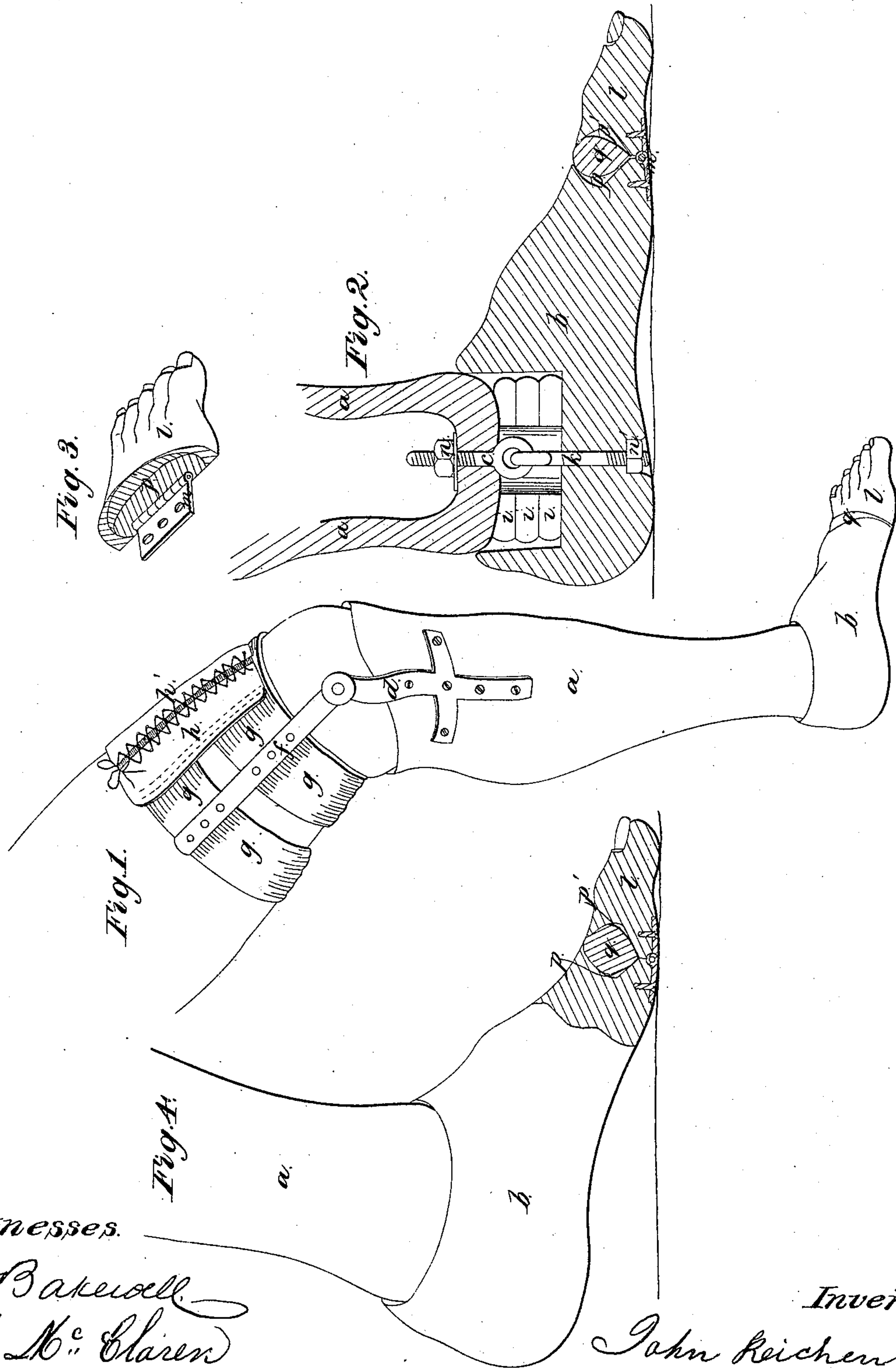


J. Reichenbach,

Artificial Leg,

No. 41,237,

Patented Jan. 12, 1864.



Witnesses.

W. B. Bakerell
M. M. C. Claren

Inventor.

John Reichenbach

UNITED STATES PATENT OFFICE.

JOHN REICHENBACH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN ARTIFICIAL LEGS.

Specification forming part of Letters Patent No. 41,237, dated January 12, 1864.

To all whom it may concern:

Be it known that I, JOHN REICHENBACH, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Artificial Legs and Feet; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is a representation of my improved artificial leg and foot attached to the stump of the natural leg of the wearer below the knee-joint. Fig. 2 is a vertical section through the foot and lower part of the leg, showing the construction of the ankle-joint and toe-joint. Fig. 3 is a perspective representation of the toe-piece separated from the foot, showing the hinge or toe joint and the cavity for the spring. Fig. 4 is a representation of the foot and lower part of the leg, showing in section the hinge-joint and spring when the toe-joint is flexed by raising the heel off the ground.

In the several figures like letters of reference denote similar parts.

My invention, described in the following specification, is an improvement in artificial legs and feet; and it consists, chiefly, in the construction of the ankle joint and the joint near the extremity of the foot, which supplies the place of the toe-joints, and which I call the "toe-joint," and in the mode of attaching the artificial leg to the natural leg of the wearer where amputation has taken place below the knee.

The construction of artificial legs to be used by persons having the natural knee-joint differs materially from those which require an artificial knee-joint, because in the former case the motion of the ankle-joint is regulated and controlled by the stump of the natural leg below the knee, which being wanting in the latter case, the requisite motion has to be supplied by mechanism. I have therefore confined myself in this specification to the description of legs and feet to be used where there is a natural knee.

The principal features of my improvement are the following: First, reduction in the weight of my artificial foot and leg; second, simplicity of construction, giving strength to

the joints, freedom from liability to derangement, and easy adjustment in case they need repairing; third, an elastic bearing to the ankle-joint, promoting ease in walking, and giving a more natural spring to the gait; fourth, making the ankle-joint susceptible of an automatic reaction or straightening of the foot after the leg has been turned on its axis in the foot so soon as the foot is raised from the ground; fifth, a mode of adjusting the length of the artificial leg, between the knee and the sole of the foot, so as to accommodate it exactly to the other or natural leg of the wearer, and allow for the stump entering more or less deeply into the cavity of the artificial leg.

To enable others skilled in the art to construct and use my improved leg and foot, I will proceed to explain their construction and operation.

In the drawings, *a* is the leg-piece, extending from the required point below the knee to the ankle-joint, where it is united to the foot-piece *b*. The leg-piece is made of wood or other suitable material, which is hollow, and is made as thin as is compatible with the requisite strength.

As will be seen, I have not placed any of the machinery of the ankle-joint in the cavity of the leg, excepting a screw-nut, *n*, and the upper extremity of the ring-bolt *c*, as thereby I prevent the possibility of the end of the stump coming in contact with any hard substance.

The lower extremity of the leg-piece *a* is solid, the cavity not extending all the way down, and it is rounded at the corners, so as to move easily in the cavity of the foot-piece *b*, as seen in Fig. 2. The foot-piece is made higher at the heel than is usual in artificial limbs, and the cavity for the insertion of the leg at the ankle smaller, the center of motion of the ankle-joint being in the cavity of the foot-piece *b*. The extremity of the leg-piece *a* enters slightly into the cavity of the foot-piece *b*, the degree of insertion being capable of regulation at pleasure by turning either of the screw-nuts *n n'*, and thereby the length of the leg from the knee to the ankle may be increased or diminished, as may be found necessary.

In the cavity of the foot-piece *b*, for the reception of the lower extremity of the leg, are

placed two, three, or more annular pieces of india-rubber, *i i i*, (see Fig. 2,) the thickness of which is made to suit the required depth of insertion of the leg-piece into the foot-piece. Annular corrugated plates of steel may be used, if preferred, in place of the india-rubber rings, but I prefer the latter. In the axis of the leg-piece *a* is placed a ring-bolt, *c*, the straight end of this bolt entering the cavity in the leg-piece and being secured by a screw-nut, *n*, screwed on it. The ring at the other extremity of the ring-bolt *c* protrudes from the lower side or end of the leg-piece *a* in the central space made by the india-rubber rings *i*, and the base of the leg-piece resting upon the india-rubber rings *i* all around the ring. A hook-bolt, *k*, is passed through the heel of the foot-piece *b* in a line with the vertical axis of the leg-piece, being fastened by a screw-nut, *n'*, in the sole of the foot-piece, and the hooked end projecting upward in the center of the india-rubber rings *i i*. The hook being inserted in the eye of the ring-bolt *c*, and the nut *n'* being screwed on the end of the hook-bolt *k*, the leg-piece and foot-piece are firmly connected together.

The india-rubber rings *i i*, on which the extremity of the leg-piece rests, serve as a spring and allow of a little vertical play to the leg, the degree of which is regulated by the nuts *n' n*, and serve to break the jar of the tread when the foot strikes the ground, and give a natural elasticity to the step in walking, and they also have the effect of causing the foot to resume its natural angle to the leg when it is raised from the ground, and allow of the natural backward-and-forward motion of the ankle-joint in walking.

The hook-and-eye joint also allows of a slight side motion of the foot in relation to the leg, the india-rubber springs yielding slightly to any side motion of the ankle-joint caused by any inequality of surface of the ground or other obstruction, and causing the foot to resume its proper position or straighten it as soon as the foot is raised from the ground.

Another motion of the ankle-joint is also permitted by the combination of the india-rubber springs and hook-and-eye joint—namely, a slight rotary motion of the leg on its axis—such as is given in the natural limb, when the body is turned partly round, without moving the feet. The hook and eye, while

they allow of such a movement in a slight degree, prevent its becoming excessive, so as to turn the foot too far either inward or outward, and as such a motion cannot take place, owing to the circular shape of the hook and eye, without drawing them toward each other and slightly shortening the leg, the increased pressure on the india-rubber springs causes the foot to straighten itself so soon as it is raised from the ground.

Thus by means of the combination of the hook-and-eye joint and the springs interposed between the foot and end of the leg around the joint these various movements of the foot on the leg, or rather of the leg in the foot, which assimilate so nearly to the natural motion of the ankle-joint, are effected at will by the motion of the body or natural leg without any wrenching or strain of the leg of the wearer.

Having thus described my improvement in artificial legs and feet, what I claim as new, and desire to secure by Letters Patent, is—

1. Forming the ankle-joint by means of a hook and eye or ring, one attached to the foot and the other to the end of the leg, forming a universal joint, in combination with springs of india-rubber or other elastic material placed in the cavity of the foot, for the purpose of allowing the requisite motion of the foot with sufficient elasticity of tread, substantially as described.

2. The mode of regulating the length of the leg from the knee to the sole of the foot by means of the hook-and-eye bolts *c* and *k*, furnished with screw-nuts *n n'*, in combination with the india-rubber springs *i i*, substantially as described.

3. So constructing the ankle-joint, substantially as described, as that when the leg has been turned on its axis in the foot the foot shall be automatically restored to its normal position in relation to the leg when raised from the ground by means of the combination of the hook-and-eye joint and india-rubber springs.

In testimony whereof I, the said JOHN REICHENBACH, have hereunto set my hand.

JOHN REICHENBACH.

Witnesses:

F. M. MAGEE,
A. S. NICHOLSON.