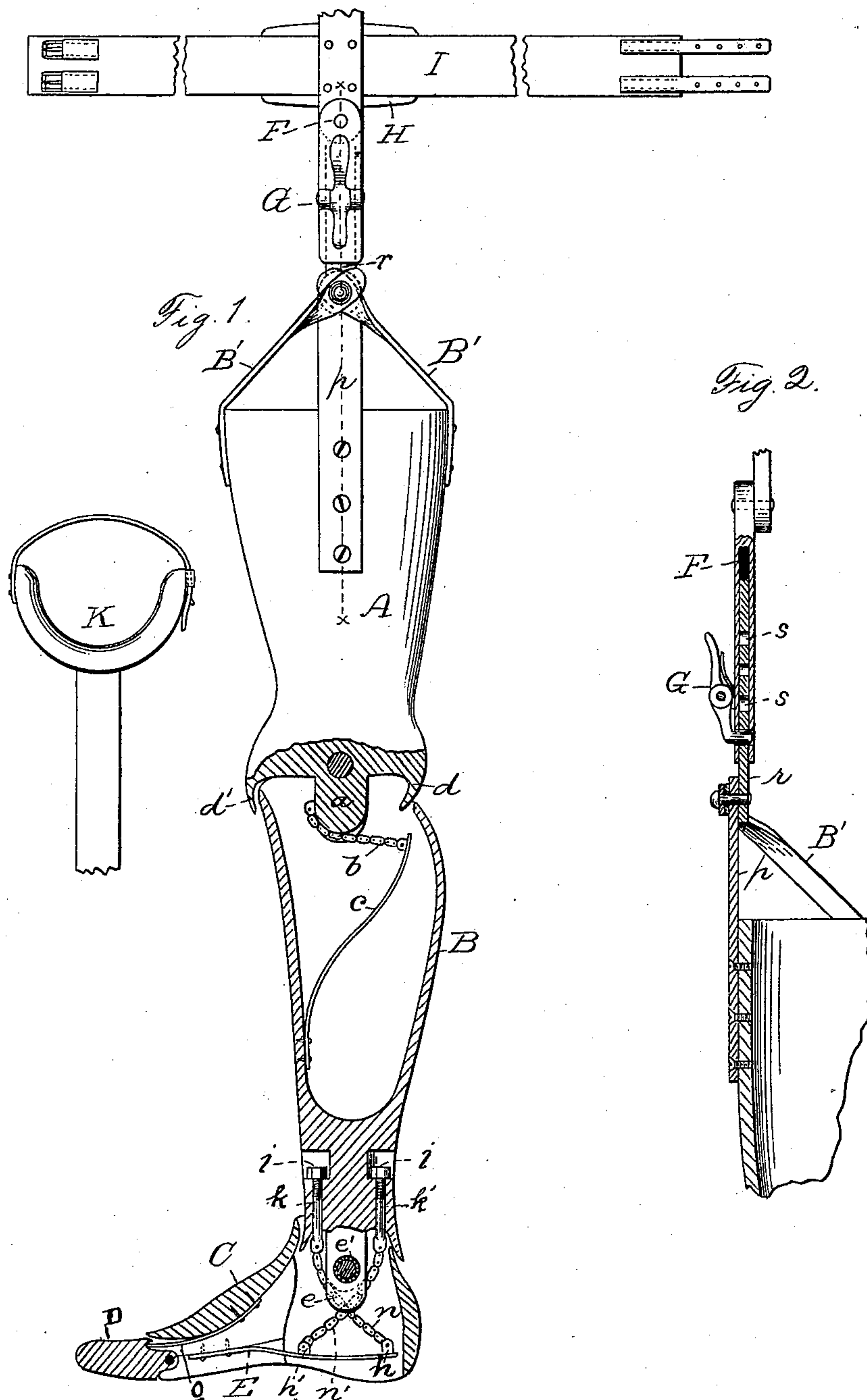


(No Model.)

R. C. DUNHAM:  
ARTIFICIAL LEG.

No. 336,904.

Patented Mar. 2, 1886.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## ARTIFICIAL LEG.

SPECIFICATION forming part of Letters Patent No. 336,904, dated March 2, 1886.

Application filed April 16, 1885. Serial No. 162,414. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH C. DUNHAM, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Artificial Legs, of which the following is a specification.

My invention relates, principally, to artificial legs, my purpose being to provide a leg which may be readily adjusted to a desired comfortable position, or may as readily be entirely removed, and in which the several movements of the knee, ankle, and foot joints are substantially the same as in the natural leg.

In the accompanying drawings, Figure 1 shows said artificial leg (side elevation) ready for attachment and use, the crutch K being shown as detached therefrom, and that portion of the leg from the knee-joint downward being shown in vertical section in order to better illustrate the internal working parts. Fig. 2 is a sectional view on line *x x* of Fig. 1, showing the spring-latch which I have employed to furnish the necessary adjustment for persons of different heights, as hereinafter described in detail.

Although I have illustrated and intend to describe a leg to be attached above the knee-joint, the lower part of my improved leg—that is to say, the foot and ankle—may be used with equally satisfactory results independent of the knee-joint. The shell or case of said leg is formed preferably of wood, papier-mâché, or other similar yet stiff material.

In the annexed drawings, A represents the thigh portion, B the calf, and C the foot.

The thigh portion A is pivoted in section B to form the knee-joint, and has projecting downward below its pivotal point a tenon or extension, *a*. Attached to the front side of said extension is a chain, *b*, which, passing downward and rearward around the channeled rounded end of said extension, is attached to the free end of a spring, *c*. This spring *c* is concealed within the hollow section B, and is secured at its lower end to said section at or near the point occupied by the shin-bone in the natural leg, and acts with a constant tendency to throw the calf and foot sec-

tions forward. The rear side of section A is cut under, as at *d*, so that it may pass within section B as the knee is bent forward, but the opposite or front side overlaps said section B, as shown at *d'*, thus forming a stop to limit the forward movement of the lower section when raised from the ground and under the influence of the spring *c*.

On the lower end of section B is a tenon, *e*, which is pivoted in the foot-section to form the ankle-joint. This joint has also a downward extension rounded and channeled substantially the same as that described above. The pivot which connects the tenon *e* with the foot-section is surrounded with a packing, *e'*, of rubber or other similar flexible material, to relieve said joint from the unnatural and disagreeable effect which results from the use of a rigid metallic joint. As a simple and cheap method of producing said packing *e'* I have used sections of rubber tubing, which I slip over the metal rivet or screw. In order to provide a natural movement at the ankle and heel I have employed a novel arrangement of chains and springs, as follows:

E represents a spring secured well forward in the foot-section, and provided near its free end with perforated lugs, staples, or other similar eyes, *h h'*. The leg-section B is mortised at the front and rear sides, (see *i i*), and is drilled from its lower end to receive eyebolts *k k'*, said bolts being held in proper position by nuts located in the mortises *i i*. Eyebolt *k'* is connected to the spring-staple *h'* by a chain, *n'*, which chain passes around extension *e*. The eyebolt *k* is connected by chain *n* to staple *h*, the two chains crossing each other at the lower end of extension *e*, being so adjusted relative to each other that they act to bring the foot-section to its normal position, whether bent forward or backward.

It will be readily understood that should a stiffer or more elastic ankle-joint be required or desired, the staples *h'* and *h* should be brought nearer each other or carried farther apart, according to the requirement of the case.

The toe-section D is pivoted in the foot-section, and is held in its normal position by an end bearing-spring, *o*, located within the foot



and acting against the rabbeted upper side of said toe-section. By the use of this flat sheet-metal spring so set that the upward movement of the toe-sections exerts an endwise pressure on the spring and deflects its middle portion sidewise, I am enabled to bend the spring more for a given movement of the toe-section than is the case with other arrangements of sheet-metal springs in artificial feet, and consequently I obtain a quicker-acting spring. It should also be noticed that the forward end of the foot-section extends forward beyond the toe-joint and covers said joint and the actuating spring.

Having thus described the construction of my newly improved artificial leg, I will proceed to describe the attachments by which it is secured to the wearer, and by means of which it may be adjusted to fit persons of different heights and sizes.

Secured to the side of section A is a metallic strap, *p*, whose upper end is preferably riveted to a similar strap, *r*, provided with a series of perforations, *s*. This perforated strap *r* is arranged to slide within a metallic piece, *F*, on whose outer side is hung a spring-pressed snap-latch, *G*, one end of said latch being of a size and shape to enter the perforations *s*, as shown in Fig. 2, in which position it abuts against the backside of piece *F*. It will thus be seen that by changing latch *G* from hole to hole, any desired adjustment within the range or limit of said holes may be easily attained, and it will be further seen that when it is desired to remove the leg it is only necessary to spring open the latch *G* and drop said leg. The metallic strap *p* is strengthened and supported either on the front or back side, or on both sides, as shown, by braces *B' B'*, whose lower ends are secured to the leg-section A, and whose upper ends are secured, preferably, by the same rivet which connects the metallic straps *p* and *r*. At a convenient point above latch *G*, I have attached a pad, *H*, and flexible strap *I*, which is buckled around the body to assist in holding the several parts in proper position, and at the extreme upper end of the metallic side strap I have also provided a crutch, *K*, which I find in practice relieves the pressure on the stump of the natural leg without causing undue inconvenience to the wearer.

In place of the several chains employed to connect the working parts, cords could be used with fairly satisfactory results; but I find the chains act with less tendency to stretch or wear, and as they are continually strained taut by their connecting-springs they are also noiseless.

I am aware that a prior patent shows a foot-section and toe-section jointed together with their confronting ends beveled off, so as to leave quite a space between said sections on the upper side, and with endwise-acting rubber springs in the form of rounded blocks set in holes in the confronting walls of the two

sections, the open space between said sections over the toe-joint being covered by a strip of leather or canvas, which also serves as a stop to prevent the rubber springs from throwing the toe part beyond the proper horizontal line of the foot. The forward end of the foot-section is in the same vertical plane as is the axis of the toe-joint. Another patent shows the pivoted toe and foot sections in connection with a flat sheet-metal spring, having one end secured to the foot-section, while its opposite end rests in a recess in the toe-section back of its joint, whereby the spring is acted upon only by a sidewise pressure, and forces the forward end of the toe-section downward until a stop arrests its movement. The seam between the toe and foot sections is back of the pivot or toe joint. All of said prior art is hereby disclaimed.

Having thus described my invention, I claim—

1. The leg-section B, pivoted in the foot-section, as shown, a spring within the foot-section, and the crossed chains *n n'*, connected at their lower end to the foot-spring and secured adjustably to the leg-section at their upper end, all being combined substantially as and for the purpose specified.

2. The combination of the toe-section having a rabbet on its upper side at a point forward of its pivot or axis, the foot-section C, jointed or pivoted to said toe-section, and the flat sheet-metal spring with one end secured to the foot-section, and having its opposite end resting in the rabbet of the toe-section at a point above and forward of the toe-joint, so as to be deflected by an endwise pressure, substantially as described, and for the purpose specified.

3. Sections A and B, pivotally joined and provided with the strap *d'*, in combination with spring *c*, secured to section B, and the chain *b*, having one end secured to section A and its opposite end to one end of said spring, said parts being so connected to each other that said spring acts to hold the leg in its normal position, substantially as described.

4. In combination with an artificial leg, a metallic strap or brace composed of two or more sections, one of said sections being formed with a series of perforations, the other sections being provided with a spring-pressed latch adapted to engage and interlock with the said perforations, and a suitable flexible strap, by means of which the complete metallic strap may be secured to the body of the wearer, all substantially as and for the object set forth.

5. In combination with an artificial leg, a crutch, a metallic strap or brace connecting said leg and crutch and adapted to be adjusted longitudinally, and a flexible body-encircling strap, by which said crutch and metallic brace are held in a desired position, substantially as described, and for the purpose specified.

6. In an artificial limb, a leg-section, a foot-



section, and a connecting rivet or screw having a metallic or otherwise solid core, and a peripheral washer of rubber or other similar yielding material, all being combined as herein  
5 described, and for the object specified.

7. In combination with the thigh-section A, metallic strap *p* and one or more strength-

ening-braces, B', when used, substantially as herein described, and for the purpose specified.

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Witnesses:

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