(No Model.) 2 Sheets—Sheet 1.

F. HONEGGER.

ARTIFICIAL LIMB.

No. 561,511. Patented June 2, 1896.

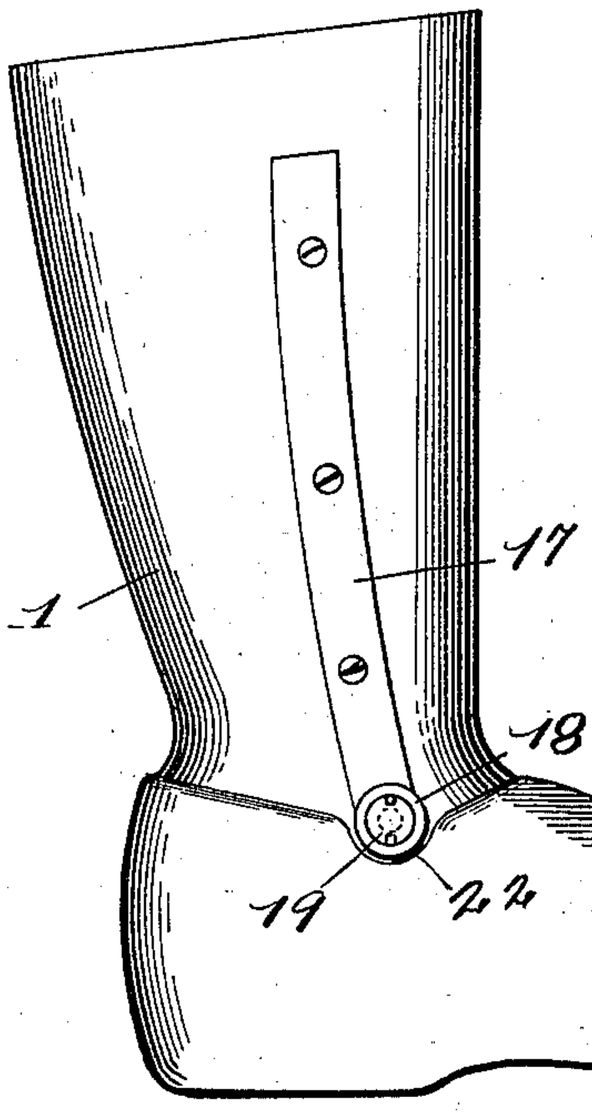

Fig. 1.

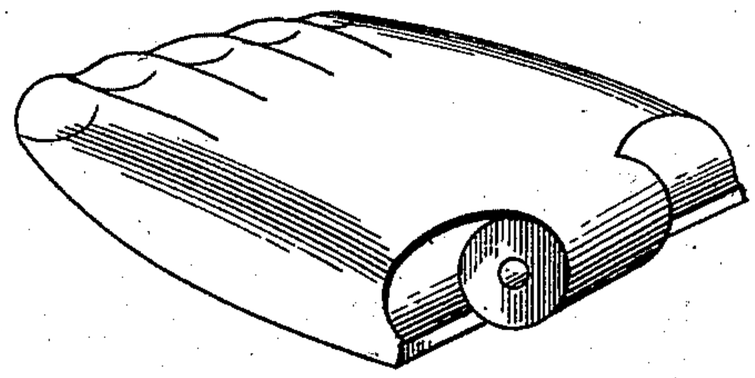

Fig. 3.

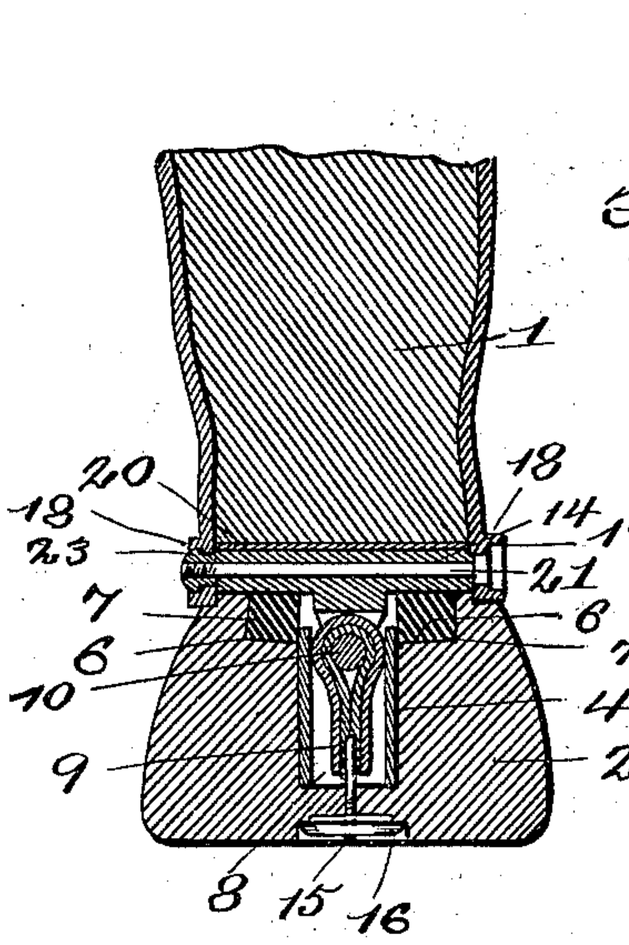

Fig. 4.

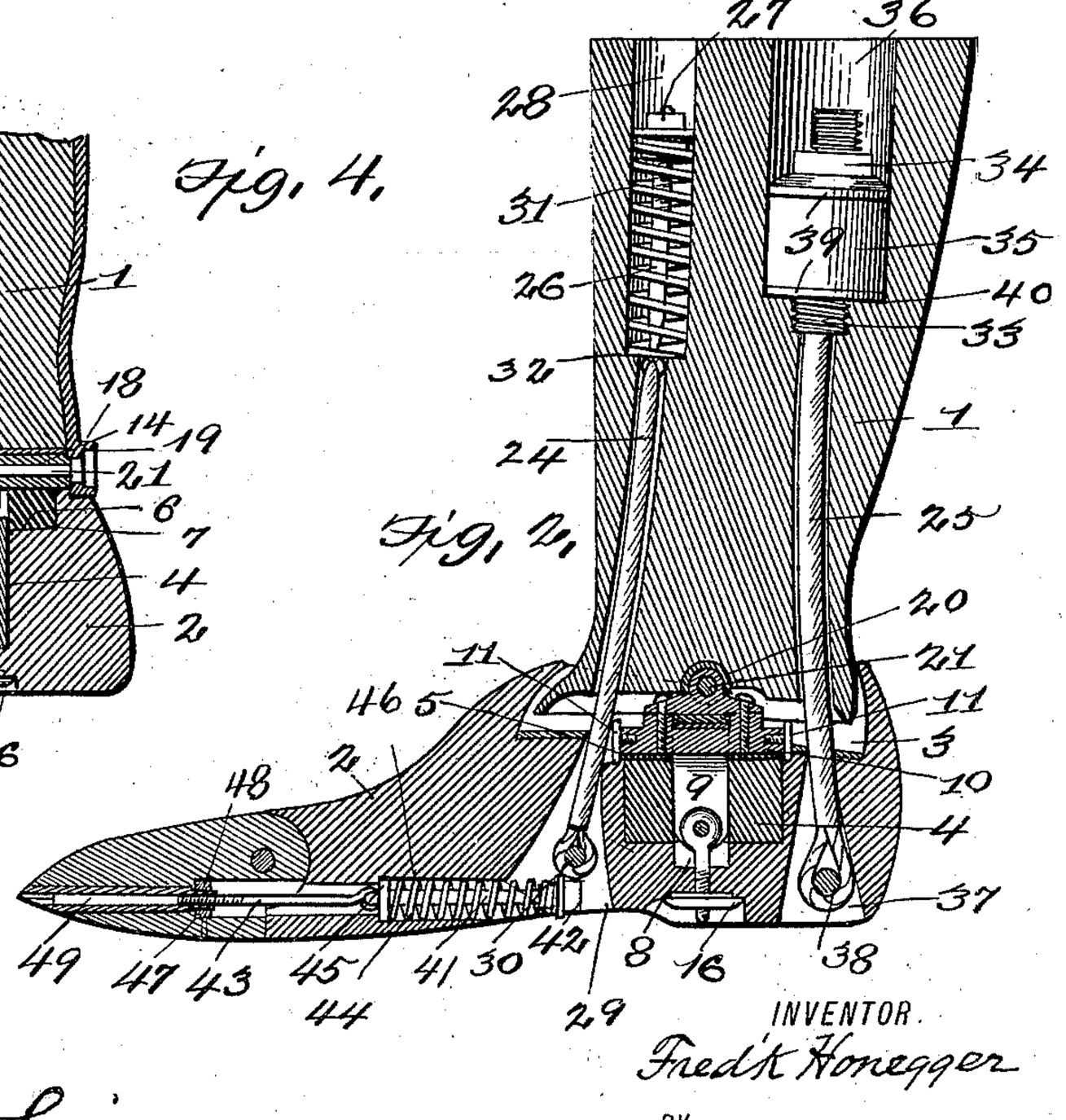

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

F. HONEGGER.

ARTIFICIAL LIMB.

No. 561,511. Patented June 2, 1896.

Fig. 5.

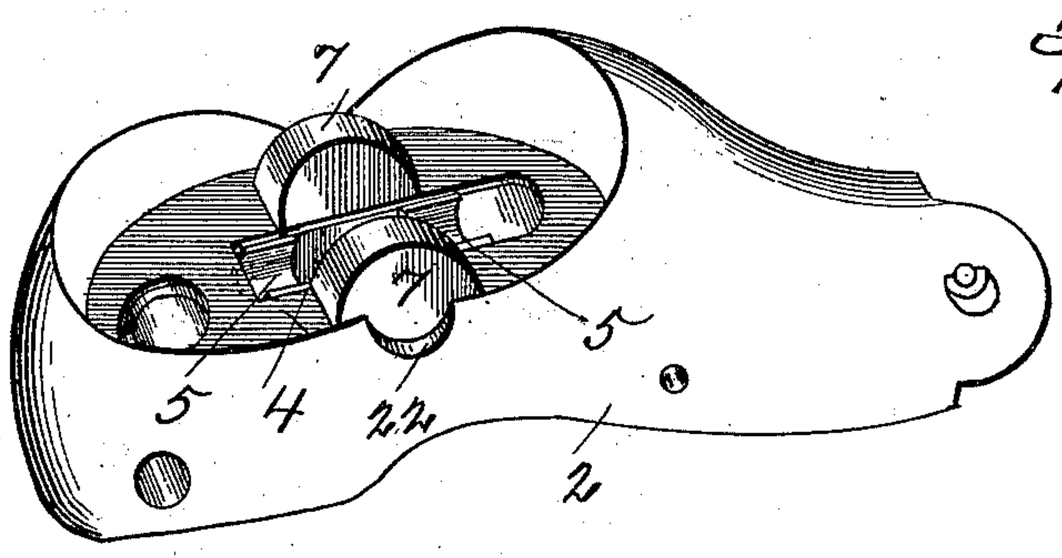


Fig. 7.

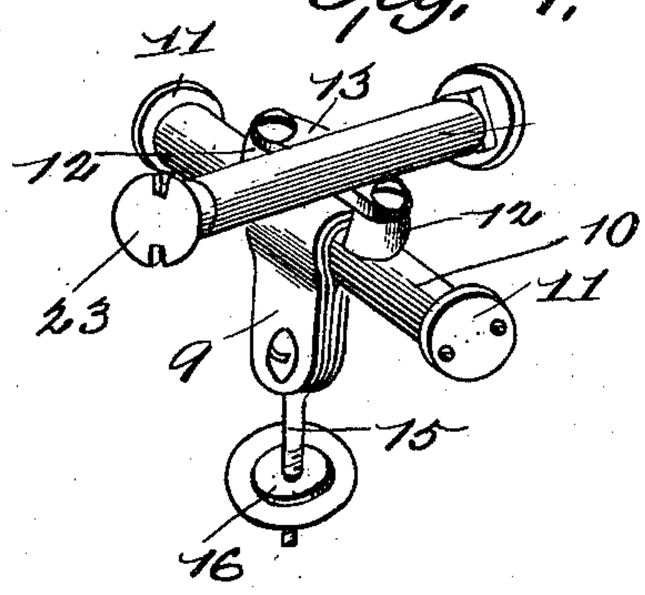
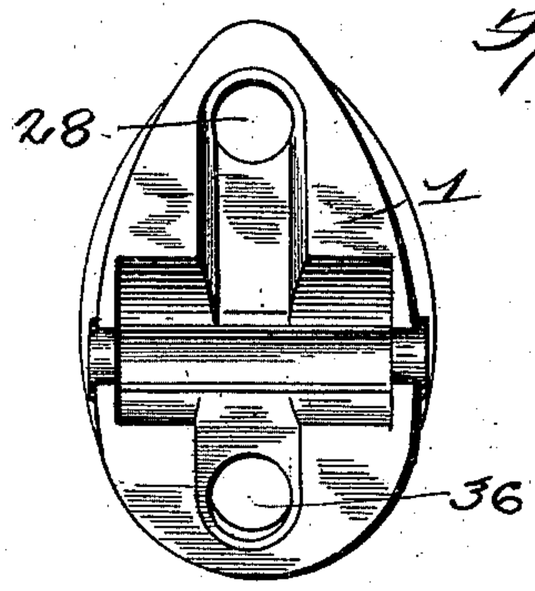


Fig. 8.



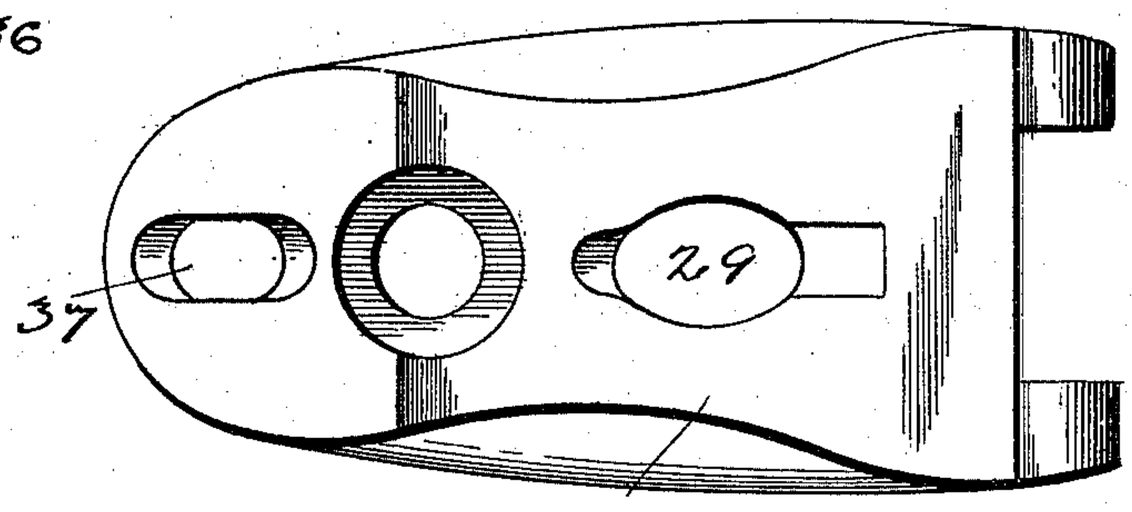


Fig. 6.

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UNITED STATES PATENT OFFICE.

FREDERICK HONEGGER, OF BALTIMORE, MARYLAND.

ARTIFICIAL LIMB.

SPECIFICATION forming part of Letters Patent No. 561,511, dated June 2, 1896.

Application filed February 8, 1896. Serial No. 578,484. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HONEGGER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Artificial Limbs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to artificial limbs; and it consists principally in certain new and useful improvements in the connections between the lower-limb and foot sections, generally called the "ankle-joint."

The invention further consists in improving the toe-joint by providing the same with means whereby an easy and springy movement is imparted to the toe-section in walking; and the invention still further consists in the combination and arrangement of the various parts, as will be hereinafter more fully described, and specifically set forth in the claims.

The principal object of the invention is to so construct the ankle-joint that an extended bearing-surface will be provided and a free and easy movement, laterally as well as longitudinally, given to the same, whereby friction will be reduced to a minimum and the parts relieved of undue strain.

Another object of the invention is to provide for a quick and ready dismembering of the several sections of the limb for lubricating purposes or for repair and the reassembling of the sections, as will be hereinafter more fully explained.

These objects are accomplished by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view in elevation of the lower-limb and foot sections; Fig. 2, a vertical longitudinal sectional view of the same; Fig. 3, a perspective view of the toe-section removed; Fig. 4, a vertical transverse sectional view taken through the ankle-joint; Fig. 5, a perspective view of the foot-section detached; Fig. 6, a bottom plan view of the same; Fig. 7, a perspective view of the ankle-joint mechanism, and Fig. 8 a bottom end view of the lower-limb section.

Referring to the several views, the numeral 1 indicates the lower-limb section, and 2 the foot-section, said sections being preferably constructed of willow wood or other suitable material. The foot-section is suitably recessed, as shown at 3, and the bottom of the rear portion of the recess is inclined to the rear in order to permit of the free rearward movement of the lower-limb section. The central portion of the bottom of the recess is cut out longitudinally to receive a block 4 of hard wood, which has its upper portion provided with a semicircular bearing 5, lined with buckskin, cemented, and seated under pressure. On each side of this bearing is located a depression 6, in which is seated a semicircular block of rubber 7, which incline slightly toward each other. The center of the bearing 5 is provided with a vertical opening 8, through which passes a clamp 9, in which is journaled a transverse rock-shaft 10, that is seated in said semicircular bearing. Each end of the transverse shaft is provided with a screw-head 11, by means of which the position of said shaft may be adjusted longitudinally.

The bearing in the clamp is suitably lined with buckskin, so as to prevent creaking in walking. The top of the rock-shaft on each side of the clamp is provided with a lug 12, and seated on said lugs and secured thereto by means of screws is a bar or plate 13, which carries a transverse tubular shaft 14, having a bearing at each end upon the rubber blocks 7. The clamp 9 is provided with a screw-threaded post 15, which receives a screw-threaded nut 16 to secure the parts firmly in their respective seats in the foot-section.

To each side of the lower-limb section is secured a strap 17, which has its lower end formed with a circular hub 18, one of which is provided with a square hole and the other with a circular hole. Each hub has its outer face formed with an annular recess 19, the purpose of which will be hereinafter explained. Between the hubs the end of the lower-limb section is provided with a transverse semicircular groove 20, which is lined with buckskin, which is first coated with cement and then forced into the recess under pressure. As thus lined, the groove forms an extended and noiseless bearing for the hollow shaft 14, and a bolt 21, passing through

the hubs and tubular shaft, unites the lower-limb and foot sections together. The end of the lower-limb section on each side of the bearing is properly recessed to conform to the circular shape of the upper portion of the rubber bearing-blocks and the bar or plate 13, as shown in Fig. 8. Each side wall of the recess of the foot-section is provided with a semicircular recess 22, adapted to receive the respective hubs 18, and the connecting-bolt has a portion of its body adjoining the head squared to fit the square hole in one of said hubs to prevent turning. The head of the bolt is circular to fit into the annular recess 19, and the end of said bolt is screw-threaded to receive a circular nut 23, which fits into the annular recess in the other hub, as shown in Fig. 4. Thus it will be seen that an additional journal-bearing is provided at each side of the extended bearing, thereby relieving the bolt of all strain.

The numeral 24 indicates the front cord or tendon, and 25 the rear cord or tendon, the body of both being composed of any suitable material, preferably of a multiplicity of small cords or threads suitably covered and protected by buckskin or other suitable material. The body of the front cord has attached to it at one end a screw-threaded rod 26, which is provided with a flanged nut 27, and the cord is adapted to pass through a counterbored hole 28 made in the lower-limb section. The lower end of the cord is formed with a loop which is passed into an opening 29 in the foot-section and secured therein by a pin 30, passing transversely through the foot-section. The rod 26 is surrounded by a coil-spring 31, which has one end seated on the shoulder 32, formed by the counterbore and the other end against the flanged nut, whereby the tension of the cord may be properly adjusted.

The body of the cord 25 has its upper end firmly secured in a thimble 33, which is externally screw-threaded for a portion of its length to receive a flanged nut 34 and a perforated rubber cushion 35, by means of which nut the tension of the cord may be properly regulated. The said cord passes down through a counterbore 36, and its lower looped end is secured in an opening 37, made through the foot-section by means of a pin 38, passing transversely through said loop and section. Leather washers 39 are placed one between the upper end of the cushion and flanged nut and one between the lower end of said cushion and the shoulder 40 of the counterbored hole. The pins 30 and 38 are firmly secured against displacement by means of screws. These cords, however, form no part of the present invention.

The toes of the foot are joined to the foot-section by means of a hinged joint, and the movable action of said toes is effected by means of a flexible cord or tendon 41, which consists of a body composed, preferably, of a multiplicity of threads and having one end firmly secured in a flanged head 42, and the other end formed with a loop which is secured in the eye formed in one end of a screw-threaded rod 43. A coil-spring 44 surrounds the body and has one end seated against the flanged head and the other end against a washer 45. The cord or tendon is confined in an opening 46, made in the bottom of the foot-section and toes with the washer abutting against a shoulder 47 and the end of the screw-threaded rod passing through a nut 48, secured in that portion of the opening passing the toes. The tension of the cord is effected by a tube 49, which has one end internally screw-threaded to receive the screw-threaded rod. The hole at the outer end of the tube is square, and by inserting therein the squared end of a key or other implement the tube can be turned to draw the rod into it, thereby compressing the spring until the desired tension is obtained, it being understood that inward movement of the tube is prevented by the rigidly-fixed nut 48. The spring, when properly tensioned, permits the toes to bend and be returned to normal or proper position in walking.

All of the parts being constructed with a view to simplicity and durability it will be seen that an inexpensive and strong limb is produced. The ankle-joint, by its peculiarly-constructed bearings, is well adapted to withstand any weight that may be placed upon it, and permits of a free and easy movement either longitudinally or laterally.

The limb is taken apart and the parts reassembled in very much the same manner as is the limb described and shown in my application hereinbefore referred to, so that further description is unnecessary.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A longitudinally and laterally movable ankle-joint for artificial limbs, comprising a rock-shaft journaled in a clamp secured to the foot-section and having end bearings in said section, a transverse tubular shaft secured to the rock-shaft and having an extended bearing in the bottom end of the lower-limb section, and a connecting-bolt passing through said tubular section and uniting said section with the foot-section in combination with the front and rear tendons, substantially as specified.

2. In an ankle-joint for artificial limbs, the combination with the lower-limb section provided with side hubs having annular recesses in their outer faces and with a transverse semicircular bearing in its bottom end, of the foot-section having a vertical clamp or post secured thereto, a rock-shaft journaled in said clamp or post and having end bearings in said foot-section, a transverse tubular shaft secured to said rock-shaft and having its upper surface seated in the semicircular bearing in the bottom end of the lower-limb section and end bearings on the rubber blocks,

and a connecting-bolt passing through the hubs and tubular shaft and having its head and confining-nut seated in the annular recess of said hubs, substantially as specified.

3. In an artificial limb, the combination with the lower-limb and foot sections, of a longitudinally and laterally movable ankle-joint secured to the respective sections and having an extended bearing each side of its center journaled lengthwise in the foot-section, and an extended bearing crosswise in the end of the lower-limb section the entire width of said limb, substantially as specified.

4. In an artificial limb, the combination with the lower-limb and foot sections, of a longitudinally and laterally movable ankle-joint consisting of a clamp or post secured to the foot-section, a rock-shaft journaled in said clamp or post and having adjusting-screws, a transverse tubular shaft secured to the rock-shaft and having end bearings on rubber blocks and a top bearing in the bottom end of the lower-limb section, and a bolt for connecting said lower-limb section to the foot-section, substantially as specified.

5. In an artificial limb, the combination with the foot-section, provided with a shouldered opening, of the toe-section hinged thereto and held in operative position by a cord or tendon consisting of a flexible body having one end secured to a flanged head and the other end provided with a screw-threaded rod, an operating-tube having its interior screw-threaded to receive the screw-threaded rod, and a fixed nut arranged to prevent the inward movement of the tube, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

FREDERICK HONEGGER.

Witnesses:
THOS. C. BAILEY,
EMANUEL WALCHER.