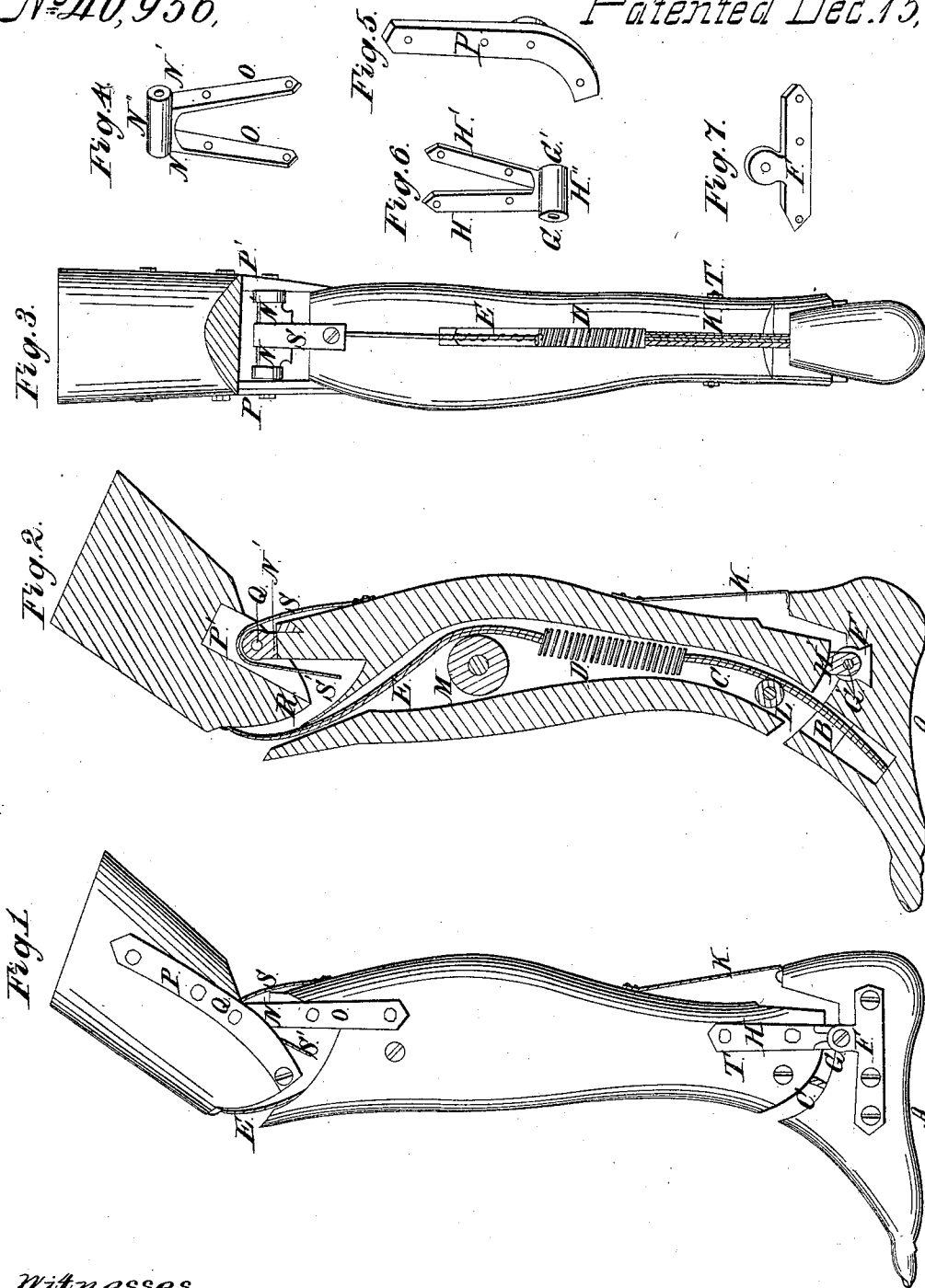


*I. D. Small,
Artificial Leg,*

No 40,956,

Patented Dec. 15, 1863.



Witnesses.

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UNITED STATES PATENT OFFICE.

ISAAC D. SMALL, OF NORTH FAIRFIELD, OHIO.

IMPROVEMENT IN ARTIFICIAL LEGS.

Specification forming part of Letters Patent No. **40,956**, dated December 15, 1863.

To all whom it may concern:

Be it known that I, ISAAC D. SMALL, of North Fairfield, in the county of Huron and State of Ohio, have invented new and useful Improvements in Artificial Legs; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side view. Fig. 2 is a vertical posterior anterior section. Fig. 3 is a posterior view; and Figs. 4, 5, 6, and 7 are detached parts.

The nature of my invention relates to durability, simplicity, and efficiency, while at the same time the movements are natural and easy.

A represents the foot. This may be made of wood or any suitable material, and of one piece, the external form being shown in Fig. 1. The anterior portion of the foot is excavated, as shown in Fig. 2, at B, for the insertion of the cord C, that connects with the lower portion of the thigh through the spiral spring D and cord E. The cord C is inserted into the foot and firmly secured at a point representing the anterior portion of the middle and external cuneiform bones.

F F' represent the astragalus, consisting of two plates with tube-like projections from the middle inward, which, in connection with parts hereinafter to be described, form the ankle-joint. That plate shown at F is secured to the external side of the foot, and that shown at F' is secured to the internal surface by screws or otherwise just below the external and internal maleola. One of these plates is shown in Fig. 7.

The external malleolus is represented at G, and the internal malleolus is represented at G'. These parts are shown detached in Fig. 6, and are secured to the leg by means of the bars H and H' by bolts T, as shown in Fig. 1. The bars H H' are united by the body H'', the ends of which fit into the tube-like projections on the plates F F' in which position they are secured by a screw-bolt passing through them.

The tendo Achillis is represented at K, and consists of an elastic strap of rubber cloth,

the lower end being secured to the posterior tuberosity of the os calsis, and the upper end being secured at a point, representing the lower extremity of the soleus muscle.

Anterior to and above the articulation of the ankle-joint, and at a position marked by the lower third of the extensor proprius pollicis, I insert a pulley, L, behind which the cord C passes before joining the spiral spring D. This spring D occupies a position and extent equaling about the middle third of the leg, and at its upper end is joined by the cord E.

At about an inch below the popliteal space, and lying just anterior to the gastrocnemius muscle, I place the pulley M, behind which the cord E passes, making an obtuse angle upward and forward to the position of the lower border of the patella, thence upward and uniting with the anterior portion of the thigh in the immediate region of the ligamentum patella. The strength of the spring D is such that when the thigh is placed in a horizontal position the weight of the foot and leg will flex the knee-joint to the extent shown in Figs. 1 and 2. The spring D and cords C and E consequently perform the office of the tibialis anticus, extensor longus digitorum, and rectus muscles.

The external tuberosity of the tibia is shown at N, and the internal tuberosity is shown at N'.

The body N'' is secured to the leg by means of the bars o o, which extend from the body downward upon each side of the leg, and to which they are secured by screws.

P represents the external condyle of the femur, and P' represents the internal condyle. One is shown detached in Fig. 5. They consist of a pair of plates secured to the lower portion of the thigh by screws, the articulation being upon the pin Q, which also passes through the body N'', as it does through the condyles P P'. The lower anterior portion of the thigh extends below the point of articulation of the knee-joint, as seen at R, and for the purpose of flexing the joint I introduce a steel spring, S, which is attached to the posterior superior portion of the leg, passing upward and over the articulation, and downward, as seen at S', and pressing against the inner surface of the extension R. This spring consequently per-

forms the function of the vastus internus and externus muscles.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The combination, with the knee and ankle joints, constructed as described, of the cords C and E, spiral spring D, and pulleys L

and M, arranged, attached, and operating as as and for the purpose specified.

2. The spring S, when constructed, applied, and operating as set forth.

Witnesses: ISAAC D. SMALL.

W. H. BURRIDGE,

A. W. McCLELLAND.