3 Sheets--Sheet 1.

J. O'BRIEN.

Artificial Leg.

No. 167,779. Patented Sept. 14, 1875.

Fig. 1

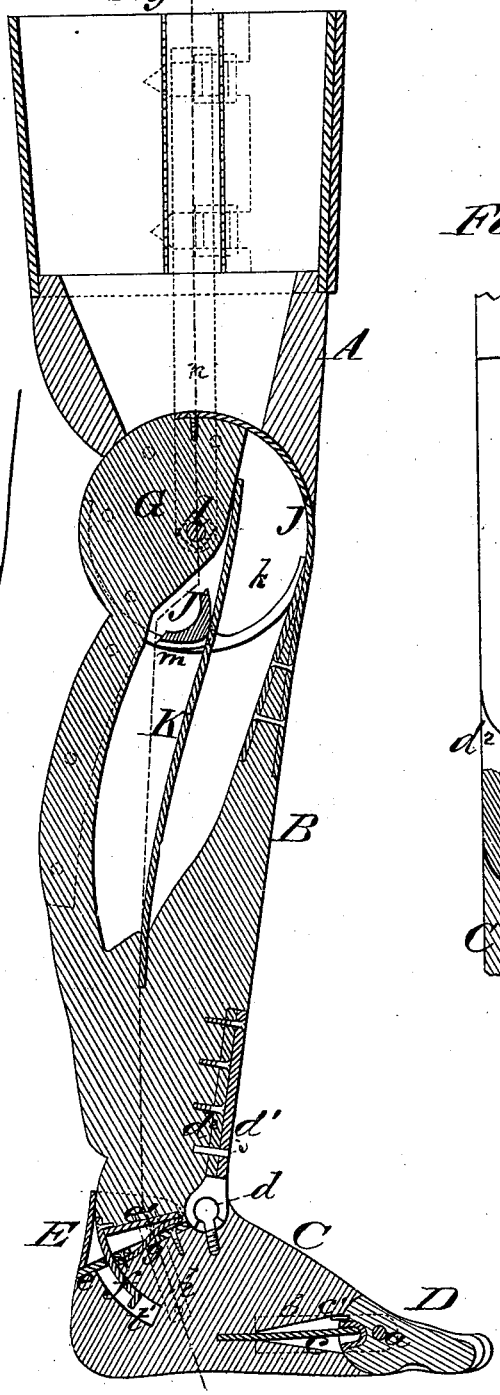

Fig 2

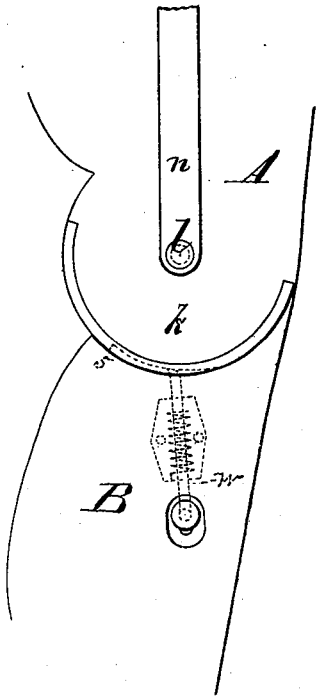

Fig. 3

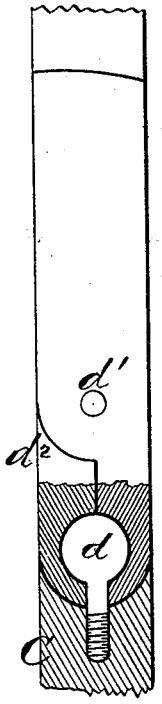

Fig. 4

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Fig. 5

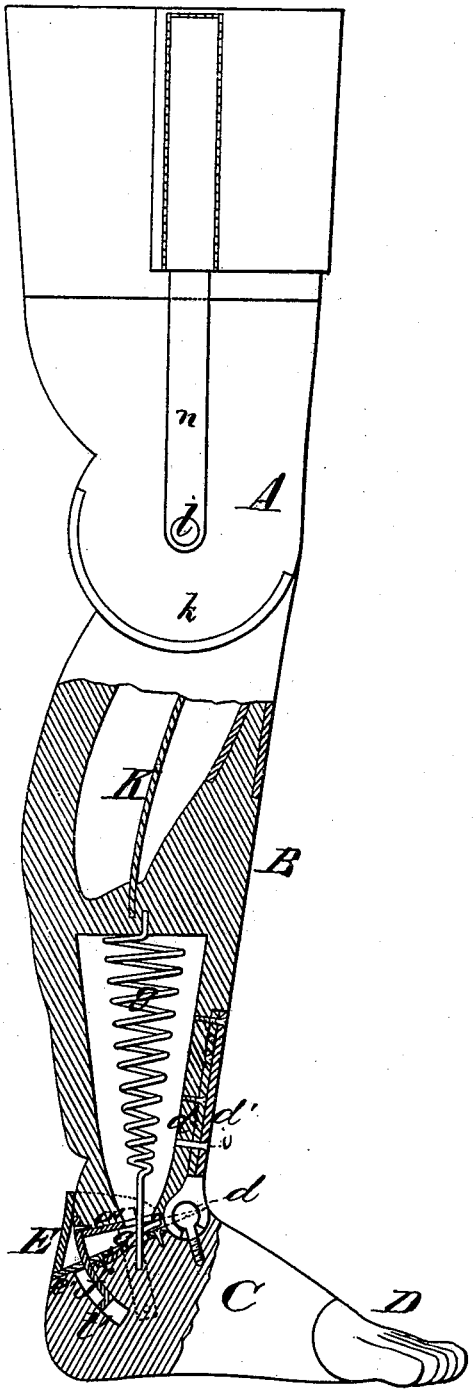

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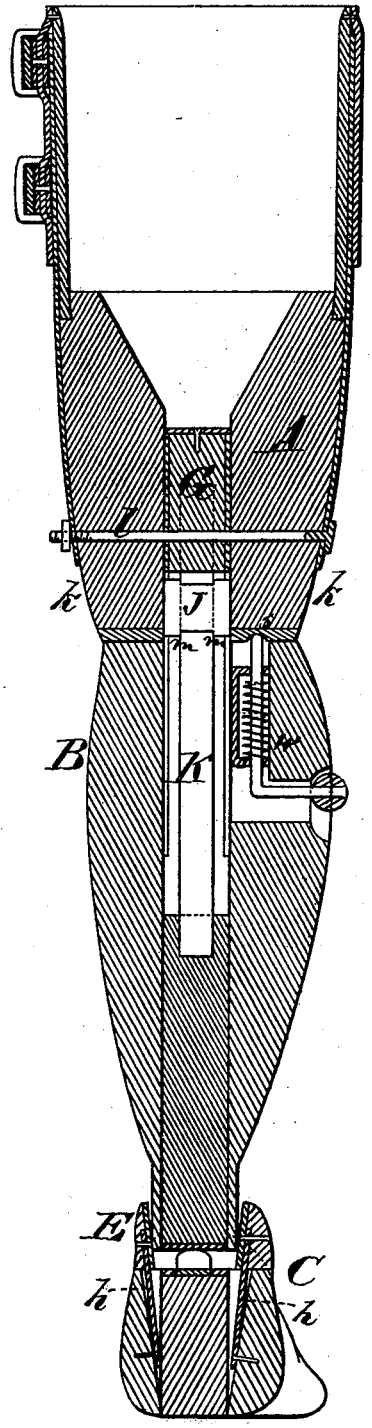
Fig. 6



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UNITED STATES PATENT OFFICE.

JOSEPH O'BRIEN, OF KALAMAZOO, MICHIGAN.

IMPROVEMENT IN ARTIFICIAL LEGS.

Specification forming part of Letters Patent No. **167,779**, dated September 14, 1875; application filed December 26, 1874.

To all whom it may concern:

Be it known that I, JOSEPH O'BRIEN, of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a new and valuable Improvement in Artificial Leg; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a vertical longitudinal section of my artificial leg. Figs. 2, 3, and 4 are detail views, and Fig. 5 is a vertical longitudinal sectional detail view of the same. Fig. 6 is a vertical transverse sectional view.

This invention has relation to artificial limbs for the lower extremities; and the nature of my invention consists in a novel toe-articulation, and a novel ankle-articulation, which latter is so constructed that it will allow the natural movements of the foot while walking, without causing the person to limp.

In the annexed drawings, A designates the wooden section of the upper leg; B, the wooden section of the lower leg; C, the main portion of the foot; D, the toe-section of the foot, and E is a loose ankle-shield. These parts are represented on Sheets 1 and 2. The toe-section D is fitted to the foot portion C by means of a knuckle and a corresponding concavity, which will allow a free ginglymoid articulation in walking. The pivot *a* of this articulation passes transversely through part of the toe-section, and has its bearings in metal straps *b*, which are rigidly secured into the foot portion C, and extend into recesses formed into the toe-section. The toe-section is held in the position shown in Fig. 1 by means of a spring, *c*, the front end of which enters a groove made in the toe-section and lined with metal. The spring *c* acts to press the toes downward, and a pin, *c'*, prevents the toes from being depressed too far. The instep portion of the foot is connected to the stump of the lower leg B by means of a ball-and-socket joint. The ball *d* is secured into the foot by means of a screw-shank, and the socket for this ball is formed in the lower ends of two narrow plates, d^1 d^2, which are pivoted together at *i*, and rigidly secured to the front of the lower leg B. By removing the screw which holds the plate d^1 this plate can be moved so as to separate the socket portions, and thus allow the ball *d* to be removed from them. The upper portion of the foot-section, from the joint *d* to the heel, is flat and inclined backward, and the middle portion thereof is covered with a plate of metal, *e*. The lower end or stump of the lower leg B is also inclined like the upper portion of the foot, and has a plate, *e'*, secured to it, and also an arc, *f*, pivoted to it, which arc is concentric to the axis of the ball *d* and plays freely through a hole made through the plate *e*. The lower end of the arc *f* has a stop, *f'*, on its end, which prevents the heel from descending too low when the foot is raised. Between the two plates *e* and *e'* a spring, *g*, is applied, which operates as a cushion when the person is walking or bearing his weight upon the foot. As a modification of this flat spring-cushion *g*, I may employ a spiral spring, *g*, as shown in Fig. 5, which is inserted into the foot, and extends into a recess made in the lower leg, at the upper end of which recess the spring is secured. The ankle-shield E, which is partly of metal and partly of wood, covers the space between the top of the foot and the bottom of the lower leg, and is secured to the foot-section by means of flat springs *h h*. These springs allow the shield to yield and accommodate itself to the lateral articulations of the foot. The upper end of the leg-section B terminates in a semicircular tenon, G, which has secured to it a metal strap, *j*, that forms the patella, and connects the upper ends of the section together. The sides of the tenon G are faced with metal to prevent undue wear, and the front edge of this tenon is slightly convex. The tenon G is received into a mortise formed in the lower end of the leg-section A, the lower ends of the cheeks *k k* forming which mortise are semicircular and faced with metal. These ends of the cheeks *k k*, and the semicircular tenon G, are concentric to the axis of the transverse joint-bolt *l*, about which the lower leg articulates. The sides of the leg-section, on opposite sides of the tenon G, are curved out, so as to receive the lower ends of the cheeks *k k* and form close joints there-

with without interfering with the knee articulation. J designates a crescentic-shaped cross-bar, which is located at the lower end of the upper leg-section between the two cheeks *k k*. The convex side of this cross-bar is directed forward and downward, and on this bar two ribs, *m*, are formed, between which a long spring, K, presses when the leg is flexed. When the leg is extended, as shown in Fig. 1, spring K presses against bar J above the ribs *m*. The lower edge of the cross-bar J will abut against the front edge of the tenon G, when the leg is extended, and when the leg is fully flexed the upper edge of the cross-bar will abut against the said tenon. The socket for the natural stump is formed of leather or rawhide, and secured to the section A by means of metal straps *n n*, through the lower ends of which the joint-bolt *l* passes. The socket portion is constructed with a flap and with buckles and straps.

What I claim as new is—

1. The toe-section D, pivoted to the section C at *a*, in combination with the knuckle articulation, the spring *c*, the stop *c'*, and the bearings *b*, substantially as described.

2. The foot C, connected to the leg-section B by means of a ball-and-socket joint, in combination with the arc *f* and spring *g*, substantially as described.

3. The ankle-shield E, attached to the foot by means of side springs *h*, substantially as described.

4. The semicircular tenon G, pivoted between the cheeks *k k*, and having the patella-plate *j* secured to it, in combination with the spring K and the cross-bar J, substantially as described.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

JOSEPH O'BRIEN.

Witnesses:

JAMES W. HOPKINS,

HENRY J. BROWNELL.