape) so closely as to leave no external aperture when the joint assumes all its various positions. Upon the instep is fitted a casing of green hide, which passes up far enough to conceal all cavity about the anterior part of the ankle, as shown at the point *n*. These articulations are free from that degree of friction attendant upon those heretofore in use, are not liable to contract and expand, do not rattle when moved quickly, are of much greater strength and durability, and together with the joint give a more perfect exterior to the limb. *c*, and *d*, are united by a socket joint, a semicircular groove in *d*, receiving a corresponding convexity on the front end of *c* in which it is secured by a wire passing through both and united at the ends or in any convenient manner.

E, and F, are tendons; both entirely in the interior of the foot and leg. E, is secured in a groove, or by means of apertures in the rear of *a*, near the lower end, and passing through *b*, is secured in two apertures in *c*, just forward of the pivot *h;* or it may be attached to the lower part of *b*, in any suitable manner. Its function is to stop the motion of the knee at a proper time, when the foot is moving forward. It also tends to obviate the too rapid downward motion of the anterior part of the foot at the touch of the heel, if attached to the foot forward of the bolt *h;* and it should be thus attached in all cases where there is a sufficient length of the natural limb remaining to govern the knee readily, as it gives better motion and more elasticity to the entire limb. This tendon is used only in case of an artificial knee. F, is attached to *b*, in any suitable manner, as far from the foot as circumstances will permit, and to the foot near the extremity of the heel. These tendons may be of gut, and fastened within the thimbles *i*, *i*. The function of this tendon is to act in conjunction with E, in giv-

ing elasticity to the limb, and to keep the front lower extremity of *b*, from coming in contact with *c* at the recess *j*,—k is a metallic spring concealed within the covering of the foot, one end of which is fastened to the bottom of *d*, just forward of the toe joint. A metallic wire or gut cord, *l*, is attached to the other end of this spring, which passes through the foot and is fastened in any suitable way to the anterior part of *b*. This spring answers a fourfold purpose. It acts conjunctively with the tendon E, in obviating the rapid and unnatural downward motion of the "ball" of the foot, when the heel touches the floor, it keeps the ankle in its proper position, it stops the motion of the ankle when it has moved sufficiently far, by coming in contact with the foot, and regulates the motion of the toes, moving them like natural ones at every step. The whole exterior of the limb may be covered with leather, which should be varnished. The limb may be attached in any of the usual forms.

Having thus fully described my improved artificial leg and foot what I claim therein as new and desire to secure by Letters Patent, is—

1. The long tendon E, the spring *k*, and the cord *l*, respectively combining and acting upon the parts *a*, *b*, *c*, and *d*, substantially in the manner and for the purpose herein set forth.

2. I also claim the improved manner of forming the knee joint uniting the parts *a* and *b*, to each other, by means of the hemisphere at the lower end of *a*, the partial concave beveled to a thin edge on the front side of the upper end of *b*, and the pivot *s*, combined and operating substantially in the manner herein set forth; for the purpose of obviating noise or friction in working the joint, and producing a perfect contour thereof.

3. I also claim the improved manner of forming the ankle joint uniting the parts *b*, and *c*, to each other,—the rear side of the lower end of *b*, being beveled to a thin edge passing over and inclosing the heel portion of that part of *c*, in the rear of the joint pivot *h*, and the front upper part of *c*, at *n*, being brought to a thin edge and overlapping the lower end of the front side of *b*, substantially as herein set forth,—thus forming a pliable joint that will work without noise, and preserve its contour in all positions.

BENJAMIN FRANKLIN PALMER.

Witnesses:
RICHARD CLEMENT,
BENGE. BORDMAN.